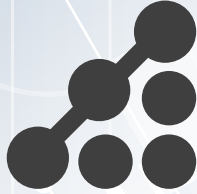




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	Online Turkish Handwriting Recognition Using Synthetic Data	146	Esma Fatma Bilgin Taşdemir	16.12.2021	15:00-15:15	9	
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	Teleklinik Siloksan Oligomerleri İçeren Poliüretan Esaslı Kaplamaların Sentezi Ve Karakterizasyonları	84	Mehmet Arif Kaya	16.12.2021	13:15-13:30	10	
	Gürültü Bariyeri İçin Çevre Dostu Alternatif: Doğal Elyaf Takvivi Kompozit Malzemeler	207	Burcu Karaca Uğural	16.12.2021	13:30-13:45	10	
	Evaluation Of Mechanical And Water Absorption Behaviours Of Corn Shell/Pumice Reinforced Epoxy Composites	125	Menderes Koyuncu	16.12.2021	13:45-14:00	10	
	Aisi 430 Çeliklerin Derin Kroyonejik İşlem Sonrası Mekanik Ve Mikroyapısal Özelliklerinin İncelenmesi	211	Serdar Şenel	16.12.2021	14:00-14:15	10	
	Gıda Tankeri İçin Aisi 304 Paslanmaz Çeliğin Tig Kaynağının İncelenmesi	134	Yunus Bertan	16.12.2021	14:15-14:30	10	
	Farklı Ph Çözeltileri Ve Donma Çözülmenin Travertenlerin Fiziko-Mekanik Özelliklerine Birlikte Etkisi	41	Engin Özdemir	16.12.2021	14:30-14:45	10	
	Diagnosis Prediction Of Construction Vehicles And Model Explainability Industry 4.0 Implementation	47	Esra Akca	16.12.2021	13:30-13:45	11	Asist. Prof. Dr. Yılmaz Kemal Yüce
Internet of Things (IoT), Cloud Computing, Software, Cyber Security Nesnelerin İnterneti; Bulut Bilişim; Yazılım; Siber Güvenlik	Hardware Design Of Single-Phase Smart Electricity Meter Based On Multiple Wireless Connectivity Technologies	73	Osman Saygın Akkaya	16.12.2021	13:45-14:00	11	
	Otomatik Geçiş Sistemleri İçin Bir Uç Veri Merkezi Modeli	218	Gülüm Cebeci	16.12.2021	14:00-14:15	11	
	Taksi Yolculuğu İçin Geliştirilmiş Mobil Uygulamalarda Süreç Modelleri: Yolcu Hakimiyeti Açısından Eksikler Ve Yeni Bir Model Önerisi	80	Ali Çoban	16.12.2021	14:15-14:30	11	
	Cabapp: Taksi Yolculuğunuzu Doğru Tasarlayın	108	Ali Çoban	16.12.2021	14:30-14:45	11	
	Kısa Metinlerin Sıkıştırılması İçin Bert Tabanlı Bir Yöntem	42	Emir Öztürk	16.12.2021	14:45-15:00	11	
	Saldırı Tespitinde Makine Öğrenmesi Yöntemlerinin Performans Analizi	16	Yasin Türkyılmaz	16.12.2021	15:00-15:15	11	
	Cyber Security Of Connected Autonomous Vehicles	106	Kürşat Çakal	16.12.2021	15:15-15:30	11	
	Phishing Attack Study To Measure Cyber Security Awareness Among Teachers In Turkey	127	Turan Çinkiliç	16.12.2021	15:30-15:45	11	
Nanotechnologies and Nanomaterials; Material Science Nanoteknoloji ve Nanomalzemeler; Malzeme Bilimi	Kenar, Sis Ve Bulut Bilişimin İot Açısından İncelenmesi	12	Muhammet Tay	16.12.2021	15:45-16:00	11	Asist. Prof. Dr. Nilay Küçükdoğan Öztürk
	The Nanostructured Cuo Films In The Different Thermal Oxidation Mediums: Production And Xrd, Uv-Vis-Nir, Fesem And Raman Investigations	52	Olca Gençyılmaz	16.12.2021	15:00-15:15	12	
	Detect And Effects Of Silicon Content In Chemical Composition Of Steel Material After The Hot Dip Galvanized Coating Process	67	Ömer Muharrem Cılız	16.12.2021	15:15-15:30	12	
	Design And Morphology Characterization Of Biopolymer Blend-Zno Nanocomposites Coated Cu-Ni-Mo-Based Steel Foam	86	Nuray Beköz Üllen	16.12.2021	15:30-15:45	12	
	Investigation Of Surface Properties Of Eggshell Based Kappa-Carrageenan-Polyvinyl Alcohol Nanobiocomposite Coated Low Alloyed Steel Foam	87	Nuray Beköz Üllen	16.12.2021	15:45-16:00	12	
	Fecon Nanokristal Toz Alaşımların Yapısal Ve Manyetik Özelliklerinin İncelenmesi	126	Telem Şimşek	16.12.2021	16:00-16:15	12	
	Optimization Of Delamination And Thrust Force In The Drilling Process Of Nanocomposites	182	Nilay Küçükdoğan Öztürk	16.12.2021	16:15-16:30	12	
	Odun Kuvars İkameli Plastik Kompozit Malzeme Özelliklerinin Araştırılması	27	Korkmaz Yıldırım	16.12.2021	16:30-16:45	12	
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	Otonom Araçların Benimsenmesi Ve Güvenlik Algılarının İncelenmesi	144	Gözde Bakioglu	16.12.2021	15:30-15:45	13	
	Remote Room Control System	74	Abdullah Bal	16.12.2021	15:45-16:00	13	
	Multi Sensor Data Fusion For Path Prediction Of Escaping From Engagement In Unmanned Aerial Vehicle Scenario	150	Enver Nurullah Gökal	16.12.2021	16:00-16:15	13	
	Burç Ve Rotil Çıkma Kuvvetlerinin Artırılması İçin Sac Kalıplama Yönteminin Geliştirilmesi	46	Melih Tuyan	16.12.2021	16:15-16:30	13	
	Raylı Sistem Taşıtlarında Ray-Teker Arası Sürtünme Yönetimi	93	Fatih Bezgin	16.12.2021	16:30-16:45	13	
	Ekf Based Model Predictive Torque Control Of Induction Motors	168	Yunus Emre Altınışık	16.12.2021	16:45-17:00	13	

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3D Printing; Mechanical Engineering 3B Yazıcı; Makine Mühendisliği	A Study On The Effects Of The Interior Architecture On The Fracture Toughness Of 3D Printed Pla Samples	9	Mirsadegh Seyedzavvar	17.12.2021	09:30-09:45	14	Lecturer Esin Tuğba Şimşek
	Comparative Investigation Of Mechanical, Thermo-Mechanical And Tribological Properties Of Commonly Used 3D Printing Materials	162	Sinan Yilmaz	17.12.2021	09:45-10:00	14	
	Investigation Of The Effect Of Protective Gas Composition On Welding Quality In Mag Welding By Tensile Test	110	Esin Tuğba Şimşek	17.12.2021	10:00-10:15	14	
	Paralel Kinematik Yapıya Dayalı 5-Dof Fdm Yazıcı Tasarımı Ve İmalatı	169	Ahmet Dumlu	17.12.2021	10:15-10:30	14	
	Designing And Manufacturing A Test Device Specific To Working Conditions Of Guiding Elements	201	Yoncagül Çelik Erez	17.12.2021	10:30-10:45	14	
	Silindirik Bükme Makinası Radyus Ölçüm Sistemi	149	Selçuk Sağır	17.12.2021	10:45-11:00	14	
	Exact Solution For The Response Of An Arbitrarily-Curved Beam	89	Lütfi Emir Sakman	17.12.2021	11:00-11:15	14	
	Silindirik Bükme Makinalarında Kolay Sac Çıkarma Sistemi	91	Yasin Mandracı	17.12.2021	11:15-11:30	14	
	Boru Kesim Lazer Makineleri İçin Şekil Algılama Sistemi	85	Özgür Gündüz	17.12.2021	11:30-11:45	14	
Production and Design; Industrial Üretim ve Tasarım; Endüstri Mühendisliği	Geri Dönüşümden Palet Üretiminde Etkin Parametrelerin Taguchi Yöntemi İle Deneysel Tespiti	102	Şevval Zümrüt	17.12.2021	09:30-09:45	15	Dr. Güllü Akkaş
	As An Alternative Photocatalytic Under Uv-A Irradiation For Food And Health Applications: Natural Melanin Nanoparticles	189	Beyza Akman	17.12.2021	09:45-10:00	15	
	Developing Innovative Uv-C Technology To Ensure High Hygiene Standards By Eliminating Bacteria And Viruses That Negatively Affect Human Health In The Tumble Dryer	177	Gizem Coşkun	17.12.2021	10:00-10:15	15	
	Acoustic Improvement Of Compressor In A Heat Pump System	202	Ejder Kağan Ük	17.12.2021	10:30-10:45	15	
	Hazır Giyim İşletmelerinde Üretim Hattında Kullanılan Online Üretim Takip Sistemleri	153	Serkan Boz	17.12.2021	10:45-11:00	15	
	Gerçek Zamanlı Mermi Kovani Kalite Kontrol Sistemi Tasarım Ve İmalatı	171	Sena Nur Karademir	17.12.2021	11:00-11:15	15	
	Polo Yaka T-Shirt Üretim Bandında Farklı Makine Türlerine Göre Genel Ekipman Verimliliğinin Hesaplanması	203	Mehmet Küçük	17.12.2021	11:15-11:30	15	
	Strength Of A Chair Renovated With Additive Production Systems And Reverse Engineering Approach	70	Güllü Akkas	17.12.2021	11:30-11:45	15	
	Fourier Dönüşümlü Kızılötesi Spektroskopisi İle Kızartma Yağlarındaki Bazı Kimyasal Değişimlerin İncelenmesi	113	Ayşe Burcu Aktaş	17.12.2021	09:30-09:45	16	Assist. Prof. Dr. Mehmet Fırat Baran
Food Engineering; Nutrition Gıda Mühendisliği; Beslenme	Production Of Structured Lipids By Chemical Interesterification Of Beef Tallow With Milk And Different Oils	114	Ayşe Burcu Aktaş	17.12.2021	09:45-10:00	16	
	Farklı Gıda Ürünlerinden İzole Edilen Laktik Asit Bakterilerinin Bazı Probiyotik Özelliklerinin Belirlenmesi	129	Harun Önlü	17.12.2021	10:00-10:15	16	
	Glutensiz Ürünlerde Kullanılan Alternatif Protein Kaynakları	133	Sevgi Deren Yağdı	17.12.2021	10:15-10:30	16	
	Geleneksellikten İnovasyona Giden Yolda Çankır, Atıştırma Gıda Üretimi: Yoka Çerezi	152	Didar Ucuncuoğlu; Esra Sarıkaya	17.12.2021	10:30-10:45	16	
	Prunus Spinosa Meyvesinden Sentezlenen Gümüş Nanopartiküllerin Karakterizasyonu Ve Bazı Gıda Patojenleri Üzerindeki Antimikrobiyal Etkilerinin Belirlenmesi	68	Mehmet Fırat Baran	17.12.2021	10:45-11:00	16	
	Alıç (Crataegus monogyna (CM)) yaprak özütünden sentezlenen altın nanopartiküllerin sentezi ve antimikrobiyal aktivitelerinin değerlendirilmesi	220	Mehmet Fırat Baran	17.12.2021	11:00-11:15	16	
	Punikalaginin Kolistin Dirençli Acinetobacter Baumannii Suşlarına Karşı Tek Başına Ve Kolistin İle Kombinasyon Halinde Antimikrobiyal Aktivitesinin Değerlendirilmesi	140	Elif Odabaş Köse	17.12.2021	11:15-11:30	16	
	Encapsulation Techniques And Controlled Release	143	Özlem Aydın	17.12.2021	11:30-11:45	16	
	Ekşi Hamur Mikroorganizmaları İle Kraker Üretimi Ve Kalite Özelliklerinin Araştırılması	180	Buse Bölükbaş	17.12.2021	11:45-12:00	16	
	Evaluation Of Seasonal Effects Of Tillage And Drainage Management Practices On Soil Physical Properties And Infiltration Characteristics In A Silt-Loam Soil	216	Rıfat Akiş	17.12.2021	12:00-12:15	16	
Textile	Buhar Fazlı Polimerizasyon Yöntemiyle Pedot Film Kaplanarak İletken Hale Getirilen Poliester Esaslı Tekstil Yüzeylerinde Flaman Sayısı Ve Örgü Yapısının Etkilerinin İncelenmesi	221	Tuğba Zengin	17.12.2021	09:45-10:00	17	R.A. Hatice Açıkgöz Tufan
	Tekstilde Sürdürülebilirlik Esaslı Yenilikçi Hammaddeler Üzerine Bir Yaklaşım	79	Korhan Şen	17.12.2021	10:00-10:15	17	
	Sustainable Eco-Friendly Yarns With Biodegradable Synthetic Fibers And Bringing These Fibers Into Short Fiber Spinning	104	Neslihan Okyay	17.12.2021	10:15-10:30	17	
	Investigation Of Physical And Liquid Performance Properties Of Feminine Hygiene Pad In Commercially Used	205	Ebru Çelikten	17.12.2021	10:30-10:45	17	
	One-Step Easy-Care And Softening Finishing Of Knitted Cotton Fabric	121	Durul Büşra Dilden	17.12.2021	10:45-11:00	17	

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	Farklı Öz Ve Sargı Liferi İçeren Özlü İpliklerden Elde Edilen Örme Kumaşların Hava Geçirgenlik Özelliklerinin İncelenmesi	204	Tuğçe Yağmur Ögüt	17.12.2021	11:15-11:30	17	
İstatistik, Matematik, AI	Classifying Surface Points Based On Developability Using Machine Learning	39	Vahide Bulut	17.12.2021	10:30-10:45	18	Assist. Prof. Dr. Vahide Bulut
	Bilgi Kuramında Shannon Entropisi Ve Uygulamaları	77	Hande Türkmençalıkoğlu	17.12.2021	10:45-11:00	18	
	Seyrek Genelleştirilmiş Ofset Polinom Eğrisinin Prony Algoritması İle Oluşturulması	118	Selcan Kocabaş	17.12.2021	11:00-11:15	18	
	A Fuzzy Multi-Criteria Decision-Making Method For Selection Of Criteria For An E-Learning Platform	179	Ömer Faruk Gürcan; Meral Güldeş	17.12.2021	11:15-11:30	18	
	Izgara Bazlı Yol Planlama İçin Matematik Tabanlı Metasezgisellerin Karşılaştırılması	128	Mustafa Yusuf Yıldırım	17.12.2021	11:30-11:45	18	
	Analysing The Purchasing Decision-Making For A Recycled Materials Used Garment By Dematel Method	191	Meral İşler	17.12.2021	11:45-12:00	18	
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	Elazığ İli İçme Beldesi Ekoturizm Potansiyelinin Değerlendirilmesi	20	Fatma Berfin Yamak	17.12.2021	13:15-13:30	19	
	Göç, Kentsel Dönüşüm Ve Devingenlik İlişkisinin Yapılmış Araştırmalar Üzerinden Okunması	164	Ceren Ağın	17.12.2021	13:30-13:45	19	
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	Türkiye'De Uzun Bisiklet Parkurlarının Bisiklet Kullanımına Etkisinin İncelenmesi	175	Seda Cabiroğlu	17.12.2021	14:30-14:45	19	
	İlman-Nemli İklim Bölgelerinde Kentsel Alanlarda Biyoklimatik Konfor	170	Aybüke Özge Boz Demir	17.12.2021	14:45-15:00	19	
	Gümüşhane Rum Erkek Okulu'Nun Sanat Tarihi Ve Tasarımı Açısından Değerlendirilmesi	174	Nurgül Şentürk	17.12.2021	15:00-15:15	19	
	Teaching, Learning, Planning And Design During Pre-Pandemic And Pandemic Periods: An Urban Planning Studio Experience	25	Emel Karakaya Ayalp; Sevim Pelin Öztürk	17.12.2021	15:15-15:30	19	
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	Deep Learning Based Garbage Detection For Autonomous Garbage Collection Vehicles	61	Dilara Karaca	17.12.2021	14:15-14:30	20	
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	Product Recommendation System Based On Artificial Intelligence	76	Şahin Batmaz, Oğuzhan Karahan	17.12.2021	14:45-15:00	20	
	Konuşmadan Duygu Tanıma Üzerine Detaylı Bir İnceleme: Özellikler Ve Sınıflandırma Metodları	109	Emel Çolakoğlu	17.12.2021	15:00-15:15	20	
	Designing An Information Framework For Semantic Search	141	Burak Parlak	17.12.2021	15:15-15:30	20	
	A Study On Cnn Based Transfer Learning For Recognition Of Flower Species	193	Ferhat Bozkurt	17.12.2021	15:30-15:45	20	
	Anfıs İle İlgili Yapılmış Çalışmaların İçerik Analizi İle Değerlendirilmesi: Tr Dizin	78	Mesut Polatgil	17.12.2021	15:45-16:00	20	
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	Patolojik Dinlenme Tremorlerinin Kompleks Düzlemde Adaptif Tahmini	72	Buket Çolak Güvence	17.12.2021	14:45-15:00	21	
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	Analysis Of The Biomechanical Behavior Of The Intervertebral Discs By Modeling Three-Phase Finite Elements	148	Hamid Zamanlou	17.12.2021	15:15-15:30	21	
	Karaciğerde Detoksifikasyon	214	Fatma Gönül Sezgin	17.12.2021	15:30-15:45	21	
	Rehabilitation Of Stray Dogs And Viral Infection Prophylaxis In Osmaniye Province	192	Bilge Kaan Tekelioğlu	17.12.2021	15:45-16:00	21	
	Etiological Investigation Of Paralysis And Mortality In Chicken, Turkey And Duck Chicks In A Free-Range Poultry Farm	107	Bilge Kaan Tekelioğlu	17.12.2021	16:00-16:15	21	
	Development And Validation Of Rp-Hplc Method For The Quantification Of Fexofenadine In Pharmaceutical Preparations	49	İbrahim Bulduk	17.12.2021	16:15-16:30	21	
	Stenoz Oluşmuş Y-Şeklinde Bir Damarın Akışkan-Katı Etkileşiminin Openfoam İle Analizi	196	Murad Kucur	17.12.2021	16:30-16:45	21	

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EEM Haberleşme	Circularly Polarized Inverted-F Antenna With A Circular Stub For Short Range Wireless Networks	105	Husnu Yalduz	17.12.2021	14:30-14:45	22	Assist. Prof. Dr. Asuman Savaşçıhabes
	Power Analysis For Indoor Visible Light Communication Channels	112	Asuman Savaşçıhabes	17.12.2021	14:45-15:00	22	
	Çeyrek Daire Yarıklı Mikroserit Yama Antenin Yapay Sinir Ağları İle Rezonans Frekansının Belirlenmesi	156	Muhammed Can Bayram	17.12.2021	15:00-15:15	22	
	Lazer Tabanlı Hava Hızı Ölçüm Yöntemlerinin Araştırılması	62	Atıf Kerem Şanlı	17.12.2021	15:15-15:30	22	
	Designing Wideband Microstrip Reflectarrays For 10 Ghz	64	Mohammed Alhennawi	17.12.2021	15:30-15:45	22	
	A Practical Implementation Of A Low-Cost 6-Dof Imu By Kalman Algorithm	26	Mustafa Emre Aydemir	17.12.2021	15:45-16:00	22	
	Kimyasal Kuplajlı İzhikevich Nöron Modelinin Lyapunov Kontrol Metodu İle Senkronizasyonu	154	Zühra Karaca	17.12.2021	16:00-16:15	22	
	Applications Of The Carathéodory'S Inequality For Driving Point Impedance Functions	71	Timur Düzenli	17.12.2021	16:15-16:30	22	
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	Alüminyum Balpeteği Soğurucu Yüzeye Sahip Bir Güneş Hava Kollektörünün Had Analizi	124	Sharif Eyyublu	17.12.2021	16:00-16:15	23	
	Comparative Analysis Of Different Photovoltaic Simulation Softwares: Case Study On Analyzing The Performance Of A 5.1 Kwp Grid Connected Photovoltaic System	167	Feten Limem	17.12.2021	16:15-16:30	23	
	Comparison Of The Performance Of Photovoltaic Power Plants At Different Angles For Different Roof Types	209	Muhammet Raşit Sancar	17.12.2021	16:30-16:45	23	
	İndiyum Oksit Nanoyapılarının Elektrokimyasal Sentezi Ve İndiyum Oksit/Kadmiyum Sülfür Kuantum Nokta Duyarlı Güneş Pillerinin Tasarımı	139	Emir Çepni	17.12.2021	16:45-17:00	23	
	A Literature Review On Extraction Of Potable Water From Atmospheric Air Using Solar Stills: Recent Developments	213	Merdin Danışmaz	17.12.2021	17:10-17:15	23	
Social Science & Design and Education	The Impact Of Service Export On Economic Growth: A Sample Of Brics Countries	210	Eyüp Emre Uluğ	18.12.2021	09:45-10:00	24	Assist. Prof. Dr. A. Selçuk Köylüoğlu
	The Effect Of Big Five Personality Traits And Self-Efficacy On The Acceptance And Spread Of Fake News In Social Media	215	Sinem Sargın	18.12.2021	10:00-10:15	24	
	The Mediating Role Of Neuromarketing In The Effect Of Advertising On Consumption Psychology	90	A. Selçuk Köylüoğlu	18.12.2021	10:15-10:30	24	
	Possible Impacts Of Covid-19 On Foreign Communities In Turkey	51	Hikmet Iskender	18.12.2021	10:30-10:45	24	
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Teaching, Learning, Planning and Design during pre-pandemic and pandemic periods: an Urban Planning Studio Experience

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Abstract

Over the last decade, there have been attempts for online virtual education. Urban planning and design courses and studio education are no exception to this, but the design studio pedagogy literature argues that online design studios will not be available to replace the traditional studio in the future. The problem of the adoption and adaptation to online studio education both for educators and learners had to suddenly be experienced during COVID-19 lockdown in Turkey in 2020.

This article examines the second-year urban planning studio experiences at İzmir Democracy University, Department of City and Regional Planning in 2020. Teaching and learning urban planning along pre-pandemic times and during lockdowns with online distance education, this article presents problems, potentials and seeking ways for a participatory group work learning experience design in distant online urban planning and design studio education. We, in this paper, aim at contributing to ongoing research of changes in applied courses during pandemics. In this respect, second grade urban planning and design studio, of which fall semester was completed face to face while the 9 weeks out of 14 weeks of spring semester handled online, is presented as a case study. Therefore, two semesters of experience provide a comparison for evaluation. The results of the research show that besides advantages of online education for self-learning and benefits of technology, studio education requires a face to face and interactive learning platform such as peer-learning by its nature.

Anahtar Kelimeler: Online studio learning, virtual applied education, COVID-19 lockdown, urban planning and design education

Pandemi öncesi dönemde ve pandemi döneminde öğrenmek, öğretmek, planlamak ve tasarlamak: Bir kentsel planlama stüdyosu deneyimi

Öz

Geçtiğimiz on yılda çevrimiçi sanal eğitim ile ilgili çeşitli girişimler ortaya çıkmıştır. Kent planlama ve tasarım stüdyo eğitimi de bu girişimler açısından istisna değildir, ancak tasarım stüdyolarının pedagojisine dönük yazına göre çevrimiçi tasarım stüdyoları gelecekte geleneksel stüdyo eğitiminin yerini almaya uygun değildir. 2020 yılında Türkiye’de COVID-19 kapanması döneminde çevrimiçi stüdyo eğitimini benimseme ve adapte olma süreci hem öğrenciler hem de eğitimciler için aniden deneyimlenmek zorunda kalınan bir süreç olmuştur.

Bu makale, İzmir Demokrasi Üniversitesi Şehir ve Bölge Planlama Bölümü’nde ikinci sınıf kent planlama stüdyosunun 2020 yılı deneyimini incelemektedir. Pandemi öncesi ve pandemi ile kapanma döneminde kent planlamayı öğrenmek ve öğretmek deneyimine referansla, bu makale uzaktan çevrimiçi kent planlama ve tasarım stüdyosu eğitimindeki sorunları ve olanakları ortaya koymakta ve katılımcı grup çalışması ile öğrenme deneyimini tasarlayanın yollarını aramaktadır. Bu çalışma ile, pandemi sürecinde uygulamalı derslerdeki değişimlerle ilgili süregiden araştırmalara katkı vermeyi amaçlamaktayız. Bu açıdan, güz dönemi yüz yüze, bahar döneminin de 14 haftasının 9 haftası çevrimiçi biçimde gerçekleştirilmiş olan ikinci sınıf kent planlama ve tasarım stüdyosu bir vaka olarak sunulmaktadır. Böylece iki farklı eğitim-öğretim dönemindeki deneyim bir karşılaştırma olanağı sunmaktadır. Çalışmanın sonuçları göstermektedir ki, çevrimiçi eğitimin bireysel öğrenme ve teknolojiye dönük faydaları olmakla beraber stüdyo eğitimi doğası gereği akran etkileşimi ile öğrenmek gibi yüz yüze ve etkileşimli bir platform gerektirmektedir.

Keywords: Çevrimiçi stüdyo eğitimi, sanal uygulamalı eğitim, COVID-19 kapanması, kentsel planlama ve tasarım eğitimi.

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1. Introduction

The coronavirus disease outbreak critically affected applied education including urban planning and design education in both education pedagogy and content of education. First emerged in 2019, COVID-19 disease caused a transition in the education all over the World. From a fully face to face education, students and academics had to adapt virtual education. Urban planning and design curriculums, which are almost fully design for face-to-face education, had been questioned and such a fast transition from face-to-face education to online education brought about potentials, problems, challenges and development of new techniques. This article examines the second-year urban planning studio experiences at İzmir Democracy University, Department of City and Regional Planning in 2020, during a pre-pandemic period followed by pandemic period and lockdowns. Teaching and learning urban planning along pre-pandemic times and during lockdowns with online distance education, this article presents problems, potentials and seeking ways for a participatory group work learning experience design in distant online urban planning and design studio education. We, in this paper, aim at contributing to ongoing research of changes in applied courses during pandemics. In this respect, second grade urban planning and design studio, of which fall semester was completed face to face while the 9 weeks out of 14 weeks of spring semester handled online, is presented as a case study. Therefore, two semesters of experience provide a comparison for evaluation. The results of the research show that besides advantages of online education for self-learning and benefits of technology, studio education requires a face to face and interactive learning platform such as peer-learning by its nature. Additionally, attempt for a fully online virtual studio education bring the results of limited knowledge of each other's settings (Duarte et al., 1999).

Although COVID-19 crises are new, the discussions for urban planning and design curriculums' traditional and "non-resilient" form have been criticized before the pandemics. Indeed, over the last decade, there have been attempts for online virtual education. Urban planning and design courses and studio education are no exception to this, but the design studio pedagogy literature argues that online design studios will not be available to replace the traditional studio in the future. The attempts for virtual education of studio lectures in urban planning can be identified as workshop or task-based works such as test of online games designed for urban space, invitation of lecturers to one-time online lectures or online-based information sharing with different urban planning schools. However, until the pandemics, attempts and cases mostly remained singular or have low proliferation effect. For instance, according to Hollander and Thomas (2009), *Second Life*, which was one of the newest computer games based on the simultaneous use of virtual three-dimensional space by millions of users throughout the globe, could be a useful tool for studio teaching. However, we don't see much about the game and its use in urban planning education at the last decade. Similarly, *SimCity* game as a pedagogical tool has been researched in studio education (Gaber, 2007), but did not create a significant effect since mid 2000s.

The studio education has a central and most critical position in urban planning education and in contemporary design pedagogy. Having a long history in urban planning education, studio originally took an apprenticeship 'design on the job' approach (Dalton, 2001). Although all spatial sciences disciplines have similar studio pedagogies, urban planning studios tend more

often to group work and encompass live projects carried out in the community (Forsyth et al., 2000) and emphasize process as a professional skill in addition to design skills (Higgins, Aitken-Rose and Dixon, 2009). In this respect, urban planning and design studio students make in-depth spatial research and analysis before starting to "planning and design process". In other words, students are expected to have full knowledge of a place chosen as subject matter or the case of the studio before they start decision making, spatial arrangement, and process design phases. In order to have full knowledge of a settlement, peer learning, task sharing, group work and "live" research have noteworthy importance. Moreover, urban planning and design studios are collaborative learning spaces and the character of the result of this process is highly determined by intensive group members and peers as a simulation of real life to test ground for theoretical knowledge in practice (Kristiánová and Joklová, 2017).

The context of the studio education in urban planning as briefly discussed above has been criticized especially at the last decade for having some trajectories related with its historical background. Firstly, a typical design orientation is connected with its origins in architectural studio education when planners had the role of being artists of grand spaces (Balsas, 2012). Secondly, the final product of urban planning studio is a plan that is perceived as cure for all problems of a certain geographical area (Balsas, 2012). Revisiting urban planning theory, comprehensive urban planning methodologies are subject of criticism for top-down, long lasting, never really been effective and not providing a guide for decision makers (Faludi, 1973).

With respect to problems akin to design education, implicit and embedded in urban planning studio education and in the lights of critiques for these problems, pandemic process caused a dramatically fast transition for urban planning studio education in 2020 in Turkey. The problem of the adoption and adaptation to online studio education both for educators and learners had to suddenly be experienced during COVID-19 lockdown. In Turkey, universities announced to continue their education online during March-April 2020. On March 13, 2020, Higher Council of Education in Turkey, asked all universities technical infrastructure and staff conditions for their online education and released results by making a statement to the press on March 18, 2020. After the release, universities decided on synchronical or asynchronical online education during 2020-2021 spring semester (URL-1). Following press release, İzmir Democracy University, which is a state-owned university founded in 2016, announced the senatus consultum for online virtual education. During the process, the first decision of the senatus was to make "theoretical part of the studio lectures" as online and go on with face-to-face education in the following period which was planned to start on March 22, 2020. However, a second senatus consultum announced for fully online education during the semester. Thus, the syllabus and design of education in studio which is prepared for a face-to-face manner had to be applied to a virtual online class with same students.

2. Material and Method

The case of this research, which is second grade urban planning and design studio at İzmir Democracy University, Department of City and Regional Planning is composed of three lecturers/educators with 41 students. The language of education is in Turkish and study area was selected as İzmir, Selçuk district during both fall semester and spring semester. The method used in this study is comparative case study evaluating learning outcomes of same student group during pre-pandemic period and

2.1. Design of the 2019-2020 Second Grade Urban Planning Studio

- First grade studios have the aim of giving basic design, creativity, and abstract thinking capability
- Second grade studios target students to make analysis, site studies and survey, combine fundamentals of urban planning (such as demographic forecasting, designing development areas and land use planning) and basic design, utopic thinking, conceptualization, abstraction and bringing “idea” as a vision in real space
- Third grade studios have the role of teaching students the development plan practice in relation to legal and administrative perspective in Turkey
- Fourt grade studios’ objectives are to give abilities of advanced analysis, having ability for development in regional scale, being able to make all scales of urban plans for a metropolitan city and developing conceptual plans in chosen specification areas.

- The scale of the site should be proper for students that only have studied basic design studio and the population size and urban size of the settlement should not be “big scale”
- The site needs to have some problems, potentials, and conflicts
- The site should have relations with several sectors such as tourism, agriculture, industry and needs relations with some conservation areas and natural assets

With the collaboration of colleagues, Selçuk town was selected as study area during both fall semester and spring semester. The town of Selçuk is located in the southern part of İzmir, as a district of metropolitan İzmir, in Aegean Region. Located in Küçük Menderes Basin, it has a 25.960 total population of which approximately 28000 is urban. The district is 75th of 872 districts in Turkey according to socio-economic development range. Well known Ephesus ancient city and Şirince conservationsite are located within the borders of the district. The district is known with its archeological, natural, agricultural and cultural assets as well as its unique character with fragile ecosystems, conservation sites, historical background and migrant population rooted Balkans. Therefore, the conflict management for settlement is multi-dimensional, multi-scalar and multi-sectoral.



Figure 1. A view from Selçuk and important locations (Retrieved from Virtual Tour at Official Website of Selçuk Municipality, URL-2)

2.1.1. Studio Programme and Method

The studio is designed to present different approaches, techniques and instruments for planning a settlement in different planning scales. The data gathering, data organization and analysis, planning concepts and theories, decision making and implementing decisions, form and structure of urban settlements, conceptualization and graphical abstraction, planning processes and design criterion are determined as primary discussion topics of the studio. Therefore, the studio process is composed of three pillars;

1. Understanding (understanding “place”): data gathering, observation, analysis and synthesis, “genius loci”
2. Thinking Future (Envisagement of Future and envisagement of space): scenario building, vision, strategies, process, actions and projections
3. Form and Function (Union of macroform and function): Planning Selçuk settlement, designing urban macroform, designing vision, strategies and actions in real space

To realize these three pillars, site survey, invited speakers from different disciplines and from different professions, discussions and “critiques” are some of the actions. The work primarily depends on group work and task sharing that each student is expected to take active role in personal tasks and group tasks.

To create a collaborative, solidarity and participant studio habitat, students are directed to take active roles in background of studio works. More clearly, the education Programme was designed in a “voice and idea sharing” manner and all tasks were shared between both educators and students. Moreover, juries which are oral examinations in a studio education, sketch exams and practicing workshops are organized for steps of the Programme.

3. The Studio Process

As the studio started face-to-face, went on during 2019-2020 fall semester, started face-to-face at spring semester and continued virtual after the 5th week out of 14 weeks of lecture education, we firstly represent the processes of two semester separately in this part. The participation and volunterism in the studio habitat evolved through task sharing and DIY (Do It Yourself) Strategy.

3.1. Fall Semester: Face-to-face Experience of First Urban Plannign Studio

The fall semester work programme could realize the targets which were put at the beginning of the semester. As it can be seen in Table 1, the work programme succeeded in two of three pillars

which are “understanding” and “thinking future”. Students did so by producing analysis in detailed, reaching a synthesis and making scenario building and strategic plan preparation. Form and Function, which is the last pillar of the two-semester studio work programme was allocated as the task of spring semester.

Table 1. Program of Studio, 2019-2020 Fall Semester

WEEK	CONTECT
1	Introduction to course and <i>Practice 1: Selçuk</i>
	Forming Analysis Groups
2	Data gathering and organizing, critiques, discussion for the context of draft analysis reports, Delivery of Practice 1
3	Data gathering and organizing, critiques, preparation of reports and analysis map sheets
4	Selçuk Site Visit and Site Survey
5	Invited Speaker: Küçük Menderes Basin and Selçuk
	Data gathering and organizing, critiques, preparation of reports and analysis map sheets
6	Mid-Jury I: Final Presentation of Analysis studies and reports
7	Fundamentals of Planning: Vision, strategy, action, scenario building, SWOT, PEST, housing sectors, recreation and so on)
	Writing Urban Senarios
8	Critiques, Invited Speaker: Ephesus Ancient City
9	Strategic Plan and Draft Report, Invited Speaker: Planning and Zoning in a zero-growth town
10	Mid-Jury II: Synthesis, Vision, Strategies, SWOT, PEST and Strategic Plan
11	Revision of Strategic Plan
12	Revision of Strategic Plan, Invited Speaker: Selçuk in History
13	Mid-Jury III: Synthesis, Vision, Strategies, and Strategic Plan and Plan Report
14	Revisions and Critiques
15	Final Jury

Figure 1. Poster for the City and Trees by Ayşegül Yarış and Zeynep Seven (Personal Archive of Emel KARAKAYA AYALP)



The semester started with “Practice 1” which asked students to choose a concept, problem, phenomenon, or topic and evaluate it in the context of Selçuk. A list of issues was given to students and they were let free to choose. Results were very satisfactory that the first research experience brought about very creative results (Figure 1).

The outputs of the fall semester studio were basically pointing out a totally learning and discovering semester for students. As students identified, it was the (semester and) year that they discovered what urban planning is and they established a bond with their prospective profession. The semester was the turning point for firsts as group work, data gathering, new techniques, visualization and a managing a whole city’s urban planning process.

According to students, all these phases could only and only be possible by face-to-face critiques. Whenever students could not go forward or solve a problem the critiques could make further step possible.

The understanding phase encompass data gathering, data processing and discovering “genius loci”. In this respect, the site visit and previous search had great importance. Before site visit, students are expected to communicate and gather information from several sources including official statistics, public institutions’ studies and raw data, municipal works, civil society research and so on. To succeed a comprehensive analysis of the city of Selçuk, we, as studio coordinators, designed a task sharing scheme and collaborated it with students. The final task results were as shown in Table 2.

Table 2. Analysis groups for Selçuk Studio, 2019-2020 Academic Year

Number of Students Responsible for Topic	Topics for Selçuk
2	Location and Identity
5	Spatial formation process and Urban History
5	Planning History and Morphology
5	Physical Structure, Natural and Environmental Sources
5	Population, demography, and socio-economic structure
5	Economic structure
5	Spatial structure
4	Infrastructure and Transportation
5	Conservation Sites and Basin

The site survey was held for 5 days. The site visit included visits to villages and rural areas. Students collected data and information from institutions such as Selçuk Municipality, local representatives of public institutions, chambers, Ephesus Excavation House and made in depth interviews with key actors. With the data collected from site and from previous research, the first group works were started.

Figure 2. A view from meeting in Gökçealan Village and Havutçulu Village (respectively), Selçuk (Personal Archive of Emel KARAKAYA AYALP)

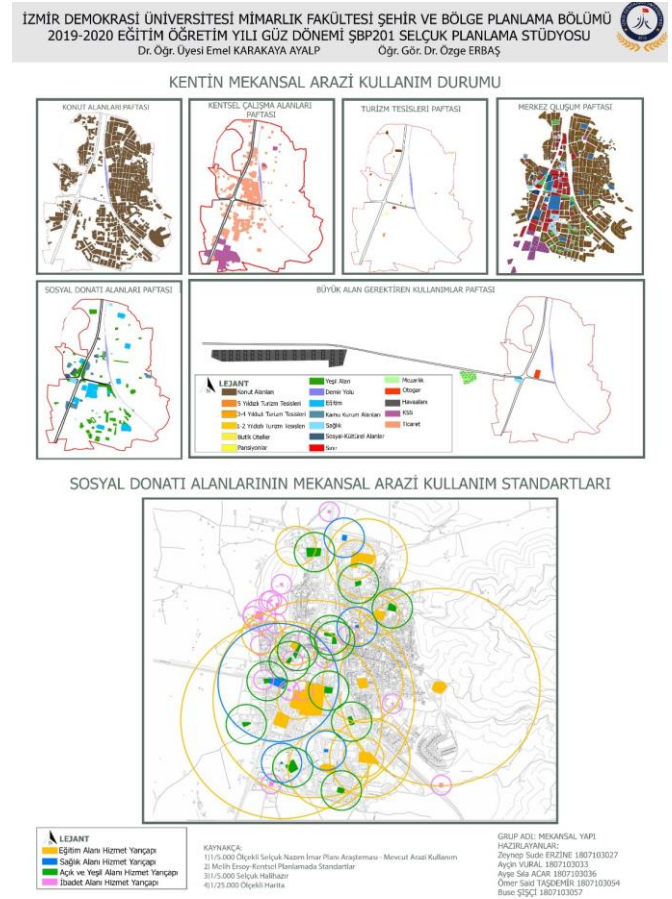


The first group work was experienced by analysis phase and students were given “a list of musts” for all topics. However, the results were more than the list that groups could create a synergy by brainstorming to develop new ideas and use new techniques in analysis phase. Figure 3 shows the land use of the settlement and students were asked to evaluate accessibility to social reinforcement areas such as schools, health institutions and green areas and revealed inadequacies in the different parts of the city. The technique was developed as an idea by students and developed in a participatory manner during critiques and panel discussions sessions with instructors. This process paved students the ways of self learning and peer learning.

The strategy of DIY worked very properly during studio process. The practices of students ranged from making handmade boards to present their studio works to editing analysis books. DIY practice let all students to work with the other one and with each other. There also occurred an unexpected result. For DIY jobs

and for all other studio jobs, students started to control and audit each other in a responsibility manner.

Figure 3. Land Use and Distribution of Social Enforcement Areas According to International Walking Distance Standards by Spatial Structure work group: Zeynep Sude Erzine, Ayşe Sıla Acar, Ayçin Vural, Ömer Said Taşdemir and Buse Şişçi (Personal Archive of Emel KARAKAYA AYALP)



After analysis studies were completed, students were asked to form new working groups that at least had representatives from 2 or 3 different analysis groups. Through this strategy, different specified information could properly be used in urban planning studies. Also, the analysis report book which was edited by a group of students became very useful as a handbook during urban planning studies and to build scenarios for the future of Selçuk.

As can be seen in Figure 4, scenarios for future of Selçuk was built on analysis and synthesis. The visions developed primarily focused on assets and conflicts of the city.

The last and final group work was for 1/100000 and 1/25000 scale strategic plans. After the processes of scenario building and vision building, students developed spatial and sectoral decisions in real space by using the hierarchy of vision-strategy-action. It can be seen in Figure 5 that students succeeded in narrowing down the analysis and synthesis and presenting the relation of these with visions and strategies developed for strategic plan. The vision presented in figure 5 is “ecologic and innovative city” in which both urban and rural areas are integrated within ecology and innovation basis through strategies and actions developed for settlements. The project’s genuine idea was to establish a web of ecological and/or innovative spatial transition either in urban or in a rural area.

Figure 4. Urban Scenarios, Analysis, Synthesis, Vision and Strategies by Aslı Canbalaban, Ayşegül Yarış, Ayçin Vural, Dila

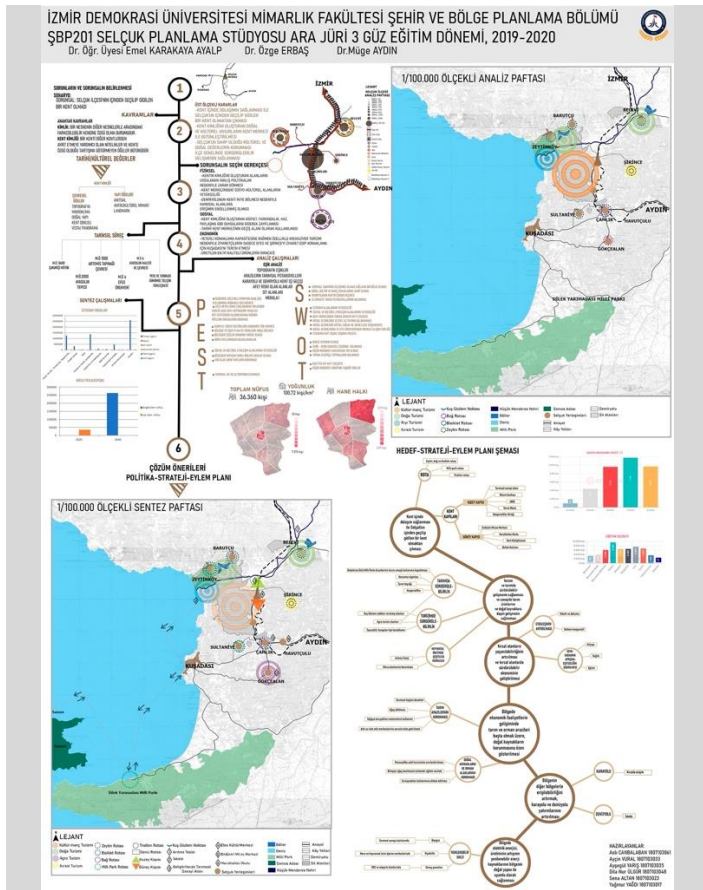
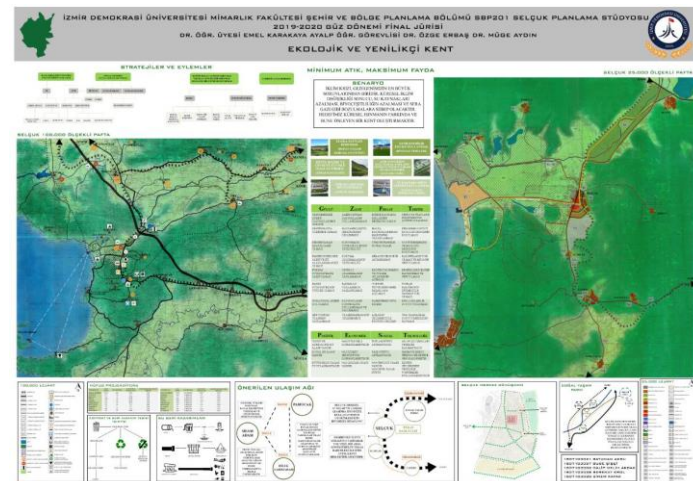


Figure 5. Vision, strategies, actions and strategic spatial plans in Selçuk by Batuhan Aksu, Buse Şişçi, Galip Melih Akbak, Serenay Erol and Sinem Kavak (Personal Archive of Emel KARAKAYA AYALP)



3.2. Spring Semester: Going on with online possibilities for an applied Bachelor programme

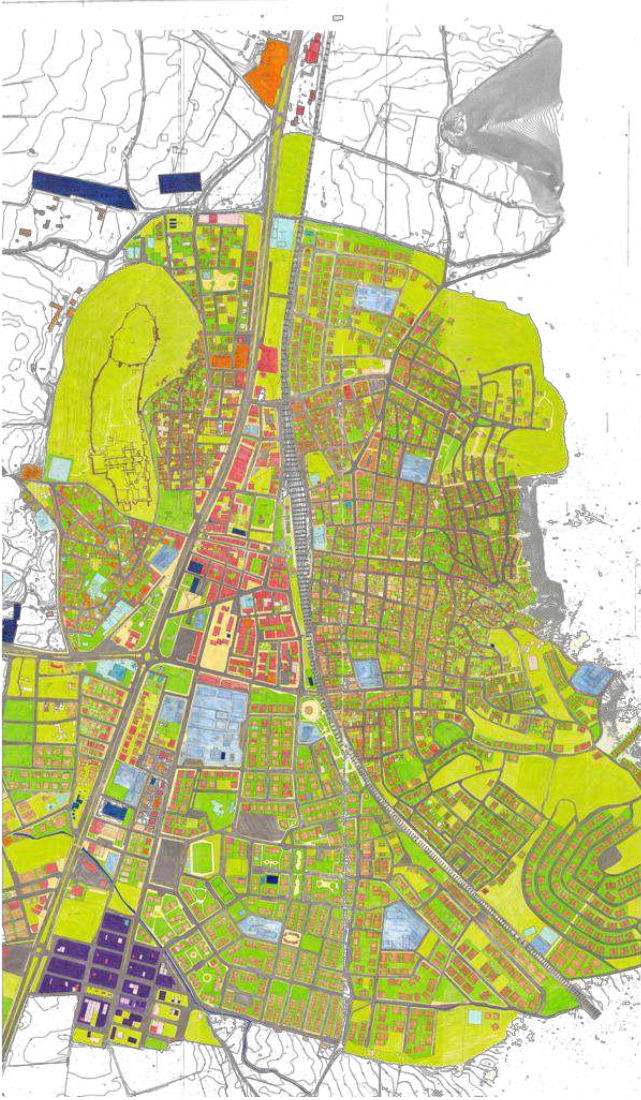
Spring Semester also started face-to-face and went along first 5 weeks. In the sixth week, students were informed to continue education online. This rapid change also affected accommodation location of students because of discharge of dormitories. This sudden change caused students and instructors to experience a new situation and hindered studio schedule which is presented in Table 3.

Table 3. Program of Studio, 2019-2020 Spring Semester

WEEK	CONTECT
1	Introduction to course and <i>Practice 1</i> : Revision of 1/100000 and 1/25000 scale plans Formation of site work groups for questionnaires and land use studies
2	Delivery of Practice 1 and Panel Discussions, Preparation for site visit and 1/5000 scale structure plan
3	Structure Plan Studies fro 1/5000 scale
4	Selçuk Site Visit and Site Survey
5	Visualization of data gathered from site survey, landuse in 1/5000 scale, digitization of questionnaires
6	Mid-Jury I: Structure plan, macroform design, design of urban transport an infrastructure system, urban intervention areas and intervention types-DRAFT SKETCHES
7	landuse in 1/5000 scale, digitization of questionnaires, Revisions for structure plan
8	Critiques
9	Mid-Jury II: Analysis: land use, data gathered from site and results of questionnaires 1/ 5000 scale Structure Plan
10	Determination of 1/1000 scale urban design project areas, revision of structure plan
11	1/1000 scale urban design projects, revision of structure plan
12	1/1000 scale urban design projects
13	Mid-Jury III: 1/1000 scale urban design projects
14	Revisions and Critiques
14+	Revisions and Critiques

However, the site visit could be completed, and students could produce “land use” collectively. As spring term site visit let students to individually make land use study and make questionnaires, they could experience self site survey and could combine their personal surveys to reveal a total profile of the city. So, 5th week of spring semester was the last time students came together and combined land use as can be seen in figure 6.

Figure 6. Land use of Selçuk in 2019, surveyed and prepared by students collectively (Personal Archive of Emel KARAKAYA AYALP)



projects on online platform and drawing material of the online education platforms were totally insufficient. Instructors tried to print student projects and draw on the projects to resend student groups, but the need for plotter for A0 size projects did not allow such a critique technique. At the 12th week, students stated that they demand to see examples of expectations. This demand was fulfilled by the instructors by making a presentation of different “successful” structure plans. However, giving examples and not being able to develop student projects together in face-to-face environment caused repetition of the projects and limited imagination of students.

Against all the odds, the distance covered in the studio was essential. Students started their structure plans by covering existing land use and developed it to redesigning urban form, develop urban revitalization, urban rehabilitation and urban conservation models for urban fabric, developing brownfield projects, redesigning urban transport system with ecological and innovative solutions. As it can be seen in Figure 7, students’ tendency while designing urban form was to make incremental interventions and finding incremental solutions to problems. However, at the end of the semester they could develop more comprehensive solutions combining their previous works and decisions taken for Selçuk by their projects in the previous semester.

Figure 7. 6th week Structure Plan by Sinem Kavak, Serenay Erol and Buse Şişçi (Personal Archive of Emel KARAKAYA AYALP)

The critical challenge of the spring semester was shrinking studio targets after 6th week. During 6th and 7th weeks, both instructors and students realized the inefficiency of online critiques. As the key factor to develop projects, face-to-face table critiques and drawing together with students could not be achieved with the bounds of possibility. Moreover, sudden discharge of dormitories caused another problem. Students brought their questionnaires together in some of the students the majority of which were accommodating in dormitories. Students left dormitories very suddenly and did not take all their stuff while leaving. A majority of questionnaires held in the site survey were left in dormitories and annihilated by dormitory staff as a security measurement for COVID-19 virus. In this respect, we as students and instructors, made a discussion session to diminish some of our programme targets and prepare a more compact programme for the rest of the semester. The decision was to eliminate 1/1000 scale urban design project and finalize the semester with 1/5000 scale structure plan.

The most critical deficiency of such a compact programme became lacking self-learning and self-management for students that 1/1000 scale urban design projects were personal tasks. Moreover, it turned an exhausting process for students to sustain group work online.

The rest of the term pursued panel online critiques. However, the main problem expressed by students was requirement for face-to-face peer drawing on scaled maps and base maps. For instructors, it was stressful to explain something and to critique

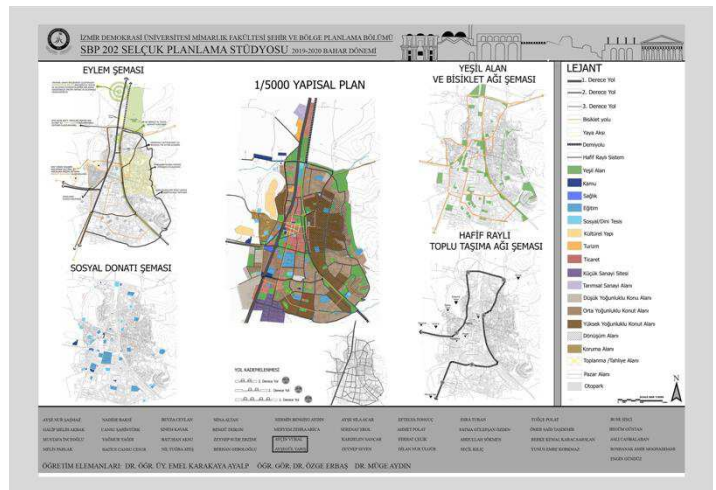
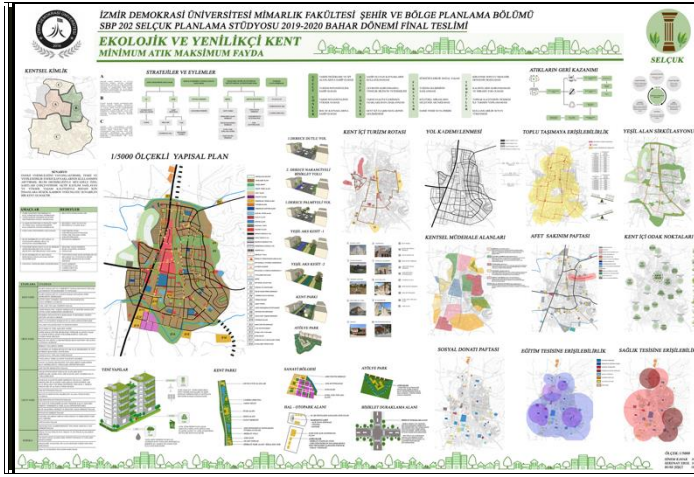


Figure 8. 15th week Structure Plan by Sinem Kavak, Serenay Erol and Buse Şişçi (Personal Archive of Emel KARAKAYA AYALP)



4. Conclusion and Discussion

We presented in this study a two semesters experience that both reflected face-to-face and online education during 2019-2020 academic year at the Department of City and Regional Planning at İzmir Democracy University. Although, the literature at the last two decades points out that virtual planning studio can introduce dangers for learning in an applied field and technological limitations exist (Hollander and Thomas, 2009), researches published during pandemic period shows that online education may provide some advantages (Milovanović et al., 2020; Rooij et al., 2020). The advantages of online education are providing digital material to students, developing self-learning, possibilities to make online juries with numerous participants from distant places. However, “a complete virtual learning environment comes with numerous challenges and caveats that limit the learning experience” (Rooij et al., 2020: 123).

According to experience of different planning schools in Turkey which are expressed during online meetings of Union of Planning Schools in Turkey in 2020, the number of instructors and number of students are key point to sustain education in a proper way. For schools that must manage education with limited number of instructors and teaching assistants, students are given limited time. Group coordinatorship, which is dividing students into groups and making appointed meetings may be effective unless student groups are not more than five people and instructor groups are not less than two. In case of İzmir Democracy University, total number of students were 41 while the number of instructors were three for fall semester and two for spring semester.

Despite its advantages for self-learning, online education was not effective for peer-learning during pandemics. Also, Peer assessment that is a collaborative learning activity in which peers participate in judging and assessing each other's work (Zayed, 2017), could not be efficiently achieved, because students could not openly criticize each other on a totally open platform. Also, interaction between student groups and within the groups was less than the previous semester. According to students view, the online education blunted their ability to discuss, to understand each other and to learn from critiques given to different groups in the studio.

The experience of online studio during pandemic lockdowns both forced students and instructors for reevaluating teaching practices and resilience of urban planning education against crises. Under these circumstances, it was obvious that a clear structure offered to students is very important.

5. Acknowledge

We would like to thank to İzmir Democracy University, Department of City and Regional Planning 2019-2020 second grade students for all their patience and enthusiasm during pre-pandemic and pandemic periods and for sustaining their perservance against all the odds. We also thank to them for their contribution by permitting us to use their projects as examples in this article.

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URL-1

<https://www.yok.gov.tr/Sayfalar/Haberler/2020/universiteler-de-uygulanacak-uzaktan-egitime-iliskin-aciklama.aspx>

URL-2

<http://www.selcuk.bel.tr/Files/360/selcuk/turkce/index.html>

Boru Kesim Lazer Makineleri için Şekil Algılama Sistemi

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Öz

Boru kesim lazer makinelerinde boru yüklenme işlemi esnasında açı ayarlanması önemlidir. Profil açısının elle yapılması ise birçok hataya sebep olmaktadır. Bu açı ayarlanmasının otomatik olarak yapılması kullanıcılar tarafından talep edilmektedir. İşlemin otomatik yapılması amacıyla çalışma başlatılmıştır. Bu sistem sayesinde boru açısı istenen değere getirilecektir. Sistem, 3 adet sensör tarafından alınan ölçüm değerlerinin 2 boyutlu uzayda birleştirilmesi sonucu borunun açısının tespitine dayanmaktadır.

Anahtar Kelimeler: Boru Kesim, Açı Tespiti

Shape Detection System for Tube Cutting Laser Machines

Abstract

It is important to adjust the angle during the profile loading process in pipe cutting laser machines. Making the profile angle manually causes many mistakes. This angle adjustment is requested by users automatically. Work has been started in order to make the process automatic. Thanks to this system, the profile angle will be brought to the desired value. The system is based on the determination of the angle of the profile as a result of combining the measurement values taken by 3 sensors in 2 dimensional space.

Keywords: Pipe Cutting, Angle Detection

1. Giriş

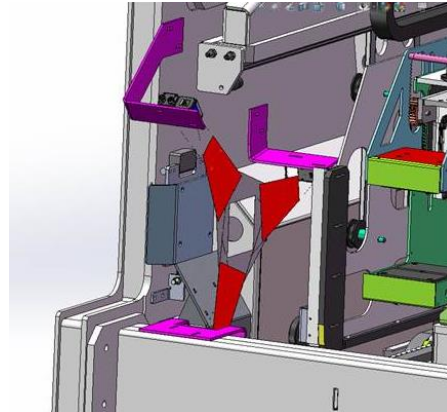
Boru kesimi gerçekleştiren boru kesim lazer makineleri endüstride yaygın olarak kullanılmaktadır. Son kullanıcıların beklentisi operatörün tamamen devre dışına çıkarak tüm yükleme sisteminin otomatize olması yönünde gelişmiştir. Özellikle borunun doğru açıda yüklenmesi endüstrinin temel beklentilerinden biri haline gelmiştir.

Boru kesim lazer makinelerinde, boru bir kayış üzerine yüklenmekte ve aynalı bir sistem üzerine oturtularak lazer ile kesilmektedir. Her kesilen yüzey sonrası ayna döndürülmekte ve bir sonraki yüzey kesilmektedir. Eğer boru ayna üzerine yanlış açıyla geldiyse kesim esnasında hatalar oluşmaktadır.

Yapılacak çalışma ile borunun istenen açıyla yüklenmesinin sağlanması hedeflenmiştir. Bunun için 3 adet sensörle profil şekli çıkartılmış ve görüntü işleme yöntemlerinin kullanılmasıyla sistemin tasarımı tamamlanmıştır.

2. Materyal ve Metot

Sistemin donanımsal tasarımında 3 adet lazer sensör kullanılmaktadır. Sensörler 120 derece açı farklarıyla yerleştirilmiş olup tüm profilin yüzeyinin sensörler tarafından algılanması amaçlanmıştır.

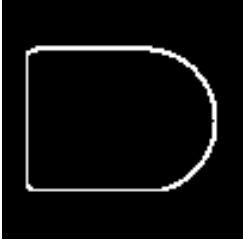


Şekil 1. Sensörlerin yerleşim düzeni

Elde edilen ölçüm değerleri 2 boyutlu uzayda birleştirilerek profilin şekli çıkarılmaktadır. Oluşturulan şekil, mpf dosyasından alınan profilin kesit görüntüsü üzerinde 0.5 derece açıyla döndürülmekte ve iki görüntü arasında kesişen nokta sayıları alınmaktadır. 360 derece için 720 defa tekrarlanan bu işlem sonucunda maksimum kesişme sayısını veren açı, istenen açı ile anlık açı arasındaki farkı vermekte olup, ayna vasıtasıyla profil istenen açıya getirilmektedir. Aşağıdaki şekil 2 ve şekil 3’de yükleme sistemine profilin 180 derece farkla geldiği, şekil 4 ve şekil 5’de elips profil için 45 derecelik bir fark olduğu gösterilmektedir.



Şekil 2. Sensörlerden gelen veri üzerinde oluşturulan şekil



Şekil 3. Profilin istenen şeklinin mpf dosyasına göre çizimi



Şekil 4. Sensörlerden gelen veri üzerinde oluşturulan şekil



Şekil 5. Profilin istenen şeklinin mpf dosyasına göre çizimi

3. Araştırma Sonuçları ve Tartışma

Yapılan ölçüm sonuçları ortamdaki tozdan sistemin etkilendiğini göstermektedir. Bu sebeple gürültü temizleme amacıyla medyan(ortanca değer) filtresi kullanılarak ortamdaki toz ve yansılardan kaynaklı gürültü en aza indirilmiştir.

4. Sonuç

Temelde iki resim arasındaki açı farkının bulunması prensibine indirgenen problem, gürültülerin en aza indirgenmesiyle efektif olarak çalıştığı tespiti ile çözülmüştür.

5. Teşekkür

Bu çalışmanın yürütülmesi esnasında Seray Karanfil önerileriyle destek olmuşlardır.

Kaynakça

Albora, Muhittin A., Uçan, N. Osman, Osman, Onur (2007). *Görüntü İşleme Teknikleri ve Mühendislik Uygulamaları*. Ankara: Nobel Akademik Yayıncılık

Deney Tasarımında Yanıt Yüzey Yöntemleri ile Optimizasyon

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Öz

Yanıt yüzey yöntemleri, optimizasyonu da içeren istatistiksel ve matematiksel yöntemlerin bir kombinasyonudur. Bu yöntemlerin az sayıda veri ile maksimum bilgiye ulaşılması, kolaylıkla optimizasyon olanağı sağlaması, parametreler arasındaki etkileşimin belirlenmesi gibi avantajları nedeniyle son yıllarda birçok alanda geniş kullanım alanı bulmuştur. Bu yöntemde, süreci etkileyen parametreler bağımsız değişkenler, yanıtlar ise bağımlı değişkenler olarak adlandırılmaktadır. Optimum bölge, yanıtların eğrilerinin çizilerek üst üste yerleştirilmesi veya istenilen hedefe ulaşma fonksiyonu yaklaşımları kullanılarak belirlenir. Bu çalışmada, yanıt yüzey yöntemlerini incelemek için Metil glikosidin vinilasyonunu etkileyen faktörlerin değerlendirildiği bir endüstriyel kimya deneyi verisi kullanılmıştır ve yöntemler bu veri seti üzerinde tartışılmıştır.

