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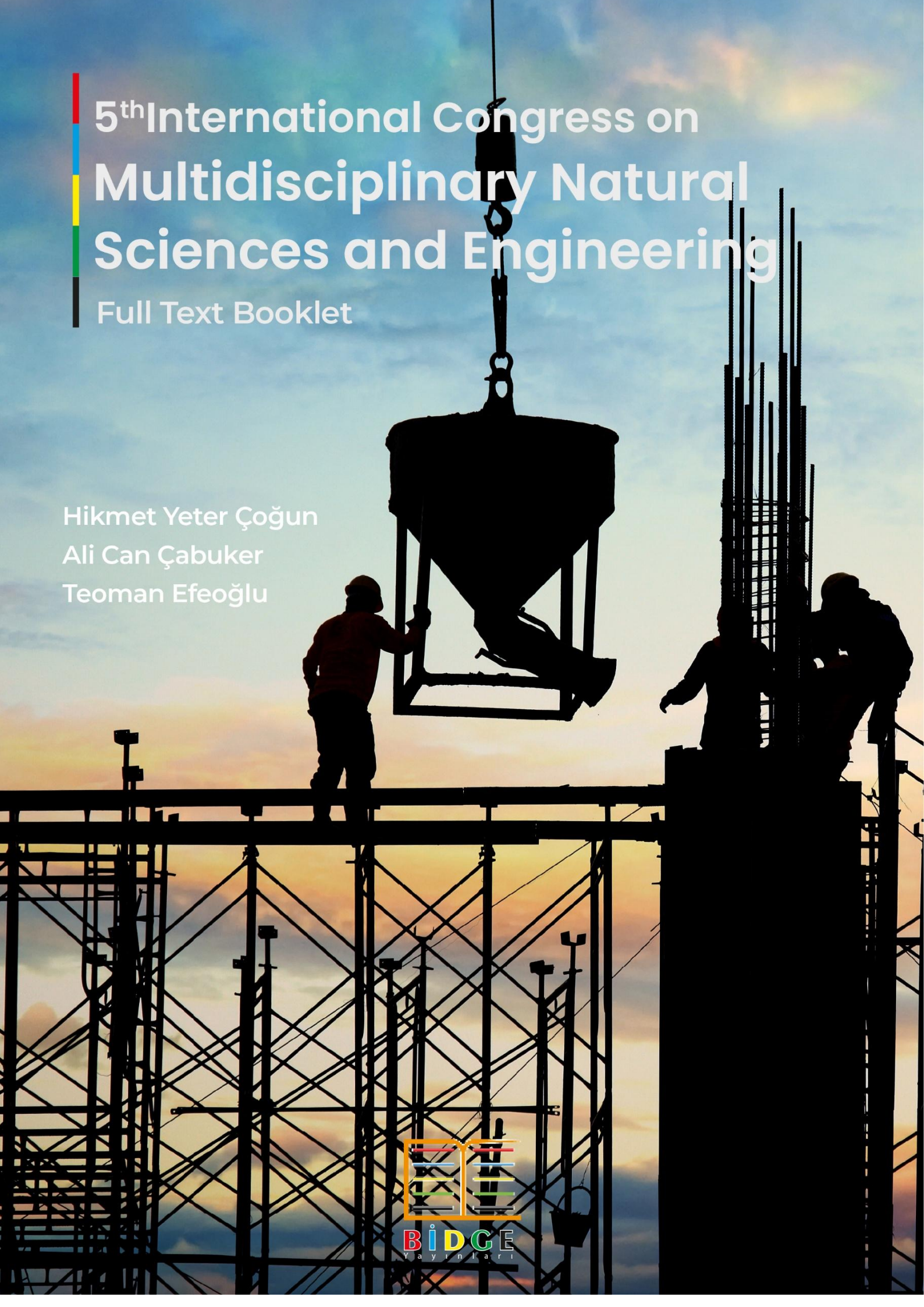

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ABSTRACTS

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Lightweight Early-Fusion Architecture for Accurate Multimodal Gas Leak Classification

RESUL BERKEM AYDEMİR[1]
BURCU DEMİRELLİ OKKALIOĞLU[2]

Abstract

Accurate classification of gas leaks is vital for public safety but remains challenging due to the limitations of single-modality systems such as electronic sensors or thermal cameras. Multimodal deep learning can combine complementary information from different sources; however, most existing approaches are too computationally heavy for real-time use on edge devices. To address this issue, we present a lightweight dual-branch early-fusion architecture that achieves both high accuracy and efficiency. The proposed model processes time-series sensor data using a compact Multilayer Perceptron and extracts spatial features from thermal images via a ShuffleNetV2 backbone. By synergizing the dense temporal feature extraction of the MLP with the spatial pattern recognition of ShuffleNetV2, the framework captures a comprehensive environmental representation that unimodal models miss. These feature vectors are merged through an early-fusion layer and fed to a final classification head. The approach was rigorously validated on the MultimodalGasData dataset, where it effectively resolved ambiguities between challenging classes, specifically minimizing false positives between harmless perfume and ambient air. Comparative experiments confirmed that this combination provides the best trade-off between performance and model size. The final model attains a test accuracy of 98.91% with only 338,160 trainable parameters. Remarkably, this architecture achieves an approximate 17-fold reduction in parameter count compared to standard high-performance backbones like EfficientNetV2B0, while maintaining equivalent precision. The results demonstrate that lightweight models can deliver near-state-of-the-art accuracy without sacrificing efficiency, making them suitable for real-time gas leak detection on edge devices.

Keywords: Multimodal Deep Learning, Early-Fusion, Lightweight Neural Networks, Edge Deployment, Gas Leak Classification

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Summarizing Customer Interactions and Automated Quality Assessment: A Case Study of Pronet Call Center

İBRAHIM ŞAHAN[1]
SUHAP ŞAHİN[2]
OSMAN MELIH TOLUNAY[3]
SALIH ŞEKER[4]

Abstract

This study presents a scalable architecture for the automatic summarization and quality evaluation of high-volume telephone calls, aiming to increase customer satisfaction and standardize the performance assessment of call center agents. The proposed AI-supported architecture seeks to prevent biased evaluations that may arise because traditional call quality monitoring processes and performance metrics such as call duration do not fully reflect customer satisfaction. The developed architecture is based on a Speech-to-Text layer that uses a DeepSeek model retrained for the Turkish language through transfer learning. The system is designed with an asynchronous queue structure to process more than 20,000 calls per day in parallel. Text transcriptions are evaluated for quality through department-based scoring algorithms, keyword and intent analyses via microservices. Analysis results are stored in databases to ensure fast query performance. The presented architecture enables continuous fine-tuning of the DeepSeek model with low-performance words and sentences and allows tracking of results, with the aim of continuously monitoring and optimizing call quality. In the quality evaluation phase, sample calls selected by team leaders are re-examined according to Pronet's tactical guidelines. At this stage, the system evaluates not only model accuracy but also the quality of customer interaction. In conclusion, this study offers an operationally viable, highly scalable AI architecture that addresses language-specific challenges and provides a holistic approach for summarizing customer interactions and performing automatic quality evaluation.

Keywords: Agent Performance Evaluation, Call Summarization, Call Evaluation, Call Center, Automatic Speech Recognition, Large Language Models

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Development of a Natural Language Processing-Based Digital Assistant System for Legal and Accounting Processes

SEDAT ÇELİK
SEZA DURSUN
SEMIH YAZICI
BAHAR ÖNEL

Abstract

This study presents the design and implementation of a Natural Language Processing (NLP)-based Digital Assistant System developed to support legal and accounting processes. The system aims to accelerate business operations, minimize human error, and enable fast, accurate access to information through AI-powered document understanding. The architecture is composed of three main layers: the Data Layer for secure storage and preprocessing of legal and financial documents, the Application Layer utilizing OpenAI GPT-3/GPT-4 and Transformer-based models for document classification and answer generation, and the Interface Layer, which allows natural language interaction through web and mobile applications.

Advanced NLP algorithms, including BERT and Retrieval-Augmented Generation (RAG), were integrated to enhance contextual understanding and response accuracy. Data processing followed strict GDPR and KVKK compliance, ensuring security and ethical handling of sensitive information. The system was developed through iterative prototyping, including user feedback from legal and accounting professionals, and tested in closed beta environments to evaluate performance in accuracy, response time, and usability.

Experimental results demonstrate significant improvements in information retrieval speed and process automation efficiency, reducing manual workload and errors. Future work will extend the system's capabilities to Human Resources, Procurement, and Customer Relations departments, aiming for a scalable enterprise-wide knowledge management solution.

