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Department of *Electronics and Communication Engineering* Presents

6th Online/Offline Mega International Conference on *"Smart Modernistic in Electronics and Communication"* on 17th & 18th December 2024

(ICSMEC-24) PROCEEDINGS

ISBN:
978-93-94246-44-7

Editor in chief
Dr.P.Santosh Kumar Patra

nirf Ranked Institute

: 8096945566, 8008333876, 8008333886 : www.smec.ac.in
: Dhulapally, Near Kompally, Secunderabad - 500 100, T.S.

ESTABLISHED 2002

International Conference on "Smart Modernistic in Electronics and Communication"

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Departments of Electronics and Communication Engineering

6th International Conference on "Smart Modernistic in Electronics and Communication" (ICSMEC–24)

ISBN No: 978-93-94246-44-7

St. MARTIN'S ENGINEERING COLLEGE

Dhulapally, Secunderabad-500100

NIRF Ranked, NAAC A+ ACCREDITED

Sri. M. LAXMAN REDDY
CHAIRMAN

MESSAGE

I am extremely pleased to know that the Department of Electronics and Communication Engineering of SMEC is organizing **6th International Conference on "Smart Modernistic in Electronics and Communication" (ICSMEC-24)** on 17th and 18th of December 2024. I understand that the large number of researchers has submitted their research papers for presentation in the conference and for publication. The response to this conference from all over India and Foreign countries is most encouraging. I am sure all the participants will be benefitted by their interaction with their fellow researchers and engineers which will help for their research work and subsequently to the society at large.

I wish the conference meets its objective and confident that it will be a grand success.

M. Laxman Reddy

M.LAXMANREDDY
Chairman

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Sri. G. CHANDRA SEKHAR YADAV
EXECUTIVE DIRECTOR

MESSAGE

I am pleased to state that the Department of Electronics and Communication Engineering of SMEC is organizing **6th International Conference on "Smart Modernistic in Electronics and Communication" (ICSMEC-24)** on 17th and 18th of December 2024. For strengthening the "MAKE IN INDIA" concept many innovations need to be translated into workable product. Concept to commissioning is a long route. The academicians can play a major role in bringing out new products through innovations.

I am delighted to know that there are large number of researchers have submitted the papers on Interdisciplinary streams. I wish all the best to the participants of the conference additional insight to their subjects of interest.

I wish the organizers of the conference to have great success.

G. CHANDRASEKHAR YADAV
Executive Director

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Dr P. SANTOSH KUMAR PATRA
GROUP DIRECTOR

I am delighted to be the Patron & Program Chair for the **6th International Conference on "Smart Modernistic in Electronics and Communication" (ICSMEC-24)** on 17th and 18th of December 2024. I have strong desire that the conference to unfold new domains of research among the Electronics and Communication Engineering fraternity and will boost the knowledge level of many participating budding scholars throughout the world by opening a plethora of future developments in the field of Electronics and Communication Engineering.

The Conference aims to bring different ideologies under one roof and provide opportunities to exchange ideas, to establish research relations and to find many more global partners for future collaboration. About 500 research papers have been submitted to this conference, this itself is a great achievement and I wish the conference a grand success.

I appreciate the faculties, coordinators and Department Head of Electronics and Communication Engineering for their continuous untiring contribution in making the conference a reality.

(Dr. P. Santosh Kumar Patra)
Group Director

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Dr. M. SRINIVAS RAO
PRINCIPAL

MESSAGE

Contemporary Society is technological and relies on technology for various aspects of daily life. There is no life without digital platforms, Internet, apps, codes, etc. Navigating the complexities of a technological society requires a balance between embracing innovation and addressing the challenges that come in the way. Considering the immediate needs of the technical Society, SMEC has been organizing International Conferences every year which really help a candidate in acquiring technical skills and making themselves familiar with the new inventions.

International Conferences are a Perfect Platform for enthusiastic researchers to come up with their innovative ideas, and I am delighted that SMEC is organizing the **6th International Conference on "Smart Modernistic in Electronics and Communication" (ICSMEC-24)** this academic year as well to enhance the skills of desiring participants. The showcase of new ideas and the latest technological advancements through this Conference would facilitate the transfer of technology, helping participants to get updated with the latest tools and methodologies. I firmly believe that this Conference serves as the catalyst for change by bringing attention to pressing issues in different fields, encouraging discussions, fostering collaboration, and promoting initiatives that address different challenges on a global scale. It is an excellent opportunity to broaden our knowledge, establish meaningful connections, and contribute to advancing engineering research. I assure you that the commitment to excellence in education and research is reflected in this Conference, providing a unique platform for learning and growth.

Around 500 research papers were submitted to this Conference. I wish the authors a promising future and the Conference a grand success.

I appreciate the continuous efforts and dedication of the HOD of the Electronics and Communication Engineering department and faculty members for their invaluable contribution to advancing global discourse. My most profound appreciation to the organizers and coordinators for organizing a conference of such caliber.

Dr. M. Srinivas Rao
Principal

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DR. S.V.S. RAMA KRISHNAM RAJU
DEAN ACADEMICS

MESSAGE

It gives me an immense pleasure to know that St. Martin's Engineering College, Department of the Electronics and Communication Engineering is organizing **6th International Conference on "Smart Modernistic in Electronics and Communication" (ICSMEC-24)**. I am sure that this conference will provide a forum to national and international students, academicians, researchers and industrialists to interact and involve in Research and Innovation. Such academic events benefit the students, teachers and researchers immensely and widen the horizons of their knowledge and work experience in the field of Electronics engineering.

I sincerely appreciate the humble efforts of the Institute in providing a platform for students, academicians, researchers and industrialists to share their ideas and research outcome through the forum of this Conference.

I give my best wishes to all delegates and organizing committee to make this event a grand success.

Best Wishes

Dr. S. V. S. Rama Krishnam Raju
Dean Academics

St. MARTIN'S ENGINEERING COLLEGE

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Dr. SANJAY KUMAR SUMAN

DEAN R & D

MESSAGE

Research, curiosity and discovery has been in existence ever since man's presence on this planet millions of years ago, civilization has been characterized by curiosity and discovery. Therefore, the curiosity to explore what will happen, how it happens, is there a better way to do it, has been the driving force behind all research efforts. During the past few decades, the engineering faculties have taken a number of initiatives to reorient the engineering machinery to play leading roles in the industrial development process.

I am delighted to acknowledge the international conference on Advances in **6th International Conference on "Smart Modernistic in Electronics and Communication" (ICSMEC-24)**. I appreciate organizing team for showing their keen interest in organizing a successful conference to provide a platform for contributors to explore new ideas and exchange research findings among researchers.

I thank the support of all students, authors, reviewers, conference team, faculty members, and conference convener for making the conference a grand success.

Best Wishes

Dr. Sanjay Kumar Suman
Dean R&D

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DR. D V SREEKANTH
DEAN ADMINISTRATION

MESSAGE

The **6th International Conference on "Smart Modernistic in Electronics and Communication" (ICSMEC-24)** has concluded its work successfully on 17th & 18th Dec, 2024 in St. Martin's Engineering College (SMEC), Hyderabad, India. The ICSMEC-24 was organized online/offline by the Department of Electronics and Communication Engineering, and the objective of this conference was to bring together experts from academic institutions, industries, research organizations for sharing of knowledge and experience in the recent technologies in Electronics and Communication Engineering. The conference program featured a wide variety of invited and contributed lectures from national and international speakers with expertise in their respective fields. The ICSMEC-24 has become one of the most extensive, spectacular international events hosted by St. Martin's Engineering College (SMEC), for its high-level quality and the large size of participation. Well- known international and national invited speakers addressed the audience, shared knowledge, and rich experiences on ICSMEC-24.

I am sure that this conference will provide a forum to national and international students, academicians, researchers and industrialists to interact and involve in Research and Innovation. Such academic events benefit the students, teachers and researchers immensely and widen the horizons of their knowledge.

Best Wishes

Dr. D. V. Sreekanth
Dean Administration

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DR. N RAMCHANDRA
DEAN ACCREDITATION

It gives me immense pleasure to welcome you all to the 6th **International Conference on 'Smart Modernistic in Electronics and Communication-24 (ICSMEC-24)'** organized by Department of E.C.E.. This conference provides a unique platform for researchers, academicians, and industry professionals to exchange ideas, showcase innovations and explore the latest trends and developments in Electronics and Communication.

As an institution committed to academic excellence and the pursuit of knowledge, we take pride in hosting events that encourage collaboration, inspire creativity and address some of the most pressing challenges of our times. This conference is a testament to our dedication to fostering an environment where intellectual curiosity thrives.

I extend my heartfelt gratitude to the organizing committee, keynote speakers, authors and participants whose hard work and enthusiasm have made this event possible. Your contributions not only enrich the proceedings but also propel us closer to achieving advancements in Electronics and Communication.

I am confident that the deliberations and outcomes of this conference will leave a lasting impact, fostering new ideas and collaborations that will benefit the global community.

Wishing you all a productive and inspiring conference.

Warm regards,

Dr. N. Ramchandra
Professor & Dean (Accreditations & Affiliations)

St. MARTIN'S ENGINEERING COLLEGE

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Dr. B. HARI KRISHNA
CONVENER

MESSAGE

The world is always poised to move towards new and progressive engineering solutions that results in cleaner, safer and sustainable products for the use of mankind. India too is emerging as a big production center for world class quality. Computer Science, Electronics, Information Technology and Electrical Engineering play a vital role in this endeavor.

The aim of the **6th International Conference on "Smart Modernistic in Electronics and Communication" (ICSMEC-24)** being conducted by the Department of Electronics and Communication Engineering of SMEC, is to create a platform for academicians and researchers to exchange their innovative ideas and interact with researchers of the same field of interest. This will enable to accelerate the work to progress faster to achieve the individuals end goals, which will ultimately benefit the larger society of India.

We, the organizers of the conference are glad to note that more than 500 papers have been received for presentation during the online conference. After scrutiny by specialist 183 papers have been selected, and the authors have been informed to be there at the online platform for presentations. Steps have been to publish these papers with ISBN number in the Conference Proceedings and all the selected papers will be published in Scopus / UGC recognized reputed journals.

The editorial Committee and the organizers express their sincere to all authors who have shown interest and contributed their knowledge in the form of technical papers. We are delighted and happy to state that the conference is moving towards a grand success with the untiring effort of the faculties of Department Head of Electronics and Communication Engineering of SMEC and with the blessing of the Principal and Management of SMEC.

Dr. B. Harikrishna
HOD, ECE

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ISBN: 978-93-94246-44-7

ISBN: 978-93-94246-44-7

ISBN: 978-93-94246-44-7

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ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-001

Automatic Railway Gate Control System and Track Breakage Alert over IOT

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ABSTRACT

The segmentation of drivable areas and road anomalies are critical capabilities to achieve autonomous navigation for robotic wheelchairs. The recent progress of semantic segmentation using deep learning techniques has presented effective results. However, the acquisition of large-scale datasets with hand-labeled ground truth is time-consuming and labor-intensive, making the deep learning-based methods often hard to implement in practice. We contribute to the solution of this problem for the task of drivable area and road anomaly segmentation by proposing a self-supervised learning approach. We develop a pipeline that can automatically generate segmentation labels for drivable areas and road anomalies. Then, we train RGB-D databased semantic segmentation neural networks and get predicted labels. Experimental results show that our proposed automatic labeling pipeline achieves an impressive speed-up compared to manual labeling. In addition, our proposed self-supervised approach exhibits more robust and accurate results than the state-of-the-art traditional algorithms as well as the state- of-heart self-supervised algorithms.

Keywords: Deep Learning, Self-supervised Learning

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-002

Antenna Pattern Synthesis and their Realization Using Optimized Amplitude and Phase Distributions

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ABSTRACT

Radars are Electromagnetic Devices that are characterized by a large number of applications. These include weather forecasting, fire control, radio astronomy, speed traps, airport traffic control, remote sensing, ground mapping, and Identification of Friend or Foe (IFF). Basically, the radar acts as a powerful electronic eye. It can detect objects in rain, clouds, snow, and everywhere except when the objects are hidden by a conductor. To perform the above functions, the Radar is always associated with one or other type of antenna. The single antenna element is limited by gain and bandwidth requirements. Therefore, different types of arrays are considered in the present work, and they are designed to generate desired radiation patterns. The shape of the radiation pattern is an important aspect in all the applications of Radars, narrow beams are used for point-to-point communications and in high-resolution radars. Unfortunately, such beams are associated with high sidelobes adjacent to the main beam. Such side lobes destroy the functioning of the radar. It is, therefore, essential to generate narrow beams with low side lobes.

Keywords: Phase shifters, Radiation pattern, Microstrip antenna

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-003

Bandwidth Improvement Techniques of a Waveguide Arrays

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ABSTRACT

The bandwidth improvement techniques for a waveguide being operated in S band are presented in this paper. Numerous methods have been talked about in this paper to improve the transmission capacity of a waveguide. Arrays Utilization of thinner walls in wave guides, decreased cross sectional waveguide, wide slots as well as adjusted slots represent the realized procedures to improve the data transfer capacity, also discussed each of the technique individually with their advantages and disadvantages in detail further we have also discussed about novel differential feeding technique named hybrid phase feeding is deployed to achieve the broadband nature of the waveguide array.

Keywords: Waveguides array, Differential feeding, Hybrid phase feeding

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-004

An Analytical Research on Hydrogen Fuel Cell Technology

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ABSTRACT

This paper investigates fuel cell technology, an efficient and environmentally friendly method for generating electricity by harnessing the energy content of hydrogen or alternative fuels. Fuel cells produce electricity with water, heat, and power as the only by-products when hydrogen is used as fuel, making them a clean and sustainable energy option. Future applications in the hydrogen economy are expected to utilize fuel cells as safe, quiet, and reliable energy sources. Fuel cells exhibit superior efficiency compared to combustion engines, promptly converting fuel energy into electrical energy. Various types and sizes of fuel cells with distinct technological requirements have been developed by scientists and inventors to enhance efficiency. The choice of electrolyte is a critical factor influencing the possibilities available to fuel cell inventors.

Keywords— Hydrogen Fuel Cell Technology, Generating Electricity, Water, Heat, Power, Sustainable Energy Option.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-005

An Energy-Efficient Routing Protocol with Reinforcement Learning in Software-Defined Wireless Sensor Networks

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ABSTRACT

The enormous increase in heterogeneous wireless devices operating in real-time applications for Internet of Things (IoT) applications presents new challenges, including heterogeneity, reliability, and scalability. To address these issues effectively, a novel architecture has been introduced, combining Software-Defined Wireless Sensor Networks (SDWSN) with the IoT, known as the SDWSN-IoT. In this paper, we present an intelligent, energy-efficient multi-objective routing protocol based on the Reinforcement Learning (RL) algorithm with Dynamic Objective Selection (DOS-RL). The primary goal of applying the proposed DOS-RL routing scheme is to optimize energy consumption in IoT networks, a paramount concern given the limited energy reserves of wireless IoT devices and the adaptability to network changes to facilitate a seamless adaption to sudden network changes, mitigating disruptions and optimizing the overall network performance. The algorithm considers correlated objectives with informative-shaped rewards to accelerate the learning process. Through the diverse simulations, we demonstrated improved energy efficiency and fast adaptation to unexpected network changes by enhancing the packet delivery ratio and reducing data delivery latency when compared to traditional routing protocols such as the Open Shortest Path First (OSPF) and the multi-objective Q-routing for Software-Defined Networks (SDN-Q).

Keywords: SDWSN-IoT, Energy-efficient routing, Reinforcement learning

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-006

Innovative Home Locker Safety Security Structure by Arduino UNO Based on Expansion of GSM

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ABSTRACT

At present the mainstream of the horse confronting issue about how to protect their own effects like adornments, significant records and cash reserved in home because of the burglary in houses, workplaces and in associations too. Henceforth, a large portion of the house individuals are taking chronological registries and protect storage spaces in homes to give security to their noteworthy things. "In any case, even still they worked with manual activity of lock and key framework without giving any data to the client when burglary is occurred by breaking them". Thus, an endeavor has been made to create propelled ready home security framework with Fingerprint and Password confirmation to open or close the entryway framework and furthermore sending the message if any miss activity will be performed by others utilizing GSM Technology with shrewd versatile. The current framework gives the better security to a wide range of houses and furthermore this framework has exceptionally prudent expense, with the goal that it can moderate to all. The framework effectively created, executed and tried in our research center and we originate that its employed is acceptable.

Keywords: Arduino Uno, GSM, Unique mark Sensor Module, Multi Segments

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-007

MIMO Antenna for 5G Review

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ABSTRACT

The paper presents detail study of multiple inputs and multiple output antennas for 5G applications. Multiple antennas are applied at transmitter and receiver, which improve the performance of communication system. The performance of MIMO system depends on the correlation between multiple path signal propagating signals, high isolation improve capacity of communication system. The aim of this paper is to present tutorial of recent developments in antenna design.

Keywords: MIMO Antenna, 5G, MIMO system, Smartphone, Communication

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-008

MalCertain: Enhancing Deep Neural Network Based Android Malware Detection by Tackling Prediction Uncertainty

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ABSTRACT

The long-lasting Android malware threat has attracted significant research efforts in malware detection. Overlooking these uncertainties poses risks in the model predictions. In this paper, we take the first step to estimate the prediction uncertainty of DNN models in malware detection and leverage these estimates to enhance Android malware detection techniques. Specifically, besides training a DNN model to predict malware, we employ several uncertainty estimation methods to train a Correction Model that determines whether a sample is correctly or incorrectly predicted by the DNN model. We then leverage the estimated uncertainty output by the Correction Model to correct the prediction results, improving the accuracy of the DNN model. Experimental results show that our proposed MalCertain effectively improves the accuracy of the underlying DNN models for Android malware detection by around 21% and significantly improves the detection effectiveness of adversarial Android malware samples by up to 94.38%. Our research sheds light on the promising direction that leverages prediction uncertainty to improve prediction-based software engineering tasks.

Keywords: DNN, Self-supervised Learning

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-009

MAC Protocol for MANETS

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ABSTRACT

Today's wireless Networks are characterized by a fixed spectrum assignment policy. However, from the literature it is concluded that only 15% to 85% of spectrum ranges are used effectively and efficiently. The lack of efficient usage of limited available spectrum necessiates a new communication paradigm to use the existing wireless spectrum opportunistically .Although in the past fixed spectrum assignment worked properly , still there are have been a lot of interest from research community to access the limited spectrum dynamically.DARPAS approach on Dynamic Spectrum Access Network is called as next Generation (XG) Program .XG Communication is also known as Dynamic Spectrum Access Networks(DSANS) as well as cognitive Radios. The main aim of the MAC Protocol is to provide fair access to the wireless medium among the number of different users efficiently.MAC protocols can be classified into three categories such as contention based MAC protocols, Contention based MAC protocol with reservation based mechanism and Contention based MAC protocol with scheduling mechanism. My project works aims at analysing the various types of MAC protocols involved in the wireless network and to develop new MAC protocol which will be more efficient in the MAC protocols in the literature. So the development of MAC Protocol using Cognitive Radio Technology is becoming a hottest research topic among many researchers.

Keywords: MANETS, Cognitive Radio, MAC.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-010

Arduino Controlled War Field Spy Robot using Night Vision Wireless Camera and Android Application

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ABSTRACT

The main objective behind developing this robot is for the surveillance of human activities in the war field or border regions in order to reduce infiltrations from the enemy side. The robot consists of night vision wireless camera which can transmit videos of the war field in order to prevent any damage and loss to human life. Military people have a huge risk on their lives while entering an unknown territory. The robot will serve as an appropriate machine for the defense sector to reduce the loss of human life and will also prevent illegal activities. It will help all the military people and armed forces to know the condition of the territory before entering it.

Keywords: Robot, Night Vision, Bluetooth Module, Android

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-011

Development of Wearable Textile MIMO Antenna for Sub-6 GHz Band New Radio 5G Applications

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ABSTRACT

An irregular octagonal two-port MIMO patch antenna is designed specifically for New Radio (NR) 5G applications in the mid-band sub-6 GHz. The proposed antenna comprises an irregularly shaped patch antenna equipped with a regular 50-ohm feed line and a parasitic strip line antenna, and is partially grounded. Jeans material serves as a substrate with an effective dielectric constant of 1.6 and a thickness of 1 mm. This material is studied experimentally. The proposed antenna design undergoes analysis and optimization using the ANSYS HFSS tool. Furthermore, the design incorporates the influence of the slot on both the ground plane and the parasitic strip line to optimize performance, enhance isolation, and improve impedance matching among antenna elements. The dimensions of the jeans substrate are 40 mm × 50 mm. The simulated impedance bandwidth ranged from 3.6 GHz to 7 GHz and the measured bandwidth was slightly narrower, from 4.35 GHz to 7 GHz. The simulation results demonstrated an isolation level greater than 12 dB between antenna elements, while the measured results reached 28.5 dB, and the peak gain for this proposed antenna stood at 6.74 dB. These qualities made this proposed antenna suitable for various New Radio mid-band 5G wireless applications within the sub-6 GHz band, such as N79, Wi-Fi-5/6, V2X, and DSRC applications.

Keywords: MIMO, jeans, irregular octagon, return loss, substrate, HFSS.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-012

Chest X-Ray Image Denoising for Covid-19 Detection and Application

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ABSTRACT

COVID-19 is considered to be the most dangerous & deadly disease for the human body caused by the novel coronavirus. In December 2019, the coronavirus spread rapidly around the world and is responsible for a large number of deaths. Earlier detection of the COVID-19 through accurate diagnosis, particularly for the cases with no obvious symptoms, may decrease the patient's death rate. Chest X-ray images are primarily used for the diagnosis of this disease. Existing system uses mean filters and median filters to remove the noise which is already present in the x-ray. But the accuracy of the noise removal from the x-ray is inadequate. In the proposed system a non-local median filter algorithm is used to acquire the maximum efficiency in removing the unwanted noise from the x-ray using MATLAB software. The advantages of this proposed system are Removal of high noise thereby improving the image quality and image metrics.

