SELÇUK UNIVERSITY 3RD INTERNATIONAL TECHNOLOGY AND INNOVATION STUDENT SYMPOSIUM ABSTRACT BOOK

EDİTÖRLER
SÜLEYMAN NEŞELİ, HAKAN TERZİOĞLU, SEMA SERVİ

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İÇİNDEKİLER

A COMPREHENSIVE ANALYSIS OF PHYSICAL, TECHNICAL, AND ADMINISTRATIVE LAYERS IN NETWORK SECURITY PROTECTION

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Abstract - Network security can be described as the activity created to protect the integrity of your important network and data from internal or external cyberthreats and cyberattacks. Network security works by using several different layers of protection in your system or the network itself. These protection layers could be such as: Physical Network Security, Technical Network Security and Administrive Network Security. Each layer can make your network and data shielded from breaches, invasions or any other dangers by network security. In this study, we investigate these three different layers of protection. Physical Network Security encompasses hardware-based protective measures, including secure server locations, biometric access controls, and surveillance systems. Technical Network Security involves sophisticated software solutions such as firewalls, encryption protocols, and intrusion detection systems (IDS) that actively monitor and respond to potential threats. Administrative Network Security focuses on policies, procedures, and human factors, establishing guidelines for access management, user authentication, and security awareness training. In today's rapidly evolving digital landscape, organizations must adopt a dynamic approach to network security that addresses both traditional and emerging threats. The proliferation of cloud computing, Internet of Things (IoT) devices, and remote work environments has expanded the attack surface, necessitating more robust and adaptable security frameworks. To address these evolving challenges, organizations are increasingly adopting comprehensive security approaches that integrate all three protection layers while embracing modern paradigms such as Zero Trust Architecture (ZTA). This multi-layered security strategy ensures a more resilient defense against both current and emerging cybersecurity threats.

Keywords: Network Security, Cyberthreats, Multi-Layer Security, Zero Trust Architecture, Data

MECHANICAL INVESTIGATION OF S700MC COLD ROLLING SHEET, WELDED AND BENT V, U, L SPECIMENS IN A HYDRAULIC PRESS TEST RIG

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Abstract **-** The choice between welding or bending manufacturing processes, which are commonly used manufacturing methodologies, is determined by factors such as cost, mechanical or other profit and loss analyses made during the assembly of components for the welding process and the area where the part will be used, cost and process speed for the bending process. Applications are carried out without examining in detail the cost or mechanical strength of the preferred method compared to the other and without further stretching the time constraint.

In this study, the advantages and disadvantages of materials such as U sheet, L sheet, V sheet produced using the welding methodology produced with S700MC hot rolled sheet metal are analyzed by subjecting them to structural hydraulic test analysis between each other by producing them with the press brake bending method based on the same dimensions. Detailed examination and comparison were made about the mechanical strength and cost of the structure related to welded manufacturing and punch bending manufacturing methods, which have an important place in terms of production methods. The method, method, welding wire, welding nozzle, welding nozzle, Itab information used for the production of V, U, L profile materials in welded manufacturing processes are given. In addition, the K factor, punch angle, punch radius used in the press brake bending process of the part to be produced with V, U, L profile bending are given and the production is completed and the advantages and disadvantages are examined. In general, parts produced by the welded process are more durable, more costly and provide more opportunities for complex part production. Twisted production method is fast, advantageous in terms of cost, more suitable for mass production, and sheet material should be selected by making good calculations according to the loads to which it will be exposed due to strength.

Keywords - Bending strength, bending process, welding strength, welding process

PERFORMANCE ANALYSIS OF DEEP LEARNING MODELS IN PISTACHIO CLASSIFICATION

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Abstract – This study aims to evaluate the effectiveness of deep learning models in classifying Kırmızı and Siirt pistachio varieties. A dataset containing 2148 images was utilized to analyze the performances of EfficientNet-B0, MobileNetV2, DenseNet201, and ResNet152 models. The dataset was divided into 80% for training and 20% for testing. The classification performance of the models was assessed using metrics such as Precision, Recall, F1-Score, MAE (Mean Absolute Error), and Cohen's Kappa. This research provides a comparative analysis of various deep learning models and highlights the potential of artificial intelligence applications in agricultural classification processes.

Keywords – Deep Learning; Pistachio Classification; ResNet152; MobileNetV2; EfficientNet-B0; DenseNet201

INVESTIGATION OF WHATSAPP, THE WIDELY USED SOCIAL MEDIA PLATFORM, IN TERMS OF KVKK

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Abstract – Communication tools have rapidly advanced with the development of technology. Along with the swift progress of communication, digital communication and social media have become integral parts of our lives. Among the widely used digital media platforms today, WhatsApp stands out as a leading example. Although primarily known as a messaging platform, WhatsApp is used for various purposes, with photo, video, and status sharing being among its most popular features. However, it remains unclear whether the shared information benefits the user or manipulates them. To ensure more efficient use of technology and the protection of individual rights, it is essential to enhance the level of awareness and knowledge.The aim of this study is to examine the reliability of platforms like WhatsApp, which have emerged with the rapid development of digital communication and social media, and to assess situations requiring the protection of users. Beyond its messaging functionality, WhatsApp is utilized for photo, video, and status sharing, yet uncertainties remain regarding how the shared information impacts users and the risks of manipulation associated with this data. The study analyzes WhatsApp's privacy policy within the framework of the general principles of personal data protection laws, investigating how the application collects, uses, and shares user data. Furthermore, it evaluates how the platform ensures user protection under personal data protection legislation.

Keywords – Personal data, social media, digital platform, KVKK

MEASURING AND ANALYZING THE IMPACT OF KONYA INDUSTRIAL ZONES ON URBAN AIR POLLUTION USING AUTONOMOUS UAVS

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Abstract – This study addresses industrial air pollution monitoring in Konya, Turkey, through an autonomous UAV-based measurement system. The developed rotary-wing UAV, equipped with sensors for nitrogen oxides, sulfur oxides, ozone, carbon monoxide, and particulate matter, collects real-time air quality data along predefined routes in industrial zones. The collected data is analyzed through correlation and multiple regression analyses, comparing results with existing measurements from the Konya Metropolitan Municipality's monitoring stations. Findings will be publicly shared via a dedicated website, supporting evidence-based environmental policy decisions. This project contributes to the United Nations' Sustainable Development Goal 13 (Climate Action) by demonstrating effective use of autonomous systems in environmental monitoring.

Keywords - Autonomous UAV, Air Pollution Monitoring, Industrial Pollution, Environmental Data Collection, Sustainable Development Goals

ARTIFICIAL INTELLIGENCE IN INFORMATION SECURITY: TRANSFORMING CYBER DEFENSE

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Abstract **–** This paper examines the transformative role of artificial intelligence (AI) in information security, focusing on its ability to address the increasing complexity and volume of cyber threats. The application of AI in areas such as threat detection, attack analysis, vulnerability management, and proactive defense is explored, emphasizing how technologies like machine learning, natural language processing, and user behavior analytics enable faster and more accurate threat identification and response. Challenges associated with AI implementation, including manipulation risks, reliability concerns, and its potential misuse by malicious actors, are also discussed. Furthermore, this paper highlights future advancements, such as autonomous security systems, enhanced threat intelligence, and quantum computing integration. The study aims to provide a comprehensive understanding of how AI is reshaping cybersecurity strategies while addressing the associated challenges.

Keywords **–** Artificial Intelligence in Cybersecurity, Threat Detection and Prevention, AI-Powered Security Solutions, Future of Cyber Defense

ARTIFICIAL INTELLIGENCE SUPPORTED MOBILE TELEREHABILITATION SYSTEM

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Abstract - Developing technology is radically transforming healthcare, especially through innovative approaches such as telerehabilitation. Telerehabilitation offers a significant opportunity for individuals who have difficulty accessing traditional rehabilitation services by eliminating barriers such as distance, time, and cost, thus making rehabilitation more accessible. The aim of this project is to make the telerehabilitation process more effective and efficient by using artificial intelligence (AI) and image processing technologies. The system to be developed will monitor and analyze patients' exercises and treatments and will enable doctors to remotely ensure that the therapy is applied correctly and efficiently. Gamified treatment programs specifically designed to increase motivation, especially for pediatric patients, will be developed and an engaging and encouraging experience will be provided through positive feedback. All these features will be integrated into a mobile application and made accessible to a wider audience. The project management plan is divided into five main stages: data collection, preprocessing, classification, model development and training, and integration of the model into the mobile application. In addition, machine learning models will be developed and trained using libraries such as TensorFlow and YOLO algorithms. This project aims to utilize artificial intelligence and image processing technologies to monitor and analyze rehabilitation processes, providing real-time insights for doctors. With remote monitoring, patients can receive treatment in a comfortable environment, while early diagnosis enables timely interventions for possible health problems. In addition, gamified treatment programs will increase patient motivation, and the mobile application will provide accessible remote rehabilitation options for people with disabilities, making the health and rehabilitation experience more effective and enjoyable.

Keywords - Artificial Intelligence (AI), Telerehabilitation, Health, Telehealth, Image Processing

DEEP LEARNING-BASED OCCUPANCY MONITORING FOR PUBLIC SPACES

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Abstract **–** This study focuses on the development of a web-based appointment system that detects occupancy in shared spaces, such as libraries and cafes, using image processing and artificial intelligence. The system tracks individuals entering and exiting an area in real-time, providing reports on occupancy levels. Designed for low cost and high accuracy, it operates efficiently on standard CPUs. The implementation utilizes Python with OpenCV for image processing and the MobileNet-SSD model with Caffe for person detection. Enhanced tracking accuracy is achieved through centroid tracking and correlation filters. Tests reveal that the system achieves over 94% accuracy and processes real-time video streams at 25–35 frames per second. Results are displayed to users via an intuitive interface and tabular reports, making it a practical tool for managing shared spaces.

Keywords **–** Occupancy Detection, Real-Time Tracking, Image Processing, Deep Learning, People Counting

SMART VERTICAL FARMING AUTOMATION WITH AI-POWERED NFT HYDROPONIC SYSTEM

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Abstract – This paper presents the development and evaluation of a smart vertical farming system utilizing the Nutrient Film Technique (NFT) and powered by artificial intelligence (AI) and computer vision technologies. The system aims to address the growing need for sustainable and efficient agricultural practices in the face of increasing global population and resource scarcity. By automating and optimizing plant growth conditions through real-time monitoring and AI-driven adjustments, the system minimizes water and energy consumption while potentially enhancing both growth rate and yield. The study investigates the impact of this innovative approach on agricultural productivity and sustainability compared to conventional farming methods.

Keywords - Artificial intelligence, automation, hydroponics, image processing, embedded systems, vertical farming, NFT.

INDUSTRIAL SYMBIOSIS DIGITAL SYNERGY PLATFORM FOR KONYA NEW MOTOR INDUSTRIAL SITE

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Abstract – Industrial Symbiosis is gaining increasing importance as a critical approach for the efficient use of resources and minimization of waste. The idea that one industry's waste can serve as a raw material input for another is vital for sustainability. The unique value proposition of this project is to develop a Digital Synergy Platform for Industrial Symbiosis for the newly established New Motorized Industrial Site in Konya. This platform will enable industrial site stakeholders to establish symbiotic relationships by sharing their waste to convert it into useful resources through a digital platform.

By creating industrial symbiosis models, this platform will offer innovative solutions for waste reuse and recycling, thereby contributing to the minimization of environmental impacts. The project's front-end processes will utilize Flutter, while the back-end processes will employ Python and FastAPI. PostgreSQL has been chosen as the database. All the software technologies used will be open source and free of charge.

The New Motorized Industrial Site in Konya has been selected as the application area for the project. To facilitate the adoption of the platform, training programs will be organized for industrial employees and business owners. These trainings will enhance the competencies of employees and managers by raising awareness of new technologies and applications. The project management team will organize and monitor the training and implementation processes. This project aims to strengthen cooperation among industrial site stakeholders and promote more efficient use of resources within the context of sustainability and digitalization. Through the developed digital synergy platform, businesses will have the opportunity to reduce costs while enhancing environmental sustainability. The results obtained from the project also have the potential to contribute to the development of new national and international projects.

***Keywords*:** Smart City, Industrial Symbiosis, Sustainability, Digital Platform

WEB APPLICATION OF LUNG CANCER DETECTION WITH MACHINE LEARNING

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Abstract – We aim to detect lung cancer, one of the types of cancer, using machine learning. Our work aims to enable doctors to diagnose lung cancer through artificial intelligence via a web application.

Our work primarily focuses on understanding the data. The dataset consists of labeled data applicable to supervised learning. The data also aims to solve a classification problem, where the patient is classified as having lung cancer or not. It was found that there were no missing values in the data, but there were repeating rows. It was observed that some values in the data were not numerical. After understanding the data, it was preprocessed. During data preprocessing, non-numerical values were converted to numerical values. Repeating rows were deleted. Feature selection algorithms were applied to the data, and the new data obtained using the method that eliminated the most features was then divided for training and testing. After the data preprocessing step, machine learning algorithms were trained and evaluated to determine which model was the most successful for the relevant data. After the evaluation stage, the selected model was used in the application. The application allowed users to enter values in a web environment and make predictions using the machine learning algorithm. The prediction result determined whether the patient had lung cancer.

Based on the results obtained, the model with the highest precision value is Extra-Trees Classifier.

In conclusion, we used machine learning to detect lung cancer in our study. The Extra-Trees Classifier algorithm was employed to make predictions about lung cancer using the machine learning model. The machine learning model is implemented with the values entered in the web application. The web application allows doctors to make disease diagnoses using artificial intelligence. In this way, doctors are facilitated.

Keywords **–** Lung Cancer; Cancer Detection; Machine Learning; Extra-Trees Classifier; Web Application

ATMOSPHERIC DISTRIBUTION EVALUATION OF RADIOACTIVE SUBSTANCES DURING THE ACCIDENT SCENARIO FOR AKKUYU NUCLEAR POWER PLANT USING HYSPLIT CODE

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Abstract – Nuclear power reactors are equipped with multi-layered safety measures to reduce accident risks and prevent accidents that may occur during the operation of the plant. Nuclear power plants do not release any radioactive material into the environment during operation. The release of radioactive substances into the environment during nuclear accidents and the dose exposure experienced by individuals are the primary concerns in potential serious accidents. Wind speed, wind direction, humidity, precipitation rates, air quality, temperature, environmental and geological conditions in the area where the plants will be established are of great importance. Using the meteorological data obtained in the plant area, calculating the expected dose around the plant in the event of an accident, and the resulting cloud formation, is essential for the safety of these facilities. In this study, the consequences of the worst-case hypothetical accident scenario of the Large Break Loss of Coolant Accident (LBLOCA) at the Akkuyu nuclear power plant, which is under construction in Turkey, were simulated using the Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model developed by the National Oceanic and Atmospheric Administration's Air Resources Laboratory. In the accident scenario, the source term used the data of radioactive isotopes released into the atmosphere as a result of the Fukushima nuclear accident in Japan in 2011.

Keywords – Akkuyu Nuclear Power Plant, HYSPLIT model, Radioactive materials dispersion, LBLOCA, Nuclear Power Plant Accident Scenario

DOSE RATE ANALYSIS OF FERTILE BLANKET IN MOLTEN SALT REACTOR CASKS

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Abstract **–** The transport and storage casks for spent nuclear fuel play an indispensable role in safeguarding human health and the environment by providing effective shielding against high radiation levels. These casks, utilized for the containment of radioactive spent fuel, are meticulously engineered to ensure maximum safety during the transportation and storage processes. Currently, there is no standardized and comprehensive cask design in the literature specifically addressing the secure transportation and storage of spent nuclear fuel from molten salt reactors. In response to this gap, extensive research is underway to develop cask systems tailored for the transport and storage of such nuclear fuels, with the objective of generating innovative solutions in this domain.