Keywords: Accounting Automation, Legal Document Understanding, Retrieval-Augmented Generation (RAG)

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Corporate Email Awareness and Phishing Simulation: The Boyner Group Case Study

EMRE KURTI[1]
BATIN GÜLER[2]

Abstract

This study presents the design, implementation, and outcomes of a corporate phishing simulation program conducted at Boyner Group between June and September 2024. The project aimed to evaluate employees' cybersecurity awareness, identify potential vulnerabilities, and enhance organizational resilience against phishing attacks through periodic simulations. Each month, simulated phishing emails were sent to a fixed target group of 2,885 employees. The simulation content was dynamically adapted to reflect realistic business contexts, such as HR notifications or internal updates. Key performance indicators included the number of users who clicked on malicious links and the monthly click-through rate (CTR). Over four months, the campaigns recorded 812 total clicks from 11,540 email deliveries, yielding an average CTR of 7.03%. Monthly rates were 6.72% (June), 5.72% (July), 6.79% (August), and 8.94% (September).

Results indicate a temporary decrease in July followed by a sharp increase in September, suggesting that variations in message design, timing, or perceived authenticity may significantly influence employee susceptibility. The findings highlight that despite continuous awareness programs, a measurable portion of users remain vulnerable to phishing attempts. The study concludes that recurring phishing simulations provide valuable longitudinal insight into corporate awareness trends. Future work will focus on integrating demographic segmentation, behavioral tracking after click events, and A/B testing of phishing templates to better tailor awareness training and reinforce cyber hygiene across the organization.

Keywords: Phishing, Corporate Awareness, Cybersecurity Training, Email Simulation

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Elaeagnus angustifolia L. as a Bioprotective Agent Against Methacrylate Toxicity

AYTÜL UZUN AKGEYİK[1]

Abstract

Elaeagnus angustifolia L. is a plant known for its rich phenolic and flavonoid profile and its notable biological potential. In this study, the protective effect of the plant extract against methacrylate-induced toxicity was evaluated using the *Allium cepa L.* bioassay system. For methacrylate, applied as the positive control, the EC50 value was first determined and identified as 250 mg/L. In onions subjected to the *Allium cepa* test, methacrylate exhibited inhibitory effects on germination rate, root length, and bulb weight, and caused pronounced anatomical damage such as compression and irregular arrangement in the epidermal tissue of root tips, collapse and disorganization in vascular bundle tissues, flattened nuclei in cortex cells, and excessive cell wall thickening. Applications using 100 and 200 mg/mL *E. angustifolia* extract alone showed no toxic effects on physiological and cytogenetic parameters. When applied together with methacrylate, the extract increased the germination rate by 54% and 64%, respectively, supported root length and weight gain, elevated the mitotic index, and significantly reduced micronucleus formation and chromosomal abnormalities in a dose-dependent manner. Anatomically, especially in treatments with 200 mg/mL plant extract + methacrylate, methacrylate-induced damage in the epidermis, cortex, and vascular bundle tissues was markedly reduced. These findings demonstrate that the antioxidant and bioactive compounds of *E. angustifolia* leaf extract alleviate methacrylate-induced physiological, genotoxic, and anatomical toxicity. Furthermore, the results indicate that the plant possesses substantial potential as a sustainable and potent bioprotective candidate against environmental and chemical stress-induced damage in toxicological studies.

Keywords: *Elaeagnus angustifolia L*, Methacrylate, Genotoxic, Micronucleus.

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Investigation of the Fungal Pathogen *Batrachochytrium Dendrobatidis* in Amphibian Species of the Gediz Delta.

DOĞUKAN YÖRÜKOĞLU [1]
YUSUF BAYRAKCI [2]

Abstract:

Amphibians are vertebrates capable of living in both aquatic and terrestrial environments, and their high sensitivity to environmental changes makes them important indicators of ecosystem health. Their dual life cycle renders them vulnerable to various stressors across different habitats. This sensitivity is considered one of the primary factors underlying the global declines in amphibian populations observed since the late 20th century. More than 70% of amphibian species worldwide have experienced significant population losses. Infectious diseases play a critical role in these dramatic declines. In particular, chytridiomycosis, a fungal infection caused by *Batrachochytrium dendrobatidis* (Bd), is one of the leading causes of mass mortality events. This disease disrupts electrolyte transport in the epidermis, leading to osmoregulatory failure and, ultimately, the death of affected individuals. In this study, the presence or absence of Bd was investigated in amphibian populations of the Gediz Delta. Sampling was conducted between 2024 -2025 across multiple sites along the Gediz River and its surrounding areas. During fieldwork, swab samples were collected from captured amphibians, and the presence of the pathogen was assessed using molecular analysis through RT-PCR. Standard samples, as well as positive and negative controls, were included in the analysis, and all DNA samples were run in triplicate using Bd-specific primers and probes . The analysis of a total of 80 samples revealed no positive findings in any individual. These findings suggest that the study area doesn't currently pose a serious threat regarding Bd and that the pathogen isn't having a prominent negative impact on the amphibian populations. However, given that the spread of the pathogen can change rapidly depending on environmental variations, the continuation of regular monitoring and more comprehensive screening studies is essential for the long-term sustainability of amphibian populations in the region.

Keywords: *Batrachochytrium dendrobatidis*, Chytridiomycosis, RT-PCR.

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Use Of Algae, Bacterıa And Fungı In Plastıc Bıodegradable Medıum: A Revıew From The Perspectıve Of Bıologıcal Mechanısms And Statıstıcal Modelıng

AYSU BESLER[1]
ÖZLEM GÜRÜNLÜ ALMA [2]

Abstract

The increasing global environmental threat posed by plastic waste necessitates the exploration of alternative degradation methods, particularly for durable and widely used synthetic polymers such as polyethylene terephthalate (PET). Due to the chemical and physical durability of PET, its degradation can take up to hundreds of years in natural environments, leading to serious consequences such as long-term pollution, accumulation of toxic compounds, and disruption of ecosystem functions in both terrestrial and marine ecosystems. Therefore, biodegradation processes are emerging as a sustainable solution to reduce the environmental impact of PET waste. While numerous studies in the existing literature indicate that bacterial and fungal species accelerate PET degradation by producing enzymes that depolymerize PET, the potential mechanisms and contributions of microalgae to PET degradation have been relatively understudied. The high photosynthetic capacity of microalgae, their ability to form biofilms, and their potential to produce hydrolytic enzymes such as esterases suggest that they may serve as complementary biological agents in PET degradation. This study examines the biochemical, ecological, and statistical aspects of microbial consortia formed by microalgae, bacteria, and fungi in PET biodegradation, specifically discussing how microalgae-based approaches can fill the existing gap in the literature. Furthermore, the study aims to provide a comprehensive interdisciplinary perspective by addressing statistical modeling techniques used in the evaluation of biodegradation data. In this context, the study provides both a theoretical and methodological basis for future research on the biodegradation of PET plastics.

Keywords: plastic biodegradation, microalgae, fungi, bacteria, statistical modeling.

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Comparative Bioremediation Potential of Gram-Positive and Gram-Negative Bacteria in the Removal of Textile Dyes

ŞULE AYBÜKE DİKİCİAŞIK[1]
GİZEM TALAŞ[2]
BERKAN SOLMAZ[3]
İSA DÜZEL[4]
GÖKHAN CORAL[5]

Abstract

Wastewater from the textile industry constitutes a major environmental pollutant, primarily due to the synthetic dyes employed in dyeing processes. Effective treatment of these effluents prior to their release into the environment is therefore critical. This study investigates the potential application of microorganisms as biosorbents for the removal of textile dyes via biosorption. Two Gram-positive bacterial strains (Bacillus subtilis subsp. spizizenii ATCC 6633 and Bacillus cereus ATCC 14579) and two Gram-negative strains (Escherichia coli ATCC 8739 and Pseudomonas aeruginosa ATCC 27853) were evaluated as biosorbents. Experiments were conducted using four textile dyes: Methylene Blue, Methyl Orange, Congo Red, and Synozol Blue KBR, with stock solutions prepared at 1000 ppm (mg/L). The strain *Bacillus subtilis* subsp. *spizizenii* ATCC 6633 exhibited 98.35% removal efficiency for Congo Red dye under acidic pH conditions; B*acillus cereus* ATCC 14579 showed 99.21% removal of Methyl Orange dye at acidic pH; *Escherichia coli* ATCC 8739 achieved 92.21% removal of Methylene Blue dye under basic pH conditions; and *Pseudomonas aeruginosa* ATCC 27853 demonstrated 98.58% removal efficiency for Methyl Orange dye at neutral pH. The effects of dye concentration, and contact time on biosorption efficiency were systematically assessed. The results demonstrate that the tested bacterial strains can serve as effective biosorbents, with specific strains exhibiting higher removal efficiencies for particular dyes. These findings suggest that microorganism-based biosorption offers a cost-effective and environmentally sustainable approach for the treatment of textile wastewater.