Anahtar Kelimeler: Yanıt yüzey yöntemi, Merkezi kompozit tasarım, Optimizasyon, En dik çıkış yöntemi.

Optimization with Response Surface Methods in Experimental Design

Abstract

The response surface methods are a combination of statistical and mathematical methods that also includes optimization. Due to the advantages of these methods such as reaching maximum information with a small number of data, providing easy optimization, and determining the interaction between parameters, they have found wide use in many fields in recent years. In this method, the parameters affecting the process are called independent variables and the responses are called dependent variables. The optimum region is determined using the curves of the responses or by using the desired goal attainment function approximations. In this study, an industrial chemistry experiment data evaluating the factors affecting vinylation of methyl glycoside has used to examine the response surface methods and the methods have discussed on this dataset.

Keywords: Response surface method, Central composite design, Optimization, The steepest ascent method.

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1. Giriş

Yanıt yüzey yöntemi (YYY), birkaç bağımsız değişken ile bağımlı değişken arasındaki ilişkinin incelendiği, deneysel optimizasyon çalışmalarında kullanılan matematiksel ve istatistiksel tekniklerin bir kombinasyonudur. Bu yöntemde gerekli olan deney tasarımındaki nicel veriler problemdeki denklemi tanımlamak ve çözmek için kullanılır (Şahin, 2000). YYY, yeni bir ürünün veya mevcut ürün tasarımının süreçlerinin geliştirilmesinde ve iyileştirilmesinde yaygın olarak tercih edilen istatistiğe dayalı bir yöntemdir (Montgomery, 1997). Bu yöntem, mümkün olan en az sayıda gözlemlenebilir değer ile yanıt yüzeyindeki en yüksek bağımlı değişkenlerin sayısını elde etmeyi amaçlayan deneysel bir kurulum göstermektedir (Öney & Samanlı, 2017). YYY, ihtiyaç duyulan cevabın çeşitli değişkenlerden etkilendiği problemlerin tasarlanması ve analizi için yararlı matematiksel ve istatistiksel teknikler ile sorunun iyileştirilmesini amaç edinmektedir (Yildiz, Ergül, Dirik & Gezeğin, 2018).

Yanıt yüzeyleri olarak grafiksel gösterimle de ifade edilebilen denklem, süreç değişkenlerinin etkileşimleri ve tüm süreç değişkenlerinin yanıt üzerindeki birleşik etkisini tanımlamak için kullanılır. YYY, üç aşamadan oluşmaktadır. Bunlar eleme denemeleri, bölge araştırması ve işlemin optimizasyonudur. Eleme denemeleri, az sayıda ve daha verimli esas deneme yapılmasına olanak sağlamaktadır. İkinci aşama olan bölge araştırmasında amaç, eleme denemeleri ile belirlenen bağımsız değişkenlerin sistemin yanıtında oluşturdukları değerlerin, optimum noktaya yakın sonuçlar verip vermediğini belirlemektir. Son aşama ise işlem optimum noktaya yaklaşıldığında başlar. Gerçek yanıt fonksiyonu optimum nokta etrafında önemli bir eğrilik göstermektedir. Bu eğriliğin tahminlenmesinde lineer olmayan modeller, genellikle ikinci dereceden polinomial modeller, üssel modeller kullanılır. Uygun bir model elde edildikten sonra, bu model optimum noktanın araştırılmasında kullanılır (Koç & Kaymak-Ertekin, 2010).

YYY'nde; faktöriyel tasarım, en dik çıkış-iniş, merkezi kompozit tasarım olmak üzere üç basamaklı optimizasyon prosedürü en sık görülen ve uygulanan yöntemlerdir. YYY, ardışık olarak ve ikinci dereceden model ise :

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_{11} x_1^2 + \beta_{22} x_2^2 + \beta_{12} x_1 x_2 + \epsilon \quad (2)$$

dir (Box, Hunter & Hunter, 1978).

2.1.1. En Dik Çıkış ve İniş Yöntemi

Çoğunlukla sistem için çalışma koşullarının ilk tahmini gerçek optimumdan uzak olacaktır. Bu gibi durumlarda deneyi yapan kişinin hedefi, hızlı bir biçimde optimum bölgesi yakınlarına ilerlemektir. Basit ve ekonomik açıdan verimli bir deney prosedürü kullanmak istenilir. En dik çıkış yöntemi, yanıtaki maksimum artış yönünde ortamda hareket etme prosedürüdür. Elbette minimize etmek isteniyorsa bu tekniğe en dik iniş yöntemi denir (Myers, Montgomery, Vining, Borror & Kowalski, 2004). Birinci dereceden yanıt yüzeyi ardışık paralel doğrulardır. En dik çıkış yolu boyunca adımlar regresyon katsayıları ile orantılıdır. Gerçek adım büyüklüğü deney bilgisine veya diğer pratik hususlara dayanarak araştırmacı tarafından belirlenir.

uygulanan bir işlemdir. Çoğunlukla optimum alandan uzak olan yanıt yüzeyinde bir noktada olduğunda birinci dereceden model kullanılabilir. Buradaki hedef, deneyi yapan kişiye optimum bölgesine doğru bir iyileşme yolu boyunca hızlı ve verimli bir şekilde öncülük etmektir. Optimum bölgesi bulunduktan sonra ikinci dereceden model gibi daha ayrıntılı bir model kullanılabilir.

YYY'nin amacı sistemin optimum çalışma koşullarını veya içinde çalışacağı faktör alanının bir bölgesini belirlemektir.

2. Materyal ve Metot

2.1. Yanıt Yüzey Yöntemleri

YYY'nde Y bağımlı değişkeninin $\xi_1, \xi_2, \dots, \xi_k$ bağımsız değişkenlerinin bir fonksiyonu olduğu kabul edilir. ϵ , hata terimini ifade eder. Hata teriminin 0 ortalama σ^2 varyansı ile normal dağılıma sahip olduğu varsayılır. Beklenen yanıt

$$E(y) = \eta = E[f(\xi_1, \xi_2, \dots, \xi_k)] + E(\epsilon)$$

$$E(\epsilon) = 0 \text{ olduğundan yanıt yüzeyi}$$

$$\eta = f(\xi_1, \xi_2, \dots, \xi_k)$$

olacaktır. Burada $(\xi_1, \xi_2, \dots, \xi_k)$ gerçek değişkenlerdir. Bu değişkenler kodlama terimi (veya deney değişkenleri) ile ifade edilirse yanıt yüzeyi;

$$\eta = f(x_1, x_2, \dots, x_k)$$

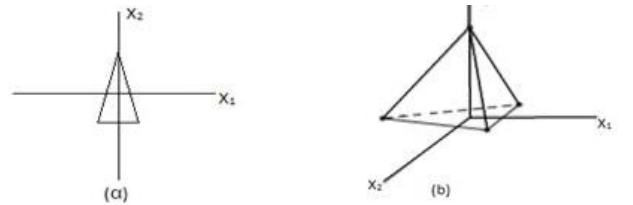
olacaktır. Gerçek yanıt yüzeyi fonksiyonunun biçimi bilinmediğinden yanıt değişkeni ve bağımsız değişkenler arasındaki gerçek fonksiyonel ilişki için uygun bir yaklaşım bulunmalıdır (Myers, Montgomery & Anderson-Cook, 2016). Yanıt değişkeni bağımsız değişkenlerin doğrusal bir fonksiyonu ile modellenirse, yaklaşım fonksiyonu birinci dereceden

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k + \epsilon$$

şeklinde verilen bir modeldir. Yanıt yüzey analizi için kullanılan en yaygın modeller birinci dereceden (lineer) ve ikinci dereceden (kuadratik) modellerdir. İki faktörlü bir deney için birinci dereceden model

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \epsilon \quad (1)$$

Deneyler, yanıtta artış gözlenmeye kadar en dik çıkış yolu



boyunca yapılır. Sonunda araştırmacı optimum bölgeye yaklaşır. O zaman daha kesin bir tahmini elde etmek için ek deneyler yapılır.

2.1.2. Merkezi Kompozit Tasarım

Merkezi kompozit tasarım (MKT) ikinci dereceden modellerin yerleştirilmesinde kullanılan en popüler tasarım sınıfıdır. Genel olarak n_F faktör çalışmalarına sahip 2^k eksen veya yıldız çalışmalarına ve n_c merkez çalışmalarına sahip 2^k faktör tasarımları oluşur. MKT sıklıkla tasarım planı ardışık deneme istendiğinde tercih edilir. İlk olarak faktöriyel ya da küp bölümleri

ve merkez noktaları birinci dereceden model kurmak için kullanılabilir. MKT içerisinde bir "küp" bölümü inşa edilerek eksen ve merkez noktalarıyla birlikte ikinci dereceden bir model kurulabilir.

Birinci dereceden bir model için 2^k tasarım kullanılmış, bu model uygunsuzluk sergilemiş ve daha sonra ikinci mertebeden terimlerin modele dahil edilmesine izin vermek için eklenmiştir.

MKT, $N = 2^k + 2k + n_c$ tasarım noktasına sahiptir. Faktör noktaları etkileşim terimlerinin tahminine, eksen noktaları ikinci dereceden terimlerinin tahminine yardımcı olmaktadır. Şekil 1'den $k=2$ ve $k=3$ için merkezi kompozit tasarımları gösteren bu noktaların yerleşimi görülebilir.

Şekil 1 (a) $k=2$ ve (b) $k=3$ için merkezi kompozit tasarım

Tasarımda belirtilmesi gereken iki parametre vardır. Bunlar eksen hareketlerinin tasarım merkezinden uzaklığı ve n_c merkez noktalarının sayısıdır. Merkezi kompozit tasarım

- Her bir noktanın $(x_1, x_2, \dots, x_k) = (\pm 1, \pm 1, \dots, \pm 1)$
- n_c merkez noktalarının $(x_1, x_2, \dots, x_k) = (0, 0, \dots, 0)$

olacak biçimde tasarlanır. MKTda merkez noktalarının sayısı (n_c) ve tasarım merkezinden eksen denemelerinin uzaklığı α 'nın seçimi büyük çapta ilgilenilen alana bağlıdır. Eğer alan kare şeklinde ise $\alpha = \sqrt{k}$ ve alanın 3 seviyeli bir tasarım olan küp şeklinde olması durumunda $\alpha = 1$ 'dir. Tasarım küp şeklinde ise 1 ya da 2 merkez denemesi yeterli olacaktır.

3. Araştırma Sonuçları ve Tartışma

Monovinil eterler üretmek için bir altyapı mevcut olduğunda yüksek basınç ve yüksek sıcaklık altında asetilene eklendiğinde Metil glikosidin vinilasyonu meydana gelir. Monovinil eter ürünleri, çeşitli endüstriyel sentez işlemleri için kullanışlıdır.

Bu çalışmada, metil glikosidin vinilasyonunu etkileyen faktörlerin etkisini değerlendirmek için bir endüstriyel kimyasal deneyi verisi kullanılmıştır (Kuehl, 2000). Çalışmanın amacı, birkaç monovinil izomerinin her biri için metil glikosidin maksimum dönüşümünü üreten koşulları belirlemektir. Bu amaçla, çalışmada basınç ve sıcaklık olmak üzere 2 faktör kullanılmıştır. Bu faktörlerin herbiri düşük ve yüksek olmak üzere iki seviyeye sahip olup, tasarım 2^2 faktöriyel tasarımıdır:

Sıcaklık	Düşük Yüksek	130 °C 160 °C
Basınç	Düşük Yüksek	325 psi 475 psi

Tablo 1. 2^2 Faktöriyel Tasarımda Metil Glikosidin Vinilasyonu Verileri

Orijinal Faktörler	Kodlanmış Faktörler	
---------------------------	----------------------------	--

Sıcaklık	Basınç	x_1	x_2	% Dönüşüm
130	325	-1	-1	8
160	325	+1	-1	24
130	475	-1	+1	16
160	475	+1	+1	32

2^k faktör tasarımları için kodlanmış seviyeleri;

$$x_i = \frac{(A_i - \bar{A})}{D}$$

eşitliği ile elde edilmiştir. Burada A_i , A faktörünün seviyesi, \bar{A} ise A faktörünün ortalama seviyesidir. D ise;

$$\frac{1}{2}(A_2 - A_1)$$

dir. Kodlanmış sıcaklık (T) ve Basınç (P) seviyeleri;

$$x_1 = (T - 145)/15, \quad x_2 = (P - 400)/75$$

şeklinde. Denklemden birinci dereceden model için katsayıların tahminleri elde edilerek tahmini birinci dereceden model ise

$$\hat{y} = 20 + 8x_1 + 4x_2$$

olarak elde edilmiştir. Deneyisel hata varyansının bir tahminini sağlamak ve lineer modelin yeterliliğini değerlendirmek için deneyel bölgenin merkezinde 145 °C 'lik bir sıcaklıkta ve 400 psi'lik bir basınçta dört tekrar yapılmıştır. Merkez tasarımıdaki dört gözlemin varyansı $\sigma^2 = 3.33$ bulunmuştur. Katsayı tahminleri için standart hatanın tahmini ise 0.91'dir.

Tablo 2. Tasarım Merkezinde 4 Tekrarlı Bir 2^2 Faktöriyel Tasarımda Metil Glikosidin Vinilasyonu

Orijinal Faktörler		Kodlanmış Faktörler		
Sıcaklık	Basınç	x_1	x_2	% Dönüşüm
130	325	-1	-1	8
160	325	+1	-1	24
130	475	-1	+1	16
160	475	+1	+1	32
145	400	0	0	21
145	400	0	0	23

145	400	0	0	20
145	400	0	0	24

Elde edilen birinci dereceden model, sıcaklık veya basınç artışında metil glukosidin vinillenmesini arttıracığını gösterir.

Sıcaklık ve Basınç etkileşimi TP, lineer modele uyumsuzluğunu ölçer ve denklemdeki ikinci dereceden modelde $\beta_{12} x_1 x_2$ terimi ile temsil edilir. β_{12} katsayısının tahmini 0 olarak bulunur. Etkileşimin 0 olması, sıcaklık ve basınç dönüşümü üzerinde bağımsız olarak hareket ettiğini gösterir. Tasarım merkezindeki tekrarlanan gözlemler, yalnızca deneysel bir hatanın bir tahminini sağlamakla kalmaz aynı zamanda deney bölgesindeki eğrilik derecesini ölçmek için bir araç sağlar. \bar{Y}_f 2^2 faktör için dört deneme kombinasyonunun ortalaması, \bar{Y}_c merkez noktalarının ortalaması olsun. $\bar{Y}_c < \bar{Y}_f$ veya $\bar{Y}_c > \bar{Y}_f$ ise yanıt yüzeyinde bir eğrilik söz konusu olduğu söylenebilir.

$\bar{Y}_f - \bar{Y}_c = -2$ ve farkın standart hatası 1.29 bulunmuştur. Bu durumda lineer yanıtın bu bölgedeki yüzeyi yeterince açıkladığı görülür.

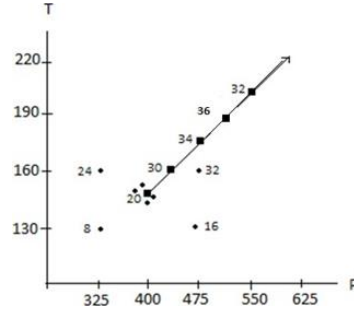
Artık optimum yanıt bölgesi karakterize edilebilir. Bunu yapmak için optimum koşullar içeren faktör seviyelerinin bölgesini bulmamız gerekir. Tahmini lineer denklemi temel alınarak eşit yanıt konturlarına dik yol 8 birim x_1 yönünde, 4 birim ise x_2 yönünde hareket eder. Yani x_1 'deki her 1 birim hareket x_2 'de $4/8=0.5$ birim harekete sahiptir. En dik çıkış yolu, tasarımın merkezinde $(x_1, x_2) = (0,0)$ ile başlar. Tasarımın merkezindeki sıcaklık ve basınç değerleri $(T,P) = (145,400)$ dir.

Tablo 3. Maksimum Yanıt Bölgesini Bulmak için En Dik Çıkış Yolu

Adım	x_1	x_2	T	P
0	0	0	145	400.0
1	1	0.5	160	437.5
2	2	1.0	175	475.0
3	3	1.5	190	512.5
4	4	2.0	205	550.0

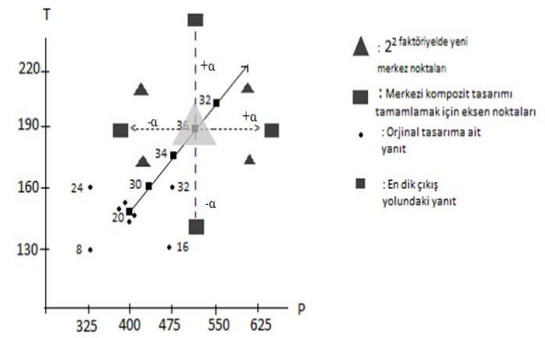
Son olarak araştırmacı en dik çıkış yolu boyunca ilerledikçe yanıtta bir azalış görmek isteyecektir. O noktada deney sürecinde yanıt yüzeye yaklaşan ikinci dereceden polinomiyal denklemini tahmin etmek için tasarlanabilir.

Şekil 2. En Dik Çıkış Yolu



Yoldaki maksimum yanıt Tablo 3 de görüldüğü üzere $T=190^{\circ}\text{C}$ ve $P=512.5$ psi'dir.

Şekil 3. Merkezi Kompozit Tasarım ve En Dik Çıkış Yolu



Şekilde gösterildiği gibi yoldaki maksimum yanıt 36 değeri ile $T=190^{\circ}\text{C}$ ve $P=512.5$ psi'dir. İkinci bir adım olarak araştırmacı $(T,P) = (190, 512.5)$ merkez tasarımında birkaç tekrarla yeni bir 2^2 faktöriyel deney yapabilmektedir. Yani deneyde hesaplanan $\bar{Y}_f - \bar{Y}_c$ farkının, yüzeyde yüksek bir eğrilik derecesini gösterdiğini varsayalım. Ardışık deneyde 3.adım $(\pm \alpha, 0)$ ve $(0, \pm \alpha)$ eksen noktalarında deneye ilave adımlar oluşturur. Eksenlerdeki deneme kombinasyonlarının bu son seti 2^2 faktöriyel tasarım ve merkez noktaları ile birlikte ardışık deneylerin sonucu olarak merkezi kompozit tasarımları oluşturur. Bir tekrarlı merkezi kompozit sistemi, 2^2 faktöriyel tasarımdan $N_f = 2^k = 4$ deneme kombinasyonu, tasarımdaki eksen noktalarından $N_a = 2k = 4$ deneme kombinasyonu ve merkezdeki tekrar sayısı $n_c = 1$ 'den oluşur. Merkezi kompozit tasarım için iki faktörlü kodlanmış x_1 ve x_2 eksenleri üzerindeki koordinatlar Tablo 4' de gösterilmiştir.

Tablo 4. Merkezi Kompozit Tasarım Koordinatları

2 ² Tasarım		Eksen		Merkez	
x_1	x_2	x_1	x_2	x_1	x_2
-1	-1	-a	0	0	0
+1	-1	+a	0		
-1	+1	0	-a		
+1	+1	0	+a		

Her faktörün 5 seviyesi olduğundan ikinci dereceden bir denklem tahmin edilebilir. Ayrıca ikinci derece yaklaşımdan herhangi önemli sapmalarda değerlendirilebilir.

4. Sonuç

YYY, 2^k faktöriyel tasarımın bir alternatifidir. Bu yöntem kullanılarak birden fazla değişkeni olan çalışmalarda az sayıda deneysel çalışma ile çok sayıda sonuç elde edilebilmektedir. Ayrıca sonuçlar istatistiksel olarak analiz edilebilmekte ve elde edilen grafiklerle sonuçlar daha sağlıklı bir şekilde değerlendirilebilmektedir. YYY sayesinde basit modeller kullanılarak çalışma modellenenilmekte, yanıtı etkileyen çok sayıda değişken bir arada ve eş zamanlı olarak incelenebilmektedir. k faktörlü MKT için gerekli olan deney birimleri, üç veya daha fazla faktöre sahip 3^k faktöriyel tasarım için gerekli olandan daha azdır. Böylece MKT, deneysel kaynakların kullanımda daha ekonomiktir ve ikinci dereceden yanıt denklemlerini tahmin etmek için olanak sağlar. Parametrelerdeki değişime verdiği yanıt en az sayıda deneme yapılarak en iyi şekilde tanımlanabilmektedir. Çok farklı alanlarda başarıyla uygulanabilmesi ve çok fazla yanıt dikkate alınarak optimum noktanın belirlenmesine olanak sağlaması optimizasyon yöntemleri arasından öne çıkmasının en önemli nedenlerinden biridir.

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Silindir Bükme Makinalarında Kolay Sac Çıkarma Sistemi

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Öz

Silindir Bükme Makinalarında bükülen sacların makinadan çıkarılması her zaman silindirik sac büküm proseslerinde göz önünde bulundurulması gereken önemli bir madde olmuştur. Bükümü tamamlanan sacın, etrafında yuvarlanmış olduğu üst merdane boyunca dışarı çıkarılması işlemi büküm çapına, sac genişliğine, sac kalınlığına dolayısı ile ağırlığına bağlı olarak farklı zorluklar doğurmaktadır. Bükümü tamamlanan sac, makinadan çıkarılmadan önce üst merdane ile teması kesilecek şekilde yan merdaneler üzerinde ve makina merkezine göre simetrik olacak şekilde dengede kalması sağlanmalıdır. Bu sacın ağırlığı ve yapısı müsait ise bir veya iki kişi ile karşılıklı olarak yan merdanelerin üzerinde sürüklenerek çıkarılabilmektedir. Bu işlem zaman kaybına yol açmakla birlikte iş güvenliği açısından da riskler taşımaktadır. Bu risklerin elimine edilmek istendiği ve insan gücünün yetersiz kalacağı durumlarda ise makinadan ayrı bir vinç vb taşıma sistemi yardımı ile sacın tüm makina elemanlarına olan teması kesilerek makinadan çıkarılması sağlanmaktadır. Bu işlem esnasında da taşıma sisteminde askıda kalan sacın stabil bir şekilde dengede tutulabilmesi oldukça zordur ve hareket esnasında özellikle üst merdaneye çarpmalar yaşanabilmekte ve makinaya zarar verebilmektedir. Bu çalışma ile birlikte yaşanan bu zorlukların minimuma indirilmesi hedeflenmiştir. Bu hedef doğrultusunda yapılan çalışmalar sonucunda yenilikçi ve minimum maliyetli bir çözüm ortaya konmuştur. Ortaya çıkan sistem tasarımı patent başvurusu ile koruma altına alınmıştır.

Anahtar Kelimeler: Silindir Büküm, Sac Büküm, Sac Çıkarma.

Easy Part Ejector for Plate Rolling Machines

Abstract

Removing the bent sheets from the Cylinder Bending Machines has always been an important item to consider in cylindrical sheet bending processes. The process of removing the bent sheet along the upper roller around which it is rolled creates different difficulties depending on the bending diameter, sheet width, sheet thickness and weight. The sheet, whose bending is completed, must be kept in balance on the side rollers and symmetrically with respect to the center of the machine so that its contact with the upper roller is cut off before it is removed from the machine. If the weight and structure of this sheet is suitable, it can be removed by dragging it on the side rollers with one or two people. This process causes loss of time, but also carries risks in terms of occupational safety. In cases where these risks are desired to be eliminated and manpower is insufficient, the sheet metal is removed from the machine by cutting its contact with all machine elements with the help of a crane, etc., transport system separate from the machine. During this process, it is very difficult to keep the suspended sheet in the transport system in a stable balance, and during the movement, especially the upper roller can be hit and damage the machine. With this study, it is aimed to minimize these difficulties. As a result of the studies carried out in line with this goal, an innovative and minimum cost solution has been revealed. The resulting system design is protected by a patent application.

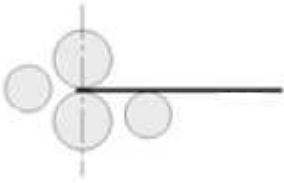
Keywords: Plate Rolling, Sheet Rolling, Part Ejector.

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1. Giriş

Sac metallerin silindirik bükümlerini gerçekleştiren Silindir Büküm Makinaları endüstride yaygın olarak kullanılmaktadır. Düz plakaların silindirik vb yapılarda bükülebilmesini sağlayan Silindirik Büküm Makinaları merdane sayılarına göre iki merdaneli, üç merdaneli ve dört merdaneli olarak sınıflandırılabilirler. Ayrıca yapılarına göre asimetrik, simetrik ve değişken geometrili olarak da sınıflandırılabilirler. Günümüzde piyasada en yaygın olarak kullanılan Silindirik Büküm Makinası tipi dört merdaneli ve simetrik yapıya sahip makinelerdir. Bu tipteki makineler bükülecek sacın kontrolü, büküm kolaylığı ve büküm sonuç kalitesi açısından piyasadaki diğer tüm makinelere göre üstünlükler sergilemektedir. Genel itibarı ile çalışma prensibi şu şekildedir.

- Bükülmek istenen sac makina merkezine konumlandırılmış olan üst ve alt merdane arasında sıkıştırılır. Üst merdane sabit iken alt merdane sac kalınlığına bağlı olarak istenen pozisyonda sıkıştırma yapabilmek üzere yukarı aşağıda hareketlidir.



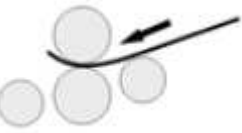
Şekil 1

- Sıkıştırılıp sabit kalması sağlanan sac, makinaya yüklendiği tarafta bulunan yan merdanenin yukarı yöndeki hareketi ile bükülür.



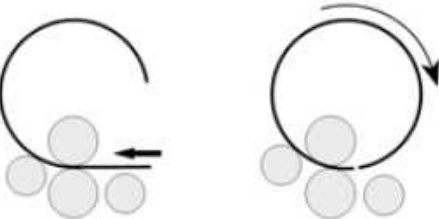
Şekil 2

- Bir ön büküme uğrayan sac sıkıştırıldığı merdanelere bağlı olan tahrik grubunun radyal yöndeki kuvveti ile sürülür.



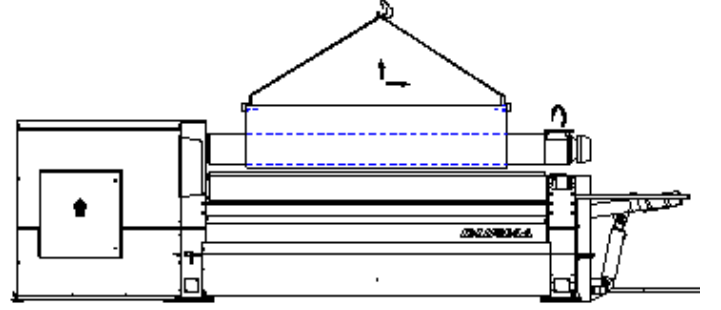
Şekil 3

- Akabinde zıt yöndeki yan merdane uygun pozisyone getirilerek tam silindirik form yakalanana kadar sürme işlemi devam eder.



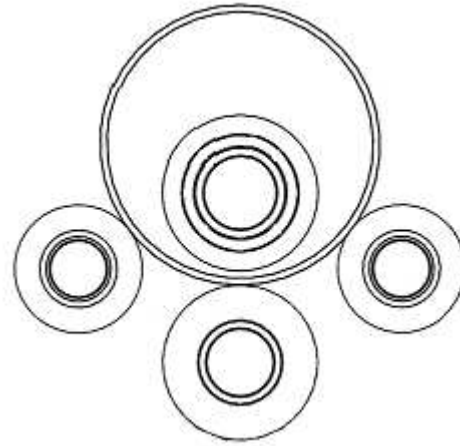
Şekil 4

Bu şekilde bükülen sac Silindir Büküm Makinalarının yapısı gereği üst merdane üzerinde yuvarlanmış şekildedir ve makinadan dışarı alınabilmesi sadece tek yönde olabilmektedir.



Şekil 5

Bükülen sacın makinadan dışarı alınması esnasında üst merdaneye temas etmemesi önem arz etmektedir. Zira sac çıkarma esnasında; makina yapısına göre boyu 7 metreyi ve ağırlığı da 10 tonu bulabilen üst merdane sadece bir ucundan yataklanmış olarak kalmaktadır. Bu merdane üzerine gelebilecek kontrolsüz bir temas makina ayarlarında bozulmalara sebebiyet verebileceği gibi ciddi maliyetlere sahip merdaneye veya yataklama elemanlarına hasar verebilir. Bu sebeple özellikle büküm çapı üst merdane çapına yakın sacların makinadan dışarı çıkarılması işleminde oldukça hassas davranılmalıdır ve taşıma ekipmanının hareket ekseninin makina üst merdane merkez eksenini boyunca olmasına özen gösterilmelidir. Günümüz şartlarında yaygın olarak kullanılan taşıma ekipmanlarında bu hassasiyetin sağlanabilmesi zor olduğundan ve büküm çapı üst merdane çapına yakın olan yani genel tabir ile büküm çapı küçük olan sacların ağırlığı da nispeten düşük olduğundan, bükülen saclar yan merdaneler vasıtası ile üst merdaneden teması kesilecek ve merkezde kalacak şekilde desteklenir. Bu şekilde sabit konumda dengelenen sac insan gücü ile yan merdaneler üzerinde sürüklenerek makinadan dışarı alınmaktadır.



Şekil 6

İmalatta hızın da kalite kadar önemli olduğu günümüzde, yukarıda bahsi geçen zorlukların giderilebilmesi veya minimuma indirgenebilmesi, silindir bükme makinaları için kaçınılmaz bir çalışma konusu konumuna gelmiştir. Bu konuda yenilikçi ve müşteri odaklı bir tavır takınılarak, çözüm olabilecek birçok sistem düşünülmüş, düşünülen her sistemde yenilikçi fikirler ortaya atılmış, tüm fikirler değerlendirilmiş ve sonuçta patent başvurusu ile koruma altına alınmış Silindir Bükme Makinaları Kolay Sac Çıkarma Sistemi ortaya çıkmıştır.

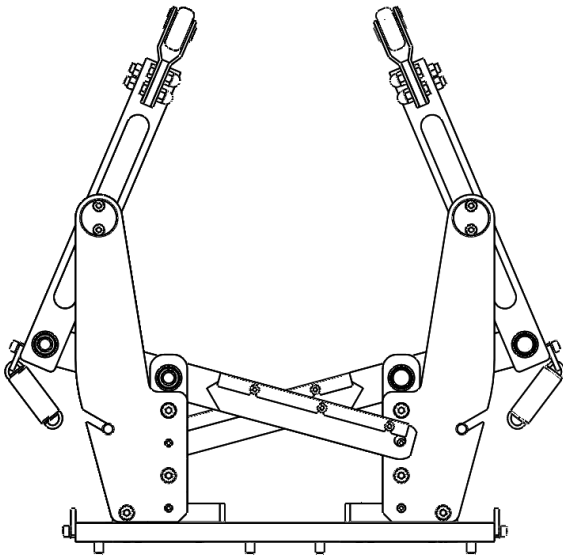
2. Materyal ve Metot

2.1. Alternatif Sistemlerin Değerlendirilmesi

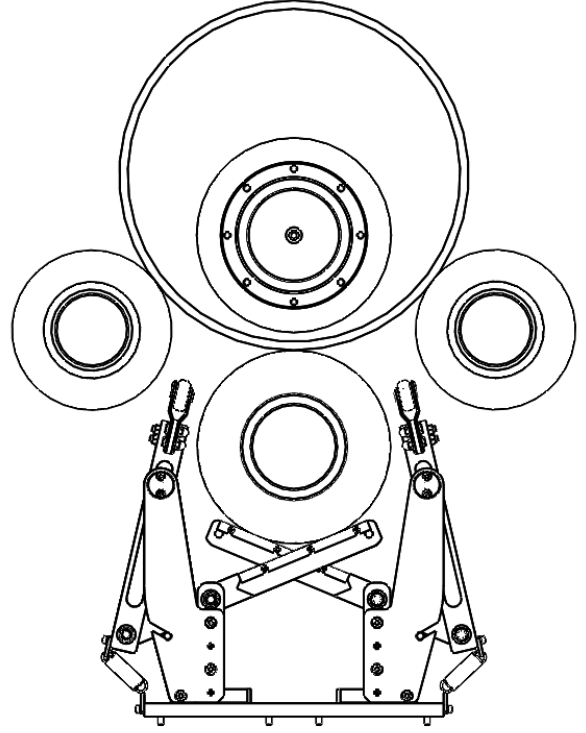
Netleşen sorunun çözüme kavuşturulabilmesi aşamasında, bükümü biten silindirik sacın, üzerinde rahatlıkla hareket edebileceği hareketli bir mekanizma tasarlanması üzerine yoğunlaşmıştır. Bükümü tamamlanan sacın rahat hareketi döner elemanların üzerinde olabileceğinden, sistemin saca temas edecek kısmının makaralardan oluşması kararlaştırılmıştır. Bu aşamadan sonra, bu makaralı yapının sac bükümü sırasında büküme engel olmayacak şekilde konumlanmış olması ve büküm tamamlanmasının ardından da sacı merkezleyecek en uygun konuma gelmesi gerekliliği, dolayısı ile hareketli bir mekanizma gerekliliği ortaya çıkmıştır. Tüm bu gereksinimler ile birlikte piyasada kullanılan tüm sistemler hareketli mekanizmaya hareketini sağlamak adına ilave tahrik-güç grubuna sahip iken yenilikçi bir yaklaşım ile makina üzerinde var olan, var oluş amacı sacı bükme gereksinimlerini yerine getirmek olan hareketlerden faydalanılması kararlaştırılmıştır. Bu sayede ilave güç-tahrik grubunun maliyeti, hedeflenen ve piyasada var olan mekanizmaların maliyetinden düşülmüş olacaktır.

2.1.1. Özel Tasarım Mekanizma

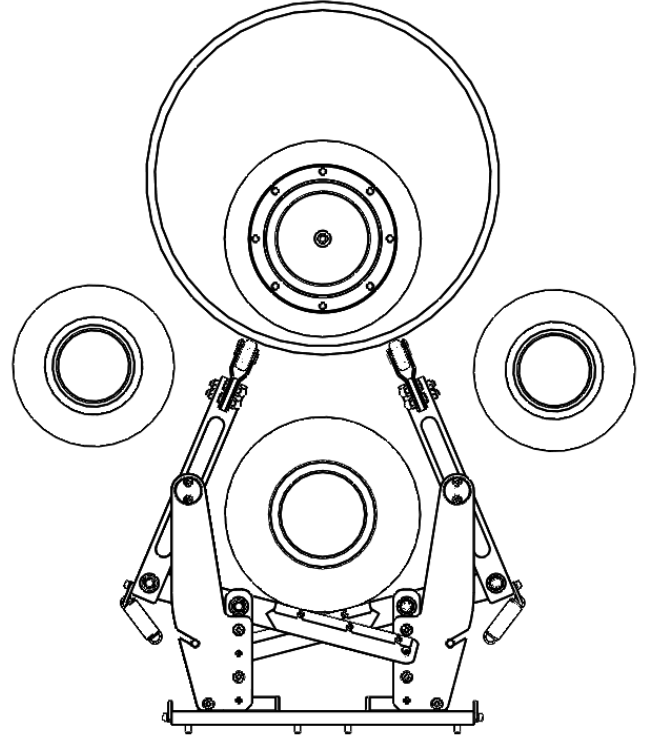
Dört merdaneli silindirik büküm makinalarının çalışma prensibinde sabit üst merdane, farklı kalınlıklarda sacları uygun şekilde sıkıştırabilmek için yukarı aşağı hareketli alt merdane ve sıkıştırılan saca ilk bükümünü verebilmek üzere üst-alt merdane merkezinden bir miktar uzakta konumlandırılmış yukarı-aşağı hareketli yan merdaneler bulunmaktadır. Tasarlanması planlanan yenin sistemde tüm makina çalışma prensibi göz önüne alındığında alt merdane hareketinden ve gücünden faydalanılması daha verimli bulunmuş ve bu şekilde ilerlenmiştir. Ortaya çıkan tasarımda, sac bükümü esnasında hiçbir hareketi kısıtlamayacak şekilde alt merdane yanlarına konumlandırılmış, bükülen sacı taşıyıcı makaralar ve bu makaraları taşımak üzere özel tasarlanan hareketli mafsallı mekanizma ile alt merdane aşağı hareketinden faydalanmak üzere bu mekanizmaya bağlanmış, alt merdaneye temas edecek olan kollar bulunmaktadır.



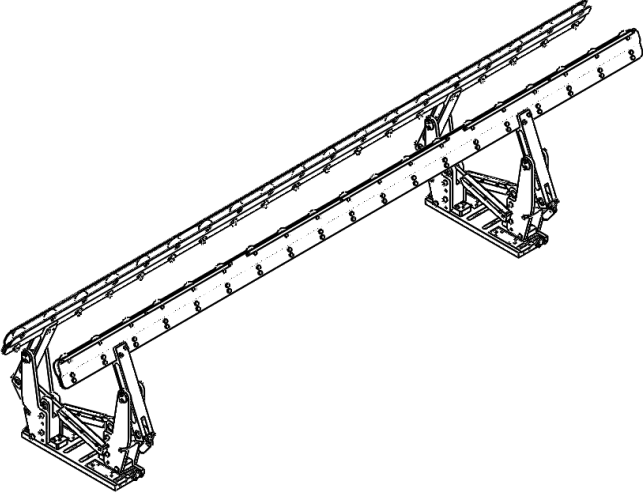
Şekil 7



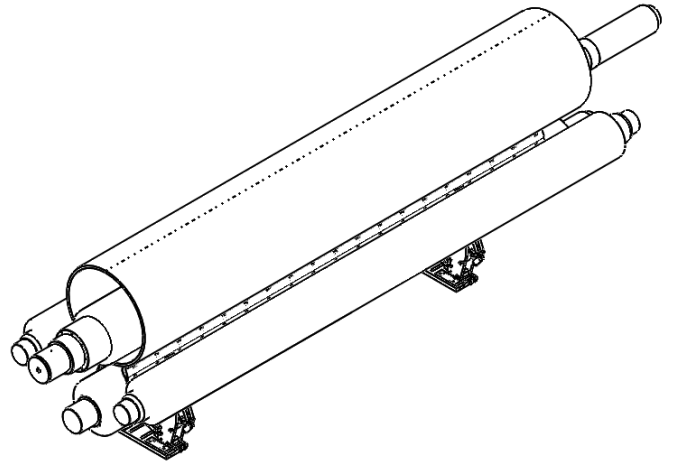
Şekil 8



Şekil 9



Şekil 10



Şekil 11

3. Araştırma Sonuçları ve Tartışma

3.1. Benzer Destek Sistemlerinin Araştırılması

Kolay sac çıkarma sisteminin piyasadaki muadillerinin araştırılması esnasında çok nadir uygulamalar olduğu görülmüştür. Bu nadirliğin birincil sebebi ilave tahrik grubu maliyeti olarak değerlendirilmiştir. Görülen tüm uygulamalarda destekleyici makara grupları lineer olarak yataklanmış ve hidrolik, pnömatik veya mekanik olarak ilave güç grubu ile hareketi sağlanmıştır.

4. Sonuç

Yenilikçi fikir ve farklı bakış açısı ile geliştirilen sistem sayesinde, silindirik büküm makinalarında üzerine düşünülmesi gereken bir sorun olarak karşımıza çıkan, bükümü tamamlanmış sacın makinadan çıkarılması işlemi, piyasadaki muadillerine oranla çok daha az maliyet ile kolaylaştırılabilmektedir.

5. Teşekkür

Çalışmalar esnasında fikirleri ile destek olan Bahattin NANE'ye teşekkür ederiz.

Kaynakça

Ferdinand P. Beer, E. Russell Johnston, Jr.

Vector Mechanics for Engineers: Statics

The McGraw-Hill Companies

2008-2018 Yılları Arasında Türkiye’de Trafik Kazaları

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Öz

Trafik kazaları çoğunlukla beklenmedik, rastgele meydana gelen talihsiz olaylar olarak kabul edilir. Kaza ile en az bir hareketli araç ve en az bir kazazedinin (yaralanmış veya ölmüş) bir kamu yolunda karıştığı olay işaret edilmektedir. Trafik kazaları, tüm dünyada olduğu gibi Türkiye’de de ölüm nedenleri arasında üst sıralardadır. Her yıl meydana gelen kazalar nedeniyle, binlerce insan için ölüm, yaralanma veya maddi hasar kaçınılmaz olmaktadır. Bu çalışma ile 2008-2018 yılları arasında Türkiye’de meydana gelen trafik kazaları, ulaşımın dört temel unsuru olan insan, taşıt, karayolu ve çevre koşulları başlıkları altında incelenmiştir. Kaza verilerinin incelenmesi öncelikle mevcut durumun ortaya çıkarılması açısından son derece önemlidir. Bu bilgiler ışığında trafik kazalarının meydana gelmesi önlenabilir veya Türkiye’de ki gibi acil önlem alınması gereken yaş grupları belirlenebilirse yaralanma şiddeti azaltılabilir.

Anahtar Kelimeler: Trafik Kazaları, Türkiye, Karayolları, Ölüm, Yaralanma.

Traffic Accidents in Turkey Between 2008-2018

Abstract

Traffic accidents are usually considered unexpected, unfortunate, and random incidents. A traffic accident refers to an incident involving at least one moving vehicle and at least one accident victim (injured or dead) on a public road. Traffic accidents are among the most significant causes of death in Turkey, as in the rest of the world. Every year, due to accidents, death, injury, or property damage are inevitable for thousands of people. In this study, traffic accidents that took place in Turkey between 2008-2018 were reviewed under the headings of human, vehicle, road, and environmental conditions, which are the four basic elements of transportation. Perusing accident data is extremely important in terms of revealing the current situation. In light of this information, traffic accidents can be prevented, or the severity of injury can be diminished if the age groups that require urgent action can be specified, as in Turkey.

Keywords: Traffic Accidents, Turkey, Highways, Death, Injury.

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1. Giriş

Trafik kazası ile en az bir hareketli araç ve en az bir kazazedinin (yaralanmış veya ölmüş) bir kamu yolunda karıştığı olay işaret edilmektedir. Uzmanlar; 30 gün içerisinde (doğal nedenlerle olanlar hariç) ölenlerinde trafik kazası nedeniyle öldükleri gerçeği ile kaza kayıplarına dâhil edilmesi gerektiğini bildirmektedir. Ancak birçok ülke bu istatistikleri tutmadığı için, bu ülkelerde, 30 gün içindeki ölümlerin sayısı bazı düzeltme faktörleriyle düzeltilmektedir. Ülkemizde trafik kazası sonucu ölenlerin sayısı, 2015 yılına kadar sadece kaza yerinde tespit edilen ölümleri kapsarken, 2015 yılından itibaren trafik kazasında yaralanıp, sağlık kuruluşuna sevk edilenlerden kazanın sebep ve tesiriyle 30 gün içinde ölenleri de kapsamaktadır (Topçu, 2021).

Trafik kazaları, tüm dünyada olduğu gibi Türkiye’de de ölüm nedenleri arasında üst sıralardadır. Her yıl meydana gelen kazalar nedeniyle, dünyada milyonlarca insan için ölüm, yaralanma veya maddi hasar kaçınılmaz olmaktadır. Trafik kazalarının zararları sadece ölüm, yaralanma ve maddi kayıplardan oluşmamakta; ölen veya yaralananların akrabalarını veya engelli hale gelen insanların yaşamlarını da her yönüyle olumsuz etkilemektedir. Türkiye’de son 30 yıl içerisinde, trafik kazaları nedeniyle 100 binden fazla kişi hayatını kaybetmiştir. 2017 yılında bir milyon otomobil başına trafik kazasında ölen kişi sayısı ise 617’dir ve bu oran Avrupa Birliği (AB) ülkeleriyle kıyaslandığında çok yüksektir. 2018 yılında Türkiye’de karayolu trafik kazalarında ölen kişi sayısı ise 6.675 olmuştur (TÜİK, 2019). Ülkede, aynı yıldaki 12.4 milyon adet otomobil sayısı ile gelişmiş ülkelerin sahip olduğu araç sayısının çok altında araç sahipliği olmasına rağmen kaza sayısı gelişmiş ülkelerin çok üstünde gerçekleşmiştir (TÜİK, 2018).

Dünyada trafik kazaları genellikle ulaşımın dört temel unsuru olan insan, taşıt, karayolu ve çevre koşulları sonucunda gerçekleşmekte olup maddi hasar, yaralanma ve ölüm gibi istenmeyen sonuçlara sebebiyet veren olayların bütünü olarak açıklanmaktadır. Türkiye İstatistik Kurumu (TÜİK) verilerine göre de 2003 yılında ülkedeki motorlu kara taşıt sayısı, 8.903.843 olup 2020 yılsonu itibarıyla 24.144.857 adede ulaşmış ve taşıt sayısı son 18 yılda yaklaşık % 171 artmıştır. (24.144.857 adet taşıtın 13.099.041 adedini yani % 54,2’sini otomobiller oluşturmuştur). 2019 yılında meydana gelen ölümlü ve yaralanmalı kazalardaki kusur oranları incelendiğinde; insan faktörlü (sürücü, yaya ve yolcu) kusur oranı % 97,66, taşıt faktörlü kusur oranı % 2,05 ve yoldan kaynaklanan kusur oranı ise % 0,30 olmuştur (KGM, 2021).

2. Materyal ve Metot

2.1. Türkiye’de Meydana Gelen Trafik Kaza Kusurları

Bu çalışmada 2008-2018 yılları arasında ülke genelinde meydana gelen trafik kazaları Emniyet Genel Müdürlüğü (EGM), Jandarma Sorumluluk Bölgesi ve TÜİK ’ten alınan veriler yardımıyla incelenmiştir.

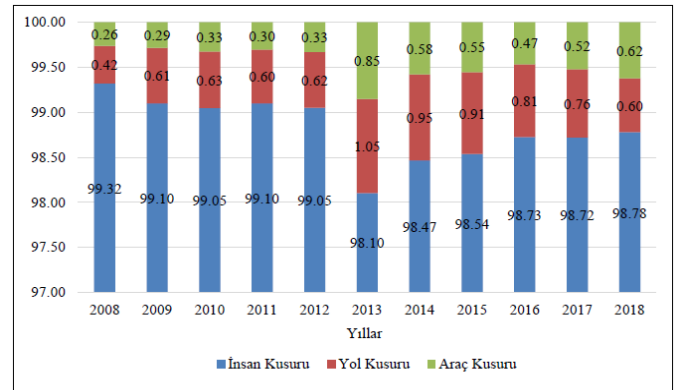
2008-2018 yılları arasında Türkiye’de gerçekleşen trafik kazalarında insan, yol ve araç faktörlü kusur sayıları ve dağılımları Tablo 1’de verilmiştir. Araç ve yol faktörlü kusurların payı insan faktörlü kusurlara kıyasla neredeyse önemsiz bir oranda gerçekleşmiş olduğu görülmektedir. Özellikle gelişmiş ülkelere baktığımızda insan araç ve yol faktörlü kusurlar arasında daha anlamlı bir dağılım olduğu açıktır. Ancak uzmanlar

arasındaki genel fikir birliği, insan hatasının yollarda meydana gelen trafik kazalarının en az %90’ına katkıda bulunduğu yönündedir. Türkiye’de doğru bir kaza incelemesi ve ilgili tüm verilerin toplanması ile yol ve araç kusurlarının daha net olarak belirlenebilmesi için, maalesef mevcut işleyişten daha fazla dikkat gerektiği açıktır (Topçu, 2021).

Tablo 1. 2008-2018 Yılları Arası Kaza Kusur Dağılımı (TÜİK, 2018)

Yıl	Toplam	Kaza Kusur Dağılımı					
		İnsan kusuru	Toplam kusura oranı (%)	Yol kusuru	Toplam kusura oranı (%)	Araç kusuru	Toplam kusura oranı (%)
2008	167.231	166.094	99.32	698	0.42	439	0.26
2009	155.982	154.579	99.10	958	0.61	445	0.29
2010	157.970	156.463	99.05	992	0.63	515	0.33
2011	174.605	173.031	99.10	1.044	0.60	530	0.30
2012	181.266	179.545	99.05	1.124	0.62	597	0.33
2013	183.030	179.559	98.10	1.913	1.05	1.558	0.85
2014	193.215	190.252	98.47	1.841	0.95	1.122	0.58
2015	210.498	207.417	98.54	1.916	0.91	1.165	0.55
2016	213.149	210.435	98.73	1.717	0.81	997	0.47
2017	213.325	210.594	98.72	1.619	0.76	1.112	0.52
2018	217.898	215.238	98.78	1.300	0.60	1.360	0.62

Şekil 1’de ise insan faktörlü kusurların ortalama % 98.8’lik pay ile kazalardan birinci derecede sorumlu olduğu ve hemen hemen her yıl diğer kusurlardan daha fazla paya sahip olduğu görülmektedir. İnsan faktörlü kusurlar içerisinde sadece sürücü değil yaya ve yolcu kusurlarından kaynaklı kazalarda anlaşılmalıdır. İnsan faktörlü kusurların ardından % 0.7 ile yol kusurları ve % 0.5 ile araç kusurları gelmektedir.



Şekil 1. 2008-2018 Yılları Arası Kaza Kusurlarının Yıllık Oran Dağılımı

Trafik kazalarının oluşumunda etkili olan faktörlerin başında gelen insan, karayollarında üç şekilde; sürücü, yolcu ve yaya olarak yol kullanıcısı olabilir. Yol kullanıcısı olarak sürücü, yaya ve yolcu faktörlü kusurlar, TÜİK tarafından 2013 yılından itibaren detaylı şekilde açıklanmaktadır. 2013 yılı öncesi ise sadece yüzdesel oranlar mevcuttur.

2.1.1. Sürücü Faktörü

Trafik kazalarında sürücüler, yolcu ve yayalardan daha fazla kazaya neden olan yol kullanıcısıdır. Teknolojik gelişmeler, karayolları standartlarının artması ve otomotiv endüstrisindeki gelişmeler ne olursa olsun, kullanıcı olarak insanların, kural ve işaret ve işaretlere uymamaları ayrıca riskli ve agresif sürüş yapmaları önlenemezse kazaların azaltılması da yeterli düzeyde sağlanamaz (Topçu, 2021). 2008-2018 yılları arasında meydana

gelen trafik kazalarında sürücü, yolcu ve yaya faktörlü kusurların dağılımı Tablo 2’de görülmektedir.

Tablo 2. 2008-2018 Yıllarında Kazalarda Sürücü, Yolcu ve Yayalara Ait Kusur Dağılımı (TÜİK, 2018)

Yıl	Toplam	İnsanların Kazadaki Kusur Dağılımı					
		Sürücü kusuru	Toplam kusura oranı (%)	Yaya kusuru	Toplam kusura oranı (%)	Yolcu kusuru	Toplam kusura oranı (%)
2008	166.094	151.386	91.14	13.995	8.43	713	0.43
2009	154.579	139.758	90.41	14.181	9.17	640	0.41
2010	156.463	141.728	90.58	14.171	9.06	564	0.36
2011	173.031	157.494	91.02	14.860	8.59	677	0.39
2012	179.545	161.076	89.71	17.672	9.84	797	0.44
2013	179.559	162.327	90.40	16.458	9.17	774	0.43
2014	190.252	171.236	90.00	18.115	9.52	901	0.47
2015	207.417	187.980	90.63	18.522	8.93	915	0.44
2016	210.435	190.954	90.74	18.612	8.84	869	0.41
2017	210.594	191.717	91.04	18.095	8.59	782	0.37
2018	215.238	194.928	90.56	18.394	8.55	1.916	0.89

Söz konusu on yıl dikkate alındığında Şekil 2’de görüldüğü üzere kazalar; ortalama % 90.5 oranı ile sürücü faktörlü kusurlardan dolayı gerçekleşmiştir. Sürücü kusurlarının ardından ortalama % 9 ile yaya ve % 0.5 oranı ile yolcu faktörlü kusurlar gelmektedir.



Şekil 2. 2008-2018 Yıllarında Kazalarda Sürücü, Yolcu ve Yayalara Ait Kusur Dağılımı

2013-2018 yılları arasında meydana gelen sürücü hatalı kazalar incelendiğinde, sürücülerin ortalama; % 41 oranı ile araç hızını yol, hava ve trafiğin gerektirdiği hız kurallarına uydurmadığı görülmektedir (TÜİK, 2018). Kazaların çoğunlukla hız kurallarına uymamaktan kaynaklandığı ancak son beş yılda bu tür kazalarda % 2 oranında düşüş yakalandığı görülmektedir. Yapılan incelemelerde trafik kazalarında en sık rastlanan sürücü hatalarından ikincisinin; kavşaklarda geçiş önceliklerine uymama olduğu görülmektedir. Özellikle geçiş üstünlüğünün belirlenmediği, trafik işaret ve işaretçilerinin olmadığı bölgelerde gerçekleşen kazalar bu türdendir (Topçu, 2021).

2.1.2. Yolcu Faktörü

Kazaların meydana gelmesinde yolcu faktörünün, diğer faktörlere göre daha az bir oranda gerçekleştiği Tablo 3’te görülmektedir (Topçu, 2021). Yolcu kusurları arasında en büyük pay, nedeni belli olmayan diğer kusurlar olarak görülmektedir. Nedeni belli olan kusurlar arasında ise kask kullanmama ve

emniyet kemeri takmama olduğu görülmektedir. 2018 yılında, kask kullanmama kusuru 2013 yılına göre % 10 oranında azalma, emniyet kemeri takmama kusuru % 4 oranında artış ve diğer yolcu kusurları ise % 1.5 oranında artış göstermiştir. Motosiklet kask kullanımının, ciddi yaralanma ve ölümler üzerinde % 20-45 oranlarında azaltma etkisi olduğu açıklanmıştır (WHO, 2004). Elvik ve Vaa (2004) yaptıkları çalışmada yine kask kullanımının % 25 oranında yaralanma olasılığını azalttığını bildirmişler.

Tablo 3. 2013-2018 Yılları Arası Kazalarda Yolcu Kusurlarının Dağılımı (TÜİK, 2018)

Kazalara neden olan kusurlar	2013		2014		2015		2016		2017		2018	
	Kazı Sayıları	Hata Oranları	Kazı Sayıları	Hata Oranları	Kazı Sayıları	Hata Oranları	Kazı Sayıları	Hata Oranları	Kazı Sayıları	Hata Oranları	Kazı Sayıları	Hata Oranları
Toplam Yolcu Kusurları	774	% 100	901	% 100	915	% 100	869	% 100	782	% 100	1.916	% 100
Kask kullanılmamak	123	% 15.89	139	% 15.43	171	% 18.69	145	% 16.69	135	% 17.26	108	% 5.64
Emniyet kemeri takılmamak	75	% 9.69	95	% 10.54	103	% 11.26	123	% 14.15	132	% 16.88	267	% 13.94
Araçlara kontrolsüz şekilde bürmek ve izlemek	37	% 4.78	38	% 4.22	59	% 6.45	34	% 3.91	44	% 5.63	188	% 9.81
Trafikçi güçleştirecek şekilde yola bir şey atmak-dökmek	55	% 7.11	68	% 7.55	66	% 7.21	52	% 5.98	43	% 5.50	122	% 6.37
Alkolü olarak seyahat etmek	19	% 2.45	18	% 2.00	13	% 1.42	14	% 1.61	13	% 1.66	53	% 2.77
Yolcuya ait diğer kusurlar	465	% 60.08	543	% 60.27	503	% 54.97	501	% 57.65	415	% 53.07	1.178	% 61.48

2.1.3. Yaya Faktörü

Ülkemizde yaya-taşıtlı kazalarının büyük bir bölümü, Tablo 4.’de görüleceği üzere geçit ve kavşakların bulunmadığı yerlerde ve geçme kurallarına uyulmamasından kaynaklanan hatalardan oluşmaktadır (TÜİK, 2018). Şekil 3’te 2018 yılında geçit ve kavşakların olmadığı yerlerde geçme kurallarına uyulmadığı için görülen kazalarda 2013 yılına göre % 7 oranında azalma, taşıt yolu üzerinde trafiği tehlikeye düşürücü hareketlerde bulunma kusurunda % 9 oranında artış ve diğer kusurlarda % 3.5 oranında azalış meydana gelmiştir.

Tablo 4. 2013-2018 Yılları Arası Kazalarda Yaya Kusurlarının Dağılımı (TÜİK, 2018)

Kazalara neden olan kusurlar	2013		2014		2015		2016		2017		2018	
	Kazı Sayıları	Hata Oranları	Kazı Sayıları	Hata Oranları	Kazı Sayıları	Hata Oranları	Kazı Sayıları	Hata Oranları	Kazı Sayıları	Hata Oranları	Kazı Sayıları	Hata Oranları
Toplam Yaya Kusurları	16.458	% 100	18.115	% 100	18.522	% 100	18.612	% 100	18.095	% 100	18.394	% 100
Geçit ve kavşakların bulunmadığı yerlerde geçme kurallarına uymamak	6.998	% 42.52	8.920	% 49.24	8.468	% 45.72	8.504	% 45.69	7.764	% 42.91	6.539	% 35.55
Trafik ışık ve işaretlerine uymamak	1.595	% 9.69	1.907	% 10.53	2.271	% 12.26	2.272	% 12.21	2.473	% 13.67	2.239	% 12.17
Taşıt yolu üzerinde trafiği tehlikeye düşürücü hareketlerde bulunmak	1.639	% 9.90	2.223	% 12.27	2.729	% 14.73	2.929	% 15.74	2.957	% 16.34	3.527	% 19.17
Karşıdan karşıya geçişlerde trafik kurallarına uymamak	1.326	% 8.06	1.306	% 7.21	1.456	% 7.86	1.532	% 8.23	1.520	% 8.40	1.622	% 8.82
Taşıt yoluna girmek	1.100	% 6.68	985	% 5.44	1.161	% 6.27	1.117	% 6.00	1.232	% 6.81	1.267	% 6.89
Taşıt yolunda sol kardan girmek	541	% 3.29	325	% 1.79	341	% 1.84	326	% 1.75	315	% 1.74	376	% 2.04
Gece ve gündüz görüşün az olduğu hallerde carpmayı önleyici tedbirler almamak	494	% 3.00	373	% 2.06	390	% 2.11	332	% 1.78	287	% 1.59	322	% 1.75
Trafikçi güçleştirecek şekilde yola bir şey atmak-dökmek	23	% 0.14	65	% 0.36	17	% 0.09	10	% 0.05	8	% 0.04	43	% 0.23
Alkolü yola çıkmak	11	% 0.07	15	% 0.08	4	% 0.02	5	% 0.03	2	% 0.01	27	% 0.15
Yayaya ait diğer kusurlar	2.741	% 16.65	1.996	% 11.02	1.685	% 9.10	1.583	% 8.52	1.537	% 8.49	2.432	% 13.22

Yaya kazalarının önlenmesi için, yol ve kavşaklar tasarlanırken yayalar kesinlikle göz ardı edilmemeli ve özellikle karşıdan karşıya geçişlerde, geçitlerin yerleri ve özellikleri uygun şekilde tasarlanmalıdır. Bu geçitler yayalar için kullanışlı olmalı ve trafiğin önceliğini belirleyen trafik işaret ve işaretçileri ile yeterli sayıda donatılmalıdır (Şahin, 2012).

2.1.3. Yol ve Trafik Yoğunluğu Faktörü

Ülkemizde 2013-2018 yılları arasında meydana gelen trafik kazalarında yol ve trafik yoğunluğu kusurları nedeniyle gerçekleşen kazalar daha önce verilen Tablo 1’de görüleceği üzere ortalama % 0.7 düzeyinde gerçekleşmiştir (Topçu, 2021). Bu oran ilk başta önemsenmeyecek kadar az gelebilir ancak insan hayatının paha biçilemez değeri açısından bakılınca çok önemli olduğu kesindir. Yol kusurlarına kendi içinde baktığımızda ise her yıl trafik kazalarının oluşumunda Tablo 5’de görüldüğü üzere yol yanında gevşek malzemelerin büyük bir payı vardır (TÜİK, 2018).

Tablo 5. 2013-2018 Yılları Arası Kazalarda Yol Kusurlarının Dağılımı (TÜİK, 2018)

Kazalara neden olan kusurlar	2013		2014		2015		2016		2017		2018	
	Kaza Sayıları	Hata Oranları	Kaza Sayıları	Hata Oranları	Kaza Sayıları	Hata Oranları	Kaza Sayıları	Hata Oranları	Kaza Sayıları	Hata Oranları	Kaza Sayıları	Hata Oranları
Toplam Yol Kusurları	1 913	% 100	1 841	% 100	1 916	% 100	1 717	% 100	1 619	% 100	1 300	% 100
Tekerleklerinde oturma	80	% 4,18	70	% 3,80	97	% 5,06	59	% 3,44	84	% 5,19	99	% 7,62
Şerit çökmesi	271	% 14,17	191	% 10,37	160	% 8,35	122	% 7,11	132	% 8,15	131	% 10,08
Kısmi veya münferit çökme	89	% 4,65	72	% 3,91	80	% 4,18	69	% 4,02	87	% 5,37	53	% 4,08
Düşük banket	49	% 2,56	34	% 1,85	47	% 2,45	28	% 1,63	39	% 2,41	25	% 1,92
Yol yanında gevşek malzeme	710	% 37,11	570	% 30,96	542	% 28,29	542	% 31,57	435	% 26,87	308	% 23,69
Yolda münferit çukur	333	% 12,18	195	% 10,59	225	% 11,74	106	% 10,83	194	% 11,98	162	% 12,46
Diğer yol kusurları	481	% 25,14	709	% 38,51	761	% 39,93	711	% 41,41	648	% 40,02	522	% 40,15

2.1.4. Araç ve Donanım Faktörü

Trafik kazalarına sebep olan kusurlardan bir diğeri olan araç faktörlü kusurlar, insan ve yol kusurlarının ardından gelmektedir. Tablo 1’de görüldüğü üzere araç kusurları 2013-2018 yılları arası ortalama % 0.5 oranında gerçekleşmiştir (Topçu, 2021). Kazalardaki araç faktörlü kusurlar kendi içerisinde incelenirse Tablo 6’da görüldüğü üzere en çok fren arızaları veya lastik kusurlarından dolayı kazaların meydana geldiği görülmektedir (TÜİK, 2018).