Depletion analyses of the LiF-ThF4 salt used in the fertile region of molten salt reactors were conducted using the MCNP code. The isotopes derived from these analyses were subsequently modeled within casks designed using the MAVRIC module of the SCALE 6.2.3 code, and the corresponding dose rates were calculated. The results were critically evaluated by comparing them against the permissible limit values established in the literature.

The temporal variations in the activities of neutron and gamma sources within the fertile salt region were examined across different time intervals. The results pertaining to the spent fertile salt region of molten salt reactors indicated that the dose rate limits within the transport casks exceeded the permissible thresholds. This observation suggests that the cask design proposed in this study does not adequately meet the radiation safety requirements. To address this issue, it is recommended that the materials used in transport casks be improved to provide more effective shielding against neutron and gamma radiation, or that appropriate additives be incorporated into these materials.

Keywords **–** Molten Salt Reactor; Spent Nuclear Fuel Cask; Decay Heat; Dose Rate; Transportation and Storage

A BRAIN-COMPUTER INTERFACE FRAMEWORK FOR EEG-BASED COGNITIVE STATE CLASSIFICATION

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Abstract - Electroencephalography (EEG) has become a critical tool for studying brain activity, offering insights into cognitive processes and neural states. This study explores the classification of cognitive states during diverse tasks, including reading, problem-solving, and social media browsing. EEG data was collected from 32 participants (15 females, 17 males) under four conditions: baseline (eyes closed), reading, problem-solving, and social media browsing. Features such as Hjorth parameters, band power ratios, and entropy measures were extracted to analyze time-domain, frequency-domain, and statistical characteristics of neural signals.

Machine learning models, including Random Forest, Support Vector Machines, and Neural Networks, were employed to classify these states. Neural Networks achieved the highest accuracy (90% for problem-solving tasks), contributing to an average classification accuracy of 85% across all tasks. Statistical analyses revealed distinct neural patterns, with increased beta-band activity and Hjorth complexity during problem-solving and higher entropy in social media browsing tasks.

The findings emphasize the potential of EEG as a scalable, non-invasive tool for cognitive state monitoring and applications in education, healthcare, and adaptive human-computer interaction. Despite challenges like small sample size and artificial task designs, the study provides a foundation for future work in real-world EEG-based cognitive monitoring systems.

Keywords - Brain computer interface, EEG analysis, Machine learning applications, EEG, Cognitive State Analysis, Machine Learning, Hjorth Parameters, Band Power Ratios, Entropy Measures

SENSITIVITY AND UNCERTAINTY ANALYSIS OF FAST MOLTEN SALT REACTOR FERTILE BLANKET ZONE

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Abstract – The aim of this study is to perform sensitivity and uncertainty analysis of the materials constituting the fertile blanket region of the Fast MSR and to calculate the effect of feedback parameters on the effective growth coefficient (k-eff). The fact that there is no comprehensive study on sensitivity and uncertainty analysis for the fertile blanket region of the Fast Molten Salt Reactor in the literature is a strong motivation.

This study involves expert nuclear power engineers, national and international companies and institutions working on the licensing of Molten Salt Reactors. The TSUNAMI-3D (Sensitivity and Uncertainty Analysis Methodology Implementation Tools) module within the SCALE code system was used for sensitivity and uncertainty analysis.

In this study, sensitivity and uncertainty analysis was performed for the materials forming the fertile blanket region of the MSR. According to the results of the analysis, the highest F-19(n,scattering), Th-232(n,scattering), Li-7(n,scattering), Th-232(n,capture), Th-232(n,gamma), Li-6(n,capture), Li-6(n,t) and F-19(n,capture) were found in the fertile blanket region. For the whole nuclear reactor, the calculated uncertainty value (% delta-k/k) was 3.1076 +/- 0.0055.

The output results show that the uncertainty value is high. This is normal due to the fact that Molten Salt Reactors have not yet been commercially produced, the material properties suitable for licensing are not yet clear, and there are no previous detailed studies on this subject. The main objectives of this study are to make the reactor reliable and suitable for licensing by minimizing the uncertainty value, to determine the nuclear reactions affecting k-eff and to get to know the neutronic system of the fertile blanket region of the reactor.

Keywords - Fertile blanket, sensitivity and uncertainty analysis, SCALE, k-eff, TSUNAMI-3D.

HAIR TYPE CLASSIFICATION WITH DEEP LEARNING MODELS

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Abstract – Hair type classification is a crucial aspect of personalized care in the beauty industry. This project offers an image-based solution for accurately classifying different hair types (straight, wavy, curly, kinky, dreadlocks) using deep learning algorithms. The proposed model focuses on the structural and textural properties of hair, achieving high accuracy rates. Unlike existing literature that mainly emphasizes hair color or specific hair attributes, this project develops a comprehensive model capable of distinguishing various hair types.

The methodology employs Convolutional Neural Networks (CNNs) trained on a large dataset to automate hair type classification. This model will be integrated into a mobile application, enabling users to analyze their hair type effortlessly. Additional features such as personalized product recommendations and virtual hair try-ons will be provided. The platform aims to empower users to make informed personal care decisions while allowing industry professionals to deliver accurate product suggestions.

This project has the potential to revolutionize the digitalization of individual user experiences and personalized services in the beauty industry. By automating the hair type classification process, it offers significant cost and time savings, contributing to the digital transformation of the sector.

Keywords – Artificial Intelligence, Deep Learning, Hair Type Classification, Convolutional Neural Networks

ACOUSTIC SIGNAL ANALYSIS WITH DEEP NEURAL NETWORK FOR DETECTING FAULT DIAGNOSIS IN INDUSTRIAL MACHINES

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Abstract – Detecting machine malfunctions at an early stage is crucial for reducing interruptions in operational processes within industrial settings. Recently, the Deep Learning(DL) approach has started to be preferred for the detection of failures in machines. DL provides an effective solution in fault detection processes thanks to automatic feature extraction. In this study, a DL based system was designed to analyze the sound signals produced by industrial machines. Acoustic sound signals were converted into mel spectrograms. For the purpose of classifying spectrogram images, the DenseNet model, a DL architecture recognized for its effectiveness in image classification tasks, was used. The model was trained using the transfer learning method on the MIMII dataset including sounds from four types of industrial machines. The results showed that the proposed method reached an accuracy rate varying between 97.17% and 99.87% at different sound noise rate levels.

Keywords – early fault diagnosis, convolutional neural networks, deep learning, MIMII dataset, transfer learning, fine-tuning.

AUTONOMOUS UNDERWATER VEHICLE TRACKING: AUTONOMOUS UNDERWATER VEHICLE TRACKING ANOTHER UNDERWATER VEHICLE

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Abstract – This paper presents a comprehensive review of various target tracking algorithms used in autonomous underwater vehicles (AUVs). Key methods such as the Kalman filter, Particle filter, Multiple Target Tracking systems, SLAM, and Reinforcement Learning are discussed in detail [1,2]. The unique challenges posed by the underwater environment—such as turbulence, variable currents, and limited visibility—make target tracking a complex problem [3]. To address these challenges, various algorithmic approaches have been developed, demonstrating varying levels of success in different scenarios [4]. This work highlights the Kalman filter's optimal performance in linear systems and its efficiency in real-time applications [5]. A practical target tracking application based on the Kalman filter was developed in a Python simulation environment to support the theoretical framework. The results underline the strengths and weaknesses of the methods reviewed and suggest potential directions for future research [6]. This review serves as an up-to-date resource for researchers in the field of underwater robotic systems.

Keywords – Autonomous Underwater Vehicles, Target Tracking, Kalman Filter, Particle Filter, SLAM, Reinforcement Learning.

IMPORTANCE OF TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM IN AVIATION

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Abstract –Traffic Alert and Collision Avoidance System (TCAS) is a vital safety system used by commercial airliners, private jets, and military aircraft to prevent mid-air collisions. This system, which provides continuous communication between aircraft via transponder signals, tracks the speed, direction, and distance of other aircraft nearby. The system provides two levels of warning when there is a risk of collision: Traffic Advisory (TA) and Resolution Advisory (RA): TA informs pilots of a possible collision, while RA advises the pilot on vertical movement in the form of "climb" or "descend". By increasing pilots' environmental awareness, the system ensures flight safety in busy airspaces, creates an additional line of defense against manual errors, and helps pilots act in harmony by providing warnings in accordance with international standards. In addition, operating independently of air traffic controllers' directions allows pilots to make quick and effective decisions at critical moments. In this study, the structure of TCAS and how it secures flight operations by minimizing human errors in aviation safety are discussed in detail.

Keywords – TCAS; Collision Avoidance; Air Traffic Control; Flight Safety; Transponder

INTERFACE DESIGN FOR AUTONOMOUS UNDERWATER VEHICLE

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Abstract – It is designed and programmed for a wireless autonomous underwater vehicle, which enables the location and direction settings of the engines to be defined for autonomous underwater vehicles and configured for 6 engines and 8 engines, and transmits telemetry data by transferring the 3-axis acceleration, gyroscope and compass values on the card inside the vehicle to the desktop interface via Wi-Fi connection. This paper is We will explain how the user interface works.

Keywords – UI/GUI design; Autonomous vehicle; Unmanned vehicle; Telemetry broadcast; AUV

TWO PILLARS OF ARTIFICIAL INTELLIGENCE: MACHINE LEARNING AND DEEP LEARNING

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Abstract – This paper provides comprehensive definitions of the concepts of algorithm, artificial intelligence, machine learning, and deep learning, detailing their applications in various domains. It explains which technologies are preferred in different fields, addressing the specific requirements of these fields and how the technologies respond to them. Additionally, the importance of the application areas of both methods and their contributions to these fields are emphasized. Several machine learning and deep learning algorithms are explained in detail, focusing on how they function and the problems they solve. In the later sections of the paper, the fundamental differences between machine learning and deep learning are compared, with their methodological distinctions clearly outlined. These differences offer valuable guidance in determining the effective use of both technologies and when each should be preferred.

Keywords – Artificial intelligence, Machine Learning, Deep Learning, Algorithm

NATIVE AND HYBRID APPROACHES IN MOBILE APPLICATION DEVELOPMENT: WHEN TO CHOOSE WHICH?

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Abstract – Mobile applications are softwares that specifically designed for mobile devices like smart phones, tablets and smart watches. These applications have become digital tools that users can access at any time and carry with them at all times. Mobile app-development process has a structure that continuously evolving, growing and diversifying as technologies and user needs change. Today there are two primary approaches to mobile app-development: Native and Hybrid. While Native applications are being developed for a certain platform specifically, Hybrid applications offer solutions that can work in multiple platforms. In this paper, these two approaches will be discussed in terms of ease of use, performance, practicality of development and access to platform specific features, and it will be discussed in which cases which approach is more appropriate. Moreover, in order to better comprehend both of these approaches, there will be evaluations by various examples, and by examining technologies that are used in these approaches an analysis will be carried out on advantages, disadvantages and usage scenarios of these two approaches. With these examinations, a comprehensive perspective about how to choose the right approach in the mobile app-development will be presented.

Keywords – Mobile Applications; Mobile Application Development Approaches; Native Approach; Hybrid Approach

APPLIED ELECTRONIC CARD DESIGN IN POWER SYSTEMS

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Abstract - The purpose of the card we designed to measure the temperature, current, and voltage values of systems operating with high currents and to analyze the system's abnormal behaviors. Using the ACS-758 150B sensor, the system can read Current ranges up to 150 amps, while the 10k NTC temperature sensor provides precise measurement capabilities. The Relay on the card allows for easy control in case of abnormal situations or Manual shutdown. The built -in CAN bus transmits data to multiple devices. Additionally, the touchscreen NEXTION display enables the user to monitor real -time data and interact with the system when intervention.

Keywords – High current systems temperature detection, ACS-758 sensor, Role control,CAN bus, Execution time

CONTROL ALGORITHM AND PID FOR AUTONOMOUS UNDERWATER VEHICLES- MOTOR CONTROL

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Abstract - Unmanned underwater vehicles, like many unmanned vehicles, must perform the desired movements and tasks without human control. However, the problem is that since they are not under human control, problems may arise due to unforeseen reasons while performing the desired operations. Therefore, it is necessary to develop a system that is in constant control of the vehicle, detects and reacts to these problems for unforeseen reasons. This system is realized with the control algorithm and PID.

Keywords – Unmanned underwater vehicles, Autonomous operation, Control algorithms, PID control, Problem detectioni, Real-time monitoring

A COMPARATIVE ANALYSIS OF OPENCV AND EAST: DEEP LEARNING-BASED METHODS FOR TEXT DETECTION

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Abstract - This paper addresses the inadequacy of traditional image processing algorithms such as OpenCV. Even though OpenCV can be preferable because of flexibility, ease of use, low cost, and the ability to provide fast results, it cannot detect text from complicated images, different resolutions, distances, and non-standard texts. This case limits the use of imageprocessing algorithms for visual data in disorganized and unstructured environments. This paper discusses why it is necessary to use EAST (Efficient And Accurate Scene Text Detection), which is a deep learning-based algorithm that yields more accurate results. EAST can provide high accuracy using Convolutional Neural Networks (CNN) even in low-resolution images and complicated backgrounds. While classical OpenCV methods focus on rectangular or horizontally aligned text regions and fail to detect inclined text, EAST can effectively detect even inclined text regions. This paper compared OpenCV-based algorithms with deep learning-based algorithms such as EAST. It analyzed why deep learning-based algorithms should be preferred for image processing in real-world applications. This study aspires to guide researchers and developers in selecting the appropriate methods for improving text detection and recognition technologies.

Keywords – Image Processing; Efficient And Accurate Scene Text Detection (EAST); OpenCV; Text Detection; Deep Learning; Algorithm Comparison

ELECTRICAL AND MECHANICAL LOAD DESIGN FOR INDUCTION MOTORS

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Abstract – This study aims to develop a next-generation control and monitoring system for industrial refrigerators, optimizing temperature and humidity control to achieve energy savings and ensure the safe storage of sensitive products. The system offers an integrated, low-cost solution using the ESP32 microcontroller, DHT22 and HDC1080 sensors, and a relay module. Data is securely stored through PHP and MySQL integration, with remote access capabilities. Relay control via the RS485 protocol ensures a reliable and compatible mechanism with industrial environments. Additionally, the system allows users to set upper and lower limits for temperature and humidity values via the system panel. When the system exceeds these limits, a notification is sent to the user via the interface, providing flexibility and ease of control. The user-friendly web interface visualizes temperature and humidity data, enabling detailed analysis. Experimental results show that the system operates effectively in industrial refrigerators and provides energy savings. This project can be used as a standard model in cooling processes in the food, pharmaceutical, and chemical industries, aiming to reduce operational costs while maintaining product quality.

Keywords – Energy-Efficient, Temperature Monitoring, Humidity Control, İndustrial Refrigerators, ESP32, RS485 Protocol, Web İnterface, Data Visualization.

THE CRITICAL ROLE AND FUTURE OF ROCKET AVIONICS

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Abstract – Rocket avionics is a critical component of modern rocket design, consisting of electronic systems that perform functions such as guidance, control, communication, and data processing. This article discusses the key components of rocket avionics, the technologies used, and the considerations that must be taken into account during the design process. The use of innovative solutions like GNSS, telemetry systems, and sensor technologies enhances the performance of avionics systems, while factors such as weight, durability, and energy efficiency play a significant role in the design. Advances in rocket avionics continue to make important contributions to the successes of the space and defense industries.

Keywords – Rocket Avionics, Telemetry Systems, Sensor Technologies, Space Technologies

UNDERWATER VEHICLE MECHANICAL DESIGN AND PROCESS

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Abstract: This article covers the design and production processes of unmanned underwater vehicles. In the study, the basic elements to be considered in underwater vehicle design, the materials used, and the production stages are examined in detail. In addition, the engineering difficulties encountered in the design process and the solution approaches to these difficulties are also included.