Keywords: Chest X-Ray, NLM Filter, Mean filter, Median filter, MATLAB2016a software.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-013

IOT Based Smart Security Surveillance Robot

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ABSTRACT

Robots are ideally capable to do a lot more things than automated bots desire to. Automated bots desire to achieve surveillance and one other major usability that the maker would want to implement and this is in general though. Multiple functionalities could be put into place if in need. This Project is aimed at developing a surveillance system which can be controlled remotely by using a website. It includes a robot with a Wireless Camera attach to it. This robot captures the high-resolution video feed and transmits it to the connected local device which is used to control the robot. The live feed can be viewed clearly on the device. Also, the bot is compatible with multiple users as it possess login functionality.

Keywords: IoT, Robot, Website

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-014

A Guide to Deep learning in Wireless Networks Attacks

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ABSTRACT

The amount of data that is handled by wireless networks has increased in day by day. This increase in the flow of data over wireless networks is due to increase in popularity of cloud computing, which is built on the concept of Software as a Service, where in all the data processing happens on the cloud. One such wireless network that is widely used but is still prone to attacks is WiFi. As a part of this, we present two architectures that use Anomaly Behavior Analysis to detect, classify attacks on the Single access point and Distributed Wi-Fi networks and then track the location of the attacker. The presented system uses the approach of ngrams and wireless flows(WFlows) to detect attacks on the network. The architectures are able to classify the attacks on the network by associating the number of different types of Wi-Fi frames in the WFlow with the Wi-Fi frames present in the attack types. The first architecture uses an approach of clustering to track the location of the attacker, while the second architecture uses classification rules learnt from machine learning to track the location of the attacker. The attack detection modules of the IDS have no false positives or negatives even when the network has a high frame drop rate. The Clustering approach to track the location of the attacker performs well in static environments and Rule Classification approach to track the location of the attacker performs well in dynamic environment.

Keywords: Wireless flows (WFlows), Clustering approach

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-015

Fabrication of Flexible Electrodes for Supercapacitor using Biodegradable Materials

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ABSTRACT

A electrode material was obtained by the thermal decomposition of biodegradable waste. A lab-scale supercapacitor (SC) was fabricated using as-prepared electrode and super capacitivebehaviors was investigated using techniques like Cyclic Voltammetry (CV), Electrochemical impedance Spectroscopy (EIS) studies. Each electrode showed a specific capacitance and the constant charging/discharging current densities. We are observing the EIS and CV studies, and graphs are observed. This remarkable super capacitive performance of biological waste-derived electrode will be demonstrated as potential as a cost effective and environmentally friendly electrode material for aqueous electrolyte-based SCs. With a constant 0.1 Ag-1 charging/discharging current density, each electrode of the coriander char demonstrated a unique capacitance of 91.73 Fg-1. whereas the menthol mint char displayed a unique capacitance of 79.03 Fg-1. Moreover, the total weight of the cell arrangement s 16.4 mg and 17.7 mg, respectively.

Keywords: Bio-Degradable Waste, EIS, CV STUDIES

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-016

Programmable Local Clock SET Filtering for SEE-Resistant FPGA

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ABSTRACT

This brief presents a new clock-related Single-Event Effect (SEE) mitigation method for Field Programmable Gate Arrays (FPGAs). SEEs are most likely to happen in harsh environments, such as space, and are decently mitigated with Triple Modular Redundancy (TMR). However, clock tree triplication has a high cost for FPGAs; it reduces the total amount of usable clocks and introduces uncontrolled skew variation. Therefore, we propose to instantiate a Programmable Local Clock Filter (PLCF) close to TMRed sequential elements to locally triplicate the clock and filter the SEEs coming from the clock tree. The PLCF mitigation method has demonstrated 100% resilience to SEEs, which target either the clock tree or the PLCF's logic. Thus, PLCF represents the first programmable clock-related SEE mitigation method and proposes a promising alternative to the state-of-the-art technics applied to FPGAs' fabric.

Keywords: Field Programmable Gate Arrays, Triple Modular Redundancy, Programmable Local Clock Filter.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-017

Optimizing Energy Efficiency in Buildings Using IOT Sensors Data and Machine learning for Urban Development

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ABSTRACT

In the contemporary real estate market, accurate prediction of house prices is of paramount importance for buyers, sellers, and real estate agents alike. The challenges, are addressed by leveraging machine learning algorithms to develop a more robust and reliable house price prediction system. The conventional approach to house price estimation typically involves manual appraisal by real estate professionals or simplistic regression models based on a limited set of features such as location, size, and age of the property. Additionally, human biases and subjective judgments can introduce inconsistencies and errors into the valuation process, leading to inaccurate predictions and potential financial losses for buyers and seller's alike. The primary challenge is the need for a more accurate, efficient, and objective system for predicting house prices. By harnessing the power of machine learning algorithms, we aim to develop a predictive model capable of analyzing diverse datasets and extracting meaningful insights to generate precise price estimates for residential properties. This model will not only enhance the transparency and reliability of house price evaluations but also streamline the decision-making process for buyers, sellers, and real estate professionals. The motivation behind our project stems from the growing demand for reliable and data-driven solutions in the real estate industry.

Keywords: IOT Sensors, Urban Development

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-018

Remote Surveillance Robot using ESP32

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ABSTRACT

The Project primary goal is to construct a robot for industrial and military surveillance. The goal of the project is to use Android smartphone to construct a robotic vehicle. Following these commands, the security system responds to the user. For remote surveillance, the security system is connected to the ESP 32 camera. An individual will be in charge of this type of robot. The importance of surveillance in hospital settings has increased due to the aging population. In our method, a passive acoustic localization device allows the robot to detect moving targets. The robot then uses a particle filter technique to track the objects. The update system updates the target model on a regular basis to accommodate variations in lighting. In order to guarantee reliable monitoring, the robot tracks an individual's upper body to identify unusual human behavior. Mel frequency costrel coefficients (MFCC) are used to extract features from audio data for audio surveillance. A support vector machine classifier receives these features as input for processing. According to experimental findings, the robot is capable of identifying unusual actions like "running" and "falling down." Additionally, an accuracy rate of 88.17% is attained in the identification of anomalous audio data, such as "crying," "groaning," and "gun shooting." By using a passive acoustic locating device to guide the robot to the area of abnormal occurrences, the abnormal sound detection system reduces false alarms. The robot can then use its camera to confirm the events' occurrence. Finally, the robot will send the image it took to the master's cell phone.

Keywords: ESP 32 camera, Remote surveillance

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-019

Vital Sign Monitoring for Cancer Patients Based on Dual-Path Sensor and Divided-Frequency-CNN Model

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ABSTRACT

Monitoring vital signs is a key part of standard medical care for cancer patients. However, the traditional methods have instability especially when big fluctuations of signals happen, while the deep-learning-based methods lack pertinence to the sensors. A dual-path micro-bend optical fiber sensor and a targeted model based on the Divided-Frequency-CNN (DFC) are developed in this paper to measure the heart rate (HR) and respiratory rate (RR). For each path, features of frequency division based on the mechanism of signal periodicity cooperate with the operation of stable phase extraction to reduce the interference of body movements for monitoring. Then, the DFC model is designed to learn the inner information from the features robustly. Lastly, a weighted strategy is used to estimate the HR and RR via dual paths to increase the anti-interference for errors from one source. The experiments were carried out on the actual clinical data of cancer patients by a hospital. The results show that the proposed method has good performance in error (3.51 (4.51 %) and 2.53 (3.28 %) beats per minute (bpm) for cancer patients with pain and without pain respectively), relevance, and consistency with the values from hospital equipment. Besides, the proposed method significantly improved the ability in the report time interval (30 to 9 min), and mean / confidential interval (3.60/[−22.61,29.81] to −0.64 / [−9.21,7.92] for patients with pain and 1.87 / [−5.49,9.23] to −0.16 / [−6.21,5.89] for patients without pain) compared with our previous work.

Keywords: Deep Learning

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-020

Analysis of the Contribution of Agricultural Sector on the Nigerian Economic Development

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ABSTRACT

Agricultural sector is seen as an engine that contributes to the growth of the overall economy of Nigeria, despite these efforts the sector is still characterized with low yields, low level of inputs and limited areas under cultivation due to government dependence on mono-cultural economy based on oil. This paper is an attempt to examine the impact of the agricultural sector on the Nigerian economy. The panel of data used was sourced from the statistical bulletin of the Central Bank of Nigeria and World Bank's development indicators, multiple regression was used to analyze the data, the result indicated a positive relationship between Gross Domestic Product (GDP) vis a vis domestic saving, government expenditure on agriculture and foreign direct investment between the period of 1986-2007. It was also revealed in the study that 81% of the variation in GDP could be explained by Domestic Savings, Government Expenditure and Foreign Direct Investment. In order to improve the agricultural sector it is recommended that government provides more funding for agricultural universities in Nigeria to carry out researches on all areas of agricultural production this will lead to more exports and improvement in the competitiveness of Nigeria agriculture production in international markets. The Central bank of Nigeria should also come up with a stable policy for loan disbursement to farmers at a reasonable interest payback.

Keywords: Bio- Agriculture, Gross Domestic product, Economic Development

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-021

Enhancing Vital Sign Monitoring with Reinforcement Learning and Wavelet Analysis in Sleep Disorders

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ABSTRACT

Sleep disorders have a major impact on individuals' health and overall quality of life. Among the most prevalent sleep disorders, obstructive sleep apnea and snoring necessitate effective monitoring and assessment methods. This paper introduces a novel approach to extract vital sign data, including heart rate, respiration rate, and body motion, from electronic signal graphs using wavelet analysis. In order to enhance the accuracy and efficiency of vital sign prediction, we employ reinforcement learning techniques to acquire an optimal policy for processing electronic signals. By identifying distinct features that characterize subjects with similar conditions, we enable personalized treatment approaches, ultimately leading to improvements in the overall health of individuals affected by sleep disorders.

Keywords*:* Reinforcement learning, wavelet analysis

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-022

Ai-Enabled Breast Cancer Classification System from Mammographic images.

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ABSTRACT

Breast cancer is one of the most prevalent and life-threatening diseases among women worldwide. Early detection plays a crucial role in improving survival rates. Mammographic imaging is a widely used screening tool for breast cancer detection .In the existing system of breast cancer detection primarily rely on manual interpretation by radiologists, which can be time-consuming and subjective. While some computer-aided diagnosis (CAD) systems exist, they often lack the accuracy and robustness required for clinical use. The existing systems for breast cancer diagnosis suffer from limitations such as manual interpretation, low accuracy, and dependency on human expertise. There is a need for a more accurate and efficient approach that can automatically classify mammographic images with high precision, aiding in early detection and reducing the workload of radiologists. Our proposed method utilizes a machine learning approach, specifically the Extra Tree Classifier (ETC), to classify mammographic images into benign and malignant categories. We preprocess the images to extract relevant features, such as texture, shape, and intensity, and then train the ETC model on these features to accurately classify the images, the system can aid in the early detection of breast cancer, leading to better treatment outcomes.

Keywords: CAD, Mammographic Images.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-023

Robust Wavelet Based Video Watermarking Scheme for Copyright Protection Using Principal Component Analysis

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ABSTRACT

Digital watermarking was a way of protecting the rights holders by embedding a hidden message inside a document in order to verify its authenticity and prevent forgery. There is a rapidly expanding body of digital information, in binary form, that can be accessed online. Recent advances in digital technology have made it possible to crack older watermarking methods. In order to stop assaults on watermarked photos, it is necessary to create new watermarking methods. In this study, watermarking methods that have been deemed effective by their creators. In this study, we evaluate the benefits and drawbacks of the newly published methods that make grand claims about their effectiveness. Researchers will benefit from identifying research gaps so that they may try their hands at developing novel methods. To achieve this watermarking goal, we have presented a novel method. Our method will include both the message plus the cover picture file. After that, we'll think about every pixel within the cover art. After that, we'll send the resulting image file over to the customer, who will use a reversal procedure to read the text back from the picture. Next, we will evaluate BLIND HIDE watermark method against our own in terms of precision and accuracy. To ensure correct agreement, we will additionally compare the two algorithms' output picture quality using the structural analogy metric

Keywords: Video Watermarking, Frame Extraction, Discrete Wavelet Transform, Principal Component Analysis, Binary Watermark.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-024

Pioneering Frontiers: Innovations and Emerging Trends in Biotechnology and Genetic Engineering

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ABSTRACT

Biotechnology and genetic engineering represent transformative scientific fields that harness biological processes and genetic information to develop innovative solutions in medicine, agriculture, and industry. Biotechnology employs living organisms, cells, and biomolecular processes for the production of therapeutic drugs, vaccines, biofuels, and environmentally sustainable materials. Genetic engineering, a subset of biotechnology, involves the direct manipulation of an organism's DNA using techniques such as CRISPR-Cas9, gene cloning, and recombinant DNA technology. These technologies have revolutionized healthcare by enabling the creation of personalized medicine, gene therapy, and advanced diagnostics. In agriculture, they have produced genetically modified crops with enhanced yields, pest resistance, and climate resilience. Despite their potential to address critical global challenges, ethical considerations, regulatory frameworks, and societal acceptance remain integral to their development. The fusion of biotechnology and genetic engineering continues to shape a new era of innovation, promising to improve human health, food security, and environmental sustainability. Innovations in CRISPR-based gene editing, such as prime editing and base editing, enable precise genetic modifications with reduced off-target effects, expanding applications in medicine, agriculture, and synthetic biology.

Keywords: Biotechnology, Genetic Engineering

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-025

VRS Based Home Automation using Voice Feedback

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ABSTRACT

This project titled "IVRS BASED HOME AUTOMATION USING VOICE FEEDBACK" to regulate an appliances with our voice through an Android application. An Arduino Mega board is used for controlling the relay by which an appliance is going to switch on or off. You can modify or alter the Android app to add more features to control accurately. Automation is one of the most important one in the upcoming decades. The Bluetooth module plays a vital role in home automation using voice recognition through the Bluetooth module. The attraction in an automatic system is mainly used for minimizing the number of human workers, efforts, working time, cost that is paid to the workers and the errors can be reduced that is being caused by the workers. In modern science and technology development, smart phones are one of the most necessary things for every individual in this world. By collaborating all ideas, we are going to do a project named IVRS based home automation using voice feedback with the help of an Arduino board that is connected to the Bluetooth Module HC-06. This system will definitely help the humans who are using this system in their place to control/regulate. In modern world, everything is based on the android application. We can control the devices using mobiles through the hardware and the software that is connected to the automation system to regulate/control the appliances.

Keywords: Deep Learning, Self-supervised Learning

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-026

Automatic Medical Dispatcher with Dynamic Tele Monitoring System using IOT in Rural Zones

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ABSTRACT

In the existing system, the dramatically increasing deployment of the Internet of Things (IoT), remote monitoring of health data to achieve intelligent healthcare has received great attention recently. In the proposed system, Health chain, a large-scale health data privacy preserving scheme based on block chain technology, where health data are encrypted to conduct fine grained access control. In the modification, modification part is our implementation. We deploy the Anytime Medical Counter in all the rural areas where people cannot get good / best doctor on track. We install Heart Beat, Temperature sensor; Ultrasonic sensor, load cell, Camera and Head phone are also connected to the Medical machine. Medical counter user and is monitor from the remote area. Application is installed in both the ends for voice communication & chatting with doctor. Doctor examines the Patient and prescribes the medicines and the Medicine Dispatcher will Dispatch the Medicines from the Camera to the user. User can send the request to the server to get the tablets intake timings.

Keywords: Ultrasonic sensor, Camera, Medicine Dispatcher.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-027

Rural IoT: Automated Medical Dispatch and Dynamic Telemonitoring System for Remote Areas

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ABSTRACT

The rapid adoption of the Internet of Things (IoT) has significantly advanced remote health monitoring, garnering attention for its potential in intelligent healthcare. The proposed system introduces **Health Chain**, a large-scale health data privacy-preserving framework leveraging blockchain technology. By encrypting health data, the system ensures fine-grained access control, enhancing security and privacy. Further, a novel implementation is presented through the **Anytime Medical Counter (AMC)**, aimed at addressing the lack of access to quality healthcare in rural areas. The AMC integrates sensors for heart rate, temperature, ultrasonic measurement, load detection, as well as a camera and headphones to support comprehensive medical diagnostics. Through a dedicated application at both the user's and doctor's ends, voice and chat communication facilitate real-time consultations. The doctor examines the patient remotely, prescribes medications, and the AMC dispenses the prescribed medicines. Users can also request and receive notifications about their tablet intake schedule via the server, ensuring timely adherence to treatment.

Keywords: IoT, Blockchain, Health Chain, Remote Health Monitoring, Anytime Medical Counter.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-028

Design and Analysis of a Triple-Band MIMO Patch Antenna with Minimized Mutual Coupling Using Unipolar EBG

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ABSTRACT

In this work we present a triple-band multiple-input-multiple-output (MIMO) antenna system with minimized mutual coupling. To mitigate mutual coupling between antennas elements, a triple-band unipolar type electromagnetic band gap (EBG) structure is incorporated. The designed antenna operates three different frequencies i.e. 2.5GHz, 3.2GHz and 5.5GHz. Single antenna resonates three different frequencies. Two antennas operate same frequencies between two antennas uni-polar EBG structure inserted. The two antennas spacing between one antenna to another is (λ max/8). The proposed antenna has excellent reflection coefficient and mutual coupling characteristics.

Keywords: EBG (Electronic Band Gap), patch antenna, MIMO (Multiple Input Multiple Output) antenna. Miniature antenna, wideband antenna.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-029

Advanced Home Automation using Wi-Fi

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ABSTRACT

Now a day's every system is automated in order to face new challenges in the present-day situation. Automated systems have less manual operations, so that the flexibility, reliabilities are high and accurate. Hence every field prefers automated control systems. Especially in the field of electronics automated systems are doing better performance. The goal of the project is to develop a system, which uses Mobile technology that keeps control of the various units of the automobiles, which executes with respect to the signal sent by the mobile. For utilization of appliances the new concept has been thought to manage them remotely by using WI-FI which enables the user to remotely control switching of domestic appliances. Just by dialing keypad of remote telephone, from where you are calling you can perform ON / OFF operation of the appliances. The ranges of appliances that can be controlled through tele remote systems are many in numbers. Some of them are as follows and this depends upon the usage priority of the appliances i.e. Industrial appliances, Music System or other electrical / electronic appliances.

Keywords: Home Automation

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-030

Intelligent Fatigue Detection System for Accident Prevention Using Video Analysis

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ABSTRACT

Developing intelligent systems to prevent car accidents can be very effective in minimizing accident death toll. One of the factors which play an important role in accidents is the human errors including driving fatigue relying on new smart techniques; this application detects the signs of fatigue and sleepiness in the face of the person at the time of driving. The proposed system is based on three separate algorithms. In this model, the person's face is filmed by a camera in the first step by receiving 14-16 fps video sequence. Then, the images are transformed from RGB space into YCbCr and HSV spaces. The face area is separated from other parts and highly accurate HDP is achieved. That the eyes are open or closed in a specific time interval is determined by focusing on thresholding and equations concerning the symmetry of human faces. The proposed system has been implemented on more than thirty different video sequences with average accuracy of 93.18% and detection rate (DR) of 92.71% out of approximately 2500 image frames. High accuracy in segmentation, low error rate and quick processing of input data distinguishes this system from similar ones. This system can minimize the number of accidents caused by drivers' fatigue.

Keywords: Fatigue Detection System, HDP

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-031

Enhancement of Cooperative Communication in Multi-Hop Wireless Networks by the use of Network Coding

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ABSTRACT

This investigates the use of orbital angular momentum (OAM) beams in the E-band frequency range for establishing wireless communication links aimed at 5G applications. By converting high-power Gaussian beams generated by a vacuum tube device into Laguerre-Gaussian (LG) beams through a meta-material structure, OAM beams were successfully generated to transmit information signals over a distance of 2 meters. The study focuses on developing a laboratory setup to validate the functional capabilities of OAM in terms of channel capacity and degrees of freedom. Results from the experiment will provide insights into the potential of OAM technology to enhance data transmission efficiency and spectral utilization in next-generation wireless systems. This approach demonstrates the feasibility of employing meta-materials to manipulate beam characteristics, offering a promising solution for increasing bandwidth and improving communication performance in 5G networks.

Keywords*:* Orbital angular momentum beams, Wireless communication, Meta-materials, Vacuum tube devices.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-032

Architecture For High Speed Energy Efficient Robust 4:2 Compressor Utilizing Novel Truth Table

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ABSTRACT

Multipliers are crucial in deciding the overall efficiency of the arithmetic circuits. Compressors are one of the vital components of the multipliers. This paper presents a new architecture for a 4:2 compressor, utilizing a novel methodology to incorporate a fast compressor into the XOR-XNOR circuit framework. Significantly, the suggested design has fewer transistors as compared to the existing 4:2 compressors. Four different and existing 4:2 compressors are examined closely for the comparative analysis with the proposed circuit. The suggested structure is compared with the latest ones found in modern publications, considering the power usage, latency as well as space optimization along with the Monte Carlo and Corner analysis. The proposed compressor has 49% lesser delay, 53% lower Power Delay Product and 76.27% lesser Energy Delay Product than the other prevailing compressor designs. Architecture simulation is performed using Cadence Virtuoso tool in 45 nanometer CMOS technology with power supply of 1 volt table as well as internal equations. Additionally, the research investigates the

Keywords: Compressors, Highspeed, CMOS Logic, Robust, Latency

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-033

Probability Multi Driven Dual Clock FIFO Buffer

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ABSTRACT

This dual clock FIFO is designed as a way for two circuits operating in different clock frequencies to communicate with each other. There is a read side and write side where data is stored into the internal memory of the FIFO using the write side clock and then read from the internal memory using the read side clock. This module is meant to be flexible, allowing to easily change the data width and address width as well as the size of the internal memory.