Tablo 6. 2013-2018 Yılları Arası Kazalarda Araç Kusurlarının Dağılımı (TÜİK, 2018)

Kazalara neden olan kusurlar	2013		2014		2015		2016		2017		2018	
	Kaza Sayıları	Hata Oranları	Kaza Sayıları	Hata Oranları	Kaza Sayıları	Hata Oranları	Kaza Sayıları	Hata Oranları	Kaza Sayıları	Hata Oranları	Kaza Sayıları	Hata Oranları
Toplam Araç Kusurları	1 588	% 100	1 122	% 100	1 165	% 100	997	% 100	1 112	% 100	1 360	% 100
Kusurlu fren	461	% 29,59	287	% 25,58	288	% 24,72	262	% 26,28	281	% 25,27	416	% 30,59
Kusurlu rot	57	% 3,66	51	% 4,55	39	% 3,35	63	% 6,32	50	% 4,50	63	% 4,63
Makas, şaft, şanzıman, vites arızası	92	% 5,91	51	% 4,55	55	% 4,72	41	% 4,11	62	% 5,58	42	% 3,09
Aks larılması	61	% 3,92	40	% 3,57	47	% 4,03	42	% 4,21	38	% 3,42	35	% 2,57
Kusurlu direksiyon	60	% 3,85	54	% 4,81	54	% 4,64	46	% 4,61	60	% 5,40	50	% 3,68
Far kusuru	49	% 3,15	36	% 3,21	58	% 4,98	43	% 4,31	49	% 4,41	50	% 3,68
Ara lastikler	79	% 5,07	60	% 5,35	60	% 5,15	33	% 3,31	58	% 5,22	41	% 3,01
Dönüş sinyali	24	% 1,54	33	% 2,94	44	% 3,78	18	% 1,81	27	% 2,43	16	% 1,18
Kapu kusuru	81	% 5,20	60	% 5,35	38	% 3,26	35	% 3,51	55	% 4,95	46	% 3,38
Lastik patlaması	388	% 25,55	322	% 28,70	191	% 16,39	289	% 29,99	283	% 25,45	208	% 15,29
Araçta diğer kusurlar	196	% 12,58	128	% 11,41	201	% 17,28	115	% 11,53	140	% 12,40	393	% 28,90

2008-2018 yılları arasında kayıtlı taşıtların türlerine göre kazalara karışan araç sayıları ve toplam taşıt sayıları Tablo 7’de verilmiştir. Tablo 7’den de görüldüğü üzere her yıl kazalara karışan taşıt türü olarak en çok otomobil ve kamyonetler gelmektedir (TÜİK, 2018). Bu sonuç Dai vd. (2010) yaptığı çalışma sonuçlarına göre en çok kazaya karışan araç türleri ile de uyumludur.

Tablo 7. 2008-2018 Yılları Arası Cinslerine Göre Trafikte Kayıtlı ve Trafik Kazasına Karışan Taşıt Sayıları (TÜİK, 2018)

Yıl	Toplam		Otomobil		Otobüs		Minibüs	
	Kayıtlı Taşıt Sayısı	Kazaya Karışan Taşıt Sayısı	Kayıtlı Otomobil Sayısı	Kazaya Karışan Otomobil Sayısı	Kayıtlı Otobüs Sayısı	Kazaya Karışan Otobüs Sayısı	Kayıtlı Minibüs Sayısı	Kazaya Karışan Minibüs Sayısı
2008	13.765.395	135.144	6.796.629	68.671	199.934	4.982	383.548	5.669
2009	14.316.700	146.964	7.093.964	77.007	201.033	4.968	384.053	5.765
2010	15.095.603	156.436	7.544.871	80.418	208.510	5.439	386.973	6.163
2011	16.089.528	179.311	8.113.111	94.333	219.906	6.014	389.435	6.307
2012	17.033.413	210.609	8.648.875	109.512	235.949	6.783	396.119	6.932
2013	17.939.447	251.729	9.283.923	126.738	219.885	7.230	421.848	8.157
2014	18.828.721	264.936	9.857.915	134.041	211.200	6.935	427.264	8.410
2015	19.994.472	290.072	10.589.337	149.449	217.056	6.843	449.213	9.140
2016	21.090.424	295.727	11.317.998	154.096	220.361	6.775	463.933	9.116
2017	22.218.945	294.515	12.035.978	155.291	221.885	6.414	478.618	9.004
2018	22.865.921	300.704	12.398.190	160.078	218.523	6.597	487.527	9.196
Yıl	Kamyon		Kamyonet		Motosiklet		Diğer	
	Kayıtlı Kamyon Sayısı	Kazaya Karışan Kamyon Sayısı	Kayıtlı Kamyonet Sayısı	Kazaya Karışan Kamyonet Sayısı	Kayıtlı Motosiklet Sayısı	Kazaya Karışan Motosiklet Sayısı	Kayıtlı Diğer Taşıt Sayısı	Kazaya Karışan Diğer Taşıt Sayısı
2008	744.217	10.436	2.066.007	21.628	2.181.383	19.210	1.393.677	4.548
2009	727.302	10.157	2.204.951	24.367	2.303.261	20.101	1.402.136	4.599
2010	726.359	11.119	2.399.038	26.478	2.389.488	21.604	1.440.364	5.215
2011	728.458	11.953	2.611.104	30.404	2.527.190	24.350	1.500.324	5.950
2012	751.650	12.865	2.794.606	34.961	2.657.722	31.577	1.548.492	7.979
2013	755.950	14.260	2.933.050	40.648	2.722.826	40.699	1.601.965	13.997
2014	773.728	14.138	3.062.479	42.047	2.828.466	43.059	1.667.669	16.306
2015	804.319	15.280	3.255.299	45.452	2.938.364	46.310	1.740.884	17.598
2016	825.334	15.484	3.442.483	46.402	3.003.733	46.481	1.816.582	17.373
2017	838.718	16.178	3.642.625	46.156	3.102.800	44.855	1.898.321	16.617
2018	845.462	14.365	3.755.580	46.105	3.211.328	46.545	1.949.311	17.818

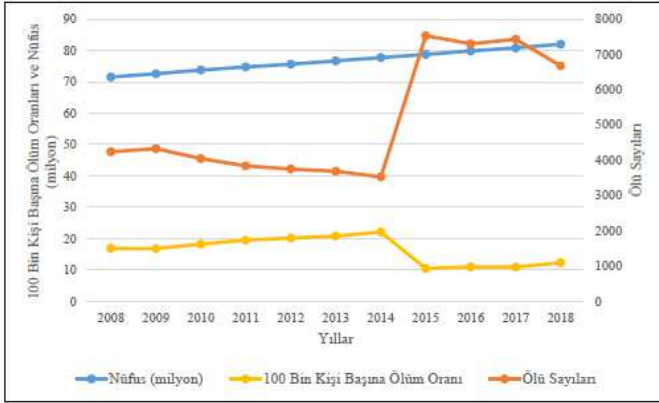
2.1.5. Coğrafi ve İklim İle İlgili Faktörler

Trafik kazalarında çevre faktörleri de kazaların oluşumunda önemli olan bir faktördür (Zhang vd., 2013). Dolayısı ile bir bölgenin jeolojik, topoğrafik veya meteorolojik şartları trafik ve trafik kazalarında önemli rol oynar. Çevre faktörlerinin en önemlilerinden olan; hava koşulları; sıcak, soğuk, ışık, gündüz, gece, sis, hava kirliliği, rutubet, fırtına, yağmur ve kar yağışı gibi etkenler, araçların çalışmasını ve yol koşullarını bozarak insanların davranışlarını veya reflekslerini etkileyerek trafik kazalarına neden olabilir. Ancak ülkemizde kaza raporlama aşamasında bu verilerin yetersizliği nedeniyle açıklanan veriler incelendiğinde kazaların sadece oransal olarak yağmurlu, güneşli vb. havalarda gerçekleştikleri verisi bulunmuştur (Topçu, 2021).

2.2. Dünyada ve Türkiye’de Trafik Kazaları

Trafik kazaları, sadece Türkiye’de değil dünyada tüm ülkelerde telafisi mümkün olmayan kayıplara neden olmaktadır. Örneğin dünya araç filosunun yalnızca % 2’sini oluşturan Afrika bölgesi, küresel toplam ölüm sayısının % 16’sını tek başına oluşturmaktadır (Ajibola, 2015). Dünyadaki araçların yaklaşık yarısına sahip olan düşük ve orta gelirli ülkelerde, dünyadaki toplam karayolu ölümlerinin % 91’i gerçekleşmektedir. Amerika Birleşik Devletleri’nde ise 2000 yılında yüz bin nüfus başına ölüm oranı 14.9 kişi iken, bu rakam 2015 yılında 10.9’a düşmüştür (OECD, 2017). Trafik kazalarına bağlı ölümlerin en çok yaşandığı kıta % 26.6 ile Afrika, en az yaşandığı kıta ise % 9.3 ile Avrupa kıtasıdır. Doğu Akdeniz ülkelerinde yüz bin kişi başına 19.9, Batı Pasifik ülkelerinde 17.3 ve Güneydoğu Asya ülkelerinde 17 kişi

hayatını trafik kazalarında kaybetmektedir (Akdağ, 2019). Türkiye’de ise yüz bin kişi başına ölüm oranları 2008 yılında 16.88 iken 2018 yılında 12.29 oranına düşmüştür. Türkiye’deki yüz bin kişi başına ölüm oranları söz konusu yıllar için Şekil 3’te verilmiştir.



Şekil 3. 2008-2018 Yılları Arası 100 Bin Kişi Başına Ölüm Oranları

Dünyada yüz bin kişi başına trafik kazası ölümlerinin ortalaması 17.4’tür. Yüksek gelir grubundaki ülkelerde bu oran 9.2, orta gelir grubundaki ülkelerde 18.4’dır. Düşük gelir grubundaki ülkelerde ise 24.1’lik bir oran ile oldukça yüksektir. Trafik kazaları sebebi ile ölümler ve toplam nüfus karşılaştırıldığında, yüksek gelir grubundaki ülkeler; dünya nüfusunun %18’ne ve trafik ölümlerinin sadece %10’una, orta gelir grubundaki ülkeler; dünya nüfusunun % 70’ine ve trafik ölümlerinin %74’üne ve düşük gelir grubundaki ülkeler ise dünya nüfusunun sadece % 12’sine ve trafik kazalarının % 16’sına sahiptir (Akdağ, 2019).

Avrupa ülkelerinde araç başına kaza oranlarının incelendiği 2012 yılında; Türkiye 0.764 kaza oranıyla üçüncü, araç başına 0.031 ölüm oranıyla dördüncü ve araç başına 1.352 yaralanma oranıyla birinci sırada olmuştur (Özen vd., 2014). Ekonomik İş Birliği ve Kalkınma Örgütü (OECD) ülkeleri içerisinde yapılan yol güvenliği karşılaştırmasında en kötü güvenlik seviyesine sahip ülkeler; 5.21 oran ile Yunanistan, 2.72 oran ile Bulgaristan ve 2.31 oran ile İtalya olarak sıralanmaktadır. Türkiye ise bu üç ülkenin ardından 1.62 olan güvenlik seviyesi ile dördüncü sırada gelmektedir. Türkiye’nin ardından 1.55 oranı ile Litvanya ve 1.53 oranı ile Slovakya gelmektedir (EDAM, 2018). Yine 2000-2015 yılları arasında meydana gelen trafik kaza sayılarının incelenmesi ile birçok OECD ülkesinde, trafik yoğunluğuna göre oluşan trafik kaza sayılarının azaldığı, Yeni Zelanda ve İrlanda’da sabit kaldığı, Yunanistan ve Türkiye’de ise sırasıyla % 8 ve % 19 oranında arttığı belirlenmiştir (EDAM, 2018).

Tablo 8’te Avrupa birliğine bağlı olan 28 ülke ile Türkiye’de ki 2017 yılına ait trafik kaza bilgileri görülmektedir. Tablo 8 incelendiğinde, 2017 yılında Türkiye’nin, bin kişiye düşen otomobil sayısı bakımından en az otomobile sahip ülke olduğu, buna karşın bir milyon otomobile düşen ölü sayısı bakımından 617 ile (617/1000000) ilk sırada yer aldığı görülmektedir. Otomobil başına en az kayıp veren ülke ise 53 ile İsveç olmuştur. AB’ne bağlı 28 ülkeye kıyasla Türkiye, otomobil başına düşen ölü sayısı (2018 yılında 538) ve nüfus başına düşen ölü sayısı (2018 yılında 81) bakımından ortalamanın çok üstündedir (UBAK, 2018).

Tablo 8. Türkiye ve Avrupa Ülkelerine Ait Trafik Kaza Bilgileri ile Bin Kişiye Düşen Otomobil Sayısı (UBAK, 2018)

ÜLKE	Ölümlü ve Yaralanmalı Kaza Sayısı	Ölü Sayısı	Bin Kişiye Düşen Otomobil Sayısı	Bir Milyon Otomobile Düşen Ölü Sayısı	Bir Milyon Kişiye Düşen Ölü Sayısı
TÜRKİYE	182.669	7.427	149	617	92
ALMANYA	302.656	3.180	561	69	38
AVUSTURYA	37.402	414	555	85	47

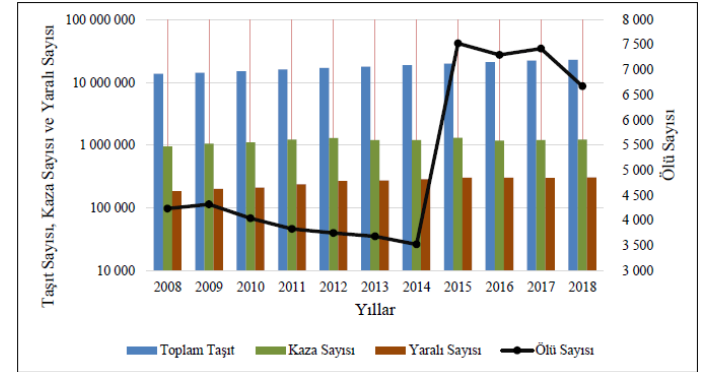
2.2.1. Türkiye’de Trafik Kazaları

Ülkemizde karayollarındaki trafik kaza verileri Emniyet Genel Müdürlüğü (EGM) ile Jandarma Genel Komutanlığı tarafından derlenmektedir. Ülkede trafik kazalarının sonuçları hem maddi hem de manevi olarak endişe verici boyutlardadır. Tablo 9’da toplam taşıt sayıları, gerçekleşen trafik kazaları ile ölü ve yaralı sayıları görülmektedir (TÜİK, 2018).

Tablo 9. 2008-2018 Yılları Arası Türkiye’de Gerçekleşen Trafik Kazaları İle Ölü ve Yaralı Sayıları (TÜİK, 2018)

Yıl	Toplam Taşıt	Kaza Sayısı	Ölü Sayısı	Yaralı Sayısı
2008	13.765.395	950.120	4.236	184.468
2009	14.316.700	1.053.346	4.324	201.380
2010	15.095.603	1.106.201	4.045	211.496
2011	16.089.528	1.228.928	3.835	238.074
2012	17.033.413	1.296.634	3.750	268.089
2013	17.939.447	1.207.354	3.685	274.829
2014	18.828.721	1.199.010	3.524	285.060
2015	19.994.472	1.313.359	7.530	304.421
2016	21.090.424	1.182.491	7.300	303.812
2017	22.218.945	1.202.716	7.427	300.383
2018	22.865.921	1.229.634	6.675	307.071

Şekil 4’te 2008-2018 yılları arası taşıt sayıları ile Türkiye’de gerçekleşen trafik kaza, ölü ve yaralı sayılarına göre artış azalış eğilimi verilmiştir. Şekil incelendiğinde taşıt sayılarında her geçen yıl görülen artış oranlarına rağmen kaza sayısının aynı oranlarda artmadığı görülmektedir.



Şekil 4. 2008-2018 Yılları Arası Taşıt Sayıları ile Türkiye’de Gerçekleşen Trafik Kaza, Ölü ve Yaralı Sayıları

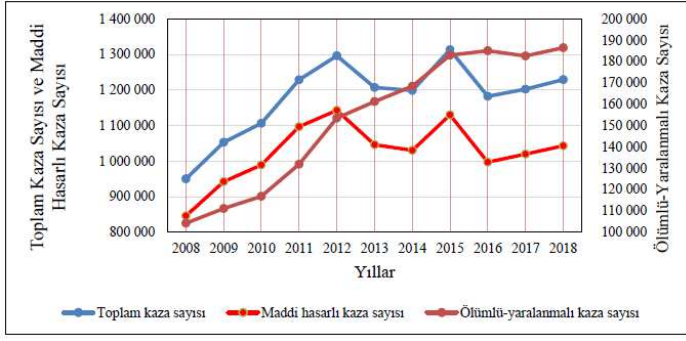
Tablo 10’da verilen Türkiye’de gerçekleşen kaza sayılarına göre (TÜİK, 2018); 2018 yılında ölümlü ve yaralanmalı kazaların 2008 yılına göre % 79 oranında ve maddi hasarlı kazaların % 23.3 oranında arttığı görülmektedir

Tablo 10. 2008-2018 Yılları Arası Türkiye’de Gerçekleşen Ölümlü-Yaralanmalı ve Maddi Hasarlı Kaza Sayıları (TÜİK, 2018)

Yıl	Toplam Kaza Sayısı	Ölümlü-Yaralanmalı Kaza Sayısı	Maddi Hasarlı Kaza Sayısı
2008	950.120	104.212	845.908
2009	1.053.346	111.121	942.225
2010	1.106.201	116.804	989.397
2011	1.228.928	131.845	1.097.083
2012	1.296.634	153.552	1.143.082
2013	1.207.354	161.306	1.046.048
2014	1.199.010	168.512	1.030.498
2015	1.313.359	183.011	1.130.348
2016	1.182.491	185.128	997.363
2017	1.202.716	182.669	1.020.047
2018	1.229.634	186.532	1.042.832

Şekil 5’de görüldüğü üzere kaza sayılarında yıllar itibarıyla büyük değişiklikler gözükmesine de ölümlü-yaralanmalı ve maddi hasarlı kaza sayılarına bakıldığında ölümlü-yaralanmalı kazaların, kaza sayılarına paralel bir şekilde 2017 yılı hariç gün

geçtikçe artmakta olduğu görülmektedir. Maddi hasarlı kazalar ise 2013, 2014 ve 2016 yıllarında azalış gösterse de diğer yıllar artış göstermiştir.



Şekil 5. Şekil 5. 2008-2018 Yılları Arası Türkiye'de Gerçekleşen Ölümlü-Yaralanmalı ve Maddi Hasarlı Kaza Sayıları

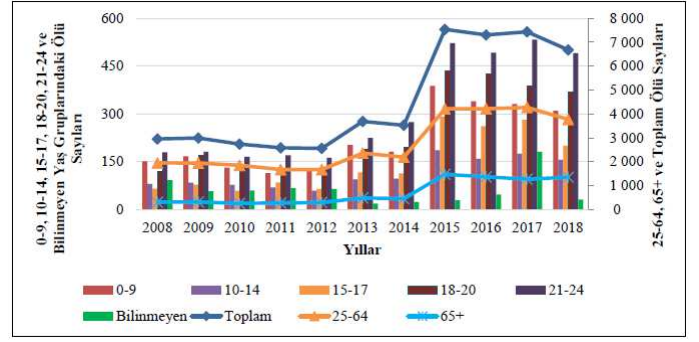
2.2.2. Trafik Kazalarının Yaşlara Göre Dağılımı

2008 ile 2018 yılları arasında, trafik kazalarında ölen insanların yaş grupları (0-9, 10-14, 15-17, 18-20, 21-24, 25-64, 65+) Tablo 11.'de verilmiştir (TÜİK, 2018). Trafik kazaları sonucunda en fazla ölümlerin 25-64 yaş grubunda ve 65 yaş üstü grupta olduğu görülmektedir. Bu sonuçlar ile riskli yaş grupları dünyadaki eğilime benzer riskli yaş aralığında bulunmuştur (Topçu, 2021). Sürücüler için ehliyet başına ölüm oranının yaklaşık 50 veya 60'ıncı yaştan sonra, yaşla birlikte arttığı bilinmektedir. Bu artış, yaşlandıkça insanların daha kırılğan/korunmasız hale gelmesinden kaynaklanmaktadır. Örneğin İngiltere'de, trafik kazalarında yaralanan araç kullanıcılarının 30-49 yaş arasındakilerin, % 0.6'sı yaralanmaları nedeniyle hayatını kaybederken, 70-79 yaş arasındakilerin % 2.0'si ve 80 yaş ve üzerindekiilerin % 4.5'i yaralanmamalardan kaynaklı hayatını kaybettiği açıklanmıştır (Box vd., 2010).

Tablo 11. 2008-2018 Yılları Arası Türkiye'de Gerçekleşen Trafik Kazalarında Ölen İnsanların Yaş Grubuna Göre Sayıları (TÜİK, 2018)

Yaş Grubu	Toplam	0-9		10-14		15-17		18-20		21-24		25-64		65+		Bilinmeyen	
2008	2.948	151	% 5,12	80	% 2,71	65	% 2,20	121	% 4,10	179	% 6,07	1.949	% 66,11	311	% 10,55	92	% 3,12
2009	2.993	167	% 5,58	84	% 2,81	78	% 2,61	169	% 5,65	181	% 6,05	1.939	% 64,78	318	% 10,62	57	% 1,90
2010	2.738	131	% 4,78	77	% 2,81	59	% 2,15	142	% 5,19	165	% 6,03	1.848	% 67,49	256	% 9,35	60	% 2,19
2011	2.582	114	% 4,42	69	% 2,67	85	% 3,29	129	% 5,00	170	% 6,58	1.674	% 64,83	274	% 10,61	67	% 2,59
2012	2.555	120	% 4,70	59	% 2,31	64	% 2,50	125	% 4,89	162	% 6,34	1.669	% 65,32	292	% 11,43	64	% 2,50
2013	3.685	202	% 5,48	95	% 2,58	116	% 3,15	187	% 5,07	224	% 6,08	2.354	% 63,88	488	% 13,24	19	% 0,52
2014	3.524	181	% 5,14	97	% 2,75	113	% 3,21	195	% 5,53	274	% 7,78	2.189	% 62,12	452	% 12,83	23	% 0,65
2015	7.530	387	% 5,14	186	% 2,47	291	% 3,86	436	% 5,79	522	% 6,93	4.205	% 55,84	1.474	% 19,58	29	% 0,39
2016	7.300	339	% 4,64	159	% 2,18	262	% 3,59	424	% 5,81	492	% 6,74	4.212	% 57,70	1.365	% 18,70	47	% 0,64
2017	7.427	331	% 4,46	175	% 2,36	281	% 3,78	388	% 5,22	533	% 7,18	4.266	% 57,44	1.272	% 17,13	181	% 2,44
2018	6.675	309	% 4,63	156	% 2,34	200	% 3,00	369	% 5,53	490	% 7,34	3.771	% 56,49	1.349	% 20,21	31	% 0,46

Şekil 6'da ise yaş gruplarına göre ölen insanların sayılarına göre artış ve azalış eğilimi gösterilmiştir.



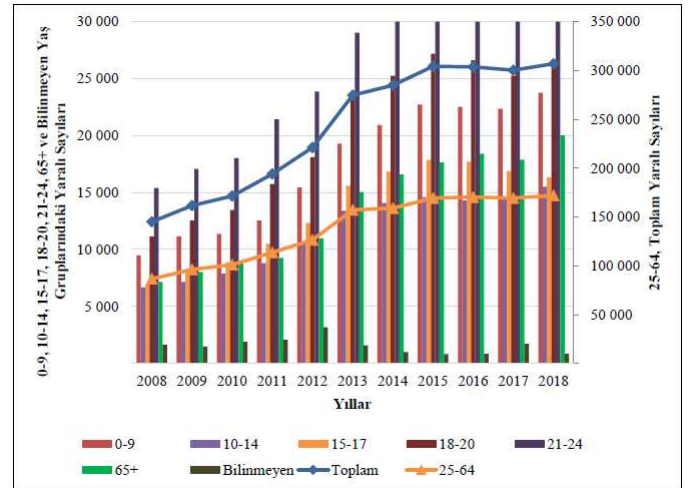
Şekil 6. 2008-2018 Yılları Arası Ölen İnsanların Yaş Gruplarına Göre Dağılımları

Tablo 12'de verilen 2008 ile 2018 yılları arası Türkiye'de gerçekleşen trafik kazalarında yaralanan insanların yaş gruplarına bakıldığında ölen insanlara benzer şekilde, kazalar sonucunda en fazla yaralanan insanların yine 25-64 yaş grubunda olduğu belirlenmiştir. Ardından 65 yaş üstü yaş grubu gelmektedir.

Tablo 12. 2008-2018 Yılları Arası Türkiye'de Gerçekleşen Trafik Kazalarında Yaralanan İnsanların, Yaş Grubuna Göre Sayıları (TÜİK, 2018)

Yaş Grubu	Toplam	0-9	10-14	15-17	18-20	21-24	25-64	65+	Bilinmeyen								
2008	145.163	9.486	%6,53	6.689	%4,61	6.930	%4,77	11.138	%7,67	15.416	%10,62	86.686	%59,72	7.176	%4,94	1.642	%1,13
2009	161.719	11.160	%6,90	7.173	%4,44	7.965	%4,93	12.535	%7,75	17.068	%10,55	96.273	%59,53	8.047	%4,98	1.498	%0,93
2010	171.475	11.371	%6,63	7.873	%4,59	8.846	%5,16	13.468	%7,85	18.037	%10,51	103.214	%59,03	8.775	%5,12	1.911	%1,11
2011	194.149	12.537	%6,46	8.797	%4,53	10.511	%5,41	15.769	%8,12	21.443	%11,04	113.732	%58,58	9.273	%4,78	2.087	%1,07
2012	221.108	15.465	%6,99	10.647	%4,82	12.328	%5,58	18.124	%8,20	23.880	%10,80	126.517	%57,22	10.982	%4,97	3.165	%1,43
2013	274.829	19.303	%7,02	13.405	%4,88	15.599	%5,68	23.540	%8,57	29.031	%10,56	157.301	%57,24	15.060	%5,48	1.590	%0,58
2014	285.059	20.920	%7,34	14.083	%4,94	16.847	%5,91	25.253	%8,86	31.193	%10,94	159.177	%55,84	16.585	%5,82	1.001	%0,35
2015	304.421	22.738	%7,47	14.585	%4,79	17.875	%5,87	27.191	%8,93	34.059	%11,19	169.498	%55,68	17.656	%5,80	819	%0,27
2016	303.812	22.530	%7,42	14.320	%4,71	17.709	%5,83	26.615	%8,76	33.081	%10,89	170.300	%56,05	18.411	%6,06	846	%0,28
2017	300.383	22.342	%7,44	14.634	%4,87	16.894	%5,62	25.247	%8,40	32.284	%10,74	169.375	%56,39	17.898	%5,96	1.729	%0,58
2018	307.071	23.765	%7,74	15.524	%5,06	16.322	%5,32	25.995	%8,47	32.515	%10,59	172.077	%56,04	20.031	%6,52	842	%0,27

Şekil 7'de ise yıllar içinde yaş gruplarına göre kazalarda yaralanan insanların sayılarına göre artış ve azalış eğilimi verilmiştir.



Şekil 7. 2008-2018 Yılları Arası Yaralıların, Yaş Gruplarına Göre Dağılımları

Genel olarak gençlerin dâhil olduğu kazalarda sürücü faktörlü kusurlar daha belirgindir (Casado-Sanz vd., 2020). Sürücü hatası olan kazalar incelendiğinde ise genç sürücülerin % 80 oranı ile daha çok kusura sahip oldukları açıklanmıştır (Cury vd., 2011). Amarasinha ve Dissanayake (2014) gençlerin, hafta sonları geç saatlerde araç kullanmak, geçerli olmayan bir belge ile araç kullanmak, emniyet kemeri takmamak ve uygun olmayan yol

yüzeylerinde (çakıl, ıslak yüzey vb.) araç kullanma eğilimleri nedeniyle kazalara karışma oranlarının daha yüksek olduğunu açıklamışlardır.

3. Tartışma ve Sonuçlar

2008 ve 2018 yılları arasında meydana gelen maddi hasarlı, ölümlü ve yaralanmalı kazalardaki kusur oranları incelendiğinde; insan faktörlü (sürücü, yaya ve yolcu) kusur oranı % 98,80, yoldan kaynaklanan kusur oranı % 0,70 ve taşıt faktörlü kusur oranı % 0,50 olarak bulunmuştur. Söz konusu yıllar için tek başına en fazla orana sahip insan kusurlarına bakıldığında ise ortalama % 90,5 oran ile sürücü faktörlü kusurlar en fazla görülen kaza nedeni olmuştur. Sürücü kusurlarının ardından ortalama % 9 ile yaya ve % 0,5 oranı ile yolcu faktörlü kusurlar gelmiştir. Yol faktörlü kusurlara bakıldığında ise 2018 yılında yol sağındaki gevşek malzemelerin kazalara etkisinde 2013 yılına göre; % 13,5 oranında azalma, şerit çökmesinde % 4 oranında azalma ancak diğer kusurlarda % 15 oranında bir artış görülmüştür. Kazalardaki araç faktörlü kusurlar kendi içerisinde incelendiğinde araçlardaki fren arızası 2013 yılına göre % 1 oranında artış göstermişken, lastik kusurları % 10 oranında azalma ancak diğer kusurlar % 16,5 oranında artış göstermiştir.

2017 yılında yapılan bir çalışmada Türkiye'nin, bin kişiye düşen otomobil sayısı bakımından AB içerisinde en az otomobile sahip ülke olduğu, buna karşın bir milyon otomobile düşen ölü sayısı bakımından 617 ile (617/1000000) ilk sırada yer aldığı görülmektedir. AB'ne bağlı ülkelerle yapılan kıyasta Türkiye, gerek otomobil başına düşen ölü sayısı (2018 yılı için 538 adet) gerekse nüfus başına düşen ölü sayısı (2018 yılında 81 kişi) bakımından maalesef ortalamanın çok üstünde sayılara sahip olmuştur (UBAK, 2018). Maddi hasarlı, ölümlü ve yaralanmalı kazaların sonuçlarına baktığımızda (Tablo 10), 2018 yılında ölümlü ve yaralanmalı kazaların 2008 yılına göre % 79 oranında ve maddi hasarlı kazaların yine aynı yıla oranla % 23,3 oranında arttığı görülmektedir. Ancak 2015 yılında trafik kazaları sonucu gerçekleşen ölüm sayısının bir önceki yıla göre yaklaşık 2 kat artması gibi orantısız bir artış gözlemlenmiştir. Bu artışa, 2015 yılından itibaren trafik kazaları sonucu 30 gün içerisinde ölenlerinde trafik kazası ölümlerine dâhil edilmesi neden olmuş olabilir. Türkiye'de yüz bin kişi başına ölüm oranları ise 2008 yılında 16,88 iken 2018 yılında 12,29 oranında bulunmuştur. Kaza sayılarının artmasına rağmen bu oranların düşmesine daha korunaklı araçlar, daha caydırıcı trafik cezaları, bölünmüş yol hamlesi sonucu karayolları standartlarının artması ve daha hızlı acil sağlık hizmetleri neden olmuş olabilir.

Ülkede kazalara en çok karışan taşıt türü Tablo 7'de görüldüğü üzere; ilk sırada otomobiller ve ikinci sırada kamyonetlerdir. 2008 ve 2018 yılları arasında taşıt sayısı sürekli artış eğiliminde olmuştur. Ancak 2017 yılında bir önceki yıla göre motorlu kara taşıt sayısı % 5,4 oranında artış göstermişken bu oran 2018 yılında % 2,9 olmuştur. Bu aradaki % 2,5 oranlık düşüşe, ülkenin 2018 yılı içinde yaşadığı ekonomik kriz ve alım gücünün düşmesi neden olmuş olabilir.

Türkiye'de gerçekleşen trafik kazalarında ölen insanların yaş gruplarına bakıldığında kazalar sonucunda en fazla ölenlerin 15-65 yaş grubu ile 65 yaş üstü olduğu görülmektedir. Trafik kazaları sonucu, 2008 yılından 2015 yılına kadar her yıl ortalama 315 çocuk, 2015 yılından 2018 yılına kadar ortalama 769 çocuk (0-17 yaş grubundan) hayatını kaybetmiştir. Ayrıca 2008 yılından 2015 yılına kadar her yıl ortalama 35 bin çocuk, 2015 yılından 2018 yılına kadar ortalama 55 bin çocuk (0-17 yaş grubundan) trafik kazaları sonucu yaralanmıştır.

Dünya Sağlık Örgütü, dünya genelinde 3 ila 35 yaş arasında bireyler için trafik kazalarının, diğer kaza ve hastalıklara göre en başta gelen ölüm ve engelli olma nedeni olduğunu bildirmiştir (Şengül, 2015). Sonuçlara bakıldığında ülkede özellikle çocukların daha korunaklı/güvenli seyahatlere sahip olması için acil eylem planlarına ihtiyaç olduğu açıktır. Ayrıca toplam trafik kazaları sonucu en fazla ölümün aktif nüfus içinden gerçekleştiği belirlenmiştir. Bu ülkemiz için her yıl trafik kazalarının, işgücünde de büyük kayıplara neden olması anlamına gelmektedir. Ülkede artan kentleşme oranları ve taşıt sayısı ile birlikte maalesef kaza sayılarının da arttığı görülmektedir.

Trafik kazaları çoğunlukla beklenmedik, rastgele meydana gelen talihsiz olaylar olarak kabul edilir. Ancak, kaza verilerinin analizleri ve ilgili güvenlik önlemlerinin uygulanmasıyla, trafik kazalarının oluşması önlenemez veya yaralanma şiddeti azaltılabilir (Zhang vd., 2013; WHO, 2004). Türkiye'de son yıllarda meydana gelen kazalar sonucu ülkenin, telafisi mümkün olmayan birçok maddi ve manevi kaybı olduğu açıktır. Birçok ülke trafik kazalarını azaltmak için "Vizyon Sıfır" adlı çalışmalar yaparak güvenli karayolları meydana getirmek için çaba sarf etmektedir. Türkiye'nin sahip olduğu ölüm, yaralanma ve maddi hasarlı kaza sayıları göstermektedir ki çok hızlı ve ülke ölçeğinde trafik kazalarını azaltma eylem planına ihtiyaç vardır. Özellikle kusurlarda en fazla orana sahip insan için eğitim, bilinçlendirme ve farkındalık çalışmaları için tüm sosyal medya kanallarının kullanılması tavsiye edilmektedir.

4. Teşekkür

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Performance Evaluation of Camera-Based Time to Collision Calculation with Different Detectors&Descriptors

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Abstract

Nowadays, the demand for producing and using autonomous vehicle is increasing. Due to the latest developments in technology, the capabilities of these vehicles in accident prevention are increasing. As a result of the accuracy of these capabilities, it is very important because it is human life. In today's technology, the collision time calculation called TTC (Time to Collision) can be done in two different ways. The first of these methods is lidar-based calculation. In this paper TTC will be calculated using the camera-based method with different combinations of detectors and descriptors. Pros and cons of these methods will be discussed. The aim of this paper is to expose an exacting performance for related methods, especially its diverse combinations are used matching. In these experiments images are used for 10 images taken from real time traffic scenario of preceding vehicle. This paper includes seven methods for detectors and 6 methods for descriptors. These detectors and descriptors are used in 42 different combinations. The analysis includes four parameters such as total keypoint detection, total matches, total time in ms and performance ratio which is total matches divided by total time.

Anahtar Kelimeler: Autonomous vehicles, TTC, Image processing, Lidar, Detector, Descriptor.

Farklı Dedektörler ve Tanımlayıcılar ile Kamera Tabanlı Çarpışma Süresinin Hesaplanmasının Performans Değerlendirmesi

Öz

Günümüz otonom araç üretme ve kullanma talebi giderek artmaktadır. Teknolojideki son gelişmeler nedeniyle bu araçların kaza önleme konusundaki yetenekleri de aynı oranda artmaktadır. Bu yeteneklerin doğruluğunun bir sonucu olarak insan hayatı söz konusu olduğu için oldukça önemlidir. Günümüz teknolojisinde TTC (Time to Collision) adı verilen çarpışma süresi hesabı iki farklı şekilde yapılabilmektedir. Bu yöntemden ilki lidar tabanlı hesaplama. Bu yazıda TTC, farklı dedektör ve tanımlayıcı kombinasyonları ile kamera tabanlı yöntem kullanılarak hesaplanacaktır. Bu yöntemlerin artıları ve eksileri tartışılacaktır. Bu bildirinin amacı, özellikle çeşitli kombinasyonların eşleştirilmesi için kullanılan yöntemler için titiz bir performans ortaya koymaktır. Bu deneylerde, öndeki aracın gerçek zamanlı trafik senaryosundan alınan 10 görüntü kullanılmıştır. Bu bildiri, dedektörler için yedi yöntem ve tanımlayıcılar için 6 yöntem içermektedir. Bu dedektörler ve tanımlayıcılar 42 farklı kombinasyonda kullanılmaktadır. Analiz toplam anahtar nokta tespiti, toplam eşleşmeler, mili-saniye cinsinden toplam süre ve toplam eşleşmelerin toplam süreye bölünmesiyle elde edilen performans oranı gibi dört parametreyi içerir.

Keywords: Otonom araçlar, TTC, İmge işleme, Lidar, Dedektör, Tanımlayıcı.

1. Introduction

Currently, nearly 50 known companies are working on autonomous vehicles. Among these companies are the leading companies of the automotive world such as Tesla, BMW and Mercedes. In addition, spare parts supply companies that support these companies have directed their production on autonomous vehicles.

In addition to autonomous vehicles, changing lanes, reminding the speed signs, warning the driver against various road warning sign and providing awareness, placing cameras in various parts of the vehicle so that the driver can see the angles that the driver cannot see, increasing the driver's awareness of environmental effects with sensors such as radar and lidar, parking assist systems and blind spot detection systems are available to improve the driver's driving experience. Such systems are called Advanced Driver Assistance Systems (ADAS), and these systems are the precursors of autonomous vehicles as well as features that autonomous vehicles should acquire. In addition to the systems in the market with vehicles that offer autopilot, there are also vehicles that only offer ADAS.

In this paper, prototypes of autonomous vehicles, sensors and the concept of autonomous will also be discussed. For this reason, not all vehicles are fully autonomous. A standard has been established by a community known as the Society of Automotive Engineers (SAE International), called the autonomous level. According to this standard [1], a table was created according to the autonomy levels of autonomous vehicles. These levels of autonomy are shown in the Table 1 below.

Acquire useful datas from sensors for autonomous vehicles are important. Sensors and algorithms developed over the years are used to obtain these real-world data with the least possible loss. These algorithms work in the form of obtaining objects structurally. Image processing has a lot of example in real world. Image matching is a very important process to obtain meaningful information. However, due to the size of the data to be processed, this application is a very difficult situation due to the time in real-time applications. For this reason, in this study time is one of the benchmark parameters and one of the two parameters in performance measurement. To elicit and test these result an image database is taken from UDACITY Sensor Fusion Nanodegree Program. It includes 10 images that taken from real time traffic scenario. This paper consist of the following heading, previous studies about detector-descriptor algorithms are given in section two, in third section engineering logic is explained, fourth and fifth section explained time to collision logic with camera and lidar sensors. Sixth section includes the performance results and seventh section includes results will be discussed. Table 1 shows automation level of autonomous driving.

Table 1. Automation Level of Autonomous Driving

Driving Level	Driving Name	Driving Information
0	No Automation	There are systems on the vehicles to assist the driver, the drivers still perform the driving task.
1	Driver Assistance	Vehicles have only one automatic system such as acceleration or steering system. Adaptive cruise control is best example of level 1.
2	Partial Automation	There must be a driver in the driver's seat and must be able to interfere with the driving in case of mishaps.
3	Conditional Automation	Vehicles at this level have environmental sensing capabilities
4	High Automation	Vehicles can intervene in the event of undesired traffic or system failure.
5	Full Automation	Vehicles of this level do not require human attention. The driving task of the driver is eliminated.

The sensor set of an example autonomous vehicle is as follows:

- 360 degree Lidar scanner on top of vehicle
- 360 degree coverage radar
- Camera in the upper front of the vehicle
- Camera to the sides and back
- GPS antenna on vehicle roof
- Processing and storage unit

Cameras: Roof cameras can focus at far and near distances. It can monitor braking vehicles, pedestrians, traffic lights and traffic signs. The cameras transmit their image outputs to a central processing computer where the data of other sensors can be processed together. Just like the human eye, the night performance

of cameras also decreases. This makes cameras less reliable in terms of detection levels and locating accuracy.

Radars: Radars emit radio waves that have the ability to reflect back from objects. The returning waves can be analyzed with their return time and shifted frequency. Another feature is that radars are the only sensors that can measure the speed of objects directly, making the radar distinguishable from camera and lidar in this regard. In addition, the radar is very resistant to adverse weather conditions such as snowfall and fog. Radar, which has been used for many years, gives the best results when identifying large objects with good reflectivity. The performance of the radar is degraded when identifying objects with low reflectivity. Even if the camera and radar work well together, there are cases where both sensors do not work optimally. For these reasons, autonomous vehicle manufacturers add a third sensor in addition to these two sensors.

Lidar: Lidar works similarly to radar. However, unlike radar, it uses infrared light instead of radio waves. The ceiling mounted lidar sensor rotates at high speed. Creates a detailed laser beams 3D model of its surroundings. 128-layer sensors a total of 128 laser beams are used to detect distances up to 300 meters. During a 360-degree rotation, approximately 4 million dots occur per second. Like a camera, a lidar is an optical sensor. Cameras are dependent on ambient light while lidar does not have these dependencies. However, the performance of lidar decreases in adverse weather conditions such as heavy snowfall and fog. In such an environment, the spots formed by the lidar may not be sufficient for detection. For this, it should be supported with sensors besides lidar.

2. Material and Method

2.1. Proposed Studies

In literature, there are too many works related to keypoint detectors and descriptors combinations for comparing their performances. Which combination is more successful is related to which performance measurement parameter the results of these processes are related to. Distinctive features in the images are defined by concepts called detector and descriptor. One of these concepts, the detector finds the important points in the image. The descriptor is a definition that can be matched with each other in common features among different images and is obtained by calculating these features. Image recognition methods are described in the referenced studies below. In the one of the proposed study numbered [2-5], the results revealed the results of BRISK, FREAK, SURF, SIFT descriptors. The best performance seeks the best match between the targeted detection accuracy, speed and the objects it detects in the targeted study. This method is too sensitive to deterioration and robustness cannot be fully ensured. Addition, the linear forward and backward movements of the camera system of the study are too limited. In [6], it is a study investigating detector and descriptor methods for studies on photogrammetrics. It compares five keypoint detector in terms of correctly detected corners, their positions, the density of detected points. But the five methods are few for comparison and the performance analysis does not give a very accurate result. Reference study [7] aims to find the best combination in parallel with our study. For this purpose, it analyzes different combinations with 7 detector and 2 descriptors. A dataset contains 60 images was used. In previous references, in this reference also and in our study, different criteria were used to evaluate

performance results. Finally, another study [8] is a study on occlusions and was carried out using a moving camera. Four descriptors were used in the study. These are the SIFT, FREAK, SURF and BRISK descriptors.

The difference of our study from these proposed papers is the difference in the number of detector and descriptors used and their combinations. The performance measurement parameter used later is a less complex formula. However, this formula is quite sufficient as the area of use is rear image of the preceding vehicle. The above-mentioned studies have inspired our work on different subjects.

2.2. Engineering a Collision Detection System

Collision avoidance system (CAS) is a safety feature that alert drivers and triggers the brake in case of a sudden collision while driving. If there is a vehicle ahead (preceding vehicle), CAS estimates the sustained collision time [9-10] (TTC). When the TTC drops below a predetermined threshold, the CAS may decide to apply the vehicle brakes autonomously. Fig.1 shows the real time traffic scenario.

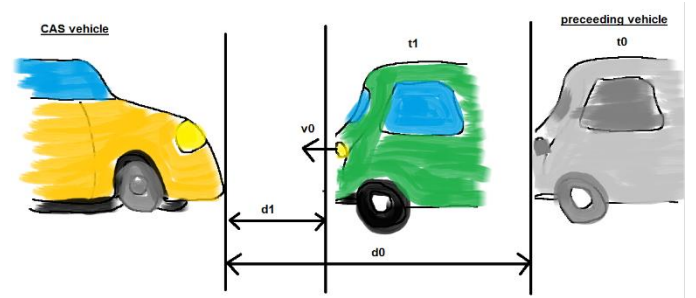


Figure 1 – Real time traffic scenario.

In the traffic scenario shown in the figure above, the green vehicle starts to decrease its speed at the moment t_0 when the yellow vehicle equipped with the collision sensor receives the distance measurement d_0 . After a time t (t_1) the green vehicle comes very close and a second measurement of d_1 is made. The purpose here is to calculate the TTC. Thus, the TTC can be calculated and the driver of the yellow vehicle can be warned. Even the brakes can be triggered autonomously. However, before this process can be done, a way to describe the movement of vehicles with a mathematical model must be found. The parameters used in the equations below are the relative speeds of the vehicle speeds, the vehicle carrying the sensor, and the vehicle scanned by the sensor. To calculate TTC, the physical behavior of the preceding vehicle must be modeled. One assumption in this regard may be that the relative velocity between the yellow and green vehicle in the above figure is constant. This will result in the constant velocity model (CVM) [11] represented by equation (1) in the formula below. V represents the velocity and d the distance and should not be confused with the derivative operator.

$$(1) \text{ Constant Velocity} \\ d(t + \Delta t) = d(t) - v_0 \cdot \Delta t$$

$$(2) \text{ Constant Acceleration} \\ d(t + \Delta t) = d(t) - v_0 \cdot \Delta t - \frac{1}{2} a_0 \cdot \Delta t^2$$

$$v(t + \Delta t) = v(t) - a_0 \cdot \Delta t$$

The distance to the vehicle at time instant $t + \Delta t$ is smaller than at time t because it subtract the product of a constant relative velocity v_0 and time Δt . From an engineering perspective, a sensor is needed because of the capable of measuring the distance to the preceding vehicle on a precise times basis with a constant Δt between measurements. This one achievable quite well with a lidar sensor. Especially in dynamic traffic situations where a vehicle is braking hard, the CVM is not accurate enough, however, as the relative velocity between both vehicles changes between measurements. In the following figure, the approaching vehicle is shown at three-time instants with increasing velocity. Fig. 2 shows the preceding vehicle increasing velocity.

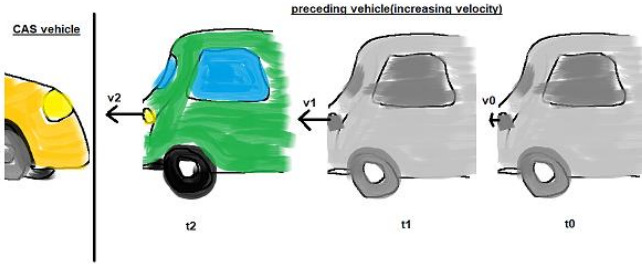


Figure 2 – Preceding vehicle increasing velocity.

Thus CVM can be expand by assuming velocity to be a function of time and subtract the second term in equation 2 which is the product constant acceleration and the squared time Δt between both measurements. Equation 2 displays velocity as a function of time, which is also dependent on the constant acceleration model (CAM) and it is commonly used in commercially available collision detection systems. On a side note, if a radar sensor used instead of a lidar, a direct measurement on velocity could be taken by exploiting a frequency shift in the returning electromagnetic wave due to the Doppler effect [12]. This is a significant advantage over sensors such as Lidar, where velocity can only be computed based on (noisy) distance measurements. In this paper CVM will be used instead of the CAM as it is much simpler to handle with regard to the math involved and with regard to the complexity of the programming task. For small instances of Δt will assumed that the CVM model is accurate enough and that it will give a decent estimate of the TTC. As a conclusion, there are the following types of models possible.

1. Constant Velocity Model (CVM): In this paper, that will consider being working on.
2. Constant Acceleration Model (CAM): An ideal case, but still complex as compared to the CVM model.
3. Changing Acceleration: Real-life scenarios, most often too complex to handle in practice.

2.3. Estimating TTC with Lidar

In the following assuming that CAS equipped vehicle using a LIDAR sensor to take distance measurements on preceding vehicles. The sensor in this scenario will be given the distance to the closest 3D point in the path of driving. In the figure below, the closest point is indicated by a red line emanating from a lidar sensor on top of the CAS vehicle. Fig. 3 shows the math behind TTC.

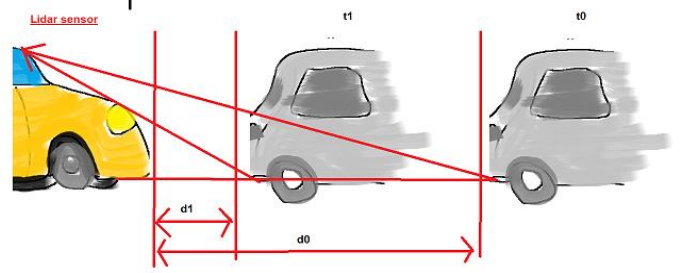


Figure 3 – The math behind TTC.

Based on the model of a constant velocity it is discussed, the velocity v_0 can be computed from two successive lidar measurements as follows:

$$\begin{aligned} (3) \quad d(t + \Delta t) &= d(t) - v_0 \cdot \Delta t \\ (4) \quad v_0 &= \frac{d(t) - d(t + \Delta t)}{\Delta t} = \frac{d_0 - d_1}{\Delta t} \\ (5) \quad \text{TTC} &= \frac{d_1}{v_0} = \frac{d_1 \cdot \Delta t}{d_0 - d_1} \end{aligned}$$

Once the relative velocity v_0 is known, the time to collision can easily be computed by dividing the remaining distance between both vehicles by v_0 . So given a lidar sensor which is able to take precise distance measurements, a system for TTC estimation [13-14] can be developed based on a CVM and on the set of equations shown above. Note however that a radar sensor would be the superior solution for TTC computation as it can directly measure the relative speed, whereas with the lidar sensor needs to be computed v_0 from two (noisy) distance measurement. The following image shows a lidar point cloud as an overlay a camera image taken in a highway scenario with a preceding vehicle directly in the path of driving. Distance to the sensor is color-coded (green is far away, red is close). On the left side, a bird-eyed view perspective of the lidar points is shown as well. Fig. 4 shows the highway scenario with a preceding vehicle.



Figure 4 – Highway scenario with a preceding vehicle.

The lidar sensor provides measurements on the vehicle as well as on the road surface. Also, some 3D points in the camera image do not seem accurate when compared to their surrounding neighbors. Especially the points near the roof of the preceding vehicle differ in color from the points on the tailgate. As measurement accuracy is correlated to the amount of light reflected from an object, it makes sense to consider the reflectiveness r of each lidar point which can be accessed. In addition to the x , y and z coordinates. The image below highlights high reflectiveness with green, whereas regions with low

reflectiveness are shown as red. An analysis of the associated reflectivity of the point cloud shows that such deviations often occur in regions with reduced reflectiveness. Fig. 5 shows the reflectiveness with preceding vehicle.



Figure 5 – Reflectiveness with preceding vehicle.

In order to derive a stable TTC measurement from the given point cloud, two main steps have to be performed :

- 1- Remove measurements on the road surface
- 2- Remove measurements with low reflectivity

In the figure below, Lidar points are shown in a top-view perspective and as an image overlay after applying the filtering. After removing lidar points in this manner, it is now much easier to derive the distance $d(t)$ to the preceding vehicle. Fig. 6 shows the Lidar points perspective.



Figure 6 – Lidar points perspective.

2.3. Estimating TTC with Camera

Monocular cameras are not able to measure metric distances. They are passive sensors that rely on the ambient light which reflects off of objects into the camera lens. It is thus not possible to measure the runtime of light as with lidar technology. To measure distance, a second camera would be needed. Given two images taken by two carefully aligned cameras (also called a stereo setup) at the same time instant, one would have to locate common points of interest in both images (e.g. the tail lights of the preceding vehicle) and then triangulate their distance using camera geometry and perspective projection. For many years, automotive researchers have developed stereo cameras for the use in ADAS products and some of those have made it to market. With more advanced ADAS products and with autonomous vehicles however, stereo cameras have started to disappear from the market due to their package size, the high price and the high computational load for finding corresponding features. Despite those limitations of the mono camera, there is a way to compute TTC without the need to measure distance. Consider the constant

velocity motion model that introduced and think about a way to replace the metric distance d with something the camera can measure reliably, such as pixel distances directly on the image plane. In the following figure, it can be seen how the height H of the preceding vehicle can be mapped onto the image plane using perspective projection. It can be seen that the same height H maps to different heights h_0 and h_1 in the image plane, depending on the distance d_0 and d_1 of the vehicle. It is obvious that there is a geometric relation between h , H , d and focal length f of the pinhole camera and this is what needed to exploit in the following. Fig. 7 shows the height of the preceding vehicle effect distance.

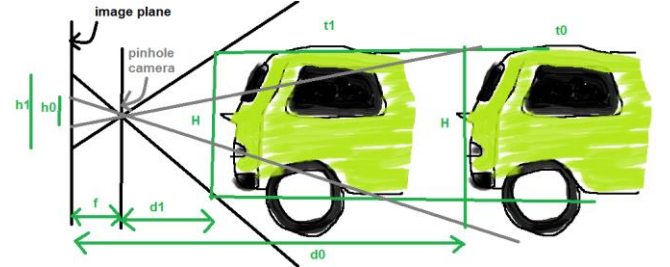


Figure 7 – Height of the preceding vehicle effect distance.

Looking at the following set of equations:

- (6) Project object into camera

$$h_0 = \frac{f \cdot H}{d_0}; h_1 = \frac{f \cdot H}{d_1}$$

- (7) Relate projection and distance

$$\frac{h_1}{h_0} = \frac{\frac{f \cdot H}{d_1}}{\frac{f \cdot H}{d_0}} = \frac{d_0}{d_1} \rightarrow d_0 = d_1 \cdot \frac{h_1}{h_0}$$

- (8) Substitute in constant velocity model

$$d_1 = d_0 - v_0 \cdot \Delta t = d_1 \cdot \frac{h_1}{h_0} - v_0 \cdot \Delta t \rightarrow d_1 = \frac{-v_0 \cdot \Delta t}{\left(1 - \frac{h_1}{h_0}\right)}$$

- (9) Compute time to contact / collision

$$TTC = \frac{d_1}{v_0} = \frac{-\Delta t}{\left(1 - \frac{h_1}{h_0}\right)}$$

In equation 6 the focal length of the camera used and a distance measurement d_0 performed at time t_0 to project the height H of the vehicle onto the image plane and thus to a height h_0 in pixels. The same is done at time t_1 , leading to a projected height h_1 . In equation 7 the ratio of the relative heights h_0 and h_1 are computed. As both H and f are canceled out, a direct relation can be observed between relative height h and absolute metric distance d . The distance to the vehicle d_0 can be expressed as the product of d_1 and the ratio of relative heights on the image plane. In equation 9, d_0 in the equation for constant velocity substituted and solve for d_1 which is now dependent on the constant relative velocity v_1 , on the time between measuring d_0 and d_1 and on the ratio of relative heights on the image plane. Also in equation 9 the TTC is computed as the ratio of remaining distance to impact, which is d_1 and the constant velocity v_0 . As it can easily be seen, the TTC now only consists of Δt , h_0 and h_1 . Thus it is possible to

measure the time to collision by observing relative height change on the image sensor. Distance measurements are not needed and it can thus use a mono camera to estimate the time to collision by observing changes in relative height (also called change) directly in the image. In the figure below, a neural network has been used to locate vehicles in successive image of a monocular camera. For each vehicle, the network returns a bounding box, whose width and/or height could in principle be used to compute the height ratio in the TTC equation derived in the last section. When observed closely however, it can be seen that the bounding boxes do not always reflect the true vehicle dimensions and the aspect ratio differs between images. Using bounding box height or width for TTC computation would thus lead to significant errors.

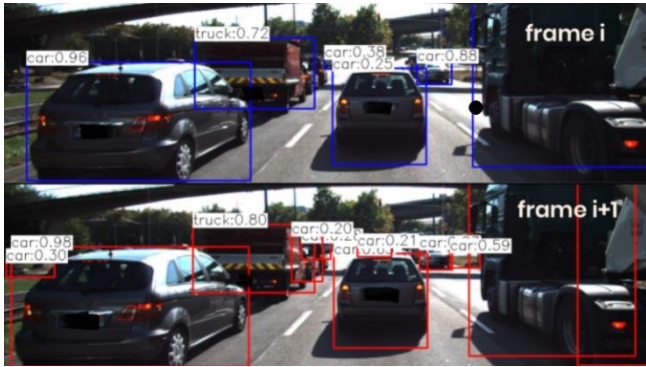


Figure 8 – Locate vehicle in successive images of a monocular camera.

In most engineering tasks, relying on a single measurement or property is not reliable enough. This holds especially true for safety related products. Therefore, it needs to be consider whether there are further properties of vehicles and objects it can be observed in an image. Instead of relying on the detection of the vehicle as a whole now needs to be analyze its structure on a smaller scale. If it were possible to locate uniquely identifiable keypoints that could be tracked from one frame to the next, it could use the distance between all keypoints on the vehicle relative to each other to compute a robust estimate of the height ratio in our TTC equation. The following figure illustrates the concept. Fig. 9 shows the keypoints of a car perspective

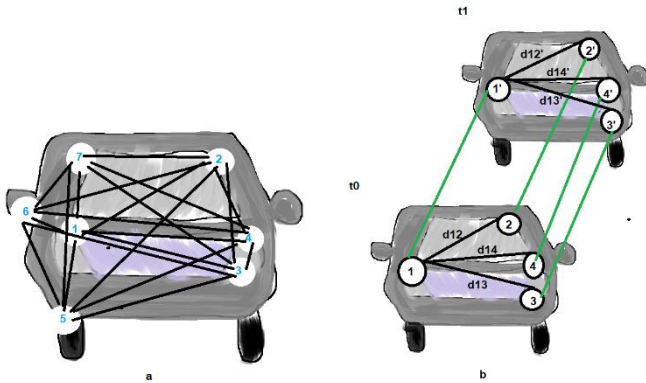


Figure 9 – Keypoints of a car perspective a) relative distances between keypoints in an image b) selected keypoint distances between successive frames.

In (a), a set of keypoints has been detected and the relative distances between keypoints 1-7 have been computed. In (b), four keypoints have been matched between successive images (with keypoint three being a mismatch) using a higher-dimensional

similarity measure called descriptor. The ratio of all relative distances between each other can be used to compute a reliable TTC estimate by replacing the height ratio $h1/h0$ with the mean or median of all distance ratios d_k / d^k . Studies on keypoint detectors have increased recently and many algorithms have been developed in recent years for these reasons. Keypoint detection applications include object recognition in image processing, robotic mapping, 3D modeling etc. These detectors are comparable in terms of performance and speed. In recent years, a number of faster detector have been developed which aim at real-time applications on smartphones and other portable devices. Fig. 10 shows the relative distance between keypoints.



Figure 10 – Relative distance between keypoints.

In the literature, a large variety of similarity measures (called descriptors) have been proposed and in many cases, authors have published both a new method for keypoint detection as well as a similarity measure which has been optimized for their type of keypoints. A keypoint detector is an algorithm that selects points from an image based on the local maximum of a function. A descriptor is a vector describing the image patch around a keypoint. It has many describing the image patch around a keypoint. It has many techniques and these include from simple to complex techniques such as comparing raw pixel values, histograms of gradient orientations. Descriptors help to assign similar keypoints in different images to each other. As shown in the figure below, a set of keypoints in one frame is assigned keypoints in another frame such that the similarity of their respective descriptors is maximized and the keypoints represent the same object in the image. In addition to maximizing similarity, a good descriptor should also be able to minimize the number of mismatches, i.e. avoid assigning keypoints to each other that do not correspond to the same object.

Most common methods are ORB, BRISK, SURF, SIFT, SHITOMASI, HARRIS. These methods generally using for this type of study. This study may refer to these steps; keypoint descriptor as given in [3], orientation assignment, keypoint localization and scale-space representation. To put it another way, the last three of the above steps are the detector, while the first is expressed as the descriptor. However, among these methods, there are those that can be used both as detectors and descriptors. Some are just detectors or only descriptor ones. In [15-16], FAST is a detector method. In [17], the BRIEF method is a descriptive method. If we talk about SIFT method, the SIFT method applies a set of DoG filters for multiscale. With this filter, we can obtain a filtered and downsampled version of the original image. The way the SIFT descriptor is created is from a histogram with a gradient size of 4x4. As another example, the basis for the formation of SURF is the sum of two-dimensional Haar wavelets using integral images and approximating the Gaussian derivatives

in [3]. The SURF detector approximates the determinant of the Hessian matrix, which gives a local maximum as a result. Unlike the detector, the SURF descriptor consists of a 64 dimensional vector, which is calculated as a result of the sum of the Haar wavelet coefficients over a 4x4 pixel. As described in [15] and [16] the application area of FAST is to detect the corners. It uses a 16 pixel circle around the corner pixels to understand that the point of interest is the corner. It then classifies these 16 pixels by comparing their brightness, and together with a threshold, it is understood whether the relevant pixel is a corner or not. As for BRIEF, BRIEF is a binary descriptor and based on density comparison. The detector side of BRISK, as summarized in reference [4], calculates the pixel maximum. This maximum is also called FAST score calculation. The BRISK descriptor is combined with a binary array and includes a gloss results test. Fig. 11 shows the keypoint-descriptor relation



Figure 11 – Keypoint-descriptor relation.

3. Experimental Results

The experiments to be tested in this paper are the success of the methods used to calculate the keypoints of the approaching vehicle, thus its distance and TTC time. For this, the 10 images below contain the preceding of a vehicle that slows down during traffic to the vehicle in use. The distance between this vehicle and the vehicle used in gradually decreasing, and therefore the TTC is getting closer and closer.

Table 2 contains different detectors and descriptors used in 10 images. It contains all the possible combination of detector and descriptor pairs. Then the total number of keypoints found by these combinations is indicated, the number of keypoints that match with the detected keypoints was found thanks to the descriptors. Since the number of match keypoints are not the only parameter, how long it takes for the relevant combination to find this match number is in another column. In the last column, the relevant value was obtained as a result of the ratio of the number of match keypoints, which is considered as a performance parameter called ratio can be found. Table 3 contains the 3 methods with the highest ratio were selected from the results in

the Table 2. The distance calculation result with the camera was the recommended for obtaining TTC.



Figure 12 – Preceding vehicle test images.