Keywords – Vehicle Design, Design Difficulties, Vehicle Engineering, Autonomous Underwater Vehicles, Solution Approaches, Underwater Technology

ORGAN TRANSPLANT BOX PROVIDING SENSOR-BASED SMART MONITORING AND CONTROL

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Abstract - Organ transplants occupy an important place in the treatment process. We have observed that the traditional organ transplant boxes used in the process have shortcomings. In our project, which we will design in order to eliminate the shortcomings, we aim to carry out the process in the healthiest way by tracking the location with our GPS sensor as well as the temperature and humidity sensors that we will integrate on the transplant boxes and displaying the data we will receive from these sensors via the mobile application. This part of our project, the ability to monitor the data obtained with the temperature, humidity and GPS sensors that we will integrate on the transport boxes through the mobile application will allow the process to be managed in the healthiest way and will add originality to the project.

Our biggest goal in the project is to play a role in an effective treatment process by increasing the use of technology in the field of health. As a result, we aim to make the process smoother and less stressful for patients and healthcare professionals. In our research, an experimental design approach was adopted to monitor organ transportation processes, observe environmental conditions (temperature and humidity) and provide rapid intervention in emergency situations. Using a Python-based backend (API), sensor data from the organ transplant box will be processed and stored in the database. The mobile application developed with Flutter will communicate with this API and provide instant temperature, humidity and location data to the users. In the system, the location of the organ placed in the organ transportation bag will be tracked with GPS and the temperature and humidity values will be continuously monitored. If these data go beyond the specified limits, the user will be notified. When the temperature value goes beyond the desired level, the fan system will be activated, and when the humidity level goes beyond the humidity level, the peltier module will be activated to make the ambient conditions suitable. This approach will increase safety during organ transportation and ensure that the transportation process takes place effectively and efficiently.

This innovative system aims to reduce error rates in organ transportation processes and ensure safe transport of the organ, and offers a solution that can potentially be patented or registered as a utility model. In addition, the data obtained within the scope of the project will be a valuable resource for scientific research and will contribute to studies in the field of organ transplantation. Project,

The aim is to increase the use of technology in the field of health, to take part in national events and to make organ transplantation processes more efficient.

Keywords – Organ Transplants, Environmental Monitoring, Python Backend (API), Real-Time Data Monitoring, Emergency Intervention, Data Storage, Temperature Sensor

THE IMPORTANCE AND FUTURE OF PAYLOAD IN ROCKETS

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Abstract – Payload refers to the payload components used for scientific, commercial or military missions that fulfill the primary purpose of a rocket or spacecraft. This article examines the main elements to be considered in payload design, the technologies used and the engineering challenges encountered in this process. Payload characteristics such as weight, size, energy consumption and environmental durability directly affect the overall success of the system. Innovations in optical systems, communication modules and sensor technologies increase the mission capacity of payloads while also providing advantages in terms of cost and energy efficiency. Developing payload technologies enable significant advances in scientific exploration, satellite communications and defense applications.

Keywords – Design, Weight, Energy Efficiency, Sensor Technologies, Optical Systems, Satellite Communications.

CALIBRATION OF STRAIN GAUGES IN THE AEROSPACE INDUSTRY: ENSURING ACCURACY AND RELIABILITY

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Abstract – Strain gauges are indispensable tools in the investigation of the mechanical behavior of materials and structures. This paper emphasizes the critical impact of strain gauge calibration on measurement accuracy and reliability. A detailed analysis of calibration processes is presented, including various calibration methods and standards. Furthermore, real-world examples of strain gauge applications in aerospace, automotive, and civil engineering are provided to underscore the significance of calibration in these industries for safety and optimization. The role of calibration certificates in legal requirements and quality control processes is also comprehensively addressed.

Keywords – Strain gauges, calibration, measurement accuracy, reliability, mechanical behavior, materials testing, structural analysis.

VIBRATION AND LOAD DAMPENERS IN ROCKET

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Abstract – Vibration damping is of critical importance in rocket design and directly affects the structural integrity of the rocket, the safety of the payload, and mission success. This article examines the basic principles, materials, and engineering approaches of vibration damping technologies. Solutions such as shock absorbers, isolation systems, and active damping technologies have been developed to reduce the impact of high-frequency vibrations generated during rocket launch. In addition, vibration analysis and testing processes play a critical role in optimizing the performance of damping systems. Developing vibration damping methods contribute to the development of more reliable and efficient systems in both space missions and defense applications.

Keywords – Rocket design, Structural integrity, Shock absorbers, Isolation systems, Active damping, Vibration analysis.

POWER DISTRIBUTION BOARD FOR UNMANNED UNDERWATER VEHICLES

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Abstract – In this study, a low-cost power distribution board has been designed, integrating essential components such as a 5V 5A DC-DC Buck Regulator, current and voltage sensing, isolated MOSFET driving, and isolated parallel communication units for use with computer boards like Raspberry Pi and Jetson Nano. The developed system enables precise measurement and analysis of power consumption during operation while emphasizing isolation in various connections. This approach provides a solution with superior safety and efficiency features. The design process focused on optimizing the power distribution board to ensure reliable energy management in critical applications such as unmanned underwater vehicles. The study demonstrates how isolation technologies can be effectively utilized in energy systems and offers a low-cost, reliable, and efficient power distribution solution in this field. Furthermore, comprehensive testing and analysis of the designed system have proven its high performance in different operational scenarios, validating its suitability for industrial applications. In this context, the study aims to provide significant contributions both academically and industrially.

Keywords- Autonomous underwater vehicle, STM32, PID control

SYSTEM DESIGN AND ANALYSIS OF DC-DC BUCK CONVERTER

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Abstract – This paper presents the design and implementation of a 500W DC-DC buck converter using the PIC16F877A microcontroller. DC-DC converters are essential components in modern power electronics, widely used for voltage regulation in various applications, such as power supplies for industrial equipment, renewable energy systems, and electric vehicles. The focus of this design is to develop a highly efficient, reliable, and cost-effective converter capable of delivering stable output power while minimizing energy losses. The PIC16F877A microcontroller is chosen for its versatility, ease of integration, and ability to handle control tasks efficiently. It is employed to regulate the pulse-width modulation (PWM) signal that controls the switching of the power transistors in the converter's power stage. The converter is designed to step down the input voltage efficiently, maintaining a regulated output voltage with minimal ripple, even under varying load conditions.

This paper discusses the design process, including the selection of key components such as inductors, capacitors, and the power switches, as well as the control algorithm implemented in the microcontroller. Key challenges, including thermal management, voltage regulation accuracy, and maintaining high efficiency at full load, are addressed. Simulation results are presented to demonstrate the performance of the converter, followed by experimental results that validate the design. The converter achieves a power output of 500W, with an efficiency exceeding 90%. The results confirm that the PIC16F877A-based DC-DC buck converter provides a reliable and efficient solution for high-power applications. The work highlights the importance of optimal component selection and microcontroller-based control strategies in achieving desired performance levels in power converter designs.

Keywords – Buck Converter, Pulse Width Modulation, Microcontroller, Energy Efficiency, Switch-Mode Power Supply

KEY CONSIDERATIONS FOR THE MECHANICAL DESIGN OF UNMANNED UNDERWATER VEHICLES

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Abstract – Unmanned underwater vehicles (UUV) are highly complex machines designed to perform specific tasks using artificial intelligence, deep learning, and image processing technologies. During the design process of UUV, several critical factors must be considered: ensuring the stability of the vehicles both underwater and on the surface, accurately positioning the center of gravity and center of buoyancy, determining the number and placement of motors, selecting materials suitable for underwater use, ensuring the hydrodynamic efficiency of the vehicles, conducting necessary pre-production analyses through simulation programs, and making design adjustments if needed. Additionally, integrating components such as manipulator arms or torpedo systems tailored to the intended missions of the vehicles, as well as performing post-production leak-proofing and mobility tests, are essential. This article thoroughly examines the mechanical design of an underwater vehicle from all aspects.

Keywords – Stability; Center of Gravity; Center of Buoyancy; Material Selection; Autonomous Vehicle Design

BALANCING A BLDC MOTOR USING PID SOFTWARE AND A MICROPROCESSOR

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Abstract- This paper delves into the concepts of PID (Propertional-Integral-Derivative) control, gyroscopes, and accelerometers. PID control, a widely adopted feedback control loop mechanism, is particularly prevalent in BLDC motor applications, especially those demanding precise balance and stability. This includes a broad range of applications such as drones, robots, self-balancing vehicles, and other dynamic systems. The PID algorithm operates by continuously monitoring the system's output and making real-time adjustments to the motor speed to maintain equilibrium. Gyroscopes and accelerometers play a crucial role in providing essential data for accurately directing the motors, ensuring the system's stability and responsiveness. It will be discussed how to use this system effectively.

Keywords - PID control, Gyroscopes and accelerometers, BLDC balance with PID

OPTIMIZATION OF GEAR TRAIN DESIGN WITH BLACK WINGED KITE ALGORITHM

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Abstract – In this study, the Black Winged Kite Algorithm (BKA), a metaheuristic optimization method inspired by nature, is applied to gear mechanism design optimization problems. The study aims to reveal BKA's potential for complex optimization problems in engineering.

Although gear mechanisms are widely used in engineering for critical functions such as power transmission and motion control, their design processes include nonlinear, multivariable optimization problems and require effective, flexible solution approaches beyond traditional methods.

This study investigates the applicability of BKA in optimizing parameters such as gear ratios, gear diameters and material selection in gear mechanism design. The algorithm's capacity to solve nonlinear problems and its compatibility with multi-objective optimization structures are evaluated in detail. Within the scope of the study, the convergence performance and solution quality of BKA are compared with other similar algorithms in the literature and the obtained results reveal the superior performance of the algorithm.

The findings obtained show that BKA may have a wider application area in engineering problems in the future. This study has the potential to significantly contribute to academic and industrial design processes and proves that BKA offers a practical and innovative solution to engineering design problems.

Keywords – Black Winged Kite Algorithm (BKA), Metaheuristic Optimization, Gear Train Design

DESIGN AND IMPLEMENTATION OF ADVANCED MARKET AUTOMATION SYSTEM

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Abstract – Researching and following the finest details of developing, growing and constantly renewing automation systems, we have designed a highly innovative and advanced Market Automation. The main purpose of automation is to keep up with all kinds of technological developments and to work with the same functionality even if time passes. Taking this impression as a directive, we used C# and SQL languages, which are accessible, flexible and very easy to use. Another goal we have adopted is to be customer and company oriented. Knowing the importance of time management in the changing and growing world population, we have designed our automation in a fast, effective and reliable way in order not to keep the customer waiting and not to leave the company in a difficult situation. In this context, every market company can use this technology that we have produced in an easy and comfortable way.

Keywords – C#, market, market automation, automation, sql, database, visual studio.

ANALYZING THE EFFECTS OF UNDERWATER CAMERA AND DEEP LEARNING METHODS ON FPS

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Abstract **–** This article presents a method to optimize real-time object detection in autonomous underwater operations. An underwater vehicle developed with Raspberry Pi 5 and Pixhawk 2.4.8 was used to compare the FPS performance of different deep learning models and identify the most efficient solution. Raspberry Pi 5 served as the main computer running the model, while Pixhawk 2.4.8 controlled the vehicle's motors and maintained balance. The devices communicated via MAVLink protocol, with interaction through Python and the pyMAVLink library, supported by libraries such as OpenCV, TensorFlow, and PyTorch.

The study analyzed YOLOv8 and TensorFlow Lite models in terms of FPS and accuracy. YOLOv8 provided fast and accurate object detection, while TensorFlow Lite offered low power consumption in resource-limited environments. Both models were tested on Raspberry Pi 5 to identify the most suitable performance for underwater vehicles. Additionally, the study examined the impact of camera types on image quality. Comparisons were made between the Raspberry Pi v3 camera module and GoPro cameras in terms of image quality, energy consumption, and underwater adaptability.

For data collection, circular images suitable for underwater object detection were selected, and datasets simulating various underwater conditions were created. These images were annotated using Roboflow and LabelImg software. Model training was done in the Google Colab environment with GPU support, and the performance of different models under underwater conditions was analyzed.

In conclusion, this study identified the most efficient deep learning model and camera system for underwater vehicles. It aims to improve energy efficiency and object detection in autonomous underwater operations and can serve as a resource for other low-power applications.

Keywords – Deep Learning Model, Dataset, FPS, Camera Modules

SINGLE AXIS PID TEST RIG FOR ROTARY WING UNMANNED AERIAL VEHICLES AND CONTROLLER DESIGN

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Abstract – While rotary wing unmanned aerial vehicles (UAVs) are used in tasks such as search, rescue, and observation, the payload they can carry, and flight duration create limitations in design. In this study, a single-axis PID test rig and PID control system were developed to enable rotary wing UAVs to fly more stably. The parameters used in the PID controller system were analyzed by equation solution and Matlab Simulink's "tune" feature. It has been observed that the values automatically adjusted with Tune stabilize the system faster and reduce the oscillation percentage and peak time.

The test rig combines electronics, mechanics, and software disciplines, allowing the controller system to be analyzed before physical tests. The study obtained unique and stable PID values , providing safer and more stable flight. These methods and values can be used in flight control algorithms of rotary-wing UAVs.

Keywords – PID Test Device, PID Control System, Unmanned Aerial Vehicle, Stable Motion, Rotary Wing

REAL-TIME TARGET DETECTION AND ELIMINATION SYSTEM FOR LIGHTWEIGHT HARDWARE

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Abstract – This paper focuses on providing a solution for target detection and elimination in autonomous systems using low-cost and lightweight hardware as an alternative to expensive and heavy equipment. The system, running on the Raspberry Pi platform, utilizes a deep learning model specifically trained by the user to detect targets from camera feed and execute their elimination through dedicated software. The primary objective of the system is to deliver a real-time and high-performance solution for target detection and shooting on cost-efficient hardware. Additionally, the study introduces special optimizations and color analysis methods for detecting geometric shapes, such as circles. The dynamic and stable performance of the developed system has been thoroughly evaluated in the processes of target detection and motor control. This approach offers an effective and economical solution for autonomous targeting and shooting systems.

Keywords – Object Detection, Target Elimination, Autonomous Systems, Low-Cost Hardware, Deep Learning Models

DESIGN AND SOFTWARE OF A TWO-AXIS FACE TRACKING TURRET SYSTEM

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Abstract – This study aims to develop a security system for real-time tracking of moving targets and effective management of security risks. The system processes live camera images performs face detection and dynamic tracking functions, and minimizes security vulnerabilities by providing continuous tracking in two axes. A secure trigger mechanism is activated when a security risk or an undesirable situation is detected, providing rapid intervention. These interventions include turret firing, sending notifications to relevant authorities, or similar actions.

The software infrastructure of the developed system provides high accuracy and low latency thanks to optimized image processing algorithms. In addition, with its low-cost hardware and compact design features, the system offers an innovative alternative that addresses different application areas such as home security, workplace monitoring, shopping mall surveillance, and target recognition.

Within the scope of the project, the integration of mechanical and software components was ensured, the performance of the system under various environmental conditions was evaluated, and comprehensive tests were conducted in different security scenarios. This solution, which combines critical functions such as face recognition, dynamic tracking, and secure triggering at an affordable cost, aims to make significant contributions to the defense industry and other related sectors.

Keywords – Facial Recognition; Dynamic Face Tracking; Secure Triggering Mechanism; Real-Time Image Processing; Defense Systems

MULTI-CORE PROCESSORS

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Abstract - In recent years, multi-core processors have become more popular. Multi-core processors are not only used in servers and high-capacity computers, but also in personal computers at home. According to Moore's Law, the number of transistors will double every two years. Thus, the era of multi-core processors has begun. The more cores there are in a processor, the higher the performance of the processor. Almost everyone wants to use standard quad-core processors. In multi-core processors, one of the cores is directed to applications, while the others can deal with viruses. Thus, performance increases and the speed of the computer increases accordingly. In addition to the benefits of a multi-core processor, the architecture of its operation is also very important. Thanks to technological developments, the size of the processors is also shrinking. Therefore, processors with reduced size work faster than others.