A testbench was created to test this circuit which will randomly choose a clock frequency for each clock after each clock pulse. Each side will randomly stop reading or writing accordingly for a random amount of clock pulses. The output is monitored and it will give an error if a non sequential output is given, which would mean an incorrect value was read.

Keywords: Dual Clock FIFO Buffer

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-034

Character Recognition of Telugu Text in Scene Images Using Neural Network

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ABSTRACT

Character recognition in scene images is one of the most attractive and demanding areas of pattern recognition with various practical application potentials. Some practical application potentials of character recognition system are: reading aid for the blind, traffic guidance systems, tour guide systems, location aware systems and many more. In this work, a novel method for recognizing basic Telugu characters in natural scene images is planned. The planned method uses zone wise horizontal and vertical profile based features of character images. The technique works in two phases. During training, zone wise vertical and horizontal profile based features are extracted from training samples and neural network is trained. During testing, the test image is processed to obtain features and recognized using neural network classifier. The method has been evaluated on 359 Telugu character images captured from 4 Mega Pixels cameras on mobile phones at various sizes 250x330, 500x700 and 800x1100, which contains samples of different sizes, styles and with different degradations, and achieves an average recognition accuracy of 91%. The system is efficient and insensible to the variations in size and font, noise, blur and other degradations.

Keywords: Telugu Character Recognition, Boards, little Resolution Images, Neural Network Classifier.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-035

Enhanced V2i Communication with Raspberry Pi Pico: A Smart Solution for Transportation

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ABSTRACT

The road safety is a pressing global issue, with countless lives lost annually due to preventable traffic accidents. To address this challenge, the proposed project introduces a smart Vehicle-to-Interface (V2I) communication system designed to enhance road safety by preventing collisions and enabling proactive decision-making. At the heart of this system lies the Raspberry Pi Pico microcontroller, integrated with a GPS module, temperature and humidity sensors, and ultrasonic sensors. Together, these components collect real-time data on vehicular movements, environmental conditions, and proximity to nearby vehicles. This data is processed and transmitted wirelessly to surrounding vehicles and infrastructure, facilitating seamless communication. The system's advanced capabilities support key features of Advanced Driver Assistance Systems (ADAS), including collision avoidance, lane change warnings, navigation guidance, and traffic condition updates. By equipping vehicles with the ability to communicate critical information efficiently, the system aims to significantly mitigate the risk of accidents, promote safer driving behaviors, and contribute to a more secure and intelligent transportation ecosystem.

Keywords: V2I communication, road safety, collision avoidance, Raspberry Pi Pico, GPS module, ultrasonic sensor, ADAS, vehicle-to-vehicle communication, real-time alerts.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-036

Prediction And Analysis of Hepatitis Using Machine Learning

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ABSTRACT

Hepatitis one of the dangerous diseases that result from viral infections. Five main types of Hepatitis have been identified, namely Hepatitis A, B, C, D, and E viruses. Among these, HBV and HCV will cause chronic Hepatitis, liver cirrhosis, and hepatocellular carcinoma. It is estimated that 257 and 71 million people around the world are currently infected with HBV and HCV, respectively. The HCV global prevalence in adults is 2.5%. Furthermore, the incidence of HCV was estimated between 0.5% and 2.8% in various studies. According to previous studies, African and Asian countries have the highest prevalence of HBV and HCV. In Iran, the prevalence of HBV and HCV was about 2.2 and 0.5% in the general population, respectively. Prediction of chronic diseases plays an important role in health informatics. Hepatitis is one of the chronic diseases that can lead to liver cirrhosis and hepatocellular carcinoma, which cause deaths around the world. Therefore, early diagnosis is needed to control, treat, and reduce the effects of this disease. Treatment. Recent studies have employed advanced machine learning techniques, such as ensemble models combining multiple algorithms, to predict Hepatitis B with high accuracy. These models u lizetilab test data and have shown promising results, achieving up to 97% accuracy1. The analysis highlights the importance of specific features in improving Hepatitis accuracy and underscores the potential of these models to enhance early diagnosis and intervention, ultimately improving patient outcomes.

Keywords: Hepatitis, HBV and HCV

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-037

IoT-Based Real-Time Weather Monitoring and Reporting System

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ABSTRACT

A state-of-the-art method for tracking local meteorological conditions and displaying the data globally is the methodology put out in this study. This is made possible by the Internet of Things (IoT), a cutting-edge and effective way to link objects to the internet and link the entire universe of things in a network. Anything from sensors to electrical devices to automobile electronics might be used here. The sensor data is plotted as graphical statistics by the system, which uses sensors to monitor and adjust environmental parameters including temperature, relative humidity, and CO level. The information is then sent to the web page. The updated data from the deployed system is available online from any location.

Keywords: IOT, LCD, DHT Sensor.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-038

Wheel chair Movement Control using Arduino Controller

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ABSTRACT

This paper describes the design of a smart, motorized, gesture controlled wireless wheelchair using ARDUINO. People with physical disabilities and partial paralysis always find it difficult to navigate through their habitat or their home without the assistance of someone. Often after paralysis or physical disability the wheelchair is the most common means of locomotion for such people. But to navigate through one's own house without help of someone every time can be demoralizing for the person as well. This project introduces a wheelchair, which operates on some easy hand gesture. As it works on hand gestures this wheelchair does not requires help of any other person for pushing it, hence handicapped or physically disabled person feel independent. This wheelchair will also be helpful for increasing the self-confidence of handicapped or physically disabled persons. The controller then follows a control algorithm and sends the commands to the motor driver L293D circuit to drive the motors accordingly. Old homes, hospitals and bed ridden soldiers are the application of this type of wheelchair.

Keywords: Arduino controller, L293D circuit

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-039

Machine Learning-Driven model for Fish Growth Estimation from Larvae Statics

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ABSTRACT

The growth estimation of fish from larvae statics is a critical aspect of aquaculture and fisheries management. Understanding the growth patterns of fish from their early developmental stages is essential for optimizing feeding regimes, monitoring population dynamics, and ensuring sustainable fishery practices. Traditionally, fish growth estimation from larvae statics has relied on manual measurements and observations, which are often labor-intensive, time-consuming, and prone to errors. Measurements such as length, weight, and body proportions are typically taken at irregular intervals, leading to gaps in data and potentially inaccurate growth predictions. Additionally, traditional methods may lack scalability and struggle to handle large volumes of data efficiently. The primary challenge is to develop a robust and automated system for estimating fish growth from larvae statics data. This involves the integration of machine learning techniques to analyze complex datasets and extract meaningful patterns related to fish growth. The goal is to overcome the limitations of traditional methods by providing accurate and timely growth estimates for various fish species. The Accurate growth estimation is crucial for optimizing fish production, maintaining ecosystem health, and ensuring food security. By leveraging machine learning algorithms, we aim to enhance the precision and reliability of fish growth predictions while reducing the reliance on manual labor and subjective measurements.

Keywords: Larvae Statics, Machine Learning

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-040

Analysis of Big Bio Medical Data using Parallel Processing

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ABSTRACT

An analysis of large sets of fundus images for automatic diagnosis of diabetes retinopathy was performed using the proposed method based on CUDA computation. A high-performance algorithm that calculates effective textural characteristics for medical image analysis has been developed. During the automatic image diagnosis, the following classes were distinguished: thin vessels, thick vessels, exudates, and a healthy area. Several images of 500x500-1000x1000 pixels were used to qualify the algorithm's efficiency using a square 12x12 dimension window. The acceleration relationship between the developed algorithm and varying data sizes was demonstrated. According to the study, certain characteristics of the image can affect the algorithm's effectiveness, for instance, the image's clarity, exudate zone shape, variability of blood vessels, and the optic disc's position.

Keywords: CUDA, Biomedical, Diabetes

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-041

Practical Application of Blockchain in Supply Chains for Security and Transparency

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ABSTRACT

This research work examines the practical application of blockchain (BC) technology to enhance the transparency and security of supply chains. The ability to maintain, store and share data without the risk of interfering or manipulation is a key benefit of block chain technology, and it has the potential to transform business operations in several industries. The study will explore the potential of block chain to provide secure and transparent data storage strategies for supply chains, as well as the challenges associated with the implementation of blockchain technology. Additionally, proposals for innovative use cases and the development of secure protocols for conducting transactions on the BC will be discussed. Moreover, the involvement of multiple stakeholders in the block chain network and the potential for dispute resolution will be examined. Finally, the research work will analyze the legal and regulatory considerations of BC technology in supply chains, and will provide recommendations for its effective use. Finally, this article seeks to offer insights into the application of BC technology in supply chains to promote security and transparency.

Keywords: Blockchain, supply chain, transparency, applications, security

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-042

Architecture For High Speed Energy Efficient Robust 4:2 Compressor Utilizing Novel Truth Table

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ABSTRACT

Multipliers are crucial in deciding the overall efficiency of the arithmetic circuits. Compressors are one of the vital components of the multipliers. This paper presents a new architecture for a 4:2 compressor, utilizing a novel truth table as well as internal equations. Additionally, the research investigates the methodology to incorporate a fast compressor into the XOR-XNOR circuit framework. Significantly, the suggested design has fewer transistors as compared to the existing 4:2 compressors. Four different and existing 4:2 compressors are examined closely for the comparative analysis with the proposed circuit. The suggested structure is compared with the latest ones found in modern publications, considering the power usage, latency as well as space optimization along with the Monte Carlo and Corner analysis. The proposed compressor has 49% lesser delay, 53% lower Power Delay Product and 76.27% lesser Energy Delay Product than the other prevailing compressor designs. Architecture simulation is performed using Cadence Virtuoso tool in 45 nanometer CMOS technology with power supply of 1 volt.

Keywords: Compressors, Highspeed, CMOS Logic, robust, latency

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-051

A Microwave Tower Location Identification: A Regression Analysis

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ABSTRACT

Microwave towers are crucial for modern communication systems, enabling long distance signal transmission and network connectivity. Traditionally, identifying optimal locations for these towers relied on manual surveys and empirical methods, often resulting in inefficiencies and suboptimal placement. As communication networks expand and demand for reliable service increases, there is a need for more precise and efficient methods for tower location identification. This project addresses this need by applying regression analysis techniques to predict optimal microwave tower locations based on various environmental and geographical factors. By leveraging advanced statistical methods, the project aims to overcome the limitations of traditional approaches, which often fail to account for the intricate variables influencing signal propagation. The regression analysis model developed in this study will analyze extensive datasets to identify patterns and correlations that inform optimal tower placement. This approach promises to enhance the accuracy of tower location decisions, leading to improved network performance, reduced signal interference, and lower operational costs. This project represents a significant step forward in telecommunications infrastructure management, offering a data-driven solution to a longstanding challenge.

Keywords: Microwave Tower, Machine Learning, Regression Analysis.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-052

Machine Learning Driven Advanced Defense Mechanisms Against Blackhole and Flooding Attacks in Wireless Sensor Networks

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ABSTRACT

Wireless Sensor Networks (WSNs) consist of distributed sensors that monitor environmental conditions, transmitting data to a central hub for analysis. Originally focused on energy-efficient protocols, WSNs now face security challenges like black hole and flooding attacks, which can compromise network reliability and efficiency. Traditional defences, such as cryptographic techniques and anomaly detection, are often inadequate due to their energy demands and limited accuracy. This project explores using machine learning to develop advanced, adaptive defence mechanisms, enhancing the security and resilience of WSNs for critical applications. By employing machine learning algorithms, the proposed system can detect and mitigate black hole and flooding attacks in real-time, adapting to new attack patterns and minimizing false positives. Simulation results demonstrate that our machine learning-driven approach significantly improves the detection accuracy and response time, thereby ensuring robust network performance and security.

Keywords: WSNs, cryptographic techniques, Attacks

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-053

QRS Detection Algorithm with Adaptive Time and Amplitude Thresholding for Indian Healthcare Systems

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ABSTRACT

Each heartbeat provides a QRS complex in the electrocardiogram (ECG) which is centered at the R-peak. The analysis of ECG is hindered by low-frequency noise, high frequency noise, interference from P and T waves, and changes in QRS morphology. Detection of the QRS complex is the most important step in analyzing ECG signals for heart monitoring and diagnosis. ECG analysis mainly includes signal denoising, wave detection, and heartbeat classification. These three issues are relevant that the signal denoising can help attenuate the noises. This proposed system presents a new peak detection algorithm that can suppress the noise and adapt to changes in ECG signal morphology for better detection performance. The proposed algorithm is based on wavelet algorithm and it is compared with existing algorithm statistical false peak elimination (SFPE) with median and moving average filters. Wavelet is efficient for analyzing non stationary signals like ECG signals for signal denoising, wave detection and heart beat classification

Keywords ECG Data, Peak detection, Wavelet transform, Statistical false peak elimination.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-054

Machine Learning Based Risk Management for Air Pressure Failure In Vehicle Automation Industry

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ABSTRACT

The automotive industry relies heavily on the optimal performance of air pressure systems, which are critical for various functions such as braking and suspension. Ensuring the reliability of these systems is paramount for vehicle safety and performance. Historically, air pressure system failures in vehicles have been managed through scheduled maintenance and manual inspections. These methods, while somewhat effective, are reactive and not always able to predict failures accurately, leading to unplanned downtimes and safety risks. The main problem is the lack of a proactive and accurate risk assessment mechanism for air pressure system failures in vehicles. Existing methods do not leverage the vast amounts of data generated by modern vehicles, missing out on potential insights that could predict failures before they occur. Traditional systems for managing air pressure in vehicles include regular manual inspections and maintenance schedules. These systems are limited by their inability to predict failures accurately and their dependence on human judgment, which can be error-prone.

Keywords: Air Pressure Systems, Risk Assessment, Traditional Systems, Braking, Suspension.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-055

Machine Learning Approaches for IOT Data Classification: A Comprehensive Review

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ABSTRACT

The concept of IoT has evolved from basic sensor networks to a vast ecosystem of interconnected devices, generating massive volumes of diverse data. Early classification methods relied heavily on rule-based systems, which were limited in their adaptability and scalability. IoT data classification involves categorizing data from various IoT devices into meaningful classes, which is critical for applications ranging from smart homes to industrial monitoring. The primary challenges include handling high-dimensional data, dealing with noise and inconsistencies, and ensuring real-time processing capabilities. Traditional classification systems for IoT data often utilize basic algorithms such as decision trees or linear classifiers. While these methods offer simplicity, they struggle with the complexity and volume of IoT data. Issues such as overfitting, limited generalization, and inability to capture intricate patterns are common limitations. With the increasing complexity and scale of IoT networks, there is a pressing need for advanced machine learning approaches that can handle high-dimensional, heterogeneous, and dynamic data. Improved classification techniques can enhance the accuracy of IoT data analysis, leading to more reliable and efficient applications across various domains, including smart cities, healthcare, and industrial automation.

Keywords: IOT Data, Data Classification, Database.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-056

Smart Traffic Enforcement System: RFID& ESP -Cam Based E-Challan System with Auto Notifications to RTA

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ABSTRACT

The evolution of Smart Traffic Management Systems has revolutionized how Traffic violations are monitored and enforced. This project presents a Centralized E-Challan System utilizing RFID technology, ESP32 CAM modules, and GSM Communication for real-time traffic violation detection and notification to the Regional Transport Authority (RTA). RFID readers installed at key traffic points to detect vehicles embedded with RFID tags. Concurrently, ESP-32 CAM modules capture images of violating vehicles, providing visual evidence. The system employs GPS modules to automatically send SMS notifications and Location of each violation to the RTA, ensuring rapid and efficient enforcement. This project is developed by using ESP-32 Micro Controller with Embedded C as the programming language and Arduino IDE Software.

Keywords: RFID, ESP-32, GSM, GPS

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-057

Wireless Lora Communication Based Industrial Sensor Monitor and Security Alert System

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ABSTRACT

In industrial environments, monitoring critical parameters such as temperature, humidity, gas levels, fire hazards, and unauthorized access is essential to ensure safety and operational efficiency. Our project aims to create a real-time monitoring and alert system that utilizes Long Range (LoRa) communication technology. The system is designed with two primary modules: a transmitter module situated in the industrial area, which collects data from multiple sensors, and a receiver module located at the base station. The sensors continuously monitor environmental conditions and detect any abnormal events like gas leaks, excessive temperatures, or intrusions. The transmitter module processes and sends this data through the LoRa module, alerting the base station if any hazard or threat is detected. The receiver module, equipped with an ESP-32 microcontroller, displays the alerts and data on an LCD and also connects to an IoT server, allowing remote monitoring by the industry owner. By providing timely alerts and accessible monitoring, this project aims to improve safety measures in industrial environments, ensuring a proactive approach to potential hazards.

Keywords: LoRa, potential hazards, IoT

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-058

Efficient Beam-Scanning Reflector Antenna Synthesis for Rural Connectivity in India: Near-Field Pattern Synthesis Approach

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ABSTRACT

When the feed array excitation of a reflector antenna is created using the conjugate field matching (CFM) method, the maximum radiation efficiency can be attained. The CFM method, however, can only obtain a feeding power distribution that is strongly tapered. Because of this, the majority of power amplifiers (PAs) will operate in low efficiency states, reducing equivalent isotropic radiated power (EIRP) while consuming less power. In this study, the radiated power efficiency (RPE) is specified as the new design target and is to be raised to obtain higher EIRP by combining the radiation efficiency and the PA efficiency. A technique based on near-field pattern synthesis is therefore suggested. All ON-state PAs are obliged to operate in the most productive mode under this strategy. Then, using a well-trained support vector machine (SVM), the ON-OFF states of the PAs are modified to improve how well the feed array's near-field pattern can synthesize the reflected focus field. As a result, the loss of radiation efficiency is kept to a minimum. The RPE is hence around 22% higher than that of the CFM approach and approximately 10% higher than that of the ideal CFM truncation situation.

Keywords: CFM, EIRP, SVM, REFLECTOR ANTENNA, PA.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-059

Secure Vault Access: ESP 32 -Powered IOT Multi-Layered Bank Locker System

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ABSTRACT

This project aims to design a bank locker security system using fingerprint recognition, a keypad, an ESP CAM, and IoT technology, applicable in banks, offices, and homes. The system ensures only authorized individuals access the lockers. Initially, users enroll with a username and password. Upon matching, the user's fingerprint is detected and stored with an ID. If the ID matches, a four-digit code is sent to the authorized person's mobile to unlock the locker. The system logs each user's check-in and checkout times along with basic information. This fingerprint-based system enhances traditional key-based lockers, addressing issues like key duplication and loss. It includes a camera to capture images of anyone attempting access. The system uses an ESP 32 microcontroller and the Arduino IDE with Embedded C programming to drive a motor that opens the locker door for authorized users only, preventing access for unauthorized users.

Keywords: Bank locker security system, Fingerprint recognition, Keypad, ESP CAM, IoT technology.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-060

Machine Learning Based Mango Leaf Disease Prediction

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ABSTRACT

Mango cultivation is a critical agricultural activity in tropical and subtropical regions, significantly impacting economies and food security. Over time, the integration of image processing and machine learning techniques into agriculture has emerged as a promising approach to enhance disease detection and prediction. Traditional methods rely on subjective judgment and are often delayed, which hampers the effectiveness of disease control measures. The conventional system involves visual inspection and laboratory testing, which are not only time-consuming but also require skilled personnel. Additionally, traditional methods may lack the ability to detect early-stage infections and differentiate between similar-looking diseases. Such a system can provide real-time diagnostics, reduce the dependency on manual inspection, and improve the accuracy of disease detection. By leveraging advanced image analysis and pattern recognition algorithms, this project aims to develop a machine learning-based predictive model for mango leaf diseases. This approach will not only enhance disease management practices but also contribute to increased crop yield and reduced economic losses. The significance of this project lies in its potential to transform mango cultivation practices through innovative technology, ensuring better health of mango plants and more sustainable agricultural practices.

Keywords: Mango cultivation, Disease identification, Manual inspection.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-061

Content Based Image Retrieval by Using Convolutional Neural Networks

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ABSTRACT

A content-based image retrieval (CBIR) system works on the low-level visual features of a user input query image, which makes it difficult for the users to formulate the query and also does not give satisfactory retrieval results. In the past image annotation was proposed as the best possible system for CBIR which works on the principle of automatically as-signing keywords to images that help image retrieval users to query images based on these keywords. Image annotation is often regarded as the problem of image classification where images are represented by some low-level features and the mapping between low-level features and high-level concepts (class labels) is done by supervised learning algorithms. In a CBIR system learning of effective feature representations and similarity measures is very important for the retrieval performance. Semantic gap has been the key challenge for this problem. A semantic gap exists between low-level image pixels captured by machines and the high-level semantics perceived by humans. The recent successes of deep learning techniques especially Convolutional Neural Networks (CNN) in solving computer vision applications has inspired me to work on this thesis so as to solve the problem of CBIR using a dataset of annotated images.