Keywords: Bioremediation, Biosorption, Wastewater, Textile dyes, Microorganisms

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Machining Analysis of Mold Steels

YALÇIN ŞAFAK ŞEN[1]
HASAN DEMİRTAŞ[2]

Abstract

The machinability of tool steels is a critical parameter in the machining industry, directly influencing production efficiency, surface quality, and tool life. In the literature, various die steels and alloys (such as Toolox 44, DIN 1.2344 – AISI H13, DIN 1.2311 – P20, DIN 1.2312, DIN 1.2738, AISI 304 stainless steel, AA2219-T851 and AA7475-T7351 aluminum alloys) have been examined under different machining conditions. These studies highlight that cutting speed, feed rate, depth of cut, tool coatings, and cooling strategies play a decisive role in machinability performance.

Experimental findings generally indicate that low feed rates combined with medium cutting speeds provide better surface quality. While higher cutting speeds improve surface finish up to a certain level, excessive values accelerate tool wear and reduce productivity. The type of tool coating is also crucial: TiAlN and AlCrN coated carbide tools have been shown to extend tool life in hard steels, whereas ZrN-coated tools enhance surface finish particularly in aluminum alloys. Additionally, CBN and ceramic inserts offer advantages when machining hardened steels such as H13 at high speeds.

Furthermore, studies comparing dry and emulsion-assisted machining report different outcomes in terms of chip morphology, surface integrity, and dimensional stability. In dry machining, chips carry a significant portion of the heat away from the cutting zone, helping preserve the machined surface, while emulsion cooling tends to reduce surface waviness. Measurement methods often include surface roughness parameters (Ra, Rz), material removal rate (MRR), cutting forces, and tool wear.

This review systematically summarizes findings from various studies, providing a comprehensive literature base for material selection and machining parameter optimization in die and mold manufacturing.

Keywords: Tool Steels, Machinability, Machining, Mold Manufacturing, Cutting Tool.

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The Importance of Planned Maintenance and Predictive Maintenance Application

AHMET EVREN GÜCEK

Abstract

Predictive maintenance techniques help determine the condition of in-service horse-rod in order to predict when maintenance should be performed. This approach offers cost savings over routine or time-based preventive maintenance, because tasks are performed only when warranted. To evaluate equipment condition, predictive maintenance utilizes nondestructive testing technologies such as sound level and vibration measurements, oil and thermal camera analysis, and other specific online tests.
Maintenance activities are decisive in terms of sustainability and cost of production. For this reason, it is important to use the right care method correctly. It is more appropriate for machines to implement methods that can be more efficient and healthier than malfunction-based maintenance. Applying predictive maintenance methods helps to ensure timely and accurate maintenance. Vibration and sound frequency analysis; oil and thermal camera analysis and equipment-specific data can be made, the analysis of the status of the equipment to measure and evaluate the important data can be obtained through predictive maintenance.
In this study, predictive maintenance applications are introduced in a rendering factory. The most useable method of the predictive maintenance applications which is Vibration Analysis is shown on the animal fat decantor. In addition to vibration analysis, temperature analysis is used for supporting to vibration analysis. With predictive maintenance applications, efficiency, cost reduction and failure-induced breakdown improvements are mentioned.
Keywords: Predictive Maintenance, Vibration Analysis, Efficiency Increasing, Cost Reduction.

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Assessing the Impact of Biophilic Tiny House Design on Building Energy Performance and Carbon Emissions

ONUR ÖZSOLAK[1]

Abstract

Increasing urbanization and greenhouse gas emissions from the housing sector, limited natural resources, and shrinking living spaces are making small-scale, high-energy-performance, sustainable, energy-efficient, and nature-integrated residential building typologies strategic. This study aims to reveal the impact of biophilic design principles on energy consumption and carbon emissions at the tiny house scale. The study evaluates the contribution of biophilic elements (natural lighting, passive heating/cooling, natural ventilation, material selection, and orientation decisions) not only to spatial/psychological comfort but also to annual primary energy consumption and CO_2-equivalent emissions.

The methodology begins by reviewing biophilic design, sustainable housing, and tiny house literature to classify design parameters directly related to energy efficiency and emission reduction. Subsequently, the tiny house models examine building envelope features, daylighting openings, shading elements, and orientation scenarios. These scenarios are then evaluated for annual heating and cooling loads, lighting energy requirements, total primary energy consumption, and CO_2 equivalent emissions across three levels: (i) traditional design, (ii) limited biophilic integration, and (iii) holistic biophilic design.

The holistic biophilic design scenario is projected to significantly reduce the need for artificial lighting and mechanical heating/cooling, particularly through optimization of natural lighting and passive air conditioning strategies, resulting in a corresponding reduction in annual energy consumption and operational emissions. It also demonstrates that the effective use of natural lighting reduces energy consumption by reducing the need for artificial lighting, while biophilic elements contribute positively to user comfort and psychological well-being in small spaces. By numerically discussing the energy performance and emission reduction potential of biophilic design at the tiny house scale, the study aims to provide a decision-supporting framework for sustainable housing policies and ecological micro-settlement models.

Keywords: Biophilic design, Sustainable architecture, Building energy performance, Natural lighting, Carbon emissions

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Performance Evaluation of Hargreaves and Allen Models for Solar Radiation Estimation in Dublin Using a 5-Year Dataset (2020–2024)

CAN EKİCİ[1]

Abstract

In this study, five years of meteorological data (2020–2024) from Dublin Airport were used to calibrate and evaluate the Allen and Hargreaves solar radiation estimation models. The models showed similar statistical performances. Although the predictive accuracy was moderate, the results indicate that both models can partially represent solar radiation under Dublin's climate. In future studies, models incorporating parameters such as humidity or cloud cover may be tested to assess whether they provide improved estimation accuracy.

Keywords: Allen model; Hargreaves model; Dublin, solar radiation

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Population Dynamics and Damage Assessment of Cydalima Perspectalis (Walker, 1859) (Lepidoptera: Crambidae) In Boxwood Areas of Karabük Province, Türkiye

ESRA NUR GÜNAYDIN[1]
MEHMET ÇOLAK[2]

Abstract

Doğu Asya orijinli istilacı bir tür olan Şimşir Güvesi *Cydalima perspectalis* (Walker, 1859) (Lepidoptera: Crambidae), Avrupa'da 2007, Türkiye'de ise 2011 yılında ilk kez kaydedilmiştir. Larvalar şimşir (*Buxus* spp.) yapraklarında beslenerek şiddetli defoliasyona, sürgün kabuklarını kemirerek kambiyum tabakasında hasara ve nihayetinde bitki ölümlerine neden olmaktadır. Bu çalışmada, *C. perspectalis*'in Karabük ili şimşir alanlarındaki popülasyon dinamiği ve zarar durumunun belirlenmesi amaçlanmıştır.

Araştırma, Mart 2024 - Şubat 2025 periyodunda Karabük ilinde şimşir varlığı bilinen 20 lokalitede yürütülmüştür. Ön surveylerde yalnızca Kavaklı Orman İşletme Şefliği Arboretumu'nda (32.41440°D, 41.168326°K; 1108-1126 m) canlı şimşir popülasyonu tespit edilmiştir. Arazi çalışmaları, vejetasyon döneminde biweekly, kış aylarında aylık periyotlarla gerçekleştirilmiştir. Sistematik örnekleme yöntemiyle 200 şimşir bitkisi incelenmiş, zarar skalası (0-5) kullanılarak defoliasyon oranları değerlendirilmiştir. Popülasyon dinamiği feromon ve ışık tuzakları ile izlenmiştir. Laboratuvar çalışmaları kontrollü koşullarda (25±2°C, %65±5 RH, 16L:8D fotoperiyot) yürütülmüştür.

C. perspectalis'in çalışma alanında yılda 3 generasyon verdiği belirlenmiştir. İlk ergin uçuşu Mayıs ortasında (15-20 Mayıs), ikinci generasyon Temmuz sonu-Ağustos başında (28 Temmuz-5 Ağustos), kısmi üçüncü generasyon ise Eylül ortasında (12-18 Eylül) gözlenmiştir. Popülasyon yoğunluğunun ikinci generasyonda maksimum düzeye ulaştığı tespit edilmiştir.

İncelenen bitkilerin %54.1'inde şiddetli (skor 3-4) veya çok şiddetli (skor 5) zarar belirlenmiştir (defoliasyon >%50). Fototaksi deneylerinde ergin bireylerin ışığa karşı nötr davranış sergilediği, ışık tuzaklarının bu tür için etkili olmadığı belirlenmiştir.