Research that requires very large calculations or simulations that require a lot of processing capacity can no longer be solved with single-core processors. Multi-core processors aim to complete tasks in a shorter time by distributing the processes that come to them to the cores on them in parallel.

Multi-core processors are effectively used in solving many different problems. For large scale simulations, advanced mathematical problems that require a large number of operations, etc., many problems can be solved much faster with a home operation.

Keywords - Single Core Processors, Multi Core Processors, Performance, Process Architecture, Size

DESIGN OF A GROUND CONTROL STATION APPLICATION FOR UAVS WITH AUTONOMOUS FLIGHT SUPPORT

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Abstract **–** This study presents the design and development of a safe, functional, and user-friendly ground control station (GCS) for unmanned aerial vehicles (UAVs). The proposed GCS system is equipped with a user-friendly interface and advanced functionality features to ensure effective management of UAVs during flight. The system aims to set a new standard in UAV control by integrating innovative features such as object tracking, multi-UAV scenarios, and image processing.

The software infrastructure is designed based on ArduPilot and MAVLink protocols and aims to provide high reliability in data transfer between UAV and GCS. The GCS interface is developed using PyQt5 and will be tested in both simulation and real-world conditions via DroneKit. The development process includes verifying the accuracy and reliability of the system on different flight scenarios in the Gazebo simulation environment.

Within the scope of the project management, each stage is planned by specific timelines and resources, and simulation, algorithm development, testing, and evaluation processes are supported by regular reporting. In addition, possible risks are defined in advance and contingency plans are prepared to address these risks.

The academic and commercial impacts of this project are quite extensive. In addition to contributing to the scientific literature with articles, technical reports and guidance documents, it is also aimed to develop a prototype for commercial use. The proposed system is expected to provide significant advances by increasing the safety and efficiency of UAV operations, especially in areas such as agriculture, security, search and rescue.

Keywords – Equivalent Electric Circuit; Squirrel Cage Induction Motor; Induction Motor Modelling; Loading of Induction Motor

THERMAL AND CAMERA-BASED IMAGE PROCESSING SMART SECURITY SYSTEM: DETECTION OF POTENTIAL THREATS AND EARLY WARNING MECHANISM

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Abstract – In this study, a smart security system developed based on Raspberry Pi will be presented. The system will use camera and thermal camera modules to ensure security. The camera will recognize previously registered people and authenticate using advanced image processing algorithms. While registered users will be able to log in to the system securely, additional security measures will be applied for unregistered people. In addition, users will receive instant notifications via social media for each unsuccessful password attempt, and an alarm will be triggered. At night, when the camera's performance in low light conditions decreases, the system will be activated and the thermal camera will detect moving objects in the environment. The thermal camera will identify these objects using temperature differences and identify potential threats. In addition, the ambient temperature will be continuously monitored and if the temperature exceeds a certain threshold, an alarm will be triggered that provides early warning for situations such as fire or extreme cold. This system will provide an effective security solution for both day and night and will significantly increase user safety.

Keywords – Smart Security System, Facial Recognition, Thermal Imaging, Fire and Temperature Detection, Notification-Based Security

ROCKET COMMUNICATION SYSTEMS

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Abstract –This paper examines the importance of rocket communication systems and the challenges encountered. Ensuring reliable communication between the rocket and the ground control station during flight is crucial for the successful execution of missions. However, factors such as limited bandwidth and signal loss pose challenges for effective data transmission. This study focuses on key topics such as satellite communication, communication protocols, and data security. Additionally, issues such as signal delay and data loss in rocket communications are addressed. The use of new technologies and international standards (CCSDS, ITU) is aimed at ensuring effective communication. This paper provides an in-depth analysis of the dynamics and challenges encountered to enhance the efficiency of rocket communication systems.

Keywords – Rocket Communication, Data Transmission, Satellite Communication, Communication Protocols, Data Security, Ground Control Station.

CLASSIFICATION OF BRUSHLESS MOTOR FAULTS USED IN UAVS USING TIME SERIES DATA AND LONG SHORT-TERM MEMORY (LSTM) NETWORKS

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Abstract - In this study, deep learning models based on time series data were evaluated for fault detection and classification of brushless direct current (BLDC) motors used in unmanned aerial vehicles (UAVs). Four different deep learning architectures were analyzed in the study: BiLSTM, CNN-LSTM, LSTM and multilayer (Stacked) LSTM models. The performance of the models was evaluated with metrics such as accuracy, precision, recall and F1 score. According to the test results, the highest accuracy rate was obtained by the Stacked-LSTM model with 89.40%. This model also showed the most balanced performance with 88.16% recall and 88.13% F1 score. The CNN-LSTM model stood out as the most successful model in terms of positive classification with 89.15% accuracy. On the other hand, the BiLSTM model exhibited the lowest performance with 84.44% accuracy.

The results show that the ability of LSTM-based deep learning models to learn long-term dependencies in time series data provides a powerful solution for early detection and reliable classification of engine failures. This study emphasizes the applicability of deep learning-based approaches to increase the reliability and performance of UAV systems and draws attention to the importance of selecting robust models, especially for early detection of critical failures.

Keywords - Brushless Motor Failure, LSTM Networks, Time Series Data, UAVs, Deep Learning, Failure Classification

TECHNOLOGICAL DEVELOPMENTS IN FISHERY IN THE BLACK SEA

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Abstract **-** Aquatic products are undoubtedly among the most essential food sources. They are an important source of animal protein in our country. Over the years, the amount of fishing in the Black Sea has fluctuated, sometimes decreasing and sometimes increasing. Among these developments, the impact of technological advancements has been significant. In our country, 80% of fishing vessels are small boats, while 20% are large boats, yet they account for 90% of total fishing activities. Nets and equipment used in traditional and regional fishing methods have become more durable and sustainable, thanks to technological advancements.

In the past, fishing activities were based on factors such as weather conditions, moonlight and its position before going fishing, and the calmness of the sea. Today, however, these activities are guided by technological developments such as sonar, GPS technologies, satellite data, smart nets, and weather forecasts, which provide us with new opportunities. Compared to the past, there have been major changes in the fishing vessels used. Modern fishing boats, which have grown in size and engine power to meet the crew's needs, now ensure that the quality and freshness of the caught seafood are preserved as it is brought ashore.

In addition to fishing activities, the Ministry of Agriculture and Forestry's Directorate General of Fisheries and Aquatic Products also benefits significantly from technological advancements, such as the marking of nets and satellite tracking systems, to ensure control and sustainability. All of these developments are carried out in compliance with regulations, contributing to the protection of the ecosystem and the sustainable increase of economic benefits.

Keywords – Technological advancements in fishing, Sustainability in aquatic products, Fishing vessel dynamics, Traditional vs modern fishing methods, Ecosystem protection and regulations

A PROGRAM THAT UNDERSTANDS THE EMOTIONAL STATE AND FATIGUE SYMPTOMS OF LONG-HAUL DRIVERS WITHARTIFICIAL INTELLIGENCE AND TAKES PRECAUTIONS ACCORDINGLY

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Abstract-Artificial intelligence is now everywhere and directly intervenes in our lives. Let's look at the positive side of this technology, which has both positive and negative aspects. Nowadays, the need for manpower has decreased a lot, but long-distance drivers are among the sectors that still need manpower, be it trucks or buses. Drivers may inevitably be sleepy on the road, or they may become tired and sleepy during the long journey. In this case, chain accidents bring risks such as disability and death to the lives of the people in the vehicle. It is also possible to take a hand in this field with artificial intelligence. An infrastructure that analyzes drivers' emotions is possible. Thanks to this infrastructure, the nervous sleep and fatigue states of bus, minibus and truck drivers will be analyzed. In this system, which will operate gradually, a warning will be given if the driver goes into sleep mode. If it does not work, the vehicle will take control autonomously and stop in a suitable place, thus preventing fatal and risky accidents.

Keywords – Artificial Intelligence, Driver SafetyInduction, Motor Modelling

SOLAR POWERED ELECTRIC VEHICLES, DESIGN AND CONTROL ALGORITHMS

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Abstract **–** Solar-powered electric vehicles (SPEVs) have significant potential as the future of sustainable transportation systems. These vehicles stand out due to their ability to generate energy independently of the grid, but they require advanced energy management techniques to balance the natural variability of solar radiation and energy demand. This paper thoroughly examines the energy management systems and control algorithms used in the design of solar-powered electric vehicles, as well as strategies that enhance the performance of these systems. Additionally, it discusses recent developments in solar energy systems and battery management, along with potential future research directions.

Keywords – Solar energy, electric vehicles, energy management, maximum power point tracking (MPPT), model predictive control (MPC), artificial intelligence, battery management, hybrid energy storage, machine learning, energy optimization.

FISHING BOATS USED FOR COMMERCIAL PURPOSES IN THE BLACK SEA

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Abstract- In our country, the Black Sea plays an important role in marine fishery. The amount of marine fish caught last year in our country was 387,115 tons. The Black Sea made a significant contribution to this amount. In the Black Sea, various types of commercial fishing activities are carried out using gillnet boats, trawl boats (midwater and bottom trawlers), carrier boats, and small boats suitable for coastal fishing. The fishing techniques, usage, and target species vary depending on the specific type of boat. These boats are designed according to the region's structure and climate conditions. Due to regional fishing restrictions imposed by the Ministry in the Black Sea, the fishing activities of some commercial boats are limited. Pelagic fish (such as anchovy, sprat, bonito, and horse mackerel) are the main target species of gillnet boats. There are fishing methods based on tracking fish in the sea using technological equipment (sonar and echo sounders) or binoculars and surrounding them with nets. The boats constantly search until they encounter viable fish stocks. Our gillnet boats are quite advanced in terms of both meeting the needs of the crew and preserving the fish until they are brought ashore. Depending on the size of the ship and various factors, there are typically between 15 to 35 crew members working on board. In the Black Sea, there are specific regional restrictions for trawl boats. Bottom trawl fishing targets demersal fish (such as turbot, whiting, and red mullet). The fishing process involves casting the net into the sea, and after a certain period, pulling it along the seabed using doors, then bringing the captured fish onto the deck. This process is repeated between 4 to 6 times daily, depending on fish quantity, weather, and other factors, usually starting at dawn and continuing until sunset. The crew working on bottom trawl boats typically ranges from 4 to 7 people. In midwater trawl fishing, the target species are pelagic fish. The doors that are characteristic of bottom trawl fishing are not used in midwater trawling. Fishing is done with two ships, where the second ship serves as a carrier vessel. As in bottom trawl fishing, the fishing activity begins early in the morning and ends when it gets dark in the evening. Carrier boats play a role in delivering supplies to the fishing boat, picking up and dropping off personnel, and handling the captured fish for packing and bringing them ashore. Although carrier boats do not play a major role in gillnet fishing, they operate in parallel with the fishing boat during midwater trawl fishing. Carrier boats typically have between 10 to 15 crew members. Coastal fishing boats are smaller vessels used for targeting specific fish species. It is evident that traditional fishing methods continue to influence the activities of these boats. There are many more of these boats compared to other types in the Black Sea. They catch a variety of fish species.

Keywords – Black Sea commercial fishing, Gillnet and trawl fishing techniques, Pelagic and demersal fish species, Fishing vessel types and crew Dynamics, Regional fishing restrictions

A REVIEW OF ARTIFICIAL INTELLIGENCE APPLICATIONS AND INDUSTRY 4.0

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Abstract – Artificial intelligence and Industry 4.0 are innovative technologies that increase efficiency by combining digitalization and automation in production processes. Industry 4.0 aims to create smart factories and customized production processes with the combination of the Internet of Things (IoT), big data, cloud computing and artificial intelligence. This transformation offers more flexible, faster and cost-effective processes, especially in complex production networks. Artificial intelligence applications are effectively used in areas such as machine learning, image processing, natural language processing and robotics. Production processes are accelerated and human-related errors can be minimized by using artificial intelligence-based robots in production processes. Artificial intelligence supported by big data analytics optimizes production processes, detects faults in advance and reduces energy consumption. In addition, innovations such as faster response to customer demands and customized product production increase the competitive advantage of Industry 4.0. Autonomous systems supported by artificial intelligence increase occupational safety while minimizing human errors. In this context, the combination of AI and Industry 4.0 shapes the future of the production sector and offers a more sustainable and innovative structure. This literature review provides important clues for managers, practitioners and decision makers who manage the Industry 4.0 transformation process. Addressing sector-specific needs and encouraging cross-sector knowledge sharing can enable more effective use of the potential of artificial intelligence technologies and support the achievement of Industry 4.0 goals.

Keywords – Artificial Intelligence; Industry 4.0; Production; Innovative Technologies

MONITORING KUBERNETES CLUSTER PROMETHEUS AND GRAFANA

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Abstract – This study examines the application monitoring processes in Kubernetes environments and the role of tools such as Prometheus and Grafana in these processes. While Kubernetes provides flexibility and scalability in modern application management, monitoring the performance and troubleshooting issues of applications running on this platform is critically important. The study details Prometheus's capabilities in collecting, storing, and querying time-series data, and explains the process of visualizing this data using Grafana to create user-friendly dashboards and reports. The integration of Prometheus and Grafana with Kubernetes is addressed, and methods supporting the efficient use of these tools together are presented with examples.Additionally, the advantages of monitoring tools such as automation, real-time analysis, and proactive issue detection are emphasized, and best practices and strategies for effectively monitoring systems are discussed.This study serves as a valuable guide for developers, system administrators, and DevOps engineers working on Kubernetes, helping them improve monitoring processes and enhance operational efficiency.

Keywords – DevOps , Grafana , Kubernetes , Prometheus

CONTRIBUTION OF ARTIFICIAL INTELLIGENCE APPROACHES TO DIFFERENTIAL EQUATION SOLUTIONS

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***Abstract*—**This study aims to comprehensively review literature studies examining the use of artificial intelligence methods in solving differential equations. Differential equations play a critical role in modeling complex systems in engineering, physics, biology, and many other branches of science. However, solving these equations with analytical or numerical methods presents difficulties, especially in high-dimensional and nonlinear cases.

Artificial intelligence and machine learning methods attract attention because they can provide faster and more effective results than traditional solution approaches. In this context, the study will analyze current research in the literature on how methods such as artificial neural networks, evolutionary algorithms, support vector machines, deep learning, and hybrid approaches are used to solve differential equations.

The study aims to compare different methods in terms of accuracy, computational cost, and applicability, and to present studies in the current literature. In this way, it is aimed to present a perspective that will guide future research by revealing the advantages and limitations of artificial intelligence-based approaches in solving differential equations.

Keywords – Differential Equations, Artificial Intelligence, Numerical Solution Techniques

ARTIFICIAL INTELLIGENCE AND HUMAN

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***Abstract*—**Today's rapidly developing technology has transformed artificial intelligence from being just a scientific innovation to a topic discussed in every area of our lives. This rapid transformation has raised questions and concerns in the minds of many people. The first of these questions is the need to question the place and competence of humans in the face of artificial intelligence. Humanity wonders whether artificial intelligence will completely take over the workforce and even replace humanity.

While artificial intelligence offers great conveniences on the one hand, it also creates deep uncertainty about the future role of humans and the effects of technology. Is this development a revolutionary new breakthrough or a natural process that we must adapt to technological advances? Such questions have become one of the most important discussion topics of our day.

The purpose of this study is to define artificial intelligence in a general framework, address its status, and seek answers to these questions by analyzing its role in our lives. This article aims to contribute to the healthier shaping of people's ideas about artificial intelligence and offers a perspective to understand its future effects.