Keywords: Content-Based Image Retrieval (CBIR), Image Annotation, Semantic Gap, Convolutional Neural Networks (CNN), Deep Learning, Feature Representation.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-062

Adaptive Filter Bank Multicarrier Modulation Scheme for Affordable Mobile Communications in Indian Rural Areas

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ABSTRACT

Future wireless systems will be characterized by a large range of possible uses cases. This requires a flexible allocation of the available time-frequency resources, which is difficult in conventional orthogonal frequency division multiplexing (OFDM). Thus, modifications of OFDM, such as windowing or filtering, become necessary. Alternatively, we can employ a different modulation scheme, such as filter bank multi-carrier (FBMC). In this paper, we provide a unifying framework, discussion, and performance evaluation of FBMC and compare it with OFDM-based schemes. Our investigations are not only based on simulations, but are substantiated by real-world testbed measurements and trials, where we show that multiple antennas and channel estimation, two of the main challenges associated with FBMC, can be efficiently dealt with. In addition, we derive closed-form solutions for the signal-to-interference ratio in doubly-selective channels and show that in many practical cases, one-tap equalizers are sufficient. A downloadable MATLAB code supports reproducibility of our results.

Keywords: FBMC, FFT, OFDM (Orthogonal Frequency Division Multiplexing).

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-063

Analyzing and Modelling the Carbon Footprint for Sustainable Environment

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ABSTRACT

As climate change accelerates, understanding and managing carbon footprints has become increasingly crucial for mitigating environmental impacts and achieving sustainability goals. The carbon footprint, which measures the total greenhouse gases emitted directly or indirectly by individuals, organizations, or activities, has been a focal point in efforts to combat global warming. The concept gained prominence in the late 1990s, evolving from rudimentary methods that relied on basic emission factors and broad estimates to more refined techniques driven by advancements in technology and data analytics. Despite these improvements, current methods for analysing and modelling carbon footprints face significant challenges. Traditional systems often rely on standardized emission factors and static data sources, which can lead to inaccuracies and an inability to account for local variations or real-time changes. These limitations hinder effective decision-making and reduce the ability to track progress toward sustainability goals. This project addresses these challenges by developing an integrated framework for carbon footprint analysis and modelling. The proposed approach aims to overcome the limitations of traditional systems by incorporating real-time data and dynamic analytical methods.

Keywords: Carbon footprints, Emission, Sustainability, Traditional systems.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-064

Smart Antenna Synthesis Using Surrogate Assisted Particle Swarm Optimization for Rural India Telecommunication Infrastructure

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ABSTRACT

Orthogonal Frequency Division Multiplexing (OFDM) is the best choice for wireless and wired high data rate communications. The OFDM system has many advantages such as high spectral efficiency, robustness to channel fading, and immunity to impulse interference. However, it has a main drawback, which is the Peak to Average Power Ratio (PAPR). Selecting Mapping (SLM) and Partial Transmit Sequences (PTS) are the two essential techniques for reducing the PAPR; however, they need to send side information to indicate how the transmitter generates signals. In this paper, Particle Swarm Optimization (PSO)-based dummy sub-carriers are inserted with the data to reduce PAPR without transmitting side information .Using MATLAB as a mathematical simulation tool, simulation results are presented for a standard OFDM network model. The network model has been simulated in an Additive White Gaussian Noise (AWGN) channel environment to investigate PAPR and Bit-Error Rate (BER) performance. The simulation results show that the dummy sequence based on PSO reduces PAPR down to 4 dB compared to a conventional OFDM system and down to 3 dB compared with the clipping technique for the same BER performance.

Keywords: Wireless communication, Antenna Synthesis, optimization algorithms

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-066

Secure Blind Digital Video Water Marking for Indian Intellectual Property

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ABSTRACT

A comparative analysis to determine the most effective video watermarking algorithm between SVD/DWT hybrid and Singular Value Decomposition (SVD) is reported in this paper. Blind video watermarking schemes are simulated and attempts made to recover the watermark after some signal processing attacks such as median filtering and Histogram equalization. The quality of the extracted watermark was then measured using the SSIM index. From the computer simulation results using a diverse set of standard video clips the SVD/DWT hybrid performed better than the reference. An average value of the SSIM index of 0.98 was obtained. The SVD transform values varied from 0.57 to 0.78 for histogram equalization attacks and 0.83 to 0.9 for median filtering attacks. The results reveal the superiority of the SVD/DWT hybrid technique over SVD for digital rights enforcement.

Keywords: Blind digital Watermarking, encryption, DCT, DWT, PCA.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-067

Internet-of-Things with MI Enabled Manufacturing: Insights from VARSew Dataset on Garment Sewing Activity Monitoring

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ABSTRACT

The garment industry, vital to the global economy, faces challenges in efficiency, quality, and worker safety due to its reliance on manual monitoring and basic automation. Despite advancements from manual to automated machinery, data-driven technologies like IoT and machine learning have seen limited adoption. These technologies offer significant potential to transform manufacturing by providing real-time insights into machine performance, worker conditions, and production workflows. This project utilizes the VARSew dataset, which captures detailed sewing activities, to create a smart IoT and ML-based system for monitoring and analysis. By enabling real-time tracking, predictive quality control, and enhanced safety measures, this approach aims to reduce costs, minimize production errors, and create a safer, more efficient manufacturing environment. This innovation allows garment manufacturers to improve quality, speed, and competitiveness in a dynamic market.

Keywords: IOT, VARSew, ML

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-068

IOT Based Electric Vehicle Charging Slot Registration System

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ABSTRACT

The Immense growth in the implementation of Electric vehicles (EVs), has established a path in the advancements of charging infrastructure. Connecting the charging stations to a common server is essential for future EV adoption. So there is an issue with the charging time if someone is charging their vehicle at the station; it takes time to charge, so it is not possible to wait. Which leads to unavailability of slots in charging stations. To overcome this problem an IoT based slot registration in EVs charging station is proposed. The existing charging stations have not implemented charging slot availability and time scheduling. Our project is proposed to share real-time information about the availability in order to reserve slots at charging stations. This system uses Real Time Clock (RTC) for the real-time traffic database to estimate the shortest path to reach the charging station. An IoT module is used to monitor and signalize the state of availability of each slot in charging station. The aim of this project is to ease the scheduling of the charging the EVs at charging stations by not to be interrupted by another Vehicle. The proposed system will result in the reduction of waiting time with good accuracy.

Keywords: IOT, Charging Slot Booking, RTC, Electric Vehicle

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-069

Machine Learning Framework for Signal Quality Detection in Optical Communication

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ABSTRACT

In optical communication systems, maintaining signal quality is paramount for ensuring the reliability and efficiency of data transmission over long distances. Traditionally, signal quality has been assessed using physical metrics such as bit error rate (BER), eye diagrams, and optical signal-to-noise ratio (OSNR), which involve manual calibration and real-time monitoring. The rise in network complexity and data demands underscores the need for more advanced solutions to detect and diagnose signal quality issues in real-time. Machine learning frameworks present a promising approach to this challenge by leveraging data-driven techniques to enhance detection accuracy and responsiveness. Unlike traditional methods, machine learning algorithms can analyse large volumes of data to identify subtle patterns and anomalies that may not be captured by conventional approaches. This ability to provide automated, adaptive analysis enables proactive identification and resolution of signal quality problems before they impact system performance. The integration of machine learning into optical communication systems not only improves the precision of signal quality detection but also reduces maintenance costs and enhances overall network reliability. As optical communication networks continue to evolve, adopting machine learning frameworks will be crucial for optimizing performance, ensuring data integrity, and meeting the increasing demands of modern communication infrastructure.

Keywords: Optical Communication Systems, Signal Quality, Bit Error Rate (BER)

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-070

Innovative Fish Farming Real Time Control and IOT for Automatic Feeding and Water Tracking

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ABSTRACT

IoT based smart fish Farming is a fully automated and remotely monitored fish farming, fully capable of operating without human intervention or interaction. Major features of this proposed project are the feed design, fish feeding over the internet and remote monitoring of all the parameters. The parameters include feed, water. They can be accessed through the IOT app on phone. This task is achieved using Arduino controller with the implementation of IoT. This is supposed to reduce human efforts and errors in owning an aquarium full of aquatic animals. We have used feed, water, IOT and RTC (Real Time Clock). In this we using IOT module to set time customization for feeding and providing water. We can control drain pump, feeder motor and inlet water pump using IOT APP. Thus, this system design provides automated Aquarium, reduces man power and increases healthy aquarium. Every sensor parameter data will display on LCD and IOT database. Proposed system implemented using Arduino Microcontroller and Arduino IDE with Embedded C programming Language.

Keywords: Fully Automated System, Remote Monitoring, Arduino Controller, Time Customization, Data Display

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-071

Intelligent Reflecting Surfaces Assisted Noma for Spectrum Efficiency Enhancement in Indian Cellular Network

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ABSTRACT

Today's wireless communication networks transmit their signals based on the Orthogonal Multiple Access (OMA) principle. As the number of users increases, OMA based approaches may fail to meet the stringent requirements emerging in the 5th Generation of wireless communications for very high spectral efficiency and massive connectivity. This paper aims to demonstrate the validity of NOMA as an optimal choice for 5G by comparing it with OMA. Three Code-Domain NOMA (CD-NOMA) schemes are examined and compared with an established OMA technique, Orthogonal Frequency Division Multiplexing (OFDM). The chosen schemes for CD-NOMA are: Low Density Spreading CDMA (LDS-CDMA), Low Density Spreading OFDM (LDS-OFDM), and Sparse Coding Multiple Access (SCMA). The performance of each scheme is evaluated by computing its Bit error rate (BER) and Outage Probability (OP) and simulating them against different values of Signal-to-Noise-Ratio (SNR) over an AWGN channel. It is observed in this paper that, while having varying performance levels, every NOMA scheme outperforms OFDM, thereby proving NOMA to be a prime candidate for implementation in future 5G communication technologies.

Keywords: Non-Orthogonal Multiple Access (NOMA), Orthogonal Multiple Access (OMA), Spectral Efficiency, 5G Wireless Communication

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-072

Gsm Driven Smart Water Supply Management, Light Fault Detection, Drainage Overflow Alert System F\for Municipal Applications

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ABSTRACT

The GSM-driven Smart Water Supply Management, Light Fault Detection, and Drainage Overflow Alert System enhances urban infrastructure management by integrating GSM technology with sensors and actuators for monitoring water supply, street lighting, and drainage systems. The Smart Water Supply Management uses sensors for efficient water distribution and sends GSM alerts for prompt action. The Light Fault Detection system uses sensors to identify faulty streetlights and sends GSM alerts to the maintenance team for timely repairs. The Drainage Overflow Alert System uses sensors to monitor water levels and sends GSM alerts to municipal workers to prevent flooding. Integrating these systems with GSM technology aims to provide a cost-effective solution for urban management, enhancing resource utilization, service delivery, and safety for city residents

Keywords: GSM, GPS, LDR, Sensors, Ultra sonic sensor

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-073

Rayleigh Fading Modelling & Channel Hardening for Reconfigurable Intelligence Surfaces

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ABSTRACT

A realistic performance assessment of any wireless technology requires the use of a channel model that reflects its main characteristics. The independent and identically distributed Rayleigh fading channel model has been (and still is) the basis of most theoretical research on multiple antenna technologies in scattering environments. This letter shows that such a model is not physically appearing when using a reconfigurable intelligent surface (RIS) with rectangular geometry and provides an alternative physically feasible Rayleigh fading model that can be used as a baseline when evaluating RIS-aided communications. The model is used to revisit the basic RIS properties, e.g., the rank of spatial correlation matrices and channel hardening.

Keywords: Rayleigh Fading, Reconfigurable intelligent surface, Channel hardening, Spatial correlation.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-076

Enhanced V2I Communication with Raspberry PI PICO: A Smart Solution for Transportation

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ABSTRACT

Road safety is a critical concern due to the high number of preventable accidents leading to loss of life. To address this issue, Vehicle-to-Interfaces (V2I) communication technology is emerging as a key solution. This project proposes a smart V2I communication system designed to prevent collisions between vehicles. The system utilizes a Raspberry Pi Pico controller integrated with a GPS module, temperature and humidity sensors, and ultrasonic sensors. It collects, processes, and transmits vehicular data wirelessly to nearby vehicles, enabling real-time alerts and preventive actions.

This implementation leverages advanced hardware components to support Advanced Driver Assistance Systems (ADAS), providing crucial information for collision avoidance, lane change warnings, navigation assistance, and traffic updates. By facilitating efficient and effective communication between vehicles, this system aims to significantly enhance road safety and reduce the incidence of traffic accidents.

Keywords: V2I communication, road safety, collision avoidance, Raspberry Pi Pico, GPS module, ultrasonic sensor, ADAS, vehicle-to-vehicle communication, real-time alerts, traffic updates.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-077

ZigBee based Smart System for Obstacle Detection and Gate Automation for Railway System

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ABSTRACT

Railway accidents at level crossings are a significant safety issue, often caused by obstacles on the tracks or human errors in manually operations .This system aims to automate the operation of railway gates, reducing the need for manual intervention and minimizing the risk of accidents caused by human errors .This system employs ultra sonic sensor for detecting obstacles, eye blink sensor and alcohol detection sensor for driver monitoring, and ZigBee for gate automation .This system enhances safety by preventing collisions with vehicles, pedestrians, or objects on railway tracks especially at level crossing .This ensures that train operators are alert and responsive reducing accidents caused by fatigue, distraction or impaired driving .The system provides real time alert to both drivers and railway operators, enabling quick responses to potential dangers

Keywords: Zigbee, Railways, Automation

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-078

Wireless Solar Power Forest Fire Prevention System using Zigbee Connectivity and Raspberry Pi Pico

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ABSTRACT

Forest fires are significant environmental hazards that demand efficient detection and rapid response systems. The project, aims to address these challenges with an innovative approach. The system utilizes a solar panel and battery to ensure continuous power supply and integrates a network of three fire sensors to monitor fire conditions in different directions in real-time. Sensor data is transmitted via Zigbee to a Raspberry Pi Pico microcontroller, which then activates preventive measures such as buzzers and water pumps. Additionally, alerts are sent to fire stations using an ESP32 microcontroller and Zigbee at the receiving end, with notifications displayed on an LCD and relayed through an IoT interface and buzzer. This advanced, energy-efficient system significantly enhances early fire detection and response, thereby reducing the risk of extensive forest fires.

Keywords: Raspberry Pi Pico, Zigbee, Solar Power, Forest Fire Prevention, Wireless Sensor Network, IoT

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-079

Exploring Fault Conditions in Emulated Gas-Fired Boilers Through Machine Learning Data Analysis

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ABSTRACT

Wireless Emulated gas-fired boilers play a crucial role in industrial and residential heating, converting fuel to heat efficiently to ensure operational reliability and comfort. The introduction of diagnostic tools in the late 20th century improved fault detection, allowing for quicker responses. However, these tools are typically limited to basic diagnostic functions, detecting only common issues and often missing subtle or complex faults. The traditional systems are generally threshold-based, operating with minimal diagnostic precision and heavily relying on human input for accurate fault analysis. This dependency creates inefficiencies, limited fault prediction, and high maintenance overhead. These constraints highlight a critical need for enhanced fault detection methods that go beyond standard diagnostic algorithms to address complex, evolving system issues effectively. The limitations of current methods have motivated the exploration of data-driven approaches, with machine learning emerging as a viable solution. Machine learning techniques enable the processing and analysis of extensive data, facilitating predictive maintenance and fault detection in real time. This project investigates the application of machine learning to improve fault detection in emulated gas-fired boilers by identifying operational anomalies early, thus reducing the likelihood of unplanned downtime and enhancing system resilience.

Keywords*:* Gas-fired boilers, fault detection, machine learning, predictive maintenance

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-080

Automated Quality Control for Magnetic Tiles Defect Classification using Artificial Intelligence

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ABSTRACT

Ensuring the quality of magnetic tiles is critical in various industrial applications, requiring precise identification of defects such as cracks, chips, and irregularities that can impact performance. This project addresses the need for a robust, efficient, and scalable solution by proposing an AI-driven approach to automated quality control of magnetic tiles. By leveraging advanced artificial intelligence techniques such as deep learning and computer vision, the proposed system aims to significantly improve the accuracy of defect detection, reduce inspection time, and minimize human error. This AI-driven system is designed to adapt to new defect patterns without significant reprogramming, overcoming the limitations of traditional automated systems. The implementation of such a system holds the potential to revolutionize quality control in the manufacturing industry, offering a more reliable, consistent, and efficient method for defect classification in magnetic tiles. By enhancing product quality and ensuring greater consistency, this approach can lead to substantial cost savings and increased productivity for manufacturers. The significance of this project extends beyond mere operational improvements; it represents a step forward in the integration of artificial intelligence into manufacturing processes, demonstrating how technology can be harnessed to solve complex industrial challenges.

Keywords: Image Processing, Automated Inspection

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-081

ESP-32 Powered Smart Surveillance for Poultry Farms: Ensuring Flock Safety

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ABSTRACT

The objective of this project is to develop an ESP32-based smart surveillance system designed to ensure the safety of poultry flocks and maintain optimal environmental conditions. The system integrates a DHT11 sensor for monitoring temperature and humidity, an MQ2 sensor for detecting harmful gases, an ultrasonic sensor for measuring distance, and a camera module for real-time visual surveillance. Output devices include an LCD for displaying environmental parameters, a GSM module for remote notifications, and a buzzer for intruder alerts. The methodology involved seamlessly integrating these components to create a cohesive monitoring system that continuously tracks and reports farm conditions. The results indicate that the system effectively detects environmental changes and potential intrusions, providing timely alerts to farm operators. This comprehensive surveillance solution significantly enhances the security and well-being of poultry farms by ensuring a safe and healthy environment for the flock.

Keywords: Poultry farm security, Poultry flock safety, GSM module, Intruder detection

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-082

Multi-Mode Medication Dispenser Using Arduino Uno

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ABSTRACT

This project explores the design and implementation of a multi-mode medication dispenser based on the Arduino Uno platform, aiming to improve medication adherence, reduce errors, and support independent medication management for patients. The dispenser operates in multiple modes, allowing for both time-based and manual dispensing, and is equipped with essential components such as an RTC module for accurate scheduling, servo motors for precise dose release, and a user-friendly LCD interface. Additional components like buzzers provide reminders, while optional Wi-Fi connectivity enables remote monitoring by caregivers or healthcare providers, enhancing patient safety and offering peace of mind for loved one.The system is highly customizable and cost-effective, with potential applications in home care settings, elder care facilities, and hospitals. By automating medication schedules and providing real-time alerts, it addresses key challenges in healthcare management, particularly for elderly patients and those managing complex, multi-dose medication regimens. This project demonstrates the potential of Arduino-based solutions in healthcare, offering an accessible, adaptable, and scalable approach that could be further enhanced with IoT integration, AI-driven personalization, and wearable connectivity to create an intelligent, interconnected medication management system. The device serves as a promising prototype with broad implications for the future of personalized and automated healthcare solutions.

Keywords: Arduino uno, dispenser, multimode.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-083

Intelligent Organic-Recyclable objects classification system using machine learning for landfill minimization

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ABSTRACT

Reducing global waste and improving recycling efficiency on earth is crucial. This Recyclable-Organic object classification model presents an intelligent system leverages advanced machine learning algorithms for prediction. As traditional manual sorting is the current system existing for this concern, it is labor-intensive and error-prone .The proposed ML model is a supervised model employing sophisticated image recognition techniques on vast datasets to sort and distinguish recyclables in a much more accurate and efficient way. This system comprises of tools and libraries such as pandas, numpy, sklearn, matplotlib and seaborn for data preprocessing and model building.By automating this process using ML, it aims to reduce landfill reliance, optimize recycling, and support environmental sustainability, potentially transforming waste management practices and contributing to broader environmental goals.

Keywords: Waste management, Landfill minimization, Advanced automation, Sustainability.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-084

Machine Learning Approach for LiDAR Based Tree Species Classification in Forest Ecosystem Mapping

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ABSTRACT

Accurate tree species classification in forest ecosystems is essential for effective biodiversity conservation, forest management, and ecological research. The advent of Light Detection and Ranging (LiDAR) technology has revolutionized forest mapping by providing high-resolution, three-dimensional data on forest structure. Despite these advancements, integrating LiDAR data with machine learning algorithms for tree species classification presents challenges, including variability in forest structures, data quality issues, and computational demands. The problem lies in the complexity of distinguishing between tree species based on LiDAR data alone. The significance of this project lies in developing robust machine learning models capable of effectively leveraging LiDAR data to enhance tree species classification. Such advancements promise to improve the accuracy and efficiency of forest ecosystem mapping, facilitating better forest management, conservation efforts, and ecological research. By addressing the limitations of traditional classification methods and optimizing machine learning techniques for LiDAR data, this project aims to provide a scalable, reliable solution for comprehensive forest ecosystem analysis, thereby advancing our understanding and management of forest biodiversity.

Keywords: LiDAR Technology, Data integration

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-085

Barcode Modulation Method for Data Transmission in Mobile Devices

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ABSTRACT

The concept of 2-D barcodes is of great relevance for use in wireless data transmission. In this any file on a phone can be transferred to another phone through a series of images on the LCD which are then captured and decoded through the camera of the second phone. Here a new approach for data modulation in 2-D barcodes is introduced then its performance is evaluated in comparison to other standard methods of barcode modulation. In this new approach, orthogonal frequency-division multiplexing (OFDM) modulation is used together with differential phase shift keying (DPSK). The aim of this project is to establish a system that is tolerant to camera movements, picture blur, and light leakage within neighboring pixels of an LCD.