Çalışma sonuçları, *C. perspectalis*'in Karabük ili şimşir ekosistemi için kritik bir tehdit oluşturduğunu ortaya koymaktadır. Zararlının etkili kontrolü için: (i) Entegre Zararlı Yönetimi (IPM) stratejilerinin implementasyonu, (ii) Mücadele uygulamalarının özellikle L1-L2 larva dönemlerine odaklanması, (iii) Doğal düşmanların potansiyelinin araştırılması önerilmektedir..

Anahtar Kelimeler: *Cydalima perspectalis*, istilacı tür, popülasyon dinamiği, defoliasyon, *Buxus* spp., Karabük

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Technical Specifications of Fishing Gears in Edirne Province and Fishermen's Problems

CEM TEBEROĞLU[1]
ALKAN ÖZETKİN

Abstract

This study examines the professional problems, social characteristics, and fishing gear usage of 167 fishermen engaged in inland water and marine fisheries in Edirne. According to the findings, the most significant challenges faced by fishermen include economic insufficiency, safety issues in fishing areas, technical limitations, marketing difficulties, and adverse environmental conditions.
Among inland water fishermen, the major problems consist of low water levels—especially evident in the Süloğlu and Altınyazı Dam Lakes due to increasing drought—growth of invasive species, and insufficient engine power. Most fishermen operate with small boats equipped with 0–20 HP engines, which reduces safety and makes it difficult to reach fishing grounds. Limited marketing opportunities in inland regions force fishermen to sell their products at low prices.
For fishermen operating along the Meriç River, the requirement to fish within a "1st degree military restricted zone" creates significant security and accessibility challenges. Fishing along the border line imposes additional difficulties due to the need for military permits and challenging transportation conditions.
Marine fishermen mainly struggle with high fuel costs, long distances to productive fishing areas, dolphin-related damage to nets, and harsh weather conditions. In the Gulf of Saros, dolphin damage to gillnets is a frequent issue, causing substantial economic losses. Fuel expenses for trawl and purse seine vessels pose a threat to the sustainability of marine fishing operations.
Shortcomings in cooperative infrastructure, insufficient cold storage facilities, and inadequate physical conditions in some harbors also constitute major complaints among fishermen. More than 65% of fishermen consider their income insufficient. Additionally, the declining interest of younger generations in the profession presents a long-term risk for the future of fisheries.
Keywords: Lake, fisherman, river, gulf

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A Geospatial Multi-Layered Framework for Quantifying Urban Vulnerability and Service Accessibility in Seismically Active Metropolitan Contexts: The Case of Istanbul

GÖKALP KÖSEOĞLU[1]
ŞULE TAĞTEKIN[2]

Abstract

Urban vulnerability in seismically active megacities represents a complex interplay between physical exposure, socio-economic fragility, and inequitable spatial distribution of critical services. This study develops a geospatially integrated analytical framework for quantifying and visualizing urban vulnerability through the convergence of seismic hazard modeling and service accessibility analytics. Employing the Maptriks Location Analytics System, heterogeneous datasets were consolidated, including Peak Ground Acceleration (PGA) rasters from AFAD, active fault geometries from MTA, and socio-demographic indicators from TÜİK. Using catchment-based network analysis (500-meter and 5-minute walking thresholds consistent with AFAD standards), the model delineates service reachability zones across Istanbul and examines disparities in accessibility to health, education, transport, and emergency assembly facilities.

Empirical analyses focus on Avcılar and Esenyurt, two high-risk districts characterized by high population densities, substandard infrastructure, and socio-economic heterogeneity. Results indicate that over 40% of residents remain beyond effective service catchment, while numerous essential facilities coincide spatially with high-PGA (>0.3g) cells, heightening systemic fragility during seismic events. The study contributes to the emerging discourse on spatial equity in disaster preparedness, demonstrating that the integration of hazard data and accessibility modeling yields more precise vulnerability indices. The proposed framework operates as a decision-support mechanism for risk-informed urban governance, enhancing the capacity of municipalities to prioritize mitigation investments, strengthen resilience, and institutionalize evidence-based disaster risk management.

Keywords: Urban Vulnerability, Seismic Risk Assessment, Spatial Accessibility, Location Analytics.

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Research on the Use of Selenium against Salt Stress in Plants and Its Convenience for Humans – A Review

KAAN FETHI KAYA[1]
EDA ZEKAİ[2]

Abstract

Selenium (Se), a micronutrient, is among the components necessary for the life of humans, animals, archaea and some microorganisms. The beneficial effects of Selenium used in appropriate concentrations have been proven by various studies. In addition, medical studies have shown that Selenium deficiency causes vital diseases. In order to prevent these diseases, this element should be taken with appropriate diets. The positive effects of Selenium, which has a great importance in agricultural besides human and animal health, on abiotic stress factors are also clearly seen. Salt stress, which is one of the most important agricultural stress factors in the world, negatively affects the yield and quality of agricultural products. External supplementation of selenium to agricultural products provides the formation of selenoproteins. Selenoproteins produced by plants reduce the accumulation of reactive oxygen species (ROS) by increasing antioxidant enzyme activity and improve the harmful effects of salinity stress on plants. İn this review, the importance of selenium in agriculture was emphasized and its physiological, morphological, and biochemical effects on plants under salt stress conditions, as well as its molecular effects were evaluated. Furthermore, the usability of this element in agriculture, its positive effects on plants, and the potential contributions of selenium applied to agricultural products to human diets were also tackled. Consequently, it is thought that while increasing the tolerance level of our species and varieties that are economically important but have weak resistance to abiotic stress factors, a synergistic effect can be created that can also support human health with the products obtained.

Keywords: Selenium, Abiotic Stress, Salt Stress, Selenoproteins, Antioxidant

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Effect of Microencapsulating Mixtures on the Encapsulation Efficiency

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ZEYNEP YILDIRIM[2]
FIRUZE ERGİN ZEREN[3]
AHMET KÜÇÜKÇETİN[4]

Abstract

In this study, the effect of the whey protein isolate (WPI) ratio in microencapsulating mixture, which includes 1% sodium alginate (SA), on the release behaviour of model material (Rhodamine B dye, RhB) from microcapsules was investigated. The microencapsulating mixtures containing 1% SA (SA), 1% SA + 0.25% WPI (W0.25), 1% SA + 0.5% WPI (W0.5), and 1% SA + 1% WPI (W1) were prepared. RhB was added to the mixtures at a concentration of 15 ppm. The microcapsules were obtained with the extrusion method using $CaCl_2$ solution (1 M), and the amount of RhB was analyzed using an UV/Vis spectroscopy at 550 nm.

The mixtures of SA and W1 exhibited the lowest (17.50 mPa·s) and highest (20.00 mPa·s) viscosity values, respectively. The encapsulation efficiency values ranged between 51.74% and 79.00% in the microcapsules. As the proportion of WPI in the microencapsulation mixture increased, the viscosity values of the mixtures and the encapsulation efficiency values also increased. The mixture of W1 had the lowest surface area and perimeter values, representing the most compact capsule morphology, which contributed to the restriction of RhB diffusion into $CaCl_2$ solution. Conclusively, the findings demonstrated that the altering the ratios of WPI affects the release behaviours.

Keywords: Extrusion method, Rhodamine B, Sodium alginate, Whey protein isolate

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Identification Of the Functional Requirements of the Traditional Turkish Bagel and Development of Flour Formulation

FATİH AKYÜZ

Abstract

This research aims to scientifically characterize the flour composition and rheological parameters that determine the sensory and structural properties of traditional Turkish bagel. Bagel is a baked product distinguished by its crispy crust, elastic–dense internal structure, unique aroma, and typical pore morphology. The ash content, protein level, gluten quality, starch–protein interactions, water absorption capacity, and fermentation behavior of the flour play a decisive role in the formation of these qualities. In particular, ash content in the range of 0.7–0.8% is noted in the literature as a critical requirement for optimizing the product's internal color, hardness, and crispness properties. However, the limited number of scientific studies on the quality criteria of bagel flour highlights the lack of knowledge in this area.

Within the scope of this study, bagel flour samples were evaluated using compositional (ash, protein, carbohydrate fractions, fat, and fiber) and rheological (farinograph, extensograph, alveograph) tests. Gluten functionality was analyzed through SDS sedimentation, gluten index, and solubility profiles. Additionally, in the industrial production process, the resistance to twisting, the compatibility of molasses-sesame coating, the shaping stability, and the crust-crumb relationship after baking were examined through field observations.

The findings indicate that flour with high protein and optimal ash content provides significant improvements in the volume development, pore structure, crust characteristics, and shelf life of bagel. Consequently, the study contributes to the scientific development of product-specific, high-performance flour formulations by defining quality criteria specific to bagel production.