Table 2. Benchmark of Detector + Descriptor Combinations with the Related Parameters

No .	Detector + Descriptor	Total Keypoints	Total Matches	Total Time (ms)	Ratio (matches)
1	SHITOMAS I + BRISK	11875	1994	124.54	16.01
2	SHITOMAS I+ BRIEF	11875	2861	83.66	34.20
3	SHITOMAS I+ ORB	11875	2526	100.74	25.07
4	SHITOMAS I + FREAK	11875	2299	318.98	7.21
5	SHITOMAS I + AKAZE	-	-	-	-
6	SHITOMAS I+ SIFT	11875	2842	143.58	19.79
7	HARRIS+ BRISK	756,00	227	87.86	2.58
8	HARRIS+ BRIEF	756,00	266	91.27	2.91
9	HARRIS+ ORB	756,00	261	84.90	3.07
10	HARRIS+ FREAK	756,00	217	303.40	0.72

11	HARRIS+ AKAZE	-	-	-	-
12	HARRIS+ SIFT	756	265	138.35 2	1.92
13	FAST+ BRISK	17330	3073	65.956 4	46.59
14	FAST+ BRIEF	17330	4754	28.251 5	168.27
15	FAST+ ORB	17330	4124	20.853 7	197.76
16	FAST+ FREAK	17330	3067	273.28 3	11.22
17	FAST+ AKAZE	-	-	-	-
18	FAST+ SIFT	17330	5559	145.08 1	38.32
19	BRISK+ BRISK	26144	4891	1927.9	2.54
20	BRISK+ BRIEF	26144	7206	1868.1 3	3.86
21	BRISK+ ORB	26144	4912	1880.6 8	2.61
22	BRISK+ FREAK	26144	4828	2117.7 8	2.28
23	BRISK+ AKAZE	-	-	-	-
24	BRISK+ SIFT	26144	6685	2150.1 0	3.11
25	ORB+ BRISK	4895	1349	144,82	9.32
26	ORB+ BRIEF	4895	1373	120,78	11.37
27	ORB+ ORB	4895	1435	151,40	9.48
28	ORB+ FREAK	4895	613	353,70	1.73
29	ORB+ AKAZE	-	-	-	-
30	ORB+ SIFT	4895	1544	334,48	4.62

31	AKAZE+ BRISK	13330	3216	395,30	8.14
32	AKAZE+ BRIEF	13330	4011	370,55	10.82
33	AKAZE+ ORB	13330	3315	376,98	8.79
34	AKAZE+ FREAK	13330	3204	575,26	5.57
35	AKAZE+ AKAZE	13330	3437	645,25	5.33
36	AKAZE+ SIFT	13330	3606	477,36	7.55
37	SIFT+ BRISK	13540	2401	433,88	5.53
38	SIFT+ BRIEF	13540	3168	427,95	7.40
39	SIFT+ ORB	OOM	OOM	OOM	OOM
40	SIFT+ FREAK	13540	2371	667,16	3.55
41	SIFT+ AKAZE	-	-	-	-
42	SIFT+ SIFT	13540	2497	749,04	3.33

Table 3. Top three Detector + Descriptor Pair

No	Detector + Descriptor	Total Keypoint s	Total Matche s	Total Time (ms)	Ratio (matche s)
1	FAST+ ORB	17330	4124	20.853 7	197.76
2	FAST+ BRIEF	17330	4754	28.251 5	168.27
3	FAST+ BRISK	17330	3073	65.956 4	46.59

When the given images are used as input data, Table 2 shows the keypoints found, the points that match the points and how long it takes for this match to be made. When these matches and the duration are divided, the ratio called rator emerges. When these ratio data are examined, the most performing (matches / time) combinations are given in Table 3. When Table 3 is examined, the FAST method appears to be most performance detector. In

addition to fast as descriptor, ORB, BRIEF and BRISK methods are seen as the most performance combinations when used

4. Conclusions and Recommendations

In this study, while doing some software load in autonomous vehicles, in our study, this task was to calculate the impact time of the vehicle in front. While calculating the TTC, we used the detector and descriptor pairs to detect the distinctive features of the preceding vehicle. As can be seen from the results, the most efficient detector and descriptor pairs were obtained.

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Silindir Bükme Makinası Radyus Ölçüm Sistemi

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Öz

Uzay mekiklerinin imalatında, havacılık sektöründe, enerji sektöründe rüzgar kuleleri yapımında, gemicilikte, endüstride kullanılan neredeyse bütün tank çeşitlerinde, inşaat sektöründe, savunma sanayisinde “Silindir Bükme Makinaları” temel yapı taşlarından biridir. Gelişen teknoloji ile birlikte bu makinaların da özellikleri artırılmakta ve piyasa taleplerine verebildiği karşılıklar artırılmaktadır. Bu bağlamda geliştirilen “Silindir Bükme Makinası Radyus Ölçüm Sistemi” ile iş verimliliği artırılmış ve ıskarta malzeme oranı büyük ölçüde azaltılmıştır. Bu sistem sayesinde manuel olarak yapılan radyus ölçümü, makina üzerinde adapte edilen sensör ile ölçülüp ekrana yansıtılabilmekte ve hedeflenen radüse ulaşana kadar otomatik büküm yapılabilmektedir.

Anahtar Kelimeler: Silindir Büküm, Sac Büküm, Radyus Ölçüm.

Plate Rolling Machine Radius Measurement System

Abstract

"Plate Rolling Machines" is one of the basic part in the manufacture of space shuttles, in the aviation industry, in the energy industry, in the construction of wind towers, in shipping, in almost all types of tanks used in the industry, in the construction industry, and in the defense industry. With the developing technology, the features of these machines are also increased and their response to market demands is increased. With the "Plate Rolling Machine Radius Measurement System" developed in this context, work efficiency has been increased and the rate of scrap material has been greatly reduced.

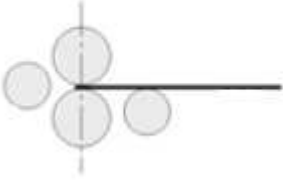
Keywords: Plate Rolling, Radius measurement, Sheet Rolling.

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1. Giriş

Sac metallerin silindirik bükümlerini gerçekleştiren Silindir Büküm Makinaları endüstride yaygın olarak kullanılmaktadır. Düz plakaların silindirik vb yapılarda bükülebilmesini sağlayan Silindirik Büküm Makinaları merdane sayılarına göre iki merdaneli, üç merdaneli ve dört merdaneli olarak sınıflandırılabilirler. Ayrıca yapılarına göre asimetrik, simetrik ve değişken geometrili olarak da sınıflandırılabilirler. Günümüzde piyasada en yaygın olarak kullanılan Silindirik Büküm Makinası tipi dört merdaneli ve simetrik yapıya sahip makinalardır. Bu tipteki makinalar bükülecek sacın kontrolü, büküm kolaylığı ve büküm sonuç kalitesi açısından piyasadaki diğer tüm makinalara göre üstünlükler sergilemektedir. Genel itibarı ile çalışma prensibi şu şekildedir.

1- Bükülmek istenen sac makina merkezine konumlandırılmış olan üst ve alt merdane arasında sıkıştırılır. Üst merdane sabit iken alt merdane sac kalınlığına bağlı olarak istenen pozisyonda sıkıştırma yapabilmek üzere yukarı aşağıda hareketlidir.



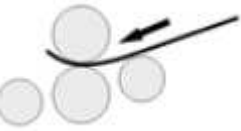
Şekil-1

2- Sıkıştırılıp sabit kalması sağlanan sac, makinaya yüklendiği tarafta bulunan yan merdanelerin yukarı yöndeki hareketi ile bükülür.



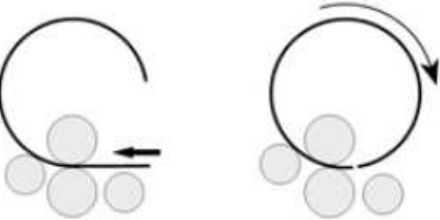
Şekil-2

3- Bir ön büküme uğrayan sac sıkıştırıldığı merdanelere bağlı olan tahrik grubunun radyal yöndeki kuvveti ile sürülür.



Şekil-3

4- Akabinde zıt yöndeki yan merdane uygun pozisyona getirilerek tam silindirik form yakalanana kadar sürme işlemi devam eder.



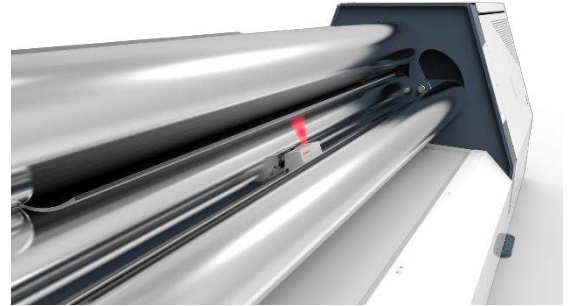
Şekil-4

Maddelendirdiğimiz adımlar arasında en önemlisi 3 numaralı adımdır diyebiliriz. Zira bükümün geri kalanı bu adımda elde edilen ön bükümün üzerine devam eder. Yani bu adımda yapılacak bir hata bükümün geriye kalanını da etkileyerek ya ciddi bir zaman kaybı ya da hurda malzemeye sebebiyet verecektir. Bu yüzden silindir bükme makinası operatörleri 3 numaralı adımdan 4 numaralı adıma geçmeden, hedeflenen radüsü yakalayıp yakalayamadıklarını sıklıkla kontrol ederler. Bu kontrol manuel olarak çeşitli masterlar ya da ölçüm aletleri ile olur. Doğru radüs yakalandığından emin olunduğunda 4 numaralı adıma devam edilir ve büküm tamamlanır. Operatör tecrübesine de bağlı olarak 3 numaralı adım defalarca tekrarlanabilmektedir. Geliştirilen Radyus Ölçüm Sistemi ile elde edilen radüs makina kontrol ünitesi ekranında anlık olarak görülebilmek ile beraber yazılım ile geliştirilen sistem sayesinde gerekli büküm tekrarlarının otomatik olarak yapılabilmesi sağlanmaktadır.

2. Materyal ve Metot

2.1. Büküm Prosesi

Giriş başlığında atıfta bulunulduğu gibi, bükümün en önemli adımı önbükümdür. Kendi geliştirdiğimiz formül neticesinde kontrolcü makinanın ilgili eksine önbüküm hedef pozisyon bilgisi gönderir. Makine ilk önbüküm ile ilgili adımları tamamladıktan sonra, otomatik ölçüm sistemi devreye girer.



Şekil-5

2.1.1. Otomatik Ölçüm Sistemi.

Şekil 5'te görüldüğü gibi, ön bükümü yapılan malzemenin, reel olarak oluşan radyusu ölçülür. Ölçüm alındıktan sonra gerçekleşen değer ile hedeflenen değer karşılaştırılır. Çıkan netice hedeflenenden büyük ise, kontrolcü yeni bir önbüküm pozisyon değeri hesaplar. Bu değere göre önbüküm prosesi tekrarlanır. Bu tekrar ölçüm ve önbüküm proseleri belli toleranslar dahilinde, hedeflenen değere ulaşılan kadar devam eder.

2.1.2. Lazerli Ölçüm Sistemi.

Lazer ölçüm sistemi bir lazerli mesafe sensörü içermektedir. Bu sensör vasıtası ile belirlenen nesnenin üzerine bir lazer çizgisi yansıtılır. Yansıtılan çizgilerden alınan koordinat bilgileri ile oluşan radyus hesaplanır.



Şekil-6

3. Araştırma Sonuçları ve Tartışma

3.1. Mevcut Uygulamaların İncelenmesi

Silindir büküm makinelerinde bugüne kadar dünyada benzeri bir uygulama yapılmamıştır. Mevcut uygulamalar büküm işlevini öğretme metodu ile sağlamaktadır: makine eksenleri önce hedef bükme noktasına yakın bir büküm yapmak için gönderilir, büküm açısı el (Radyus ölçüm cihazları) ile ölçülür ve makinenin bir sonraki hamlesi hesaplanıp tekrardan makineye büküm hedefi

girilir. Bu işlem büküm hedefine ulaşılan kadar devam eder. Bükümlerde kullanılan çok farklı karakteristikte malzemeler olduğu için de her malzeme için ayrı bükümler yapılmalı ve veri tabanına kaydedilmeli. Bu işlev zahmetli ve ciddi anlamda zaman kaybına neden olmaktadır.

Mevcut uygulamalarda diğer bir büküm yöntemi ise makine geometrisi esas alınarak belirli formüller kullanmaktır. Bu yöntem ile büküm işlevi sağlanır fakat büküm sonucu kesin olarak doğru olmayabilir.

4. Sonuç

Dünya genelinde otomatik büküm yapan cnc silindir makineleri dâhil olmak üzere, büküm sonuçlarını almak ve gerekli düzeltme faktörünü girmek için operatör desteğine ihtiyaç duyulmakta. Geliştirilen radyus ölçüm sistemi ile bu sonuçlar otomatik hesaplanır, büküm algoritmasında işlenerek kontrolcüye iletilir. Kontrolcü içerisine alınan ölçüm değeri sayesinde makine, düzeltme faktörlerini otomatik olarak parça programına işler.

Otomatik radyus ölçme sistemi olmayan makinelerde bükülen parça operatör tarafından her defasında manuel olarak, bir master yardımı ile ölçülür. Otomatik radyus ölçme sistemi ile bükülen parçanın sonuçları ise makine ekranında gösterilmektedir. Bu sayede operatörün manuel ölçüm yapmasına ihtiyaç kalmamıştır. Bu da makine kullanımı açısından operatöre büyük kolaylık sağlamaktadır.

5. Teşekkür

Çalışmalar esnasında fikirleri ile destek olan Serkan TOKYÜREK'e teşekkür ederiz.

Kaynakça

Thierry Bosch, Marc Lescure
SPIE Optical Engineering Press,

Theft Detection in Video Surveillance Videos with 3D CNN Model

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Abstract

In this work, we classify theft and non-theft action surveillance videos in supermarkets. For this purpose, we benefit from an action recognition model, which is very useful when classifying human actions. We use a pre-trained model (18-layer 3D-ResNets) and apply the model to the dataset that we gathered from YouTube. However, we collected the test dataset from a supermarket. Also, we train and test different models of input sizes, temporal lengths (frame), and batch sizes to compare the influence of parameters. As a result, a model has been developed that can successfully classifies the theft action and for the best model (Model 1), training and test results are 88% and 77%, respectively.

Keywords: Theft detection, Artificial intelligence, Convolutional Neural Networks, Action recognition.

3B CNN Modeli ile Video Görüntülerinde Hırsızlık Tespiti

Öz

Bu çalışmada, hırsızlık eylemi içeren ve hırsızlık eylemi içermeyen market güvenlik video görüntülerini sınıflandırılmıştır. Bu amaçla, insan eylemlerini sınıflandırırken çok faydalı olan bir eylem tanıma modelinden yararlanılmıştır. Önceden eğitilmiş bir model olan (18 katmanlı 3D-ResNets) kullanılmış ve model YouTube'dan topladığımız veri setine uygulanarak tekrar eğitilmiştir. Ancak, test veri seti yerel bir süpermarketten toplanmıştır. Ayrıca, parametrelerin etkisini karşılaştırmak için farklı girdi boyutları, farklı temporal çerçeve sayısı ve ağı sunulan farklı veri yığını ile model eğitilmiş ve test edilmiştir. Sonuç olarak, hırsızlık eylemini başarı ile tanıyabilen bir model geliştirilmiş olup en iyi model (Model 1) için eğitim ve test sonuçları sırasıyla %88 ve %77 olarak belirlenmiştir.

Anahtar Kelimeler: Hırsızlık tespiti, Yapay zekâ, Konvolüsyonel sinir ağları, Eylem tanıma.

1. Introduction

Supermarkets are necessary to purchase daily necessities, but this brings some management problems such as shoplifting. Persons are watching over closed-circuit television (CCTV) surveillance cameras to detect shoplifting in supermarkets. However, human vision makes it difficult to detect theft action. An estimated 27 million persons shoplift annually in the United States, resulting in at least US \$13 billion worth of goods shoplifted each year and more than \$100 billion annually worldwide (Lasky, Fisher, & Jacques, 2017). Also, some supermarkets use paper alarm tags, but they can be ripped off easily. Thus, the supermarket theft problem becomes essential. With the developments in artificial intelligence, the lack of preventing shoplifting can be examined. Therefore, we focus on human action recognition studies of artificial intelligence.

Action Recognition (AR) is related with video understanding, and it has been studied for decades. AR observes the activity or the action in a video clip and identifies the act by analyzing both spatially and temporally. AR can be implemented in many areas such as video surveillance, human-computer interaction, and robotic systems. A video clip contains two critical information for AR, which are spatial and temporal information. Spatial information exemplifies static information in a single video frame, while temporal information represents a sequence of images taken at different times. With the help of temporal information, AR can monitor the dynamic changes of the object in the video. Thus, AR models can utilize for video surveillance to identify theft actions in supermarkets.

In this paper, we propose a new approach to theft action in supermarkets that uses a pre-trained AR 3-Dimensional Convolutional Neural Network (3D CNN) model. We gather theft and non-theft actions from YouTube for the training dataset. Also,

we capture the test dataset from a supermarket. We train multiple models with different options to examine the effects on theft and non-theft actions. In this work (Zhang, et al., 2020), theft actions in a supermarket, classified with a 2-Dimensional CNN (2D CNN) model, whereas our approach is a 3D model. Also, our dataset samples are similar.

2. Material and Method

2.1. Theft Recognition Approach in the Supermarket

Theft and non-theft actions consist of several motion, such as taking goods, looking at goods, putting goods into a bag-pack, and goods into a pocket. In a supermarket, surveillance regarding these actions is limited and certain. For instance, a person taking goods from a shelf or stealing goods into a pocket. Basically, persons do these actions in a sequence. Moreover, in the work (Zhang, et al., 2020), theft behavior in a supermarket is examined and classified with a 2D CNN model, and the structure is based on LeNet-5 (LeCun, Bottou, Bengio, & Haffner, 1998). In data collection, researchers selected four different people (e.g., height, gender, clothes) to eliminate the influence of personal factors in training. Consequently, they eliminated the factors with %83 average recognition accuracy. Their 2D CNN theft model is suitable for image recognition, while our model is suitable for AR tasks.

2D CNNs used for AR tasks are different from image recognition 2D CNNs. AR 2D CNNs (Two-Stream ConvNets (Feichtenhofer, Pinz, & Zisserman, 2016; Simonyan & Zisserman, 2014)) consist of RGB, and stacked optic flow frames are used to extract spatio-temporal information from videos. The 3D CNNs (C3D) (Tran, Bourdev, Fergus, Torresani, & Paluri, 2015), I3D (Carreira & Zisserman, 2017), 3D-ResNet (Hara, Kataoka, & Satoh, 2018), R(2+1)D (Tran, et al., 2018), P3D (Qiu, Yao, & Mei, 2017), S3D (Xie, Sun, Huang, Tu, & Murphy, 2018) and CSN (Tran, Wang, Torresani, & Feiszli, 2019)) use as input only RGB or RGB and optical flow streams. Moreover, 3D CNNs operate with 3D kernels and 3D convolution. In the early of AR CNN models (Two-Streams CovNets and C3D), 2D CNNs outperformed 3D CNNs due to low quality of annotation large-scale video datasets such as YouTube-8M (Abu-El-Haija, et al., 2016), Sports-1M (Karpathy, et al., 2014), which they were sufficient, but they were too noisy to optimize 3D Kernels from scratch. After the release of Kinetics-400 (Kay, et al., 2017), trained models with Kinetics-400 3D CNNs (I3D, 3D-ResNets, R(2+1)D, and S3D) outperformed 2D CNNs (Two-Stream CovNets) on UCF101 (Soomro, Zamir, & Shah, 2012) and HMDB51 (Kuehne, Jhuang, Garrote, Poggio, & Serre, 2011) AR video datasets. Kataoka, Wakamiya, Hara, & Satoh (2020) trained 3D-ResNets and R(2+1)D models by increasing layer depth on datasets: Kinetics-700 (Carreira, Noland, Hillier, & Zisserman, 2019), Kinetics-400, and merged Kinetics-700 and Moments in Time (MiT) (Abu-El-Haija, et al., 2016). They confirmed that increase in the dataset scale allows enhancing spatio-temporal 3D CNNs.

To the best of our knowledge, we need to approach this video classification task with AR models. The theft action is not only visual information but also a motion. Therefore, we need to extract spatio-temporal information to better classify theft and non-theft action. Spatial information is important for visual appearance and information of theft action. Also, temporal

information is essential for theft action. Thus, we didn't use image recognition 2D CNNs. Tran et al. (2015) showed that 3D CNNs preserve the temporal information while AR 2D CNNs lose the temporal information because applying 2D convolution on a video volume results in an image. Thence 2D CNNs lose the temporal information.

2.2. Network Architecture

The network that is used in this study is based on ResNets (He, Zhang, Ren, & Sun, 2016). ResNets utilize shortcut connections to ease the training of deep networks. Also, shortcut connections do not cause extra parameters and computational complexity. Shortcut connection of a residual block bypass a signal from the top to the bottom, and signals are summed at the bottom. In other words, input information can be propagated to lower layers by short connection. We used the 3D-ResNet-18 model from (Hara et al., 2018). Kataoka et al. (2020) trained the model on Kinetics-700, also the model available at cited paper.

Table 1 shows the network details that for the best-trained model. Input is represented as $C \times T \times W \times H$; where C is the number of channels, T is temporal (frame) length, W is width, and H is height. Also, the input of the network is 32 frame RGB video clips. Convolutional kernel sizes are $3 \times 3 \times 3$ except for conv1 layer. Each convolutional layer is followed by batch normalization (Ioffe & Szegedy, 2015) and ReLU (Nair & Hinton, 2010). We adopt the shortcut type B, which is used for matching dimensions (He et al., 2016). Conv1 layer down-samples the input only in spatial domain with a stride of $1 \times 2 \times 2$. Implementing the down-sampling by conv3, conv4, and conv5 with a stride of 2. Thus, down-sampling is utilized both spatially and temporally. Finally, our Theft and Non-Theft dataset with two classes is classified by softmax in fully-connected layer.

Table 1. 18 Layer 3D-ResNet Architecture

Layer Name	Input	Layer Details	Output
Conv1	$3 \times 32 \times 224 \times 224$	$7 \times 7 \times 7$, stride $1 \times 2 \times 2$	$64 \times 32 \times 128 \times 128$
Pooling	$64 \times 32 \times 128 \times 128$	$3 \times 3 \times 3$ max pool with stride 2	$64 \times 16 \times 64 \times 64$
Conv2	$64 \times 16 \times 64 \times 64$	$\begin{pmatrix} 3 \times 3 \times 3 \\ 3 \times 3 \times 3 \end{pmatrix} \times 2$	$64 \times 16 \times 64 \times 64$
Conv3	$64 \times 16 \times 64 \times 64$	$\begin{pmatrix} 3 \times 3 \times 3 \\ 3 \times 3 \times 3 \end{pmatrix} \times 2$	$128 \times 8 \times 32 \times 32$
Conv4	$128 \times 8 \times 32 \times 32$	$\begin{pmatrix} 3 \times 3 \times 3 \\ 3 \times 3 \times 3 \end{pmatrix} \times 2$	$256 \times 4 \times 16 \times 16$
Conv5	$256 \times 4 \times 16 \times 16$	$\begin{pmatrix} 3 \times 3 \times 3 \\ 3 \times 3 \times 3 \end{pmatrix} \times 2$	$512 \times 2 \times 16 \times 16$
Fully-connected layer	$512 \times 2 \times 16 \times 16$	average pool 2 - d fc softmax	2x1

2.3. Implementation

Implementation details are generally adopted from (Kataoka et al., 2020). Since our dataset is relatively small-scale to train from scratch, we applied transfer learning on the Kinetics-700

pre-trained model. In other words, the new model's weights are only updated on fully-connected layers. For all models: training, validation, and test implemented on PyCharm Community Edition 2020.3.3 by using PyTorch. The GPU is NVIDIA GeForce GTX 1070. We trained models of different inputs, temporal lengths, and batch sizes. Input is set as $3 \times T \times 112 \times 112$ and $3 \times T \times 224 \times 224$ pixels, T (frame length) is set to 16 and 32 samples and batch size of 12, 10 and 8 samples. These options are implemented for all models, which is shown in Table 2. If the videos are shorter than the input size, the video clip is adjusted by iterating the video frames.

Temporal positions of each sample are selected uniformly from the input video clip in every epoch. Input images are normalized between [0-1]. Mean subtraction is performed for each sample by Kinetic mean subtraction values. Data augmentation details for x10 training image samples applied as Spatial crop is implemented by four-corner/center, and then the width and height are set to input resolution. Networks are trained for 200 epochs, and augmented samples are horizontally flipped with 50% probability. We use stochastic gradient descent (SGD) as an optimizer and cross-entropy loss as a loss function. The weight decay, learning rate, and momentum are set to 0.001, 0.1, and 0.9, respectively. Learning rate is divided by 10 if the validation loss is saturated.

When we use the trained model on the test dataset to classify the theft or non-theft action: We adopt the sliding window manner to generate input clips, and each clip is cropped around a center position with the maximum scale. Then we estimate class

probabilities of each video and average them for overall accuracy on the test dataset.

2.4. Theft and Non-Theft Video Dataset

We collected theft and non-theft action videos in supermarket from YouTube. Also, we collected test videos from a supermarket surveillance camera. We trimmed the videos into actions, and the average duration of each video is about 1.5 seconds, which is equal to 32 frames. Training dataset consists of 300 videos, where 139 theft action and 161 non-theft action videos. Validation dataset consists of 14 videos, where 7 theft videos and 7 non-theft action videos. Test dataset consists of 270 videos, where 130 theft and 140 non-theft action videos. Each 32-image input model has 10,048 and 8,640 images for training and testing, respectively. Also, each 16-image input model has 5,024 and 4,320 images for training and testing, respectively.

Theft actions consist of three actions: stealing goods into a pocket, handbag, and backpack. Due to the lack of videos on YouTube, most of the theft videos we collected are stealing goods into the pocket. Non-theft actions consist of four actions, which are walking, standing still, and taking goods from a shelf. Three non-theft actions were collected almost equally, unlike theft actions. In training dataset, nearly all persons are utilized for both theft and non-theft actions. In addition, it is likewise to the test dataset. However, our test dataset is almost large as training dataset, but it is limited to 2 persons only as one female and one male, unlike training dataset. Our training samples are shown in Figure 1.



Figure 1. Theft and Non-Theft Action Samples

3. Results and Discussion

In simulation study, we aim to compare the effects of different models of inputs, temporal lengths, and batch sizes that are shown in Table 2. We trained and tested 18-layer 3D-ResNet models on our theft and non-theft dataset. To analyze the performance of models, all models are trained for 200 epochs and models tested by the 200th epoch model. Model 1 has the highest training and test accuracy, 88.0% and 77.0%, respectively. Also, the training graph accuracies of Model 1 are shown in Figure 2. Total of 131 theft action videos, 104 videos has been correctly labeled whereas 26 videos has been wrongly labeled. Thus, the result of theft action dataset accuracy is 79.4%. Total of 139 non-theft videos, 104 videos has been correctly labeled whereas 36 videos has been wrongly labeled, non-theft action test dataset accuracy is 74.8%. Therefore, Model 1 classified 270 test videos with 77.0% overall accuracy.

When comparing different temporal lengths for inputs of 224×224 and same batch sizes, which are Model (1,4), Model (2,5), and Model (3,6): even though training accuracies are close, test accuracies significantly drop on paired models that are Model 4, 5, 6 and the drop-downs are 21.9%, 17.4%, and 12.2%, respectively. In addition, the same comparison for inputs of 112

×112 are that Model (7,10), Model (8,11), and Model (9,12): also, in this comparison, training accuracies are even more close, and test accuracies almost are not different except for Model (7,10) pair and the drop down is 10.3%. We mention in Section 2.4, dataset videos consist of an average of 32 frames. In addition, to classify the theft action correctly, temporal length needs to be at least 32. Therefore, according to Table 2, we can confirm that the effect of temporal length is to be at least 32 for input resolution 224×224. We believe that, in order to achieve higher training and test accuracy rates, the temporal length should be increased.

Table 2 shows that for different input models, both training and test accuracies drop. However, drop of test accuracy is significant, whereas training accuracy. Thus, we consider models comparisons on test accuracies. Comparison of different inputs, same temporal lengths and same batch sizes which are Model (1,7), Model (2,8), Model (3,9), Model (4,10), Model (5,11) and Model (6,12): when each pair model considered, drop down on testing accuracies are 21.9%, 15.5%, 13.3%, 10.3%, 1.8% and 2.9%, respectively. Therefore, we can confirm the impact of input resolution that is crucial for theft action recognition. In addition, the effect of batch size is known, and a large batch size is important to train good models (Ioffe et al., 2015).

Table 2. The comparison of the different models

Model	Input Resolution (W x H)	Temporal (Frame) Length	Batch Size	Training Accuracy (%)	Test Accuracy (%)
1	224×224	32	12	88.0	77.0
2	224×224	32	10	84.3	72.5
3	224×224	32	8	85.0	68.8
4	224×224	16	12	82.0	55.1
5	224×224	16	10	79.6	55.1
6	224×224	16	8	82.3	56.6
7	112×112	32	12	80.3	55.1
8	112×112	32	10	78.0	57.0
9	112×112	32	8	77.6	55.5
10	112×112	16	12	77.6	44.8
11	112×112	16	10	77.0	53.3
12	112×112	16	8	75.0	53.7

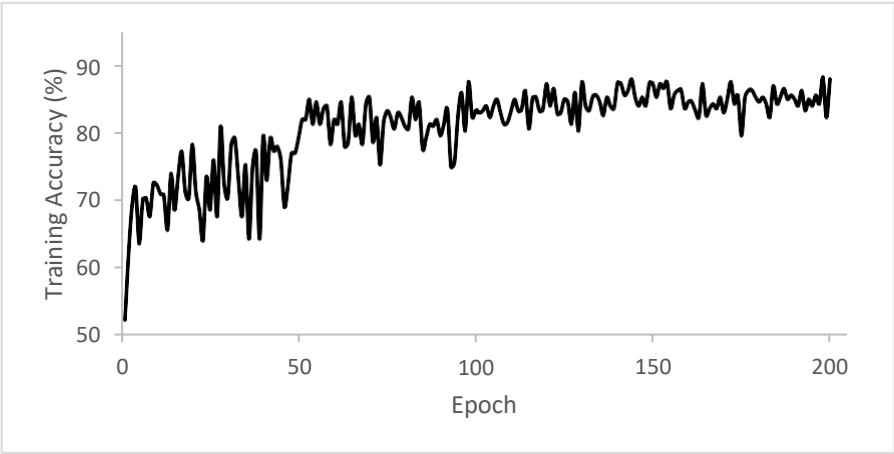


Figure 2. Model 1 Training Accuracy

4. Conclusion

In this paper, we classified theft and non-theft action videos in supermarkets, and we approach this case with action recognition. We consider the theft action class as stealing goods into the pocket, stealing goods into a handbag, and stealing goods into a backpack. Also, we consider non-theft actions as walking in the supermarket, standing still, and taking items from the shelf. We collected the training videos from YouTube. However, we gathered the test dataset from a supermarket. Theft and non-theft actions are classified by a pre-trained model on Kinetics-700, which is an 18-layer 3D-ResNet and RGB input only. Training and test datasets consist of 300 and 270 videos, respectively. We trained 12 different models and models different on input resolutions, temporal lengths, and batch sizes. Model 1 resulted as the best model, and temporal length of Model 1 is 32 also, input size is 224 x 224. For model 1, results of training and test accuracies are 88.0% and 77.0%, respectively. The results of experiments suggest that input size, temporal length, and batch size increase accuracy, especially temporal length.

For future work, we will focus on increasing temporal length, which we couldn't train, and test the model with higher temporal length and batch size because of a lack of hardware.

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Interactive Machine Learning for Wheat Head Counting

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Abstract

Wheat (*Triticum*) is a grass widely grown for its seed. It is one of the most important sources of food for humans. In this respect, it plays a significant role for the economies of undeveloped countries. The condition and number of wheat heads can be determined by traditional image processing methods based on the extraction of texture, color and morphological features. However, these methods do not produce very robust and accurate results when environmental conditions such as wind and sunlight change. In addition, factors such as seed maturity, type and head orientation deteriorate the results. It is also possible to achieve better results by applying advanced machine learning methods such as Convolutional Neural Network (CNN), which automatically extracts features. However, these methods build models without any human intervention. In some situations, such as complex backgrounds or computationally difficult problems, human intervention can have a valuable effect on the results. In this study, we will count the number of wheat heads using the pictures obtained from the farm under a variety of conditions. Unlike similar studies, we will use *ilastik*, an interactive machine learning tool. In addition to being an open-source software, *ilastik* increases the accuracy of the model by using human knowledge in the learning process. This approach is known as the combination of human intelligence and interaction skills with the computing power of an artificial system. The overall accuracy of the developed model is approximately 95%. It has roughly similar results with other studies. Thus, we will present the effect of the human factor on the accuracy of models in the learning processes of machine learning.

Keywords: Machine Learning, Interactive Learning, Object Segmentation, Object Counting.

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Mutfak Dolaplarında Kullanılan Farklı Bağlantı Elemanlarının Deformasyonlarının Analiz Edilmesi

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Öz

Bu çalışmanın amacı, mobilya mutfak endüstrisinde tercih edilen farklı mobül bağlantı elemanlarının birbirleri arasında kıyaslanması ve maximum yük anındaki deformasyonlarının analiz edilmesidir. Bu maksat ile 18mm kalınlığında yonga levha (YL) ve orta yoğunlukda lif levhadan (MDF) olmak üzere iki farklı malzemeden üretilmiş modüllere, alyan başlı kavelalı tutkalsız, alyan başlı kavelalı tutkallı, minifixli kavelalı tutkalsız, presli kavelalı tutkallı, spax vidalı kavelalı tutkalsız ve spax vidalı kavelalı tutkallı olmak üzere altı farklı bağlantı elemanı uygulanmıştır. Deney örnekleri, kullanım sırasında etkisinde kalabilecekleri kritik yükler göz önüne alınarak sürekli artacak şekilde dinamik yük altında basınç deneylerine tabi tutulmuştur. Deney sonuçlarına göre, MDF’den imal edilmiş, ahşap kavela ve tutkal ile presleme işlemi uygulanarak birleştirilmiş modüllere uygulanan kuvvet miktarının ortalaması, diğer kutulara uygulanan kuvvet ortalamalarından en daha yüksek çıkmıştır.

Anahtar Kelimeler: Kutu rijitlik, Bağlantı elemanı, Mutfak mobilyası.

Deformation Analysis of Fasteners Used in Kitchen Cabinets

Abstract

The aim of this study is to compare different fasteners preferred in the furniture and kitchen industry among each other and to analyze their deformations at maximum load. For this purpose, modules made of two different materials, 18mm thick particle board (YL) and medium density fiberboard (MDF), hex head screw and dowel glueless, hex head screw and dowel glued, minifix and dowel glueless, press and dowel glued, spax screw and dowel glueless and spax screw and dowel glued six different fasteners were applied. The test specimens were subjected to pressure tests under dynamic load, constantly increasing, taking into account the critical loads that they may be exposed to during use. According to the test results, the average of the amount of force applied to the modules made of MDF, which were assembled by pressing with wooden dowels and glue, was higher than the average of the force applied to the other boxes.

Keywords: Box stiffness, Fastener, Kitchen furniture.

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Geleneksel Yapılarda Fonksiyon-Estetik İlişkisinin Korunma ve Sürdürülebilirlik Bağlamında İrdelenmesi

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Özet

Geleneksel yapılar, geçmişin sosyal, kültürel ve ekonomik verileriyle birlikte mimari değerlerini de yansıtan çok yönlü eserlerdir. Bu yapıları oluşturan pek çok öge, öncelikle kullanıcıların ihtiyacını karşılamaya yönelik olarak, döneminin özelliklerine göre en yalın yapılmış ve hızla ulaşılabilen malzemelerle inşa edilmiştir. Bu anlamda geleneksel yapıların sade ancak fonksiyonel nitelikler taşıdıkları düşünülebilir. Bununla birlikte söz konusu yapıları mütevazı olmaktan çıkaran ve günümüzün modern yapılarında bulunmayan pek çok estetik detayın varlığından söz etmek mümkündür. Bu detaylar hem tasarım anlamında; hem de işlev açısından geleneksel yapıları özgün kılmaktadır. Bu bağlamda çalışmanın amacı, geleneksel yapılarda bulunan fonksiyonel ve aynı zamanda estetik değerleri ortaya koyarak; bu değerlerin, yapıların korunması ve sürdürülebilirliğiyle olumlu ilişkisine vurgu yapmaktır. Çalışma kapsamında Türkiye’de bulunan farklı coğrafyalardaki yerleşim alanları içinde yer alan geleneksel yapılar incelenmiş ve sahip oldukları estetik değerler ele alınmıştır. Bu değerlerin işlevsel yönü de göz önünde bulundurulmuştur. Bu anlamda çok yönlü değerlendirmeler yapılarak, incelenen bilgiler bir araya getirilmiştir. Çalışma yöntemini, ilgili literatürden alınan veriler ve yerinde gözlemler oluşturmaktadır. Çalışma sonucunda ortaya koyulan irdelemelerin, geleneksel yapıların korunmasına ve sürdürülebilirliğine katkı sağlayacağı düşünülmektedir.

Anahtar Kelimeler: Geleneksel yapılar, estetik, koruma, sürdürülebilirlik.

Examination Of Function-Aesthetic Relationship In Traditional Buildings In Context Of Conservation And Sustainability

Abstract

Traditional buildings are versatile works that reflect the social, cultural and economic data of the past as well as their architectural values. Many elements that make up these structures were built with the simplest construction technique and rapidly accessible materials, according to the characteristics of the period, primarily to meet the needs of the users. In this sense, it can be thought that traditional buildings have simple but functional qualities. However, it is possible to talk about the existence of many aesthetic details that make the said buildings not modest and are not found in today's modern buildings. These details are both in terms of design and makes traditional buildings unique in terms of function. In this context, the aim of the study is to reveal the functional and aesthetic values found in traditional buildings; to emphasize the positive relationship of these values with the conservation and sustainability of buildings. Within the scope of the study, traditional buildings located in settlement areas in different geographies in Turkey are examined and their aesthetic values are discussed. The functional aspect of these values is also taken into account. In this sense, multidimensional evaluations were made and the analyzed information was brought together. The study method consists of data taken from the relevant literature and on-site observations. It is thought that the investigations revealed as a result of the study will contribute to the conservation and sustainability of traditional structures.

Keywords: Traditional buildings, aesthetics, conservation, sustainability.

Trend Comparison of Bias Corrected and Raw GCMs

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Abstract

Climate modelling results can not provide required outputs accurately for regional or local scale since GCMs are generally not capable of determining the sub-grid cycles. In this study, we investigated the trend of 17 CMIP5 raw GCM data and bias corrected GCM data and ensemble raw and bias corrected data for the Capital City Ankara of Turkey. The data ranges were from 1980 to 2005 in daily scale; Mann-Kendall trend test and Innovative Trend Analyses (ITA) were used to identify both the direction and magnitude change among the raw and bias corrected model data. The results show bias corrected model results exhibited consistent results with the raw data and only two bias corrected model data set showed a sign change. 50% of the models showed a decrease in the magnitude of the trend while 35% of the models revealed an increase in the magnitude of the trend for the bias corrected values. Considering the significance (95% in this study), 65% of the bias corrected GCM results presented a decreasing significance when compared with their corresponding raw values. 5 of the 17 model results exhibited significance change (significant to insignificant or insignificant to significant). Furthermore, especially higher values of most of the models exhibited sign of trend change in comparison with their bias corrected equivalent. Among the models, ensemble raw and bias corrected data represented more consistent results both in terms of magnitude, direction and for the significance level. However there are also models such as NORESM1.M, CSIRO.MK3.6.0, CANESM2 that show better performance than the ensemble results.

Keywords: GCM, Climate change, Bias correction.

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UZAK ODA KONTROL SİSTEMİ

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Öz

Dünya üzerinde vinçler makine, madencilik, metalurji, enerji, savunma sanayi, kimya endüstrisi vs. gibi ağır sanayi sektörü başta olmak üzere her sektörde kullanılmaktadır. Kullanım prosesleri ise amaca yönelik olarak farklılık göstermektedir. Vinçler, kedi üzerine bağlı kablolu kumanda, vinç üzerinde köprü aksı boyunca hareketli kablolar ile opere edilebilen seyyar kumanda, kablosuz uzaktan kumanda ya da vince bağlantısı yapılmış bir operatör kabini içerisinde kontrol edilmektedir. Mevcut kontrol şekilleri, vinç üzerindeki kabine çıkma ya da çalışma ve ortam koşulları ağır sahalarda operatörün vinci çalıştırması gibi gereklilikleri ortaya çıkarmaktadır. Ağır şartlarda çalışan vinçlerde operatörlerin güvenli alanda kalması gerektiği düşünüldüğünde günümüz haberleşme teknolojisi anlık görüntüleri yüksek hızda aktarımına olanak sağlaması vinç kullanımı için vinç üzerinde olma gerekliliğini ortadan kaldırmıştır. Çalışma kapsamını dökümhane ortamında kullanılacak döküm vincinin, vinç çalışma alanı dışında konumlandırılan uzak bir odadan kontrol edilmesi oluşturmaktadır. Kontrol odasından vinci direkt olarak görmek mümkün olmadığı için vinç üzerinde muhtelif bölgelere ve sahaya kameralar yerleştirilmiştir. Kontrol odasında ise kamera görüntülerini izleme amaçlı monitörler bulunmaktadır. Vinçler hareketli makine olduklarından dolayı uzak kontrol odası ile arasındaki haberleşme, endüstriyel Ethernet tabanlı kablosuz alıcı-verici üniteler ile sağlanmaktadır. Buna göre vinç üzerinde CLIENT Ethernet modülü antenler bulunmaktadır. Vincin yürüdüğü holde ise sabit noktalarda ACCESS modül ve antenler bulunmaktadır. Vincin hareket ettiği saha ile uzak kontrol odası arasındaki mesafe uzun olduğu için bu iki nokta arasında haberleşme fiber optik kablo ile sağlanmıştır. Ayrıca vincin yarı-otomatik olarak kullanılması için pozisyonlama sensörleri kullanılmıştır. Genel olarak otomasyon ve haberleşmede safety sistemler kullanılmıştır. Çalışma sonucunda ülkemizde ilk defa tasarımı ve imalatı yerli olarak yapılan uzak odadan kontrolü sağlanabilen bir sistem ortaya çıkmıştır.

Anahtar Kelimeler: Vinç, Uzak Oda, Kontrol, Dökümhane, Emniyetli Çalışma

REMOTE ROOM CONTROL SYSTEM

Abstract

Cranes are used in machinery, mining, metallurgy, energy, defense industry, chemical industry, etc. in the world. It is used in every sector, especially in the heavy industry sector. The usage processes differ according to the purpose. The cranes are controlled from push button with cable (moving with trolley), a push button with cable (free from trolley), a remote controller or an operator cabin connected to the crane. Existing forms of control reveal requirements such as climbing up to the cabin on the crane or operating the crane in heavy working areas and environmental conditions. Considering that the operators should stay in a safe area in cranes operating under heavy conditions, today's communication technology allows the transfer of snapshots at high speed, eliminating the need to be on the crane for crane operating. The scope of study consists of controlling the casting crane to be used in the foundry environment from a remote room located outside the crane working area. Since it is not possible to see the crane directly from the control room, cameras are placed in various areas on the cranes and field. In the control room, there are monitors for viewing camera screens. Since cranes are moving machines, the communication between them and the remote control room is provided by industrial Ethernet based wireless transceiver units. Accordingly, there are CLIENT Ethernet module antennas on the crane. In the hall where the crane traveling, there are ACCESS modules and antennas at fixed points. Because of the distance between the area where the crane traveling and the remote control room is long, communication between these two points is provided by fiber optic cable. In

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addition, positioning sensors are used to operate the crane semi-automatically. In general, safety systems are used in automation and communication. As a result of the study, for the first time in our country, a system that can be controlled from a remote room, designed and manufactured locally, has emerged.

Keywords: Crane, Remote Room, Control, Foundry, Safety Working

Product Recommendation System Based on Artificial Intelligence

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Abstract

Recommendation systems have become increasingly popular in recent years, and they are utilized in a variety of areas including movies, music and products in general. They play an important role in marketing and sales because it helps users to discover new products and services. Mostly used in e-commerce sites like Amazon, eBay etc make use of better serve the customers with they are bound to like or buy. There can be positive effects on the user experience. For these reasons, several algorithms have been developed. According to our literature research Collaborative Filtering, Autoencoder, Deep Learning Matrix Factorization techniques has been used for product recommendation system. The data to be used for the first studies are filter groups of products, properties, sales numbers of Hybrone security company. Models will be trained on these datasets with recent methods used for the recommendation systems. These scores will be measured and analyzed.

In addition to the features used in the base model, the dataset will be developed to make propositions based on sales experience. To achieve this, a meeting will be held to discuss with marketing and sales departments about their experiences with B2B customers. In the next step, Collaborative Filter will be used in the model. This filter system focuses on product and user similarity. The model created as a result of this study will be actively used on the Hybrone e-commerce site.

Keywords: Recommendation System, Deep Learning, Collaborative Filtering, Autoencoder

Production of Structured Lipids by Chemical Interesterification of Beef Tallow with Milk and Different Oils

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Abstract

Beef tallow is a valuable by-product of meat industry and narrowly used in the food production. The tallow is rich in terms of saturated fatty acids and has higher melting temperatures which prevents its direct use in the food processes. In order to bring tallow in the food industry, appropriate modifications should be carried out. Structural lipids could be manufactured by chemical interesterification. Chemically interesterified lipids have better chemical properties with ideal functionality and show lower melting behavior. This study aims production of structured lipids by chemical interesterification of beef tallow-milk mixture individually with sunflower and hazelnut oils. Twenty one different blends were prepared according to a full factorial design in order to evaluate the effects of milk concentration (10-15-20% w/w), oil type, and oil ratio (20-30-40%) on structured lipids. For this purpose, free fatty acid content (FFA), peroxide value (PV) and slip melting points (SMP) of produced samples were measured. The data were analyzed with univariate (ANOVA) and multivariate statistical analysis (PCA) techniques to investigate the differences regarding the oil types, oil ratio and milk concentration. The SMP of tallow decreased by interesterification and was ranged from 34 to 46.4 °C. The FFA content of structured lipids increased slightly regardless of oil type. The peroxide value of tallow rised by addition of milk. ANOVA results indicated that milk concentration and oil ratio were the significant parameters affect the chemical properties of the interesterified lipids. Moreover, the constructed PCA model revealed a separation of samples with respect to oil ratio.

Keywords: beef tallow, chemical interesterification, milk, vegetable oils

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Görme Engelliler İçin Baharatlık Seti Tasarımı

Levent Tural

Görmengelliler için baharatlık seti tasarımı / Hascevhher tasarım merkezi / Kahramanmaraş / Türkiye / 0000-0002-3107-7591

Öz

Toplum içinde ayrıştırılmadan, hayatın küçük bir parçasında da olsa görme problemi yaşayan insanların kendilerini özel hissettirmek amaçlanmıştır ve bunu hayatın her alanına uygulayabilmek hedeflenmiştir. Baharatlık seti olarak tasarlanan ürünler öncelik olarak görme duyusu olamayan insanlara hitap edecek şekilde planlanmıştır. Günlük yaşamda kullanıma uygun yapısı ev, kafe, restoranlarda kullanım tercihlerini artırarak görme problemi yaşayan insanları daha özel hissettirecektir. Baharat gurubundaki delik yapısı gıda tüketimindeki tuz oranını optimum seviyede olacak şekilde tasarlanmıştır. Bu sayede ne daha fazla nede daha az dökülerek ideal tada ulaşmak hedeflenmiştir. Yağ, Sirke, Nar ekşisi gibi sosların koyulması için tasarlanan şişe ise gövde içerisinde yer alan hazne sayesinde her kullanımda bir yemek kaşığı dökülecek şekilde tasarlanmıştır. Gövde formundaki ergonomik yapı ele tam oturmasını sağlayan kullınımı kolay yapıdadır. Gövde altına denk gelecek şekildeki hazne içerisinde yer alan mıknatıs ile devrilme gibi sorunların önüne geçilerek bahart takımının bir bütün olarak kalması planlanmıştır. Gövde üzerinde bulunan Braille alfabesi ergonomik gövde formunun parmak dokunma seviyesine denk gelecek şekilde tasarım oluşturıldı bu sayede tercih yapılan baharatın ne olduğun tam okunması sağlanarak kullanım kolaylığı sunulmuştur. Baharat takımının bir arada görünmesini sağlayan alt hazne tasarım bütünlüğü sağlayarak görsel yönü güçlü ergonomik bir kullanım sunulmuştur. Projenin ismi İDA olarak belirlende Doğru anlamı taşıyan İDA kelimesinden esinlenerek görme engelli kullanıcıların isteklerine doğru techi yapması hedeflenmiştir.

Anahtar Kelimeler: Tuzluk, Braille

Spice Set Design For The Visually Handicapped

Abstract

It is aimed to make people who have vision problems feel special, even if they are a small part of life, without being separated in the society, and it is aimed to apply this to all areas of life.

Products designed as spice sets are primarily planned to appeal to people who have no sense of sight.

Its structure suitable for use in daily life will increase the usage preferences in homes, cafes and restaurants, and will make people with vision problems feel more special.

The hole structure in the spice group is designed in such a way that the salt ratio in food consumption is at the optimum level. In this way, it is aimed to reach the ideal taste by pouring neither more nor less.

The bottle, which is designed to put sauces such as oil, vinegar and pomegranate syrup, is designed in such a way that a tablespoon is poured in each use, thanks to the reservoir in the body.

The ergonomic structure in the form of the body is easy to use, which ensures a perfect fit in the hand. It is planned that the spice set will remain as a whole by preventing problems such as tipping with the magnet in the chamber, which is located under the body.

The Braille alphabet on the body has been designed to coincide with the finger touch level of the ergonomic body form, thus providing ease of use by ensuring that the preferred spice is read exactly.

By providing the design integrity of the lower chamber, which allows the spice set to appear together, an ergonomic use with a strong visual aspect is presented.

When the name of the project was determined as İDA, inspired by the word İDA with the correct meaning, it was aimed to provide the right technology to the wishes of visually impaired users.

Keywords: Shaker, Braille

Türkiye'deki Öğretmenler Arasında Siber Güvenlik Farkındalığını Ölçmek İçin Kimlik Avı Saldırısı Çalışması

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Öz

Bu çalışmada siber saldırılar arasında en yaygın olarak yapılan Phishing(Oltalama) saldırısı açıklanarak bu saldırı karşısında alınacak önlemler anlatılmıştır. Milli Eğitim Bakanlığında görev yapan 3480 öğretmene phishing(oltalama) saldırısı konusunda farkındalık oluşturmak için bir saldırısı uygulaması yapılmıştır. Saldırıda kişilere covid-19 aşısı konusunda manipülasyon yapılarak bir mail gönderilmiştir. Mail içindeki linke tıklayanlar sağlık bakanlığının kopya sitesine yönlendirilmiştir. Site üzerindeki formda kişisel bilgilerinde olduğu bir takım bilgiler istenmiş ve bilgileri doldurup kayıt düğmesine basanlara bir video üzerinden farkındalık eğitimi yapılmıştır. Aynı kişilere birkaç hafta sonra yine covid-19 konusunda salgın kurallarına uymadıkları gerekçesi ile hazırlanan başka bir mail gönderilerek linke tıklamaları istenmiştir. Birinci maildeki linke kişi sayısının %23.56'sının tıkladığı, farkındalık eğitiminden sonra ikinci maildeki linke ise %15,43'sinin tıkladığı görülmüştür.

Anahtar Kelimeler: Phishing(Oltalama) Saldırısı, Siber Saldırı, Farkındalık Eğitimi, Siber Olay

Phishing Attack Study to Measure Cyber Security Awareness Among Teachers in Turkey

Abstract

In this study, the most common phishing attack among cyber attacks is explained and the precautions to be taken against these attacks are explained. In this case study, a phishing attack was applied to 3480 teachers working in the Ministry of Education to raise awareness about the phishing attack. In the attack, people were manipulated about the Covid-19 vaccine and sent an e-mail. Those who clicked on the link in the mail were directed to the copy site of the Ministry of Health. In the form on the site, some information, including their personal information, was requested and awareness training was given via a video to those who filled in the information and clicked the registration button. A few weeks later, another e-mail was sent to the same teachers that they did not comply with the Covid-19 rules, and they were asked to click on the link. It was observed that 23.56% of the number of people clicked on the link in the first e-mail, and 15.43% of them clicked on the link in the second e-mail after the awareness training. As a result of the study, it was concluded that awareness training increased the awareness of cyber security attacks among teachers.

Keywords: Phishing Attacks, Cyber Security, Cyber-Attack Awareness

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Öz

Tasarımda en önemli konu estetik yaratmak ve bunu kısa sürede topluma iletmektir. Tasarım görsel bir uygulamadır ve tasarımcılar görsel olarak bilinçli profesyoneller olarak değerlendirilebilirler. Görsel araçları üretimde ilham kaynağı olarak kullanmak yaygın olarak kullanılan bir yöntemdir. Bunlara ek olarak mimarlık ve fotoğraf arasındaki benzerlikler ve kesişimler bilgi verme amaçlıdır; ikisi farklı ifadeler olsa da birlikte kullanıldıklarında farklı anlamlar ve boyutlar kazandırmaktadır. Fotoğraflar sadece bir bilinç duygusu yaratmakla kalmaz, aynı zamanda bilincimizi ortaya çıkaran bir kontrast da sağlar. Bu noktada da yeni bir imge inşa ederken kapısı oldukça açık bir ortam hazırlamaktadır. Görsel düşünce sistemi, sanatsal kavramların içeriğiyle var olmaktadır. Bu nedenle fotografik gözlem ve kayda ek olarak görüntüler de kavram ve formları netleştirebilecek tanımlamaları oluşturmaktadır. Eserlerin ve mimari alanların fotografik temsilleri, kültürel ve profesyonel gündemleri geliştirmekte ve değişen ideolojileri ve politikaları yansıtmaktadır. Yapının fotoğraf yüzeyine aktarılması, çoğu zaman çelişkili bağlantılarla, sorunun karmaşıklığı üzerine bir yansımayı ima etmektedir. Tüm bu gözlem ve tartışmalar ışığında, bu araştırmanın odak noktası, mimariyi ve fotoğrafın ilişkisinin nasıl daha etkin kullanılacağını sorgulayarak günümüzde fotoğrafın yaygınlaşmasından mimari algı, değerlendirme ve gelişim açısından nasıl yararlanılabileceğini tartışmaktır.

Anahtar Kelimeler: İmge İnşası, Fotoğraf, Simbiyoz, İç Mimari Tasarım, Mekanda Algı.

Photo-Architectural Symbiosis Relation

Abstract

The most important issue in design is to create aesthetics and convey this to the society in a short time. Design is a visual practice and designers can be considered visually conscious professionals. Using visual tools as a source of inspiration in production is a widely used method. In addition, the similarities and intersections between architecture and photography are informative; Although the two are different expressions, they give different meanings and dimensions when used together. Photographs not only create a sense of consciousness, but also provide a contrast that reveals our consciousness. At this point, while building a new image, it prepares an environment with a very open door. The visual thought system exists with the content of artistic concepts. Therefore, in addition to photographic observation and recording, images also constitute definitions that can clarify concepts and forms. Photographic representations of artifacts and architectural sites advance cultural and professional agendas and reflect changing ideologies and politics. Transferring the structure to the photographic surface implies a reflection on the complexity of the problem, often with conflicting connections. In the light of all these observations and discussions, the focus of this research is to question how the relationship between architecture and photography can be used more effectively, and to discuss how the popularization of photography can be benefited from in terms of architectural perception, evaluation and development.

Keywords: Image Construction, Photography, Symbiosis, Interior Design, Perception in Space.

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Mimari Değerlerin Korunması Sürecine Sistemik Bir Yaklaşım: IUAV Üniversitesi Kampüsü

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Öz

Günümüzde çoğu tarihi yapı işlevini yitirmiş ve başka amaçlarla restore edilmiştir. İşlevini yitirmiş yapının dönüşümü, sadece yapıyı korumakla kalmaz, aynı zamanda yapının hizmet ömrünü de uzatır. Binayı sürdürülebilir ve yaşanabilir kılmak için yeniden işlevsel hale getirme fikrinden yola çıkarak; geçmişte farklı işlevler için kullanılan binaların dönüştürülmüş hallerinin tasarımsal ve mimari ilkeler ile ilişkisi bir model bina üzerinden test edilecektir. Venedik'teki tarihi binaların renovasyonundan seçilen bir pamuk fabrikası örnek alınarak, eski ve yeni binalar arasındaki ilişkiyi incelemek için SWOT analizi yöntemi kullanılmıştır. Bu doğrultuda yapının değerini koruma teorisi ve etiği ile desteklenen araştırmada mekan analizi takip edilmekte, yapının mevcut durumunun yeni işlevler kurmaya uygun olup olmadığı anlaşılmaya çalışılmaktadır. Bu yöntemle incelenen yapıya yüklenecek olan işlevin; çevresel, mimari ve teknolojik avantaj ve dezavantajları ortaya çıkarılmıştır. Yapılan analizler sonucunda yeniden yapılanma önerisi sistematik olarak değerlendirilmiş ve fonksiyonel öneriye göre seçim kriterleri belirlenmiştir. Demiryolu istasyonları, fabrikalar ve kervansaraylar önemli dönem yapıları oldukları için tarihi mirasın simgesel değerleri olarak değerlendirilmesi gereken yapılardır. Bu nedenle bu yapıların işlevlerinin restorasyonu sürecinde daha önce harekete geçen çevre üzerindeki sosyo-ekonomik etkileri de işlevsel hale geldikten sonra devam etmeli ve başka bir boyuta taşınmalıdır. Araştırma yapısı, tarihi mekan, yapı, sürdürülebilirlik, işlev ve mekan kavramları üzerinden incelenmiştir. Ayrıca sürdürülebilir mekanlar açısından geliştirilebilir bir örnek olması nedeniyle mimari araştırmalara ışık tutacağı düşünülmektedir.

Anahtar Kelimeler: Sürdürülebilirlik, Fiziksel Çevre Kontrolü, Yeniden İşlevlendirme, İç Mimari Tasarım, Mimarlık ve Tasarımda Ekoloji.

A Systematic Approach to the Protection of Architectural Values: IUAV University Campus

Abstract

Today, most historical buildings have lost their function and have been restored for other purposes. The transformation of the dysfunctional structure not only protects the structure, but also extends the service life of the structure. Starting from the idea of re-functionalizing the building in order to make it sustainable and livable; The relationship between the converted buildings, which were used for different functions in the past, and the design and architectural principles will be tested on a model building. SWOT analysis method was used to examine the relationship between old and new buildings, taking as an example a cotton mill selected from the renovation of historical buildings in Venice. In this direction, space analysis is followed in the research, which is supported by the theory and ethics of preserving the value of the building, and it is tried to understand whether the current situation of the building is suitable for establishing new functions. The function to be loaded into the structure examined by this method; environmental, architectural and technological advantages and disadvantages were revealed. As a result of the analysis, the restructuring proposal was systematically evaluated and the selection criteria were determined according to the functional proposal. Since railway stations, factories and caravanserais are important period structures, they should be considered as symbolic values of historical heritage. For this reason, the socio-economic effects on the environment, which were activated in the process of restoring the functions of these structures, should continue and be moved to another dimension after they become functional. The research structure has been examined through the concepts of historical space, structure, sustainability, function and space. In addition, it is thought that it will shed light on architectural research, as it is an example that can be developed in terms of sustainable spaces.

Keywords: Sustainability, Physical Environmental Control, Reuse, Interior Design, Architecture and Ecology in Design.

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GERÇEK ZAMANLI MERMİ KOVANI KALİTE KONTROL SİSTEMİ TASARIM VE İMALATI

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Öz

Yerli üretimleri yapılan 9 mm tabanca mermilerinin kovanlarının üretim sonrası kontrolleri genel olarak göz ile yapılmaktadır. Yapılan bu kontroller insana bağlı olduğundan hata yapılması kaçınılmaz olmakta ve ayrıca maliyeti artırmaktadır. Yeter Makina tarafından önerilen bu proje ile kovanların hatasız bir şekilde gerçek zamanlı olarak kamera sistemleri ve görüntü işleme yazılımı ile 320 adet/dakika kapasite ile düzgün ve hatasız olarak kalite kontrollerinin yapılması amaçlanmaktadır. Bu proje ile yapılacak sistemle, personel tarafından yapılan hatalı kontrolleri ortadan kaldıracak ve otomatik kontrol ile hatasız bir kalite kontrolü meydana getirilecektir. Geliştirilecek görüntü işleme yazılımları ve birçok kamera sistemi ile aynı anda ve yüksek hızlarda, ürünlerin kalite kontrolünün yapılması sağlanacaktır. Ana bilgisayara konulacak programımız ile tüm sistem kontrol edilecektir. Sistemin hızı kameraların, sensörlerin ve yazılımın etkinliği ile kontrol edilecek ve zaman içerisinde program algoritmasında yapılacak değişikliklerle sistemin daha hızlı çalışması sağlanabilecektir.

Sistemin daha hızlı çalışabilmesi ve muadillerinin önüne geçebilmesi için kameralardan alınan görüntüler farklı bilgisayarlar tarafından işlenecek ve sonuçlar C++ yazılım dili kullanılarak ana bilgisayara kurulacak program ile toplanacaktır.

Alan taramalı ve yüksek hızlı global shutterli kameraların kovan yüzeyine olabildiğince yakın konumlandırılması sayesinde daha düşük çözünürlükteki veriler daha hızlı işlenebilecektir. Kovan yüzeyinin tümü yerine operasyon için seçilecek öncelikli alanların kullanıcı arayüzü vasıtasıyla seçilebilmesi sağlanacaktır. Bir görüntü üzerindeki farklı alanlar multi-threading yöntemler ile paralel işlenecektir. Bu sayede daha az veri daha hızlı işlenebilecektir.

Anahtar Kelimeler: Kalite Kontrol, Mühimmat, Görüntü işleme.

DESIGN AND MANUFACTURING OF REAL TIME BULLET SHIELD QUALITY CONTROL SYSTEM

Abstract

Post-production controls of the shells these are domestically produced 9 mm pistol bullets are generally carried out visual inspection. When these controls are human-dependent, it is inevitable to make mistakes and also increases the cost. It is aimed to carry out quality control of the shells in real time without errors, with camera systems and visual processing by software, with a capacity of 320 parts per minute with this project proposed by Yeter Makina. With the system to be made with this project, imperfect controls made by the human will be eliminated and a faultless quality control will be created with automatic control.

With the visual processing software to be developed and many camera systems, the quality control of the products will be carried out simultaneously and at high speeds. The whole system will be controlled with the program to be installed the main computer. The speed of the system will be controlled by cameras, sensors and software, and with the changes to be made in the program algorithm over time, the system will be able to run faster.