Keywords: OFDM, DPSK, LCD.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-086

Explainable Machine Learning in Industrial IOT: Predictive maintenance for machine condition monitoring

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ABSTRACT

Predictive maintenance in industrial settings is crucial for optimizing operational efficiency, reducing downtime, and lowering maintenance costs. Therefore this project leverages the Internet of Things (IoT) and machine learning (ML) to develop an advanced predictive maintenance system for machine condition monitoring. By integrating IoT sensors, the system continuously collects high-dimensional data, including temperature, vibration, pressure, and operational parameters from industrial machinery. This proactive approach enables timely maintenance actions, significantly reducing unplanned downtimes and enhancing machine reliability. Additionally, the system optimizes maintenance schedules based on actual machine conditions, improving resource utilization and reducing maintenance costs. The project demonstrates significant improvements over traditional maintenance practices by enhancing the accuracy and efficiency of failure predictions. The integration of ML with IoT data provides a comprehensive view of machine health, facilitating a proactive maintenance strategy that ensures operational continuity and safety. This ML-based predictive maintenance system represents a transformative advancement in industrial operations, promoting better asset management and extending the lifespan of machinery.

Keywords: ECG Data, Steganography, DWT, PSNR

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-087

Wireless Sensor Network based Ambient Environmental Monitoring System using NodeMCU and WSN Monitoring

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ABSTRACT

Landmines present a significant and persistent threat in many post-conflict regions, causing substantial human suffering and economic damage. Traditional landmine detection methods, such as metal detectors and ground-penetrating radar (GPR). Metal detectors are effective but struggle with soil mineralization and metal debris, resulting in high false alarm rates. These traditional systems are also labour-intensive, and inefficient for large-scale demining operations. To address these challenges, this project explores the use of artificial intelligence (AI) to revolutionize landmine detection by analysing magnetic anomalies and soil characteristics. By integrating AI technologies with advanced detection methods, this project aims to enhance accuracy, reduce false alarms, and improve overall operational efficiency. This innovative methodology promises to address the deficiencies of existing technologies, offering a safer and more efficient alternative for landmine clearance. The significance of this project lies in its potential to transform landmine detection practices. By improving detection accuracy and operational safety, this project will contribute significantly to global humanitarian mine action efforts, ultimately helping to create safer environments and mitigate the long-term impact of land Mines.

Keywords: Ground-Penetrating Radar (GPR), Artificial Intelligence(AI), Magnetic Anomaly Sensors

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-088

Predictive Modeling for Space Craft Operation State Identification Based on Time Stamped IOT Data

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ABSTRACT

Predictive modeling for spacecraft operation state identification is critical for enhancing decision-making, improving safety, and optimizing performance. Therefore this project aims to develop advanced predictive models using time-stamped IoT data from various onboard sensors to accurately identify and monitor the operational states of spacecraft in real-time. The predictive models are trained to recognize patterns and anomalies that indicate different operational states, enabling early detection of potential issues and timely interventions. This proactive approach enhances the safety and reliability of spacecraft by preventing failures and optimizing system performance. The developed models demonstrate superior capabilities in handling complex and high-dimensional data, providing real-time monitoring and insights. The system's scalability allows it to process large volumes of data from multiple sensors, making it suitable for modern spacecraft with extensive sensor networks. By facilitating data-driven decision-making, the predictive models support more efficient and effective spacecraft operations, reducing maintenance and operational costs.

Keywords: Predictive Modeling, Spacecraft, Scalability

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-089

Classification of Impaired Radar Signals Using Feature Extraction and Machine Learning

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ABSTRACT

Radar systems are vital for applications across aerospace, defence, meteorology, and automotive industries. However, these systems often encounter signal impairments due to noise, interference, and signal degradation. Therefore, this project aims to enhance the classification of impaired radar signals through advanced feature extraction and machine learning (ML) techniques. Traditional methods, including threshold-based, statistical approaches, and manual analysis, are limited in their ability to handle the complexity and diversity of radar signal impairments, often resulting in inadequate performance and adaptability. The proposed approach involves extracting relevant features from radar signals to capture their essential characteristics, followed by the application of sophisticated ML algorithms for classification. These techniques are designed to process and classify impaired signals in real-time, supporting immediate decision-making and response in critical applications. Extensive testing and validation demonstrate that the ML models significantly improve the accuracy and robustness of impairment detection compared to traditional methods. The models are adaptable to various types of impairments and operational conditions, enhancing the versatility and reliability of radar systems.

Keywords Reliability, Automation, adaptability, Noise Reduction, Advanced Algorithms.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-090

Machine Learning Analysis of Drone Classification Models: Inspire, Mavic, Phantom and No Drone

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ABSTRACT

This study investigates the machine learning-based classification of four specific drone models—Inspire, Mavic, Phantom, and No Drone. Historically, drone classification relied on manual inspection and basic pattern recognition techniques, which were limited in accuracy and efficiency due to variability in lighting conditions, image quality, and environmental factors. Traditional systems, constrained by rule-based algorithms and manual feature extraction, often struggled to adapt to the diverse and evolving nature of drone appearances. With advancements in machine learning and computer vision, there is an opportunity to enhance classification performance through automated, data-driven methods. This research addresses the need for a robust classification model capable of accurately differentiating between multiple drone models, including scenarios where no drone is present. The significance of this work lies in its potential to improve drone detection and management systems, facilitating better airspace regulation, security surveillance, and autonomous operations. By applying sophisticated machine learning algorithms to drone classification, this study aims to overcome the limitations of traditional methods and provide a scalable, efficient solution for real-world applications, ultimately contributing to the advancement of drone technology integration and operational reliability.

Keywords Classification, Image Recognition, Security, Surveillance

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-091

Parametical facial landmark detection for secure biometric application and active shape model approach using Matlab

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ABSTRACT

Facial landmark detection is crucial for subsequent tasks such as face recognition and three-dimensional face reconstruction. In this work, we present an active shape model (ASM) parametric approach for facial landmark detection. Concretely, we propose encoding the landmark locations using ASM parameters. We then leverage cascade regression to estimate these ASM parameters effectively. Final landmark locations are decoded from the ASM parameters, resulting in a more compact and efficient representation compared to existing methods. This parametric approach not only enhances accuracy but also improves processing speed and scalability. Our method demonstrates superior performance in handling variations in facial appearance and environmental conditions. Experiments validate the effectiveness and robustness of our approach, showing significant improvements over traditional landmark detection techniques.

Keywords: leverage, cascade regression, robustness, Concretely

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-092

Feature Engineering and Modelling of Temperature Modulated MOS Sensor Data for Gas Classification

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ABSTRACT

Metal-oxide-semiconductor (MOS) sensors are crucial for gas detection in industrial, environmental, and indoor air quality applications due to their sensitivity, robustness, and cost-effectiveness. However, the accurate classification of gases using MOS sensors is challenging due to complex response characteristics and environmental influences. Therefore this project aims to enhance gas classification accuracy through feature engineering and modelling of temperature-modulated MOS sensor data. Temperature modulation, which involves varying the sensor's operating temperature, improves sensor selectivity and sensitivity by affecting its response to different gases. The core of this project is the extraction of meaningful features from the dynamic responses of MOS sensors under temperature modulation and the development of robust machine learning models to classify gases accurately. Traditional methods, such as single temperature operation and threshold-based detection, are limited by their lack of flexibility, poor selectivity, and inability to handle the nonlinear and noisy nature of sensor data. In contrast, our approach leverages advanced feature extraction techniques to capture rich, informative characteristics from the sensor responses.

Keywords: MOS sensor, Temperature modulation, Perceptron

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-094

Optimising Millimeter Wave Massive MIMO Systems For Indian Environment A Mutlicell Mutliuser Analysis

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ABSTRACT

Multi-cell wireless systems usually encounter both intra- cell and inter-cell interference, which can bemitigated via coordinated multipoint (CoMP) transmission. This is practically infeasible for millimeter-wave (mm Wave) systems where large amounts of antennas are necessary to provide suffcient gain and to enable transmission/reception of multiple streams to/from a user. This article provides a general methodology to analytically compute the expected per-cell spectral effciency of a mm Wave multi-cell single-stream system using phase-shifter- based analog beam forming and regularized zero-forcing digital beam forming. Four analog-digital hybrid beam forming techniques for multi-cell multi-stream mm Wave communication are proposed, assuming that base stations in different cells share channel state information to cooperatively transmit signals to their home-cell users. It is shown from the results that millimeter-wave has better suppression capability to PC than classical estimation algorithms. Its performance is close to that of the optimal MMSE as the length of channel impulse response (CIR) is increased. the performance of the millimeter-wave does not degrade when the number of antennas is large at the base station (BS).

Keywords: Multi cell Wireless systems, Intra cell Interference, Coordinated Multipoint (CoMP), Microwave Band

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-095

Cost Effective Implementation of Code Domain Noma for Indian Wireless Communication Network

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ABSTRACT

Due to the characteristic of transmitting multiplexed signals in superposed mode over the same spectrum, non-orthogonal multiple access (NOMA) technology is deemed as a promising way to improve spectral efficiency in fifth generation (5G) networks. In this paper, we develop a NOMA with generalized quadrature spatial modulation (GQSM) based cooperative system based on the two-path successive relaying concept, in which the data at the source node is divided into two parallel parts and is transmitted to the destination in superposed mode via the assistance of two decode-and-forward (DF) relays. On the condition that the transmit power of the individual nodes and the entire system are all constrained, the maximization of achievable rate is formulated as an optimization problem. Following the guidelines of optimization, the dual decomposition method is adopted to obtain the closed-form expressions of the optimal power allocation. Moreover, to balance the achievable rate between two superposed signals, which is equivalent to minimizing the required spectrum bandwidth, a power allocation scheme between the superposed signals is proposed. The results demonstrate that the proposed NOMA-GQSM resulted in superior bit error rate (BER) rate performance as compared to conventional methods.

Keywords: NOMA, GQSM,Decode-and-Forward (DF) Relays, Bit Error Rate (BER) Spectral Efficiency, Power Constraints, Superposed Signals Spectrum, 5G Networks

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-096

Mindirect Fetal Compensation Technique Considering Variation in Inter Channel Time Offsets for Indian Obstetric Monitoring

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ABSTRACT

The electrocardiogram (ECG) is widely used for diagnosis of heart diseases. Good quality ECG is utilized by physicians for interpretation and identification of physiological and pathological phenomena. However, in real situations, ECG recordings are often corrupted by artifacts. Two dominant artifacts present in ECG recordings are: (1) high-frequency noise caused by electromyogram induced noise, power line interferences, or mechanical forces acting on the electrodes; (2) baseline wander (BW) that may be due to respiration or the motion of the patients or the instruments. These artifacts severely limit the utility of recorded ECGs and thus need to be removed for better clinical evaluation. Several methods have been developed for ECG enhancement. In this paper, we propose a new ECG enhancement method based on the recently developed empirical mode decomposition (EMD). The proposed EMD-based method is able to remove both high-frequency noise and BW with minimum signal distortion. The method is validated through experiments on the MIT–BIH databases. Both quantitative and qualitative results are given. The simulations show that the proposed EMD-based method provides very good results for denoising and BW removal.

Keywords*:* Mindirect Fetal, ECG.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-097

Secure Signature Verification Utilizing Normalised Static Features A Reliable Solution For Document

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ABSTRACT

Multi-cell wireless systems usually encounter both intra- cell and inter-cell interference, which can be mitigated via coordinated multipoint (CoMP) transmission. Previous works on multi-cell analysis in the microwave band generally consider fully digital beam forming, requiring a complete radio-frequency chain behind each antenna. This is practically infeasible for millimeter-wave (mm Wave) systems where large amounts of antennas are necessary to provide sufficient gain and to enable transmission/reception of multiple streams to/from a user. This article provides a general methodology to analytically compute the expected per-cell spectral efficiency of a mm Wave multi-cell single-stream system using phase-shifter- based analog beam forming and regularized zero-forcing digital beam forming. Four analog-digital hybrid beam forming techniques for multi-cell multi-stream mm Wave communication are proposed, assuming that base stations in different cells share channel state information to cooperatively transmit signals to their home-cell users. It is shown from the results that millimeter-wave has better suppression capability toPC than classical estimation algorithms. Its performance is close to that of the optimal MMSE as the length of channel impulse response (CIR) is increased. the performance of the millimeter-wave does not degrade when the number of antennas is large at the base station (BS).

Keywords: Signature Verification, Behavioral Trait, Hand writing Analysis, Size Invariance, Angle Invariance

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-098

IOT Based Autonomous Vehicle for Advanced Safety Solutions

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ABSTRACT

Nowadays, we come across a lots of Vehicle accidents in our daily life. There are many reasons behind such accidents like rash driving, diminished vigilance level of driver, driver health condition, Vehicle breakdown etc. Here in this work we are proposing a simple prototype for smart Embedded real time monitoring of driver vigilance to avoid accidents using expression reading and to identify whether the driver is alcoholic and to give real time alarm about the situation along with vehicle security. This Project work consists of Arduino microcontroller, DC motor, Eye blink Sensor, Heart Beat Sensor, Vibration sensor, Temperature sensor, Wi-Fi module, LCD, Buzzer and dc motor. This Project Autonomous vehicle presents an automotive localization system using GPS and IOT services. This tracking system is composed of a GPS receiver, Microcontroller and a IOT Modem. GPS Receiver gets the location information from satellites in the form of latitude and longitude. The Microcontroller processes this information and this processed information is sent to the user/owner using IOT modem. The presented application is a low cost solution for automobile position and status with high security. Proposed system implemented using Arduino Microcontroller and Arduino IDE with Embedded C programming Language.

Keywords: Real Time Monitoring, Vehicle Accidents, DC Motor

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-101

Finger Print Based Secure Smart Metro Pass with IOT Integration

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ABSTRACT

In modern urban environments, efficient transportation systems are crucial for seamless mobility. This project proposes a Smart Metro Pass System, this system aims to enhance the security and efficiency of metro transit systems by integrating a fingerprint-based identification method with IoT technology. The solution enables users to access metro services seamlessly while ensuring secure and personalized travel experiences. The system aims to streamline metro access through automated finger print verification, enhancing security, reducing manual intervention, and providing a user-friendly experience. This platform facilitates remote monitoring of metro access statistics, pass validity checks, and gate operation statuses. Key components of the system include a secure cloud infrastructure for data storage and management, ensuring privacy and reliability. Our Proposed idea is Smart Metro Pass is by integrating with Embedded "C" Arduino IDE Software.

Keywords: Data storage and Management, Ensuring privacy and Reliability, finger print, check pass status, and receive notifications

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-102

Machine Learning Based Fuel Flames Extinguishing Status using Sound Statistics

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ABSTRACT

Fire safety is a paramount concern across various sectors, necessitating the development of reliable and efficient fire detection and monitoring systems. Traditional methods, relying on visual and thermal sensors, often face limitations such as visibility constraints and slower response times. This ML-based system offers significant advantages over traditional fire detection methods, including enhanced accuracy, real-time monitoring capabilities, and robustness in challenging environmental conditions where visibility is poor. Extensive testing demonstrates that the proposed approach outperforms traditional systems by providing timely and reliable information about the extinguishing process of fuel flames. This automation reduces the risk of human error and false alarms, ensuring more efficient fire management and response. In conclusion, integrating ML-based acoustic analysis into fire safety systems represents a significant advancement, offering a powerful tool for enhancing fire detection, monitoring, and intervention strategies across various applications.

Keywords: Flame Detection, Machine learning, Sound Analysis, Fire Safety

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-103

Machine Learning-Based Fault Diagnosis in Engines Using IOT Based Thermodynamics Feature Vectors

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ABSTRACT

The integration of Machine Learning (ML) and Internet of Things (IoT) technologies has revolutionized engine fault diagnosis, leveraging real-time data from IoT sensors to enhance predictive maintenance practices. This project addresses these limitations by employing advanced ML algorithms, such as neural networks, decision trees, and support vector machines, to analyze and interpret the high-dimensional data from IoT sensors. The proposed system is designed to provide real-time monitoring and predictive maintenance, significantly reducing downtime and maintenance costs while enhancing engine performance and safety. The ML models are trained on a diverse dataset of thermodynamic features, enabling them to detect subtle anomalies and predict potential faults before they escalate into major issues. Through rigorous testing and validation, the system demonstrated superior diagnostic accuracy and adaptability to varying operational conditions. This project underscores the potential of ML and IoT in transforming engine fault diagnosis, offering a scalable, efficient, and reliable solution for modern industrial and automotive applications. The findings contribute to the advancement of predictive maintenance strategies, fostering greater operational reliability and safety in engine management systems.

Keywords: Machine learning, Thermodynamics, IOT

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-104

Detection and Classification of Bronchogenic Carcinoma by Using Neural Network

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ABSTRACT

In our project, we developed a novel modular neural network for accurate detection of lung cancer in humans. In this paper we have taken the MRI reports of the patients and then we have analyzed the MRI images with the use of image processing techniques and Neural networks to check whether the patient has been affected by Bronchogenic Carcinoma or not. In order to improvise the MRI images for analysis we are using grayscale function for making the images fit for the analysis of Bronchogenic Carcinoma. We have implemented the neural fuzzy classification algorithm in order to find the contrast and energy of the image which is the key factor in determining the Bronchogenic Carcinoma. To calculate the entropy of the image we have made use of the Feature Extraction Algorithm. By obtaining the values of the Entropy, Contrast and Energy we can find whether the patient is affected by Bronchogenic Carcinoma or not.

Keywords: Bronchogenic Carcinoma, Neural network, Grayscale, Neural fuzzy classification

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-105

Design a Real – Time Product of Self Indicating Smart Bin with Auto Garbage Collecting System

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ABSTRACT

In last few years there is a rapid growth in urban development plans, the concept of smart cities. While the thought comes up for Smart cities there is a requirement for Smart waste management. The idea of smart bin with auto garbage robot is for the Smart buildings, Colleges, Hospitals and Bus stands. The Self indicating smart bin is an improvement of normal dustbin by elevating it to be smart using sensors such as ultrasonic sensors for garbage level detection, IR sensors for human detection and GSM for sending message to the concern department person updating the status of the bin using GSM module and sends the location through GPS. Our Proposed title is real-time self indicating smart bin with auto garbage collecting robot using Microcontroller Embedded C and Arduino IDE software.

Key words: Ultrasonic sensor, Liquid Crystal Display, Arduino board, Global System for Mobile Communication (GSM), Global Positioning System (GPS)

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-106

Automated Shopping with Raspberry PI PICO: A Socially Distanced Approach Through Embedded Technology and IOT connectivity

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ABSTRACT

In modern shopping malls, customers enjoy a wide array of products and conveniences like discounts and home delivery. However, long queues during checkout on busy days often lead to dissatisfaction and wasted time. To enhance customer satisfaction, we propose implementing a Smart Trolley System. This system uses RFID technology embedded in trolleys to automatically scan and display product details and prices on an LCD screen as items are placed inside. This real-time tracking ensures transparency and accuracy in purchases. By automating checkout, the Smart Trolley System reduces waiting times at billing counters, improving operational efficiency and customer flow. This saves time for shoppers and enhances their overall experience by simplifying the shopping process. Additionally, it supports social distancing efforts by minimizing crowding at checkout lanes, adhering to health and safety guidelines. In conclusion, integrating RFID technology into shopping trolleys represents a significant advancement for modern retail environments. It addresses issues like long queues and enhances customer satisfaction, preparing malls to meet evolving consumer expectations in a digital age.

KeyWords: RFID, Smart trolley

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-107

MI Model Analyzing Maize Varieties and Soil Treatments Using IOT Sensor Data and Physical Measurements

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ABSTRACT

The integration of Machine Learning (ML) and Internet of Things (IoT) technologies has opened new frontiers in precision agriculture, particularly in optimizing maize cultivation through data-driven insights. Therefore, this project explores the development and application of an ML-based system to analyze the impact of different maize varieties and soil treatments using data collected from IoT sensors and physical measurements. These sensors monitor various parameters such as soil moisture, temperature, and nutrient levels, providing a comprehensive dataset for analysis. Traditional agricultural methods, including field trials and manual data collection, are often time-consuming, labor-intensive, and limited in scope and precision. By leveraging ML algorithms, this project aims to overcome these limitations, providing a scalable, accurate, and real-time solution for maize cultivation. The proposed system enables real-time monitoring and predictive analytics, allowing for proactive decision-making and resource optimization. This approach not only enhances maize yield and quality but also promotes sustainable farming practices by optimizing the use of water, fertilizers, and other inputs. Therefore, this project underscores the transformative potential of ML and IoT in agriculture, offering a robust framework for improving crop management and fostering sustainable agricultural practices.

Keywords: Internet of Things (IOT), Machine Learning, Data Analytics.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-108

Automated Diagnosis of Eye Disease from Retinal Images Using Machine Learning

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ABSTRACT

The automation of eye disease diagnosis through machine learning (ML) techniques has emerged as a transformative approach in ophthalmology, addressing the critical need for early detection and timely intervention to prevent vision loss. Therefore, this project focuses on developing an ML-based system to diagnose eye diseases, such as diabetic retinopathy, glaucoma, and age-related macular degeneration (AMD), from retinal images. The system employs ML algorithms to detect pathological changes in retinal images, providing real-time analysis and facilitating immediate clinical decisions. By processing large volumes of data efficiently, the ML-based approach ensures widespread screening and early detection of eye diseases, enhancing patient outcomes and reducing the burden on healthcare systems. Through rigorous testing and validation, the proposed system demonstrated superior diagnostic performance, accurately identifying various eye diseases and their severity levels. The implementation of this automated diagnostic tool not only increases the accessibility of eye care but also promotes cost-effective and scalable solutions for early disease detection. This project underscores the significance of integrating ML in ophthalmology, paving the way for advanced, data-driven approaches to improve eye health and prevent blindness on a global scale.