Keywords: bagel flour quality, rheological properties, gluten matrix stability

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Recent Advances in Palm Oil Based Oleogels

SEVAL YÜKSEL[1]
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Abstract

Palm oil is the world's most widely used vegetable oil, holding an important place in the global food supply thanks to its very low cost, high stability against oxidation and long shelf life. The high amount of saturated fatty acids (SFAs) found in Crude Palm Oil (CPO) is its main drawback and is associated with various health problems. High Oleic Palm Oil (HOPO), which is considered rich in healthy compounds, is valued for its cardiovascular benefits. Oleogelation technology is used to facilitate the replacement of unhealthy saturated and trans fats. Oleogel is essentially a solid-like network created by structuring healthier, unsaturated liquid fats without any significant chemical modification. Palm-based oleogels have shown potential to replace commercial margarines and shortenings, generally exhibiting comparable thermal and physical properties. Palm-based oleogels are typically structured using food-grade materials known as oleogelators, such as natural waxes such as beeswax (BW) and carnauba wax (CW), or food-grade hydrocolloids in hydrogel-oleogel composites. These structured oils are versatile and have been extensively studied as partial or complete replacements for traditional solid fats in a wide range of food products. Common applications where palm-based oleogels have been successfully tested include chocolate spreads, where they improve texture and fatty acid composition; bakery products such as cookies and cakes, where they serve as shortening or margarine substitutes; and dairy alternatives, such as replacing fat in ice cream to improve nutritional profile while maintaining stability. Overall, these oleogels are a keyway to make foods healthier by reducing saturated and trans fats without compromising quality.

Keywords: palm oil, oleogelation, oleogels, saturated fatty acids, fat replacement

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Kinematics of Fracture Systems in the Akpınar-Çiçekdağı (Kırşehir) Region: Statistical Analysis of Location-Based Field Measurements

ENGIN EKDUR[1]
YAŞAR EREN[2]

Abstract

The Akpınar-Çiçekdağı region, situated at the northern margin of the Central Anatolian Crystalline Complex (Kırşehir Massif), exhibits a complex structural architecture characterized by a diverse lithostratigraphy ranging from Paleozoic basement to Quaternary cover and a history of superimposed polyphase deformation. This study focuses exclusively on the statistical analysis of systematic fracture and joint measurements obtained directly from the field, independent of remote sensing data, to decipher the brittle deformation mechanisms and dominant stress regimes in the region.

Within the scope of the study, a total of 1,887 fracture planes were measured from 27 distinct stations representing the metamorphic basement, Upper Cretaceous magmatics and Eocene-Pliocene sedimentary cover units. The obtained data were converted into rose diagrams for each location, and their geometric relationships with regional structural elements (active faults and fold axes) were analyzed in detail.

The results reveal two dominant orthogonal and diagonal fracture systems developed across the region: (1) Northeast-Southwest (N65°-75°E) trending shear fractures, which run parallel to the Seyfe and Manahözü fault zones and represent the regional right-lateral strike-slip regime; and (2) North-South (N10°W-N10°E) trending extensional (tension) fractures kinematically associated with this system. Location-based evaluations demonstrated that lithological age and rock type exert significant control over fracture patterns. While the Paleozoic metamorphic basement and Cretaceous magmatics exhibit multi-directional (polymodal) and complex fracture sets due to the interference of cooling joints and inherited tectonic signatures, younger cover units (specifically the Kızılırmak Formation) display more regular and unimodal fracture systems. These findings prove that the fracture network in the region did not develop randomly but was shaped under the strict control of the current tectonic stress field (NE-SW compression and associated strike-slip deformation).

Keywords: Structural Geology, Fracture Analysis, Rose Diagram, Kırşehir Massif, Kinematics

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Integrated Analysis of Lineament (Fault–Fracture) Relationships in the Akpınar–Çiçekdağı (Kırşehir) Region

ENGIN EKDUR[1]
YAŞAR EREN[2]

Abstract

Located at the northern margin of the Central Anatolian Crystalline Complex (CACC), the Akpınar–Çiçekdağı region exhibits a complex structural architecture shaped by superimposed paleotectonic and neotectonic deformation phases. This study integrates field-based structural data with GIS-driven automatic lineament analysis to decode the fault and fracture network of the region. Detailed geological mapping was combined with the kinematic analysis of 374 fault planes and 1,887 fracture measurements collected from Paleozoic metamorphic basement, Upper Cretaceous magmatics, and Cenozoic cover units. Additionally, lineaments were automatically extracted from Digital Elevation Models (DEM) using multi-azimuth hillshade techniques to validate field observations.

The results reveal two dominant fault trends: a primary NE-SW set (N40°–55°E) and a secondary NW-SE set (N55°W), which are kinematically consistent with the right-lateral strike-slip geometry of the active Seyfe and Manahözü fault zones. Rose diagram analyses of fracture data indicate a prevailing N-S (N4°E) trend associated with extensional components and a secondary NE-SW trend related to shear stresses. A high correlation was observed between the automated lineaments derived from 90°/270° hillshade maps and the field-measured fracture networks.

Collectively, the structural data suggest that the region's morphotectonic framework is controlled by the transition from a Paleogene compressive regime (NE-SW shortening) to a Neotectonic strike-slip regime governed by the Kayseri-Sivas tectonic province. The geometric discordance between the Paleotectonic fold axes (sub-horizontal, ~E-W trending) and the brittle fracture systems confirms that the current lineament architecture is primarily driven by Miocene–Quaternary reactivation. This integrated approach demonstrates that the fracture network in the Akpınar–Çiçekdağı region is not random but is strictly controlled by the regional transcurrent tectonic stress field.

Keywords: Kinematic Analysis, Lineament Analysis, Neotectonics, Fracture Network, GIS-based Structural Analysis

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Investigation of the Morphotectonic Evolution of the Akpınar–Çiçekdağı (Kırşehir Massif) Region Using GIS and Structural Analysis

ENGIN EKDUR[1]
HUZAELY LATİEF SUNAN[2]
YAŞAR EREN[3]

Abstract

The Akpınar-Çiçekdağı (Kırşehir) region, located in the northern part of the Kırşehir Massif, exhibits a complex topography shaped by the interaction of active tectonic processes and erosional forces. This study employs GIS-based quantitative morphometric analysis methods to determine the relative tectonic activity level of the region. Six fundamental geomorphic indices were calculated: Basin Shape (B_S), Stream Length-Gradient Index (S_L), Valley Floor Width-to-Height Ratio (V_f), Basin Asymmetry Factor (A_F), Hypsometric Integral (H_i), and Mountain Front Sinuosity (S_{mf}).

The analysis results indicate a heterogeneous tectonic characteristic in the drainage basins of the region. B_S and A_F values classified the basins into three tectonic activity classes; specifically, basins numbered 35, 47, 65, and 81 were identified as having high tectonic activity (Class I), while others exhibited moderate to low activity. The variation of S_L values between 10 and 1,962 points to lithological and tectonically controlled anomalies in river profiles along fault zones. The correlation of S_{mf} (1.37–2.69) and V_f values revealed that the majority of mountain fronts fall into Class II and Class III categories, suggesting that erosional processes are becoming more dominant compared to tectonic uplift. The concentration of Hypsometric Integral (H_i) values in the 0.4–0.5 range confirms that the regional topography is in a "mature" stage.

These findings demonstrate that while the Akpınar-Çiçekdağı region remains tectonically active, uplift rates vary regionally (ranging from 0.05 mm/yr to >1 mm/yr), and the landscape shows a tendency to equilibrate through erosional processes.

Keywords: Morphometric Indices, Geomorphic Analysis, Kırşehir Massif, Tectonic Activity Classes, Drainage Basin Analysis.

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Dose-Dependent Induction of Apoptosis and Ferroptosis by Resveratrol in MDA-MB-231 Cells: A Comparative Gene Expression Analysis

KÜBRA AÇIKALIN COŞKUN[1]

Abstract

This study aimed to investigate whether Resveratrol induces not only apoptosis but also ferroptosis in MDA-MB-231 cells in a dose-dependent manner. The effects of Resveratrol were compared with those of standard apoptosis (Staurosporine) and ferroptosis (Erastin) inducers to evaluate the pathway specificity at the gene expression level.

To determine the 48-hour IC_{50} values of Resveratrol, Staurosporine, and Erastin in MDA-MB-231 cells, MTT assays were performed.Based on these results, cells were treated with Resveratrol at 100, 226.4 (IC_{50}), and 300 µM for 48 hours. Positive control groups were treated with Staurosporine (0.528 µM) and Erastin (12.67 µM) as classical apoptosis and ferroptosis inducers, respectively.The expression levels of apoptosis-related genes (CASP3, BAX, BCL2) and ferroptosis-related genes (GPX4, SLC7A11, ACSL4) were quantified using RT-qPCR. Gene expression changes were calculated via the ΔΔCt method, using GAPDH as the reference gene.