In order for the system to work faster and to get ahead of its counterparts, the images taken from the cameras will be processed by different computers and the results will be collected with the program to be installed on the main computer using the C++ software language.

Thanks to the positioning of area scanning and high speed global shutter cameras as close as possible to the shell surface, lower resolution data will be processed faster. It will be ensured that the priority areas to be selected for operation instead of the entire shell surface can be selected via the user interface. Different areas on an image will be processed simultaneously with multi-threading methods. In this way, less data will be processed faster.

Keywords:Quality Control, Ammunition, Image Processing.

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Çamaşır Kurutma Makinesinde İnsan Sağlığını Olumsuz Etkileyen Bakteri ve Virüsleri Yok Ederek Yüksek Hijyen Standartlarını Sağlamak Üzere Yenilikçi UV-C Teknolojisinin Geliştirilmesi

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Özet

Tüketicilerin daha bilinçli hale gelmesiyle birlikte hijyen beklentisi sürekli artmakta ve piyasada bu doğrultuda yeni ve rekabetçi ürünlerin çıkmaya başladığı görülmektedir. Bu kapsamda yenilikçi teknolojiler kullanarak çamaşır ve makine hijyeni sağlayan kurutma makinesi geliştirme projesi gerçekleştirilmiştir.

Kurutma makinesi içerisindeki mevcut kurutma sistemine müdahale etmeyecek şekilde entegre edilen UV-C teknolojinin sağladığı UV-C ışınları ile çamaşır ve kişisel eşyalar üzerinde, makine içerisinde insan sağlığını tehdit eden Escherichia Coli, Staphylococcus Aureus ve Enterococcus Faecium bakterileri, Aspergillus Niger mantarı, Poliovirüs Tip-1, Adenovirüs Tip-5 ve Human Coronavirus virüsleri yok edilerek %99,99 ve üzeri oranda yüksek hijyen seviyesi sağlanır.

UV-C teknolojisi entegre edilmiş çevreci R290 soğutucu akışkana sahip ısı pompalı çamaşır kurutma makinesi ile düşük sıcaklıklarda makine içerisindeki mikrobiyolojik zararlıların %99,99 ve üzeri oranda giderilmesi sağlanır. Çalışmalar sonucunda sektörde hijyen anlamında yenilik yaratacak ve tüketici konforunu arttıracak, çamaşır hijyenini sağlayan ev tipi bir çamaşır kurutma makinesi geliştirilmiş olacaktır.

Anahtar Kelimeler: UV-C, UV-C LED, Hijyen, Çamaşır Kurutma Makinesi.

Developing Innovative UV-C Technology to Ensure High Hygiene Standards by Eliminating Bacteria and Viruses that Negatively Affect Human Health in the Tumble Dryer

Abstract

Consumers becoming more conscious, the expectation of hygiene is constantly increasing and it is seen that new and competitive products have started to appear in the market in this direction. In this context, a drying machine development project that provides laundry and machine hygiene by using innovative technologies was carried out.

With the UV-C rays that the UV-C technology will provide to the system, which is integrated in a way that does not interfere with the existing system in the dryer, the expected hygiene level in the machine is provided on the laundry and personal belongings. Escherichia Coli, Staphylococcus Aureus and Enterococcus Faecium bacteria, Aspergillus Niger fungus, Poliovirus Type- 1, Adenovirus Type-5 and Human Coronavirus viruses are removed, providing a high hygiene level of 99.99% and above.

Heat pump tumble dryer with integrated UV-C technology, it is aimed to remove microbiological pests on the laundry by using 100% natural and environmentally friendly R290 refrigerant, it is ensured that 99.99% and more of the microbiological pests in the machine

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are removed at low temperatures. As a result of the studies, a household tumble dryer will be developed that will create innovation in the sector in terms of hygiene, increase consumer comfort, and provide laundry and machine hygiene.

Keywords: UV-C, UV-C LED, Hygiene, Tumble Dryer

Ekşi Hamur Mikroorganizmaları İle Kraker Üretimi ve Kalite Özelliklerinin Araştırılması

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Öz

Bu çalışmada, kraker hamurunda bulunan kimyasal kabartıcılar yerine ekşi hamur mikroorganizmaları kullanılarak kraker üretimi gerçekleştirilmiş ve kalite özellikleri incelenmiştir. *Lactiplantibacillus plantarum*, *Levilactobacillus brevis*, *Saccharomyces cerevisiae* ve bu mikroorganizmaların kombinasyonları kraker hamuruna eklenerek üretim gerçekleştirilmiştir. Bu mikroorganizmaların hamura eklenmesiyle hamur pH'ları arasında istatistiksel açıdan farklılık bulunmuştur ($p < 0.05$). Kimyasal kabartıcı olarak sodyum bikarbonat içeren kontrol hamuru en yüksek pH değerini verirken *Lc. plantarum* ve *S. cerevisiae* kombinasyonu ile *Lev.brevis* ve *S. cerevisiae* kombinasyonu en düşük pH değerini vermiştir. Ekşi hamur mikroorganizmalarının dahil edilmesiyle birlikte krakerlerde kalınlık kontrol krakerlerine göre önemli ölçüde artmıştır ($p < 0.05$). En yüksek çap değeri ise kontrol krakerinde görülürken, en düşük çap değeri *Lc. plantarum* eklenen krakerde görülmüştür. Krakerlerde yayılma oranı, kontrol krakerlerinde diğer ekşi hamur mikroorganizmaları katılarak üretilen krakerlere oranla istatistiksel açıdan önemli ölçüde daha yüksek çıkmıştır ($p < 0.05$). Kontrol krakeri ve sadece *S. cerevisiae* içeren kraker örneği, diğer krakerlere oranla daha düşük parlaklık (L^*) değerinde oldukları gözlemlenmiştir ($p < 0.05$). *Lev. brevis* ve *S. cerevisiae* mikroorganizmalarının bir arada kullanıldığı krakerler en yüksek sertliğe sahip iken, sadece *S.cerevisiae* içeren kraker en düşük sertlik değerine sahip olmuştur. Ekşi hamur mikroorganizmalarının, kraker hamurunun dinamik reolojik özellikleri üzerine etkisi de incelenmiş ve tüm numuneler için depolama modülünün (G') kayıp modülünden (G'') yüksek olduğu görülmüştür. Duyusal analiz sonuçlarına göre panelistler tarafından en az beğenilen kraker, kontrol krakeri olurken en yüksek genel beğeni puanına sahip kraker, *Lev.brevis* katılan kraker olmuştur.

Anahtar Kelimeler: Ekşi Hamur Mikroorganizmaları, Kraker, Kalite.

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Cracker Production with Sourdough Microorganisms and Investigation of Quality Characteristics

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Abstract

In this study, cracker production was performed by using sourdough microorganisms instead of chemical leavening agents in cracker dough and their quality characteristics were investigated. *Lactiplantibacillus plantarum*, *Levilactobacillus brevis*, *Saccharomyces cerevisiae* and their combinations were used in the cracker production. A statistical difference was found with the addition of these microorganisms into dough formulation in terms of pH value ($p < 0.05$). The highest pH value was observed in control dough containing sodium bicarbonate as chemical agent while the lowest pH value was observed in the combination of *Lc. plantarum* and *S. cerevisiae* and the combination of *Lev. brevis* and *S. cerevisiae*. The thickness of the crackers increased significantly compared to the control crackers with the addition of sourdough microorganisms ($p < 0.05$). The highest diameter value was observed in the control cracker, while the lowest diameter value was observed in the cracker containing *Lc. plantarum*. Spread ratio of control cracker was significantly higher than the crackers produced by sourdough microorganisms ($p < 0.05$). The lowest lightness (L^*) value was observed in the control cracker and the cracker containing only *S. cerevisiae* ($p < 0.05$). The crackers produced with the combination of *Lev. brevis* and *S. cerevisiae* had the highest hardness value while the cracker produced with only *S. cerevisiae* showed the lowest hardness value. The effect of sourdough microorganisms on the dynamic rheological properties of cracker dough was also investigated and it was observed that the storage modulus (G') was higher than the loss modulus (G'') for all samples. According to the sensorial evaluation, the control cracker had the lowest score while the cracker produced with *Lev. brevis* had highest score.

Keywords: Sourdough Microorganisms, Cracker, Quality

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Baretlerin Farklı Tasarım Parametrelerinin Darbe Dayanımı Özelliklerine Etkisinin İncelenmesi

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Öz

İş kazaları, işin yürütümü sırasında gerçekleşen ve sonucunda çalışanları ruhen ve bedenen zarara uğratan öncesinde tahmin edilemeyen olaylardır. İş kazalarını önlemek için alınması gerekli önlemler, toplu koruma önlemleri ve kişisel koruma önlemleri şeklinde iki gruba ayrılmaktadır. Baretler, çalışanları yüksekte herhangi bir cisim düşmesine karşı koruyan kişisel koruma önlemleri grubunda yer alan donanımlardır. Baretlerin malzeme ve tasarım özellikleri mukavemet yapılarına etki eden iki önemli faktördür. Mukavemet özelliklerinin yüksek olması çalışanların güvenliklerini artırıcı en önemli unsurdur. Baretlerin üretiminde hafif ve dayanıklı olan polietilen termoplastik malzeme kullanılmaktadır. Bununla birlikte bir baret temelde EN397 standartına uygun olarak minimum 5 kilogram kütleye sahip cismin 1 metre yüksekten düşmesine dayanıklı olmalı, herhangi bir deformasyona uğramamalıdır. Bu çalışmada farklı yüzey tasarımlarına sahip olan üst yüzeyinde havalandırma delikleri bulunan baret tasarımı ile havalandırmasız baret tasarımı için Ansys Workbench'te farklı yüksekliklerden farklı kütlelerde cisim düşmesi için darbe dayanımı analizi gerçekleştirilmiştir. Havalandırma delik boyutlarının ve sayılarının da mukavemet özelliklerine etkisi incelenip tüm sonuçlar karşılaştırılarak optimum tasarım özellikleri belirlenmiştir.

Anahtar Kelimeler: Baret konstrüksiyonu, Baret darbe dayanımı, Mekanik analiz.

Investigation of the Effect of Different Design Parameters of Safety Helmets on Impact Strength Properties

Abstract

Occupational accidents are unpredictable events that occur during the execution of the work and as a result harm the employees mentally and physically. Measures to be taken to prevent occupational accidents are divided into two groups as collective protection measures and personal protection measures. Safety helmets are equipment included in the group of personal protection measures that protect employees against any object falling from a height. The material and design features of the safety helmets are two important factors affecting the strength structures. Having high strength properties is the most important factor that increases the safety of employees. Lightweight and durable polyethylene thermoplastic material is used in the production of safety helmets. However, a hard hat must be resistant to a 1 meter drop of an object with a minimum mass of 5 kilograms, in accordance with the EN397 standard, and must not undergo any deformation. In this study, impact strength analysis was carried out for falling objects of different masses from different heights in Ansys Workbench for the design of safety helmets with ventilation holes on the upper surface, which have different surface designs, and for the design of non-ventilated. Optimum design features were determined by examining the effect of ventilation hole sizes and numbers on strength properties and comparing all the results.

Keywords: Safety helmet construction, Safety helmet impact strength, Mechanical analysis.

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Yataklama Elemanlarının Çalışma Koşullarına Özgü Test Cihazının Tasarlanıp İmal Edilmesi

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Öz

Sürekli gelişen teknoloji farklı malzemelerden üretilen yataklama elemanlarının imal edilmesi ve performanslarının sürekli olarak artırılması ihtiyacını doğurmaktadır. Özellikle savunma sanayi projelerinin yerleştirilmesi kapsamında ulusal güvenliği ilgilendiren stratejik projelerde kullanılan hidrolik silindirlerin çalışma ömürlerini uzatmak ve sızdırmazlık performanslarını iyileştirmek için yataklama elemanlarının yüksek yük taşıma kabiliyeti ve üstün aşınma dayanımları gibi özelliklere sahip olmaları gerekmektedir. Bu çalışmanın amacı ağır ve orta hizmet uygulamalarında yoğun şekilde kullanılan yataklama elemanlarının performanslarının tespiti ve optimize edilmesi için kullanılacak test cihazının tasarlanıp imalatının yapılması ve doğrulamasının sağlanmasıdır. Bu amaç doğrultusunda ilk etapta test parametreleri belirlenmiş, bu parametrelere uygun olarak test cihazı tasarlanıp imalatı ve teori ile doğrulaması yapılmıştır. Bu test cihazı sayesinde yataklama elemanlarının fiziksel testleri yapıp bu test verileri ışığında tasarım ve malzemelerinde gerekli değişiklikleri yaparak optimize edilecektir.

Anahtar Kelimeler: Yataklama Elemanı, Test Cihazı, Statik Test, Dinamik Test, Fiber Takviyeli Kompozit Bant, PTFE Bant.

Designing and Manufacturing a Test Device Specific to Working Conditions of Guiding Elements

Abstract

Ever-growing technology requires the production of guiding elements made of different materials and the need to continuously increase their performance. In order to extend the lifetime and improve the sealing performance of hydraulic cylinders used in strategic projects concerning national security, especially within the scope of localization of defense industry projects, guiding elements must have features such as high load carrying ability and superior wear resistance. The aim of this study is to design, manufacture and verify the test device to be used to determine and optimize the performance of guiding elements used extensively in heavy and medium-duty applications. For this purpose, test parameters were determined in the first step, a test device was designed in accordance with these parameters, manufactured and verified with theory. Thanks to this test device, physical tests of the guiding elements will be made, and they will be optimized by making the necessary changes in the design and materials in the light of these test data.

Keywords: Guiding Element, Test Device, Static Test, Dynamic Test, Fiber Reinforced Composite Tape, PTFE Tape.

Isı Pompalı Sistemde Kompresörün Akustik Açıdan Geliştirilmesi

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Özet

Tüketicilerin daha bilinçli hale gelmesiyle birlikte kalite beklentisi sürekli artmakta ve piyasada bu doğrultuda yeni ve rekabetçi ürünlerin çıkmaya başladığı görülmektedir. Bu kapsamda yenilikçi teknolojiler kullanarak kurutma makinesinde ses basıncı ve ses kalitesinin geliştirilmesi üzerine proje gerçekleştirilmiştir.

Çamaşır kurutma makinesinde soğutucu akışkan döngüsü için kullanılan rotary kompresör başlıca ses kaynaklarından birisidir. Makinanın performans katsayısını (CoP) etkilemeyecek şekilde, kullanılan mevcut kompresör gövdesi içerisine eklenen susturucu ve titreşim azaltıcı kompresör braketi tasarımı ile ses basıncı ve ses kalitesinde beklenen geliştirme sağlanmaktadır.

Çalışmalar sonucunda, piyasadaki aynı koşullarda bulunan kurutma makineleri arasında ses kalitesi anlamında fark yaratacak, makinedeki komponentlerin ömrünü uzatacak ve ses kalitesi anlamında tüketici konforunu arttıracak ev tipi bir çamaşır kurutma makinesi geliştirilmiş olacaktır.

Anahtar Kelimeler: Kompresör, Isı Pompalı Sistem, Akustik, Çamaşır Kurutma Makinesi.

Acoustic Improvement of Compressor in a Heat Pump System

Abstract

Consumers becoming more conscious, the expectation for quality is constantly increasing, and it is seen that new and competitive products have started to appear in the market in this direction. In this context, a project was carried out to improve the sound pressure and sound quality of tumble dryer by using innovative technologies.

The rotary compressor used for the refrigerant cycle in the tumble dryer is one of the main sound sources. With the design of silencer and vibration reducing compressor bracket added to the existing compressor body to achieve an improvement in sound pressure and sound quality, without affecting the coefficient of performance (CoP).

As a result of the studies, a household tumble dryer will be developed that that will make a difference in terms of sound quality among dryers in the market under the same conditions, extend the life of the components in the machine and increase consumer comfort in terms of sound quality.

Keywords: Compressor, Heat Pump, Acoustic, Tumble Dryer

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OTOMATİK GEÇİŞ SİSTEMLERİ İÇİN BİR UÇ VERİ MERKEZİ MODELİ

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Öz

Otomatik geçiş sistemi (OGS) site, okul ve hatta üniversite gibi çok çeşitli alanlara yetkilendirilen araçların hızlı geçişini sağlayan sistemlerdir. OGS'lerde merkez sunucuda hem araçların tanımlamaları hem de geçiş kontrol yetkileri değerlendirilir ve araçların geçiş noktalarında beklemeden geçiş yapmaları sağlanır. Bir araç geçiş noktasına geldiğinde yetki kontrolü merkez sunucu üzerinde yapılarak kontrol kartına cevap döner. Ancak, bu işlem için geçen zaman araçların geçişte beklemelerine neden olur. Bu çalışmada, araçların hızlı geçişini sağlamak için geçiş kontrol yetkilerinin değerlendirme işlemini araç tanımlamalarının yapıldığı sunuculardan ayırıp uç veri merkezi (UVM: ing. Edge Data Center)'nde yapıldığı bir model önerilmiştir.

UVM, omurga ağına kenarına yakın yerleştirilmiş modüler bir yapıdır ve merkez bilgi işlem ile veri kaynakları arasında ara bir katman olarak çalışmaktadır. Verileri kaynağa yakın olarak barındırır ve gerçek zamanlı olarak işlemektedir. Ayrıca UVM'ler her an artmakta olan veri miktarı ve bunların iletimi sırasında meydana gelen gecikmelerin önüne geçtiği için sistem yöneticileri tarafından tercih edilmektedir. Gerçek zamanlı veriler ile çalışan akıllı evler, hastaneler, okullar ve daha birçok endüstriyel kuruluşlarda uç veri merkezleri kullanılmaktadır.

Bu çalışmada önerilen modelin öncelikle amacı oluşturulan UVM'de kontrol ünitelerinden gelen verileri değerlendirip cevap sürelerini mevcuttan daha kısa zamana indirmektir. Modelde UVM ana bilgi işlem sunucusuyla ile uç noktalar olan kontrol kartları arasında çalışmaktadır. Modelimiz sayesinde otomatik geçiş sistemlerinde yaşanan yanıt sürelerindeki gecikmeler azaltılarak hizmet kalitesi arttırılacaktır. Önerdiğimiz modelin kullanılması ile gecikmelerin önüne geçilip gerçek zamanlı yürütülen sistemlerde performans artışına sebep olacağı için gelecekte birçok farklı kuruluş tarafından tercih edilebilecektir.

Anahtar Kelimeler: Uç veri merkezi, Araç geçiş sistemi, Otomatik geçiş sistemi, Uç bilişim

An Edge Computing Data Center Model For Automatic Transition Systems

Abstract

Automatic transit systems (ATSSs) are the systems that allow rapid passage of vehicles authorized to various areas such as sites, schools and even universities. In ATSSs, both the definitions of the vehicles and their access control authorizations are evaluated on the central server, and the vehicles are provided to pass without waiting at the crossing points. When a vehicle arrives at the crossing point, the authorization control is done on the central server and the control card is answered. However, the time taken for this process causes vehicles to wait in transit. In this study, a model is proposed in which access control authorizations are evaluated in the edge data center (EDC) by separating the evaluation process from the servers where the vehicle definitions are made, in order to ensure the rapid passage of the vehicles.

EDC is a modular structure placed close to the edge of the core network and processes as an intermediate layer between core computing and data sources. It hosts data close to the source and work it in real time. Also, EDCs are preferred by the system administrators because they prevent the increasing amount of data and the delays that occur during their transmission. EDCs are used in smart homes, hospitals, schools and many other industrial establishments working with real-time data.

The primary purpose of the model proposed in this study is to evaluate the data coming from the control units in the EDC created and to reduce the response times to a shorter time than the current one. In the proposed model, EDC works among the main computing server and the control cards which are the endpoints. Thanks to the proposed model, the service quality can be increased by reducing the delays in response times experienced in automatic transition systems. By using the model, in the future, different organizations used the model, can reduce the delays and real-time performance of their system can be increased.

Keywords: Edge data center, Vehicle transition system, Automatic transition system, Edge computing.

Buhar Fazlı Polimerizasyon Yöntemiyle Pedot Film Kaplanarak İletken Hale Getirilen Poliester Esaslı Tekstil Yüzeylerinde Flaman Sayısı ve Örgü Yapısının Etkilerinin İncelenmesi

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Özet

Teknolojinin ilerlemesi ile birlikte iletkenliğe sahip tekstil yüzeyleri her sektör için ihtiyaç haline gelmiş ve bu yüzeyleri elde etmek için kullanılacak farklı yöntemler geliştirilmiştir. Bu yöntemler içinde uygulaması en kolay olan, bakır, gümüş gibi iletken tellerin kumaşa ilave edilmesiyle iletkenlik sağlanmasıdır. Dokuma yüzeyleri oluştururken metal iplikler kullanılması; kumaşın esnekliğini yitirmesi, dokuma tezgâhlarını yıpratması veya kırılabilirliği nedeniyle üretim ve kullanım sırasında iletkenliğinin bozulması gibi dezavantajları vardır. Bu çalışmada; endüstriyel ölçekte üretime modifiye edilebilecek bir polimerizasyon yöntemi ile iletken tekstil yüzeyleri elde edilmesi ve dokuma örgü tipi ile filament sayısının iletkenlik performansına etkisi ele alınmıştır. Bu amaçla, daha önce yapılan çalışmalar incelenerek iletkenlik performansı nedeniyle PEDOT polimeri, uygulama kolaylığı ve sanayiye uyarlanabilirliği nedeniyle buhar fazında polimerizasyon yöntemi seçilmiştir. Üretilen numune kumaşlarda uygun maliyeti, geniş kullanım alanı ve dayanıklı bir polimer olduğu için polyester tercih edilmiştir. Atkı ve çözgü sıklıkları sabit tutularak 150 Den 48, 144 ve 288 filament ipliklerle, bezayağı ve 3/1 dimi örgülü numune kumaşlar dokunmuştur. Polimerizasyon için tekstil kumaşlarının yatay akışına uygun bir kabin tasarlanmış ve sağlıklı bir karşılaştırma yapabilmek adına setler halinde, laboratuvar ölçeğinde buharlamaları yapılmıştır. Her setin, kaplama sonrası ve kullanım şartlarını simüle eden performans testleri sonrası elektriksel direnç değerleri ölçülerek karşılaştırılmıştır. Çalışmayla, numunelerin büyük kısmının performans testleri sonrası, iletkenliğinin sürdüğü tespit edilmiş ve yöntemin büyük ölçeğe çevrilebilmesi için araştırmalara başlanmıştır.

Anahtar Kelimeler: PEDOT, Buhar Fazında Polimerizasyon, Poliester, İletken Kumaş, Akıllı Tekstil,

Investigation of the Effects of Filament Number And Weaving Structure on Polyester Based Textile Surfaces Made Conductive by Coating Pedot Film With Vapour Phase Polymerization Method

Abstract

With the advancement of technology, conductive textiles have become a necessity for every sector and different methods have been developed to obtain these surfaces. The easiest process to apply among these methods is to provide conductivity by adding conductive threads such as copper and silver wires to the fabric. The use of metal threads when creating woven surfaces; It has disadvantages such as losing the flexibility of the fabric, damage of the looms or deteriorating its conductivity during production and use due to its fragility. Obtaining conductive textile surfaces with a polymerization method that can be modified for industrial scale production and the effect of weaving type and number of filaments on conductivity performance are examined in this study. For this purpose, PEDOT polymer was chosen due to its conductivity performance, and vapor phase polymerization method was chosen due to its ease of application and industrial adaptability. Polyester has been preferred for the weaving because of its cost-effectiveness, wide usage area and durability of the polymer. By keeping the weft and warp densities same, plain and 3/1 twill knitted sample fabrics were woven with 150 Den yarns with 48, 144 and 288 filaments. For polymerization, a cabinet was designed to be similar to the horizontal flow of textile fabrics and to make the right comparison, steaming was done in sets, in laboratory scale. The electrical resistance values of each set were measured and compared after coating and performance tests simulating the usage conditions. With this study, it was determined that the conductivity of most of the samples continued after the performance tests and researches were started in order to convert the method to a large scale.

Keywords: PEDOT, Vapour Phase Polymerization, Polyester, Conductive Fabric, Smart Textile

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A Hybrid Evaluation Approach for Social Sustainability Performance Measures in Warehousing Hub

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Abstract

The field of sustainable supply chain management has been abundantly explored from environmental perspective however the growing focus on holistic sustainable development demands critical perspective on social dimensions also. Consequently, organizations under national and global pressures tend to implement social sustainability measures in their supply chains. While existing research suggests that social sustainability measures are prevalent in developed countries, the developing nations nonetheless require elaborate efforts. This study aims to explore the initiatives and practices adopted by logistics, specifically warehousing operations organizations. Social sustainability practices identified and finalized using Best Worst Method (BWM) are prioritized for their impact on improving social sustainability footprint of organizations. Considering the importance of corporate social responsibility (CSR) of organization, these practices are explored for measuring the CSR performance. Using survey-based approach data collected from 217 organizations is statistically analyzed by binary logistic regression. The hybrid approach results indicate the importance of ‘health and safety management’ as strong contender for improving social sustainability performance. Contrary to theoretical predictions and expectations, ‘training education and development’ is found lacking for improving social footprints of organizations indicating deeper and rigorous approaches. Additionally, ‘corporate ethical responsibility commitment’ towards social reforms and ‘environmental sensitization of labor’ are considerably lacking the seriousness of corporates and requires further exploring.

Keywords: Social Sustainability Practices, CSR, Hybrid approach, BWM, Logistic Regression, emerging economy.

Diagnosis Prediction of Construction Vehicles and Model Explainability Industry 4.0 Implementation

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Abstract

With the developing technology, the production and use of computerized machines and vehicles have gathered momentum and consequently the amount of information obtained has increased gradually. The conversion of continuously increasing and streaming data stacks into logical and useful information becomes more and more important. Various methods and algorithms have been developed for this purpose. This group of methods and algorithms, which are called data mining in the most general terms, have been combined with statistics and turned into methods of more comprehensible and logical solutions.

Today, many devices produced are equipped with electronic circuit elements and software. Thus, the operation and control of these devices becomes convenient and it is possible to detect any failure that may occur in the devices in such a way that it does not stop the flow of the process. This has resulted in significant returns in terms of cost and time.

Borusan, one of the world's leading companies in the production and maintenance of construction vehicles, aims to use electronic circuits in its equipment in the most effective way. Construction vehicles of Caterpillar Inc. sold by Borusan are equipped with a total of 1667 different sensors that are used to detect major failures that require replacement of parts. With the help of these sensors, the data related to the operation of the construction vehicles are provided instantly via satellite over GPS and GPRS.

In this study, a model has been developed to provide early fault detection and vehicle maintenance needs by using instant data obtained from Caterpillar Inc. construction machinery (vehicles). With the Early Warning System (EWS), primarily, the selected sensor data coming from the satellite related to the vehicles is used to predict the failure possibility of the vehicles in a certain time ahead remotely by using the methods of machine learning methods and using the internet of things and cloud technology. Then, prediction data are integrated into decision-making mechanisms in business processes. Finally, the information acquired by using data visualization technologies is made available for being reported and made traceable through summary data. The focus of the personalized product mentioned by Industry 4.0 (the system developed in this study) can be easily adapted to the operation of different machines.

Keywords: Machine Failure, Machine Learning, Gradient Boosting, Logistic Regression, C5.0 Algorithm.

Burç ve Rotil Çıkma Kuvvetlerinin Artırılması İçin Sac Kalıplama Yönteminin Geliştirilmesi

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Öz

Günümüzde binek araçlara ait süspansiyon sisteminin parçası olan denge kolları, sistemin önemli yük taşıyıcı elemanlarından kabul edilmektedir. Sürekli değişen ve gelişen otomobil dünyasında, ekipmanların kullanım koşullarına uygun gerekli testlerden başarıyla geçmesi beklenmektedir. Süspansiyon sisteminde; salıncak ve denge kollarında burç ve rotıl çıkma testi, aracın boş ve dolu ağırlığının yanında; aşırı kullanım koşullarında daha fazla yüke maruz kaldığından belirlenen kritik yükün altında çıkması kabul edilemez.

Bu makalede sac salıncak ve denge kollarına ait burç ve rotıl sıvama yüksekliklerinin verimsiz temas yüzeyini minimuma indirmek adına yeni bir kalıplama metodu kullanılmış ve temas yüzeyinin artırılması ile çıkma yüklerinde artış sağlanmıştır. Temas yüzeyinin artırılması ilk olarak matematiksel model üzerinden analiz yapılarak gerçekleştirilmiştir. Elde edilen sonuçlar neticesinde çıkma yüklerinde artış görülmüştür. Yapılan analizler sonrasında sıvama temas yüzeyinin artırılması adına yeni bir kalıplama metodu geliştirilmiştir. Geliştirilen bu metod ile elde edilen numuneler çıkma testine tabi tutulmuştur. Çıkma yükleri klasik kalıplama metoduna göre yaklaşık %50 artış sağlandığı görülmüştür. Elde edilen numuneler ile matematiksel model analiz sonuçları karşılaştırıldığında tutarlılık görülmüştür.

Anahtar Kelimeler: Burç sıvama, Rotil sıvama, Sıvama temas yüzeyi.

Development of Method of Sheet Metal Molding to Increase Bushing and Ball Joint Pull-Out Forces

Abstract

Today, control arms, which are part of the suspension system for passenger vehicles, are recognized as important load-carrying elements of the system. In the constantly changing and developing automobile world, it is expected that the equipment will successfully pass the necessary tests simulating conditions of use. In the suspension system, the bushing pull out test on the wishbone and control arms, as well as the empty and full weight of the vehicle, it is unacceptable that it comes out below the critical load determined because it is subjected to more load on extreme

conditions.

In this article, a new molding method was used to minimize the inefficient contact surface of the bushing and ball-joint mating heights of the control arms, and an increase in contact surface and exit loads was achieved by increasing the contact surface. Increasing the contact surface was first performed by analyzing it using a mathematical model. As a result of the results obtained, there was an increase in pull-out forces. Based on the analyses, a new molding method was developed to increase the mating contact surface. The samples obtained by this developed method were subjected to pull-out force test. It was seen that an increase of about 50% was achieved in the pull-out forces compared to the classical molding method. Consistency was observed when the obtained samples and the results of the mathematical model analysis were compared.

Keywords: Bush spinning, Ball join spinning, Spinning contact surface

Simulation of Mixing Processes of Granular Materials in a Concrete Batching Plant via Discrete Element Method

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Abstract

A new concrete batching plant with the production capacity of $270\text{m}^3/\text{hr}$ was designed, analyzed and fabricated. In this concrete batching plant, the granular materials used for a high-quality product must be uniformly mixed to attain a homogenous mixture. For this, the discrete element method (DEM) was utilized to simulate the filling and mixing processes. The Hertz-Mindlin, elastic-plastic spring-dashpot, and Simplified Johnson-Kendall-Roberts (SJKR) models were used for the interaction rules among granular particles. In the light of the aforementioned models, the simulation with monosized particles was realized. In this simulation, convective, diffusive and shear mixing mechanisms were observed and consequently the quantification of the mixing index was calculated using the miles statistical method. At last but not least, the active regions formed in the mixer were investigated by taking the velocity of the particles as reference during the mixing stages.

Keywords: Discrete Element Method, Granular Material, Twin Shaft Mixer

Beton Santralinde Granül Malzemelerin Karıştırma Proseslerinin Ayırık Eleman Metodu ile Simülasyonu

Öz

$270\text{ m}^3/\text{saat}$ üretim kapasiteli yeni bir beton santralinin tasarımı, analizi ve imalatı gerçekleştirilmiştir. Bu beton santralinde, yüksek kaliteli ürünler elde edilmesi için kullanılan granüler malzemeler, homojen bir şekilde karıştırılmalıdır. Bu amaçla doldurma ve karıştırma işlemlerini simüle etmek için ayırık eleman metodu (DEM) kullanılmıştır. Hertz-Mindlin, elastik-plastik yaylı-amortisör ve basitleştirilmiş Johnson-Kendall-Roberts (SJKR)

modelleri, granül tanecikler arasındaki etkileřimler için kullanılmıřtır. Bahsedilen modeller ıřıęında, aynı büyüklükte parçacıklarla simülasyon gerçekteřtirilmiřtir. Bu simülasyonda, konvektif, difüzyon ve kaymalı karıřtırma mekanizmaları gözlemlenmiřtir ve karıřım indeksinin deęeri, miles istatistiksel yöntemi kullanılarak hesaplanmıřtır. Son olarak karıřtırma ařamaları sırasındaki parçacıkların hızı referans alınarak, mikserde oluřan aktif bölgelerin incelemesi gerçekteřtirilmiřtir.

Anahtar Kelimeler: Ayrık Eleman Metodu, Granül Malzeme, Twin Shaft Mikser

Tekstilde Sürdürülebilirlik ve Geri Dönüşüm Esaslı Yenilikçi Hammaddeler Üzerine Bir Yaklaşım

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Öz

Günümüzde dünya nüfusunun artması, doğal kaynakların azalması, giderek artan atık birikimleri gibi nedenler sürdürülebilir bir yaşam ihtiyacının önemini gündeme getirmiş ve sürdürülebilirlik kavramının farkındalığının artmasına yol açmıştır. Tekstil ve moda tasarımı alanları ise sahip oldukları dinamikler ile son yıllarda tekstil tüketiminde ve dolayısıyla tekstil üretiminde önemli bir artışa neden olmuştur. Bu noktada, sürdürülebilirlik odaklı yaklaşımların ve çözümlerin gündeme gelmesi olası bir sonuç olmakla birlikte aynı zamanda bir gerekliliktir. Bu çalışmada, güncel gelişmeler ve kavramlar ışığında sürdürülebilirlik esaslı yenilikçi liflerden 3 farklı hammadde tespit edilmiştir. Bu kapsamda sürdürülebilirlik ve geri dönüşüm odaklı bir yaklaşıma sahip olan malzeme gruplarından S.Café®, Umofil®, Seacell™ hammaddelerin tanımı, ortaya çıkışı, hangi gruplardan oluştuğu ve bu kapsamda geliştirilen kumaşların yapısal ve performans özellikleri incelenmiştir.

Anahtar Kelimeler: Sürdürülebilirlik, Yenilikçi Hammaddeler, Doğal Lifler, Geri Dönüştürülmüş Lifler, Geri Dönüşüm

An Approach to Innovative Raw Materials Based on Sustainability in Textile

Abstract

Today, reasons such as the increase in the world population, the decrease in natural resources, and the increasing waste accumulation have brought the importance of a sustainable life to the agenda and led to an increase in the awareness of the concept of sustainability. Textile and fashion design fields, on the other hand, have led to a significant increase in textile consumption and therefore textile production in recent years, with their dynamics. At this point, the emergence of sustainability and recycled oriented approaches and solutions is a possible outcome, but also a necessity. In this paper, 3 different types of raw materials from sustainability-based innovative fibers have been identified in the light of current developments and concepts. In this context, the definition of raw materials such as S.Café®, Umofil®, Seacell™, which have a sustainability and recycled oriented approach, their emergence, which groups they consist of, and the structural and performance properties of the fabrics developed in this context were examined.

Keywords: Sustainability, Innovative Raw Material, Natural Fibres, Recycled Fibres, Recycling

Raylı Sistem Taşıtlarında Ray-Teker Arası Sürtünme Yönetimi

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Öz

Çağımızın güvenilir ulaşım yollarından birisi olan raylı sistemlerde, taşıt ve altyapı arasındaki ilk etkileşim ray ve teker teması ile başlar. Ray-teker temasından doğacak olacak sürtünmenin fazla olduğu durumlarda, tekerde ve rayda izin verilen limitler dışında aşınmalar ve ses meydana gelecektir. Sürtünmenin yeterli olmadığı durumlarda ise ray üzerinde kayarak ilerleme durumu ya da ilk kalkış esnasında patinaj durumu ortaya çıkacaktır. Bu sebeplerden ötürü, sürtünmenin hat ve çevre koşullarına göre azaltılıp, artırılması gerekmektedir. Sürtünmeyi azaltmak için yağlama sistemi, artırmak için ise kumlama sistemi olarak adlandırılan sistemler taşıtlarda kullanılmaktadır. Bu çalışmada yağlama sistemi ve kumlama sistemlerinin temel bileşenleri incelenmiş olup bir tramvay için tasarlanan yağlama ve kumlama sistemleri tanıtılmıştır.

Anahtar Kelimeler: Ray, Teker, Sürtünme.

Rail-Wheel Friction Management in Rail System Vehicles

Abstract

In rail systems, which is one of the reliable transportation ways of our age, the first interaction between vehicle and infrastructure starts with rail and wheel contact. In cases where the friction that will arise from the rail-wheel contact is high, abrasions and noise will occur on the wheel and the rail outside the allowable limits. In cases where the friction is not sufficient, the wheel will slide on the rail or the vehicle will skid during the first run. For these reasons, it is necessary to increase or decrease the friction according to the line and environmental conditions. Systems called lubrication system to reduce friction and sanding system to increase friction are used in vehicles. In this study, the basic components of the lubrication system and sanding systems were examined and lubrication and sanding systems designed for a tram were introduced.

Keywords: Rail, Wheel, Friction.

Kablo ve Baralı Kanal Birimi Sistemlerinin Karşılaştırılması

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Öz

Baralı kanal birimi ve kablo sistemleri alçak gerilim dağıtım sistemlerinde enerjinin aktarımı için kullanılmaktadır. Bu sistemlerin tasarımı, kurulumu ve işletilmesi aşamasında birbirlerine göre avantaj ve dezavantajları bulunmaktadır. Bu avantaj ve dezavantajların belirlenip tasarım aşamasında değerlendirilmeye alınması sistem güvenilirliği ve uygulanabilirliği açısından önem taşımaktadır. Bu kapsamda baralı kanal birimi ve kablo sistemlerinin farklı özellikleri karşılaştırmalı olarak değerlendirilmiştir. Gerçekleştirilen değerlendirmeler ve analizler sonucunda baralı kanal birimi sistemlerinin boyutlandırma aşamalarında gerçekleştirilen temel mühendislik hesaplamalarının daha kolay ve uygulama aşamasında gerekli olan işçiliğin daha az olduğu söylenebilmektedir. Bunun yanında paralel kablolar kullanılan sistemlerde oluşan akım dağılımı dengesizliği baralı kanal birimi sistemlerinde ihmal edilebilir seviyede olmaktadır. Gerilim düşümü ve sistemler etrafında oluşan ortalama manyetik alan dağılımları değerlendirildiğinde ise analizi gerçekleştirilen sistem için baralı kanal birimi yapısının performansının daha iyi olduğu görülmektedir.

Anahtar Kelimeler: Baralı Kanal Birimi, Paralel Kablo Sistemi, Manyetik Alan Dağılımı, Akım Dağılımı.

Comparison of Cable and Busbar Trunking Unit Systems

Abstract

The busbar trunking unit and cable systems are used for the transmission of energy in low voltage distribution systems. There are advantages and disadvantages of these systems compared to each other at the stage of design, installation and operation. Determining these advantages and disadvantages and evaluating them at the design stage is important for the reliability and applicability of the system. In this context, different features of busbar trunking unit and cable systems have been evaluated comparatively. As a result of the evaluations and analyzes carried out, it can be said that the basic engineering calculations performed during the sizing stages of the busbar trunking unit systems are easier and the labor required during the application stage is less. In addition, current distribution imbalance in systems using

parallel cables is negligible in busbar trunking unit systems. When the voltage dropped and the average magnetic field distributions around the systems are evaluated, it is seen that the performance of the busbar channel unit structure is better for the analyzed system.

Keywords: Busbar Trunking Unit, Parallel Cable System, Magnetic Field Distribution, Current Distribution.

Sürdürülebilir Sentetik Liflerle Çevre Dostu İpliklerin Geliştirilmesi ve Bu Liflerin Kısa Elyaf İplikçiliğine Kazandırılması

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Öz

Çevresel kaygıların artması sebebiyle ekolojik ve sürdürülebilir tekstil ürünlerine ihtiyaç duyulmaktadır. Dünyada plastik üretimi artarak devam ederken, deniz ve okyanusları kirleten bu plastikler yaklaşık 800'den fazla canlıya zarar vererek ekolojik dengeyi bozmaktadır. Çalışma kapsamında; çevresel sorumluluk bilinciyle okyanuslardan toplanan geri dönüşümlü deniz plastiği ve organik pamuk kullanılarak, kısa elyaf ring teknolojisi ile iplik ve kumaş geliştirilmiş ve performans testleri yapılmıştır. Aynı zamanda standart polyester organik pamukla da harmanlanarak, iplik ve kumaş üretilmiş, çalışma kapsamında geliştirilen geri dönüşümlü deniz plastiği iplikle performans değerleri mukayeseli olarak incelenmiştir.

Anahtar Kelimeler: Ring teknolojisi, Seaqual, Pamuk

Sustainable Eco-Friendly Yarns with Biodegradable Synthetic Fibers and Bringing These Fibers into Short Fiber Spinning

Abstract

Due to the increase in environmental concerns, ecological and sustainable textile products are needed. While plastic production continues to increase in the world, these plastics, which pollute the sea and oceans, damage the ecological balance by damaging more than 800 livings. Within the scope of the study; yarn and fabric were developed with short fiber spinning technology by using organic cotton with recycled marine plastic collected from the oceans with environmental responsibility awareness and their performance properties were examined. At the same time, yarn and fabric were produced from mixture of standard polyester and organic cotton, and performance values were compared with the yarn developed within the scope of the study.

Keywords: Ring technology, Seaqual, Cotton

Farklı Öz ve Sargı Lifleri İçeren Özlü İpliklerden Elde Edilen Örme Kumaşların Hava Geçirgenlik Özelliklerinin İncelenmesi

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Öz

Bu çalışmada, vorteks iplik eğirme sisteminde 6 farklı özlü iplik numune üretimlerinde, öz kısmında 3 farklı filament (Polivinil Alkol (PVA), Tekstürüze Filament Polyester, Viskon (CV)) ve sargı kısmında 3 farklı lif şeridi (Viskon, Polyester ve Polyester/Viskon (65/35)) kullanılmıştır. Geliştirilen fonksiyonel özlü ipliklerden numune süprem örme kumaşlar üretilmiştir. Örme kumaşların konfor özelliklerinin araştırılması amacıyla birim ağırlık, kalınlık ve hava geçirgenliği özellikleri incelenmiştir. Elde edilen sonuçlara göre, en yüksek hava geçirgenlik değerinin 28/1 Ne öz kısmında polivinilalkol, sargı kısmında polyester elyafının kullanıldığı örme kumaşlardan elde edilmiştir.

Anahtar Kelimeler: Vorteks özlü iplik, örme kumaş, hava geçirgenliği.

Investigation of Air Permeability Properties of Knitted Fabrics Obtained from Core Yarns Containing Different Core and Sheat Fibers

Abstract

In this study, 3 different filaments (Polyvinyl Alcohol (PVA), Textured Filament Polyester, Viscose (CV)) in the core part and 3 different sheat fiber (Viscose, Polyester, and Polyester/Viscose) were used in the production of 6 different core yarn samples in the vortex spinning system. Single jersey knitted fabrics were produced from the developed functional corespun yarns. In order to investigate the comfort properties of knitted fabrics, basis weight, thickness, and air permeability properties were investigated. According to the results obtained, the highest air permeability value was obtained from knitted fabrics in which PVA was used in the core and polyester fiber was used in the sheat.

Keywords: Vortex core yarn, knitted fabric, air permeability.

Investigation of Physical and Liquid Performance Properties of Feminine Hygiene Pad in Commercially Used

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Abstract

Globally, the rate of use of disposable personal care products is increasing day by day. In general, one of the most important disposable personal care items is the feminine hygiene pad for all women. Feminine sanitary pads have some basic properties. These are; liquid absorption, preventing leakage, odor control, feeling comfortable, etc. In this study, it was aimed to investigate the physical and performance properties of commercially used feminine hygiene pads. For this purpose, the layers of 7 different feminine hygiene pads were analyzed by separating them from each other. And also, liquid performance tests were carried out as pads. According to the obtained test results, feminine sanitary napkins have different construction such as production technology of layers and raw material. Therefore, the thickness and weight of the pads are shown variability. In addition, it has been determined that these variations significantly affect the liquid performance properties of the pads.

Keywords: Feminine hygiene pad, liquid strike through time, wetback.

Ticari Olarak Kullanılan Kadın Hijyen Pedinin Fiziksel ve Sıvı Performans Özelliklerinin İncelenmesi

Öz

Dünyada tek kullanımlık kişisel bakım ürünlerinin kullanım oranı her geçen gün artmaktadır. Genel olarak, tüm kadınlar için en önemli tek kullanımlık kişisel bakım ürünlerinden biri kadın hijyen pedidir. Kadın hijyen pedlerinin bazı temel özellikleri vardır. Bu özelliklerden bazıları; sıvıyı emmesi, sızıntıyı önlemesi, koku oluşumunu engellemesi, konforlu hissettirmesi, vb. Bu çalışma kapsamında, ticari olarak kullanılan kadın hijyen pedinin fiziksel ve performans özelliklerinin araştırılması amaçlanmıştır. Bu amaç doğrultusunda, piyasada kullanılan 7 farklı kadın hijyen pedlerinin katmanları birbirlerinden ayrılarak incelenmiş olup ped olarak sıvı performans testleri gerçekleştirilmiştir. Elde edilen sonuçlara göre, kadın hijyenik pedleri, katmanların üretim teknolojisi ve hammadde gibi farklı bir yapıya sahiptir. Bu

nedenle, pedlerin kalınlığı ve ağırlığı deęişkenlik göstermektedir. Bunun yanı sıra, bu varyasyonların pedlerin sıvı performans özelliklerini önemli ölçüde etkilediğı tespit edilmiştir.

Anahtar Kelimeler: Kadın hijyen pedi, sıvı geiş süresi, geri ıslanma.

The Combined Effect of Different pH Solutions and Freeze-Thaw on Physico-Mechanical Properties of Travertines

Year 2021, Volume , Issue 32, 1 - 6, 31.12.2021

Engin ÖZDEMİR

<https://doi.org/10.31590/ejosat.1039246>

Abstract

Travertine is widely used as a construction material due to gives blocks, various patterns and easy to process. However, its biggest disadvantage is that it has a more porous structure than other natural stones. This situation restricts the outdoor usage areas of travertines. Especially, in environments that receive heavy rainfall and freeze-thaw events, the use of such natural stones is not recommended. Many researchers, while investigating the effect of freeze-thaw on travertines, saturated with water and did not determine acidic-basic properties of water. In this study, combined effect of freeze-thaw by exposure to different pH (2.0, 7.0 and 12.0) solutions is investigated. For this purpose, Malatya red travertine and Erzurum travertine were exposed to freeze-thaw 20 times using three different solutions and at the end of every 5 cycles, uniaxial compressive strength, P wave velocity and Schmidt hammer hardness values were determined. As a result of the study, the decrease in uniaxial compressive strenght, P wave velocity and Schmidt hammer hardness of travertines increased as pH value decreased and freeze-thaw cycle numbers increased.

Keywords

Natural stones, P wave velocity, pH, Uniaxial compressive strength, Travertine

A Study on the Effects of the Interior Architecture on the Fracture Toughness of 3D Printed PLA Samples

Year 2021, Volume , Issue 32, 14 - 19, 31.12.2021

Cem BOĞA Mirsadegh SEYEDZAVVAR

<https://doi.org/10.31590/ejosat.1039951>

Abstract

Additive manufacturing (AM) using 3D printing techniques is widely used not only in prototyping, but also in production of structural elements in many applications such as medical science and biomechanical engineering. Therefore, it is highly important to investigate the fracture mechanics of components and engineering materials made with 3D printing techniques with the aim of application in biomechanical components. In this study, to investigate the effects of interior architecture on the mixed mode fracture behavior of 3D printed polylactic acid (PLA) components, special Arcan samples were produced at 70% filling ratio and four different filling types using fused filament fabrication technique. A special fixture has been designed that allowed the mixed-mode fracture experiments of the Arcan samples to be conducted on a unidirectional tensile test machine. The fracture tests were performed under 3 different loading angles of 0°, 45° and 90° as opening mode, mixed mode I / II and shear mode, respectively. In addition, the finite element analyses were also conducted to determine the geometric functions of the Arcan samples required for calculation of fracture toughness at different loading angles. Overall, the results of fracture toughness tests revealed that for the sections of the samples that are mainly exposed to opening and mixed-mode loading conditions, printing with the triangular filling pattern provides higher fracture toughness to the final products. In contrast, for the sections exposed to pure shear loadings, hexagonal printing pattern provides a better resistance against fracture.

Keywords

Additive manufacturing, 3D printing, PLA, Arcan samples, Mixed-mode fracture

Prediction of Diabetes Mellitus by Using SVM and Naive Bayes Classification Algorithms

Year 2021, Volume , Issue 32, 7 - 13, 31.12.2021

Güneş HARMAN

<https://doi.org/10.31590/ejosat.1041186>

Abstract

Machine learning is one of the fields that help to get better results from data or analysis without any human intervention. In recent years with the developing technology, it is widely used in the field of medical diagnosis, especially to analyze serious and complex situations and make predictions with high accuracy. In this study, it was tried to diagnose diabetic disease at an early stage by using Naïve Bayes and Support Vector Machines (DVM) machine learning algorithms on Pima Indians Diabetes Dataset. In order to increase the performance of the classifiers used, the missing values in the data set were restructured according to the skewness, and data standardization was done using standard scaling. Then, the Synthetic Minority Oversampling (SMOTE) technique was used to reduce the negative effect of class imbalance problem on classification. Evaluation criteria of the classifiers created within the scope of the study were calculated by using Accuracy Rate, Precision, Recall and F1-Score (F1 Score) values. According to these results, Support Vector Machines gave the best server with 88% accuracy rate.

Keywords

Machine Learning, Classification, Diabetes

A Leading Indicator Approach with Data Mining Techniques in Analysing Bitcoin Market Value

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Özerk YAVUZ

<https://doi.org/10.31590/ejosat.1039530>

Abstract

In the last decade as a result of the changes in business landscape new payment systems have evolved. Some of the Consumers, business stakeholders, investors and individuals turned to different types of payment systems and virtual currencies for various reasons. Peer to peer architected Bitcoin which uses a blockchain mechanism is one of these approaches that found place in our lives. In this study, a leading indicator focused data mining methodology has been followed in analyzing Bitcoin market value and bitcoin valuation. Several classification and clustering algorithms applied to the data following a literature review, pre-processing of the data and conceptual framework formation. Finally performances of these supervised and unsupervised machine learning techniques with rules discovered have been compared, assessed and presented for this type of problem and research domains.

Keywords

Digital Currency, Payment Systems, Bitcoin, Blockchain, Clustering, Classification, Supervised Learning, Unsupervised Learning, Data Mining, Machine Learning, Quantitative Analysis

Gait Data for Efficient Gender Recognition

Year 2021, Volume , Issue 32, 27 - 31, 31.12.2021

Zehra KARAPINAR ŞENTÜRK

<https://doi.org/10.31590/ejosat.1040002>

Abstract

Biometric recognition applications have been frequently used nowadays mostly because of reliability and ease of use for automated detection. There are many applications based on eyes, face, fingerprint, and voice for authentication and gender classification. In this paper, we focused on gender detection using the features of the steps of people. A different biometric sign has been investigated. Gait analyses were examined to determine the gender information of the people. Basic parameters like speed, variability, and symmetry of a gait, its several temporary, spatial, and height parameters, which were obtained via Physilog 5 sensor, were used in the analysis. A 321-D feature vector was comprised based on these features and an Artificial Neural Networks (ANN) model was trained with them. 95.83% accuracy was obtained. The experimental results show the success of the proposed ANN-based gait analysis system against the state-of-the-art for gender classification.

Keywords

Artificial Neural Networks, Gait Analysis, Gender Classification

Alternative Protein Sources Used In Gluten-Free Products

Year 2021, Volume , Issue 32, 32 - 39, 31.12.2021

Sevgi Deren YAĞDI Zehra GÜLSÜNOĞLU KONUŞKAN

<https://doi.org/10.31590/ejosat.1045522>

Abstract

Celiac disease is a chronic intestinal disease which occur as a result of gluten consuming. The most effective treatment for celiac disease is the elimination of gluten from the diet. Considering the malabsorption and macro-micro nutrient deficiencies, enrichment of nutrient composition in the gluten-free products can significantly increase the life quality of celiac patients. Moreover, gluten is main structure-forming protein in dough and it is very difficult to obtain gluten-free products with the same properties without gluten. Therefore, both improving the technological properties and increasing nutritional value have been gained importance. Alternative protein sources play an important role for the formation of the desired dough structure and improvement of quality characteristics like color, appearance, texture and flavor after baking. Viscoelasticity, nutrient content, dough firmness and color-taste-fragrance acceptability of gluten-free products have been studied by several researchers. The most commonly used gluten alternatives are milk proteins, egg albumin and vegetable proteins. Recently, algae and edible insects, which contain high protein as well as high amounts of bioactive compounds, have been used as an alternative to gluten. In this review, it is aimed to give information about protein alternatives to gluten and their contributions to the nutritional value and technological properties of gluten-free products.

Keywords

celiac disease, protein substitutes, gluten-free bakery products

Understanding Ethanol Usage and Its Influences by Applying a Qualitative and Quantitative Research Design

Year 2021, Volume , Issue 32, 40 - 49, 31.12.2021

Özerk YAVUZ

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Abstract

Human kind's interest on alcohol has been known for many decades. People used alcohol in different geographies, countries and cultures in parallel to the discovery and development of fermentation and distillation techniques. As seen in the analysis of many behavioural patterns it is believed to be several factors and antecedents that lead to engaging drinking alcohol and such behavior to occur. Today especially in 21st century alcohol usage became an important behavioral pattern in various contexts and settings and gained popularity in many social and cultural settings. With the help of transitions of the society and business landscape it found place in many organizational settings and landscapes in a more social and individualistic way. Interest of human to alcohol known for many decades and expected to remain. However different norms, traditions, values, approach of regulatory frameworks, environment, group influence have impact on alcohol consumption with several micro and macro level variables directly or indirectly in a moderating nature. Despite its popularity in many generations, life styles and preferences excessive levels of alcohol consumption constitutes several hazardous risks and dangerous to human health. There are several studies associated with alcohol consumption and its benefits, dangers and risks associated with its short term, long term and excessive usage in literature. In this study some of the factors associated with alcohol consumption is investigated with the triangulation approach of qualitative and quantitative research methodologies composed of in depth interviews, observation and supervised and supervised forms of data mining with the aim of having an comprehensive understanding of the phenomena and highlighting the risks and dangers associated with long term, excessive usage.

Keywords

Quantitative Analysis, Supervised Learning, Unsupervised Learning

An Improved Deep Learning Based Cervical Cancer Detection Using a Median Filter Based Preprocessing

Year 2021, Volume , Issue 32, 50 - 58, 31.12.2021

Zehra KARAPINAR ŞENTÜRK Süleyman UZUN

<https://doi.org/10.31590/ejosat.1045538>

Abstract

Cervical cancer is one of the prevalent type of cancer among women although its treatment success is the highest when compared to other types of cancer once diagnosed. Automatic classification of cervical cancer is essential to accelerate the treatment process and increase the survival rate of the patients. Inadequate awareness, deficiency of medical opportunities, and expensive screening procedures increase the death rates. This common cancer is frequently screened by several imaging tests including Pap smear, cervicography and colposcopy. The decisions are made by the help of these tests, but structural complexities of cervical cells may complicate the decision. Recent developments in neural networks show remarkable achievements in disease diagnosis. Also, transfer learning draws the attention of most of the researchers because of its advantages. This paper presents a transfer learning based cervical cancer detection method for early diagnosis. Pap smear images were preprocessed using median filter before training the deep learning model in order to remove noise from the images for better classification. Cancerous and non-cancerous cervical cells are distinguished through pre-trained networks. Five popular pre-trained networks which are SqueezeNet, VGG-19, AlexNet, ResNet-50 and InceptionV3 have been utilized and compared for the problem. SqueezeNet achieved the best validation accuracy (96.90\%) when compared to other neural structures and this performance makes the proposed method the best among other unsupervised approaches in the literature for cervical cancer diagnosis. Additional experiments also proved the success of the proposed model for the classification of two similar classes, namely Parabasal and Metaplastic cells. The results demonstrate that the proposed approach can provide a confidential, cheap, and fast decision support system for cervical cancer diagnosis.

Keywords

Cervical cancer diagnosis, Convolutional neural networks, Transfer learning, Pap smear images

Performance Evaluation of Camera-Based Time to Collision Calculation with Different Detectors&Descriptors

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Abstract

Nowadays, the demand for producing and using autonomous vehicle is increasing. Due to the latest developments in technology, the capabilities of these vehicles in accident prevention are increasing. As a result of the accuracy of these capabilities, it is very important because it is human life. In today's technology, the collision time calculation called TTC (Time to Collision) can be done in two different ways. The first of these methods is lidar-based calculation. In this paper TTC will be calculated using the camera-based method with different combinations of detectors and descriptors. Pros and cons of these methods will be discussed. The aim of this paper is to expose an exacting performance for related methods, especially its diverse combinations are used matching. In these experiments images are used for 10 images taken from real time traffic scenario of preceding vehicle. This paper includes seven methods for detectors and 6 methods for descriptors. These detectors and descriptors are used in 42 different combinations. The analysis includes four parameters such as total keypoint detection, total matches, total time in ms and performance ratio which is total matches divided by total time.

Keywords

Autonomous Vehicles, Image Processing, Lidar, Detector

Study of Edge, Fog, and Cloud Computing in Terms of IoT

Year 2021, Volume , Issue 32, 68 - 75, 31.12.2021

Muhammet TAY Arafat ŞENTÜRK

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Abstract

Major developments in the field of the Internet of Things (IoT) and the increase in the number of objects/devices connected to the Internet continue rapidly. With this increase, the importance of concepts such as data analysis, storage, and interpretation is increasing. This increase also raises some problems that need to be solved. Software and hardware studies are needed for the next-generation cellular network technology (5G), which is thought to be a solution to speed, bandwidth, and latency, to achieve the expected improvement. Edge, Fog and Cloud Computing (EFC) technologies are very important to respond to the needs of the new generation technology and to analyze the data emerging with the increasing IoT devices and meet the end-user needs. Having a developing and growing network structure, IoT requires reconsideration of current needs day by day. In parallel with this growth, many researchers are working in this area to overcome the problems. According to the literature study, it has been seen that the use of distributed network structure and EFC technologies rather than centralized network structure is a solution for the delay, energy-saving, and bandwidth. In this study, the latest innovations were discussed by referring to the concepts of EFC and the solutions they have provided in the field of IoT. In addition, the ongoing problems were mentioned and the results.

Keywords

IoT, Edge Computing, Fog Computing, Cloud Computing.

A Sample Product Design, Production with Cold Forming and The Role Of The Ergonomics in Design

Year 2021, Volume , Issue 32, 76 - 85, 31.12.2021

Alper BAYGUT

<https://doi.org/10.31590/ejosat.1039297>

Abstract

In this study, design studies were carried out based on the production, process efficiency and quality increase criteria of the fastener manufactured using the machining method. With the revisions to be made in the design criteria, a new design has been developed based on the cold forming method. In this context, design methodology and ergonomics issues were examined. Function-material-shape and process method components that make up the design concept are evaluated in terms of design criteria. In addition, the main criteria of ergonomics in design and production method are examined. The developed process was applied on a sample product produced by cold forming and the results are given in detail.

Keywords

Design, Ergonomics, Cold Forming, Forming

Evaluation of The Ecotourism Potential of İçme Town, Elazığ

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Ebru DOĞAN Fatma Berfin YAMAK

<https://doi.org/10.31590/ejosat.1039389>

Abstract

As a result of lifestyle and psychological needs, various tourism activities have been developed to meet the holiday and rest. Ecotourism is a tourism activity that is shaped within the framework of sustainable principles and purposes, depending on the economic concern brought about by today's society and state order. Ecotourism is realized by evaluating natural beauties, historical artifacts and various activities that will contribute to the regional economy. In the study, an evaluation was made on the ecotourism potential of İçme Town, which has historical background and natural beauties. In this context, literature study was conducted on ecotourism and the history of the region, and an observational trip was organized to determine the current situation of the region. Depending on the data obtained, SWOT analysis of the region in terms of ecotourism was made and strategies were presented for the transformation of the region into an ecotourism center.

Keywords

Ecotourism, Sustainability, İçme town

Acquiring Kinematics of Lower extremity with Kinect

Year 2021, Volume , Issue 32, 92 - 100, 31.12.2021

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<https://doi.org/10.31590/ejosat.1041675>

Abstract

Gait analysis is used in monitoring the procedures of treatment and determining many illnesses notably musculoskeletal system disorders. Gait analysis has been carried out with divergent methods for a long time. In this study, kinematic parameters of lower human extremities are determined using Kinect, a camera called Time of Flight that is usually used in the entertainment sector. Kinect is recommended as a low-cost solution for existing gait analysis systems. Kinematic parameters that are used to analyze walking are found by filtering RGB images of colored markers that are attached to joints. 3D world coordinates of the marker centers were determined and labeled by mapping the depth information, which is obtained from Kinect, on RGB images. We used the Kalman filter to estimate the coordinates of markers when the coordinates cannot be accurately determined because of motion blurring. 15 kinematic parameters for each joint are extracted from the coordinates of these markers.

Keywords

Human Motion Analysis, Microsoft Kinect, Kinematics, Gait.

A 21st Century Approach in Analysing Health Precautions in London with Machine Learning Driven Data Mining

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Özerk YAVUZ

<https://doi.org/10.31590/ejosat.1039544>

Abstract

As in the past, today preventive treatments and health policies constitute an important role in combatting with several diseases, medical phenomenon like pandemics or epidemics. These approaches can prevent several health focused negative consequences in early stages or can give leaders and medical professionals advantage in managing risks associated with health concerns. Usually effective usage of early warning systems, analysis of historical data for exploratory and confirmatory understanding may provide several advantages in this context. In this study a historical data analysis has been applied to understand similar phenomena with the help of machine learning driven data mining. Clustering and classification performances and rules generated by these approaches have also been assessed.