Keywords: Retinal Images, AMD (Age-related Macular Degeneration)

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-109

Enhancing Elderly Care: Gas Sensor Based Home Activity Monitoring System Using Artificial Intelligence

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ABSTRACT

The increasing elderly population requires innovative solutions to improve their care and safety. Traditional elderly care methods, such as manual checks and basic surveillance systems, often intrude on privacy and offer limited monitoring capabilities. A modern approach involves developing a home monitoring system that uses gas sensors and artificial intelligence (AI). Gas sensors can detect hazardous gases like carbon monoxide, methane, and smoke. When integrated with AI, these sensors can continuously monitor the home environment and analyze activity patterns. The AI system identifies anomalies and potential hazards, such as gas leaks or fires, and alerts caregivers or emergency services for immediate intervention. This ensures timely response to prevent accidents. The system is designed to be discreet and user-friendly, maintaining the privacy and independence of elderly individuals while providing continuous monitoring. The AI's predictive analytics can also identify potential health issues by observing changes in activity patterns. Overall, combining AI with sensor technology offers a scalable, efficient, and proactive solution to enhance the safety and quality of life for elderly individuals.

Keywords: Elderly Care, Home Monitoring, Realtime Monitoring, Predictive Analysis

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-110

Indoor Localization of Data Analytics: Integrating wi-fi And Inertial Sensor Data from Smartwatches and smartphones

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ABSTRACT

Indoor Localization Technology Has Become Essential in various applications, such as healthcare, security, retail, and augmented reality, due to the limitations of GPS in indoor environments. The proposed system addresses the need for improved accuracy, reliability, seamless integration, and real-time performance in indoor localization. By combining Wi-Fi signal strength data with inertial sensor readings (accelerometers and gyroscopes), the system mitigates the limitations of each standalone technology. This fusion approach enhances positional accuracy, reduces signal interference impacts, and minimizes sensor noise. Traditional methods, such as RFID and BLE beacons, are limited by high setup costs, maintenance requirements, short range, and susceptibility to interference. Standalone inertial navigation systems suffer from positional drift over time. In contrast, the proposed integrated system offers a cost-effective solution using existing Wi-Fi infrastructure and widely available consumer devices, making it scalable and adaptable to various indoor environments. It can be used for real-time tracking in many different areas like navigation, healthcare and managing assets. This project highlights the transformative potential of integrating Wi-Fi and inertial sensor data, providing a scalable, accurate, and reliable indoor localization.

Keywords: RFID, BLE Beacons, Scalable, Robustness.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-111

Predictive Maintenance in Packing Machinery: Machine Learning Approach for Alaram Sequence Prediction from IOT Data

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ABSTRACT

Predictive maintenance is revolutionizing the management of packing machinery, a crucial component in industries such as food and beverage, pharmaceuticals, and consumer goods. Traditional maintenance strategies, including reactive and scheduled maintenance, often result in unexpected downtime or unnecessary repairs, impacting production efficiency and increasing costs. Therefore, this project focuses on leveraging machine learning (ML) and Internet of Things (IoT) data to develop a predictive maintenance system that anticipates equipment failures and optimizes maintenance activities. The proposed system integrates ML algorithms with real-time IoT data from packing machinery to predict alarm sequences and potential failures. By analyzing historical and live sensor data, the system identifies patterns and anomalies indicative of imminent issues, enabling timely and targeted maintenance interventions. This approach aims to minimize unplanned downtime, reduce maintenance costs, and enhance the overall reliability and efficiency of packing machinery. Through rigorous testing and validation, the system demonstrated significant improvements in failure prediction accuracy and maintenance scheduling. By transitioning from reactive and scheduled maintenance to a data predictive model, the system ensures maintenance activities.

Keywords: Alaram Sequence, Schedule Maintenance, Unplanned downtime

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-112

Machine Learning Approaches for Discriminating Metal Cylinders and Cylindrical Rocks Using Solar Signal

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ABSTRACT

Accurate classification of cylindrical objects, such as metal cylinders and cylindrical rocks, is crucial in applications like material sorting, mining, and environmental monitoring. Traditional methods, including visual inspection and physical measurements, are often limited in precision and efficiency. Therefore this project aims to leverage machine learning (ML) techniques to enhance the discrimination of these objects using solar signal data, which provides insights into the interaction of light with materials. The project focuses on developing an ML-based system that analyzes solar signals reflected from cylindrical objects to differentiate between metal and rock. By utilizing advanced ML algorithms, the system processes complex signal data to accurately classify objects. This approach addresses the limitations of traditional methods by offering improved classification accuracy, efficiency, and automation. Through rigorous data collection and model training, the ML system demonstrated significant improvements in distinguishing between metal cylinders and cylindrical rocks. The system processes solar signal data rapidly, enabling real-time classification and reducing the reliance on manual inspection. This innovation not only enhances the precision of material classification but also streamlines processes in various industrial and environmental contexts

Keywords: Machine learning, classification, regression, feature extraction.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-113

Analysis of Ionospheric Radar Returns using Machine Learning for Structure Detection in Aerospace Surveillance Systems

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ABSTRACT

The detection and characterization of structures in aerospace surveillance systems using ionospheric radar returns present significant challenges due to the complex interactions between radar signals and the ionosphere. These interactions, including refraction, reflection, and scattering, can distort radar signals, complicating object detection and tracking. Traditional signal processing techniques often struggle with these distortions, leading to inaccuracies in surveillance data. Therefore this project aims to enhance structure detection in aerospace surveillance by employing advanced machine learning (ML) techniques to analyze ionospheric radar returns. The proposed system leverages ML algorithms, to process and interpret complex radar data. By training these models on extensive datasets of ionospheric radar returns, the system learns to identify and mitigate the effects of ionospheric distortions, significantly improving the accuracy and reliability of structure detection. The ML models are designed to handle the variability and noise inherent in radar signals, enabling real-time processing and robust object detection. Through rigorous testing and validation, the ML-based system demonstrated enhanced performance in detecting and characterizing aerospace structures, outperforming traditional signal processing methods.

Keywords: Machine learning, classification, regression, feature extraction.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-114

Detection and Quality of Dragon Fruit

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ABSTRACT

A huge population of India is dependent on agriculture as their primary source of livelihood. The financial growth of India depends on the GDP (gross domestic product) rate of the agricultural commodities. Since dragon fruit is in high demand both domestically and globally, dragon fruit plantations are economical for small scale to large scale growers and businesses. There is a heavy focus on each stage of the fruit's development because prolonged or premature harvesting of the fruit can result in food decay and can also impact the India's economic growth. Farmers are still making use of manual methods of grading fruit maturity and identifying disease ridden crops, which can result in poor grading due to weariness and misjudgement. The article proposes the use of region-based algorithm for detection and classification of common dragon fruit diseases and detection of dragon fruit maturity. There are three key steps to this process of detection and classification. The first step includes identification of several regions of interest, which are the bounding box candidates using selective search. The last step performs grouping of support vector machine (SVM) that tries to classify the regions for the classification of different dragon fruit diseases and detecting its maturity.

Keywords: Region-based Convolutional Neural Network. Image Processing. Image Classification. Agriculture. Fruit Diseases.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-115

Accurate Hand Gesture Recognition System for Indian Human Computer Interaction Modified SVM and Hybrid Ensemble Classifier Integration

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ABSTRACT

In order to receive information people repeat same mouse and keyboard actions, inducing waste of time and inconvenience. To improve these situations we have proposed a system in which user can interact with system by using hand gesture. Communication through gestures has been used since early ages not only by physically challenged persons but nowadays for many other applications. As most predominantly hand is use to perform gestures, Hand Gesture Recognition (HGR) methods have gained tremendous interest in the past few years. we propose a new HGR system using PCA as the feature descriptor. The initial stage of classification is performed by the proposed modified Support Vector Machine (SVM) classifier. In the second stage a classifier fusion model called as hybrid ensemble classifier obtained by combining K-Nearest Neighbour (KNN) and the modified SVM classifier is used. The experimental results show that the proposed hybrid ensemble and the modified SVM classifier provides better results compared to the individual classifiers.

Keywords: Speeded Up Robust Feature(SURF), Bag-of-Features(BOF), K-Nearest Neighbour(KNN), Modified SVM Classifier, Hybrid Ensemble Classifier

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-116

Machine Learning for Classification of Physical Therapy Exercises from Intertial and Magnetic Sensor Data

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ABSTRACT

Accurate classification of physical therapy exercises is critical for effective rehabilitation and recovery from injuries and chronic conditions. Traditional methods, relying on visual observation and patient feedback, are subjective and prone to error. this project leverages machine learning (ML) to develop an automated system for classifying physical Therefore therapy exercises using inertial and magnetic sensor data. These sensors, embedded in wearable devices, capture detailed motion data, including acceleration, angular velocity, and magnetic field strength, providing a comprehensive view of exercise performance. The proposed system employs advanced ML algorithms to analyze the complex sensor data, distinguishing between various physical therapy exercises and identifying correct versus incorrect execution. By training ML models on extensive datasets, the system learns to accurately classify exercises, providing real-time monitoring and feedback. This approach addresses the limitations of traditional methods by offering objective, consistent, and accurate assessments of exercise performance.

Keywords: Orthopedics, Physical medicine and rehabilitation, Healthcare

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-117

Fault Detection and Classification in Photovoltaic System Using High-Frequency Data with MI Model

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ABSTRACT

Effective fault detection and classification in photovoltaic (PV) systems are crucial for maintaining optimal performance, reducing downtime, and ensuring the longevity of solar installations. Traditional methods, relying on manual inspection or simple statistical techniques, often fall short in accurately identifying and classifying faults. Therefore this project aims to leverage machine learning (ML) techniques to enhance fault detection and classification in PV systems using high-frequency data, such as current and voltage signals. The proposed system utilizes advanced ML models, to analyze high-frequency data from PV systems. By training these models on extensive datasets that include various fault conditions, the system learns to identify complex patterns and anomalies indicative of faults such as shading, hot spots, module mismatch, and inverter issues. This approach enhances the accuracy and reliability of fault detection, enabling real-time monitoring and immediate fault diagnosis. Through rigorous testing and validation, the ML-based system demonstrated superior performance in fault detection and classification compared to traditional methods. It effectively processed high-frequency data, providing real-time alerts and facilitating prompt maintenance actions, thereby minimizing downtime and operational costs. Additionally, the system's ability to learn from new data and adapt to evolving fault conditions ensures continuous improvement in its detection capabilities.

Keywords: Photovoltaic (PV), Machine Learning (ML), Real-time monitoring and diagnosis

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-118

Artificial Intelligence For Authentication And Classification From Voice Signal

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ABSTRACT

Voice authentication and classification are essential in enhancing security and user experience in voice-controlled systems and virtual assistants. Traditional methods, relying on static passwords and basic feature extraction, often fail to address the complexity and variability of voice signals, leading to vulnerabilities and user inconvenience. Therefore this project leverages artificial intelligence (AI) and machine learning (ML) techniques to develop a robust system for voice authentication and classification, addressing these limitations. The proposed system captures voice signals and employs advanced feature extraction methods to derive comprehensive vocal characteristics. Sophisticated ML models, are trained to accurately authenticate and classify users based on their unique voice patterns. Unlike traditional systems, this AI-based approach enables continuous and seamless authentication during natural interactions, enhancing security without interrupting the user experience. Key advantages include improved resistance to spoofing attacks, adaptability to variations in voice signals due to environmental factors or health conditions, and the ability to provide personalized services. Extensive testing demonstrates that the AI models significantly outperform traditional methods in terms of accuracy, reliability, and user convenience.

Keywords: voice authentication, security, Robust system, Artificial Intelligence

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-119

Sensor Guided Surveillance Hospital Robot for Enhanced Security

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ABSTRACT

This paper discusses in detail a proposed IoT Based Medical Assistant Robot(Aida-Bot) that will be designed and implemented for hospital security. By deploying the sensor-Guided surveillance Hospital robot, healthcare facilities can significantly bolster their security infrastructure, mitigate risks, and ensure a safer environment for the patients and staff alike. This innovative robot integrates advanced sensor technologies to autonomously navigate through hospital environment while continuously monitoring its surroundings. These sensors allows or gives when ever there is a gas, fire alarm's and also allows us to keep a continuous monitoring to our mobile. In this project we are going to use a espn-32 camera with allows us to keep an continuously monitoring an detection of objects in a wireless mode. Along with ultra sonic sensors are used for detection of objects.Micro controller like Arduino esp-32 and Arduino IDE software is been used.

Keywords: Temperature sensing, video conferencing, Auto-Matic mode, Gas sensor, Object detector.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-120

Insights Into Daily Activity Recognition from Wrist-Worn Accelerometer Data: A Ml Analysis

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ABSTRACT

This project uses machine learning (ML) to analyze accelerometer data from wrist-worn devices, like smartwatches, for accurate daily activity recognition. The goal is to build ML models that can handle complex and noisy data to classify activities such as walking, running, sitting, and sleeping. By training these models on large, labeled datasets, they learn patterns in movement and improve accuracy over traditional methods like manual logs or simple pedometers. The system provides continuous, real-time activity monitoring and generates personalized insights based on individual activity patterns, supporting fitness, healthcare, and assisted living. It also helps monitor daily activities for the elderly and people with disabilities, promoting safety and well-being.

Keywords: HAR, AR,CNN

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-121

IOT- Military Soldier Security with Boarder Tracking System Using RPI Pico

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ABSTRACT

The Indian army is the land-based branch and it is the largest component of Indian Army. It will be beneficial for our country's safety if we try to provide them better advanced technology equipment. In this project we have explained track the location of the soldier with the help of GPS and IOT and also we will be able to monitor health parameters such as pulse rate and body temperature. The measured parameters will be sent to the control room with the help of GSM module to know the condition of the soldier. The proposed system is implemented using RPI PICO Microcontroller. If the soldier is injured the fluctuations with the temperature, panic, heartbeat and the pulse rate will be measured and will inform the military base station and through GPS we can locate the wounded soldiers. From this information we can strategize the future war plan with the actual number of unharmed soldiers and also we can provide the needed medication for the harmed one with the location provided by the GPS. This consisting of wearable physiological equipment and transmission modules which are mounted inside the jacket for communication between soldier and base station or between soldier and soldier. Hence, it is possible to implement a low cost mechanism to protect the valuable human life on the battlefield. Proposed system implemented using Arduino Microcontroller and Arduino IDE with Embedded C programming Language.

Keywords: Real-time Health Monitoring, RPI Pico Microcontroller, IoT Soldier Safety

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-126

Climate Conscious Travel: Monitoring of Vehicles CO_2 Emission using IoT

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ABSTRACT

The increasing number of commercial vehicles on the roads has led to a significant increase in Exhaust CO2 emissions, which contribute to air pollution and environment degradation. The proposed IoT-based automatic exhaust gas emission monitoring system offers a solution to this problem by providing a cost-effective, efficient and accurate way of monitoring the emissions of commercial vehicles system with resident using Arduino which is responsible for receiving and sending the data of the overall data. It communicates with IOT to collect the data from the Arduino on the emission levels of the commercial vehicle. The data is transmitted to the central server, along with the emission data, through an IoT. This allows for real-time monitoring and analysis of the emission data, providing a more accurate and reliable way of accessing the impact of commercial vehicles on the environment. The system is capable of measuring various gases like carbon dioxide (CO2), the system provides an eagerly warning system, altering the driver when the emission levels exceed the permissible limit. The driver can take appropriate action, such as reducing the speed or stopping the vehicle.

Keywords: Vehicle CO2 Emissions, IoT, Embedded System, Real-Time Monitoring, Environmental impact

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ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-127

Enhancing Activity Monitoring in Smart Homes with IOT Enabled Sensor Networks

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ABSTRACT

The advent of smart home technology has revolutionized the way we interact with our living environments, making everyday tasks more convenient, energy-efficient, and secure. Central to this innovation is the role of IoT sensor networks in monitoring resident activities, enhancing safety, and improving overall well-being. However, current activity monitoring systems face significant challenges, including sensor accuracy, data processing efficiency, energy consumption, and privacy concerns. Traditional systems, reliant on basic sensors and limited integration, fall short in providing comprehensive and real-time analysis, resulting in inefficiencies and scalability issues. Therefore, this project aims to enhance activity monitoring in smart homes through the integration of advanced IoT sensor networks. By addressing the limitations of traditional systems, the proposed solution seeks to provide accurate, reliable, and real-time monitoring capabilities. Enhanced sensor integration and data analytics will enable the detection of unusual activities, optimizing energy use, and supporting health monitoring, particularly for the elderly and disabled. Furthermore, the project emphasizes the importance of maintaining privacy and ensuring low energy consumption, thereby creating a sustainable and user-friendly system. The significance of this project lies in its potential to improve residents' quality of life, offering a safer, healthier, and more convenient living environment. Advanced activity monitoring will not only lead to smarter home automation but also drive innovation in IoT technologies and sensor networks. As the demand for smart home solutions grows, the proposed system will position itself at the forefront of market trends, delivering a competitive edge through superior performance and user-centric design.

Keywords: Smart Home, Activity Monitoring, IOT

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-128

Next-Gen Agri-Harvest Technology: Raspberry Pi Pico Based System for Grain Humidity Monitoring and Dryer Automation

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ABSTRACT

This project presents an innovative solution for grain drying through the development of Raspberry Pi Pico based Agri-Harvester. Traditional grain drying methods are often labor-intensive and lack precision, leading to suboptimal results. The proposed system leverages Raspberry Pi Pico technology, keypad for setting humidity, switch for manual operation and to automate and optimize the drying process, ensuring efficient and consistent grain drying. The system incorporates humidity control mechanisms to regulate the drying environment, enhancing the quality of the harvested grains. Sensor monitors and maintain the desired humidity levels inside the harvester, preventing over drying or under-drying of the grains. The Raspberry Pi Pico enables real-time adjustments, ensuring adaptability to varying environmental conditions. Key components of the system include humidity sensor, keypad, switch, and Raspberry Pi Pico, working in tandem to achieve precise humidity. The user-friendly interface allows farmers to set specific drying parameters, providing a customized and automated solution. Additionally, the system is designed to be energy-efficient, minimizing resource consumption during the drying process. The Raspberry Pi Pico based Agri-Harvester offers a reliable, cost-effective, and sustainable solution for grain drying, catering to the evolving needs of modern agricultural practices. By optimizing the drying process, this innovation contributes to improved grain quality, reduced post-harvest losses, and increased overall efficiency in the agricultural sector.

Keywords: Raspberry Pi Pico, Humidity Sensor, Dryer, Keypad

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-129

Machine Learning Driven Anomaly Detection for IOT Edge Devices: Insights From ADMM-Based Frequency Management

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ABSTRACT

Internet of Things (IoT) edge devices. With the rapid growth of IoT devices, traditional centralized anomaly detection methods are struggling to handle the massive data generated, facing issues with scalability, latency, and diversity of data. To solve this, our ML framework uses the Alternating Direction Method of Multipliers (ADMM) for efficient frequency and resource management, enabling each device to process data locally. By distributing the computation across devices, the system reduces the strain on central servers and allows for faster, more efficient anomaly detection directly at the edge. This approach not only improves security and reliability by catching anomalies in real-time but also optimizes energy use and device performance, making it scalable and sustainable for future IoT applications. Overall, this solution aims to enhance the security, efficiency, and robustness of IoT systems by empowering edge devices to independently monitor and manage system integrity.

Keywords: IOT, ML, Edge devices, ADMM, Anomaly detection, Efficiency.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-130

Enhanced Single Image Dehazing Integrity Improved Bright and Dark Channel Prior for Indian Environmental Conditions

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ABSTRACT

Remote sensing images (RSIs) taken in hazy conditions, such as haze, fog, thin could, snow, silt, dust, off gas, etc., suffer from sever color and contrast degradations. Dehazing algorithm is therefore highly demanded to restore hazed RSIs from their degradations. In the literatures, most dehazing algorithms were originally designed for natural images dehazing (NID). For our analysis, the physical model of NID is different from that of RSI dehazing (RSID), which was not clearly addressed yet. In this paper, a new concept of "virtual depth" concerning physical model of RSI is firstly raised. Virtual depth is different from real depth of nature image in that the former gives the distance of an object departing from the fore ground, while the later measures the coverings of the earth's surface, such as snow, dust, cloud and haze/fog. These coverings act as the hazes in a natural image, providing the hint of foreground and background. Secondly, an Iterative Dehazing for Remote Sensing image (IDeRS) is proposed, in which dehazing operator is implement meditatively to remove haze progressively until arriving at a satisfied result. In IDeRS, we also raise a fusion model for combining patch-wise and pixel-wise dehazing operators to overcome both halos and over-saturation caused by them respectively.

Keywords: RSI, IDeRS, DCP, Dehazing algorithms

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-131

Lifi Based System for Reliable Data and Audio Transmission

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ABSTRACT

The main aim of our project is to develop improvements in the modern communication. We have tried to demonstrate the latest technology for data transmission Li-Fi. The radio waves are just one part of the spectrum that can carry our data Li-Fi is one of the wireless technologies which uses visible light for communication. Instead of Wi-Fi modems, Li-Fi would use the transceiver as fitted LED lamps This presents a way for serial and parallel communication of data through Li-Fi by using the number of LEDs and photo transistor along with the Arduino Uno.

Keywords: Wi-Fi, visible light communications, LEDs

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-132

Interpretable And Intervenable Machine Learning Models for Pediatric Appendicitis.