Keywords – Artificial Intelligence (AI), Digital Transformation, Workforce Automation, Human-Machine Interaction, Employment and Technology

ARTIFICIAL INTELLIGENCE IN AGRICULTURE AND CURRENT APPLICATIONS IN LITERATURE

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***Abstract*—** This study aims to examine the scope, methods and effects of artificial intelligence (AI) applications in the field of agriculture in the current literature. AI-based technologies are increasingly gaining importance in order to increase efficiency, reduce costs and ensure sustainability in agricultural production processes. The study covers various application areas such as plant disease diagnosis, soil analysis, crop yield estimation, irrigation management and similar. Studies using AI techniques such as deep learning, machine learning and image processing are analyzed; the successes and limitations of these techniques are discussed. In addition, issues such as difficulties in the use of AI in agriculture, data insufficiency, and the adaptation process are also discussed. It is expected that this review will provide researchers and practitioners with a comprehensive perspective for future applications and development areas of AI in agriculture.

Keywords – Management of crop; Pest management; Treatment of diseases; monitoring and storage of agricultural products; Management of soil and irrigation; Management of weeds Artificial Intelligence; Machine Learning; Precision Agriculture; Crop Yield.

MEOWSIC

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Abstract **–** Throughout human history, music has been a medium of expression for emotions and thoughts that people cannot convey through words. Therefore, music education, which is an indispensable part of our civilization, holds a significant place in our lives. Conservatory courses, music schools, private lessons, and mobile applications are various methods used for music theory education. Especially in today's digitalized world, mobile applications have become crucial for those who want to learn music theory individually. As a result, various mobile applications have been developed for music theory or instrument training. In the literature, there is no comprehensive application that covers both music theory and instrument education. With this in mind, we developed Meowsic. With Meowsic, users who want to learn piano can start learning music theory from the most basic level or from their appropriate level through a simple and beautiful interface. Additionally, if users have sheet music for a piece they want to play, they can scan and upload it to the application using our deep learning model and practice that piece. Another important feature of our application is that it offers courses where users can develop their sheet music reading skills. Furthermore, thanks to the Residual Shuffle-Exchange Networks deep learning model, users can continue with their own pianos without needing a virtual keyboard. In this way, Meowsic aims to provide users with a unique experience by utilizing artificial intelligence technologies. The development of the application using artificial intelligence is the most important feature that sets it apart from other existing music education applications, and it also strengthens the application's originality in this aspect. In the future, efforts will be made to develop Meowsic further and extend its use to instruments other than piano. Meowsic will be a pioneering mobile application for music theory and instrument education.

Keywords – Individual Learning, Music, Mobile Application, Artificial Intelligence

AUTONOMOUS VEHICLE FOLLOWING ANOTHER AUTONOMOUS VEHICLE

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Abstract – Our study includes a literature review of a vehicle following another vehicle. This study answers questions such as how a vehicle follows another vehicle and why it is needed. The vehicle in question is generally cars. This process may work differently in different vehicles, but we will focus on how cars follow other cars.

The results of the literature review showed that a vehicle following another vehicle is generally achieved using image processing methods and image data. In addition to this image data, different sensor data is collected. The purpose of using each sensor and the advantages it provides to the system are different. Simulation-based systems are used in data creation. Real-life data is used to solve real-life problems. The models used are generally developed using reinforcement learning methods. It is recommended to use similar structures in the systems to be developed to achieve this study.

Keywords – Autonomous Vehicle; Car Following; Car Following System; Computer Vision; Image Processing

FIDE: KNOW NATURE, LOVE IT, PROTECT IT

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Abstract **–** This study discusses the design and development process of the FIDE mobile application, which was developed to protect and raise awareness of biodiversity. The application stands out with its features of species identification using artificial intelligence technologies, identifying invasive species, and offering customized tasks to users. The core components of the application consist of a backend structure developed in accordance with Clean Architecture principles, a database infrastructure strengthened with PostgreSQL and PostGIS integration, and a user interface designed with the Flutter framework. The transition from the initially used EfficientNetV2 architecture to the vector similarity approach built on the ResNet-50 model in the species recognition system has significantly increased the system's accuracy rate. The application allows users to earn nature contribution points and make donations to various institutions, thus encouraging active participation. FIDE presents an innovative approach to biodiversity conservation, raising awareness among its users and enabling them to contribute to nature conservation efforts.

Keywords **–** Biodiversity, Artificial Intelligence, Mobile Application, Species Identification, Clean Architecture

AUTOMATIC MUSIC GENRE CLASSIFICATION WITH XGBOOST

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Abstract – This study examines the automatic classification of digital music data, which is a significant challenge in the field of Music Information Retrieval (MIR). The research was conducted on the GTZAN dataset, and a classification model was developed using acoustic parameters such as spectral features, Mel-frequency cepstral coefficients (MFCC), and chroma features. The dataset used in the study consists of 9990 samples and 60 variables. In the structural analysis of the dataset, spectral and harmonic differences between Blues and Classical music genres were comparatively examined through spectrogram and chroma features. The analyses revealed that Blues music has a wider spectral bandwidth and dynamic structure, while Classical music exhibits more regular spectral characteristics. The SelectKBest method applied for feature selection demonstrated that chroma features were the most determinant factor in classification performance. The dataset was split into 67% training, and 33% test data, and Sparse Categorical Crossentropy loss function and Adam optimization algorithm were used in model training. In the classification process performed with the XGBoost algorithm, the model achieved approximately 300 correct predictions for each class and demonstrated overall satisfactory performance.

Keywords – Genre Classification, XGBoost, Feature Selection, Mel-frequency Cepstral Coefficients (MFCC

TECHNOLOGIES DEVELOPED AGAINST UAV THREATS AND GLOBAL APPROACHES

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Abstract **–** Unmanned Aerial Vehicles (UAVs) have rapidly become one of the most prevalent technologies in modern battlefields, transforming the nature of warfare. These aerial platforms are used for various operations such as reconnaissance, surveillance, intelligence gathering, and offensive strikes, presenting both strategic advantages and significant risks. UAVs' capabilities have forced militaries around the world to develop technologies that can counter their threats. This article explores the core technologies designed to neutralise UAVs, including frequency jamming systems, AI-assisted detection techniques, and directed energy weapons. Additionally, it provides examples of national efforts by countries like the US, China, Russia, Israel, Turkey, and others to address the growing UAV threat.

Keywords – UAV Threats, Counter-UAV Technologies, Frequency Jamming, Directed Energy Weapons, Global Defense Strategies

AIM-120 AMRAAM: ADVANCED MEDIUM-RANGE AIR-TO-AIR MISSILE OVERVIEW

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Abstract – The AIM-120 Advanced Medium-Range Air-to-Air Missile, commonly known as AMRAAM, is a crucial component of modern air combat. Developed as a successor to the AIM-7 Sparrow, AMRAAM represents a significant leap forward in air-to-air missile technology. This article will examine the history, characteristics, variants, and ongoing development of the AMRAAM weapon system.

Keywords – AIM-120 AMRAAM; Air-to-Air Warfare; Guidance Systems; High-Energy Solid Rocket Motors; Defence Systems

COMMUNICATION PROTOCOLS, CIRCUIT DIAGRAMS AND INTERFACE DESIGNS USED IN ELECTRIC VEHICLES

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Abstract – The automotive industry has represented a significant sector of industrial development worldwide. With the advancement of technology, vehicles are equipped with various devices that allow them to perform different functions, increase their level of autonomy, and provide greater confidence and comfort to drivers. A wide range of network protocols are used to facilitate effective communication and data exchange between sensors, devices, and systems within vehicles. Data exchange between Electronic Control Units (ECUs) about the status of the vehicle is possible with these network protocols. A thorough understanding of these automotive network protocols is vital to establishing reliable and efficient communication networks that support a wide range of functions and safety features in modern vehicles. This study presents a comprehensive review of the five most commonly used in-vehicle networks.

Keywords – In-Vehicle Network; Electronic Control Unit (ECU); Communication Protocols; CAN; FlexRay; LIN

TECHNOLOGICAL DEVELOPMENTS IN AQUACULTURE IN THE BLACK SEA

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Abstract **–** Sea products are undoubtedly among the most fundamental food sources. They are an important source of animal protein in our country. Over the years, the fishing activity in the Black Sea has fluctuated, sometimes decreasing and sometimes increasing. Technological advancements have had a significant impact on these developments. In our country, 80% of fishing vessels are small boats up to 12 meters long. Larger boats, which are over 12 meters, make up 20% of the total fleet. However, nearly 90% of the fish caught in our country come from the activities of these larger vessels. Traditional and local fishing methods, including the use of nets and equipment, can benefit from technological advancements. This enables sustainable fishing practices.

During fishing activities, the weather, moonlight, and location before going out to sea are considered. Nowadays, these factors are obtained by utilizing technological developments. Technologies such as sonar, echo sounders, GPS, satellite data, smart nets, and weather forecasting have made fishing activities easier. Compared to previous times, there have been significant changes in the fishing vessels used. Technological equipment has been added to the vessels, which has increased their size and engine power, meeting the needs of the crew and allowing the caught seafood to be preserved for freshness and quality when brought ashore. However, it is crucial that technological advancements in our country's fishing vessels are used without leading to overfishing. Otherwise, the sustainability of fish stocks will be at risk.

To ensure monitoring and sustainability of fishing activities, the Ministry of Agriculture and Forestry's Directorate General of Fisheries and Aquatic Products carries out effective tasks. Technological efforts are being made, such as the marking of nets and satellite tracking systems. All these developments are carried out in accordance with regulations, enabling the protection of the ecosystem and the sustainable increase of economic benefits.

This paper will discuss the impact of developing technological equipment on sustainable fishing practices, using science and collective wisdom, and will share these insights with relevant stakeholders.

Keywords – Sustainable fishing practices, Technological advancements in fishing, Fishing vessel Dynamics, Ecosystem protection and regulations, Fish stock sustainability

FISHING BOATS USED FOR COMMERCIAL PURPOSES IN THE BLACK SEA

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Abstract – In our country, the Black Sea plays an important role in commercial fisheries. The amount of marine fish caught in 2023 was 387,115 tons, with the Black Sea making a significant contribution to this total. In the Black Sea, fishing activities are carried out using various types of vessels, including purse seiners, trawl (midwater-bottom) vessels, carrier vessels, and small boats suitable for coastal fishing. The fishing techniques, usage methods, and target species of these vessels vary. They are designed to suit the region's structure and climatic conditions. Due to fishing area restrictions set by the ministry, some commercial vessels' fishing activities have been limited.

Pelagic fish species (such as anchovy, sprat, bonito, and horse mackerel) are the primary targets for purse seiners. Fishing methods involve tracking the fish in the sea with technological equipment (such as sonar and echosounders) or binoculars, and then surrounding them with nets. They are in continuous search until they find fishable stocks. In our country, purse seiners are highly developed both in terms of meeting the crew's needs and preserving the caught fish until they reach shore. Depending on the size of the ship and other factors, the crew usually consists of 15 to 35 people.

In the Black Sea, there are regional bans specific to trawl vessels. Bottom trawling focuses on demersal fish species (such as turbot, whiting, and red mullet). The fishing process involves casting the net into the sea and pulling it along the bottom for a certain period using doors, then hauling up the catch. This process varies depending on the catch, weather conditions, and other factors, and typically repeats 4-6 times between dawn and dusk. Bottom trawl vessels typically have 4-7 crew members.

Midwater trawling, on the other hand, targets pelagic fish species. The doors used in bottom trawling are not found in midwater trawlers. Fishing is conducted using two vessels. The second vessel serves as the carrier ship. Similar to bottom trawling, fishing activities start early in the morning and continue until sunset. Carrier vessels play a crucial role in delivering supplies to the fishing vessel, picking up and dropping off the crew, and storing and transporting the catch to shore. While carrier vessels do not play a significant role in purse seiner fishing, they assist in midwater trawling by sailing parallel to the fishing vessel. Carrier vessels typically have a crew of 10-15 people.

The boats used in coastal fishing are small vessels. Their activities are shaped around the target species they aim to catch. Traditional fishing practices continue to have an impact on these boats. The number of such vessels in the Black Sea is much higher compared to other types. These boats catch a variety of species.

Keywords – Black Sea commercial fisheries, Pelagic and demersal fish species, Fishing vessel types and roles, Technological advancements in fishing methods, Fishing area restrictions and sustainability

DESIGN, MANUFACTURING, AND ANALYSIS OF ROLLBAR AND ROLLCAGE SYSTEMS FOR ELECTRIC VEHICLES

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Abstract – Driver safety is a top priority in the technical design processes of electric vehicles. Rollbar and rollcage systems, developed within this scope, aim to provide maximum protection for the driver in the event of a rollover or collision. This study addresses the design, manufacturing, and durability analysis of a rollbar and rollcage system specifically developed for electric vehicles. The geometric and physical properties of the system were optimized using SolidWorks software, while structural durability analyses were conducted with ANSYS software. The use of 32x2 mm ST-37 steel pipes effectively enhances the system's reliability by absorbing crash energy. This innovative design has the potential to contribute significantly to the advancement of safety standards in electric vehicles.

Keywords – Electric Vehicles, Rollbar, Rollcage, Driver Safety, Design, Manufacturing

2 DEGREES OF FREEDOM DYNAMIC TRAJECTORY MODEL OF 5.56X45MM NATO AMMUNITION WITH MACHINE LEARNING

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Analyzing the Effects of Underwater Camera and Deep Learning Methods on FPS
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Abstract - This study aims to compute the trajectory of 5.56x45mm NATO ammunition in a two degree of freedom (2DOF, 2 Degree of Freedom) approach with low cost and high accuracy. In this context, a machine learning model is developed based on the Mach Drag Coefficient (Cd) of the munition. The proposed model estimates the Cd value of 5.56x45mm NATO ammunition based on the Mach number. By combining the Cd values with atmospheric conditions, the drag force (Fd) acting on the ammunition is calculated. This force was used to determine the acceleration on the projectile. The calculated acceleration value is used to determine the new velocity and position of the munition at the end of a given step interval. This process is repeated dynamically, with the Mach number, Cd and Fd values renewed at each step. During the calculations, it is assumed that the airflow is isentropic and atmospheric conditions neglect energy losses. In addition, the angle of attack of the munition is assumed to be constant and 0°. The developed model provides a cost-effective and accurate approach to trajectory analysis. By analyzing the dynamic behavior and trajectory characteristics of the munition, this study can form the basis for future research on military decision support systems.

Keywords - Machine Learning; External Ballistics; Drag Force; Trajectory Analysis; Modeling

MEASURING AND ANALYZING THE IMPACT OF KONYA INDUSTRIAL ZONES ON URBAN AIR POLLUTION USING AUTONOMOUS UAVS

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Abstract **–** This study addresses industrial air pollution monitoring in Konya, Turkey, through an autonomous UAV-based measurement system. The developed rotary-wing UAV, equipped with sensors for nitrogen oxides, sulfur oxides, ozone, carbon monoxide, and particulate matter, collects real-time air quality data along predefined routes in industrial zones. The collected data is analyzed through correlation and multiple regression analyses, comparing results with existing measurements from the Konya Metropolitan Municipality's monitoring stations. Findings will be publicly shared via a dedicated website, supporting evidence-based environmental policy decisions. This project contributes to the United Nations' Sustainable Development Goal 13 (Climate Action) by demonstrating effective use of autonomous systems in environmental monitoring.