Keywords

Health Restriction, Health Precaution, Covid-19, Pandemy, Epidemy, Clustering, Classification, Data Mining, Machine Learning, Quantitative Analysis, Supervised Learning, Unsupervised Learning

Performance Analysis of Machine Learning Methods in Intrusion Detection

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Yasin TÜRKYILMAZ Arafat ŞENTÜRK

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Abstract

Interest in the Internet has grown tremendously in recent years and continues to increase. When epidemic disease conditions are added to this increase, it is focused on doing everything that affects human life via the internet. Just as the interest in the Internet has increased, the number of people who want to abuse this interest has also increased in the number of attacks carried out over the Internet and in activities capable of committing crimes, and it has continued to increase steadily. It has become much more difficult for organizations to maintain network security. Many different security systems are used to provide network security against attacks and criminals. Intrusion Detection Systems (STS) is one of the security systems used for network security. STS is also a subject of great interest in the academic world. In recent years, researchers have done many studies to reveal a more efficient and effective STS. In the studies, it has been seen that the data sets used as the benchmark data set do not meet today's conditions and do not give the correct results in the evaluations. The UNSW-NB15 dataset, published in 2015, was created to solve this problem. The aim of this study is to examine and compare the machine learning methods used to make STS more efficient and effective using the UNSW-NB15 data set. Within the scope of the study, the performances of machine learning methods were compared using the Orange tool for the UNSW-NB15 dataset. In addition, performance evaluation was made with the results obtained and previous studies.

Keywords

Intrusion Detection System, Machine Learning, UNSW-NB15.

Newly Proposed Binary Krill Swarm Algorithm for Backpacking Problem

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Emine BAŞ

<https://doi.org/10.31590/ejosat.1039616>

Abstract

Herd behavior is the collective behavior of animals of similar size that gather in the same place or migrate in the same direction. Many algorithms created by imitating swarm behaviors are available in the literature. Krill algorithm (KH) is one of such algorithms. The KH algorithm studied the lifestyle of the Krill herd. Krill is used as the building block of the ocean ecosystem. Krill creatures always live in large herds. There are two reasons why krill swarms travel. The first is to survive without being eaten by other creatures and to increase the density of the krill living herd, and the other is to be hunted more easily. In this study, the KH algorithm has been updated again to solve the binary optimization problems. The applications are tested on the backpack problem, which is a binary optimization problem.

Keywords

Krill, Binary optimization, Backpack problem.

Assessment of Concentration, Erosivity and Seasonality of Precipitation Data for 1970-2019 Period of Karataş Gauging Station

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Cihangir KÖYCEĞİZ Meral BÜYÜKYILDIZ

<https://doi.org/10.31590/ejosat.1040131>

Abstract

Temporal and spatial variations in precipitation as a result of the effects of climate change generally cause a flood, drought, soil erosion, etc. events to occur. For this reason, determining the precipitation variability in a region is quite important in protecting soil and water resources and in struggling soil erosion. This study aims to examine the monthly and annual variation of precipitation, annual and seasonal precipitation concentration (APCI and SPCI), annual and seasonal precipitation erosivity (AMFI and SMFI), and seasonality of precipitation (SI) of the Karataş meteorological station in the Seyhan Basin for the period 1970-2019. In addition, the change of these parameters in the examined period was examined using the Mann-Kendall (MK) trend test. According to the results obtained, generally irregular and strong irregular precipitation distribution was obtained in the APCI values calculated for the Karataş station. According to SPCI analysis, SPCIWinter values are uniform and moderate, SPCISpring values are moderate, SPCISummer values are strongly irregular, and SPCIAutumn values have moderate precipitation distribution. According to the AMFI values calculated to examine the precipitation erosivity, it was determined that the precipitation generally constitutes a high (34%) and a quite high (40%) erosion risk. According to seasonal MFI analysis results, SMFIWinter values generally show a high and very high erosion risk, SMFISpring and SMFISummer values show no or very low erosion risk, and SMFIAutumn values show moderate, high and very high (about 62%) erosion risk. According to the SI analysis results of the 50-year study period, about half of the SI values represent significant seasonal precipitation with a long dry season. The Mann-Kendall trend results of monthly total precipitation, annual total precipitation, APCI, SPCI, AMFI, SMFI and SI values show that there are no significant trends for the 1970-2019 period.

Keywords

Erosivity, Mann-Kendall, Precipitation Concentration Index, Seasonality, Trend

Correlation Study Between PMT and SPT Results of Artificially Filled Area

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Özgür YILDIZ

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Abstract

The non-linear nature of the soils can cause the parameters to change significantly even in a limited area. In site investigation studies, the sampling frequency is important in determining soil properties with sufficient accuracy and in developing an idealized soil profile in which the engineering design will be made. Statistical methods are used in cases where field studies cannot be done adequately due to technical limitations, unsuitability of the study area and cost problems. These methods usually provide important information about the soil at the preliminary design stage. While statistical methods are used by researchers and practitioners to obtain soil parameters, no study has been found in the literature on the use of these methods in artificially filled areas. In this study, the soil parameters of the filled area created in the Yenikapı, İstanbul with an area of 715.000 m² were examined. In this context, empirical correlations have been developed between the parameters obtained by the geotechnical tests carried out and the relationships between the soil parameters have been revealed. The data obtained from pressuremeter and standart penetration tests were used in correlations. The developed correlations were compared with the empirical correlations developed for natural soils and important findings were obtained.

Keywords

Standard penetration test, Pressuremeter test, Correlation, Bearing capacity

Steady Flow Analysis Using HEC-RAS Hydrodynamic Model: Case of Nevşehir Province, Turkey

Year 2021, Volume , Issue 32, 135 - 141, 31.12.2021

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Abstract

The stream bottom topography and flow measurement data at seven different sampling point on the Kızılırmak River in the Nevşehir province are obtained within the scope of the project titled “Analysis of Sediment Transport and Accumulation in the Kızılırmak Basin using Field Studies and Numerical Models”, completed in 2017 which was supported by the Nevşehir Hacı Bektaş Veli University Scientific Research Projects Unit. The project area compromises a 32.472km long path with an irregular cross section, from Gülşehir, to Sarıhdır Village on Kızılırmak River. A hydrodynamic model was created by using US Army Corps of Engineers, Hydrologic Engineering Center's (CEIWR-HEC) River Analysis System (HEC-RAS v.6.0) in order to perform one-dimensional steady flow surface profile computations. The route, elevations and cross sections of irregular main channel was derived from digital elevation maps (DEM) accomplished in the HEC-RAS Mapper portion of the software. The model calculates water depths based on the solution of the one-dimensional energy equation. Energy losses were evaluated by Manning's equation and contraction/expansion coefficient multiplied by the change in velocity head. The water depths calculated with HEC-RAS model were compared with the field measurements.

Keywords

DEM, Kizilirmak, HEC-RAS, Water surface profile

Modeling of Fixed and Dual Axis Solar Tracking Systems in Konya by Using Pvsyst

Year 2021, Volume , Issue 32, 142 - 147, 31.12.2021

Ayşegül ETCİ Ayşe BİLHAN

<https://doi.org/10.31590/ejosat.1039800>

Abstract

The rapid increase in energy demand and the limitation of fossil fuel resources have increased the need for reliable and clean energy sources. Photovoltaic (PV) systems using solar radiation, which is one of the alternative energy sources, is one of the main methods to be used to meet the future global electricity production. Turkey is very advantageous in terms of using solar energy due to its geographical location. When the solar map potential is examined, solar power plants can be established in many different regions. Konya was chosen as the city of this study because of its high solar energy potential. In the case of using a fixed-axis or dual-axis solar tracking system with the PVSyst software program, an analysis of the solar energy potential in Konya was made. This program was used to compare the analysis of different types of solar tracking systems. The same analysis can be done for different cities by using the updated information.

Keywords

Solar energy, Solar tracking system, PVSyst

Dynamic Analysis of a Motion Restricting Car Seat Mechanism

Year 2021, Volume , Issue 32, 148 - 151, 31.12.2021

Samet YAVUZ

<https://doi.org/10.31590/ejosat.1039823>

Abstract

Within the scope of this study, dynamic analysis of a single degree of freedom mechanism activated by the release of a pretensioned spring was carried out. The mechanism, which starts to motion with the release of the spring, will bring the driver's seat to a more upright position and provide movement restriction before the crash. The dynamic analysis of the mechanism was performed by Newton-Euler method and its differential equation was solved with MATLAB software. The performance of the mechanism is shown by transferring the obtained motion equation to a time dependent graph.

Keywords

dynamic analysis, machine theory, restrictive systems

The Investigation of Wood Quartz Replaced Plastic Composite Material Properties

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Korkmaz YILDIRIM

<https://doi.org/10.31590/ejosat.1039897>

Abstract

In a world where natural resources are gradually decreasing due to limited resources, it is of great importance to recycling waste materials into production. In this study, the mechanical and thermal properties of wood-quartz reinforced composite materials were investigated. In terms of the results, it can be repeated from the samples of the bending from the experience to the experience, from the samples to the characteristics of the old products. In the results of Tensile, Screw Tensile, and Janka Hardness Tests, significant changes were observed in the resistance values due to the different ratios of substitution additives. In the results of the Thermogravimetric Analysis experiment, it was observed that the produced sample completely deteriorated when it reached 470 - 500 °C, and only quartz remained. In the DSC results, the peak point occurred at a heat flow rate of 10-15 m/W, and the melting temperature was observed in the range of 110-140°C. According to the SEM results, the mixtures of the components showed consistency. As a result, quartz hardness showed its effect, as the amount of quartz increased, the resistance values increased, it was observed that the components in the composite material were compatible with each other and homogeneously distributed.

Keywords

Quartz, Wood powder, Composite Material, Bending, Injection

The Effect of Occupational Safety Culture on the Safety Performance of Employees in the Flour Industry Sector (Example of Konya Province)

Year 2021, Volume , Issue 32, 160 - 166, 31.12.2021

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Abstract

Occupational accidents are one of the most important problems faced by employees in their working lives. Many legislations and institutional arrangements have been made in order to prevent accidents that may occur during the working life of humanity and to create a healthy environment for employees. Despite this, many accidents still occur in the workplace. Recently, the concept of safety culture has been emphasized in the prevention of occupational accidents. Occupational health and safety play an important role in creating the concept of a positive safety culture in a workplace. In this study, the effect of safety culture perceptions of employees in the flour industry on safety performance was examined. The sample of the research consists of 164 people working in 2 different companies operating in the flour sector in Konya, which was determined by a simple sampling method. As a data collection tool, 9 different scales adapted to Turkish by Dursun (2011) were used. IBM SPSS 25 package program was used in the analysis of the data in the research. As a result of the research, it was determined that the variables of reporting culture and security awareness were an important predictor of safety compliance, while the variables of reporting culture, fatalism, employee participation, security awareness and managers' behaviors were found to be an important predictor of safety engagement.

Keywords

Flour Industry, Safety Culture, Safety Performance, Work Safety.

A Practical Implementation of a Low-Cost 6-DOF IMU by Kalman Algorithm

Year 2021, Volume , Issue 32, 167 - 170, 31.12.2021

Abdullah Ersan OĞUZ Mustafa Emre AYDEMİR

<https://doi.org/10.31590/ejosat.1040765>

Abstract

In this study, the implementation of a 6 Degree of Freedom (DOF) Inertial Measurement Unit (IMU) via the Kalman Filter is aimed. High accuracy IMU units have been in practical use since the first space navigation practices. Today, the need for IMU's have been widespread among every aspect of life. The IMU sensors are mostly solid-state devices and are manufactured with Micro Electromechanical System (MEMS) technologies. The sensor noise has to be eliminated. The most popular method is the Kalman Filtering. The aim of this study is to better explain the IMU concept and make a practical implementation of the Kalman Filtering which is somehow complicated. In this study, a low cost IMU MEMS sensor has been selected and Kalman Filtering has been applied for both one and multi-dimensional outputs. The steps are explicitly explained to help the reader better understand the process. The study may be easily tailored to other sensor systems where noise is a concern.

Keywords

Sensors, Navigation, Noise, Kalman Filtering

Classifying Surface Points Based on Developability Using Machine Learning

Year 2021, Volume , Issue 32, 171 - 176, 31.12.2021

Vahide BULUT

<https://doi.org/10.31590/ejosat.1039296>

Abstract

The classifiers K-nearest neighbor (KNN), Multiclass support vector machine (MSVM), Decision Tree (DT), Discriminate Analysis (DA), Naive Bayes (NB), Random Forest (RF), and Ensemble Tree (ET) are the most well-known methods in machine learning. They are used in many fields like pattern recognition, medical disease analysis, user smartphone classification, text classification, etc. This paper presents a new framework for 3D surface point type classification using the most known classification methods in machine learning and the principal curvatures, the binormal vector, the cosine value of the angle between the normal vector and binormal vectors. The purpose of this study is to classify data points according to their developability. Also, the comparison between these methods is given to measure developability based on the accuracy and the processing time using several 3D surface examples.

Keywords

Machine learning, classification, principal curvatures, binormal vector.

A BERT-Based Method for Compressing Short Texts

Year 2021, Volume , Issue 32, 177 - 182, 31.12.2021

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Abstract

Using data compression algorithms in data transmission and storage provides advantages in terms of time and storage cost. There are several methods for compressing texts created in natural language which is one of the most produced data types. Many traditional methods are not successful in compressing short texts. Compressing short texts requires different methods than general-purpose compression methods. In this study, a short text compression algorithm which uses the prediction mechanism of BERT is proposed and compared with traditional methods. In addition, the results of the proposed method were examined and compared for different parameters and models. The proposed method has achieved compression ratios up to 39% better than traditional algorithms such as Gzip, Bzip2 and Zstd.

Keywords

Data Compression, Short Text Compression, BERT

Comparison of Seismic Demands Obtained from Linear and Nonlinear Time History Analysis of Reinforced Concrete Buildings

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Emrah MERAL

<https://doi.org/10.31590/ejosat.1045535>

Abstract

Seismic demands obtained from linear and nonlinear time history analyzes of low and mid-rise existing reinforced concrete buildings were compared in this study. A total of 144 analyzes were performed with 12 earthquake records taking into consideration both principal directions of 3-, 6- and 9-storey buildings. The parameters such as base shear force, roof drift and maximum interstory drift ratio of buildings were compared per the analysis results. The average base shear force ratio for 3-storey buildings was 1.19 and 1.24 in linear analysis and 1.61 and 2.88 times in nonlinear analysis higher than those of the 6- and 9-storey buildings, respectively. The average roof and interstory drift ratios show that the demands of 9-storey buildings are higher than values of 3- and 6-storey buildings. In linear analysis, the base shear force demands are calculated high whereas the roof and interstory displacement demands are computed high in nonlinear analysis.

Keywords

Time history analysis, Dynamic analysis, Reinforced concrete buildings

Determination of Appropriate Structural Component Section Options for Noise Control in Sound Recording Studios

Year 2021, Volume , Issue 32, 191 - 196, 31.12.2021

Okan ŞİMŞEK

<https://doi.org/10.31590/ejosat.1039518>

Abstract

In sound recording studios, the sound insulation performances of the building elements to ensure the indoor noise level limit values should be determined depending on the noise level of the source volume and the sensitivity of the receiver volume to noise. Nowadays, computer programs are increasingly used to determine the cross-sectional properties of the building envelope and partition elements in order to provide the optimum acoustic environment inside the building. The aim of this study; It is to propose suitable section options that provide the insulation values specified in the ‘Regulation on Noise Protection of Buildings’, which is the legislation containing the noise control in sound recording studios, building envelope and partition elements. For this, Adana DB Sound Recording Studio was evaluated and the current performances of the building elements were determined. Suggestions have been developed for suitable structural element section options by using Insul software. As a result, a method proposal has been developed for the determination of a sound recording studio structural element section options within the framework of the regulation that has recently entered into force in our country.

Keywords

Sound recording studio, Noise control, Sound insulation

Determination of Intersection Transition Priority of Autonomous Vehicles with Artificial Potential Field

Year 2021, Volume , Issue 32, 197 - 206, 31.12.2021

Abdullah Ersan OĞUZ Mustafa Emre AYDEMİR

<https://doi.org/10.31590/ejosat.1040657>

Abstract

Studies on the use of Autonomous Vehicle Systems are increasing day by day. In addition to the land use trials of autonomous vehicles, various methods and practices are continuing for the use of pedestrian and manned vehicle traffic in urban traffic. The ability of the autonomous vehicle to move in mixed traffic without harming itself and other traffic elements is one of the most important problems waiting for a solution. In the studies, logical decision makers and many rule bases are created for safe navigation of autonomous vehicles and driver behavior is tried to be modeled. Within the scope of this study, autonomous vehicles moving in the intersection structure, which consists of roads and vehicles modeled with potential functions, follow the lane without hitting each other and create transition priorities in the intersection and reach their target point safely. The aim of the study is to provide the logical decision making complex with the artificial potential area map created. Artificial potential field approach is one of the techniques used in road planning and lane tracking applications in autonomous vehicle applications. In this study, a solution was sought by combining the artificial potential field approach road and lane with the vehicle that is likely to collide in the intersection as a moving (dynamic) obstacle. As a result of the study, it was seen that instead of using logical decision makers, the use of artificial potential field prepared/optimized in accordance with the logical rule base gave successful results. In the study, the formation of undesired local minimas was prevented by the use of harmonic and Gaussian functions to create an artificial potential field.

Keywords

Navigation, Artificial Potential Field, Path Planning, Obstacle Avoiding.

The Use of Web 2.0 Tools for Research Purposes in Design Studio Education: The Case of User-Generated Videos

Year 2021, Volume , Issue 32, 207 - 214, 31.12.2021

Gizem Hediye EREN Fatma KORKUT

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Abstract

Web 2.0 tools such as blogs, vlogs, wikis, instant messaging and podcasts allow internet users to create, share and collaborate on content, and offer creative opportunities to use them for educational and research purposes. Video sharing platforms are one of the online environments that provide user-generated content (UGC). The rapid increase in the use and sharing of videos in many different fields, from private life to working life and the public sphere, from scientific and technical areas to education, has led researchers to consider online video sharing platforms as rich data sources. Despite their many benefits, the use of such media for educational and research purposes also brings various technical and ethical challenges. This study focuses on the use of user-generated videos (UGVs) on Web 2.0 platforms in design studio education for research purposes. It discusses the technical and ethical aspects of using UGVs as a data source in qualitative research in design studio education and offers recommendations.

Keywords

User-generated content, User-generated video, Design research, Internet research ethics, Design studio education

Linear Time History and Response Spectrum Analyses of RC Buildings

Year 2021, Volume , Issue 32, 215 - 220, 31.12.2021

Emrah MERAL

<https://doi.org/10.31590/ejosat.1045545>

Abstract

The base shear force and displacement demands which obtained from response spectrum and linear time history analysis of the reinforced concrete buildings were compared in this study. Therefore, 2-, 4- and 7-storey 3-D buildings were created according to the 2007 Turkish Earthquake Code. A total of 78 analyzes in the X and Y directions of the buildings were performed to calculate the parameters such as base shear force, roof drift ratio and maximum interstory drift ratio. According to the results, while the demands between the two types of analysis differed in 2- and 7-storey buildings, very close values were obtained each other in the 4-storey building. In both analyzes, displacement demands increased depending on the increment in the number of storey and 7-storey buildings were found to be riskier in examined buildings.

Keywords

Time history analysis, Response spectrum analysis, Reinforced concrete buildings

Video Captioning Based on Multi-layer Gated Recurrent Unit for Smartphones

Year 2021, Volume , Issue 32, 221 - 226, 31.12.2021

Bengü FETİLER Özkan ÇAYLI Özge Taylan MORAL Volkan KILIÇ Aytuğ ONAN

<https://doi.org/10.31590/ejosat.1039242>

Abstract

Video captioning is the visual understanding process to generate grammatically and semantically meaningful descriptions that are of interest in the fields of computer vision (CV) and natural language processing (NLP). Recent advances in the computing power of the mobile platform have led to many video captioning applications that use CV and NLP techniques. These video captioning applications mainly depend on the encoder-decoder approach running with the internet connection, which employs convolutional neural networks (CNNs) on the encoder and recurrent neural networks (RNNs) on the decoder. However, this approach is not powerful enough to get accurate captioning results, and fast response due to online data transfer. In this paper, therefore, the encoder-decoder approach has been extended with a sequence-to-sequence model under a multi-layer gated recurrent unit (GRU) to generate a semantically more coherent caption. Visual information from image features of each video frame is extracted with ResNet-101 CNN in the encoder to feed the multi-layer GRU based decoder for caption generation. The proposed approach has been compared with the state-of-the-art approaches using experiments on the MSVD dataset under eight performance metrics. In addition, the proposed approach is embedded into our custom-designed Android application, called WeCap, capable of faster caption generation without an internet connection.

Keywords

Convolutional Neural Network, Gated Recurrent Units, Natural Language Processing, Video Captioning, Android Application.

Classification of Employer Industry with Data Mining Methods

Year 2021, Volume , Issue 32, 227 - 234, 31.12.2021

Elvan Kübra DOĞAN Arafat ŞENTÜRK

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Abstract

In order to make data mining algorithms ready for use, the data set named "Data Science Questionnaire in Kaggle", was analyzed in the data mining problem recognition stage. In line with the analyzed data set and the decided target, the data preprocessing stage was also carried out. The processed data set obtained as the output of the pre-processing stage is modeled by C4.5, Random Forest and K-Nearest Neighbor classification algorithms of data mining technology. The model success rates of these three algorithms were calculated. The success rate deviation values between them were analyzed and the situations that caused the deviation values were mentioned. In order to look at the issues affecting the model success rate from a different perspective, new modeling was performed with these three algorithms. The modeling process, which was carried out with the three algorithms decided for the processed data set and the modeling criteria of these algorithms, was also carried out using the original data set. The success rate calculations of the models obtained using the processed data set were also calculated for the original data set and their comparisons were made. The comparison of the factors affecting the success of the model, such as the data set used, the method decided, algorithm, algorithm criterion values, were embodied and expressed thanks to the modeling applications carried out. By taking these comparative examples as a reference, the factors affecting the model success rate were evaluated, and inferences were made about the data set quality analysis and data mining processes, respectively.

Keywords

Data Preprocessing, C4.5, Random Forest, KNN Algorithm, Confusion Matrix, Model Success Rate.

A Quantitative Approach to Wheat Production in Turkey

Year 2021, Volume , Issue 32, 235 - 240, 31.12.2021

Kübra TÜMAY ATEŞ

<https://doi.org/10.31590/ejosat.1039919>

Abstract

The scarcity of precipitation, which is one of the biggest problems of recent times, has brought with it a weakening in agricultural production. Looking at Turkey in general, it is seen that the last years have been very dry. Increasing droughts have reduced the farmer's ability to obtain irrigation water, and increasing input costs have made it very difficult to obtain fertilizer and consumables. This situation affects the resources of the state, albeit indirectly. Due to these and similar reasons, the production of wheat has decreased compared to previous years and its cost has increased. In this context, the estimation data for the coming years is that wheat production will decrease. Considering all these, the parameters affecting the wheat production were obtained from the Turkish Statistical Institute , the Ministry of Agriculture and Forestry and the Turkish Grain Board .In line with the information obtained, it was explained by using principal component analysis with which parameters wheat production is more related. At the same time, whether the effect parameters have an indirect effect on wheat production was investigated by correlation analysis. The factors that may cause a decrease in wheat production were evaluated quantitatively.

Keywords

Principal Component Analysis, Correlation Analysis, Parameter Determination

Possible Impacts of COVID-19 on Foreign Communities in Turkey

Year 2021, Volume , Issue 32, 241 - 247, 31.12.2021

Hikmet İSKENDER

<https://doi.org/10.31590/ejosat.1040349>

Abstract

At the start of the year 2020 humanity found itself facing a new pandemic that eventually impacted the whole world on various levels. Many countries are already facing difficulties as well as many marginalized groups in these countries. In the present research, attention is focused on the possible impacts of COVID-19 and vulnerabilities of foreign groups in Turkey, especially those who came from the Levant region and Egypt after 2011. The research applied a survey suggested by the World Health Organization office for the European Union, and used other observational tools such as official reports and media coverage to evaluate the situation of the target community. It was determined that the effects of COVID-19 on this group can be seen already and this research is very important in order to document these effects. It was concluded that a good portion of the foreign community was impacted heavily by the pandemic both socially and economically, and the possible methods that can be used in order to accelerate their recovery were noted.

Keywords

COVID-19, Pandemic, Foreign communities, Economic impacts, Social impacts

The Nanostructured CuO Films in The Different Thermal Oxidation Mediums: Production and XRD, UV-vis-NIR, FESEM and Raman Investigations

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<https://doi.org/10.31590/ejosat.1040788>

Abstract

In this work, CuO films were produced by the successive ionic layer adsorption and reaction (SILAR) method. The oxidation process was applied to CuO films in three different mediums as air, oxygen and argon. CuO films were kept at 400 °C for 2 hours in each medium during the oxidation process. The effect of the selected medium in the oxidation process on the physical properties of the CuO films was investigated. This study showed that the physical properties of the CuO films can vary significantly in different oxidation mediums. XRD studies reveal that all the films are polycrystalline with monoclinic structure and exhibit (-111) and (111) preferential orientations. Grain sizes were determined to vary in the range of 26-28 nm in different oxidation mediums. The XRD results were confirmed by Raman spectrum analysis. The band gap values increased between from 1.80 to 2.11 eV. In addition, it was discovered that with the oxidation of CuO films in argon medium, crystalline melanothallite structure was formed and the surface morphology was significantly changed.

Keywords

CuO nanostructure, Thermal oxidation, Melanothallite sturucture, XRD, RAMAN, FESEM

Designing Wideband Microstrip Reflectarrays for 10 GHz

Year 2021, Volume , Issue 32, 257 - 261, 31.12.2021

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<https://doi.org/10.31590/ejosat.1040838>

Abstract

This paper presents two microstrip reflectarray designs based on variable size unit cells for 10 GHz. One design uses a 3-layer unit cell with polygon shaped patch and the other uses a unit cell with 1-layer square loop patch. Both arrays have a size of $10\lambda \times 10\lambda$ at 10 GHz, can reflect the incoming wave as a high gain pencil beam in the desired direction of $\theta = 30^\circ$. Gains at 10 GHz are 23.6 dB and 26.1 dB for the 3-layer and one-layer structures, respectively. The multi-layer structure resulted in a wider gain bandwidth. Simulation results show that the 3-dB gain bandwidth is about 22% for the 3-layer structure reflectarray, as compared to 12% for the one-layer structure

Keywords

Microstrip, Unit cell, Multilayer, Reflectarray, Bandwidth.

Enzymatic Function Estimation with Binary and Multilabel Classification Using Deep Learning Techniques

Year 2021, Volume , Issue 32, 262 - 267, 31.12.2021

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<https://doi.org/10.31590/ejosat.1041643>

Abstract

Enzymes that act as biological catalysts are classified according to the reaction type and mechanism they catalyze, while subclasses are formed under each class according to their substrate selectivity. At the same time, structural, chemical and connectivity features are important in the classification of enzymes. Predicting enzyme function is important in helping to design new enzymes and in diagnosing enzyme-related diseases. While a significant majority of enzymes carry out certain reactions, a limited number of enzymes can perform different reactions. Therefore, it can be directly associated with more than one enzymatic function. In this study, it was aimed to predict the enzymatic function by binary and multi-label classification. It has been observed that more successful results the use of chemical properties in have emerged in the classification of enzymes. However, it was observed that the classification performance increased even more when all features were used. When the success of the models used for enzymatic function estimation was examined, it was seen that the Deep Learning models had higher both binary and multi-label classification performance. As a result, it has been demonstrated that the proposed models are an important tool in the classification of enzymatic functions.

Keywords

Enzymatic function, Enzyme Commission numbers, Deep Neural Networks, Machine Learning

Design and Development of an GUI for Pre-Trained Network-Based Automated Classification of Cervical Cancer Cells

Year 2021, Volume , Issue 32, 268 - 274, 31.12.2021

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<https://doi.org/10.31590/ejosat.1045509>

Abstract

Cervical cancer is the second most common cancer in women after breast cancer, causing the death of one woman every two minutes in the world. The most important risk factor originating from the cervix is infection with the papilloma virus (HPV). Cervical cancer screening programs are extremely important to reduce the incidence and death rates of this cancer. The primary goal of screening for cervical cancer is the accurate detection and timely treatment of intraepithelial precursor lesions of the cervix, in order to prevent cervical cancer. With the PAP smear test, cells in the cancerous stage are detected in the endocervical canal, and cancer development can be prevented before the cells turn into cancer with cancer treatment at this stage. The PAP test, which is used in early diagnosis, is an easy-to-apply, low-cost, harmless, high-sensitivity test that also reduces the burden of treatment. Recent developments in the field of artificial intelligence have achieved serious success in the diagnosis of cervical cancer. In this study, a transfer learning-based cervical cancer detection method and an application developed to easily perform these procedures are presented. Cancerous and non-cancerous cervical cells were classified using pre-trained networks. Five popular pre-trained networks, namely Xception, VGG-16, DenseNet, InceptionV3, and InceptionResNetV2, were used for the problem and the obtained performance results were compared. In addition, an application has been developed so that experts working in this field can easily make such classifications. With this application, users can create their own models by conducting a new training, use the model created in this study, and quickly test which class the newly obtained images belong to. As a result of the study, DenseNet network obtained the highest accuracy with 94.72% accuracy. Experimental results show that the proposed approach can provide an inexpensive and rapid decision support system for cervical cancer detection that anyone can apply.

Keywords

Cervical Cancer Cells, Classification, Deep Learning

From Threshold to Space-From Space to Place Yeldeğirmeni-Rasimpaşa Neighbourhood

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<https://doi.org/10.31590/ejosat.1045528>

Abstract

Urban and architecture are two main spatial elements that affect and transform each other. While urban settlement consists of urban landscape like dimensions of building blocks, street patterns, the architectural form includes the horizontal and vertical components of the buildings, the height of the building, the width of the facade, the windows, the doors, the building indentations and protrusions, etc. formed by features. At this point, architectural thresholds are a building intersection, as well as creating transition spaces that we come and go through frequently during the day; facade elements, building entrances are the details that enrich the architecture. The uniform construction seen in today's cities is far from reflecting the historical and cultural values of the city with abstract architectural designs from the environment and makes it difficult to establish a personal connection with the place. This situation causes urban memory to be damaged day by day and alienates those living in Istanbul from the city. Thresholds; as the building entrance and the details of the entrance, it stands out as the details that bring awareness to the city and architecture, increasing the perception of place. In this study, the space-place dialectic is handled as "being a place" through threshold elements. Traditional architectural details such as a bay window, overhanging, arcaded, fringed, wooden framed wall in Yeldeğirmeni-Rasimpaşa District, which are now being forgotten, are examined as "threshold-forming elements". Threshold elements in Yeldeğirmeni- Rasimpaşa Neighborhood; entrance and physical recesses and protrusions and details of the entrance (door-window, wall, stairs, pavement, landscaping equipment, bay window, eaves, arcade, column-column, etc.), courtyard (Atrium), passage areas, building interfaces (pavement cafes and eating and drinking places) are discussed in 3 sections. The findings obtained from the fieldwork were processed on the 1/1000 Implementation Development Plan and 1/15000 scale Master Development Plans obtained from Kadıköy Municipality. In the study, which is based on fieldwork and literature research, it is concluded that Yeldeğirmeni Rasimpaşa neighborhood is a district rich in threshold elements in the metropolitan city of Istanbul, and that it exhibits an exemplary spatial syntax for the perception of "place" by forming a local cross-section in the metropolitan city Istanbul.

Keywords

Threshold, building, space, sence of place, Yeldeğirmeni-Rasimpaşa Neighbourhood.

Numerical and Experimental Analysis of Water Surface Profile Back of The Regulator

Year 2021, Volume , Issue 32, 282 - 287, 31.12.2021

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<https://doi.org/10.31590/ejosat.1039504>

Abstract

In this study, experimental and numerical analysis of the water surface profile formed back of the regulator was carried out. The experiments were performed by placing a threshold on the downstream part of the open channel experimental setup, which is located in Dokuz Eylul University Hydraulics Laboratory and whose slope can be changed. Using the initial conditions of the experiments, the differential equation of the water surface for the gradually varied flows was solved numerically by the Euler Method, the Fourth Order Runge Kutta Method, the Standart Step Method, the Direct Step Method, and the Differential Quadrature Method. By using experimental data, the relative errors obtained from different numerical methods were compared with each other and the accuracy of the methods was examined.

Keywords

Gradually Varied Flow, Numerical Analysis, Physical Model

Time Series Forecasting of COVID-19 Transmission in Turkey Using ARIMA Model and LSTM Network

Year 2021, Volume , Issue 32, 288 - 297, 31.12.2021

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<https://doi.org/10.31590/ejosat.1039394>

Abstract

On March 11, 2020, the World Health Organization (WHO) declared the new coronavirus 2019 as a global epidemic. The new type of coronavirus, also known as COVID-19, first appeared in Wuhan city of China in December 2019 and spread all over the world within a few weeks. More than 5 million people all over the world and nearly 70,000 people in Turkey have died due to this disease. It is vital to take precautionary measures in the fight against this epidemic, which threatens human health on a globally and causes economic crises. The forecasting of the spread of the COVID-19 epidemic gives an idea about what measures to take regarding this disease. In this study, daily number of cases, daily number of recoveries and daily number of deaths were estimated in the COVID-19 outbreak in Turkey using the ARIMA time series model and LSTM network. To test the accuracy of the models, known and unknown data were estimated and the error percentages of the estimated data were compared. As a result of the experimental studies carried out to predict the course of COVID-19 transmission in Turkey for the next 15-days, it has been observed that the daily number of cases and daily number of death sare estimated with high accuracy in the ARIMA model, while the daily number of recoveries are estimated with high accuracy in the LSTM model. In the ARIMA and LSTM models, a decrease was observed in the number of daily cases and deaths. However, a decrease in the daily number of recoveries in the ARIMA model and an increase in the LSTM model were observed.

Keywords

Time Series Forecasting, Machine Learning, COVID-19

The Characterization of Silver Nanoparticles Synthesized From Prunus spinosa Fruit and Determination of Antimicrobial Effects on Some Food Pathogens

Year 2021, Volume , Issue 32, 298 - 305, 31.12.2021

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YAVUZ Necmettin AKTEPE Cumali KESKİN

<https://doi.org/10.31590/ejosat.1040082>

Abstract

In this study, silver nanoparticles (AgNPs) were synthesized using Prunus spinosa (PS) fruit extract in an easy, low-cost and environmentally friendly way. According to the Ultraviolet (UV)-visible Spectrophotometer analysis data, the nanocrystals showed a characteristic peak at 438.3 nm. Field Emission Scanning Electron Microscopy (FE-SEM), Transmission Electron Microscopy (TEM), and Atomic Force Microscopy (AFM) analyzes revealed that the morphological structures of the biosynthesized AgNPs were spherical. According to the results of XRD analysis, it was determined that the crystal structures of AgNPs were cubic. The size of the nanoparticles was calculated as 29,34 nm by the Debye-Scherrer equation. The zeta size of the synthesized nanomaterial was measured as 117.4 nm. Inhibitory effects of AgNPs on food pathogens Bacillus subtilis, Pseudomonas aeruginosa, Staphylococcus aureus ATCC 29213, Escherichia coli ATCC25922 and Candida albicans were revealed by the Minimum Inhibitory Concentration (MIC) method. Keywords: AFM, Food pathogens, FT-IR, TEM, XRD.

Keywords

AFM, Food pathogens, FT-IR, TEM, XRD, AFM, Food pathogens, FT-IR, TEM, XRD.

Detect and Effects of Silicon Content in Chemical Composition of Steel Material After the Hot Dip Galvanized Coating

Year 2021, Volume , Issue 32, 306 - 311, 31.12.2021

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<https://doi.org/10.31590/ejosat.1041541>

Abstract

We are looking for permanent solutions to the problems based on global warming, which is one of the main agenda items of the world and our country; In the light of critical considerations such as sustainability, efficient use of resources, and prevention of waste; protection of steel from corrosion has become a obligation beyond necessity in order to protect and make sustainable the values produced by the increased use of steel. In this article, which includes the details of our study on the visual variability that occurs after the hot dip galvanizing process, which is widely used to protect the raw material resources of our world and the energy spent to bring these resources to the economy, and the determination of the silicon content after coating, The processes that it is involved in from corrosion to its separation from the structure and the results it causes are discussed.

Keywords

Silicon, Steel, Galvanic, Hot-Dip Galvanize, Post-Coating, Destructive Failure Analyze, Coating

Wear Analysis of Human Cornea in Keratoconus Disease

Year 2021, Volume , Issue 32, 312 - 317, 31.12.2021

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<https://doi.org/10.31590/ejosat.1039221>

Abstract

The cornea is a transparent and curved tissue located at the front of the eye, specialized to focus light and protect the eye from external factors. The importance of the cornea in the structure of the eye and visual system is often overlooked because of its transparent nature. The cornea lacks the complex neurobiological structure of the retina and the dynamic nature of the lens, but despite this, it is unable to function properly without transparency in this organ of the eye. The complexity of the structure and function of the cornea, which makes it transparent, is a surprise that led us to examine one of the most important components of the visual system. The cornea is a vascular-free connective tissue that serves as the first barrier to the spread of infection to It acts inside the eyeball as well as the building block of the eye wall. Corneal transparency is due to several factors, including the structural anatomy and physiology of its cellular components. Keratoconus is an eye condition in which the cornea deforms and protrudes forward in a cone shape. This change that occurs in the cornea causes the incoming light to be unable to focus in the visual field. The result is blurred and distorted vision. There are also studies showing that eye rubbing can be effective in the onset and progression of the disease. In this study, wear from eye rubbing in kerataconus disease was analyzed by means of finite elements. Deformation and stress analysis in the cornea were investigated. FEM can help to predict biomechanical behavior of corna after kerataconus dises. Due to the rubbing effect at the contact point, contact pressure, vonmises stress and wear reach their maximum value.

Keywords

Wear, Cornea, Finite Elements Methods

Adaptive Prediction of Pathological Resting Tremors in the Complex Domain

Year 2021, Volume , Issue 32, 318 - 325, 31.12.2021

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<https://doi.org/10.31590/ejosat.1039914>

Abstract

In this study, adaptive estimation of pathological resting tremors, which is frequently encountered in Parkinson's patients, is performed in the complex domain. In this context, pathological "right hand and left hand" or "right leg and left leg" tremors, which were measured instantaneously, are first expressed in the complex domain. Then, these complex-valued pathological tremors are predicted adaptively using one-step-ahead strictly linear (SL) and widely linear (WL) based predictors. Here, the SL based predictor is trained by the Complex-valued least mean square (CLMS) algorithm, while the WL based predictor is trained by the augmented CLMS (ACLMS) algorithm. The performances of these predictors were examined in terms of absolute error and prediction gain on pathological resting tremors as real-world data. Simulation results reveal that complex-valued pathological resting tremors exhibit non-circular behavior and thus the WL based predictor outperforms the SL version.

Keywords

Parkinson's disease, Resting Tremor, Complex Domain, Adaptive Prediction, Parkinson's disease, Resting Tremor, Complex Domain, Adaptive Prediction

Applications of the Carathéodory's Inequality for Driving Point Impedance Functions

Year 2021, Volume , Issue 32, 326 - 331, 31.12.2021

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<https://doi.org/10.31590/ejosat.1040073>

Abstract

In this study, the Carathéodory's Inequality, which is a highly popular topic of complex analysis theory, has been applied to electrical engineering to obtain novel driving point impedance functions. In electrical engineering, driving point impedance functions correspond to positive real functions and they are used for representation of the spectral characteristics of a particular circuit. Accordingly, boundary version of the Carathéodory's inequality has been considered here assuming that the driving point impedance function, $Z(s)$ has a fractional function structure with $0 < \operatorname{Re}(z(s)) \leq a$ for $\operatorname{Re}(s) = 0$ and it is analytic in the right half plane. At the end of the analyses, new driving point impedance functions have been obtained and they have been presented with their spectral characteristics. According to simulation results, it is possible to say that the frequency responses of the obtained generic driving point impedance functions have spiky filter structures where the number of the spikes in the frequency response of these filters depend on a pre-defined parameter, n .

Keywords

Driving point impedance function, Carathéodory's Inequality, Circuit, Filter

Hardware Design of Single-Phase Smart Electricity Meter based on Multiple Wireless Connectivity Technologies

Year 2021, Volume , Issue 32, 332 - 338, 31.12.2021

Osman Saygın AKKAYA Hakkı SOY

<https://doi.org/10.31590/ejosat.1040829>

Abstract

Smart meters are an indispensable element of new generation smart grids. This study presents the hardware design of a novel single-phase smart electricity meter, which can provide energy efficiency, adaptive pricing and automated data collection functions. Besides, an extensive information is given about the Bluetooth, Wi-Fi and NB-IoT technologies that are used to transfer the electrical parameters (current, voltage, active/reactive power, power factor etc.) related with its connected load to the cloud server. Our designed smart meter has been tested by connecting to the LED lighting panel, which is supplied over the electric grid. So, the measurement validity has been verified by using the application program. Also, the smart meter readings have been successfully transferred to the mobile phone application and cloud platform with the help of available wireless connection technologies.

Keywords

Electricity, Smart Grid, Smart Meter, Bluetooth, Wi-Fi, NB-IoT

Design and Morphology Characterization of Biopolymer Blend-ZnO Nanocomposites Coated Cu-Ni-Mo-based Steel Foam

Year 2021, Volume , Issue 32, 339 - 345, 31.12.2021

Nuray BEKÖZ ÜLLEN

<https://doi.org/10.31590/ejosat.1039292>

Abstract

Recent developments have been focused on the fabrication and application of metal–metal oxide nanocomposites coated steel foam for nanomaterials, which can have excellent surface morphology and mechanical properties than conventional materials. In this study, a novel 3 dimensional (3D) biopolymer blend-ZnO nanocomposites coated Cu-Ni-Mo-based steel foam was designed and prepared. The objective of this work was to investigate the deposition of the nanofilm by immersion of the steel foam into a solution containing ZnO nanostructures and to determine the effect of the surface coating of biopolymer blend-ZnO nanocomposites onto the Cu-Ni-Mo-based steel foam. A low-cost and easy-to-use dip-coating method was preferred to obtain uniform and high quality coating layers. With this approach, the nanocoatings were prepared at 25 °C and low contact time (≈ 10 min). X-ray diffraction (XRD), scanning electron microscopy (SEM), and stereo microscope analysis methods were used to demonstrate surface and chemical properties of the tragacanth gum / chitosan blend encapsulated ZnO nanocomposites (TG/CH/ZnO NPs) coated Cu-Ni-Mo based steel foam. According to the SEM and stereo microscope images, the prepared 3D random shape with irregular ZnO NPs on the surface of the Cu-Ni-Mo based steel foam were formed. Furthermore, the mean surface roughness values of uncoated steel foam and TG/CH/ZnO NPs coated steel foam were measured as 4.48 μm and 4.61 μm , respectively. Additionally, the RGB pixel of the SEM micrograph of the coated steel foam was analyzed to investigate the effect of coating materials on the surface. Due to cost-efficient and green fabrication of the nanocoating, it has a significant potential to be a promising nanomaterial in biomedical applications.

Keywords

ZnO nanocomposite, Steel foam, Nanocoating

The Mediating Role of Neuromarketing in the Effect of Advertising on Consumption Psychology

Year 2021, Volume , Issue 32, 346 - 352, 31.12.2021

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<https://doi.org/10.31590/ejosat.1039362>

Abstract

Neuromarketing techniques have begun to be used for the analysis of consumer behavior, although they are not very new in the field of marketing. The aim of the study, which is based on this, is to reveal the mediating role of neuromarketing in the effect of advertising on consumer psychology. The research is a general and relational survey model based on quantitative data. Data were collected by questionnaire method. The research population consists of the central districts of Konya. Participants aged 18 and over were included in the study. Convenience sampling method was preferred in the selection of the subjects. And the study was conducted with 200 volunteer subjects. The questionnaire used as a data collection tool was classified as consumer psychology (n=18), advertising (n=11) and neuromarketing (n=5). Descriptive and inferential statistics were used in the analysis and interpretation of the data. Structural Equation Models (SEM) were drawn in order to verify the compatibility of the theoretically established relations with the data in the research. Accordingly, the model was tested with the three-stage structural equation model developed by Baron and Kenny (1986). As a result, it has been determined that neuromarketing has a mediating role in the effect of advertising on consumer psychology.

Keywords

Neuromarketing, Advertisement, Consumption Psychology.

Student Attitude Towards Basic Design Education In Interior Design Departments

Year 2021, Volume , Issue 32, 353 - 361, 31.12.2021

İpek YILDIRIM

<https://doi.org/10.31590/ejosat.1039952>

Abstract

Abstract Based on the fundamental that attitude can change with learning and experience, the study deals with student attitudes towards basic design education, which is given to students in the first year curriculum in design-related fields. Thus, it is aimed to identify possible differences in student attitudes at the beginning and end of the lesson. In order to determine the attitude towards the course in the study that created with qualitative method, two-stage survey study was applied in 2019-2020 Academic Year Fall Semester of Nuh Naci Yazgan University Interior Architecture and Environmental Design Department basic design education course. The first stage of the study was applied to 51 students in the third week of the semester, and the second stage to 45 students in the 14th week. The data obtained as a result of the survey were analyzed with the SPSS program and the findings were reached. In line with the results reached by the study, it is seen that students have generally positive attitudes towards basic design education, there is no meaningful attitude change in the second stage, only male students' attitudes towards the homework of the course have changed negatively. It is a positive situation that students have positive attitudes towards the lesson and not being biased, although they have just been introduced to the lesson. However, the negative attitude towards homework reveals the necessity of updating the method of the course considering today's student profile and expectations.

Keywords

Interior Architecture, Basic Design Education, Learning, Attitude, Attitude Change

Does Telephone Use While Walking Affect Spatio-temporal Characteristics of Gait?

Year 2021, Volume , Issue 32, 362 - 366, 31.12.2021

Ayşe UNAL Gülsüm TİKAÇ Filiz ALTUĞ

<https://doi.org/10.31590/ejosat.1040001>

Abstract

Telephone use is an indispensable part of our daily life and provides us convenience in many areas. However, it brings with it many negativities due to its habit-forming. Continuing to use the phone while doing many things during the day makes it difficult to focus on the work being done. This may result in an accident or injury. The aim of this study is to investigate the effect of phone use while walking on the spatio-temporal characteristics of gait. Fifty-three healthy volunteers aged 20-30 years (mean age: 23.00±1.60 years; 31 females, 22 males) were included in the study. At the beginning of the study, individuals were asked to walk 10 meters at their own walking speed. Afterwards, they were asked to complete the 10-meter distance by listening to music on the cell phone, texting, surfing social media and playing games, respectively. During all these activities, the gait characteristics of individuals were recorded using the BTS G-Walk Gait Analysis System, such as gait speed, cadence, step length, stride length, stance phase, swing phase, gait quality and pelvic symmetry. Significant disturbances in gait speed, cadence, stride length, stance phase, swing phase and symmetry of pelvic rotation were observed due to cell phone use during walking ($p<0.05$). The use of phones while walking causes abnormal changes in the normal walking period and disrupts the gait symmetry.

Keywords

Healthy volunteer, Cell phone, Gait analysis., Gait analysis

Synthesis and Characterizations of Polyurethane Based Coatings Containing Telechelic Siloxane Oligomers

Year 2021, Volume , Issue 32, 367 - 382, 31.12.2021

Mehmet Arif KAYA

<https://doi.org/10.31590/ejosat.1040411>

Abstract

Polyurethanes (PU) are a large family of polymers that have urethane bonds formed as a result of the reaction of diisocyanate and diol monomers in their main chain. Telechelic siloxane oligomers (TSO) are unique materials that have various reactive functional groups at their end groups and can chemically bond from these functional groups with various oligomer blocks, allowing to obtain block copolymers that can be used in many applications depending on their molecular weight and composition. In this study, Polyurethane/Polydimethylsiloxane (PU/PDMS) multiblock copolymers were synthesized by using telechelic Polydimethylsiloxane (PDMS) oligomers. Basic functional properties such as insulation and adhesion performance of PU/PDMS-based materials intended to serve as coating material were determined. Also hardness, mechanical and thermal characteristics, and combustion behaviors of PU/PDMS based coatings were examined and the optimum composition was determined by revealing the structure-property relationship as a result of the examinations carried out.

Keywords

Polyurethane, Polydimethylsiloxane, Telechelic Oligomer, Multiblock copolymer, Coating, Flammability Behavior.

A Study on the Effect of Features Obtained From Signal Segments on Classification Success

Year 2021, Volume , Issue 32, 383 - 391, 31.12.2021

Erdem ERKAN Yasemin ERKAN

<https://doi.org/10.31590/ejosat.1040429>

Abstract

Successful classification depends on the selection of the distinctive features and the effective channel subset used in the classification. In this study, novel and practical methods are proposed for determining the distinctive features and detecting effective channel subsets in the multi channel classification systems such as EEG. Two different feature extraction methods are compared in the study. The first one is based on classical Wavelet transform and the second is our proposed approach which used the slope of signal segments. Feature vectors are generated from some signal properties such as the mean, standard deviation, numerical integral of the Wavelet coefficients for classical Wavelet transform based feature extraction method. For our proposed method, only the slopes of signal segments are used for the feature vectors. In the proposed Signal Path Slope (SPS) feature extraction method, differently from the classical Wavelet based method, a Savitzky Golay (S-G) filter with an optimal frame length is applied to the signal before segmentation to make the path of the signal more prominent in time domain. In this way, the distinctive classification features are extracted by using S-G filter. For channel selection, an iterative channel selection method based on the classification results which divide the dataset labelled dataset into two groups as % 90 pre-training and % 10 pre-test data is proposed. The dataset provided as dataset-3 in BCI competition IV is used in this study. The feature vectors extracted by using the proposed methods are classified for each method with the Support Vector Machine classifier. The results are given comparatively and it is observed that our proposed method has less computational complexity and more successful classification than Wavelet based classical feature extraction methods. The highest classification accuracies of % 67.74 and % 49.27 for subject-1 and subject-2 respectively are obtained with a low dimensional feature vector by proposed SPS feature extraction method. The classification accuracies achieved in the study are increased by % 8.24 for subject-1 and % 14.97 for subject-2 when compared average of the competition results. The significant increase in the success for both subjects shows the consistency of the proposed methods. By this study, it is observed that there is a subject-specific signal pattern related to motor imagery tasks in the brain. This pattern distinctive features is successfully determined by using the proposed methods.

Keywords

Brain Computer Interface, Classification, Feature Vector, Channel Selection, Savitzky Golay

The Effect of Shielding Gas and Welding Groove on Mechanical Properties in Joining Surface Hardened S355J0 Steel Welded by GMAW

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Abstract

In this study, both surface hardened S355J0 structural steel and unhardened structural steel of the same quality were joined in the form of an overlay, using two different shielding gases by gas metal arc welding method (GMAW). The effects of shielding gas and welding groove on mechanical properties on the shaping of weld seam geometry with this joining process were investigated. In this study, S355J0 materials used in 10 mm and 12 mm thickness were joined in the overlap welding position using the gas metal arc welding (GMAW) method. Welding operations were carried out with a torch drive robot. Experiments were carried out by opening the weld groove to the area of the surface hardened material to be overlap welded and without a weld groove. In the study, 1.6 mm SG3 solid welding wire and 2 different shielding gas mixtures (88%Ar+10%CO₂ +2%O₂ and 100%CO₂) were used. After MAG welding was done with these selected parameters, destructive and non-destructive tests were applied to the samples. According to the macrostructure studies, it was observed that the weld penetration increased with the increase in the amount of CO₂ in the mixture. In parallel with the increase in penetration detected in the macrostructure examinations, an increase of 59.7% was observed in the tensile strength. It was determined that the tensile strength values decreased in both shielding gas environments in the welding processes without opening the weld groove. According to the results of the hardness test, higher hardness values were obtained in the samples whose weld groove was not opened. While the weld metal hardness value was measured at 250 HV in the samples with the weld groove, it was measured around 330 HV in the samples without the weld groove. In addition, in all test samples, the highest hardness value was measured in the hardened region of the surface-hardened material, followed by ITAB, weld metal and 10 mm S355J0 material, respectively.

Keywords

GMAW, Gas Metal Arc Welding, Cementation

Investigation Of Physical Properties Of Poly(Lactic Acid)/Eggshell Powder Composite Films

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<https://doi.org/10.31590/ejosat.1044796>

Abstract

In this work, the effects of Chicken egg shell powder (ESP) on the properties of Poly(Lactic Acid) PLA/ESP composite films (products) were examined. 4 wt.% PLA solution prepared and ESP added to solution at wt. %10, %20, %30, %50. PLA and PLA/ESP films prepared by the film-casting method. The mechanical and thermal behaviours of the composites were investigated using fourier transform infrared spectroscopy (FTIR), xray diffraction analysis (XRD), thermogravimetric analysis (TGA), dynamic mechanic anaylsis (DMA) and polarized optical microscopic analysis. While ESP added in different amounts into the PLA film also increases the crystal density the composite film as the amount of substance increases. Also, as the amount of ESP in the product increased, the thermal stability of the composite films increases and a sharper and roughness structure is occurs. % 10 and % 20 ESP added composites had elasticity properties as PLA, while high-strength composite film formation was observed at % 30 and %50 ESP added composites. So, the storage modulus is seen at a higher level than normal PLA. These composites could be used in packaging application because of reducing light permeability properties and high-strength composite film formation.

Keywords

Eggshell Powder, Poly(Lactic Acid)(PLA), Composite films

Process Models in Mobile Applications Developed for Cab Journey: Deficiencies in Passenger Control and a New Model Suggestion

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Abstract

Many applications software developed for taxi travel is available in mobile application markets. Related mobile applications contain various operations and functions for journey control. In this study, the applications that control the taxi journey are investigated. As a result of this investigation, the process model and operation-function clusters used by the applications were revealed. Thus, a generic model for the journey was revealed. The generic model has 5 stages that can handle the taxi journey holistically: Journey Design, Journey Matching, Taxi Waiting, Journey Tracking, and Post Journey. The operations and functions of the examined applications were compared with each other. As a result of the comparison, the differences among the functionalities of local (for Turkey) and international mobile applications were revealed. Another aim of the study is to design a new taxi journey service model. The important aspect of this model is that it has a function that is not found in other applications which were examined under review. Thanks to the related function, route regulations can be made during taxi journey. As a future study, it is planned to develop a location-based passenger information mobile application for taxi transportation within the scope of the proposed model in the study.

Keywords

Location-based services, Smart transportation systems, Urban transportation, Cab, Taxi, Passenger information systems

Exact solution for the response of an arbitrarily-curved beam subject to a moving load

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Abstract

An arbitrarily curved beam under the effect of a moving load has been considered. An analytical series solution has been developed for the case when the beam cross-section is symmetrical so that it resides in a plane during the motion. The moving force is assumed to be a singular force sliding through the length of the beam with constant speed while its direction always pointing in the principal normal of the curved shape of the beam. After developing the general solution for any plane beam, example computations were carried out on a specific example by means of power series expansion.

Keywords

Arbitrarily-curved, Moving load, Power series.

Determining the Best Location for a Religious Build by K-means Clustering Methods

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<https://doi.org/10.31590/ejosat.1037519>

Abstract

Point of Interest is expressed as locations that people find interesting and want to interact with. Religious facilities are one of the important points frequently used by people. Since religious facilities are frequently used by people, their location is also of great importance in terms of interaction. Considering the recent pandemic process, it is necessary to reduce or balance the density at religious facility points where people come together in order to reduce the spread of the virus. The k-means algorithm, which is the most widely used and expressed as the simplest algorithm, is used for density-based analysis. For all these reasons, it is very important to distribute the new POI points according to their densities. In this study, a new multidimensional k-means based approach is proposed to consider the distance and the population density of the points where religious establishments will be built. In this study, spatial building and religious facility data belonging to Kayseri Metropolitan Municipality and Melikgazi Municipality were used in the proposed model. In the proposed multidimensional k-means model, the number of independent sections in the building data is taken into account to balance the population density. The performance of the proposed multidimensional k-means model is compared with the performance of the classical two-dimensional k-means method on real data. Experimental results showed that the proposed multidimensional k-means approach produced more successful results in terms of population density than the two-dimensional k-means approach.

Keywords

Multidimensional clustering, K-means, Spatial data

Guided Modes of Cylindrical Dielectric Rod and Designation of Modes

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Abstract

Due to nonconducting boundary condition of an open waveguide structure, all magnetic and electric field components exist both inside and outside the waveguide. As a result, hybrid modes called HE and EH exist in open waveguide structures, along with the TE and TM modes that exist in closed waveguides. The question has to be answered which one is designed HE and EH because hybrid modes correspond to different roots of the characteristic system of equations belonging to the structure or a closed function produced from this system. A universal approach, based on the relative contribution of the longitudinal component of the electric field or the relative contribution of the longitudinal component of the magnetic field, has been accepted to designate the hybrid modes. The aim of this study is to present the methods used in designation the modes and to obtain guided TE modes, TM modes and hybrid modes of cylindrical dielectric rod waveguide. Numerical results obtained for the method used in designation the hybrid modes of the structure presented on the figures. It is shown that there is a difference in sign between the hybrid modes on the figures. As a result of numerical calculations, all modes that have the same sign as the lowest-order mode, which is universally accepted as the EH₁₁ mode, are named HE. Conversely, all modes with the opposite sign of the same mode are called EH.

Keywords

Cylindrical Dielectric Rod, Guided Modes, Designation of Modes

Investigation of Heavy Metal Levels of Cr, Zn, Pb, Cu, As in the Nevşehir Province Kızılırmak River Sediments Using Toxic Risk Index (TRI)

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Abstract

Increasing anthropogenic activities with the industrial revolution cause the negative effects on the natural environment to increase due to advances in industry and technology, wrong agricultural policies and other anthropogenic effects. Investigations of heavy metal-related pollution in rivers and lakes as a result of these negative effects; It has become the focus of attention of many scientists who conduct research in different branches of science. This study, which includes field and laboratory studies, was carried out on the line of Kızılırmak River, one of the most important rivers of Turkey, in the Gülşehir District, Nevşehir Province, Avanos District and Sarıhidir Village of Ürgüp District. Cr (Chromium), Zn (Zinc), Pb (Lead), Cu (Copper), As (Arsenic), heavy metal levels in the indisurbed sediment core samples obtained from seven sampling points determined on the Kızılırmak River were evaluated based on the TRI (Toxic Risk Index) used to determine the toxic effects of the elements. It was determined that the percentage of toxic effect risk of Cr (Chromium) heavy metal was at the highest level in all locations. As (Arsenic) heavy metal ranks second in terms of toxic risk effect percentage. As (Arsenic) heavy metal has the highest values in the analysis results obtained from the 2nd location in terms of toxic risk effect percentage.

Keywords

Toxic Risk Index, Kızılırmak, Sediment, Heavy Metal, Pollution

Mitigating Data Imbalance Problem in Transformer-Based Intent Detection

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Abstract

There are two major problems when deploying a practical intent detection system for a new customer. First, domain-specific data from the customer could be limited and imbalanced. Additionally, despite different customers might share the same domain, their intent categories might be different from each other. Thus, it might be difficult to combine the datasets collected for different customers into a single and larger one. In this paper, we use class weights in the loss computation to alleviate the data imbalance problem. The class weights are defined inversely proportional to the frequency of the class in the training set in order to give more influence to less observed classes. We also employ a two-pass fine-tuning procedure to utilize the information in different in-domain datasets. Experimental results show that intent detection performance is improved significantly when the weighted loss function is used together with the two-pass transfer learning procedure. The absolute performance improvement in percent detection accuracy is approximately 2% over a transformer-based baseline.

Keywords

Intent Detection, Deep Learning, Transformers, Data Imbalance, Transfer Learning

Effects of Pumice Quarry Wastes on Abrasion and Hardness Values

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Abstract

Resource shortage and increasing needs enhanced the importance of the evaluation of waste materials day by day. In this regard, especially in the production and evaluation of building materials, waste and resource management has a very important place in terms of nature, economy, and time-efficient. The continuous increase in construction causes the increase of quarries. The storage problem of products that cannot be used in the production process is one of the frequently encountered problems in the construction industry. In this context, waste undersize pumice products which are described as inert of the quarries located in Aksaray Province Taşpınar Region were used instead of fine aggregates in the produced blocks. In this study, uniaxial compressive strength, apparent porosity, vertical abrasion, and Schmidt Hammer tests were carried out on specimens prepared as cubes of 15 x 15 x 15 cm dimensions. As a result, the abrasion and hardness characteristics of the pumice blocks were correlated and interpreted with the strength and void ratio. The usability criteria of these products which are defined as waste, in building materials were evaluated together. As expected, the strength and hardness values decreased and the abrasion values increased when the void ratio increased. In addition, it was shown in which limits the waste pumice material can be used and how much usage rate affects the physical resistance, to be brought industry.

Keywords

Waste utilization, Vertical abrasion, Hardness, Pumice

Effects of Environmental Factors on Fingerprint Development

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Abstract

Fingerprints are unique to individuals and play an important role in the investigations at the crime scene. Today searches for developing the best methods to detect the fingerprints that are not completely visible or not have sufficient characteristics are still ongoing. In this study, 2448 fingerprints were used as samples collected from four individuals, between 24-50 years old, two women and two men, who signed the consent form as material. Porous and nonporous materials were used to develop fingerprints in the laboratory. Glass, metal, and plastic materials were used as nonporous materials. Cyanoacrylate vapor and staining methods were used for non-porous materials. Iodine vapor, ninhydrin, and silver nitrate were used for porous materials such as paper and raw wood. Image sharpening was performed by taking high-quality photographs for each sample. Thus, fingerprints were identified. Fingerprints that can and cannot be classified were successfully compared and their data were calculated. The experimental results showed that surface types are extremely important in the elucidation of the event in detecting hidden fingerprints of the perpetrator.

Keywords

Crime Scene Investigation, Fingerprint, Environmental Conditions, Fingerprint Development Methods

A Detailed Survey on Speech Emotion Recognition: Features and Classification Methods

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Abstract

Speech is one of the fastest and most natural communication methods between people. Emotion recognition studies without speech try to obtain semantic information from the sound signal during speech. In recent years, many studies have been carried out on emotion analysis over speech signals. In these studies, detailed research was conducted by considering 3 important aspects in sentiment analysis. The first topic is feature extraction from speech signals, the second topic is the selection of these features that will contribute positively to the classification, and the third topic is the design and performance evaluation of the classification schemes. The correct determination of the features and the successful implementation of the selection process on the features greatly affect the performance. However, although different methods are preferred in the extraction and classification of features from the voice, the performance may vary according to the data sets, moods, languages, and the method of use of the training set. Generally, among the articles examined, SVM was used as the classifier and MFCC was used as the feature. The highest recognition rate was achieved with the auto-encoder, TESS dataset and Alex-net CNN and 98% success was achieved.