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ABSTRACT

Pediatric appendicitis, a prevalent yet potentially severe condition, necessitates prompt and accurate diagnosis to avoid complications like perforation and peritonitis. Traditional diagnostic methods, including clinical evaluations, laboratory tests, and imaging, often involve subjective assessments and can vary significantly among practitioners. Also traditional diagnostic systems suffer from subjectivity, delays, high costs, and limited interpretability, which can hinder timely and effective treatment decisions. By leveraging ML, this project seeks to enhance diagnostic accuracy, reduce variability, and support timely interventions. Therefore this project aims to develop interpretable and intervenable machine learning (ML) models for diagnosing pediatric appendicitis, that specifically utilizing Multi-Layer Perceptron (MLP).The proposed system will analyse clinical, laboratory, and imaging data to identify patterns indicative of appendicitis, offering clear explanations for their predictions. The significance of this project lies in its potential to revolutionize the diagnosis of pediatric appendicitis, providing reliable, consistent, and timely assessments that lead to better patient outcomes. By bridging the gap between advanced ML techniques and practical clinical applications, this project aims to improve healthcare delivery and enhance the diagnostic process for pediatric appendicitis.

Keywords*:* Pediatric Appendicitis, Diagnostic Accuracy, MLP, Interpretability.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-133

Predicting Wine Quality: Exploring Chemical Properties for Machine Learning Modeling and Parameter Fine Tuning

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ABSTRACT

Wine quality is a multifaceted attribute influenced by various chemical properties, such as acidity, sugar content, and alcohol levels. Traditionally, wine quality assessment has relied on expert tasters, a method that is subjective, time-consuming, and inconsistent. Traditional wine quality assessment methods have several limitations, including subjectivity, variability, and scalability issues. Therefore, this project aims to leverage machine learning (ML) techniques to predict wine quality based on its chemical properties, providing an objective, efficient, and scalable solution for the wine industry. The project addresses key challenges in ML modelling, including feature selection, handling multicollinearity, and parameter finetuning. By utilizing large and diverse datasets, the project seeks to develop robust ML models capable of generalizing across different types and vintages of wine. The proposed models aim to balance complexity and interpretability, making them practical for use by winemakers and quality control teams.ML-driven models offer significant advantages.

Keywords*:* Multicollinearity, Quality Control, Wine Industry, Feature Selection, ML Models.

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ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-134

Advanced Predictive Maintenance Framework for Mechanical Equipment: Comparative Analysis of Machine Learning Algorithms in Industrial Context

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ABSTRACT

Predictive maintenance has emerged as a transformative approach in industrial maintenance, leveraging advanced technologies to forecast equipment failures and optimize maintenance strategies. Traditional maintenance practices, including scheduled and reactive maintenance, often lead to inefficiencies, such as excessive downtime and higher operational costs. This project presents an advanced predictive maintenance framework that integrates machine learning (ML) algorithms to enhance the accuracy and reliability of failure predictions for mechanical equipment in an industrial context. Therefore, this proposed framework addresses the limitations of conventional maintenance strategies by utilizing large volumes of sensor data and complex ML models to predict potential equipment failures with greater precision. The significance of this project lies in its ability to offer a proactive maintenance strategy that reduces the need for unnecessary maintenance activities, minimizes unplanned downtime, and lowers overall maintenance costs. By implementing this advanced framework, industries can achieve improved equipment reliability, operational efficiency, and cost savings.

Keywords: Predictive Maintenance, Machine Learning, Equipment Failure Prediction

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-135

Drone Fault detection From Sound Data using Machine learning models: A multi task learning Approach

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ABSTRACT

The increasing reliance on drones for applications such as surveillance, agriculture, and infrastructure inspection underscore the need for reliable fault detection systems to ensure operational safety and efficiency. Traditional methods, including manual inspections and threshold-based monitoring, often fall short in detecting subtle or complex faults, particularly those manifesting as changes in sound. Therefore, this project proposes a novel approach to drone fault detection by leveraging sound data analyzed through machine learning (ML) models, employing a multitask learning framework to simultaneously address multiple fault types and operational conditions. The core of this approach lies in utilizing advanced ML techniques to interpret complex sound patterns emitted by drones. By analyzing these patterns, the system aims to identify potential faults with high accuracy and minimal false alarms. The multitask learning model is designed to handle various related tasks, improving the system's ability to generalize across different fault types and operational scenarios. This project addresses the limitations of traditional systems by providing a more sophisticated, real-time fault detection solution. The proposed method enhances detection accuracy,supports real-time monitoring, and improves overall reliability and scalability. The ability to simultaneously learn and adapt to multiple fault conditions makes the system robust and versatile, catering to the diverse needs of modern drone operations. Ultimately,this advanced fault detection framework aims to enhance the safety, efficiency, and performance of drone applications, offering a significant improvement over existing methods.

Keywords: Fault detection, Anomaly detection, Machine learning

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-136

Robust Driver Fatigue Detection Algorithm from Video Stream for Road Safety Enhancement

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ABSTRACT

Fatigue among drivers is a major cause of road accidents every year in India. Lack of sound sleep for six to eight hours is one of the primary reasons behind this fatigue. Drivers with sleep deprivation can imbalance the reaction time and decision making when behind the wheels and this can increase the cause of accidents. This type of accidents is more likely to result in death or severe injury as they tend to be in high speed and because of the fact that driver has fallen asleep cannot apply brake or skew to avoid or reduce the impact. Therefore, it is highly essential to create a smart system which can spot and alert the driver of his/her condition. Although there are few solutions proposed in this direction, most of them have not been implemented successfully and many of them only remain in theory. In this research paper, we propose an efficient driver fatigue detection and alert system using mainly open-source technologies. We implement and test this system in real time and the results are highly encouraging compared to many existing systems.

Keywords*:* Road Accidents, Fatigue-Induced Accidents, Sleep Deprivation, Driver Fatigue Detection, Driver Alert System, Real-Time Implementation, Driver Safety.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-137

IOT Driven Voice Guided Assistance System for the Visually Impaired with Real Time Location

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ABSTRACT

The advent of the Internet of Things (IOT) has enabled significant advancements in assistive technologies particularly for visually impaired individuals. This project presents the design and implementation of an IOT driven voice-guided assistance system that provides real time location. The system integrates various IOT devices, including GPS modules, sensors and smart devices, to create a comprehensive assistance network. The assistance system for visually impaired people has been implemented by using ultrasonic principle to provide navigation. The presented system functions in 4 modes of operation that are obstacle recognition mode, fall detection mode, depth detection mode, water detection mode using IOT based technology. This project is implemented by using microcontroller arduino and computer languages embedded c and arduino ide software for better effiency of signal. This project is implemented using embedded design.

Keywords: Iot servers, Ardunio, Sensors

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-138

MI Model for Food Adulteration Analysis

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ABSTRACT

Food Adulteration analysis heavily relies on Several analytical methods such as chromatography, sensors are used to detect the quality of foodstuff.To ensure consumer protection against fraudulent activities, authentication of food and the detection of adulterants in various food items should be taken into consideration. The detection of food adulterants is still a challenge, especially when aiming for quantitative precision through chemical reactions. The primary challenge addressed by this project is the complexity and variability in food matrices and the presence of multiple potential adulterants, which traditional methods struggle to handle efficiently. The proposed ML model will process large datasets rapidly, offering real-time monitoring and detection capabilities that surpass the speed and scalability of conventional techniques.

Keywords: Spectroscopy, Chromotography.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-139

Efficient Citrus Leaf Disease Detection: Hierarchal Support Vector Machine Approach for Indian Agriculture

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ABSTRACT

In Agriculture, an effective framework is proposed to classify four types of citrus leaf diseases out of healthy leaves through leaf features inspection. Four considered citrus leaf. Our framework consists of three main stages of pre-processing, feature extraction and classification. Since image analysis of citrus leaf disease is based on texture, color and shape features through leaf region, the region of main leaf is first segmented from the complex background in the pre-processing stage. Then leaf features are extracted in different color spaces and prominent ones are chosen based on feature distribution analysis.In second phase the disease present in the leaf is classified, this process includes different types methods-based segmentation of defected area, feature extraction of defected portion and the SVM based classification of disease. Then the disease grading is done on the basis of the amount of disease present in the leaf. the experiments shown that our proposed algorithm is effective by using mat lab.

Keywords: GLCM, Hierarchical l SVM, Threshold region growing method.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-140

IOT Powered Driver Security: Elevating Protection for Vehicle

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ABSTRACT

This project proposes an IoT-based system to enhance driver and vehicle safety through real-time monitoring of driver behavior and vehicle status. Using a combination of sensors—such as IR for drowsiness detection, an alcohol sensor, a GPS module, and a vibration sensor—connected to an Arduino microcontroller and Raspberry Pi Pico, the system monitors factors like speed, location, and driver alertness. Alerts are sent to a centralized IoT platform for analysis, triggering emergency notifications via GSM and GPS tracking in case of accidents or risky behaviors. Additional features, such as a buzzer to warn drivers of drowsiness or intoxication, provide proactive alerts to prevent accidents, while GPS tracking allows real-time monitoring and vehicle security. By leveraging embedded C programming and a regulated 5V power supply, this compact, cost-effective IoT prototype offers a smart solution for vehicle safety, addressing modern-day road challenges with real-time responsiveness.

Keywords: IoT, Raspberry Pi PICO, Ultrasonic sensor, Eye blink sensor**,** Vibration sensor, GSM, GPS

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-141

Proactive Safety Management in Indian Construction Sites: Predictive Modelling of Safety Risk Levels Using Machine Learning

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ABSTRACT

The construction industry in India, characterized by its rapid growth and complex safety challenges, demands a shift from reactive to proactive safety management strategies. The traditional safety management, which often relies on manual risk assessments and generalized safety protocols that may not effectively address site-specific risks. Additionally, it often addresses safety issues only after incidents occur, leading to delayed responses and increased risks. Therefore, this project introduces a proactive safety management system utilizing predictive modeling of safety risk levels through machine learning (ML) techniques to enhance safety outcomes on construction sites. The proposed system leverages historical and real-time data to develop predictive models that accurately assess safety risks. By integrating advanced ML algorithms, the system identifies potential hazards before they manifest, enabling timely interventions and preventive measures. The significance of this project lies in its potential to transform safety management practices in the Indian construction industry. By providing enhanced risk prediction capabilities, the system allows for early intervention, tailored safety measures, and data-driven insights into safety trends and risk factors. These advancements not only improve overall safety management but also reduce the likelihood of accidents and enhance worker protection. Ultimately, the proposed predictive modeling approach offers a sophisticated solution to address the unique safety challenges faced by construction sites in India, promoting a safer work environment and supporting the industry's growth and development.

Keywords: Management, proactive

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-142

Impact Of Network Topology on Process Management in IOT Operating System: Multi Hop Vs. Single-Hop Analysis

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ABSTRACT

This project explores the impact of network topology on the efficiency and performance of IoT operating systems, focusing on single-hop and multi-hop configurations. Single-hop networks allow direct communication between devices and a central hub, offering simplicity but limited range and scalability. In contrast, multi-hop networks relay data through intermediate nodes, extending coverage but introducing complexity, latency, and higher energy consumption. The analysis compares these topologies across key factors such as data transmission efficiency, latency, energy consumption, and system performance. While single-hop networks provide straightforward communication, they may struggle with scalability, whereas multi-hop networks offer greater range but at the cost of increased complexity and resource usage. The findings aim to guide IoT network design, helping stakeholders balance performance, energy efficiency, and scalability to meet specific application needs.

Keywords: Network Topology, IoT, Single-Hop, Multi-Hop

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-143

Impact of Machine Learning based Differential Diagnosis of Erythemato-Squamous Diseases and Features

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ABSTRACT

Erythemato-squamous diseases, characterized by erythema and scaling, present significant diagnostic challenges due to their overlapping clinical features and variability in patient presentations. Traditional diagnostic methods, relying on clinical examination and histopathological analysis, often involve subjective assessments and can be time-consuming. Therefore, this is project proposes the development of a machine learning-based differential diagnosis system to improve the accuracy and efficiency of diagnosing erythemato-squamous diseases.The system leverages advanced machine learning algorithms to analyze patient data, including clinical images and histopathological features, identifying subtle patterns that may be overlooked by conventional methods. By automating the diagnostic process, the system aims to provide consistent and accurate differential diagnoses, assisting dermatologists in making more informed decisions. The machine learning model is trained on a comprehensive dataset of dermatological cases, enabling it to handle the complexities and variabilities inherent in erythemato-squamous diseases.

Keywords: Machine Learning, Erythemato-squamous Diseases, Differential Diagnosis, Clinical Images, Histopathological Analysis.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-144

Machine Learning for Alarm Forecasting and Anomaly Detection In Industrial IOT Environments

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ABSTRACT

In industrial Internet of Things (IIoT) environments, efficient monitoring systems are crucial for ensuring smooth operations, minimizing downtime, and maintaining safety. Traditional methods for alarm forecasting and anomaly detection often fall short in handling the vast amounts of real-time data generated by IIoT devices, leading to delayed of potential issues. Traditional methods, including manual monitoring and predefined rule systems, face limitations such as scalability issues, lack of flexibility. In contrast, the ML-based approach offers enhanced detection accuracy, and the ability to adapt to dynamic data patterns, ensuring consistent and reliable monitoring. This project proposes the development and implementation of a machine learning (ML)-based system to enhance alarm forecasting and anomaly detection in IIoT environments. By integrating machine learning into the monitoring framework, the project aims to deliver a robust, scalable, and efficient solution and safety. This innovative approach promises to revolutionize industrial monitoring practices, providing real-time insights and early warnings that facilitate proactive maintenance and optimal performance of IoT systems.

Keywords: Machine Learning (ML), Anomaly detection, Predictive maintenance

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-145

Scalable IOT Solutions for Urban Air Quality Monitoring: MI Approaches for Low Power Wide Area Network Data Analysis

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ABSTRACT

Urban air quality monitoring is crucial for public health, as poor air quality is linked to numerous health problems, including respiratory and cardiovascular diseases. Traditional monitoring systems, relying on a limited number of fixed stations, are costly and offer sparse coverage. Traditional air quality monitoring systems have limitations, including limited spatial coverage, high costs, data latency, and basic analysis methods. In contrast, the proposed IoT solutions offer enhanced coverage, cost-effectiveness, real-time data, and advanced analytical capabilities. By deploying LPWAN-based sensor networks, this project aims to provide comprehensive and dynamic air quality monitoring across urban areas, capturing data from various pollution sources. This project explores scalable IoT solutions for urban air quality monitoring, utilizing LPWAN to collect and transmit vast amounts of data efficiently.The challenge lies in managing and analyzing the massive data generated by these networks. This project leverages advanced machine learning (ML) techniques to analyze the data, identify pollution patterns, and provide actionable insights for urban planning and public health interventions. The ML approaches are designed to address issues related to data accuracy, sensor calibration, network reliability, and real-time data processing.The significance of this project lies in its potential to transform urban air quality monitoring, enabling timely and informed decision-making to mitigate pollution and protect public health. The integration of scalable IoT solutions with ML for data analysis promises to deliver robust, real-time insights, supporting proactive and effective air quality management.

Keywords: IoT, LPWAN, ML, Calibration

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-146

Machine Learning Based Crack Detection on Concrete and Pavement Surfaces

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ABSTRACT

Detecting cracks in concrete and pavement is essential for infrastructure safety and longevity. Traditional methods like manual inspections are labor-intensive, slow, and error-prone, highlighting the need for more efficient detection systems. This project applies machine learning (ML) to automate crack detection, providing a scalable solution that reduces labor, minimizes human error, and ensures broader monitoring. Unlike traditional methods, the ML-based system analyzes high-resolution images and sensor data to accurately identify and classify cracks. Automation enables real-time, continuous monitoring over large areas, offering timely data to guide maintenance decisions. By addressing the limitations of traditional methods, this ML approach enhances safety and infrastructure management, potentially preventing minor cracks from escalating into significant issues. This project aims to revolutionize maintenance practices, improving both the efficiency and cost-effectiveness of crack detection in concrete and pavement surfaces.

Keywords: ML, Infrastructure maintenance, Traditional methods

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-147

Fusion of Thermal and Visible Ear Images for Improved Biometric Identification Using Unsupervised Learning

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ABSTRACT

Biometric identification systems play a critical role in security, access control, and personal identification. Traditional biometric methods such as fingerprint, iris, and facial recognition often face challenges due to varying environmental conditions and susceptibility to spoofing. The human ear, with its unique and stable structure, offers a promising alternative for biometric identification. The primary objective is to develop a biometric identification system that can accurately identify individuals by fusing thermal and visible ear images, thereby overcoming the limitations of single-modality systems. By combining thermal and visible imaging, this project aims to provide complementary information that improves the resilience and accuracy of biometric identification. Unsupervised learning techniques offer advanced capabilities for analyzing large datasets without the need for extensive labeling. The proposed system is designed to perform reliably under various lighting and environmental conditions, making it more robust and difficult to spoof compared to traditional systems. The significance of this project lies in its potential to revolutionize biometric identification by providing a scalable, accurate, and secure solution. Enhanced biometric identification can significantly improve security and reliability in critical applications such as border control, law enforcement, and secure access systems. This innovative approach promises to address the limitations of traditional biometric systems and deliver a robust solution for high-security environments

Keywords: Biometric identification, Thermal and visible ear images, Unsupervised learning

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-201

ML-Driven Palm Print Authentication System for Security Applications

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ABSTRACT

In the contemporary real estate market, accurate prediction of house prices is of paramount importance for buyers, sellers, and real estate agents alike. Traditional methods of price estimation often rely on simplistic models or subjective assessments, leading to inaccuracies and inefficiencies. The conventional approach to house price estimation typically involves manual appraisal by real estate professionals or simplistic regression models based on a limited set of features such as location, size, and age of the property. However, these methods often overlook crucial factors that can significantly influence house prices, such as neighborhood demographics, economic indicators, and recent market trends. Additionally, human biases and subjective judgments can introduce inconsistencies and errors into the valuation process, leading to inaccurate predictions and potential financial losses for buyers and sellers alike. This model will not only enhance the transparency and reliability of house price evaluations but also streamline the decision-making process for buyers, sellers, and real estate professionals. The motivation behind our project stems from the growing demand for reliable and data-driven solutions in the real estate industry. With the proliferation of digital technologies and the availability of vast amounts of housing-related data, there is an unprecedented opportunity to revolutionize the way house prices are predicted and assessed. Aspire to empower stakeholders with accurate and actionable insights, thereby facilitating more informed and efficient transactions in the housing market. Leveraging supervised learning algorithms such as regression and ensemble methods, we will train the model to analyze historical sales data, demographic information, economic indicators, and other relevant features to accurately estimate house prices.

Keywords: MI, Supervised Learning

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-202

Lung Cancer Detection using Convolutional Neural Networks – A Review

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ABSTRACT

Early detection of lung cancer significantly enhances treatment outcomes, yet conventional methods face challenges of accuracy and efficiency. This paper presents an optimized neural network architecture tailored for lung cancer detection. The system incorporates data preprocessing, feature selection, and a lightweight neural network trained on labeled medical imaging datasets. By employing techniques such as dropout regularization and data augmentation, the model achieves robust performance in real-world scenarios. Comparative analysis with state-of-the-art methods shows increased precision and recall. The findings underline the transformative potential of optimized neural networks in reducing diagnostic workloads while maintaining reliability.

Keywords: Neural Network, Lung Cancer

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-203

Sharing user IoT devices in the Cloud

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ABSTRACT

Internet of Things (IoT) is the set of technologies that can interconnect anything, from daily life objects to more sophisticated networked devices. The IoT paradigm is constantly increasing the number of devices owned by end-users. Following the social networks paradigm, IoT-centric social networks would allow sharing of devices between users that would provide useful information captured by sensor devices or giving ways to make remote actions on user devices. This paper proposes an IoT centric social device network based on a Cloud computing model which provides a virtual execution environment thanks to its decentralized nature, high reliability and accessibility from anywhere and at any time. The paper describes an approach that allows easily reusing highly distributed IoT resources by building services on top of them. Applications are built by composing those services and deploying into service platforms distributed and hosted in the Cloud that grants secure access to the data shared by these devices in compliance.

Keywords: Internet of Things, Cloud computing

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-204

Automatic Pet Feeder using Arduino

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ABSTRACT

Automated pet feeder is a product that would replace manual feeding method which can be set at a required feeding amount and feeding time. Innovation of pet feeder is used to overcome forgetful of the pet owner to feed their pet and to avoid extra spending expenses by leaving them at a pet hotel. The objective of this project is to design and develop a mechanism for pet feeder. In this project, Arduino is used as the micro-controller to control the mechanism and to operate the system with a given of set time. Finite element analysis is used to analyze the maximum stress that the designed mechanism can withstand. Furthermore prototype testing on the mechanism with experimental and theoretical was conducted, the result of the analysis is analyzed. The analysis is providing the path to make sure the final concept of the pet feeder is reached.

Keywords: Arduino IDE, Arduino UNO, DS 3231 RTC.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-205

Conservatory Monitoring and Controlling System

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ABSTRACT

The main purpose of coming up with this project is to build an Automatic Green House Monitoring in which GSM module sends the information about Temperature, Humidity, Light intensity, Soil moisture and status of appliances (Fan, Sprays, Artificial Lights and Water pump) that are connected with circuit for controlling Green House effects or Green House parameters (Temperature, Humidity, Light intensity and Water supply for plants).

Keywords: GSM module, Aitomation Sensors

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-206

Live Monitoring of Urban Air quality and Sound levels

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ABSTRACT

Air and sound pollution are a point of concern for any urban dwelling throughout the world. For every urban local body monitoring of air quality and improving is a challenge. The noise pollution coming from various industries and automobiles are needed to be regulated. The project attempted is a console consisting of noise sensor and a gas sensor (MQ2/MQ136). Which is controlled by Arduino UNO microcontroller i.e., connected to an IOT based server such that the sensed values from MQ2 and noise sensor are displayed over the display unit. The statistical obtained on day-to-day basis with air quality and noise levels from for a model of acceptance levels in a specific region. This gives us limits on when to initiate the buzzer. This allows authorities to monitor air pollution in different areas and take action against it. Also, authorities can keep a watch on the noise pollution near schools, hospitals and no honking areas, and if system detects air quality and noise issues it alerts authorities so they can take measures to control the issue.