The 48-hour IC_{50} values were determined as 226.4 µM for Resveratrol, 0.528 µM for Staurosporine, and 12.67 µM for Erastin. At 100 µM Resveratrol, a marked increase in apoptotic gene expression was observed (CASP3: ↑3.2-fold; BAX: ↑2.5-fold; BCL2: ↓0.6-fold). In contrast, at the IC_{50} dose and especially at 300 µM, apoptotic gene activity declined, while ferroptosis-related genes exhibited substantial modulation (GPX4: ↓0.3-fold; ACSL4: ↑3.1-fold). Positive control groups confirmed the pathway-specific gene activation of

This study demonstrates that Resveratrol can induce both apoptosis and ferroptosis in MDA-MB-231 cells in a dose-dependent manner.While lower concentrations predominantly activated apoptotic responses, higher doses shifted the cellular response toward ferroptosis.To the best of our knowledge, this is the first comparative gene-level analysis to characterize the dual cell death mechanisms triggered by Resveratrol in this breast cancer model.The findings may contribute to the development of novel therapeutic strategies targeting alternative cell death pathways in treatment-resistant breast cancer subtypes.

Keywords: Resveratrol, Apoptosis, Ferroptosis, Triple-negative breast cancer, Gen expression

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Multi-Domain Feature Extraction and Band-Specific Analysis for EEG-Based Epilepsy Classification: A Comparative Machine Learning Approach

HAMED KAGHAZCHI[1]

Abstract

Electroencephalography (EEG) is a mainstay of epilepsy diagnosis; however, EEG signals are non-linear and non-stationary and present a challenge to seizure classification with reliability. The focus of this study is to improve automated epilepsy diagnosis by carrying out a comparative study of multi-domain feature extraction and band-specific analysis on the University of Bonn EEG dataset. EEG signals were preprocessed by applying a 50 Hz notch filter and breaking down into intrinsic frequency bands (Delta, Theta, Alpha, Beta, Gamma) with a 4th-order Butterworth filter applied to each. Features such as mean, variance, skewness, kurtosis, and Shannon entropy were computed on three domains: time domain, frequency domain (with discrete Fourier transform), and time–frequency domain (with discrete wavelet transform of Daubechies-6 order). Four supervised classifiers (k-Nearest Neighbor (KNN), Support Vector Machine (SVM), Decision Tree (DT), Linear Discriminant Analysis (LDA)) were trained and tested on a 5-fold cross-validation strategy. Results proved that Decision Tree and RBF-SVM resulted in the best accuracy (above 0.97) and sensitivity (above 0.96) for all domains, with LDA exhibiting relatively constant performance (~0.94–0.95 sensitivity) and KNN with inferior domain-based performance (best accuracy being 0.87 with sensitivity 0.74 for the time domain). The values of specificity were kept near perfect, with DT and LDA performing 100% in all domains. It was overall seen that time–frequency domain features provided balanced characterization of data, with the best classifiers being those with a non-linear decision boundary (SVM, DT) to handle complex dynamics of EEG signals. The findings highlight the clinical promise of automated domain-based machine learning to arrive at robust as well as accurate epilepsy classification.

Keywords: Electroencephalography (EEG), Epilepsy Classification, Feature Extraction, Machine Learning, Time–Frequency Analysis

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Awareness of construction technicians and civil engineers working in the construction sector regarding sustainable environment and green building certification systems

MEHMET ANIL KIZILASLAN[1]

Abstract

This study investigates the awareness and perceptions of construction technicians and engineers regarding sustainable environmental practices and green building certification systems. The research sample includes 89 professionals—37 construction technicians and 52 civil engineers—working across different regions of Turkey. Using a quantitative research design, the study employed a structured questionnaire to collect data, which were analyzed through both independent samples t-tests and Mann–Whitney U tests to determine differences between groups. The results indicate that the concept of green buildings is widely recognized in the Turkish construction sector; however, the level of awareness concerning national green building certification systems remains considerably limited. Engineers generally demonstrated higher levels of knowledge and awareness of sustainability issues compared to technicians. Moreover, participants with longer professional experience exhibited a stronger understanding of sustainable practices and environmental standards. Despite perceiving certification systems as costly, most respondents expressed a willingness to adopt environmentally friendly and energy-efficient design principles even in the face of short-term cost increases. The findings emphasize the importance of professional training programs, awareness campaigns, incentive mechanisms, and government policies to enhance sustainability awareness and implementation. Ultimately, this study contributes to both the academic literature on sustainable construction and the practical advancement of environmentally responsible practices within the Turkish construction industry.

Keywords: Sustainable environment, green building certification systems, awareness

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Trending Behavior Of Flow Time Series In The Firat Basin: Monthly, Seasonal And Annual Scale Evaluation

GÜLÇIN TANAS SAVAŞ[1]
NEŞE ERTUGAYI[2]

Abstract

Water is an essential natural resource and a fundamental element for sustaining life. Throughout history, it has shaped human societies and played a determining role in the development of civilizations. The growth and progress of communities have often depended on the presence and accessibility of water resources. Today, the effective and efficient use of water, the prevention of water pollution, and the increase in per capita water availability have become more critical than ever.

The uneven global distribution of water resources creates significant environmental challenges. While excessive water causes floods and inundations, water scarcity results in drought and related problems. Under current climate conditions, Turkey is experiencing the impacts of global climate change in the form of reduced water resources, prolonged droughts, heat waves, more frequent and intense flooding, and decreased agricultural productivity.

Global climate change also alters the hydrological cycle, leading to shifts in essential hydrometeorological variables such as precipitation patterns, evaporation rates, surface runoff, and groundwater levels. Therefore, long-term analysis of streamflow trends is vital for the sustainable management of water resources. This study investigates trend changes in hydrological time series using a 70-year dataset from the D21A001 streamflow observation station located in the Euphrates Basin.

The research employs both classical and innovative statistical methods, including the Innovative Şen Trend Method (YŞTY), Şen Trend Slope Method (ŞTEY), Sequential Mann-Kendall test (SQMK), Spearman's Rank Correlation, and the Mann-Kendall (MK) test. Through these approaches, the study analyzes the direction of statistically significant streamflow trends—whether increasing, decreasing, or stable—the magnitude of these trends, and potential change points over time. The findings demonstrate the spatial and temporal variability of hydrological conditions within the Euphrates Basin. They provide valuable insights for developing basin-scale water management strategies and evaluating regional impacts of climate change.

Keywords: Trend analysis, Flow data, Euphrates basin

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Smartphone Selection with AHP (Analytical Hierarchy Process), Fuzzy MOORA (Multi Objective Optimization on the basis of Ratio Analysis) and Fuzzy TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) Methods

SELIN İNCEKUL[1]

Abstract

Technology is becoming an increasingly indispensable part of our lives. Smartphones are a clear example of this. Today, technological advancements lead to a wide variety of smartphone models. People's demands and expectations are constantly evolving. Smartphones with new features are emerging. While this may seem appealing at first glance, it actually causes people to experience significant challenges when choosing a smartphone. The criteria for phone features also vary by age group. This study reviewed the literature and identified six important criteria for phone selection: camera, battery, screen size, memory (GB), weight, and color. These criteria were rated on a scale of 0 to 9 by 10 people aged 22-25. University students were observed during their smartphone selections. The AHP (Analytic Hierarchy Process) method was applied to the obtained data to calculate the weights of the criteria. Three smartphones in the same price range were then evaluated by three decision-makers with a deeper understanding of the technical details. In this evaluation, the best smartphone model was selected using the fuzzy MOORA (Multi-Objective Optimization Based on Ratio Analysis) and fuzzy TOPSIS (Ideal Solution Similarity Rank Preference Technique) methods. The aim was to compare two different fuzzy decision-making methods. The study yielded the same rankings with both methods, and Model-2 was selected as the first model.

Keywords:AHP Method, Fuzzy TOPSIS Method, Fuzzy MOORA Method, Smartphone Selection, Multi Criteria Decision Making.

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An Efficiency Study Conducted Using Method Studies in the Dyehouse Department of a Machinery Manufacturing Company

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MUHAMMET SEFA GÖKTAŞ[2]

Abstract

This study focuses on improving the efficiency of the paint shop (dyehouse) department within a machinery manufacturing company through the application of method study techniques. The main objective is to identify and eliminate unnecessary operations, simplify working methods, and reduce time losses in the painting process. In the current situation, workpieces are hung manually using wires before painting, which causes variability in setup time and worker effort. To address this issue, a new hanging method using standardized S-hooks was designed and implemented.