Keywords

Speech Emotion Recognition, Survey, Feature Reduction Techniques, Classification

Address Information System with Spatial Interaction Analysis for Geographic Information Systems

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Abstract

Address Information Systems (AIS) is an essential component for Geographic Information Systems (GIS), which is used for the collection and regular storage of geographical assets for particular purposes. The accuracy and consistency of the addresses stored in this system are critical for health, communication, security, postal and cargo operations, education, and many social services to be carried out healthily. To generate an ideal (AIS) and provide a trouble-free service, the GIS address architectural design should be done logically, consistently, effectively, and efficiently, both theoretically and practically. This study proposes a spatial interaction method instead of a classical relational database design for addressing information system architectural design. It has been seen that the proposed method is more successful than the classical relational method and offers a stable structure in eliminating the problems that arise in the classical approach. The data used in the study belong to Kayseri Metropolitan Municipality and are genuine and original data. The study is critical because it is a solution to a real-world problem.

Keywords

Geographical Information System, Address Information System, Spatial Interaction.

CFD Analysis of a Solar Air Collector with Aluminum Honeycomb Absorber Plate

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Abstract

In this study, CFD (Computational Fluid Dynamics) analyses of two different solar air collector configurations according to the air intake spot were performed. An aluminum absorber plate with honeycomb geometry is used to increase the efficiency of the solar air collector. In order to examine the heat transfer and air flow properties, simulation analyses were carried out on the solar air collector with air-draught from the center and side. The optimum operating ranges of the system under different radiation and mass flow rates were determined and the design comparison of the center and side aspirated collectors was performed. Thermal analysis of collectors with aluminum honeycomb absorber plate were carried out for 600-1000 W/m² radiation, 0.01-0.015 kg/s mass flow rates and constant 300K inlet air temperature. Temperature rise in outlet air and corresponding thermal efficiencies were found. The findings show that the highest temperature output is approximately 312 and 310K at 1000 W/m² irradiance and 0.01 kg/s mass flow rate for edge and center air draught type solar air collectors, respectively. The highest thermal efficiencies, on the other hand, were approximately 45% for the side air intake collector and 42% for the center air intake collector both at 600 W/m² irradiance and 0.015 kg/s flow rate for both configurations.

Keywords

Solar air collector, CFD (Computational Fluid Dynamics) analysis, Honeycomb absorber plate

Shannon Entropy and Its Applications in Information Theory

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Abstract

Entropy has applications in many fields from physics to statistics, from engineering to social sciences in the age of communication and technology in the 21st century. It appears as an application of information theory in areas such as secure data transfer, lossless data compression, machine learning and classification. The entropy formula created by Shannon using probability calculations is an important measurement method used in information theory. In this study, some uses of Shannon's entropy formula in information theory are demonstrated with applications. Firstly, in a coin flip game played with fair and fraudulent coins, the amount of information and entropy were calculated, and the results were compared with each other. The entropy value obtained from the fair coin was higher than that of the fraudulent coin, proving that entropy is a measure of uncertainty in a system. With the use of entropy in information theory, great progress has been made in processes such as effective communication and data storage using minimum bits. In the second application, while coding the characters in a data group, the required minimum number of bits was calculated with the entropy formula and an example coding was made. In information theory, Shannon entropy is used in data mining, machine learning and artificial prediction mechanisms as well as information transmission and storage. In the last application, it has been shown that the entropy formula is used to determine the 'root node' in the formation of the tree in the creation of the 'Decision Tree' from artificial learning areas. The applications have shown the functionality of Shannon entropy in information theory.

Keywords

Entropy, Information Theory, Information Gain

Performance of Thermoelectric Cooling System as an Alternative Transformer Cooling System

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Abstract

Distribution transformers are cooled by different cooling systems according to the places in which they are used, and they are named oil-type and dry-type transformers according to this cooling type. In the cooling of oil-type transformers naphtanic and paraffinic oils, namely paraffin (wax)-containing insulating materials with high dielectric strength, called classical transformer oil, are used. Innovative approaches aiming to increase the degree of combustion and dielectric strength of these oils have been increasing in recent years. In these studies, higher quality oils such as ester-based oils have been used instead of conventional transformer oils, resulting in increased effects on the performance and life time of transformers. However, regardless of the characteristics of transformer oils, their features such as burning-explosive properties that cause environmental pollution and excess maintenance-repair costs create disadvantages in their use in transformer insulation. In this study conducted to eliminate such disadvantages, the oil-type transformers is cooled by using thermoelectric coolers, which are environmentally friendly and renewable energy sources. As a result of the study, it was determined that the thermoelectric cooling system provides 15-20% better cooling than naphtanic and ester based oil cooling types. It is considered that this will take place as a new technology and type in distribution transformer cooling systems.

Keywords

Oil-type transformers, Ester-based oils, Naphtanic-based oils, Thermoelectric cooler, TEC, Cooling systems.

Automatic Classification of Induction Motor Bearing Faults using Long-Short Term Memory Deep Neural Networks

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Abstract

The reasons for the preference of induction motors, which are widely used in the industry, are that they are affordable, durable and reliable. Bearing errors in the inner race, ball and outer race parts of induction motors are the most common errors. Therefore, it is very important to detect bearing faults at an early stage in order to increase the efficiency of operation of induction motors. In this study, using Case Western Reserve University (CWRU) bearing dataset, bi-directional long-short-term memory type (Bi-LSTM) deep neural networks are proposed for automatic classification of faults in the inner race, outer race and ball regions of induction motor bearings on vibration data. In the study, the performance of the proposed Bi-LSTM network is evaluated as a result of feature extraction using instantaneous frequency and spectral entropy, by dividing the vibration data of normal bearing and faulty bearing into windows of different sizes such as 128, 256, 512 and 1024. In the study, the accuracy of the Bi-LSTM network for the test set with different window widths on the dataset created from normal and faulty bearing data is 80% on average, on the other hand, after feature extraction with instantaneous frequency and spectral entropy in the classification of normal and faulty bearing data, the accuracy of Bi-LSTM network is observed 99.28% accuracy, 99.72% sensitivity and 97.53% specificity scores. As a result, the proposed Bi-LSTM network is considered to be a powerful classifier for the separation of faulty and normal bearing vibration data.

Keywords

Induction motor, Bearing faults, Classification, Bi-directional long-short-term memory (Bi-LSTM)

Forecasting of Bitcoin Price Using LSTM Neural Network and ARIMA Time Series Models and Comparison of Methods

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Abstract

It is important to forecast the future value of financial assets for investors to protect their assets. Bitcoin, which introduced to our lives in 2008 and is a radical change in financial assets, has been attracted the attention of both old and new investors. However, by its nature, Bitcoin contains different parameters that determine its value compared to other financial assets, and traditional forecasting methods have difficulty in predicting future values with very volatile financial assets such as Bitcoin. In this study, multivariate LSTM neural network and classic ARIMA time series model to forecast the future value of Bitcoin have been developed. The prediction accuracy of the two models applied has been compared using error metrics, which are performance evaluation metrics. As a result of the experimental studies, the LSTM neural network model has been performed prediction performance with a low error rate for the near and far future, while the ARIMA time series model has been performed prediction performance with a low error rate for the near future prediction.

Keywords

Time Series Forecasting, Machine Learning, Bitcoin

Comparison of Maths-Based Metaheuristics for Grid-Based Path Planning

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Abstract

Path planning, one of the most important components of robot navigation, has been extensively studied by researchers in recent years and many different metaheuristic algorithms are used for this problem. In this study, the global path planning of a mobile robot in a grid-type environment is discussed and the effects of different maths-based metaheuristic algorithms for this problem are investigated. First, three different environments with grid type and different difficulty levels were designed. Then, the optimum paths of the robot in the environments were calculated by using different maths-based algorithms developed in recent years. Stochastic fractal search (SFS), arithmetic optimization algorithm (AOA) and sine cosine algorithm (SCA) were used as metaheuristic algorithms in the study. When the results were evaluated, it was observed that SFS algorithm has given better results than other algorithms in terms of shortest distance and obstacle avoidance.

Keywords

Path Planning, Metaheuristic, Maths-Based Algorithm, Optimization

Investigation of the Effect of Protective Gas Composition on Welding Quality in Mag Welding by Tensile Test

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Abstract

MAG (Metal Active Gas) welding method is widely used in joining structural steels. In this research, S355J2+N structural steel was welded with MAG welding method in the semi-automatic welding mechanism created for the welding process. In order to observe the effect of different shielding gas compositions and different welding speeds used during welding on the welding quality, a total of 27 welded parts were obtained by using 9 gas mixtures and 3 speed values. The samples obtained from the welded parts were examined by performing tensile tests. As a result of this study, it was observed that the tensile strength decreased as the amount of CO₂ increased while the O₂ was constant in the shielding gas, or as the amount of O₂ increased while the CO₂ was constant. It has been observed that the welding speed and therefore the number of passes also affect the tensile strength.

Keywords

Mag Welding, S355 Structural Steel, Shielding Gas Mixture, Automatic Welding

Power Analysis for Indoor Visible Light Communication Channels

Year 2021, Volume , Issue 32, 536 - 541, 31.12.2021

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Abstract

One of the most important alternative techniques for radio frequency communications is optical wireless communication technology. Due to the RF bandwidth limitation, the need for high speed wireless communication systems has been increasing in recent years. Due to the limitations of the RF system such as uncontrolled radiation, limited bandwidth, regulated frequency, and the increase in the number of mobile users, RF-based communication has faced a serious spectrum problem in recent years. Visible light communication (VLC) uses higher frequency bands in the visible light spectrum for the transmission medium. Considering the visible light spectrum due to its bandwidth advantage, VLC is advantageous as it offers high transmission speed and strong resistance to electromagnetic interference. In this respect, optical wireless communication is considered as a promising solution for new generation wireless communication systems. In this paper we investigate channel impulse response and power analysis of VLC systems over single-tap Line-of-sight (LOS) flatfading channels.

Keywords

Visible Light Communications, Optical Wireless Communication, Power Analysis

Determination of Some Chemical Changes in Frying Oils by Fourier Transform Infrared Spectrum

Year 2021, Volume , Issue 32, 542 - 547, 31.12.2021

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Abstract

The purpose of this study is to determine some chemical changes occurring in canola oil and anhydrous fat during deep frying process. For frying frozen potato samples, a factorial design was constructed by considering the oil type and the number of frying as factors. 11 different frying processes were carried out according to the experimental design. Frozen potato samples were fried in a domestic deep-fat electrical fryer for 4 minutes at 180°C without oil replenishment. Free fatty acid content, peroxide value and K232, K270 values were determined for all oil samples. Moreover, collection of Fourier-transform infrared (FTIR) spectra during frying process is also aimed in order to better characterize and classify frying oil samples. The data were analyzed by analysis of variance (ANOVA) and principal component analysis (PCA). ANOVA results showed that, oil type and number of frying have significant effects on peroxide number and conjugated diene and triene values of the samples. The PCA model with 3 PCs, $R^2 = 0.97$ revealed that there is a separation of the frying oil samples with respect to oil type. According to the data obtained, it is recommended to use canola oil in deep oil frying for maximum 7 times at 180 °C.

Keywords

deep frying, infrared spectra, frying oils.

Experimental Determination of Effective Parameters in Pallet Production from Recycling by Taguchi Method

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Mustafa SOYLAK Şevval ZÜMRÜT

<https://doi.org/10.31590/ejosat.1040763>

Abstract

In this study, it is aimed to determine what the most important factor will be during the use of waste sawdust from recycling in pallet production, which is used for load carrying purposes. The determination of the effective parameter for obtaining high strength in the manufacture of the chipboard material, which is one of the wood composites and formed within the scope of the study, was carried out by the Taguchi method. Among the 3 factors that are thought to be important to obtain the desired strength value, the one with the most important effect was determined using the Taguchi L8 test series. Within the scope of the study, the pressure during the production, the mixing ratio and the operation time were determined as factors worth examining. Experimental study was carried out by trying 2 different levels of these 3 parameters. The study was completed with 23=8 experiments with 3 parameters and 2 levels. As a result of the study, the most important factor in pallet production was determined by using chipboard shavings obtained from recycling. It has been concluded that none of the factors of pressure, mixing ratio and printing time have a more significant effect than the other and the desired strength value is obtained as a result of their joint effects.

Keywords

Taguchi, Pallet, Mechatronics, Furniture.

Forming The Sparse Generalized Offset Polynomial Curve by Prony Algorithm

Year 2021, Volume , Issue 32, 553 - 556, 31.12.2021

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Abstract

Technological advances in computer hardware have allowed scientists to greatly expand the size and complexity of the problems they tackle with scientific computing. Sparse polynomials are found in almost every computer application, and zero coefficient polynomials occur frequently in practical settings. In recent years, various algorithms have been designed for the interpolation of a sparse polynomial using a different term basis than the power basis. Prony's classical numerical technique in the 18th century was rediscovered by Ben-Or and Tiwari and adapted to the computer field nearly 200 years later. When we look at the situations where sparse polynomials are encountered in practical life, these include problems such as image sharpening and sound waves adjustment. While photo processing and making it close to the real thing have made great progress in recent years, digital images of landscapes such as forests, sunsets and rainbows can be synthesized with unprecedented realism. However, simulating the phenomena associated with the camera lens and sound waves still remains a challenging problem. In the work to be done, sparse generalized offset curves will be found by approaching the sparse polynomials used in the adjustment of lens blur, aberration and sound waves from a geometric perspective. This sparse generalized offset polynomial curve will be reconstructed using the values of the curve with the Prony algorithm. The relationship between the original sparse polynomial and the sparse generalized offset polynomial curve will be examined. Thus, by using these curves, computer aided geometric design and calculation methods will contribute to fine-tuning the camera lens and sound waves.

Keywords

Sparse Polynomials, Prony Algorithm, Sparse Generalized Offset Polynomial Curve

An Investigation of Cu²⁺ Removal by Using Different Types of Modified Starch

Year 2021, Volume , Issue 32, 557 - 561, 31.12.2021

Türkan BÖRKLÜ BUDAK

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Abstract

In this study, Cu²⁺ removal from the aqueous solution using different types of starch was examined by the batch method. The potato starch and corn starch which were modified in different ways were examined to determine the percent removal values of Cu²⁺ by various trials. The optimum conditions of the experimental procedure were investigated from 10 to 50 mg L⁻¹ as beginning concentration, 4 to 6 as pH, with 5-30 min. as shaking time. 0.15 g modified starch was added 50 mL study solution at room temperature during all different studies. The experimental results offered that thanks to the starch modification with water as an adsorbent, the percent removal values of potato starch 89.58% and corn starch 74.07% were found. Concentration, shaking time, and pH were detected with the optimum values as 20 mg L⁻¹, 20 min, and 6 respectively. Moreover, the obtained results were also evaluated according to the Freundlich adsorption isotherm and observed to be compatible with this curve.

Keywords

Corn starch, Potato starch, Freundlich adsorption isotherm, Removal, Copper

Determination of Some Probiotic Properties of Lactic Acid Bacteria Isolated From Different Food Products

Year 2021, Volume , Issue 32, 562 - 572, 31.12.2021

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Abstract

Lactic acid bacteria (LAB) are a group of commercially important organisms that play an important role in the fermentation process of hexose sugars into lactic acid and widely used in industrial applications and as probiotics since they were designated as “generally recognized as safe” organisms. In order to isolate lactic acid bacteria (LAB), different food samples were collected and 14 bacterial strains were purified from those samples. Gram staining, catalase test, methylene blue staining was used for morphologic identification, RAPD-PCR, and 16S rRNA gene sequencing methods were used for molecular identification. The isolates were characterized for antibiotic susceptibility, survival under pepsin, pancreatin, bile salts, low pH, bacteriocin production, and hemolytic activity. According to the 16s rRNA gene sequence analysis isolates were designated as *Lactobacillus sakei* MH1, *Lactococcus garvieae* MH3, *Enterococcus faecium* MH5, *Pediococcus acidilactici* MH10, *Pediococcus acidilactici* MH11, *Pediococcus acidilactici* MH12, *Pediococcus acidilactici* MH13. Disc diffusion test results show that all of the isolates were resistant to kanamycin, and most of resistant to gentamicin. MIC test results show that all of the isolates were resistant to streptomycin. No strains showed antimicrobial effect against indicator microorganisms according to the bacteriocin production test. All strains were able to survive in pancreatin and different bile salt (%0.3, %0.5, %1) concentrations. According to these results, our isolates are probiotic potential candidates for the application in the food and pharmaceutical industries, however, isolates should be screened for further probiotic selection criteria.

Keywords

Lactic Acid Bacteria, Probiotic, Antibiotic Susceptibility

Evaluation of Mechanical and Water Absorption Behaviours of Corn Shell/Pumice Reinforced Epoxy Composites

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Menderes KOYUNCU

<https://doi.org/10.31590/ejosat.1042310>

Abstract

Bu çalışmada, Mısır kabuğu takviyeli-pomza tozu doldurulmuş epoksi resin matrisli kompozit malzemeler üretilmiştir. Bu malzemelerin Çekme, Eğme ve su emme direnci Ölçülmüştür. Bu amaç doğrultusunda matris elemanı olarak epoksi, takviye elemanı olarak mısır kabuğu kullanılarak elle yatırma yöntemi ile kompozit malzemeler üretilmiştir. Çalışma kapsamında ayrıca dolgu maddesi olarak 250 mesh altında ağırlıkça farklı yüzde oranlarda pomza tozu kullanılarak kompozit numuneleri de yapılmıştır. Üretilen kompozitlerde pomza tozu eklenmeden ve pomza tozunun eklenmesiyle çekme, eğme ve su emme özellikleri üzerindeki etkisi değerlendirilmiştir. Elde edilen sonuçlara göre, ağırlıkça %20 ve %15 pomza tozu katkılı kompozitin çekme ve eğilme sonuçları sırasıyla, 11.745 ve 11.250MPa olarak bulunmuş ve mekanik özelliklerini iyileştirdiği görülmüştür. Ayrıca, Ağırlıkça %25 Pomza tozu dolgulu kompozit diğer pomza tozu katkılı kompozitlere göre daha az su emme özelliği göstermiştir.

Keywords

Pumice, Composite, Water resistance

The Effect of Biodiesel from Canola, Safflower and Waste Oils on Engine Performance and Exhaust Emissions

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Abstract

The use of energy and oil in the world is increasing day by day. For this reason, the increase in air pollution in parallel with energy use affects people's living standards negatively. 80% of the world's energy needs are met by fossil fuels such as oil, coal and natural gas. With the depletion of fossil fuels, increasing energy demands and strict emission norms, alternative fuels such as biodiesel are needed for engine applications that can reduce the gap between energy source and demand. Biodiesels are portable and biodegradable, renewable in nature. It is obtained from many natural raw material sources and there are approximately 300 products for biodiesel production. In this study, biodiesel obtained from biodiesel canola, safflower and waste oils was used. As a result of the experiments, as the biodiesel ratio in the mixture increased, it was observed that the specific fuel consumption increased by 6.47% and the brake thermal efficiency increased by 3.37% compared to diesel fuel. In the emission analysis results, it was found that carbon monoxide (CO) decreased by 18.23%, hydrocarbon (HC) by 4.43% and is 10.95% compared to the amount of engine load in relation to the biodiesel in the mixture, however nitrogen oxide (NOx)) showed a stable structure by increasing 54.17% and carbon dioxide (CO2) by 26.92% according to the amount of engine load.

Keywords

biodiesel, waste oil, diesel engine, exhaust emissions

Biodiesel from Sesame Oil in Diesel Engine Effect on Performance and Exhaust Emissions

Year 2021, Volume , Issue 32, 583 - 587, 31.12.2021

Süleyman ŞİMŞEK İlker GÖKÇE

<https://doi.org/10.31590/ejosat.1045572>

Abstract

Today, the increasing population, the depletion of fossil fuel reserves as a result of increasing consumption of fossil fuel-derived products, and the pollutant emissions and greenhouse gas effect that cause environmental pollution caused by the use of fossil fuels negatively affect living spaces and at the same time cause global warming. Due to these emerging situations, the search for renewable, more environmentally friendly alternative fuels has accelerated in order to prioritize a more livable environment and living life. In this study, the usability of biodiesel obtained from sesame oil as an alternative fuel in a single-cylinder diesel engine was investigated. These biodiesels obtained from SY10 (10% Sesame Oil + 90% Diesel) and SY20 (20% Sesame Oil + 80% Diesel) are produced in a fixed speed, air-cooled, four-stroke, single-cylinder, direct injection diesel engine. Between 500 – 3000 rpm. Different load tests were carried out. During the test, CO, HC, CO₂, NO_x and special fuel consumption values were measured instantly. These measured values were examined and it can be said that SY20 biodiesel has less fuel consumption as the CO, HC, CO₂, NO_x parameters increase as the biodiesel ratio increases and the specific fuel consumption is 2500 rpm.

Keywords

Sesame Oil, Biodiesel, Diesel Engine, Exhaust Emissions

Etiological Investigation of Paralysis and Mortality in Free-Ranging Chicken, Turkey and Duck Chicks

Year 2021, Volume , Issue 32, 588 - 594, 31.12.2021

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ÇELİK Aydın GÜREL Özge ERDOĞAN BAMAÇ Nuri TURAN Özge AYDIN Hüseyin
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<https://doi.org/10.31590/ejosat.1045575>

Abstract

In this study, the etiology of paralysis, nervous system disorders and deaths in chicken, duck and turkey chicks in a free-range poultry family enterprise was investigated. In the history of the disease, it has been reported that the neurological signs seen in the animals started on the 11th to 12th days after the chicks came to the farm, and deaths occurred on the 2nd to 3rd days. In order to determine the causes of death and for the etiological examination, 6 chickens, 12 ducks and 21 turkeys, which were paralyzed and near death situation, and feed samples were sent to our institution for investigation. Necropsies were performed on a total of 6 animals, one from each paralyzed and one dead animal from each animal group, and samples were taken from the feeds used. According to clinical symptoms and necropsy findings, poisoning, malnutrition and New Castle (ND) disease were suspected. Sampled kidney, liver, intestine, brain, lung and heart tissues were examined histopathologically and virologically, by RT-PCR. Atomic absorption spectrophotometer were used for feed analyzes. The amounts of copper (Cu), zinc (Zn), iron (Fe), lead (Pb), cadmium (Cd), manganese (Mn) and selenium (Se) were investigated in the feed samples. Conclusion; Viral RNA of New Castle disease virus (NDV) Avian Paramyxovirus Type-1 could not be detected by RT-PCR. In the histopathological examination, no traces of disease due to infectious agents were found and it was determined that there was destruction and degeneration in the muscle and nerve tissue and necrosis in the brain tissue. In the results of atomic absorption spectrophotometer, it has been determined that the amount of selenium is far below the required value, and the metal amounts that can cause accumulation poisoning by passing through food to humans and animals are at acceptable values. According to all the findings, it was concluded that the disease possibly related to the nutrition due to insufficiency of Se and vitamin E. It was decided to add selenium and vitamin E to the diets of animals and prescribed. From the 3rd day of the diet change, the sick animals started to heal and from the 7th day full recovery was observed.

Keywords

Chick, Etiology, Paralyse, Death, Fee-Range, Selenium.

The Effect of Biodiesel Obtained from Poppy Seed Oil on Engine Parameters

Year 2021, Volume , Issue 32, 595 - 601, 31.12.2021

Süleyman ŞİMŞEK Alper AYDIN Hatice ŞİMŞEK

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Abstract

Due to the environmental effects of fossil fuels and the damage they cause to global warming, the shortness of their reserves in the world, has accelerated the search for alternative fuels in the world. Since 85-90% of the energy resources in our country are imported from other countries, the search for alternative fuels is more important for us. For this reason, the countries of the world and especially our country have turned to the search for renewable energy sources that are less harmful to the environment and have a longer useful life. In this study, we tested the results and emission values on the engine by mixing poppy oil, which is widely produced in our country and which we think can adapt better when mixed with diesel fuel due to its chemical properties, with diesel fuel. We compared the results found with each other. We put forward the benefits and harms of the result of our study. In specific fuel consumption, 34.95% reduction in NOx emission, 31.02% decrease, 23.62% decrease in CO emission, 26.09% increase in CO2 emission and 39.57% decrease in HC emission were determined.

Keywords

biodiesel, poppy oil, exhaust emmissions, engine performance

CabApp: Design Your Journey Correctly

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Abstract

Public transportation is an option preferred frequently in terms of benefits such as fare and duration of journey. It also offers better comfort and lower risk of contagion, in contrast to alternatives. On the other hand, variety and amount of issues with cab journey is on the rise with widespread use of novel electronic services for taxi journey services in Turkey. Taking these issues into account, it can be considered that expectations of passengers for a journey and journey results might end up on two extremes. In this study, a mobile application software has been designed and implemented for passengers to plan their journeys prior to journey. The application is capable of computing alternative routes with a number of stop-and-go locations (i.e., intermediate nodes between starting location and destination) and related journey indicators (fare, distance, duration) and allows users to display them effectively. To be able to compute a very close and accurate estimate to actual journey fare, the application computes an estimated waiting time for each route depending on data provided by Google's Directions API such as current traffic flow and average journey time on a route. Thereby, users can grasp a close estimate of total journey time and fare of a route. The application implements the first phase of Generic Taxi Journey Model and therefore aims to reduce cab journey issues due to differences between passengers' journey expectations and results of journey.

Keywords

Intelligent Transportation Systems, Journey Planning, Taxi Complaints, Location based services, taxi

Investigation of Structural and Magnetic Properties of the FeCoNi Nanocrystalline Powder Alloys

Year 2021, Volume , Issue 32, 616 - 621, 31.12.2021

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<https://doi.org/10.31590/ejosat.1048336>

Abstract

In this study, (FeCo)90Ni10, (FeCo)70Ni30 ve (FeCo)50Ni50 (% wt.) nanocrystalline powder alloys are produced by mechanical alloying, where milling duration set for 5 h. The structural and morphological properties of the as-produced alloys are performed using X-ray diffraction (XRD) and scanning electron microscopy/energy dispersive spectroscopy (SEM/EDS). As a results of the XRD analysis of the alloys, fcc and bcc phases were determined. After 5 h of milling durations the crystallite sizes lattice strain of the (FeCo)90Ni10, (FeCo)70Ni30 ve (FeCo)50Ni50 alloys are calculated as 24.7, 23.2 ve 16.5 nm and 0.308 %, 0.404 % ve 0.563 %, respectively. Vibrating Sample Magnetometer (VSM) results show that the samples have soft magnetic properties with low coercivity and relatively high saturation magnetization. The high saturation magnetization of 127 emu/g and low coercivity of 18 Oe of the (FeCo)70Ni30 nanocrystalline alloy show that the alloy is a good candidate for applications that require soft magnetic properties, especially for power generation, distribution, and conversion.

Keywords

FeCoNi, Mechanical Alloying, Nanocrystalline, Magnetic Properties.

Investigation of TIG Welding of AISI 304 Stainless Steel for Food Tanker

Year 2021, Volume , Issue 32, 622 - 626, 31.12.2021

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Abstract

In this study, the joints of food tankers made of AISI 304 stainless steel used on highways were applied on both sides by Tungsten Inert Gas welding method using AISI 316LSi additive metal. The microstructure of the welded joint was investigated by optical microscope and scanning electron microscope. The microstructure of the weld zone consists of austenite and delta ferrite phases. Possible discontinuities in the welded joint were examined by liquid penetrant test and radiographic examination. Hardness and tensile tests were carried out for mechanical tests. The hardness values taken from the base metal, heat affected area and weld zone were measured at approximately 200 HV, the hardness of these three zones was obtained close to one. The tensile strength of the welded joint was determined as 580 MPa. Therefore, it has been seen that the selected welding parameters are optimal by microstructure investigations, non-destructive examinations and mechanical tests.

Keywords

TIG welding, welding parameters, penetration, austenitic stainless steel

A Deep Learning-Based Approach for Detection of COVID-19 from X-Ray Images

Year 2021, Volume , Issue 32, 627 - 632, 31.12.2021

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Abstract

COVID-19 is a disease caused by the SARS-CoV-2 virus. Early detection and diagnosis of COVID-19 play an important role in controlling the spread of the disease. Reverse transcription-polymerase chain reaction (RT-PCR) is frequently used in the diagnosis of coronavirus. However, tests cannot give accurate results at every stage of the disease. The time taken for test results facilitates the spread of the disease. Medical radiological imaging methods such as X-ray (X-Ray) and Computed Tomography (CT) are used to diagnose COVID-19 in the early stages, which are less contact-dependent and can provide faster results. The use of deep learning approaches in disease detection through radiological images very popular in recent years. In this study, a deep learning-based approach was used for rapid and accurate diagnosis of COVID-19 from lung radiological images. The performance of the approach was examined on an open-source COVID-19 dataset.

Keywords

COVID-19, Deep Learning, Convolutional Neural Network(CNN), Chest X-Rays

Investigating the Safety Perception and Adoption of Autonomous Vehicle

Year 2021, Volume , Issue 32, 633 - 639, 31.12.2021

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<https://doi.org/10.31590/ejosat.1039725>

Abstract

With the advancement of technology, transportation systems have started to transform the way of digitalization. Level 3 autonomous vehicle having the capability of environmental detection will nearly be available for all vehicles soon. Level 5 self-driving vehicles will probably be commercialized within 10 years, and these vehicles are expected to enhance the sustainable urban mobility and decrease the traffic crashes caused by human error. However, new technology may bring some safety and security issues. In this regard, adoption of autonomous vehicle will be of decisive importance. This study examines the factors affecting the adoption of autonomous vehicle, and safety and security perceptions towards those vehicles. The findings of this study will be conducive for decision-makers and policy-makers.

Keywords

Autonomous vehicle, Adoption of technology, Safety Concern, Crash

Encapsulation Techniques and Controlled Release

Year 2021, Volume , Issue 32, 640 - 648, 31.12.2021

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<https://doi.org/10.31590/ejosat.1039736>

Abstract

Encapsulation is the protection of at least one active ingredient by at least one kind of coating material, provided that it is released under appropriate conditions and at the desired dose. The used material must be biocompatible and biodegradable, as well as ensuring the stability of the active ingredient. Controlled release systems have numerous advantages; such as, enhanced efficacy, high stability against enzymatic etc. degradation of encapsulated or immobilized components, reduced toxicity, and easy application. The release systems can be in different forms such as sphere, capsule, rod, membrane, slab, etc. Its dimensions, on the other hand, can be of different sizes due to the purpose of use; it can vary between nano, micro or milli levels. These forms, which are generally called micro- and nanoparticles; can be carriers of active ingredients such as drugs, vitamins, minerals, volatile aromatic compounds and various nutritional supplements called nutraceuticals. The main goal in encapsulation is the preservation of sensitive components and their release over time to a set extent. There are different techniques commonly used for the encapsulation of active substances into micro or nanoparticles. These are the techniques; thermal phase separation (coacervation), spray cooling and freezing, melt dispersion, solvent evaporation, fluidized bed coating, spray drying, homogenization of water and organic phases, rotary suspension separation, extrusion and inclusion complex, etc. The aim of this review is to give general information about the controlled release of active ingredients with different encapsulation techniques.

Keywords

Controlled release, Encapsulation, Active substance

Online Turkish Handwriting Recognition Using Synthetic Data

Year 2021, Volume , Issue 32, 649 - 656, 31.12.2021

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Abstract

We present a recognition system for online Turkish handwriting trained with synthetically generated data and transfer learning. Training deep networks requires large amounts of data. However, a sufficiently large collection of Turkish handwriting samples is not available. Hence we synthesize data to do pretraining before adapting the system to target dataset by fine tuning. We generate words from isolated character collection of a large English handwriting dataset. Then, we train the system first with synthetic data and fine tune it with Turkish handwriting samples from a smaller dataset. Fine tuning increases the character recognition rate of the final system which is evaluated on 2,041 samples of isolated Turkish words from the initial value of 61% to 88%. Performance of the system on synthetic data is quite similar to that on the Turkish test data which shows that the synthetic data resembles the real data quite closely. According to these results, synthetic data generation can be a solution to the data scarcity problem of online Turkish handwriting.

Keywords

Turkish Handwriting Recognition, Online Handwriting Recognition, Deep Learning, Synthetic Data Generation, Transfer Learning.

Electrochemical Synthesis Of Indium Oxide Nanostructures And Design Of Indium Oxide/Cadmium Sulfide Quantum Dot Sensitized Solar Cells

Year 2021, Volume , Issue 32, 657 - 662, 31.12.2021

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<https://doi.org/10.31590/ejosat.1040289>

Abstract

The exploration for alternative energy sources in order to meet the increasing energy need in the world with the rapidly developing technology has increased the interest especially in solar cells in recent years. This study reports the synthesis of indium oxide (In_2O_3) based photoanodes decorated with cadmium sulfide (CdS) quantum dots to be used for the first time in the literature in quantum dot sensitized solar cells with high conversion efficiency. The X-ray photoelectron spectroscopy, X-ray powder diffraction spectroscopy, Energy dispersive X-ray spectroscopy, Scanning electron microscopy and photocurrent density measurements were used for the structural, morphological and photoelectrochemical characterization of the synthesized material. Quantum dot sensitized solar cells were designed using the characterized photoanodes and the basic quality parameters, the filling factor, and the conversion efficiency were calculated with the photocurrent density-voltage curves. As a result of the measurements, it has been determined that the designed solar cells have a filling factor of 0.324 and a conversion efficiency of 0.22%.

Keywords

Indium oxide, Electrochemical synthesis, Quantum dot sensitized solar cells

A Review of Three Phase AC-DC Power Factor Correction Converters for Electric Vehicle Fast Charging

Year 2021, Volume , Issue 32, 663 - 669, 31.12.2021

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<https://doi.org/10.31590/ejosat.1041081>

Abstract

Electric vehicle charging station for fast DC charging performs AC-DC conversion at off-board. In recent years, three-phase AC-DC power factor correction (PFC) converters are dealt with fast charger. These converters are developed using unidirectional and bidirectional power flow structure. In this study, three-phase AC-DC PFC converter topologies, providing bidirectional power flow, are evaluated in terms of performance. The aim is to present the latest technology of bidirectional multilevel AC-DC PFC converters for EV fast charging. This paper provides a comprehensive and practical review for researchers interested in fast charging infrastructure for electric vehicles.

Keywords

Improved power quality, AC-DC converters, Power factor correction, Three-phase AC-DC converters, Fast charging infrastructure

Evaluation of the Antimicrobial Activity of Punicalagin Alone and in Combination with Colistin Against Colistin-Resistant *Acinetobacter baumannii* Strains

Year 2021, Volume , Issue 32, 670 - 674, 31.12.2021

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<https://doi.org/10.31590/ejosat.1041147>

Abstract

The aim of this study was to evaluate the antimicrobial activity of punicalagin alone and in combination with colistin on colistin-resistant *A. baumannii* strains. Five colistin-resistant *A. baumannii* strains were used to be tested in the study. Broth microdilution test was performed to evaluate the antimicrobial activities of punicalagin and colistin against strains and Minimum Inhibition Concentrations (MIC) were determined. Combination activities of these two agents were evaluated with the Checkerboard Synergy Test. According to the results of the broth microdilution test, the MIC value of punicalagin against all strains was 256 µg/ml, the MIC values of colistin were found to be 32 µg/ml on two strains and 8 µg/ml on the other three strains. The Fractional Inhibitory Concentration Index (FICI) was calculated to determine combination interactions with the Checkerboard synergy test. Accordingly, the FICI values of the combination of colistin and punicalagin were found as 1.12 for two strains, 1.03 for the other three strains. In conclusion, punicalagin showed antimicrobial activity on colistin-resistant *A. baumannii* strains. It was determined that the combination with colistin had an indifferent effect on all tested strains. No synergistic effects were observed on any of the strains. In addition, no antagonistic effects were detected.

Keywords

Acinetobacter baumannii, colistin, punicalagin, indifferent effect

A New Image Enhancement Method Based on Segmentation

Year 2021, Volume , Issue 32, 975 - 981, 31.12.2021

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Abstract

The histogram equalization method is the fundamental image processing method used to adjust the contrast and brightness in the image. However, histogram equalization can cause negative effects such as excessive enhancement, artifacts, saturation, and loss of details in images. In this paper, a segmentation-based new image enhancement method is proposed. With this proposed method, more effective enhancement is obtained by preventing the negative effects of the histogram equalization method on images. In the proposed method, the object regions in the image are segmented with active contour-based methods, and histogram equalization is applied to these regions. Enhanced objects obtained later are added to their region in the input image. With this proposed method, more effective enhancement is achieved by preventing the negative effects of the histogram equalization method on images. In addition, the success of the existing methods is examined by combining the segmentation method with histogram stretching and bi-histogram equalization methods. The entropy value of the images, the absolute average luminance error (AMBE), and the Peak-Signal-Noise-Ratio (PSNR) metrics are used in the performance comparison. The obtained results are presented both visually and numerically. The proposed method is compared with the histogram equalization-based methods, and the success of the proposed method is revealed.

Keywords

Image enhancement, Image segmentation, Active contour method, Histogram equalization.

Designing An Information Framework For Semantic Search

Year 2021, Volume , Issue 32, 682 - 689, 31.12.2021

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Abstract

New generation information retrieval procedures provide complex tools to remodel the design of search engines. Even though semantic analysis is gradually adopted by corporations, complex behavior of knowledge behind the information entails subsequent data learning models. Text models are currently in use through lexical features. Search engines with lexical methods lack contextual and semantic information. This barrier has been overcome with the development of deep learning methods. More accurate results can be retrieved by obtaining contextual information of different types of content such as text, image, video with neural models. In this study, a broad perspective of search engines was considered through lexical and semantic features. Semantic search methods were experimented then compared with lexical methods in data sets consisting of scientific documents. Since scientific documents are relatively well-formatted datasets and do not contain irrelevant content, the focus was on comparing semantic search methods and neural models throughout the study, without dealing with out-of-context data and semantic conflicts. As a result, semantic search methods performed better than lexical search. We conclude that current search-retrieval tasks require new perspectives in semantics where multimodal information is handled with deep learning strategies.

Keywords

Information retrieval, Semantic search, Deep learning, Re-ranking, Dense retrieval

EduFERA: A Real-Time Student Facial Emotion Recognition Approach

Year 2021, Volume , Issue 32, 690 - 695, 31.12.2021

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MOHAMMED, Burcu YILMAZEL

<https://doi.org/10.31590/ejosat.1039184>

Abstract

The use of video conferencing tools in education has increased dramatically in recent years. Especially after the COVID-19 outbreak, many classes have been moved to online platforms due to social distancing precautions. While this trend eliminates physical dependencies in education and provides a continuous educational environment, it also creates some problems in the long term. Primarily, many instructors and students have reported issues concerning the lack of emotional interaction between participants. During in-place education, the speaker receives immediate emotional feedback through the expressions of the audience. However, it is not possible to fully utilize this valuable feedback in online lectures since current tools can only display a limited number of faces on the screen at a time. In order to alleviate this problem and promote the online education experience one step closer to in-place education, this study presents EduFERA that provides a real-time emotional assessment of students based on their facial expressions during video conferencing. Empirically, several state-of-the-art techniques have been employed for face recognition and facial emotion assessment. The resulting optimal model has been deployed as a Flask Web API with a user-friendly ReactJS frontend, which can be integrated as an extension to current online lecturing systems.

Keywords

Computer vision, Affective computing, Facial emotion recognition, Video conferencing, Online education

A Genetic Algorithm-Based Model for Inventory Control in Intermittent Demands

Year 2021, Volume , Issue 32, 696 - 701, 31.12.2021

Ferhat YUNA Burak ERKAYMAN

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Abstract

Demand forecasting is a difficult field of study for intermittent demands. Spare parts demand structures also have an intermittent demand structure. Therefore, for companies operating in this field, this situation causes various problems (holding cost or cost of lost sale). Intermittent demands are inherently difficult to predict. Demands with a smooth structure provide a more suitable working environment for businesses. Because the more accurately the relevant demand is forecasted, the more smoothly the works that depend on demand forecasting are carried on. In this study, a randomly generated demand series with intermittent demand structure is examined. The estimation difficulty of intermittent demand is illustrated by an estimation made in Matlab. In order to avoid this difficulty, the costs were tried to be minimized by determining the inventory levels. An inventory model is proposed that determines stock levels using intermittent demands and calculates average profit by calculating costs. The related model was solved with Genetic Algorithm in Matlab and the results were recorded.

Keywords

Genetic Algorithm, Intermittent Demand, Inventory Control, Optimization

Analysis of the Biomechanical Behavior of the Intervertebral Discs by Modeling Three-Phase Finite Elements

Year 2021, Volume , Issue 32, 702 - 704, 31.12.2021

Filiz KARABUDAK Hamid ZAMANLOU

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Abstract

Intervertebral discs act as a shock absorber to counteract the blows to the spine. These elements have the ability to deform when applied pressure, thus reducing the intensity of impacts. The main shape of discs is spherical when not under pressure; but when they are placed between the vertebrae, they expand under the pressure. One of the important functions of intervertebral discs is to facilitate movements in the spine. In order to study biological mechanics as one of the engineering infrastructures, in this paper, the combined modeling of finite element intervertebral discs as a saturated porous soft tissue is discussed. First, according to the continuum mechanics, the mathematical model is extracted and then the finite element model is prepared by ANSYS program package. Based on the different loads according to the available medical information, the biomechanical behavior of the disk was investigated. This model can be used to investigate the behavior of intervertebral discs in patients before or after surgery. In this paper, in addition to the mathematical model, the mechanical behavior of the disk and the stress distribution under different loads were investigated.

Keywords

Intervertebral Discs, Finite Elements Methods, Stress Distribution

Multi-Sensor Data Fusion for Path Prediction of Escaping from Engagement in Unmanned Aerial Vehicle Scenario

Year 2021, Volume , Issue 32, 705 - 710, 31.12.2021

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<https://doi.org/10.31590/ejosat.1039358>

Abstract

Achieving air superiority is one of the key steps to success in warfare. It is necessary for a combat aircraft to have the survivability it needs in an aggressive combat environment. Unmanned aerial vehicles (UAVs) suffer from maintaining the maneuverability and navigational ability in the event of a disconnection from the control station. In this paper, an escape path prediction algorithm developed by fusing multi-sensor data is presented to facilitate the escape of engagement of UAVs. Data from radars are evaluated in the Extended Kalman Filter and used to make estimations. The estimations made are used in constraint optimization to generate an instantaneous optimal escape route. Since the constraints and objective function are not linear, nonlinear programming is used as a method of constraint optimization. According to the simulation results, the proposed method shows a promising result for escaping from engagement in the selected scenario.

Keywords

Unmanned Aerial Vehicle, Extended Kalman Filter, Nonlinear Programming, Sensor Fusion, Data Fusion, Engagement, Path Prediction

Determination of pKa Value of Piroxicam by High Performance Liquid Chromatography

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Abstract

In this study, acid ionization constants (pKa) of piroxicam, a nonsteroidal anti-inflammatory drug, in different acetonitrile-water binary mixtures and water were determined by reverse phase liquid chromatography method. SVEA C18 (5 μ m, 150 mm x 4.6 mm) HPLC analysis column and different ratios of acetonitrile-water (30%, 35%, and 40% (v/v)) binary mixtures with different pH values (3.13-6.18) were used to investigate the combined effect of pH of the mobile phase and percentage of solvent on the chromatographic behavior of piroxicam. Acidic ionization constants were estimated using a nonlinear regression model. The pKa value of piroxicam in water was calculated by the mole fraction- pKa method. The data were compared with values obtained by different techniques in the literature and were found to be compatible.

Keywords

pka, Piroxicam, High Performance Liquid Chromatography

Resonance Frequency Determination of Quarter Circular Slotted Microstrip Patch Antenna using Artificial Neural Networks

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Abstract

Since there are no analytical models that can directly calculate the operating frequency in the newly developed microstrip antenna geometries, artificial neural network (ANN) models based on the multilayer network structure are widely used to obtain the operation frequency. A multilayer ANN model is developed to determine the resonance frequency of a quarter-circular slotted microstrip antenna for various input data (antenna parameters). These data are varied to obtain the resonance frequency of the antenna in the range of 1.475-2.45 GHz. 120 different antenna data obtained by the ANSYS HFSS simulation program are used in the training and testing processes of the ANN model. The resonance frequency of the antenna is determined using the created ANN model for various parameters of the antenna. When the simulation and test results are compared, a mean error value for 40 test data is 0.34% is obtained. The results show that the multilayer network structure can be successfully used to determine the resonance frequency. The ANN model is created using MATLAB software to construct classifier performance algorithms.

Keywords

Resonance Frequency, Artificial Neural Networks, Microstrip Antenna, Antenna Design

Ag NPs-SnO₂/Reduced Graphene Oxide Paper: Production of Flexible Electrode Material for Supercapacitor

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Abstract

In this study, tin (IV) oxide (SnO₂)/reduced graphene oxide (rGO) flexible paper electrode decorated with silver nanoparticles (Ag NPs) was produced, and supercapacitor (SC) performance of this material (Ag NPs-SnO₂/rGO) was investigated. For this purpose, SnO₂ synthesized by a simple hydrothermal method and GO were mixed and this prepared dispersion was vacuum filtered to obtain SnO₂/rGO flexible paper electrode. Then, Ag NPs-SnO₂/rGO flexible paper electrode was produced through electrochemical deposition of Ag NPs on the SnO₂/rGO flexible paper electrode surface. Characterization of the obtained material was performed using scanning electron microscopy, energy-dispersive X-ray spectroscopy, and X-ray diffraction techniques. The SC performance of the prepared flexible and free-standing Ag NPs-SnO₂/rGO paper electrode was investigated. The specific capacitance value of this flexible paper electrode was determined as 280 F g⁻¹ at 0.5 A g⁻¹. Additionally, the use of Ag NPs-SnO₂/rGO paper electrodes in flexible SC applications was studied. It was observed that there was only a 28% decrease in the initial specific capacitance value as a result of folding Ag NPs-SnO₂/rGO paper electrode at 180° inward 200 times.

Keywords

Reduced Graphene Oxide, Flexible Paper Electrode, Silver Nanoparticles.

Determination of Compressive Strength of Concretes Suitable for Automatic Production Technology by Machine Learning Method

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Abstract

Concrete is one of the most complex composites with mechanical properties among building materials. The most basic mechanical property of concrete is compressive strength. It is a very important goal to determine the compressive strength of concrete in reinforced concrete structures quickly, accurately, inexpensively and effortlessly. In this study, concrete compressive strength is estimated by image processing and machine learning methods, taking into account the mentioned purposes. In order to be able to apply the proposed method, 48 cube samples were prepared in accordance with automatic production technology. In the prepared concrete samples, 6 different concrete types were used in which fly ash and fiber variables were formed. The images obtained from the concrete samples were first prepared by going through the preprocessing steps. In the next step, the features of the concrete images were extracted using the Gray Level Co-occurrence Matrix (GLCM) method. Of the features obtained, 80% randomly selected were determined as training and the rest as test set. In the last step, by applying the K-Nearest Neighbor (KNN) algorithm, the changes in the materials used in the concrete and the differences in the concrete compressive strength and appearance were investigated. The proposed method was repeated 100 times and the average of the accuracy rates was taken. The results obtained showed a accuracy rate of 79.7% between the concrete images suitable for automatic production technology and the compressive strength. In this way, it has been revealed that the pressure strength estimations, which is one of the most important mechanical properties of concrete, can be made through images of structures suitable for automatic production technology, which increases its development day by day.

Keywords

Machine Learning, Image Processing, Mechanical Properties, 3D Concrete

Synchronization of the Chemically Coupled Izhikevich Neuron Model with the Lyapunov Control Method

Year 2021, Volume , Issue 32, 736 - 740, 31.12.2021

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Abstract

Although there are many studies on the electrically coupled Izhikevich neuron model in the literature, the study of the chemically coupled structure is limited. The synchronization of bidirectional chemically coupled Izhikevich neurons with the Lyapunov control method is discussed for the first time in this study. Standard deviation results are given to observe the effect of the coupling weight of the coupled neurons. With the Lyapunov controller applied to one of the coupled neurons, the control of whether the neurons are synchronized regardless of the coupling weight was also observed by means of standard deviation analysis. Finally, it has been shown that the system with the Lyapunov control method is fired synchronously regardless of the changes in the value of the synaptic coupling weight.

Keywords

Izhikevich Neuron Model, Chemically Coupling, Synchronization, Lyapunov Control Method.

Online Production Monitoring Systems Used in Production Lines in Apparel Industry

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Abstract

To maintain their competitiveness in international markets, the apparel manufacturers must produce and ship the products faster and at lower cost with higher quality. In this context, the increasing importance of the concept of efficiency, which comes to the forefront, has provided the necessary importance to be given to the measurement of productivity. It is seen that, in the productivity measurement of apparel manufacturing process, the manufacturers use "work study" and "time study" to determine work time and work numbers. In this study, the working principle of online production monitoring systems connected to the machine, which records the amount of work done by the operator for continuous measurement of performance, and the advantages of this system are explained through a sample system. The data of a bolero model with a soufflé collar, long sleeves and a shirring detail in the middle of the front, which has just entered production in an apparel company, were recorded with this online production monitoring system for 8 days. The operational and model-based efficiency values of the model and the non-productive time data during the production were presented and evaluated.

Keywords

Apparel, productivity, production monitoring, online production monitoring system

Relationships between Vp and Vs velocities in Metamorphic rocks

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Mahmut SARI

<https://doi.org/10.31590/ejosat.1040028>

Abstract

Determination of VP and VS wave velocities in engineering studies; it has an important place in determining the elastic parameters of soils, investigating the thickness of the cover layer, bedrock depth, and classifying the soils. Therefore, the correct estimation of the parameters constituting these studies is essential for reliability, time, and economy. In this study, empirical equations with high estimation capacity were obtained by simple regression analyses using Vp obtained by seismic refractive tomography (SRT) and Vs and obtained by multi-channel surface wave analysis (MASW) from geophysical measurements applied in the metamorphic rock mass. Accordingly, it evaluated the performance indexes of the equations produced by different researchers and the equations produced in this study in determining the Vp parameter. In the equations produced, the highest coefficient of determination value depending on the Vp and Vs wave velocity was calculated as $R^2=0.89$. When it evaluated the produced equations according to the performance indices, they had the optimal RMSE and VAF values than the empirical equations obtained by previous studies and had very high estimation capacities.

Keywords

Vp ve Vs wave velocity, Regression analysis, VAF, RMSE

Design and Manufacturing of a Novel 5-DOF FDM Printer Based on Parallel Kinematic Structure

Year 2021, Volume , Issue 32, 754 - 760, 31.12.2021

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<https://doi.org/10.31590/ejosat.1039979>

Abstract

In this study, the mathematical analysis and design of a new 3D printer with 5 degrees of freedom was carried out. Thanks to the developed system, a new concept has been brought to the multi-axis 3D printer mechanisms and thus, it is aimed to improve the part quality in additive manufacturing (AM) processes. First of all, the kinematic analysis of the system was obtained using vector algebra and the work space of the current printer was determined by considering the system constraints. Then, by giving detailed information about the mechanical and electrical components of the designed system, the working principle of the whole system is presented. According to the findings obtained in the studies, the kinematic analyzes performed for the proposed system proved to be correct and a new system was proposed especially for additive manufacturing technologies.

Keywords

Additive manufacturing, Parallel manipulator, Kinematics, Workspace

Hirshfeld Surface Analysis and Theoretical Calculations of the (E)-5-Phenyl-N-(2-thienylmethylene)-1,3,4-thiadiazole-2-amine

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Abstract

In a previously study, (E)-5-Phenyl-N-(2-thienylmethylene)-1,3,4-thiadiazole-2-amine, (C₁₃H₉N₃S₂), molecule had been synthesized and characterized by x-ray diffraction analysis (Demirtaş et al., 2009). In this current study, geometric parameters of the title compound were calculated by using DFT/B3LYP/6-311++G(d,p) basis set and the experimental (Demirtaş et al., 2009) values with the calculated geometric parameters were compared. The comparison between the theoretical calculations and experimental results revealed that the parameters obtained by DFT/B3LYP/6-311++G(d,p) were in good agreement with the experimental data. In addition to these studies, molecular electrostatic potential and frontier orbitals (HOMO-LUMO) analysis for the title compound were computed in the solvent media by using theoretical methods. Furthermore, Hirshfeld surface analysis were performed to determine intermolecular interactions.

Keywords

Hirshfeld Surface Analysis, Theoretical Calculations, Density Functional Theory

Evaluation of Gümüşhane Greek Boys' School in terms of Art History and Design

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Mahmut SARI

<https://doi.org/10.31590/ejosat.1039451>

Abstract

Gümüşhane came under Ottoman rule after conquering the Greek Empire of Trabzon in 1461, operating differently. It is seen that Greeks and Armenians, who played an active role in the Eastern Black Sea Region during World War I, built many public buildings in Trabzon and the surrounding provinces. Gümüşhane Greek Boys' School, popularly known as the 'Yellow School'; in the expanding Süleymaniye District, it has been used for many different purposes since its establishment and has largely preserved its silhouette. This study examined the Gümüşhane Greek Boys School in terms of architecture, art history, and design features, illuminated the unknown aspects of the building, challenged its sustainability, and emphasized the importance of transferring it to future generations. At a point that dominates the Old Gümüşhane; It has been determined that it was built in the usual rectangular plan type, in a symmetrical and simple order. In addition, with the field observations made on the ground and its surroundings, it was determined that the school's bottom had collapsed. Accordingly, it had to undergo various repairs over time. It should pay attention to preserving and restoring such qualified cultural assets and bringing them to the present day.

Keywords

Greek School, Art History, Architectural Design.

Reading the Relationship between Migration, Urban Renewal and Mobility through Researches

Year 2021, Volume , Issue 32, 776 - 790, 31.12.2021

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Abstract

It is possible to consider the urbanization of Turkey together with the history of migration. In other words, migration and population movements that develop along with it are important components of urbanization in Turkey. Population movements that started in the Anatolian geography since the proclamation of the Republic have been the basic dynamics of urbanization in Turkey under different influences. Therefore, every study of the city and urbanization must inevitably include migration and the social and spatial effects that develop along with it. At this point, the phenomenon of slum in terms of spatial processes, and a classed social structure in terms of social processes come before us as the main study subjects. Both, on the basis of the socio-economic expansions they contain, make it important to understand the fragmented nature of urban life and the displacement movements within the urban system consisting of different layers. In other words, it makes it important to understand the conditions of mobility. At this point, spatial interventions that are inevitably determinant on these conditions become important. This study focuses on migration and urban renewal practices that are restructuring multi-layered urban structures in such an understanding process, and discusses the researches made since the emergence of these practices through articles. The study, which examines how the phenomenon of mobility is handled through electronic publications made between January 2000 and October 2021, questions the relationship between periodically changing urban interventions, the changing conditions of the social segments exposed to these interventions, and the new displacement movements that emerge in this context.

Keywords

Migration, Mobility, Urban Renewal, Concept Review

Treatment by Electrocoagulation of Congo red from Aqueous Solution Using Cantor Alloy

Year 2021, Volume , Issue 32, 791 - 796, 31.12.2021

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Abstract

Electrocoagulation (EC) is one of the most effective techniques in removing color and organic pollutants from wastewater. This study aims to use a new alloy system, so-called High Entropy Alloys (HEAs), which contains at least five principal elements with 5-35 at. %, as an electrode in the EC process. The well-studied equiatomic CrMnFeCoNi HEA (Cantor alloy) was used as an anode in the treatment of the synthetically prepared wastewater (congo red solution) with EC. In the EC study, COD and color removal were evaluated at different current densities (5-100 mA/cm²) for 15 min electrolysis period. The results showed that removal efficiency of above 80 % was obtained for both parameters of COD and color at the lowest current density of 5 mA/cm². The optimum current density was determined to be 10 mA/cm², and the COD and color removal efficiencies were found to be 84 and 99.4 %, respectively. It was shown that the Cantor alloy possesses an effective removal in the EC process.

Keywords

Electrocoagulation, congo red, high entropy alloy, cantor alloy, COD removal.

A fuzzy multi-criteria decision-making method for selection of criteria for an e-learning platform

Year 2021, Volume , Issue 32, 797 - 806, 31.12.2021

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<https://doi.org/10.31590/ejosat.1041281>

Abstract

Thanks to developing technology, one of the most significant changes in people's daily life routines have emerged in the education system. Due to developed software and hardware, people have begun to access, process, and share information regardless of time and place. Therefore, the internet-based teaching process, used alone or integrated with traditional education techniques, has brought many advantages and has become indispensable. Especially towards the end of 2019, the COVID-19 epidemic, which emerged in Wuhan, China, and spread worldwide, has again revealed that these systems have great importance for the future world. During the epidemic, traditional face-to-face education has been disrupted in many parts of the world, increasing online education. This situation has allowed increasing the number of studies on these systems. In particular, studies on the practical design of these systems are essential for the stakeholders of education systems. In this study, some significant criteria and sub-criteria are chosen based on literature and evaluated by using the fuzzy analytic hierarchy process.

Keywords

FAHP, Optimization, E-Learning, MCDM

Optimization of Delamination and Thrust Force in the Drilling Process of Nanocomposites

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Abstract

A new design optimization technique is presented to improve the analytical performance of the drilling process of graphene oxide nano-composites. A detailed study was conducted for modeling-design-optimization of the drilling process using multiple nonlinear neuro-regression analyses for this goal. The data were selected from a literature study for this objective. The accuracy of the predictions of the nine potential functional structures presented for modeling the data was tested using a hybrid neuro-regression-based technique. Model selections to determine the objective functions were made by controlling the R2 values, limit values, and statistical results, respectively. The selected models were used in the optimization studies of delamination and thrust force values with four different optimization algorithms. The results show that the R2training and R2 training-adjust values give good results in the nine models as objective functions. However, R2testing values and statistical calculations were distinctive among all models. Furthermore, when the optimization results of the third-order polynomial and logarithmic models for both responses were compared to the reference study's results, it was observed that the current results were more closer to the test results.

Keywords

Nano-composites, Drilling process, Neuro-regression modeling, Optimization

Comparative Analysis of Different Photovoltaic Simulation Software: Case Study on Analyzing the Performance of a 5,1 kWp Grid Connected Photovoltaic System

Year 2021, Volume , Issue 32, 816 - 826, 31.12.2021

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<https://doi.org/10.31590/ejosat.1040126>

Abstract

The high installation costs of photovoltaic (PV) systems are the most important obstacle in the spread of systems; that's why various studies are carried out on the optimization of PV systems today. Thus, PV systems can be optimized in terms of criteria such as inclination angle, PV module number, module type, module construction structure, and inverter. Different user-friendly software is used to design PV systems. Such software estimates energy production using climate data and provides economic data accordingly. However, the reliability of these data varies as the productivity of photovoltaic systems depends on climatic conditions. In this paper, it is aimed to evaluate the effectiveness of PV*SOL, PVsyst, RETScreen, and PVGIS software, widely used in the solar energy sector, under the climatic conditions of Kocaeli province. A 5,1kWp roof-top PV system installed on Kocaeli University Technology Faculty building is simulated with these programs to reveal which software is more successful in predicting real energy production data. According to comparison, PV*SOL and PVsyst are evaluated as the most reliable software since the yields obtained are the closest to the real energy values.

Keywords

Photovoltaic system, Simulation tool, Performance analysis, PV*SOL, PVsyst, RETScreen, PVGIS

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Humanoid Robots in Special Education

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Nihal ŞEN

<https://doi.org/10.31590/ejosat.1047564>

Abstract

Robots are becoming a useful part of the education ecosystem, with abilities ranging from the ability to perceive people and their environment to the ability to rationalize people's situations and emotions. Humanoid robots, with their humanoid appearance, add another dimension to their human-like body language and social signaling abilities, offering more natural and intuitive human-robot interaction in education. With the introduction of robots into our lives, especially humanoid social robots are frequently used in education. Humanoid robots, which offer many benefits at almost every level of education, have received increasing attention in the field of special education in recent years. The purpose of this article is to introduce the applications of humanoid robots in special education and to raise awareness about these applications. Based on a comprehensive literature review, this study, which includes humanoid robots that are frequently used in special education, also includes the details of researches in which these robots are used in the field of special education. The study shows that in recent years, a large number of humanoid robots have been used in the education of individuals with different disabilities, especially autism spectrum disorder, and this number is gradually increasing. It is expected that the information in this study will guide educators and researchers who plan to use robots in special education in the future.

Keywords

Humanoid robots, Educational robots, Robot-assisted teaching, Human-robot interaction, Special education

Evaluation of the manufacturing strategies of ready-mixed concrete companies from the perspective of environmental awareness and sustainable development

Year 2021, Volume , Issue 32, 843 - 849, 31.12.2021

Hamdi TEKİN

<https://doi.org/10.31590/ejosat.1045969>

Abstract

Climate change has become one of the most important problems of our time as a result of increasing environmental pollution and the global warming. A large part of the building stock in Turkey consists of reinforced concrete structures. Compared to other construction types, reinforced concrete structures cause serious damage to the environment and also increase energy consumption. Environmental pollution is felt even more in metropolitan cities such as Istanbul, where the construction and building density is very high. There are two options for solving this problem. These are to prefer more sustainable structures such as wood and steel instead of reinforced concrete structures or to manufacture reinforced concrete structures with more sustainable strategies. Both the problem of availability of qualified personnel and the high costs of raw materials and logistics limit widespread use of other building types. Therefore, in the short term, it is important for sustainable development to construct reinforced concrete structures in a way that they cause the least damage to the environment. This study aimed to evaluate the production strategies of ready-mixed concrete companies from the perspective of environmental awareness and sustainable development. Within the scope of the study, questionnaires were applied to ready-mixed concrete company officials in different cities. As a result, it has been observed that ready-mixed concrete companies do not adopt sustainable manufacturing strategies at desired level. In order to raise awareness and develop R&D studies, trainings should be given, incentives and sanctions should be applied and actions should be taken to create demand for sustainable products.

Keywords

Sustainable concrete, Ready-mixed concrete, Sustainable development, Environmental awareness

Comparative Investigation of Mechanical, Tribological and Thermo-Mechanical Properties of Commonly Used 3D Printing Materials

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Sinan YİLMAZ

<https://doi.org/10.31590/ejosat.1040085>

Abstract

In this study, it is aimed to comparatively examine tensile, thermomechanical, and adhesive wear properties of PLA (poly lactic acid), ABS (acrylonitrile butadiene styrene) and PETG (polyethylene terephthalate glycol) materials, which are the most widely used filament materials in 3D (three dimensional) printing technology. The printing process was carried out by considering the mostly preferred manufacturing parameters by the end users and the options offered by the slicing software by default. Mechanical tests were performed at three different temperatures, 25, 35 and 45 °C, according to the glass transition temperatures of the materials. Determination of tribological properties, both bottom and upper surfaces of the test samples were exposed to adhesive wear by using standard pin-on disc tester. During the tensile tests, it was observed that the most sensitive material in terms of the alteration of mechanical properties with temperature was PLA, and the most stable material was ABS. It was determined that there was a significant difference in wear volume for all tested materials, depending on whether the abraded surface was top or bottom. The variation of storage modulus values with temperature was also investigated by applying DMTA (Dynamic mechanic thermal analysis) tests to the samples.