Keywords – Autonomous UAV; Air Pollution Monitoring; Industrial Pollution; Environmental Data Collection; Sustainable Development Goals

SMART VERTICAL FARMING AUTOMATION WITH AI-POWERED NFT HYDROPONIC SYSTEM

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Abstract **-** This study introduces a comprehensive approach to smart vertical farming by utilizing the Nutrient Film Technique (NFT) in combination with artificial intelligence (AI) and computer vision technologies. Addressing global food security challenges, the system automates the monitoring and optimization of plant growth conditions. This innovation not only minimizes water and energy consumption but also increases growth rates and yields. By comparing this AI-powered approach to conventional farming methods, the research evaluates its potential to enhance agricultural productivity, sustainability, and scalability for various applications. Additionally, the system's modular design and adaptability make it a promising solution for urban agriculture. Furthermore, the integration of advanced imaging and environmental monitoring technologies establishes a new standard for precision farming, ensuring consistent performance across diverse environmental conditions.

Keywords - Artificial intelligence, automation, hydroponics, image processing, vertical farming, NFT, smart agriculture, sustainability.

DEEP LEARNING-BASED OCCUPANCY MONITORING FOR PUBLIC SPACES

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Abstract – *This study focuses on the development of a web-based appointment system that detects occupancy in shared spaces, such as libraries and cafes, using image processing and artificial intelligence. The system tracks individuals entering and exiting an area in real-time, providing reports on occupancy levels. Designed for low cost and high accuracy, it operates efficiently on standard CPUs.The implementation utilizes Python with OpenCV for image processing and the MobileNet-SSD model with Caffe for person detection. Enhanced tracking accuracy is achieved through centroid tracking and correlation filters. Tests reveal that the system achieves over 94% accuracy and processes real-time video streams at 25–35 frames per second. Results are displayed to users via an intuitive interface and tabular reports, making it a practical tool for managing shared spaces.*

Keywords – Occupancy Detection, Real-Time Tracking, Image Processing, Deep Learning,People Counting

MOBILE APPLICATION NOTIFYING UNIVERSITY STUDENTS AND ACADEMICS ABOUT UNIVERSITY EVENTS (UBI)

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Abstract **–** With the development of the digital revolution, mobile applications offer various opportunities to individuals. The rapidly developing mobile world is now with individuals at every step. A university notification application was developed to provide opportunities for individuals who care about their academic and personal development. This mobile application provides individuals with notifications about scientific events (symposiums, conferences, hackathons, etc.) organized on national and international platforms. This cross-platform mobile application, developed using Flutter and Firebase, processes event data obtained from the websites of universities in Turkey through BeautifulSoup and Selenium libraries. This application provides real-time data synchronization and user authentication. By designing a user-friendly interface with Figma, event information is presented to users in Turkey where there is no centralized access to academic event information.

Keywords – Academic Event, Notification, Mobile Application, Socialize, Flutter, Recommendation Algorithm

FEATURE SELECTION ALGORITHMS IN ARTIFICIAL INTELLIGENCE

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Abstract—*This paper aims to provide a comprehensive review of the literature on feature selection algorithms in artificial intelligence. Feature selection is a critical step that aims to eliminate redundant and irrelevant features in high-dimensional datasets, thus improving model performance and reducing computational costs. Especially in data-intensive methods such as machine learning and deep learning, correct feature selection is a factor that significantly affects the accuracy of prediction and classification processes.*

In this study, different feature selection techniques such as filter, wrapper and embedded methods will be analysed and their advantages, disadvantages, computational costs and performances will be evaluated. Furthermore, a comparative analysis of various algorithms such as genetic algorithms, decision trees, regression-based methods and modern hybrid approaches will be presented.

As a result of the literature review, the success of feature selection algorithms on different datasets and application domains will be evaluated and the limitations of existing methods and areas for improvement will be discussed. This study aims to shed light on the development of new methods that will make the feature selection process more effective for both researchers and practitioners.

Keywords - Artificial Intelligence, Feature Selection, Machine Learning

REMOVAL OF METHYLENE BLUE USING ATMOSPHERIC PRESSURE PLASMA SYSTEM

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Abstract **–** Non-thermal atmospheric pressure plasma jets are of increasing importance in various plasma-assisted applications. In the design of the system, an atmospheric plasma field is created that directs an electric current from a low-pressure gas flow and contacts it with the wastewater, thus achieving treatment. In the study, the wastewater treatment efficiency was investigated using a plasma jet reactor that allows liquid (water) treatment at atmospheric pressure. In the study, the color removal efficiency was investigated using the atmospheric pressure plasma system. Methylene blue (MB) was used as a model dye. Oxygen and argon gas were tested as feed gas. In this study, plasma treatment was carried out in only 5 min and at a flow rate of 12 mg/L and the results were evaluated. In the study, the highest color removal efficiency for an initial concentration of 20 mg/L was calculated as MB 99%, energy efficiency as 15.32 mg/kWh and reaction rate constant as 0.85 1/min. COD removal efficiency was found as 88.6% for methylene blue applied plasma treatment. It was also investigated whether there was any toxic effect caused by the radicals formed in the system. For this, the *Lepidium sativum* toxicity test was used. No toxic effect was observed due to the system. As a result; the usability of the atmospheric pressure plasma system, which is a new technology, in water treatment was evaluated with the study.

Keywords – Atmospheric Pressure Plasma, Methylene Blue, *Lepidium sativum*, Degradation

DOOR DESIGN FOR TEKNOFEST ELECTRIC VEHICLE RACES

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Abstract – The vehicle door to be used in Teknofest Electric Vehicle Races is a design element that directly affects the performance of the vehicle and is critical in terms of safety and functionality. In this article, the basic criteria taken into account in door design: safety, durability, material selection, ergonomics and compliance with racing rules will be discussed in detail. The primary goal in the design of the door is to ensure maximum safety during the race. The vehicle doors are equipped with manual and electronic locking systems and are designed to be easily opened from both inside and outside. The electronic lock system is controlled via NFC card reader and works connected to the AKS infrastructure. This system increases the safety of the vehicle in high speed and challenging racing conditions. The locking mechanism of the door was specially designed using torsion springs and locking plates, and the hinge systems were developed with a three-piece structure to adapt to the shell form of the vehicle, instead of classical hinges. Durability and lightness are other important elements taken into consideration in door design. The doors are manufactured from reinforced glass fiber polyester, providing both durability and lightness. The light weight of the door contributed to increased performance by optimizing the overall weight of the vehicle. Additional structures such as door bars are made of glass fiber material and supported by federated structures in order to protect them from external loads. The material selections used in the door design were made carefully in terms of durability and cost. 3 mm thick sheet metal sheets were machined to fit with the chassis and polyamide bearing elements were mounted with bolts. These materials ensure that the door is resistant to impacts while also supporting vehicle performance. As a result, the doors designed for Teknofest Electric Vehicle Races have been developed to fully comply with criteria such as safety, durability, ergonomics, material selection and compliance with racing rules. This design plays a critical role in the team's path to success, as an important structural element that both increases the performance of the vehicle and ensures the safety of the driver and passengers.

Keywords – Door Design; Locking Mechanism; Ergonomics; Electronic Lock System; Teknofest Races

ENHANCING PROTOTYPE VEHICLE AERODYNAMICS: A CFD-BASED APPROACH FOR DRAG REDUCTION

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Abstract – The operation of prototype vehicles with minimum energy consumption is achieved by reducing aerodynamic drag, rolling resistance, and mechanical friction between moving parts. The Shell Eco-Marathon competition, held annually in Europe, the USA, and Asia, provides a platform for developing innovative ideas and technologies aimed at minimizing energy consumption. In the 2024 competition, traveling more than 1074 kilometers using only one cubic meter of hydrogen fuel highlights significant advancements in energy efficiency. Although the teardrop shape theoretically offers minimum drag, practical limitations such as size, configuration, and safety often prevent its application. Additionally, one of the major challenges in designing low-drag vehicles is the users' perception of vehicle shape, which significantly influences design processes.

A prototype vehicle with low drag force was developed as part of this study. The design process began with the creation of an initial model using SOLIDWORKS software, followed by meshing the model in ANSYS Fluent Meshing. The airflow around the vehicle was then analyzed in detail using Computational Fluid Dynamics (CFD) software. The pressure and velocity distribution data obtained from the analysis were evaluated to reduce drag coefficient and minimize downward force. Through geometric optimizations performed on the front, bottom, and rear regions of the vehicle, the initial drag coefficient of 0.145 was reduced to 0.096 following shell design optimizations.

Keywords – Aerodynamic Design Modifications; Aerodynamic Optimization; Computational Fluid Dynamics (CFD); Flow Continuity

DATA PREPROCESSING STEPS IN ARTIFICIAL İNTELLIGENCE

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Abstract — Data is one of the most important sources of information today. The success of augmentation systems made with artificial intelligence depends largely on the quality of the data used. Data preprocessing is the set of operations performed to make raw data usable and meaningful, and is one of the foundations of distributed data. Data is the preliminary step in intelligence "The importance of processing accuracy, efficiency and overall performance increase has been emphasized by studies in the literature. It manages to provide a literature-supported guide for doctors to develop effective data preprocessing systems.

Keywords — Artificial Intelligence, Data preprocessing steps, Data mining

THE ROLE OF INTERIOR DESIGNERS IN AUTOMOTIVE DESIGN THE POWER OF AESTHETICS AND ERGONOMICS

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Abstract – The integration of interior architects in the automotive design process has become a vital aspect of achieving comprehensive and user-centered solutions. Interior architects bring a profound understanding of ergonomics, which is critical for optimizing the spatial organization of vehicle interiors, ensuring both comfort and efficiency. Their expertise in functionality enhances the practicality of design, bridging the gap between aesthetic appeal and usability. By prioritizing user experience, interior architects meticulously address sensory and emotional dimensions, tailoring vehicles to meet diverse customer needs.

Moreover, their contribution to design innovations allows for the creation of sophisticated and visually compelling interior concepts, integrating advanced materials and technologies. The emphasis on sustainability, a cornerstone of modern design, ensures that vehicle interiors are environmentally responsible without compromising quality. Collaborating with engineers, interior architects foster interdisciplinary synergy, producing designs that outperform those developed without their input. The absence of such collaboration often results in vehicles lacking in aesthetic coherence and ergonomic efficiency, adversely affecting market competitiveness.

This paper highlights the unparalleled advantages of involving interior architects in automotive projects, demonstrating how their multidisciplinary knowledge elevates vehicular design standards, enhances functionality, and addresses the growing demand for sustainable innovation.

Keywords – Ergonomics; Functionality; User Experience; Design Innovations; Sustainability

DESIGN AND IMPLEMENTATION OF A HIGH-POWER BUCK-BOOST CONVERTER FOR VARIABLE INPUT VOLTAGE APPLICATIONS

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Abstract – This study focuses on the design and implementation of a high-power Buck-Boost Converter for DC voltage regulation. The proposed converter operates within an input voltage range of 24-85V, providing a stable 48V output voltage with a maximum current of 10A, delivering approximately 500W of power. Emphasizing efficiency and reliability, the system is tailored for applications that require high power and variable input conditions. Experimental results demonstrate the converter's ability to maintain consistent performance under different load scenarios, showcasing its potential in renewable energy systems, industrial applications, and other areas where efficient DC-DC conversion is crucial.

Keywords – Buck-Boost Converter; DC-DC Converters; Voltage Regulation; Power Conversion; Electronic Circuits; High-Power Applications.

CONVERTİNG AND READİNG AN ANALOG SİGNAL İNTO A DİGİTAL SİGNAL VİA A MİCROCONTROLLER

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Abstract – In this article, it has become necessary to convert analog values that we use in daily life, such as temperature, pressure, flow measurements, into digital signals in order to make them more understandable and to prevent these values from being affected by noise. As a result of these difficulties, it was necessary to convert analog signals into digital signals with two states. This was done by microcontrollers and since these very complex structures convert analog signals into digital signals, LCD screens are used to make this value visible. Analog signals such as voltage are converted into digital signals by microcontrollers and reflected on the LCD screen with the necessary software codes. It is possible to do many examples like this.

Keywords *– Microprocessor circuits, Microprocessor conversion, LCD screen projection*

CURRENT, VOLTAGE AND MOTOR SPEED MEASUREMENT FROM EACH PHASE OF A 3-PHASE (BLDC) MOTOR

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Abstract – In this article, the advantages of brushless motors, which are generally used in drones, compared to brushed motors are high power-to-weight ratio, high speed, almost instant speed and torque control, high efficiency and low maintenance. Thanks to these advantages, the use of brushless dc motors in projects such as drones was needed. It is necessary to use mosfet driver integrated circuits to drive brushless dc motors and the display of analog values such as voltage, current, speed affects our use of the project more accurately, so thanks to the microcontrollers used in many places in daily life, we convert the analog signal to digital by displaying it on the LCD screen with the necessary codes.

Keywords – 3 phase motor, speed voltage current reading, LCD display

PASSENGER SEAT DESIGN FOR TEKNOFEST ELECTRIC VEHICLE RACES

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Abstract – The passenger seat to be used in the Teknofest Electric Vehicle Races is a crucial design element that directly affects vehicle performance and supports race success. This article will detail the fundamental criteria of passenger seat design, including comfort, safety, ergonomics, material selection, and compliance with race regulations. One of the most important aspects of passenger seat design is ensuring user comfort. The seat must be designed to provide comfort even during long periods of sitting. An ergonomic design should adjust the seat's angle, lumbar support, and leg alignment to fit the user's anatomy. This is one of the key factors in ensuring the driver performs optimally during the race. Safety is another critical function of the passenger seat. In the high-speed and intense conditions of the race, the safety of both the passenger and the driver must be ensured. In this regard, a 5-point seatbelt mechanism will be used for both the passenger and driver seats, in accordance with Teknofest specifications. The seat must also be impact-resistant, with a reinforced structure that absorbs energy in the event of a crash, protecting the passenger. Additionally, a secure mounting mechanism is necessary to ensure the seat is firmly attached to the vehicle and resistant to vibrations or shocks. The selection of materials used in the passenger seat design is also of great importance. The seat must be both lightweight and durable to enhance race performance while ensuring safety. For this reason, S235JR material has been chosen. This material has the desired mechanical properties under load, while also being readily available and cost-effective. In conclusion, the passenger seat designed for the Teknofest Electric Vehicle Races is considered a significant step toward the team's success, adhering meticulously to criteria such as comfort, safety, material selection, aerodynamic structure, and compliance with race regulations.

Keywords – *Passenger Seat Design*; Electric Vehicle Races; Ergonomics; Passenger Seat Comfort

EXPERIMENTAL INVESTIGATION OF THE HYDRAULIC PERFORMANCE OF A SINGLE-STAGE CENTRIFUGAL PUMP IN POSITIVE AND NEGATIVE SUCTION SYSTEMS

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Abstract **–** Centrifugal pumps are widely utilized for fluid transfer in industrial and agricultural applications. The suction conditions of centrifugal pumps can significantly affect their performance. This study aims to experimentally investigate the hydraulic performance of a single-stage centrifugal pump in positive and negative suction systems and provides valuable insights to understand the behavior of centrifugal pumps under varying suction conditions, offering critical guidance for design criteria. In this research, a single-stage centrifugal pump, manufactured by Sempa Pump, was used. Experimental studies were conducted on two distinct test setups, designed for positive and negative suction systems, created at Sempa Pump facilities. In the positive suction system, the pump was operated with the liquid level higher than the pump inlet, while in the negative suction system, the liquid level was set below the pump inlet. For both systems, the flow rate, head, efficiency, and Net Positive Suction Head (NPSH) values were determined. The effects of turbulent flow, cavitation risk, and suction conditions on pump performance were thoroughly analyzed during the experiments. The results indicate that the pump operates with higher efficiency in positive suction systems, whereas the risk of cavitation increases in negative suction systems. In the negative suction test setup, sudden drops in pressure and efficiency due to cavitation were observed at a certain flow rate. In contrast, the pump demonstrated the ability to operate at higher flow rates in the positive suction test setup. These findings highlight the critical impact of suction conditions on pump performance and offer practical recommendations for optimizing pump operation under varying system configurations.