The redesigned hanging system provided a more stable and faster setup, ensuring consistent alignment and reducing the physical workload of operators. Preliminary observations showed a significant decrease in preparation time, leading to a noticeable improvement in overall process efficiency. A time study will be conducted to quantitatively measure the time savings and validate the performance improvement achieved by the new method.

The study demonstrates how applying a systematic method study can lead to measurable productivity gains in industrial environments, especially in manual operations such as painting and assembly. The results are expected to contribute to future improvement projects within the company and similar manufacturing settings

Keywords: Method Study, Productivity Improvement, Paint Shop, Time Study, Industrial Engineering

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Comparative Analysis of Organic Compounds in Larval Habitats of *Culex pipiens* and *Culiseta longiareolata*

PARDİS HEYDARPOUR[1]
GÖKÇE MEREY[2]

Abstract

Mosquitoes are vector organisms with a wide global distribution and significant ecological importance. The species examined in this study, *Culex pipiens* and *Culiseta longiareolata*, represent two important mosquito groups that are adapted to wetland environments and complete their larval development in aquatic habitats. The habitats in which mosquitoes spend their larval stages are among the key ecological factors influencing their biology, population dynamics, and potential roles as vectors.

Culex pipiens generally prefers polluted and stagnant waters with high organic matter content (such as sewage systems, and wastewater), whereas *Culiseta longiareolata* reproduces mostly in temporary water bodies and clean or semi-clean aquatic environments (such as rainwater pools, clean ponds, or water storage). The preference of this species for less polluted habitats highlights the ecological distinctions between the two species.

In this study, it was aimed to compare the organic matter content of the larval development environments and to identify characteristic organic compounds that may influence species-specific habitat preferences of these mosquito species which are important for public health. Samples collected from the larval habitats of both species were extracted using different organic solvents, and the resulting fractions were analyzed by gas chromatography-mass spectrometry (GC-MS). As a result of the analyses, the compound cinnamoyl piperidine was detected exclusively in the larval waters of *Culiseta longiareolata*. This compound has been associated in the literature with antimicrobial and neuroprotective potential, and its presence is considered a noteworthy finding in both ecological and biotechnological contexts.

Keywords: *Culex pipiens*; *Culiseta longiareolata*; Mosquito larvae; Larval habitat.

This study was supported by Marmara University with the project numbered TYL-2025-11875.

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Prediction OF Life Status OF Hepatitis Patients With SVC, k-NN And MLP Algorithms

BÜŞRA KANDEĞER[1]
İLKAY SİBEL KERVANCI[2]

Abstract

Hepatitis is a disease that increases disease burden and mortality rates by leading to severe outcomes such as cirrhosis and liver cancer; therefore, early and accurate risk classification is of great importance. This study aims to predict the survival status of hepatitis patients using machine learning techniques. In this context, Support Vector Machines (SVM), K-Nearest Neighbors (kNN), and Multilayer Perceptron (MLP) methods were evaluated through 5-fold cross-validation. The findings revealed that the progression of survival could be predicted with an accuracy rate of up to 95%. The confusion matrices particularly indicated high correct classification rates in the "survival" class. Among the predictive variables, ascites (abdominal fluid), albumin, varices, histology, bilirubin, and spider angiomas were found to be the most influential features. In conclusion, despite the limited sample size, the use of SVM/kNN/MLP algorithms provides a feasible and effective framework for clinical decision support and risk prediction in hepatitis patients.

Keywords: Hepatitis, SVM, KNN, MLP, Clinical Decision Support Systems.

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Density and Hardness Behaviors in Ceramic Particle Reinforced Metal-Based Composites

ÖZNUR AKYOL[1]
TUĞBA MUTUK[1]

Abstract

In this study, boron nitride (BN) was added to the titanium (Ti) matrix at different ratios (0.2%, 0.4% and 0.6%) using the powder metallurgy method, and the density, hardness, and microstructural properties of the resulting composites were investigated. Titanium matrix composites are advanced engineering materials widely used in defense, aerospace, automotive, and biomedical implant applications due to their light weight, high temperature resistance, corrosion resistance, and high specific strength. Despite the advantages of Ti such as high toughness and low density, its surface hardness and wear resistance are limited. Therefore, strengthening with ceramic reinforcements is a common method. BN used in this study is an ideal reinforcement material for titanium composites due to its structure, and potential to react with Ti to form high-hardness phases such as TiN and TiB. Density analyses showed that the highest density value after sintering was obtained in the sample containing 0.6 wt% BN (~94%). This ratio provided adequate particle distribution and effective sintering behavior in the Ti matrix, resulting in optimum pressability. The increased BN content contributed to the formation of a more compact structure by filling the intra-matrix voids. Vickers hardness tests revealed a significant increase in hardness as the BN content increased. The highest hardness value of ~421 HV was measured in the sample containing 0.6wt.% BN. Scanning Electron Microscopy coupled with Energy Dispersive X-ray Spectroscopy (SEM-EDX) studies revealed good bonding of the BN particles to the Ti matrix, a homogeneous distribution, and a strong metal-ceramic interaction at the interface. All results demonstrate that BN reinforcement significantly improves the mechanical and structural performance of Ti-based composites.

Keywords: Ceramic reinforcement, hardness, powder metallurgy

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Influence of Deformation-Induced Microstructural Evolution on the Machinability of Low-Carbon Low-Alloy Steels

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MUHARREM GÜRGEN[2]
BARIŞ ÖZLÜ[3]
HALİL DEMİR[4]
SÜLEYMAN GÜNDÜZ[5]

Abstract

Machinability refers to the ability of a material to be produced with the desired dimensions, shape and surface quality through machining processes. As one of the most widely used engineering materials, steel is extensively employed in the automotive, machinery, and defense industries, where a significant proportion of components undergo machining operations to achieve tight tolerances and specific surface requirements. Therefore, improving machinability is of great importance, as it shortens production time, reduces energy consumption, extends tool life, and lowers overall manufacturing costs.

Previous studies on the machinability of steel materials have mainly focused on optimizing chemical composition and heat treatment parameters. However, there is a limited number of investigations addressing the influence of manufacturing process parameters, particularly the degree of deformation. In this study, the effects of deformation ratio on the machinability performance of low-carbon low-alloy steels were experimentally investigated. The machinability characteristics including cutting force, cutting depth, cutting temperature and surface roughness were compared by considering the microstructural and mechanical properties of samples produced with different deformation ratios.

The investigations revealed that increasing deformation ratio led to distinct microstructural changes across the material cross-section, primarily due to differences in both the applied deformation level and the associated cooling rates. These microstructural variations were found to influence not only the mechanical properties but also the machinability behavior of the materials processed under different deformation conditions. The results indicate that optimizing the deformation ratio can enhance machining performance while also serving as an effective strategy to reduce production costs and energy consumption.

Keywords: Machinability, Deformation Ratio, Low carbon steel, Low alloy steel, Cutting Force.

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Synthesis of novel mono-, bis-, and tetra-rhodamine-substituted rhodamines as smartphone-compatible cascade sensors for detecting metals and anions in real water samples: bioimaging and anticancer activities

SINAN BAYINDIR[1]
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FERRUH LAFZI[3]
FUNDA KETECI[4]
BUKET BAKAN[5]

Abstract

In this study, new probes, Rh-TPE, $(Rh)_2$-TPE, and $(Rh)_4$-TPE, were created by attaching one, two, or four rhodamine groups to a tetraphenylethene ring. Several notable properties distinguish these compounds. Bright fluorescent signals were emitted when detecting aluminum ions (Al^{3+}) or mercury ions (Hg^{2+}), even at low concentrations ranging from 287 to 345 nM. When Al^{3+}/Hg^{2+} and fluoride (F^-) or cyanide (CN^-) were present together, fluorescence was quenched, allowing detection of fluoride or cyanide at concentrations between 1.05 and 1.25 µM. Besides these sensing abilities, the probes also acted as molecular "memory" devices. Quick detection of Al^{3+}/Hg^{2+} and F^-/CN^- ions was achieved using simple filter paper strips, with results analyzed via smartphone imaging and RGB color analysis. In biological tests with MCF-7 cancer cells, the compounds showed dose-dependent anticancer activity, and intracellular aluminum ions were visualized through fluorescence imaging.