Keywords

3D printing technology, Tribology, Mechanical properties, Thermo-mechanical properties.

Effect of Long Cycling Tracks on Cycling Behaviour in Turkey

Year 2021, Volume , Issue 32, 850 - 857, 31.12.2021

Seda CABIROĞLU Abdulkadir ÖZDEN

<https://doi.org/10.31590/ejosat.1042311>

Abstract

In recent years, we have adopted a more intense and complex lifestyle along with the increasing urban mobility and it has become necessary to find solutions to increasing traffic problems. The concept of micromobility, which is considered within the scope of sustainable transportation, has gained popularity in recent years and includes individual transportation vehicles such as bicycles and scooters, and pedestrian transportation. Furthermore, with the Covid-19 pandemic, the health impact of individual mobility comes to the fore, and it is seen that the relevant institutions provide temporary and permanent infrastructure services in this regard. This study was carried out with the aim of evaluating the perspectives of active cyclists in Turkey towards long cycling tracks and investigating the current situation, expectations, demands and complaints of users. In the results obtained, it was emphasized that the safety, ease of driving, quality of physical infrastructure and the tracks with less interaction with motor vehicles are preferred by people. At the same time, it has been observed that the majority of people who do not have bicycles or do not cycle regularly have a positive intention to the idea of cycling on safe tracks where physical infrastructure is sufficient. It has been stated that institutions do not follow an effective policy regarding sharing information about bicycle paths and tracks, and their cycling condition with users.

Keywords

Cycling, SustainableTransportation, Bicycle Tracks, Cycling Safety, Micromobility

EKF Based Model Predictive Torque Control of Induction Motors

Year 2021, Volume , Issue 32, 858 - 863, 31.12.2021

Yunus Emre ALTINIŞIK Rıdvan DEMİR

<https://doi.org/10.31590/ejosat.1041552>

Abstract

In this study, speed-sensorless model predictive torque control (MPTC) based induction motor (IM) drive that control performance is improved by estimating rotor resistance is presented. For this purpose, in addition to the speed and flux information required for high-performance speed control of MPTC, estimation of rotor resistance was realized by Extended Kalman filter (EKF) that uses the stator currents and voltages which are measured as inputs. The rotor resistance estimated by GKF is updated to the MPTC system at each sampling step, reducing the deteriorates caused by parameter changes. Designed EKF algorithm and MPTC based IM driver which used this algorithm is tested and confirmed in simulation environment over a wide speed range under challenging scenarios including load torque and rotor resistance variations. The obtained simulation results confirm that the GKF algorithm has high estimation performance, and accordingly the speed-sensorless MPTC-based ASM drive has high control performance.

Keywords

Model predictive control, Induction motors, Extended Kalman filter.

Analysing the Purchasing Decision-Making for a Recycled Materials Used Garment by Dematel Method

Year 2021, Volume , Issue 32, 864 - 871, 31.12.2021

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Abstract

Factors such as the change in technology, the unconscious use of resources, and the adoption of trends that trigger consumption have made the apparel industry one of the most resources consuming sectors. However, with the increasing awareness in the sector and consumers, concepts such as slow fashion, sustainable production, and recycled products have come to the forefront and the demand for these products has increased day by day. In this study, the factors affecting the purchase of textile products made from recycled materials were examined. For this purpose, 11 experts, working in the textile industry or academia with at least 1-4 years of experience were asked to comparatively evaluate the criteria that affect making the purchasing decision for a recycled materials used garment and the obtained data were analyzed with the DEMATEL method. In conclusion, it was determined that the highest impact in terms of prominence level was the Environmental Impact (C5), and the lowest impact was the Brand's Social Responsibility Projects (C3)

Keywords

Sustainability, recycling, apparel production, multi-criteria decision making, DEMATEL

Fluid-Solid Interaction of a Stenosed Y-Shaped Vessel with OpenFOAM

Year 2021, Volume , Issue 32, 872 - 877, 31.12.2021

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Abstract

In this study, a Y-shaped solid vessel model was created with the open-source Salome program, and fluid-structure interaction analysis was performed in a branch with stenosis. Computational fluid dynamics analyzes were performed by using OpenFOAM (foam-extend). Both Newtonian and Non-Newtonian flow models are used for the fluid. The velocity input is taken as a pulsatile cycle from the literature. As a result of the analysis, the wall shear stresses and wall deformation in the stenosed region were tried to be determined, and the effect of the stenosed region on the flow was explained.

Keywords

Stenose, Vessel, OpenFOAM

Parameter Analysis for Crow Search Algorithm

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Emine BAŞ

<https://doi.org/10.31590/ejosat.1039646>

Abstract

This paper introduces a new metaheuristic algorithm named Crow Search Algorithm (CSA) based on the intelligent behavior of crows. CSA is a population-based technique that works from this idea that crows store their excess food in their hiding places and retrieve it when needed. On the CSA method, the constant parameter fl creates significant differences between local and global search capabilities. In this study, five different fl values were determined and the effect of CSA on performance was investigated. CEC-C06-2019 serial functions developed in ten different recent years have been solved with CSA. Various results were obtained with CSA (mean, standard deviation, best and worst). The results obtained by CSA were compared with each other and with the results of various heuristic algorithms. The test results reveal that the use of CSA can lead to promising results compared to other algorithms.

Keywords

Crow Search Algorithm, Continuous optimization, CEC-C06-2019.

A Study on CNN Based Transfer Learning for Recognition of Flower Species

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Ferhat BOZKURT

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Abstract

The flower that is one of the plant organs, is essential element of the ecological order. Flowers have been used in many areas that are beneficial to humans. There exist about four hundred thousand varieties of flowers known today. It is a difficult task to distinguish flowers from each other due to their similarity in shape and color. Flower classification is a challenging problem due to the high variety of shapes, color distribution, lighting conditions and deformation of exposure. It becomes more difficult to distinguish flowers that are similar in color and shape to each other with the human eye for some images. It takes remarkable training for humans to correctly distinguish between particular species, and often very specific morphological features are the only thing that distinguishes closely related species. CNN models have been recently used by researchers in many classification problems to eliminate the need for manual features. In this study, CNN-based transfer learning methods are studied for recognition of flower species. Popular pretrained learning techniques which are VGG16, VGG19, SqueezeNet, DenseNet-121, DenseNet-201, and InceptionResNetV2 are conducted for classification of flower species. Their classification performances are compared on same flower dataset in experimental results. It was observed that the InceptionResNetV2 model gives superior results than other models in experiments. The highest accuracy (92.25%) is obtained with the InceptionResNetV2 model for flower dataset.

Keywords

Deep learning, Transfer learning, Convolutional neural network, Feature selection, Flower species

Computation of General Equipment Efficiency According to Different Machine Types in Polo Neck T-Shirt Production Line

Year 2021, Volume , Issue 32, 891 - 896, 31.12.2021

Mehmet KÜÇÜK Meral İŞLER

<https://doi.org/10.31590/ejosat.1039304>

Abstract

Due to today's developing technology and difficult market conditions, companies have to struggle to stand out in this ecosystem. This situation requires keeping up with technology, not staying behind the era, and using the machinery and equipment most efficiently. Using the machinery and equipment within the business most effectively and efficiently increases overall performance and reduces the businesses' costs. This situation can be succeeded possibly by monitoring "OEE (Overall Equipment Efficiency)". Based on this point, this study aims to determine the effect of the used sewing machines on the production line's efficiency and productivity by using the general equipment efficiency method. Availability, performance, quality, and OEE values were calculated on the basis of general evaluation and also on the machine-wise (lockstitch, overlock, automat, etc.). The results of the research showed that although the performance, quality and usability parameters gave good results, the overall equipment efficiency values remained below the World Class values.

Keywords

Efficiency, OEE, Apparel production, Polo t-shirt, General equipment efficiency

Sorption Behaviour of Inorganic Material Filled-PDMS Films in Ethanol, Butanol, Acetone and Water

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Abstract

The pervaporation method in which the transport mechanism through a nonporous membrane is explained by the solution-diffusion model can be used for the separation of water-organic and organic-organic mixtures. The sorption behaviour of a polymeric membrane plays important role in membrane transport, depending on the solvent and polymer properties. Since the membrane itself is the key component in the pervaporation method, as with all other membrane processes, it is necessary to determine suitable membrane material that can selectively separate at least one component from a liquid mixture. Ethanol, butanol and acetone are widely used in many industrial applications. PDMS is one of the polymers that is frequently used in the recovery of organics from organic-water mixtures or the separation of organic-organic mixtures. PDMS gives high chain mobility, low mechanical resistance and low selectivity values. For this reason, its properties need to be improved. In this study, unfilled PDMS, PDMS/TiO₂, PDMS/NaY and PDMS/5A mixed matrix films were prepared, and the sorption behaviours of prepared PDMS films in different chemical substances at temperatures of 30,40 and 50°C were investigated.

Keywords

Polydimethylsiloxane, Membrane, Mixed matrix, Sorption

The Factors Effecting Renewable Energy Generation in Turkey: Different Inducement and Blocking Mechanisms depending on Profit Motivation in Solar and Wind Energy

Year 2021, Volume , Issue 32, 901 - 916, 31.12.2021

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<https://doi.org/10.31590/ejosat.1045546>

Abstract

The rapid increase in energy demand and the relative inadequacy of energy resources to meet this increase brings sustainable energy production to the agenda. Most energy resources are imported, making it even more critical to expand domestic and renewable energy resources in electricity generation. Electricity generation technologies based on wind and solar energy, called emerging technologies, are less used than other types of renewable energy (such as hydroelectricity). For this reason, it is of great importance to identify and analyze the inducement and blocking factors for motivating the use of these resources in electricity generation. In this context, semi-structured interviews were conducted with 57 representatives from actors directly or indirectly related to renewable electricity generation in Turkey. In the study, 40 inducement factors and 40 blocking factors were determined by the open coding method. These factors are grouped under seven different headings: Economic, physical, institutional, psychological, technological, political and organizational. In the findings, it was observed that economic, institutional, political and organizational factors came to the fore. When the factors that prevent and support the diffusion of renewable energy technologies, compiled from the eyes of the relevant actors in the private and non-private sectors, are analyzed, it is determined that political factor, organizational factors and institutional factors are the main determinants for inducement and blocking mechanisms in the private sector. For the non-private sector, it was seen that primarily economic factors were the main determinants. Among the economic factors, the most prominent ones are cost-based and investment-based mechanisms. Cooperation and coordination mechanisms are the prominent institutional factors, and among the political and organizational factors, supports and incentives, existing infrastructure, and bureaucratic practices come to the fore.

Keywords

Renewable Energy Technologies, Inducement Factors, Blocking Factors, Turkey, profit motive, Renewable Energy Technologies, Inducement Factors, Blocking Factors, Turkey, profit motive

Comparison of Fiber and Analytical Methods for Construction of Biaxial Moment – Axial Load Interaction Diagrams for Reinforced Concrete Column Design

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Abstract

Columns in reinforced concrete structures are vertical load-bearing elements that allow the structure to stand under the influence of vertical loads such as the weight of the structure and lateral effects such as earthquakes. Columns are designed to withstand lateral forces as well as vertical axial loads in structures. The moment capacities of load-bearing elements vary with respect to the axial load level on them. For this reason, as in all modern building codes, this variability must be included, with the principles of moment - axial load interaction, in the design of load-carrying elements where the axial load cannot be ignored. Moment – axial load interaction diagrams are used to account for this variability in the design of columns. Analytical generation of interaction diagrams for columns is a fairly simple process as far as uniaxial moment is concerned. However, introducing this interaction under the effect of biaxial moment, as in reality, becomes complicated. The process of dividing a cross-section into slices/pieces along the depth, calculating the stress due to the unit deformation profile, as well as the resultant force with respect to the areas of these slices/pieces, and obtaining the resultant effect of the calculations acquired from these pieces, is called the cross-sectional analysis with fiber method. The moment capacities and interaction diagrams of structural members can be obtained by the analytical method as well as fiber analysis method. Analysis programs, which are frequently used in practice, use these methods for cross-sectional analysis and column designs. In this study, an algorithm for the analytical method is constructed in order to obtain the biaxial moment – axial load interaction diagram. Interaction diagrams, which are explained quite simply under uniaxial bending in the literature and other resources, with plenty of examples, become quite complex for design engineers in the biaxial case. Explanatory examples and a computer algorithm have been created for interaction diagrams, which are not often encountered for the biaxial situation. In the cross-sectional analysis, the fiber analysis method was used in the XTRACT program, while the analytical method was used in the created algorithm and the SAP2000 Section Designer module. Biaxial interaction diagrams obtained by performing cross-sectional analysis with a computer program based on the analytical method were compared with the results of the SAP2000 Section Designer module based on the same analytical method. The results of both analytical methods were compared with the results obtained with the help of the XTRACT program based on the fiber analysis method. From the comparison of the interaction diagram graphs, it was observed that the results obtained by the analytical method were on the safe side. It has been determined that the analytical method and the fiber method give similar results for the uniaxial case. However, in the fiber analysis method, it has been observed that more realistic results can be obtained in the case of biaxial moment effect, especially since the actual stress distribution on the concrete and the material behavior model can be taken into account.

Keywords

Reinforced Concrete, Column, Moment – Axial Load Interaction Diagram, Cross-Sectional Analysis, Cross-Sectional Analysis with Fiber Method

Comparison Of Reinforced Concrete Shear Wall And Friction Damper Retrofitting Alternatives For Reinforcement Of A Typical Reinforced Concrete Hospital Building

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<https://doi.org/10.31590/ejosat.1042760>

Abstract

Earthquake safety of existing structures is a phenomenon whose importance is increasing day by day. Although demolition and rebuilding of structures designed and built according to old and outdated codes is perceived as the first solution that comes to mind by the vast majority, retrofitting applications emerge as a more rational and reasonable option. There are many strengthening methods to improve the earthquake resistance of existing reinforced concrete buildings. The most classical and well-known method, at the same time the most time-consuming and long-lasting method for strengthening reinforced concrete structures, especially those with global strength and displacement problems, is the reinforcement by adding shear walls. Modern alternatives stand out in terms of both time and convenience in reinforcement applications in reinforced concrete buildings that have similar problems. The addition of friction dampers that provide passive behavior control in structures is one of these modern strengthening methods. Thanks to the energy absorption capacity of the friction dampers, the base shear forces that occur under earthquake excitations can be kept at a limited level and the non-linear inelastic deformation demands on the existing elements can be drastically reduced. In this study, the reinforcement of an existing hospital building with insufficient earthquake performance, which was designed and built according to the 1975 Turkish Earthquake Code, was evaluated by two different methods and the results obtained by nonlinear static pushover and dynamic analyses were evaluated. In the present study, addition of conventional reinforced concrete shear walls and modern friction damper were applied separately as reinforcement alternatives and their results were compared. Within the scope of this study, the earthquake performances of the current state of the structure, the shear wall-reinforced state and the friction dampers-reinforced state were determined and compared. According to the results, there were significant improvements in building top displacement demands, interstory drifts and element damage conditions with both methods. On the other hand, it was determined that the floor shear forces remained at lower levels in the reinforcement with friction dampers.

Keywords

Reinforced Concrete Structures, Retrofitting, Frictional Dampers, Nonlinear Pushover Analysis, Nonlinear Time History Analysis

As an Alternative Photocatalyst Under UV-A Irradiation for Food and Health Applications: Natural Melanin Nanoparticles

Year 2021, Volume , Issue 32, 940 - 946, 31.12.2021

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Abstract

Since finding of photocatalytic effect of metallic nanoparticles under UV irradiation, an innovative class of materials based on non-toxic nanoparticles have gathered enormous interest owing to their usability in food and health application. As a sustainable, biocompatible, biodegradable alternative to photocatalyst metallic nanoparticle, we demonstrated the photocatalytic activity of natural melanin nanoparticles under UV-A irradiation for gram-negative bacterial strain, Escherichia coli (E. coli). Initially, nanosized melanin nanoparticles were extracted from natural source, cuttlefish (Sepia officinalis) ink and their inactivation capability of generating reactive oxygen species including singlet oxygen under UV-A irradiation were detected with 1,3-diphenylisobenzofuran (DPBF). The antimicrobial efficacies of MNP with and without UV-A were investigated. Dynamic light scattering (DLS) analysis and scanning electron spectroscopy (SEM) images showed that the diameter of MNP were found 214 ± 0.5 nm and 129 ± 30 nm, respectively. As a result of only one minute of light application, all of the DPBF in the environment was quenched, and it was proven that MNP gave free radicals to the environment under UV-A irradiation. The presence of MNP solution under 1-minute UV-A irradiation applied to the experimental groups at all concentrations significantly increased cellular inactivation compared to UV-A irradiation alone and the 200 µg/ml of MNP solution exposed to UV-A irradiation for 1-minute caused the cellular apoptosis to occur at the level of 70%, giving the best result in all groups.

Keywords

Natural melanin nanoparticles, UV-A irradiation, Disinfection, Photocatalyst

Battery Technology from Past to Present

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Abstract

The dependence of human beings on energy for the survival of their lives has created an increasing demand for energy, and as a result, energy has become one of the most researched subjects in the world. Technological systems such as robotics, computers, mobile phones, electric vehicles, space systems, which are the products of developing electronics and nanotechnology; needs a light, easily accessible, cheap, and reliable energy source with high energy potential. In these mobile and portable systems, the continuity of the energy needed and its storability are as important as its environmental friendliness. In the energy storage studies carried out to date, many different methods have been tried in the form of storing thermal energy, electrical energy, mechanical energy, and chemical energy depending on the type of energy to be stored. In this study, battery technology, which is widely used in technological systems and where energy is stored chemically, is discussed. In the study, battery types, working principles, advantages, and disadvantages have been examined comparatively from past to present.

Keywords

Batteries, Energy Storage, Comparison

Rehabilitation and Viral Infection Prophylaxis of Stray Dogs in Osmaniye Province

Year 2021, Volume , Issue 32, 956 - 966, 31.12.2021

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Abstract

This project was supported by Osmaniye Municipality and Çukurova University Ceyhan Veterinary Faculty, with the contribution of Nature, Wildlife Conservation and Research Association. The aim is to maintain human, animal and environmental health within the scope of the Animal Protection Law No. 5199 and 7332 and its amendments, and to provide rehabilitation and viral infection prophylaxis of stray dogs by cooperational scientific and technological resources of the institutions. Within the scope, rehabilitation was applied to 259 stray dogs living in Osmaniye in a 12-month period. Viral antigen was detected in 77 (%72.6) out of 106 dogs with signs of disease, and hematological and serological examinations were performed and treatment was administered. Of these dogs, 47 (%44.3) had Canine Parvovirus (CPV-2), 9 (%8.5) had Canine Distemper Virus (CDV), 21 (19.8) had Canine Coronavirus (CCoV), and 11 (%10.4) had CPV and CCoV coinfection. All dogs received prophylactic ecto- and endoparasitic treatment. Prophylactic vaccination against Rabies, CPV, CDV, Canine Adenovirus Virus (CAV-1 and CAV-2), Canine Parainfluenza Virus (CPIV-2) and Leptospira spp. infections was administered to dogs that were healthy and recovered after treatment. 36 dogs were adopted, 206 of them were unregistered and registered with ear tags and microchips, 189 active ones were neutered and all were released back to where they were found. Investigation of major canine viral diseases in Osmaniye province, detection and treatment of sick and carrier animals, and regional infection control preventive efforts were carried out. Rabies is a deadly zoonotic infection and routine vaccination of stray animals against Rabies vaccination is a common practice across the country and is provided by laws and regulations. CPV-2, CDV, CAV-1 and CAV-2, CPIV-2 and Leptospira spp. vaccinations are Core Vaccines for dogs, but vaccination of stray dogs and microchip application is not a common practice. Regarding public and environmental health, it is a 'One Health' practice concerning to prevent viral diseases among stray dog population. Conclusion: This study supported the "Happy City" project of Osmaniye Municipality. 255 stray dogs were rehabilitated in 12 months with the cooperation of the Local Administration, University and Non-Governmental Organization, and viral infection prophylaxis was provided by vaccination.

Keywords

Vaccine, Canine Coronavirus, Canine Distempervirus, Canine Parvovirus, Stary Dogs, Prophylaxis

The Impact Of Service Export On Economic Growth: A Sample Of BRICS Countries

Year 2021, Volume , Issue 32, 967 - 973, 31.12.2021

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Abstract

The competitiveness of the countries in open economies depends on the ability of the access to low-costs and high-quality producer services. The firms or countries using the services such as telecommunications, transport and distribution, financial intermediation can produce the products which are high competitive power. In this study, the impact of service exports on economic growth has been analyzed for BRICS countries (Brasil, Russia, India, China and South Africa). BRICS countries represent almost 30% of the total gross domestic product and 40% of the World population. This study has an importance, because these countries constitute most of the world economy. The balanced panel data analyse method have been applied by using annual datas for the period of 1996-2017. According to the results of the analyse, there is a positive relationship between service exports and economic growth. An increase (decrease) in the service exports causes the increase (decrease) in the economic growth. The results which was obtained from the paper are consistent with the results of the most of studies in the literature.

Keywords

Service Exports, Economic Growth, Panel Data Analysis, BRICS.

Synthesis of Gold Nanoparticles from Hawthorn (*Crataegus monogyna*) Fruit Extract and Evaluation of Antimicrobial Activities

Year 2021, Volume , Issue 32, 974 - 978, 31.12.2021

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Abstract

Researchers are of great interest in the synthesis of nanostructures of biological origin due to their unique properties. The advantages of the biological method are that it is environmentally friendly, fast and easy to synthesize. In this study, gold nanoparticles (AuNPs) were synthesized using Hawthorn-*Crataegus monogyna* (CM) fruit extract. Characterization of AuNPs from fruit extract were performed by Field Emission Scanning Electron Microscopy (FE-SEM), UV-visible Spectrophotometer (UV-vis.), Fourier Transform Infrared Spectroscopy (FT-IR), X-Ray Diffraction Diffractometry (XRD), Scanning Electron Microscopy (SEM), Zeta-size and potential analysis. Antimicrobial activities of synthesized AuNPs were evaluated on gram positive and gram negative bacteria and fungal strains using minimum inhibition technique. According to the findings of the study, it was determined that AuNPs synthesized from the CM plant showed strong antimicrobial activity.

Keywords

Antimicrobial activity, AuNPs, FE-SEM, TEM, XRD.

The Effect of Big Five Personality Traits and Self-Efficacy on the Acceptance and Spread of Fake News in Social Media

Year 2021, Volume , Issue 32, 979 - 990, 31.12.2021

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Abstract

The credibility of the news on social media is very low. Fake news has a very negative effect on consumers and brands. In this direction, the purpose of this study is to examine the effect of consumer personality traits and self-efficacy on the acceptance of fake news on social media and the intention to use these news. An online questionnaire was conducted on 408 consumers selected by convenience sampling method. The data were analyzed using the SPSS package program. According to findings, it was determined that extraversion and emotional balance (neuroticism), among the big five personality traits, were effective on the acceptance of fake news; however, the dimensions of openness to experience, agreeableness and conscientiousness were not. Self-efficacy does not have a significant effect on the acceptance of fake news; besides, the acceptance of fake news is effective on the intention to use fake news.

Keywords

Big Five Personality Traits, Self-Efficacy, Acceptance of Fake News, Spread of Fake News

A Literature Review on Extraction of Potable Water from Atmospheric Air Using Solar Stills: Recent Developments

Year 2021, Volume , Issue 32, 991 - 999, 31.12.2021

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Abstract

Drinking water and utility water are indispensable elements in meeting many vital needs, especially drinking, cooking and cleaning. Unconscious agricultural irrigation, pollution, and population growth cause water scarcity that humanity must cope with. As a result of global warming and climate change, especially the amount of potable water is decreasing, making it difficult to access clean water resources. The occupancy of drinking water sources decreases in high temperature seasons and some of them even disappear. This situation has made it necessary to search for alternative methods to obtain drinking water. One of these methods is to obtain potable water from atmospheric air containing high amounts of water. With the widespread use of this method, the scarcity of drinking water can be alleviated to a certain extent. In this study, the processes of condensing the water in the atmospheric air by using solar energy, which is a renewable energy source, and thus obtaining potable water are discussed. Efforts to increase the efficiency of obtaining potable water by using various absorbents and by various systemic solar still designs have yielded positive results. As a result of this literature review, the limits of the studies and their regional effectiveness were evaluated together. The effect of temperature, velocity, humidity of the atmospheric air and the amount of solar radiation on the process were evaluated. It has been concluded that certain desiccant materials with good water absorbers such as calcium chloride and silica gel can be used effectively in the processes of obtaining potable water from atmospheric air by developing correct designs. It has been demonstrated that high atmospheric air temperature, which is an important cause of water scarcity, can be converted from disadvantage to advantage by utilizing solar energy.

Keywords

Potable water generation from air, Solar water generation, Desiccant, Solar still

Investigation of the Mechanical and Microstructural Properties of AISI 430 Steels After Deep Chryonegic Treament

Year 2021, Volume , Issue 32, 1000 - 1005, 31.12.2021

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Abstract

Cryogenic treatment is a type of heat treatment applied to stainless steels in today's industry and is rapidly spreading as an alternative to conventional heat treatment. Although the effects of shallow cryogenic treatment on stainless steels have been investigated in the literature, it is seen that there are limited number of studies on deep cryogenic treatment. In this study, the effects of deep cryogenic treatment (-140 oC) on the microstructural and mechanical properties of AISI 430 ferritic stainless steel were investigated. In addition, the effects of conventional heat treatment and cryogenic treatment were compared. In the study, 1 hour annealing time at 300 oC, 500 oC and 700 oC for conventional heat treatment and 12, 24, 36 and 48 hours at -140 oC for cryogenic treatment were selected as heat treatment parameters in the study. After heat treatment, the samples were examined using an optical microscope and subjected to hardness and tensile tests (using mini tensile specimen). The findings determined that while the mechanical properties decrease after 300 oC in conventional heat treatment, the optimum annealing time for yield strength is 24 hours in cryogenic treatment, while the optimum annealing time for tensile strength is 48 hours. In addition, the study shows that cryogenic treatment causes significant changes in the microstructure of AISI 430 stainless steel.

Keywords

Cryogenic Cooling, Heat Treatment, AISI 430 Stainless Steel, Mechanical Properties, Microstructure, Mini Tensile Specimen.

Environmentally Friendly Alternative for Noise Barriers: Natural Fiber Reinforced Composite Materials

Year 2021, Volume , Issue 32, 1006 - 1010, 31.12.2021

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<https://doi.org/10.31590/ejosat.1039332>

Abstract

In recent years, sustainability in product-production cycles has been one of the most focused topics within the scope of the green deal. There is a growing interest in recyclable composites produced from environmentally friendly materials within all sectors where composite materials are used. In this study, the potential of natural fiber reinforced thermoplastic composite materials to be used in the acoustic sector was investigated. Sound absorption coefficient and sound transmission loss performance of laminated composite plates produced from flax/polypropylene unidirectional prepreg structures, in which flax fibers are arranged in one direction, were examined. The test results show that the laminated composite plates produced from flax/polypropylene unidirectional prepreg structures exhibit a closed-pore structure when used in a flat geometry and therefore have the potential to be used in the isolation of structure-born sound.

Keywords

flax fiber, unidirectional prepreg, thermoplastic composite, acoustic performance

Evaluation of Seasonal Effects of Tillage and Drainage Management Practices on Soil Physical Properties and Infiltration Characteristics in a Silt-Loam Soil

Year 2021, Volume , Issue 32, 1011 - 1023, 31.12.2021

Rıfat AKIŞ

<https://doi.org/10.31590/ejosat.1050860>

Abstract

The impacts of tillage and drainage managements on soil infiltration characteristics need to be scrutinized for a better understanding and prediction of soil hydrological processes, such as runoff, evapotranspiration and soil water storage. The objectives of this study were i) to evaluate the effects of tillage and drainage practices on soil physical properties and water infiltration, and ii) to compare prediction accuracy of estimated and optimized infiltration model characteristics for the observed and predicted quantities of infiltration process in the soil. The research site contains the Crosby-Kokomo soil series (fine, mixed, mesic, Aeric Ochraqualf and fine, mixed, mesic Typic Argiaquoll, respectively). The experiment was a two factorial completely randomized block design with two levels of tillage (chisel plow (CH) and no-till (NT)) and two levels of drainage (drained (D) and undrained (UD)) with three replicates. Soil bulk density (ρ_b), saturated hydraulic conductivity (K_{sat}), soil moisture retention curves (SMRC), soil infiltration capacity and piezometric water head in each treatment were also measured. Soil drainage flows at each drain lateral and outlet discharges were measured. The results showed that The UD treatments were always higher for K_{sat} values than the D treatments regardless of the tillage practices for both depths and the CH treatments always had greater K_{sat} values than those in the NT at both the depths regardless of drainage practices. The D treatments reduced the soil bulk density by 4.2 and 0.8 % in the surface soil and 4.61 and 6.7% for the subsurface soil in respect to no-till-UD and chisel-UD treatments. The UD treatments had higher bulk density at both of the depths than those of the D treatments regardless of tillage practices except the CH-UD treatments. The NT had higher bulk density at both depths of the soil than those of the CH treatments regardless of drainage practices. Drainage increased pore size distribution significantly higher than the UD treatments ($p < 0.05$). The D treatments had significantly higher storage pores and effective pores (9.37%) (pores retaining water at -10kPa pressure head) than the ones in the UD treatments (8.96%) ($p < 0.05$). The NT treatments yielded higher infiltration rates than the CH and the D treatments produced higher apparent infiltration rates and cumulative infiltration values than the UD treatments. The changes in soil physical properties were found to be strongly and significantly dependent on season, soil depth, and rainfall ($p < 0.05$). The optimized infiltration models predicted larger range of infiltration rate values for each treatment than the estimated infiltration models, indicating that the optimization produced higher accuracy and validity of the predicted models in the field. To conclude, soil dry bulk density, soil saturated hydraulic conductivity, and increased macropore volumes can significantly impact soil hydrological responses to soil water infiltration, soil water storage and drainage flow under conservation tillage and drainage management practices on a seasonal basis. This impact enhances greater potential to capture water in soil for future crop use in the study site.

Keywords

Tillage, Drainage, Infiltration.

Comparison of Photovoltaic Systems Designed for Different Roof Types for Isparta Province

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Abstract

Due to global warming, there has been a compulsory shift from carbon-based power plants to renewable energy power plants in electricity production. In our country, in recent years, photovoltaic power plants have joined the increase in installed power from renewable energy plants, hydroelectric and wind energy. In this study, rooftop photovoltaic power plants, the prevalence of which is increasing rapidly in our country, is discussed for Isparta Province. A total of 6 different simulations and three-dimensional modulations were carried out by simulating unobstructed roofs with azimuth values of 0° and 180° with 18°, 24° and 35° orientation angles, and flat roofs with 0° azimuth value at the same orientation angles. When the simulation results are examined, it has been determined that the lowest electricity generation value is in the rooftop photovoltaic plant with an uneven 35° slope, and the highest electricity generation value is in the rooftop photovoltaic plant with a flat and 35° orientation angle. It has been calculated that the electricity generation difference between these two roofs is 12,415 kWh.

Keywords

Rooftop Photovoltaic Systems, Solar Energy Systems, PVsyst

Modeling and Design Optimization of Hot Tearing Defect in a Valve Body Part

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Selçuk ŞİRİN Metin YOLDAŞ

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Abstract

Globe valves are industrial materials with a wide range of uses, from oil pipelines to dams. In recent years, valves of various types and designs have been produced with the expectation of cost reduction and performance increase. As a result of this situation, very different section thicknesses are obtained, especially in valve bodies. This variation in cross-section thicknesses of valve bodies produced by casting method reveals the risk of hot tearing in some alloy groups. In this study, the root cause of the hot tear failure occurring in a valve body part cast from 1.0619 steel alloy was investigated and then a defect-free product was produced by optimizing the casting design.

Keywords

Hot tearing, Casting simulation, Design Optimisation

The Interaction of the Exchange Rate, the VIX Fear Index and Foreign Portfolio Investments

Year 2021, Volume , Issue 32, 1034 - 1042, 31.12.2021

Müberra GÜNGÖR

<https://doi.org/10.31590/ejosat.1044711>

Abstract

The purpose of this study is to determine whether the VIX Fear Index (Volatility Index) and the exchange rate have an effect on portfolio investments. In this direction, ARDL Bounds test method was used to determine the cointegration relationship between the variables by using monthly data for the period January 2009 - August 2021. According to the results of the ARDL Boundary Test, there is a long-term relationship between portfolio investments, the exchange rate and the VIX fear index, but when looking at the results of long-term coefficient estimates in models, only the exchange rate had a significant effect on portfolio investments. According to the results of the error correction model, it was concluded that the exchange rate had a negative and significant effect on portfolio investments in the short term, and the VIX fear index variable had a positive and significant effect on portfolio investments.

Keywords

VIX Fear Index, Portfolio Investments, Exchange Rate

Evaluation of Antiviral Compounds Against SARS-CoV-2 Main Protease Enzyme by Computer Aided Drug Design Methods

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Abstract

COVID-19 is a serious disease that has asymptomatic or mild disease symptoms and can lead to death as a result of rapid and severe upper respiratory tract findings. Since SARS-CoV-2 is a newly identified virus, its short and long-term effects are not fully known, and the effects it creates differ between individuals, the diagnosis and treatment of COVID-19 becomes difficult. However, in the discovery of a new drug molecule, approximately 5-10 thousand candidate molecules are examined, it may take more than 10 years to launch a drug among these candidate molecules, and the cost of the whole process can reach approximately 330 million dollars. Considering that drug discovery is a costly and time-consuming process, with the high rate of death cases due to the COVID-19 pandemic worldwide, the importance of new rational approaches in the development of preventive and therapeutic drugs and vaccines has increased. In recent years, computer-aided drug design (in silico) methods have been developed for drug development studies with the advances in computer technologies. Thus, instead of high-cost and time-consuming wet laboratory studies, the drug development process can be completed in a short time and at low cost. In this study, it was aimed to investigate the biological activities of the main protease (Mpro), which plays an important role in the virulence of SARS-CoV-2, and 15 antiviral compounds used clinically for various viral diseases by using computer aided drug design methods. In the first step of the study, 3-dimensional structure analyzes of the main protease enzyme of SARS-CoV-2 and antiviral compounds were performed. Then, the binding free energy and inhibition constant between each antiviral compound and the target enzyme were calculated using molecular docking, which is a computer aided drug design method. As a result of this analysis, Lopinavir compound was determined as the compound with the best binding affinity against SARS-CoV-2 main protease. In addition, this compound formed a hydrogen bond interaction with Cys145, Glu166, Glu189 and Ser144 aminoacids, which have an important role in the activity of SARS-CoV-2 main protease. The results obtained provided a more advantageous examination of the biological activities of the existing antiviral drug molecules in terms of time and cost. This study will guide clinical studies to develop more effective antiviral drugs for the treatment of COVID-19.

Keywords

COVID-19, SARS-CoV-2, SARS-CoV-2 main protease, Molecular docking, in silico, Computer aided drug design.

RP-HPLC Method Development and Validation for Quantification of Fexofenadine in Pharmaceutical Products

Year 2021, Volume , Issue 32, 1048 - 1053, 31.12.2021

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Abstract

Fexofenadine belongs to the antihistamine family of drugs. It is used to treat seasonal allergic rhinitis symptoms. In this study, a rapid, simple and sensitive liquid chromatographic method for the quantitative determination of fexofenadine was optimized and validated. Agilent Extend C18 column was used to perform the separation. The optimum chromatographic separation was achieved by the mobile phase consist of acetonitrile and 20 mM KH₂PO₄ solution (pH 7.5) in 35:65 ratios respectively. The flow rate of 1.2 mL min⁻¹ with a standard retention time of 3.5 min at a wavelength 220 nm was optimized. The developed method has been validated in terms of their linearity, specificity, precision, accuracy, limits of detection and quantification, and robustness as per I.C.H. guidelines. The developed method has shown excellent linearity, precision, and recovery. There were no spectral or chromatographic interferences from non-medicinal ingredients found. Within a concentration range of 10–60 g mL⁻¹, the correlation coefficient was greater than 0.999. Low relative standard deviation values were obtained in the results of intra-day and inter-day precision tests. The method's accuracy ranged from 99.45 to 100.52 %. The present analytical method can be used to quantify fexofenadine in pharmaceutical preparations.

Keywords

Fexofenadine, analysis, method, validation

The Effect of Different Aggregates and Binder Types on the Mechanical Properties of Hot Mix Asphalt

Year 2021, Volume , Issue 32, 1054 - 1065, 31.12.2021

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<https://doi.org/10.31590/ejosat.1041688>

Abstract

In this study, the effect of different aggregates and binder types on the mechanical properties of hot mix asphalt has been investigated experimentally. Three types of aggregate were used as limestone, basalt and creek material in the study. Limestone from Elazığ city Kömürhan quarry, basalt from Elazığ city Harput concrete quarry and stream material from Bingöl city Genç-Murat sand gravel quarry were provided. Two types of bituminous binders supplied from Batman Refinery (B 50/70 and B 160/220) were used as binders. Asphalt mixtures were prepared using 2 types of bituminous binders in 4%, 4.5%, 5%, 5.5% and 6% ratios for each aggregate group of limestone, basalt, creek material and limestone + creek material. The optimum bitumen ratios of the mixtures were determined by Marshall experiments and the mechanical properties of the mixtures were evaluated. In addition, the stability, flow, density and void values of the mixtures are discussed comparatively. From the results obtained from this study, It was clearly observed that the aggregate group limestone and bituminous binder B 160/220 mixture gave better results because Marshall design parameter values had boundary condition, low bitumen requirement, economical and stability advantages.

Keywords

Aggregate., Bituminous Binder., Marshall Test

Can Emissions Be Reduced Using Latent Heat of Methane in LNG Powered Heavy Vehicles?

Year 2021, Volume , Issue 32, 1066 - 1069, 31.12.2021

Adem UĞURLU

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Abstract

Liquid natural gas-powered vehicles store liquid natural gas fuel on board. When the gasification of this fuel is maintained, cooling down of the the vehicle cabin can be provided. In this study, the theoretical calculation of the savings that can be achieved if this process is done with an appropriate tool is emphasized. Since diesel fuel is used in heavy vehicles, diesel is taken as reference fuel in the calculations. How much methane is needed by the heavy vehicles that operate at various consumption values is calculated fist, then how much LNG should be evaporated for this need is found, and then, what amount of cooling this evaporating LNG could provide is computed. The results are presented in tabular form. It is seen that the proposed system can provide fuel savings with sufficient cooling, and therefore reduce emissions, especially in the vehicles mentioned.

Keywords

Air conditioning, Internal combustion engines, Liquid natural gas.

Investigation of Laser Based Air Speed Measurement Methods

Year 2021, Volume , Issue 32, 1070 - 1075, 31.12.2021

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Abstract

Airspeed is a critical parameter in many applications in terrestrial, marine, space, and aviation. Especially in airplanes, by calculating this parameter, events such as turbulence and wind shear can be predicted, and precautions can be taken. In this study, traditional and laser-based techniques used in the measurement of air velocity, working details and sample system designs were investigated. In addition, the importance of Light Detection and Ranging (LIDAR) technology in these techniques has been examined. In addition, the advantages and design characteristics of UV Doppler LIDAR, which has significant advantages in air velocity measurement, are investigated.

Keywords

Airspeed measurement, Doppler effect, UV LIDAR, Aerosol

Applying a Combination of AHP, ANP, and PROMETHEE Methods to Find the Optimal Location for Solar Power Plant

Year 2021, Volume , Issue 32, 1076 - 1085, 31.12.2021

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Abstract

One of the well-known renewable energy resources is solar energy which has been developed rapidly in recent years. Turkey is one of the high energy consumer countries where has a good potential for using solar power due to its geographical location. Choosing the right location is one of the main issues related to the solar power plant problem. The main objective of this study is to select the optimal location to install a solar power plant among the five cities (Antalya, Nigde, Konya, Mersin, and Isparta) in the south of Turkey, which all of them are considered as potential locations because of receiving a high amount of solar radiation. To accomplish this task, three well-known multi-criteria decision-making methods (AHP, ANP, and PROMETHEE) are used to find the best location considering six different criteria. To simplify and improve the accuracy of calculation, SuperDecisions and VisualPROMETHEE Programs are utilized for analyzing the data. The program results show that Mersin is selected as the best location and the second one is Antalya. Besides, the lowest scored city is Nigde which is considered as the least preferred alternative.

Keywords

Solar power plant, MCDM, AHP, ANP, PROMETHEE.

Evaluation Of The Studies Related To Anfis With Content Analysis: Tr Index

Year 2021, Volume , Issue 32, 1086 - 1093, 31.12.2021

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Abstract

Adaptive neuro-fuzzy inference system (ANFIS) is one of the frequently preferred methods within the scope of artificial intelligence studies in recent years. It is gaining importance day by day with its successful results in many different fields and different types of data. It is a need to analyze and evaluate the studies on this subject. The purpose of this research is to analyze the studies on ANFIS published in journals covered by TR Index. 102 studies on Anfis published in journals scanned within the scope of Tr Index were analyzed. Analyzes were carried out with Maxqda analysis program. Studies were analyzed in terms of history, data normalization, division of data into training tests, performance evaluation, compared methods and methods used together. Analysis results are given with the support of Maxqda program graphics and visuals. As a result of the study, it has been determined that the number of studies related to Anfis has increased in recent years within the scope of Tr Index, but there are serious deficiencies in data normalization, separation of data for training and testing, and metrics used in performance measurement. It is thought that the results of the study will play a supportive role in the studies to be carried out on Anfis.

Keywords

Machine Learning, Artificial Intelligence, Tr Index, Maxqda, Anfis.

Dilemma in Health During Pandemic in OECD Countries: Increasing Health Expenditures for Preventing Against the Pandemic Will Cause a Crowding-out in Increasing the Employment in Nursing Service or not?

Year 2021, Volume , Issue 32, 1094 - 1102, 31.12.2021

Özlem ÖZSOY

<https://doi.org/10.31590/ejosat.1051266>

Abstract

In the early of December 2021, the COVID-19 related cases has exceeded 263 million and deaths 5.2 million. With COVID-19, it has been seen that the health system and health personnel are indispensable in the fight against the virus, even during the pandemic period. For a strong a resilient healthcare system need for nurses has emerged as the COVID-19 spreads very fast. According to WHO 19.3 million of the global nursing workforce which is 27.9 million, and 59% of the health professions are professional nurses. In OECD countries, there are 13.4 million nurses, and 987 nurses per 100,000 population. While health expenditures are made for treatment and vaccination, it should not be neglected to train health personnel, especially nurses. Increasing health expenditures against pandemic may mostly go to for preventing, vaccines and medical treatment and cause a crowding-out in increasing the employment in nursing service.

Keywords

Nurses, public health, COVID-19, Pandemic, health expenditure

Next Generation, Modular and Smart Battery Management System

Year 2021, Volume , Issue 32, 1103 - 1112, 31.12.2021

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Abstract

Today, battery management systems (BMS) play a critical role not only in electric (land, air and sea) vehicles but also electrical energy storage and redundancy of renewable energy plants such as solar and wind. In this regard, for the domestic development and production of a new generation, modular and smart battery management system that fulfills all the functions of BMSs, which are currently in the retail energy sector, and offers additional unique innovative solutions; studies were started in 2018 within the scope of TUBITAK 1512 Entrepreneurship Support Program. The project is numbered 2170454 and titled "E-CAMELEON - Adaptive Battery Management System for Electric Vehicles". As a result of the project, the first version of the BMS with unique features was developed and the project was completed successfully. In order for BMS to be further developed and capable of being used for various solutions; a new project supported by Inonu University has been initiated. The project numbered FOA-2018-1358 and titled "Modelling, Development of New Generation Battery and Power Management Systems in Electric Vehicles and Analysis of the Recycling Processes of Batteries". This proceeding project has also been successfully completed. As the final product of the project, software and hardware were developed with distinctive design, and thus a new generation, modular and smart battery management system was produced. Following these studies three different patent applications completed as "Automatically Determining Battery Chemistry, Adaptive, Modular and Intelligent Battery Management System, 2021/018973, 2021-GE-831229", "Method for Electronically Determining Battery Chemistry

Keywords

Battery Management System, Batteries, Hybrid and Electric Vehicles, Energy Storage Systems, Recycling, Battery Management System, Batteries, Hybrid and Electric Vehicles, Energy Storage Systems, Recycling.

Phenol Removal From Model Waste Waters by Mn-MCM-41 Type Catalysts

Year 2021, Volume , Issue 32, 1113 - 1120, 31.12.2021

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Abstract

In this study, Mn-incorporated MCM-41 catalysts with different Mn/Si molar ratios were synthesised and the characterisation of the catalysts was carried out by using XRD, BET, SEM, EDS and particle size analysis methods. The activities of the catalysts were tested in the phenol removal reaction from model solutions using the wet catalytic oxidation with hydrogen peroxide. XRD and BET results showed that the MCM-41 support material in the pure silicate form had the desired hexagonal porous structure but upon addition of the manganese metal, the crystal structure deteriorated becoming amorphous and the surface areas reduced significantly due to the partial blocking of the pores. Phenol removal reactions were carried out using a 50 ppm phenol solution prepared in the laboratory at 25,40 and 60oC, at an initial pH value of 6.0 in a batch reactor. The experimental results depicted that the optimum metal loading occurred at a Mn/Si molar ratio of 0.06. Investigation of the reaction results showed that phenol removal increased with temperature. In addition, at atmospheric pressure and at the studied different temperatures, with the addition of the metal to the MCM-41 structure, the phenol removal percentage increased in the range of 4.6%-14.4% for Mn-MCM-41 catalysts, compared to the purely siliceous MCM-41. Optimum reaction conditions were determined as 60oC, atmospheric pressure, 0.06 Mn/Si molar ratio, and 56% phenol removal was obtained under these conditions. Obtaining an optimum 56% phenol removal from moderately concentrated model waste waters with Mn-MCM-41 catalysts by using a small amount of metal and small amount of catalyst (Mn/Si molar ratio 0.060, catalyst amount 1.0 g/L) under moderate reaction conditions (60oC and atmospheric pressure), is thought to make an important contribution to the literature.

Keywords

Mn-MCM-41, Phenol, Wastewater

Cyber Security of Connected Autonomous Vehicles

Year 2021, Volume , Issue 32, 1121 - 1128, 31.12.2021

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<https://doi.org/10.31590/ejosat.1039449>

Abstract

Importance of communication security in vehicular network systems is a soaring issue with the evolving automotive industry day by day. The proposed study covers fundamental requirements to ensure automotive system security and some cryptography algorithms that can be beneficial for the security of connected cars from our point of view. Autonomous systems use lots of IoT sensors data. Connected vehicles have a data-sharing network and they are vulnerable to security attacks. So, ensuring the security of these data is an important challenge. The main purpose of this study is to draw attention to the basic security elements of communication between interconnected vehicles, to touch on its daily importance and usage points in human life, and to present the research on possible cryptography methods that can be used by giving information about the current studies. Our research focuses on ensuring both powerful securities infrastructure methods and considering hardware-based conditions. Different approaches, cryptography algorithms, protocols, and real-life companies that dive into autonomous system security challenges are tackled in this study. In addition, some of the important methods and applications are presented in a table from two different perspectives as attack mitigation and security requirements support that are thought to contribute to literature studies.

Keywords

VANET, MANET, Lightweight, RSU, OBU, CIA, GPS, ECU, TA, ARX, NSA

The Effect of Hemp Oil/Diesel Fuels on Performance and Emission Parameters in a Single Cylinder Diesel Engine

Year 2021, Volume , Issue 32, 1129 - 1133, 31.12.2021

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Abstract

With the development of technology, the decrease or inadequacy of our energy resources has brought about the search for new energy sources. Due to the reduction of current fossil fuel reserves and the greenhouse effect of these fuels in the atmosphere, researchers have directed the search for more environmentally friendly fuels. and its effects on emissions were investigated. Three different fuels, D100 (0% Biodiesel + 100% Diesel), KY10 (90% Diesel + 10% Hemp Oil), KY20 (80% Diesel + 20% Hemp Oil) were used in the experiments. Experiments were carried out at six different test loads. During the test, CO, CO₂, HC and NO_x emissions as well as Specific Fuel Consumption (BSFC) and Effective Efficiency (BTE) values were measured. When the test results were examined, an increase was observed in BSFC values as a result of the use of KY10 and KY20 fuel, while a variation was detected in BTE values according to the load situation. When examined in terms of emissions, it is clearly seen that the improvement in emissions increases as the CG ratio in test fuels increases.

Keywords

Cannabis Oil, Biodiesel, Emission, Engine Performance, Cannabis Oil, Biodiesel, Emission, Engine Performance

Bioclimatic Comfort at Urban Areas in Temperate-Humid Climate Regions

Year 2021, Volume , Issue 32, 1134 - 1139, 31.12.2021

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<https://doi.org/10.31590/ejosat.1045518>

Abstract

Nowadays, cities warm up and urban heat islands form due to intensive and unplanned urbanization, large number of impermeable surfaces and the lack of green areas. It is important to take certain precautions such as increasing the green areas for enhancing the urban microclimate in order to decrease the impacts of urban heat islands. The importance of urban public spaces and predominantly those of green areas has been understood much better during the global COVID-19 pandemic period. These areas that enable interaction with nature in outdoor areas are directly affected from climate factors. In this scope, factors that have an impact on the human bioclimatic comfort along with the concept of bioclimatic comfort as well as the climate and human relationship have been examined in the present study thus putting forth the importance of attaining bioclimatic comfort in temperate-humid climate regions for planning and design.

Keywords

Global warming, Human bioclimatic comfort, Temperate-humid climate, Urban landscape planning and design

The effect of the researchers, research and development expenditure as innovation inputs on patent grants and high-tech exports as innovation outputs in OECD and emerging countries especially in BRIICS

Year 2021, Volume , Issue 32, 1140 - 1149, 31.12.2021

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<https://doi.org/10.31590/ejosat.1051899>

Abstract

According to the correlation tests (Pearson Correlation and Spearman's rho) analysis with the cross-section data for forty-eight countries of OECD and some emerging countries including BRIICS countries, R&D expenditures, patents and FDI have high positive effect on high-tech exports and there is a low positive relationship with high-tech exports and researchers. For causality analysis of raw data with Granger causality test it is seen that only researchers does Granger cause R&D. For Toda Yamamoto causality test (Wald test) patents and FDI cause high-tech exports. R&D and researchers cause patents too. It can be said that researchers and R&D end up with patent grants and patents will cause an increase in high-tech exports. The results of the OLS does show an adequate relationship between high-tech exports and patents, between R&D expenditures and FDI while high-tech exports and researchers do not have.

Keywords

High-tech exports, R&D, Patents, Innovation, FDI

Strength of A Chair Renovated With Additive Production Systems and Reverse Engineering Approach

Year 2021, Volume , Issue 32, 1150 - 1155, 31.12.2021

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Abstract

Furniture are items that provide convenience and comfort in daily works, and that are present in all areas of life. The furniture renovation process is of great importance for the protection of furniture and the maintenance of furniture's function. Today, this process may include applications involving reverse engineering and additive production systems. The aim of this study is to provide guidance for amateur and professional workers in the field of furniture renovation about the use of reverse engineering approach and additive production systems in this field. In this study, missing details of a plywood chair were scanned with 3D scanners. Point clouds were obtained in STL format. These point clouds were converted into meaningful data and the missing details were printed out with the additive production system. Damaged areas of the chair were repaired with this method. The repaired chair sample and the original chair sample were subjected to static and dynamic strength tests, and the test results obtained from these samples were compared. As a result of these tests, the renovation work was found to be successful.

Keywords

Furniture, Renovation, Reverse Engineering Approach, Additive Production Systems

Detoxification in Liver

Year 2021, Volume , Issue 32, 1156 - 1161, 31.12.2021

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<https://doi.org/10.31590/ejosat.1049025>

Abstract

The liver is where physiological and biochemical events occur for living. A series of complex chemical reaction occurs and detoxifies harmful substances in the liver. This event is called "detoxification". It realizes in two stages as phase I and phase II. It's represented by researching enzymes which effect liver detoxification and relevent with genes, inhibition, induction and effecttion with nutrients.

Keywords

Antioxidant, detoxification, liver, CyP450

A Systematic Meta-Analysis of Aflatoxin B1 Presence in Red Pepper

Year 2021, Volume , Issue 32, 1162 - 1167, 31.12.2021

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<https://doi.org/10.31590/ejosat.1045487>

Abstract

Aflatoxins are one of the pollutants that can be isolated from the dried food products, especially spices. Since red pepper is one of the most consumed spices all over the world, this research aimed to estimate the prevalence and concentration of aflatoxin B1 (AFB1) in different red pepper spices with the help of a systematic review and meta-analysis. Therefore, the articles published between January 2000 and December 6, 2020, were systematically collected from four well-known databases. In this context, 10 articles containing 455 samples in total among 981 articles were included in the meta-analysis according to the determined inclusion and exclusion criteria. According to the analysis results, the AFB1 prevalence of all studies was determined as 50.8%. The lowest and highest AFB1 concentrations were observed in seasoning paprika Korea (0.14 mg/kg) and Turkey (31.13 mg/kg), respectively. The result of this meta-analysis can be used in the evaluation and organization of solution actions to be developed to reduce AFB1 exposure and prevent financial losses through the consumption of red pepper spice products.

Keywords

AFB1, Contamination, Food safety, Aflatoxin, Red pepper, Meta-analysis

Smartphone-based Multi-parametric Glucose Prediction using Recurrent Neural Networks

Year 2021, Volume , Issue 32, 1168 - 1174, 31.12.2021

Zeki PALAZ Vakkas DOĞAN Volkan KILIÇ

<https://doi.org/10.31590/ejosat.1041547>

Abstract

Diabetes Mellitus causes many deadly diseases, including pancreatic cancer as irregularity of glucose level triggers dysfunctions like unchecked cell growth. The critical stages in glucose irregularity are categorized as hyperglycemia (high blood glucose) and hypoglycemia (low blood glucose) which needs to be detected in advance for the quality of human life. In that sense, many tools have been developed based on artificial intelligence (AI) systems which mostly consider the glucose measurement as a prediction parameter. However, in this study, we propose to employ multi-parameter in glucose prediction based on a Recurrent Neural Network (RNN), a subset of AI, to enhance predictability. The proposed system utilizes a Long-Short Term Memory (LSTM) based RNN to handle complex memory operations caused by multi-parametric prediction. Training and validation scores on the OhioT1DM dataset show the advantage of our proposed system over the baseline systems for predicting glucose levels with a significantly reduced error. The system is later integrated with our custom-designed Android application, BffDiabetes PRO, capable of reading the glucose levels from the sensors via Bluetooth. The BffDiabetes PRO transfers the current glucose level, acceleration, and baseline skin temperature to the server via a cloud system to predict the next level. It receives the prediction result to evaluate whether the glucose level tends to reach the critical stages. In case of this tendency is detected, the BffDiabetes PRO alerts the user for necessary precautions.

Keywords

Artificial Intelligence, Recurrent Neural Networks, LSTM, GRU, Glucose Prediction, Smartphone Application

Separation of π^0/γ in an Electromagnetic Sampling Calorimeter with Deep Learning Structures

Year 2021, Volume , Issue 32, 1175 - 1180, 31.12.2021

Güral AYDIN Hasan SARIGÜL

<https://doi.org/10.31590/ejosat.1041107>

Abstract

In this study, it was investigated how effective the use of deep learning artificial neural networks can be in distinguishing neutral pion and single photon in an electromagnetic sampling calorimeter. The sampling calorimeter was constructed in the form of a 9×9 matrix array with the Geant4 simulation program. Identification of the particles was carried out by using the shower images created by the neutral pion and a single photon at different energies in the calorimeter. First, differences in shower images were observed using image parameters. Then, the topologies created by the shower images were used as input parameters in deep learning structures to distinguish the particles. It has been observed that very high signal efficiency and background rejection values can be achieved under the specified simulation conditions with machine learning.

Keywords

Artificial Neural Network, Electromagnetic Calorimeter, Photon Interaction, Particle Identification

On the way from Tradition to Innovation ‘Çankırı’, Snack Food Production: Yoka Crackers

Year 2021, Volume , Issue 32, 1181 - 1187, 31.12.2021

Didar ÜÇÜNCÜOĞLU

<https://doi.org/10.31590/ejosat.1039631>

Abstract

In general, functional foods are defined with their advantages containing basic nutritional elements, promoting health, preventing some diseases, and reducing the ratio of some disorders due to a component in it. Today, the production, consumption, import and export of packaged fast food products, which are called 'snacks' with functional qualities, have become quite widespread. In this study, pomace with high nutritional fiber content, which is separated as a by-product in olive oil production and used as an organic fire source or fertilizer without any technologic process and caused environmental pollution, was reprocessed and met with Çankırı traditional phyllo (yoka) bread. Thus, a dietary snack food (Yoka Cracker) enriched in terms of fiber content, low in salt-based sodium content, and in which no oil is used, was produced. Therefore, the olive pomace, which contains valuable nutritional components, was managed to return back to the economy. The presented work includes the results of the first workpackage of our R&D project. Accordingly, traditional yoka-bread production was learned on-site by food and chemical engineers graduated from Çankırı Karatekin University, traditional production style was transferred to younger generations, traditional production conditions and parameters were optimized and adapted into industrial production. Yoka Crackers were flavored with various spices and fresh green vegetables. As a result of the R&D activities carried out, it was found that a portion of Yoka Cracker has 112 kcal.

Keywords

Pomace, phyllo bread, functional foods

Investigation of Surface Properties of Eggshell based Kappa-Carrageenan-Polyvinyl Alcohol Nanobiocomposite Coated Low Alloyed Steel Foam

Year 2021, Volume , Issue 32, 1188 - 1193, 31.12.2021

Nuray BEKÖZ ÜLLEN Gizem KARABULUT Selcan KARAKUŞ

<https://doi.org/10.31590/ejosat.1039245>

Abstract

In this study, we developed a novel eggshell based kappa-carrageenan-polyvinyl alcohol nanobiocomposite coated low alloyed steel foam. The prepared nanobiocomposite was preferred as a coating function on the distribution of particles on the low alloyed steel foam. The scanning electron microscopy (SEM), stereo microscope, and fourier transform infrared spectroscopy (FT-IR) techniques were used to determine the chemical and surface properties of the nanobiocomposite and nanobiocomposite coated low alloyed steel foam. According to the characterization results, we observed that the nanobiocomposite coated low alloyed steel foam had a uniform controlled morphology. Furthermore, the mean surface roughness values of uncoated low alloyed steel foam and nanobiocomposite coated low alloyed steel foam were measured as 4.48 μm and 4.61 μm , respectively. Consequently, we showed that the nanobiocomposite was uniformly coated onto the surface of the micropore channel of the low alloyed steel foam. Based on these results, eggshell based kappa-carrageenan-polyvinyl alcohol nanobiocomposite is a promising nanomaterial for surface modification of the low alloyed steel foam with a controlled and homogeneously distributed surface feature in biomedical applications using a green approach.

Keywords

Nanobiocomposite, steel foam, coating material

Deep Learning Based Garbage Detection for Autonomous Garbage Collection Vehicles

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Abstract

With the rapid technological advances and the increasing human population, the need for more production has emerged and consumption has increased accordingly. As a result of this increased consumption, more garbage has been generated. Environmental pollution caused by these garbages emerges as a problem that people have to overcome both in Turkey and in the world. Many studies have been conducted to overcome this problem. Especially today, with the development of autonomous vehicles and artificial intelligence, the solutions using these technologies have increased. In this study, a new data set was created for autonomous garbage collection vehicles and a model was proposed in which these vehicles can be used. The data set was prepared with images of garbage with paper cups, which is one of the most polluting garbage, taken in different places, and images consisting of different garbage without paper cups. Paper cups were detected from these images with pre-trained Squezenet, VGG-19 and GoogLeNet convolutional neural networks. The performance rate of the Squezenet, GoogLeNet and Vgg-19 networks used in the study was found as 97.77%, 96.44% 94.66%, respectively.

Keywords

Transfer learning, Garbage detection, Garbage dataset

One-step Easy-Care and Softening Finishing of Knitted Cotton Fabric

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Abstract

Cotton is a natural fiber which has a tendency to wrinkle due to its perfect absorbancy properties. Nowadays, people prefer to use easy-care fabrics, so a lot of research has been done about this issue since the 1940s. In most researches, carboxymethylation and causticization processes are applied to bleached or semi-bleached cotton fabric, yet in this project dyed cotton fabric is used. Factories are applying resin finishing which is expensive, decreases fabric strength, increases stiffness of fabric so handle affected poorly from this application. Formaldehyde-based chemistries were used for increase wrinkle recovery performance of fabrics before, but formaldehyde is a suspicious carcinogenic chemical very dangerous for human health. Currently, DMDHEU and BTCA are the most well-known crosslinking chemical materials in wrinkle-free finishing, but in this study, cationic silicone softener was used as the crosslinker, and its effect on crease resistance was investigated. In the study, after the dyed cotton fabrics were given anionic character by applying causticization with Sodium Hydroxide (NaOH) and carboxymethylation processes with Sodium Chloroacetate (SCA), respectively, three different concentrations of cationic silicone were applied with the pad-dry-cure method for the cross-linking process. Then, wrinkle recovery angle (WRA) measurements were performed on crosslinked cotton fabrics in order to understand the interaction between causticization and crosslinking; and determine the better causticization and crosslinking levels that offer highest fabric performance. Experimental results showed that the best WRA results were observed at 10% NaOH, 0.5M SCA. Same SCA and softener concentration with 15% NaOH has adverse effect compared to 5% and 10% NaOH levels.

Keywords

Cotton, Colored Fabric, Carboxymethylation, Ionic Crosslinking, SCA, Cationic Silicone

Effects of Anhydrous Enzymes Usage in Denim Washing on Fabric Tear Strength

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Abstract

In this study, an anhydrous enzyme washing process was produced as an alternative for stone washing which is one of the major steps of denim production. For this concept, 3 different fabric contents and 4 different anhydrous washing enzymes were used, the visual appearance as well as the strength of the products that was obtained after washing were compared with the products that was made with conventional stone washing. The results of the physical performance and visual tests showed that the developed anhydrous enzyme washing process can replace the stone washing process. In addition, up to 12 liters of water was saved on a product basis and the use of pumice stone was completely eliminated. Therefore, product costs were also reduced while natural resource consumption was reduced.

Keywords

Anhydrous Enzyme, Denim Washing, Tear Strength