Keywords – Centrifugal Pump; Positive Suction, Negative Suction, Cavitation, Pump Performance

LIGHTWEIGHT AND EFFICIENT VEHICLE BODY PRODUCTION WITH GLASS FIBER COMPOSITES

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Abstract – *This study focuses on the development of an optimized body design that emphasizes energy efficiency, lightweight structures, and safety for vehicles participating in the Teknofest Vehicle Competition. Glass fiber reinforced composite material was selected for the vehicle body due to its advantageous properties such as low weight, high durability, cost effectiveness, and ease of production. This production method prioritizes structural efficiency to achieve minimum energy consumption while meeting safety requirements with improved impact resistance. The proposed production approach not only improves vehicle performance and efficiency, but also complies with environmentally friendly and sustainable mobility principles.*

Keywords – *Glass fiber composites*; Glass fiber composites; Ergonomics; Impact resistance;

CALIBRATION OF STRAIN GAUGES IN THE AEROSPACE INDUSTRY: ENSURING ACCURACY AND RELIABILITY

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Abstract – Strain gauges are indispensable tools in the investigation of the mechanical behavior of materials and structures. This paper emphasizes the critical impact of strain gauge calibration on measurement accuracy and reliability. A detailed analysis of calibration processes is presented, including various calibration methods and standards. Furthermore, real-world examples of strain gauge applications in aerospace, automotive, and civil engineering are provided to underscore the significance of calibration in these industries for safety and optimization. The role of calibration certificates in legal requirements and quality control processes is also comprehensively addressed.

Keywords – Strain gauges, calibration, measurement accuracy, reliability, mechanical behavior, materials testing, structural analysis.

AERODYNAMIC BODY DESIGN FOR SHELL ECO-MARATHON PROTOTYPE VEHICLES: OPTIMIZATION PROCESS WITH CFD ANALYSES

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Abstract – Shell Eco-Marathon is an international competition that offers student teams the opportunity to innovate by designing prototype or urban concept vehicles with the aim of achieving maximum fuel efficiency. This competition serves as a significant platform for promoting energy efficiency and the development of environmentally friendly technologies. Vehicles developed for the competition undergo rigorous design processes, focusing on both aerodynamic performance and structural integrity. In this process, the vehicle body design aims to optimize fluid dynamics by minimizing drag and flow separation while ensuring driver safety and structural durability.

In a comprehensive design process, body shapes are often based on teardrop principles to enhance aerodynamic efficiency. Advanced computer-aided design (CAD) software such as SolidWorks is utilized in these studies, and Computational Fluid Dynamics (CFD) analyses are conducted using the ANSYS Fluent platform to evaluate designs in detail. CFD analyses enable the calculation of critical parameters such as drag forces and coefficients, as well as aerodynamic stability and downforce.

This study addresses the body design process of a prototype vehicle designed in accordance with Shell Eco-Marathon competition regulations. Throughout the design process, an approach aiming for a minimum drag coefficient and low turbulence levels was adopted. Among the four different body models analyzed within the scope of this study, the preliminary design with the lowest drag force and coefficient, combined with the rear design offering balanced downforce, was selected. The results revealed that the aerodynamic performance of the vehicle largely depends on body design, allowing the optimization of both fuel efficiency and safety criteria.

Keywords – Equivalent Electric Circuit; Squirrel Cage Induction Motor; Induction Motor Modelling; Loading of Induction Motor

NUMERICAL INVESTIGATION OF SHOCK WAVE DEVELOPMENT ON THE 5.56X45 MM NATO PROJECTILE

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Abstract – The motio n of projectiles with supersonic muzzle velocities towards their effective range is examined, revealing the formation of oblique shock waves on the projectile. During the development of these shock waves, variations in the aerodynamic coefficients of the projectile are observed. In this study numerically investigates the development of shock waves on a 5.56x45 mm NATO projectile within the Mach number range of 2.6 to 1.0. The angle of attack was set at 0°, and it is assumed to remain constant in the numerical simulations. Transient explicit density-based solver and k-ω turbulence model were used in this numerical study. The results indicate that as the Mach number decreases, the angle of the oblique shock waves increases. Additionally, it was found that as the projectile velocity approaches sonic velocity, interactions occur between the oblique shock waves trailing the projectile. Aerodynamic heating on the surface of the projectile is observed after the oblique shock waves.

Keywords – 5.56x45 mm NATO projectile, CFD, Shock waves and Aerodynamic heating

CNC PLOTTER THAT CONVERTS VOICE TO HANDWRITING

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Abstract – The unique value of this study is that it aims to develop a low-cost CNC plotter design that converts voice to text and uses old electronic components that are inactive as an alternative to the high-cost and complex structure of existing industrial CNC machines. This approach provides both economic advantages and supports environmental sustainability. The research aims to produce handwritten text through a CNC plotter device by converting voice data into G codes. This new application, obtained by combining voice recognition and CNC systems, offers an innovative contribution to existing technological processes. The study aims to reduce the environmental impact of electronic waste by reusing the electronic components that are inactive, while at the same time providing an accessible solution that will increase usability in educational areas with a low budget. This study will be an alternative study in the field in terms of converting voice data into mechanical movements and developing low-cost CNC systems focused on recycling. The method of the study covers the process of converting voice data into usable G codes in the CNC plotter device as well as the design of a CNC plotter device that can write text. In the first stage, the voice signal will be converted into G codes. G codes will be used to control the movements of the CNC plotter in the X, Y and Z axes, thus enabling the conversion of sound data into text. The integration of idle electronic components into the CNC plotter system is expected to provide a low-cost and functional solution.

The management of the study is based on the step-by-step implementation of the project based on predetermined work packages. The first stage is the establishment of the software and hardware infrastructure required for the correct detection and processing of the sound signal. The second stage is the design of the CNC plotter device and the integration of recycled components. This process includes the detection and procurement process of idle components so that the idle electronic components can be used in a compatible way with the system. The third stage is to test the accuracy of the text production process by controlling the X, Y and Z axis movements of the CNC plotter device with the obtained G codes. Each stage will be monitored according to the determined timeline and progress will be made by solving the encountered problems. The progress of the research will be regularly reviewed by the project manager, and the work packages and resource usage will be continuously evaluated. In this way, the project goals can be achieved and concluded effectively.

Its widespread impact has great potential, especially in the field of education and small-scale projects. The low-cost CNC plotter design will provide an accessible solution for institutions such as schools, universities and maker workshops with limited budgets. In this way, students and researchers will be provided with the opportunity to experience CNC technology more economically, which will contribute to the widespread use of the technology. In addition, the process of converting voice data to G codes will introduce voice recognition and transcription technologies to a wider audience and will set an example for innovative applications in this field. Recycling and reusing electronic waste will support environmental sustainability and contribute to the more efficient evaluation of technology waste. Finally, this study, which will appeal to a wide audience and can be widely applied thanks to its low cost, is expected to both increase the accessibility of technology in education and encourage environmental awareness.

Keywords – G-Code; Electrical-Electronic Waste; Speech Recognition; CNC plotter

VEHICLE CONTROL SYSTEMS

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Abstract - Modern vehicles have become complex structures dominated by electronic systems. While this has led to a significant increase in in-vehicle safety, comfort and performance, it has also created the need for data communication. The large number of sensors, actuators and control units interacting with each other requires data collected from different parts of the vehicle to be processed in a centralized system. In this complex network, the choice of a suitable communication protocol is critical for reliable, fast and efficient data transfer.

In this study, it is aimed to investigate and implement the UART-based RS485 (MODBUS) communication protocol for transferring the data obtained from units such as motor driver and battery control system used in electric vehicles to the in-vehicle control system. The RS485 protocol is widely used in industrial environments, provides high speed data transfer over long distances, and is preferred in the automotive industry as it is a noise-resistant communication protocol.

The main objective of the study is to evaluate the suitability of UART-based RS485 communication to reduce the complexity of the in-vehicle communication system, increase the data transfer rate and ensure the reliability of the system. In this context, the advantages and disadvantages of different communication protocols will be compared and the reasons for choosing RS485 communication will be explained in detail.

The dashboard to be developed within the scope of the project will present the data obtained from in-vehicle systems to the driver through a visual and user-friendly interface. In this way, the driver will have real-time information about the operating status of the vehicle and will have a safer driving experience.

Keywords - RS485, UART, Electric Vehicles, Communication, MODBUS.

BOOST CONVERTER DESIGN FOR PEM FUEL CELL

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Abstract - Hydrogen energy, thanks to its high energy density and environmentally friendly properties, reduces dependence on fossil fuels by reducing carbon emissions. PEM fuel cells play a critical role in hybrid vehicles by efficiently converting hydrogen energy into electrical energy. The research examines the integration of PEM fuel cells in hybrid vehicles and optimization techniques to increase energy conversion efficiency. It examines the role of hydrogen energy in environmental sustainability and the transportation sector, specifically addressing the technical limitations of Proton Exchange Membrane (PEM) fuel cells and providing solutions to overcome these limitations. The study aims to optimize the low output voltages obtained from PEM fuel cells with DC-DC boost converter circuits. In this context, optimization of components such as mosfets, TLP350 drivers, coil design and capacitor selection are focused on. The aim of the research is to increase the energy efficiency and provide efficient energy transfer in hydromobile systems by increasing the voltage of 30-46V obtained from the PEM fuel cell to 72V required by the BLDC motor drive. By increasing the use of hydrogen energy in sustainable transportation solutions such as hybrid vehicles, it is aimed to minimize environmental impacts and provide economical transportation solutions in the long term. It aims to contribute to the transition to clean energy by increasing the potential of PEM fuel cells in energy systems.

Keywords - Hydrogen Energy, PEM Fuel Cell, DC-DC Amplifier, Energy Efficiency

BITCOIN WEEKLY PRICE PREDICTION: COMPARATIVE ANALYSIS WITH CNN, XGBOOST AND LSTM MODELS

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Abstract - In this study, we compare the performance of modern artificial intelligence and machine learning techniques for Bitcoin price prediction. For the analysis, a total of 468 weekly data from 2016 to the present, including weekly "open, close, maximum price, minimum price and volume" information, are used. Deep learning-based LSTM, machine learning-based XGBoost and CNN models were applied to predict price movements and 100-week test forecasts were generated with these models. The predictions of each model are plotted on the same graph with the actual prices and their accuracy and average error rates are analyzed. This study reveals that it is possible to improve forecasting performance in cryptocurrency markets with artificial intelligence models.

Keywords - Bitcoin Price Prediction; Deep Learning; Time Series Analysis; Image Processing; Machine Learning

EXPECTATION ANALYSIS OF SMES FROM ELECTRICAL TECHNICIANS: KONYA EXAMPLE

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Abstract – The original value of this study aims to analyze the expectations and current status of students studying in higher education regarding post-graduation workforce readiness so that technical personnel can properly meet the basic needs of small and medium-sized enterprises (SMEs) such as electrical infrastructure, fault detection, maintenance and repair, energy efficiency and continuity of electrical systems. In this context, the expectations of SMEs providing employment in a wide area from electricity production to consumption from electrical technicians who are expected to have comprehensive technical knowledge will be emphasized, and the roles of technicians in the electricity market, job satisfaction and labor efficiency and sectoral expectations will be evaluated. Method: This research is based on the screening model, which is one of the quantitative research methods. The aim of the research is to examine the expectations of technical personnel in areas such as electrical infrastructure, maintenance, repair and energy efficiency of small and medium-sized enterprises (SMEs). In this direction, the expectations of SMEs from electrical technicians and the importance of the roles of technical personnel in the sector will be analyzed. The data of the research will be collected by interview or survey method. The interview or survey questions developed by the researcher will be applied to SME managers to obtain technical personnel expectations and sector-related evaluations. The data collected will be analyzed with the help of SPSS program. Percentage, frequency and correlation analysis methods will be used for data analysis. In this way, the relationship between SMEs' expectations from electrical technicians and their importance in the sector will be revealed. In addition, the obtained results will allow the development of concrete suggestions for SMEs' needs in the sector.
Management; includes examining the studies on the subject in the literature, managing the processes under the consultancy of sectoral stakeholders, regular reporting and meticulous attention to the accuracy and reliability of the data to be obtained through secure survey applications.
The widespread effect: Knowing the expectations of SMEs from newly graduated electrical technicians will contribute to the determination of how students who are currently receiving education should improve themselves based on their expectations of work efficiency, energy efficiency and readiness. In addition, it will increase the compatibility of the education system with the labor market by providing important data on the level at which the education provided in higher education should be shaped for SMEs. This study will enable training programs to become more effective in line with the needs of SMEs and to train more equipped technicians in the sector.

Keywords – Professional experience; Expectation analysis; electrician; Labor productivity

LI-FI BASED AUDIO TRANSMISSION SYSTEM DESIGN FOR USE AT DIFFERENT DISTANCES

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Abstract – Li-Fi technology offers a solution that provides much faster data transmission and reduces transmission losses. The project aims to eliminate problems such as interference, data loss problems and network areas in wireless transmission encountered in other wired and wireless systems in large areas such as stadiums, theater halls, entertainment venues. The system, designed on digitizing sound signals and converting them into light waves, is expected to provide high quality sound transmission, transmit data to long distances and offer a wide range of possibilities from operating a remote device to controlling it. It is expected to be cheaper than wired sound transmission systems from the design, eliminating losses in sound signals weakened along the line and provide reliable and fast data transmission. In this way, it is aimed to provide a cheaper, faster and more reliable solution. The method is built on binary digitization of the sound signal to be sent with light waves, modulation to light waves, transmission of data with light waves, perception of light signals, design of the demodulator that enables the digitization of the perceived light signals back into binary and finally transmission to the speaker as sound. The project is built on; It includes determining the areas of use, investigating the problems to be encountered at different distances, providing electrical and electronic equipment that will enable the conversion of analog signals to digital signals, developing software on the microcontroller for process control, adapting LED and/or laser systems to the system as light wave generators to provide high frequency data transmission. It also includes the perception of light waves on the receiver, demodulation of the perceived light wave into a sound signal, a second microcontroller and software for system control and finally the conversion of data into a sound signal. Considering that the receiver may receive data from different light sources, it also includes the separation of the light signal in the environment and the light signal sent. After the system installation, performance tests such as data transmission speed, data transmission loss and external environment effects will be performed. Necessary improvements on the system will be determined by conducting relevant plot tests. These steps include the determined integration of Li-Fi technology into the system. Management: It includes determination of the project scope at the beginning of the project and the effective use of resources by establishing a multi-disciplinary team. The flow of information within the team will be ensured by regular and coordinated communication. The stability of the system, comparison with existing systems, data transmission speed, resistance to possible interferences and data received from different distances will be compared and observed and reported. These processes are necessary steps for the system to be effective and sustainable for Li-Fi technology.
Widespread effect: The system has the potential to be used in data transmission for different applications. It increases the transmission quality by minimizing possible interference and data loss in wired systems. Due to the high data transmission speed, it can create performance increase in many applications due to the effective management of large data flows. Since the signals are modulated in the form of light waves, it eliminates electromagnetic interferences and enables its use in sensitive environments such as health and aviation areas to become widespread. The decrease in cabling costs allows the installation and sustainability costs of businesses to decrease. These effects show that Li-Fi application areas may increase in the future.

Keywords – Green communication, wireless transmit, communication; Data transmission; Li-Fi

INSULATION MONITORING CIRCUIT

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Abstract - In electrical systems, isolation means isolating components from each other and the environment to ensure a safe working environment. This is especially vital in industrial and commercial applications. Isolation monitoring circuits monitor whether this isolation has deteriorated, detecting potential hazards in advance and ensuring safety. In case of insulation degradation, it alarms or shuts down the system, protecting users from hazards.