Keywords: Aluminum, Cyanide, Fluoride, Human breast cancer cell, Mercury, RGB-analysis, Rhodamine, Tetraphenylethene

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Effects Of Vehicle and Railway Vibrations on Buildings and Determination of Safe Building Approach Distance

MUSTAFA CEVHER[1]
EMIR YALÇIN AKSOP[2]
MUSTAFA SOYDABAŞ[3]

Abstract

The passage of road and railway vehicles causes vibrations in buildings, especially in areas with heavy traffic. These vibrations have negative effects on the durability, comfort and longevity of structures. Intermittent vibrations or continuous vibrations can cause damage to structural elements in continuity. When the frequency of vibration coincides with the frequency of structural elements such as walls, floors and load-bearing elements, each with different natural frequencies, it can be 0.5 - 5 times more effective due to the resonance effect and causes various damages depending on the height or size of the building. The effect of vibrations on buildings in the city is a vital issue in terms of building safety, which combines the disciplines of construction, geophysical engineering and urban planning elements. Determining the correct approach distance ensures that buildings are long-lasting and safe, while also increasing user comfort. In this article, the effects of road and railway vehicle vibrations on buildings, the determination of safe building approach distances to railways and highways, and the measures that can be taken to reduce these effects will be examined.

Keywords: Soil Dominant Period, Resonance, Buildings

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Hotel Similarity Recommendation with Machine Learning: A Two-Stage Feature Selection Approach

MURAT BERKER ÖZBEK[1]
FURKAN KIZILAY[2]

Abstract

This paper introduces a machine learning–based hotel similarity recommendation system developed for an online travel platform to enhance personalization and booking conversions. The system integrates data from over 11,000 hotels and nine months of user interaction logs to model relationships between hotel characteristics, user behavior, and booking patterns. A comprehensive feature engineering process generated more than 200 predictive variables capturing geographic, behavioral, and temporal attributes, later refined to 100 features through a two-stage feature selection pipeline combining Recursive Feature Elimination with Cross-Validation (RFECV) and Lasso regularization. Using a Random Forest Regressor optimized through extensive hyperparameter tuning, the model achieved an R^2 of 0.847, with strong top-5 performance across NDCG (0.24), Precision (0.19), Recall (0.17), and MRR (0.31) metrics. The analysis revealed that user behavior–based features, such as funnel conversion rates and temporal booking patterns, play a dominant role in predicting hotel similarity, while geographic proximity and relative rating ratios provide secondary but complementary insights. The proposed two-stage feature selection approach not only improved model efficiency but also enhanced interpretability by reducing feature dimensionality by 50% without compromising accuracy. From a business perspective, the deployment of this system resulted in measurable improvements in user engagement, booking conversion rates, and customer satisfaction through more relevant and context-aware recommendations. Overall, the study demonstrates that integrating advanced feature engineering with interpretable machine learning models provides a scalable framework for developing next-generation recommendation systems across travel and other e-commerce domains.

Keywords: Hotel Recommendation System, Machine Learning, User Behavior Analysis, Travel Technology.

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Improvement of Notification, Tracking, and Reporting Processes in Maintenance and Failure Operations through Information Technology Methods

BARBAROS VATANSEVER[1]
ERKAN BAYIR[2]
FATİH EMRE ERDEM[3]

Abstract

Maintenance is a systematic set of activities aimed at ensuring that equipment and systems maintain their functions at the highest performance level, thereby enabling production facilities to operate in a sustainable, high-quality, economical, and efficient manner. Machines used in production processes are exposed to performance losses and failures due to time and operating conditions. Therefore, maintenance and failure management processes are of critical importance in terms of production continuity, resource efficiency, and operational reliability. However, notification, monitoring, and reporting activities carried out through traditional methods lead to delays in information flow, data loss, and traceability issues, which negatively affect production efficiency and decision-making processes.

This study aims to restructure maintenance and failure notification processes in production areas based on digital transformation principles. In the existing system, failure records created manually by operators and subsequently transferred to Excel by maintenance engineers caused time loss and increased the risk of errors. According to 2024 data, maintenance personnel spent an average of 500 meters of walking distance and approximately 90 minutes daily during data entry and notification activities.

Within the scope of the developed digital system, a data infrastructure, card-based identity verification, and mobile notification integration were implemented. Failure reports created by operators via touch screens are instantly transmitted to maintenance personnel, while alerts are displayed through mobile devices and visual warning systems. Thus, manual recording processes have been eliminated, and data integrity and traceability have been enhanced. As a result, maintenance processes have been transformed into a real-time, fast, and sustainable structure, leading to a significant improvement in production efficiency.

Keywords: maintenance, digital transformation, lean production, furniture, furniture manufacturing

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Assessment Of Personal And Workplace Respirable And Total Dust Exposures Using A Multi-Criteria Decision-Making Approach

AYŞE ERİM[1]
ERGÜN ERASLAN[2]

Abstract

Dust exposure is an important occupational risk that threatens the health of workers in workplaces. During the research; TREXMO (TRanslation of EXposure MOdels) exposure model, a peer-reviewed exposure assessment tool developed in collaboration with Institut Universitaire, was used to determine the criteria for factors affecting dust exposures. The weighting of the criteria increasing dust exposures was compared using the AHP Method (Analytic Hierarchy Process) with the expert opinion resulting from the scoring of decision makers (DM) using the criteria in the occupational exposure model.
In this study, four basic criteria (Hazard Class, Number of Employees, Ventilation, Working Time) affecting dust exposure were analyzed by AHP (Analytic hierarchy process) method. The weights of the criteria were calculated and their effects on dust exposure were prioritized. The results showed that Hazard Class is the most important criterion (weight: 0.407), followed by Ventilation (0.355), Working Time (0.133) and Number of Employees (0.105). Additionally, two categorical data were compared using Chi-Square Tests.

Keywords:

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Enhancing GRIMS: From Global Monitoring to Regional Anomaly Mapping via Multi-Continental CORS Integration

BEHLÜL NUMAN ÖZDEMİR[1]

Abstract

The Global and Regional Ionosphere Monitoring System (GRIMS), accessible at www.online-grims.com, provides data for monitoring global ionospheric variability. However, the detection and analysis of localized, small-scale ionospheric phenomena require higher-resolution regional data. This work details an expansion of the GRIMS platform through the integration of dense, ground-based Continuously Operating Reference Station (CORS) networks from several key regions: Türkiye, the Netherlands, the USA, New Zealand, and Brazil.

We present the methodology used to ingest, process, and integrate GNSS data from these diverse networks into the existing GRIMS framework. This integration facilitates the generation of high-resolution ionospheric anomaly maps derived from Total Electron Content (TEC) analysis. These products leverage the high density of the new CORS stations to provide enhanced detail within these national boundaries.

This study outlines the technical implementation of the Regional Ionosphere Monitoring System (RIMS) within the GRIMS architecture. We detail the specific procedures for downloading and processing CORS data from the targeted regions. The methodology includes calculating ionospheric anomalies at 15-minute intervals, utilizing flexible spatial resolutions tailored to the network density of each specific region. We demonstrate the visualization pipeline, which employs Generic Mapping Tools (GMT) to generate high-quality anomaly maps. Finally, we describe the automation of the RIMS workflow, which operates daily to continuously produce and update these regional anomaly maps without manual intervention.

Keywords: Ionosphere, GRIMS, TEC, GNSS, CORS

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Effect of Separator Thickness on Performance in AGM (Absorbent Glass Fiber) Lead Acid Batteries

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Abstract

The performance of Absorbent Glass Mat (AGM) lead-acid batteries is strongly influenced by the physical characteristics of the separator, particularly its thickness, which directly affects electrolyte absorption, compression behavior, heat generation, and electrochemical efficiency. This study investigates the impact of increased separator thickness on key performance parameters of two automotive battery formats, L5 and L6, with the aim of identifying an optimal separator design for enhanced reliability and functional stability.

Separator thicknesses of 1,38 mm, 1.50 mm and 1.55 mm (@20 kPa) were evaluated through production trials, saturation measurements, and standardized functional tests including Cold Cranking Amps (CCA), water loss, and initial cycle performance assessments. L5 batteries manufactured with a 1.50 mm separator demonstrated full compliance with all evaluated parameters, successfully passing saturation, CCA, and water loss tests. These results indicate that the thicker separator design does not negatively affect compression uniformity or thermal behavior in L5 battery construction.

In contrast, L6 batteries produced with a 1.55 mm separator demonstrated limitations in functional tests, failing the first step of the CCA test due to voltage dropping below 7.5 V, and exhibiting excessive water loss. However, cycle tests for the same design continued successfully. Comparative evaluation revealed that a previously tested 1.38 mm separator design showed even poorer CCA performance, suggesting that the observed failures may be related not to separator thickness but to production conditions.

Overall, the findings demonstrate that a 1.50 mm separator represents a robust and feasible option for both L5 and L6 battery types. Further pre-series production and repeated saturation, capacity, and CCA tests under updated manufacturing conditions are recommended to validate and stabilize the performance of the L6 configuration.

Keywords: Absorbent Glass Mat (AGM) lead-acid batteries, Cycle Life Assessment, Water Loss

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