With the proliferation of modern electrical devices, strict requirements for device safety have been established. Exposure of charging equipment to factors such as rain, humidity and collisions can reduce failure. Isolation failure of any one piece of equipment puts the safety of the entire system at risk. Therefore, insulation monitoring circuits play a critical role in electrical safety.

An insulation monitoring circuit is an inspection mechanism that monitors the state of electrical insulation in the system. It sends early warning signals by detecting low insulation levels. If below thresholds, it ensures safety by shutting down the system. These systems are often used in transformer rooms, patient care units and critical electrical equipment.

The insulation monitoring circuit monitors voltage changes using a reference resistor. When the insulation breaks down, leakage current is generated and this current can be detected through the reference resistor. Thanks to this mechanism, insulation breakdowns in the system are detected at an early stage. The information obtained is used to determine the size of the leakage current and ensure the safety of the system.

Monitoring the insulation level ensures both the proper functioning of electrical equipment and the early detection of potential faults. In this way, it is possible to prevent serious problems, especially in high-voltage systems. Insulation monitoring circuits, which are vital for electrical safety, are widely used in various application areas.

Keywords – Isolation Monitoring, İndustrial Security, Grounding System, Protection Relay

AUTOMATIC EYE DISEASE DETECTION WITH ARTIFICIAL INTELLIGENCE

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Abstract - This project focuses on the automated detection of retinal diseases using artificial intelligence, specifically targeting the identification of drusen through OCT (Optical Coherence Tomography) imaging. Drusen, yellowish deposits beneath the retina, are significant markers for conditions such as age-related macular degeneration (AMD). Utilizing a dataset sourced from Kaggle, which includes 1,335 labeled images across two categories ("normal" and "drusen"), the YOLOv8 model was trained to perform efficient and accurate disease classification.

The dataset was augmented using the Roboflow platform to enhance model robustness, applying transformations such as rotation, brightness adjustment, and noise addition, effectively tripling the available data. The model demonstrated high performance in detecting the "normal" class, with a precision of 0.987 and recall of 1.0, while the "drusen" class achieved a precision of 0.705 and recall of 0.564. The overall model performance metrics, including a mean Average Precision (mAP50) of 0.824 and mAP50-95 of 0.523, highlight its effectiveness.

The system was further integrated with a graphical user interface built using Python's Tkinter library, enabling real-time image analysis through a user-friendly application. This tool facilitates early diagnosis, enhances diagnostic accuracy, and reduces clinical workloads, offering significant benefits in both clinical and remote healthcare settings.

Keywords – Artificial Intelligence (AI), Optical Coherence Tomography (OCT), Medical Imaging, Automated Diagnosis, Eye Health

ENHANCING CONNECTIVITY IN SMART CITIES: UAV PLACEMENT OPTIMIZATION WITH THE REPTILE SEARCH ALGORITHM

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Abstract- Unmanned Aerial Vehicles (UAVs) serving as mobile base stations (UAV-BSs) are emerging as a transformative solution for advancing communication networks, particularly in the context of smart cities, disaster recovery, and areas lacking traditional infrastructure. These aerial platforms can be rapidly deployed to ensure seamless connectivity during emergencies, network overloads, or failures of terrestrial base stations. This study addresses the challenging problem of optimizing UAV-BS placement to maximize downlink coverage while minimizing energy consumption, taking into account user distribution and UAV altitude. To solve this intricate optimization problem, we employ the Reptile Search Algorithm (RSA), a cutting-edge metaheuristic inspired by the adaptive predatory behavior of reptiles. RSA effectively balances exploration and exploitation to uncover optimal solutions in complex search spaces. Comparative analysis across multiple scenarios demonstrates that RSA surpasses established algorithms such as the Marine Predators Algorithm (MPA), the Whale Optimization Algorithm (WOA), and the Grey Wolf Optimization (GWO), providing a robust and efficient approach for UAV placement in static environments. The findings of this research pave the way for innovative UAV-based solutions in modern communication systems.

Keywords- UAV base station; Replite Search Algorithm; Energy Efficient; Downlink coverage; Smart Cities.

DEPLOYMENT OF AIR DEFENSE SYSTEMS WITH ARTIFICIAL INTELLIGENCE AND MULTI-CRITERIA DECISION-MAKING METHODS

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Abstract -Air defense systems have a critical role for the airspace security of countries. With today's technology, artificial intelligence (AI) technologies offer solutions to the problems specific to air defense systems against the diversity of air threats and the complexity of the battlefield. The integration of AI into air defense weapons provides significant advantages in the areas of threat detection, situational awareness, automatic decision-making and simulation. Analyzing data from radar, satellite and various sensors, AI can quickly and accurately classify threats, predict potential attack scenarios and take or present effective decision options to the user without the need for human intervention. The speed, accuracy and big data processing capacity offered by AI optimize decision-making processes and reduce operational costs. However, challenges such as data security, algorithmic errors and human-machine collaboration are critical issues that need to be addressed. In the future, the capabilities of these systems will increase with autonomous systems, quantum computing and more advanced AI algorithms. Ethical responsibilities and international regulations will ensure that the technology is used in a safe and balanced manner. AI is positioned as a game changer offering speed, efficiency and strategic superiority in air defense systems. On the other hand, the use of multi-criteria decision-making methods (MCDM) together with artificial intelligence with the solutions it brings to fuzzy areas will contribute positively to the process of making the best decision. The issue of deployment in air defense systems emerges as a situation where decision-makers need to make a decision by evaluating many criteria. With the learning and optimization capability offered by AI, it will be possible to find a solution to this problem.

Keywords - Air Defense, Artificial Intelligence, Deployment, MCDM

FROM GROUND CONTROL TO THE SKY: ROCKET INTERFACE SYSTEMS

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Abstract - Interface communication in rocket systems provides data exchange by establishing a bridge between ground control stations and the rocket reaching into the sky. These systems are transferred to ground control like the heartbeat of the rocket before launch and at every moment of the flight and real-time data is accessed. It enables the vehicle to embark on a safe and successful journey. When eyes are turned to the endless sky, interface systems draw a road map like a captain. They guide them to make the most critical decisions in a timely manner. In this way, this journey that started from the ground continues by turning into a success story in the sky.

Keywords - Rocket Navigation, Space Exploration, Interface Communication, Data Exchange, Flight Data Monitoring, Safe Journey, Critical Decision Making

ARTIFICIAL INTELLIGENCE SUPPORTED MOBILE TELEREHABILITATION SYSTEM

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Abstract - Developing technology is radically transforming healthcare, especially through innovative approaches such as telerehabilitation. Telerehabilitation offers a significant opportunity for individuals who have difficulty accessing traditional rehabilitation services by eliminating barriers such as distance, time, and cost, thus making rehabilitation more accessible. The aim of this project is to make the telerehabilitation process more effective and efficient by using artificial intelligence (AI) and image processing technologies. The system to be developed will monitor and analyze patients' exercises and treatments and will enable doctors to remotely ensure that the therapy is applied correctly and efficiently. Gamified treatment programs specifically designed to increase motivation, especially for pediatric patients, will be developed and an engaging and encouraging experience will be provided through positive feedback. All these features will be integrated into a mobile application and made accessible to a wider audience. The project management plan is divided into five main stages: data collection, preprocessing, classification, model development and training, and integration of the model into the mobile application. In addition, machine learning models will be developed and trained using libraries such as TensorFlow and YOLO algorithms. This project aims to utilize artificial intelligence and image processing technologies to monitor and analyze rehabilitation processes, providing real-time insights for doctors. With remote monitoring, patients can receive treatment in a comfortable environment, while early diagnosis enables timely interventions for possible health problems. In addition, gamified treatment programs will increase patient motivation, and the mobile application will provide accessible remote rehabilitation options for people with disabilities, making the health and rehabilitation experience more effective and enjoyable.

Keywords – Healthcare Technology, Distance and Cost Barriers, Artificial Intelligence (AI), Gamified Treatment Programs, Data Collection, Preprocessing, Remote Therapy, Image Processing

PERFORMANCE ANALYSIS OF ATTENTION MECHANISM MODELS IN ELECTRICITY CONSUMPTION ESTIMATION

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Abstract The accurate estimation of electricity consumption is essential for the planning and management of energy systems. In particular, the increasing integration of renewable energy sources into the grid and variable consumption models increase the importance of accurate forecasting models. The study examined the use of Repetitive Neural Networks (RNN) and Long- and Short-Term Memory Networks (LSTM), which are one of the deep learning methods used in time series estimation, to perform electricity consumption estimates. These models stand out for their ability to learn complex temporal dependencies and patterns in electricity consumption. In the study, the performance of attention mechanisms was examined in contrast to traditional regression-based estimation methods. The attention mechanism offers significant advantages, especially in long-term dependency modeling, by allowing the model to focus on important temporal components in the input data. The studies present experimental results showing that hybrid models using LSTM and attention mechanisms provide higher accuracy compared to traditional statistical methods and other hybrid approaches. The proposed hybrid model is capable of producing consistent forecasts even in difficult scenarios such as seasonal changes, holidays and sudden changes in consumption. The study reveals the potential of deep learning techniques based on the attention mechanism in time series predictions such as electricity consumption. This approach provides a reliable framework for future applications of smart grids and energy management systems and contributes to improving energy efficiency.

Keywords – Deep Learning Methods, Time Series, Attention Mechanis, Hybrid Models

ENERGY-EFFICIENT CONTROL SYSTEM FOR INDUSTRIAL REFRIGERATORS

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Abstract This study aims to develop a next-generation control and monitoring system for industrial refrigerators, optimizing temperature and humidity control to achieve energy savings and ensure the safe storage of sensitive products. The system offers an integrated, low-cost solution using the ESP32 microcontroller, DHT22 and HDC1080 sensors, and a relay module. Data is securely stored through PHP and MySQL integration, with remote access capabilities. Relay control via the RS485 protocol ensures a reliable and compatible mechanism with industrial environments. Additionally, the system allows users to set upper and lower limits for temperature and humidity values via the system panel. When the system exceeds these limits, a notification is sent to the user via the interface, providing flexibility and ease of control. The user-friendly web interface visualizes temperature and humidity data, enabling detailed analysis. Experimental results show that the system operates effectively in industrial refrigerators and provides energy savings. This project can be used as a standard model in cooling processes in the food, pharmaceutical, and chemical industries, aiming to reduce operational costs while maintaining product quality.

Keywords- ESP32 Micro,DHT22 Sensor,Industrial Cooling,HDC1080 Sensor,Data Analysis, Energy Efficiency, PHP

PYTHON LIBRARIES FOR RENDERING AND ANALYZING IMAGES OBTAINED FROM UNDERWATER CAMERAS

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Abstract The exploration and analysis of the underwater world is of great importance in terms of understanding marine ecosystems, security and research studies. However, underwater images contain data that is difficult to process due to difficulties such as insufficient contrast, blur and noise. Python offers extensive opportunities for image processing and deep learning applications, especially with its powerful libraries such as OpenCV, TensorFlow and NumPy. In this study, the adaptation of deep learning methods to underwater conditions is examined using Python libraries.

Keywords- Deep Learning, Computation Tools, Image Deblurring, Python Library

A REVIEW OF ADDITIVE MANUFACTURING TECHNOLOGIES: FUTURE MANUFACTURING METHODS

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Abstract – Additive manufacturing technologies are an innovative production method that allows the production of products with complex geometries by depositing material in layers. Unlike traditional production methods, it increases design flexibility while minimizing material waste. These technologies are widely used in sectors such as aviation, automotive, medical and defense. Additive manufacturing processes offer time and cost advantages, especially in the production of personalized prosthetics, precision parts with lattice structures and rapid prototyping with 3D printers. Additive manufacturing also makes significant contributions in terms of sustainability. While excess material is used in traditional methods and waste materials such as scrap are generated, only the amount of material needed is used in additive manufacturing. The technologies used in additive manufacturing applications offer a structure compatible with Industry 4.0 by integrating digitalization into production processes. This research study aims to popularize additive manufacturing technology and reveal its positive and negative aspects. Problems such as high equipment costs, limited material variety and determination of quality standards in additive manufacturing technologies require further research and development studies. Additive manufacturing technologies have the potential to offer major innovations in production methods in the future, bringing flexibility, efficiency and sustainability to industrial applications.

Keywords- Additive Production,3 Dimensional, Layered Manufacturer, Partner, Rapid Prototyping, Digitalization

WORKING PRINCIPLE AND SIMULATIONS OF BOOST CONVERTER CIRCUIT

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Abstract Boost Converter is a switching power converter used to increase the input voltage. The working principle i s based on storing energy in the inductor and transferring this energy to the load circuit. When the switch (usually a MOSFET) is closed, energy from the input source is stored in the inductor.When the switch is opened, the energy accumulated in the inductor is added to the input voltage, creating an increased voltage, and this voltage is transmitted to the load circuit via the diode. In this way, a low DC input voltage is converted into a higher DC output voltage.

Keywords- Boost Converter,Key, Income, Induction ,Ene, MOS, Key,Company, DC-DC Converter

BASIC DEEP LEARNING MODEL BASED ON FINANCIAL TIME SERIES ANALYSIS

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Abstract It is of great importance to make correct and fast decisions in financial markets, especially in short-term transactions. In decision-making processes with limited data, traditional strategies are insufficient and it cannot react instantly to fluctuations. This project aims to use deep learning algorithms as financial indicators and a system that will enable investors to make more informed and profitable decisions by combining them with basic/technical analysis it aims to improve. This system applies not only to individual investors, but also to the country by increasing market efficiency.Using large data sets such as stock prices and trading volume as a method, it is planned to develop a model based on deep learning that will predict price movements. Python the programming language has been included in the project because it offers comprehensive library support for data analysis and deep learning. Within the scope of the project, Long-Short-Term Memory (LSTM) and Gated Repetitive Unit (GRU) will be used with deep learning architectures based on historical data, time series analysis, possible future.LSTM and GRU networks will be used in the modeling phase; performance measurements It will be evaluated as MAE, RMSE and R2. In addition, a more comprehensive one with technical and basic analysis methods a prediction model will be created. This project aims to help investors make informed decisions by increasing financial literacy and the contribution of the sustainable Development Goals to the goal of decent work and economic growth by providing it, it aims to take an important step for a better economic future. Developing a financial strategy he will contribute to the literature in this field and his analyses will make it more accessible for individuals with low financial literacy.

Keywords- RMS, R2(R-squared), Predictions, Financial, Literacy, Sustainable, Economic, Investment

DESIGN OF A GROUND CONTROL STATION APPLICATION FOR UAVS WITH AUTONOMOUS FLIGHT SUPPORT

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Abstract This study presents the design and development of a safe, functional, and user-friendly ground control station (GCS) for unmanned aerial vehicles (UAVs). The proposed GCS system is equipped with a user-friendly interface and advanced functionality features to ensure effective management of UAVs during flight. The system aims to set a new standard in UAV control by integrating innovative features such as object tracking, multi-UAV scenarios, and image processing. The software infrastructure is designed based on ArduPilot and MAVLink protocols and aims to provide high reliability in data transfer between UAV and GCS. The GCS interface is developed using PyQt5 and will be tested in both simulation and real-world conditions via DroneKit. The development process includes verifying the accuracy and reliability of the system on different flight scenarios in the Gazebo simulation environment. Within the scope of the project management, each stage is planned by specific timelines and resources, and simulation, algorithm development, testing, and evaluation processes are supported by regular reporting. In addition, possible risks are defined in advance and contingency plans are prepared to address these risks. The academic and commercial impacts of this project are quite extensive. In addition to contributing to the scientific literature with articles, technical reports and guidance documents, it is also aimed to develop a prototype for commercial use. The proposed system is expected to provide significant advances by increasing the safety and efficiency of UAV operations, especially in areas such as agriculture, security, search and rescue

Keywords-Article, Multiple UAV, Image, ArduPilot, MAV Connection, PyQt5, UAV, Simulation