Keywords: MQ2, IOT

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-207

Circuits and Architectures for Next-generation Attentive & Intelligent Systems

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ABSTRACT

Ultra-low power attentive systems with always-on operation and signal monitoring with a disproportionately higher peak performance are now being in high demand, due to the convergence of AI and IoT. In this talk, circuits and architectures to enable exceptionally low power consumption in the common case while achieving high peak performance are discussed for next-generation intelligent systems. Several silicon demonstrations are presented for accelerators, processors and SRAMs with enhanced peak performance above traditionally allowed at nominal voltage, yet at reduced minimum energy. Energy-quality scaling is explored as additional dimension to break the conventional performance-energy tradeoff in error-resilient applications such as AI and vision, from networks on chip to memories and accelerators. Further performance and energy improvements are discussed through uncommonly flexible in-memory broad-purpose computing frameworks for true data locality, from buffering to signal conditioning and neural net workloads. Finally, challenges and opportunities for the decade ahead are discussed to enable next-generation attentive & intelligent systems with divergently high peak performance, common-case performance and low minimum power.

Keywords: AI – Artificial Intelligence, IoT – Internet of Things, SRAM – Static Random Access Memory.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-208

An Asymmetrical Psi-Shaped Multiband Antenna for Wireless Applications

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ABSTRACT

In this article, a low-profile multiband asymmetrical psi-shaped antenna for different wireless applications is presented and analyzed. This multiband antenna consists of an asymmetrical psi-shaped radiator considered on a single layer FR4 substrate with compact dimensions. The better impedance matching characteristics between the radiating element and the signal source are obtained by employing a slotted structure. The designed antenna operates at six different frequency bands of 1.8−2.03 GHz [GSM1800, personal communication systems (PCS)], 4.64−5.35 GHz [wireless local area network (WLAN)], 6.05−6.95 GHz (C-band), 7.92−8.59 GHz (military), 9.55-11.14 GHz [fixed satellite service (FSS)], and 11.57-12.29 GHz (DBS) while the S_{11} value is lower than -10 dB. The Ansoft HFSS 21 electromagnetic simulator is employed to optimize the antenna dimensions and study the antenna functionality at the six different frequency bands. The designed antenna exhibits higher gain at six frequency bands. The developed multiband antenna is prototyped, and test results are generated to validate its performance. The simulation results authenticate acceptable agreement with the measurement results. This antenna is a good choice for GSM1800, PCS, WLAN, C-band, FSS, and military defense applications.

Keywords: C-band, FSS, HFSS, impedance matching and return loss.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-209

Enhanced Dual Strategy-Based VLSI Architecture for Computing Pseudo Inverse of Channel Matrix in A MIMO Wireless System

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ABSTRACT

Multiple input multiple output (MIMO) wireless technology involves highly complex signal processing which is directly related to increased power and area consumption in VLSI architecture. This paper proposes an enhanced dual strategy based VLSI architecture developed for computing the pseudo inverse of augmented channel matrix used in MIMO systems. The architecture concurrently addresses algorithmic optimization of number of multipliers while at the same time allowing for intelligent selective clock gating to disable the clock to those portions of the architecture that remain inactive during period of computation. Results indicate overall 36% power and 31% area reduction compared to previous architecture without degrading the BER performance.

Keywords: MIMO - Multiple input multiple output, BER – Bit Error Rate.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-210

Developing a framework to conduct ageing studies in Insulating Oil for Power and Distribution Transformers

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ABSTRACT

Due to significant dielectric properties of Mineral Oil (MO) it has been used as an insulating oil in Power Transformer (PT) and Distribution Transformer (DT). The critical functions of the insulating oil dies as it ages and needs to be replaced periodically. The ageing of insulating oil gives data that can be used to develop predictive model. With the use of predictive model one can predict the deterioration rate of an oil. The ageing model or predictive model requires a framework to streamline the ageing test on oils. The method is overwhelmed by various ideas of ageing model adopted from previous literature. Upon using the ageing framework, the new ageing method and standards can be developed in future. Hence, the review catapulted the designing of new ageing model to predict the deterioration of oil under transformer environment.

Keywords: MO-Mineral Oil, PT - Power Transformer, DT - Distribution Transformer

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-211

An Efficient Adiabatic 4-Bit Array Multiplier for Low Power Applications

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ABSTRACT

This research presents an innovative technique to designing a 4-bit array multiplier for mixer circuit applications in signal and image processing, based on an efficient low-power VLSI methodology. The suggested architectureuses adiabatic approaches in the Near Threshold Region to optimize the trade-off between propagation delay and power dissipation. Multipliers are essential components in many digital electronics contexts, resulting in the birth of many multiplier types customized to certain applications. This technology significantly reduces dynamic and static power dissipation as compared to traditional CMOS technologies. Near Threshold Adiabatic Logic (NTAL) is implemented using a single time-varying power source, which simplifies clock tree management and increases energy efficiency. The suggested design is simulated on the TSMC 65 nm technology node using the Tanner EDA tool and the Spectre simulator, guaranteeing that the optimized outcome is verified. Compared to typical CMOS approaches, while maintaining similar design parameters, there is a significant improvement in power dissipation of roughly 66.6%, 14.4%, and 64.6% for variable frequency, supply voltage, and load capacitance, respectively. Notably, with frequency variation, the load capacitance is held constant at Cload = 10 pF and VDD (max) = 1.2 V; with supply voltage variation, the load capacitance remains constant at Cload = 10 pF and frequency at F = 4 GHz; and with load capacitance variation, the frequency is maintained at F = 4 GHz and the supply voltage at VDD (max) = 1.2 V

Keywords: 4-bit array multiplier, adiabatic logic, low-power VLSI, Near Threshold Region, NTAL approach, TSMC 65 nm CMOS technology, mixer circuit, Spectre simulator, and power dissipation optimization.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-212

Artificial Intelligence in Back-End Semiconductor Manufacturing

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ABSTRACT

The semiconductor manufacturing industry is facing a dynamically growing complexity in the management of production bottlenecks, efficiency of manufacturing equipment and product quality management. In order to maintain the competitiveness in both productivity and sustainable growth, manufacturing organizations are seeing huge opportunities in the application of Artificial Intelligence (AI) as a competitive advantage. To address this approach in a case study, this paper reviews the literature on the application of AI in the manufacturing industry and proposes several AI-based solutions in the subfields of machine learning and computer vision that can be applied to address the challenges faced by a back-end semiconductor manufacturing organization (Company-A). The primary KPI or Key Performance Indicator of this organization is the on-time delivery of manufactured Integrated Circuit (IC) products with high quality at minimized cost. The ideas presented show how Artificial Intelligence can be potentially used to solve problems in the semiconductor manufacturing operations.

Keywords: Artificial Intelligence, Key Performance Indicator

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-213

IoT Based Vital Signs Monitoring with Fall Detection System

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ABSTRACT

Now a days healthcare spending rising rapidly, continuous monitoring in the home becomes increasingly critical for enhancing patient outcomes and lowering costs. Therefore, Vital signs monitor with a fall detection system based on IoT help to address this issue. The design and implementation of a Vital signs monitor system (VSMS) with fall detection (FD) system based on IoT (Blynk application) is presented in this paper. Various vital signs, including heart rate, the saturation of oxygen in the peripheral blood (SpO2), are measured by the designed system, which uses the MPU6050 sensor to detect falls. The collected data is transmitted to the Blynk application for visualization and analysis. Continuous monitoring of vital signs and fall detection, which is crucial for elderly and chronically ill patients, is provided by the proposed system. The results showed that the proposed FDs were successful in monitoring the vital signs of elderly patients with a fall detection accuracy of 93.4%. The healthcare sector is rapidly transformed by the Internet of Things (IoT) enabling continuous monitoring of patients' health conditions, with vital signs monitoring and fall detection systems being two important applications of IoT in healthcare.

Keywords: IoT, Blynk application

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-214

System Verilog System C Test Bench Architecture for VLSI Chip Design Verification

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ABSTRACT

Simulation-based verification of Very-Large-Scale Integration (VLSI) chip design is inevitable. However, the simulation speed can be a bottleneck in the verification process productivity. People tried to accelerate simulation-based verification through parallelization, emulation, and reducing the number of test scenarios, etc. In this paper, we exploited the power of abstraction of SystemC to design fast and accurate golden functional reference models. These reference models can be integrated in the Universal Verification Methodology (UVM) based TestBench through Transaction Level Modeling (TLM). Thus, the UVM based TestBench interacts with the SystemC reference model to get the golden values, and use them for checking. We used the proposed methodology to verify the execution unit (EXU) of the open-source RISC-V based VeeR EL2 processor core. The experimental results showed that the proposed TestBench architecture with SystemC reference model is up to 15x faster than the TestBench with SystemVerilog reference model.

Keywords: Verilog, UVM, TLM

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-215

A Low Voltage 6T SRAM Cell Design and Analysis Using Cadence 90nm and 45nm CMOS Technology

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ABSTRACT

This paper investigates the performance optimization of a 6T SRAM cell design in 90nm and 45nm technologies. Focused on reducing both power consumption, access time and area the study utilizes Cadence tools for transient and DC analysis, employing the GPDK for 90nm and 45nm technologies. The proposed CMOS-based 6T SRAM cell design demonstrates notable improvements in power efficiency, area and read/write delay compared to existing 180nm and 45nm technologies. Simulation results in Cadence Virtuoso validate the effectiveness of the enhanced design, showcasing its applicability in modern VLSI applications. This work contributes to advancing semiconductor technology by presenting a refined 6T SRAM cell design tailored for 90nm and 45nm technologies. The outcomes underscore the potential for superior performance in memory design, aligning with the pursuit of energy-efficient and high-speed VLSI applications

Keywords: 6T SRAM Cell, 45nm Technology, 90nm Technology, VLSI Applications

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-216

Analysis of Coupled Slotted Waveguide with Multiple Radiation Slots

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ABSTRACT

Slotted waveguide (SWG) array has the advantage of array configuration blended with slot reduction. In this paper, the two configurations of slotted waveguides are considered and excited through an energy coupled through an energy coupled through a primary waveguide. Two array configurations with 4 slots and 8 slots are simulated, designed successfully and analyzed in terms of reflection coefficient, voltage standing wave ratio (VSWR) 3D and 2D radiation patterns along with far field distribution plots. The considerable import on the beam width (BW) is also studied.

Keywords: slotted waveguide, slot array, coupling slot, radiation pattern, and beam width.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-217

Bandwidth Improvement Techniques of a Waveguide Arrays

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ABSTRACT

The bandwidth improvement techniques for a waveguide being operated in S band are presented in this paper. Numerous methods have been talked about in this paper to improve the transmission capacity of a waveguide. Arrays Utilization of thinner walls in wave guides, decreased cross sectional waveguide, wide slots as well as adjusted slots represent the realized procedures to improve the data transfer capacity, also discussed each of the technique individually with their advantages and disadvantages in detail further we have also discussed about novel differential feeding technique named hybrid phase feeding is deployed to achieve the broadband nature of the waveguide array.

Keywords: waveguides array, differential feeding, hybrid phase feeding

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-218

Machine Learning-Based Anisotropic Filtering Framework for Infrared and Visible Sensor Image

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ABSTRACT

The fusion of infrared and visible imaging is an important and frequently occurring problem. Recently, many fusion methods have been proposed to combine the features present in infrared and visible images into a single image. The key problem of image fusion is how to extract salient features from the source images and how to combine them to generate the fused image. For decades, many conventional signal processing methods have been applied in the image fusion field to extract image features, such as discrete wavelet transform (DWT), contour let transform, shift-invariant shear let transform and quaternion wavelet transform etc. For the infrared and visible image fusion task. But these methods may introduce artifacts into the fused image. These methods take multiple iterations to find the optimal solution (fused image). These optimization methods may over smooth the fused image because of multiple iterations. In addition, edge preserving image fusion schemes are becoming popular these days. So, this work adopted the anisotropic filtering for identification of edges of Infrared and Visible Senor Images.This method use edge preserving smoothing filtering/process for the purpose of fusion. Further, machine learning has become a very active research tool which is used in many images processing fields. So we propose an effective image fusion method using principal component analysis (PCA) based unsupervised machine learning framework to generate a single image which contains all the features from infrared and visible images. First, the source images are decomposed into base parts and detail content using anisotropic filtering. For the detail content, we use PCA to extract multi-layer features. Using these features, we use weighted-average strategy to generate the final fused detail content.

Keywords: Principal component analysis (PCA), DWT, VII.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-219

Smart Antenna Engineering: Revolutionizing Design with VLSI Modelling

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ABSTRACT

The evolution of antenna design integrated with VLSI modeling and machine learning is driving innovations in the development of compact, high-performance antennas for diverse applications, particularly in the RF and millimeter-wave domains. This paper highlights the transformation impact of micro machined antennas, machine learning-driven designs, and advanced optimization techniques. Micro machined antennas, employing substrate removal and wet etching, demonstrate superior performance for miniaturized devices, achieving exceptional gain and return loss metrics. Machine learning, leveraging convolutional neural networks, facilitates rapid and accurate inverse design of planar antennas, significantly reducing simulation overheads and broadening design possibilities. Additionally, optimization techniques such as variable-fidelity simulations and genetic algorithms enable cost-effective and efficient design of high-gain antennas across wide frequency ranges. Despite these advancements, challenges persist in ensuring manufacturability and reliability in real-world scenarios. This study provides a comprehensive exploration of cutting-edge methodologies, setting the stage for future breakthroughs in antenna engineering.

Keywords—Antenna design, VLSI modeling, machine learning, micromachined antennas, optimization techniques, convolutional neural networks (CNNs), variable-fidelity simulation, genetic algorithms, RF antennas, millimeter-wave antennas.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-221

Power Optimization Using Spectral Sharing for Next Generation Cellular Networks

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ABSTRACT

The rapid increase in the number of subscribers demanding high data rate applications have resulted in maturing of the 4G networks. The next generation (5G) wireless communication networks (WCN's) are required to fulfill these rising requirements, hence aiming to utilize the available spectrum as efficiently as possible. Also this is leading to a detrimental effect on the ecological balance of the environment as the transmit power levels increase correspondingly in the atmosphere. Hence power optimization has also become a major concern. Various technologies such as massive MIMO, spectrum sharing, device to device communication (D2D), GREEN communication have gained significant attention in aiding spectrum utilization along with power optimization. This proposal intends to optimize power using spectrum sharing for the next generation networks (NGN) to achieve high spectrum and energy efficiency for both the primary and secondary system without introduction of a secondary transmitter. The performance of the proposed model has been compared with the opportunistic spectrum sharing model and other popular resource allocation algorithms. The results obtained confirm the efficiency of the proposed scheme for increased performance of the system.

Keywords: fourth generation (4G), fifth generation (5G), wireless communication networks (WCN's), device to device communication (D2D), next generation networks (NGN), multiple- input and multiple-output (MIMO)

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-222

sEMG Signal Processing using DWT for Neuromuscular Disorders Detection

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ABSTRACT

The Electromyogram (EMG) signals arising from muscle activities have become a useful tool for clinical diagnosis, rehabilitation medicine and sport medicine. These signals are essentially non-stationary may contain indicators of current category, or even warnings about impending events. Wavelet analysis is often very effective because it provides a simple approach for dealing with local aspects of a signal. It is shown that wavelet representation can be practical in detecting particular spikes in EMG signals and may be constructive for the detection of active segments. This manuscript presents a signal analysis based on the wavelet transform which describes an approach for classifying Electromyography (EMG) signals via Matlab between three types of muscle diseases. Three diverse cases of EMG signals have been considered, filtered and compared with the Butterworth filter results. The present work describes the application of Wavelet Transform to provide a more accurate picture of the localized time-scale features indicative of disease abnormalities. The first step includes Processing and Filtering of EMG signal. The second step includes the comparison of the signal under DWT filter and Butterworth filter.

Keywords—Biomedical, Electromyography, Signal processing, Discrete wavelet Transform, Neuropathy, Myopathy

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-223

Optimal Power Allocation with Statistical QoS Provisioning for D2D and Cellular Communicationsover underlaying Wireless Networks

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ABSTRACT

By enabling two adjacent mobile devices to establish a direct link, device-to-device (D2D) communication can increase the system throughput over underlaying wireless networks, where D2D and cellular communications coexist to share the same radio resource. Traditional D2D schemes mainly focus on maximizing the system throughput without taking into account the quality-ofservice (QoS) provisioning. To overcome this problem, we develop a framework to investigate the impact of delay-QoS requirement on the performance of D2D and cellular communications in underlaying wireless networks. Then, we propose the optimal power allocation schemes with statistical QoS provisioning for the following two channel modes: 1). co-channel mode based underlaying wireless networks where D2D devices and cellular devices share the same frequency-time resource; 2). orthogonal-channel mode based underlaying wireless networks where the frequency-time resource is partitioned into two parts for D2D devices and cellular devices, respectively. Applying our proposed optimal power allocations into D2D based underlaying wireless networks, we obtain the maximum network throughput subject to a given delay-QoS constraint for above-mentioned two underlaying wireless network modes, respectively. Also conducted is a set of numerical and simulation results to evaluate our proposed QoS-driven power allocation schemes under different delay-QoS requirements.

Keywords—Underlaying wireless networks, statistical qualityof-service (QoS) provisioning, power allocation, device-to-device (D2D) communication, cellular communication.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-224

Distributed Cross-Layer Protocol Design for Magnetic Induction Communication in Wireless Underground Sensor Networks

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ABSTRACT

Wireless underground sensor networks (WUSNs) enable many applications such as underground pipeline monitoring, power grid maintenance, mine disaster prevention, and oil upstream monitoring among many others. While the classical electromagnetic waves do not work well in WUSNs, the magnetic induction (MI) propagation technique provides constant channel conditions via small size of antenna coils in the underground environments. In this paper, instead of adopting currently layered protocols approach, a distributed cross-layer protocol design is proposed for MI-based WUSNs. First, a detailed overview is given for different communication functionalities from physical to network layers as well as the QoS requirements of applications. Utilizing the interactions of different layer functionalities, a distributed environment-aware protocol, called DEAP, is then developed to satisfy statistical QoS guarantees and achieve both optimal energy savings and throughput gain concurrently. Simulations confirm that the proposed cross-layer protocol achieves significant energy savings, high throughput efficiency and dependable MI communication for WUSNs.

Keywords—Wireless underground sensor network, magnetic induction communication, cross-layer optimization, Pareto optimal front, distributed power control, distributed protocol.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-225

Overview and an Approach to AI based Healthcare System by using NLP

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ABSTRACT

This paper presents the analysis and comparison of existing literature relevant to various s that act as virtual medical assistance and the mechanisms associated with it. Though, the literature consists of a lot many research contributions, but, here, we have critically and exhaustively analysed recent research and review papers that ae pertinent to AI based health care s. Based on the basic concepts used in their mechanisms, the existing approaches are categorized. The emphasis is on the concept used by the concerned authors, the methodology used for experimentations and the performance evaluation parameters. The claims of the researchers are also highlighted. Our findings from the exhaustive literature review are mentioned along with the identified problems. This paper is very important for the comparative study of various healthcare s approaches which is prerequisite for solving remote health issues. In the end, we've proposed our own pertaining to the health care system. We have blended AI with NLP and ML. We have implemented the idea wherein one can easily and readily diagnose the disease or illness and the details can be provided remotely before consulting a medical practitioner or visiting a doctor. This can inherently reduce the healthcare expenses and can be easily accessible at any time and place. Also, our proposed approach looks consistent and accurate.

Keywords: Artificial Intelligences, Health Care Systems, Machine Learning, Natural Language Programming

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-226

Health Monitoring System using 7-Segment Display & ATmega Microcontroller

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ABSTRACT

This health monitoring system is a very useful system, which can be used to monitor the health parameters of the patient. This system continuously monitors the heart rate and the temperature reading of the patient. In this health monitoring system project, we use two 7 segment modules to display the parameters, as the display has a greater viewing distance. We can select the upper limit and lower limit for the temperature and heartbeat as well. While monitoring, if the temperature is increased beyond the set high limit or is decreased below the set limit then the buzzer sounds and the load turns off. Similarly, when we remove the heartbeat sensor and system detects low heartbeat and buzzer buzzes and the load is switched off. This buzzer can help the patient's well-wishers to take action in an emergency. When the temperature and heart rate come into control the bulb turns on and the alarm gets off.

Keywords: 7 segment modules, buzzer

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-227

Analysis of EEG Signal for Epilepsy Seizure Detection Using Machine Learning

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ABSTRACT

The brain is a vital organ responsible for regulating various bodily functions. An electroencephalogram (EEG) is a powerful tool for recording brain activity from the scalp. Analyzing EEG signals plays a key role in diagnosing and treating neurological conditions such as epilepsy, seizures, and other brain disorders. However, these signals are often affected by noise and artifacts, making analysis challenging. Accurate evaluation of EEG signals is critical for reliable diagnosis. Numerous approaches have been developed to achieve high-precision analysis. In this study, Discrete Wavelet Transform (DWT) is utilized to pre-process EEG signals, breaking them down into five distinct frequency bands. Subsequently, features such as mean, standard deviation, root mean square (RMS), entropy, energy, and relative energy are extracted. These features are classified using machine learning algorithms, including Support Vector Machine (SVM), K-Nearest Neighbor (KNN), and Naive Bayes (NB). The findings reveal that SVM achieves the highest performance, with a classification accuracy of 99.5%, specificity of 100%, and sensitivity of 100% when distinguishing between normal and epileptic subjects.

Keywords: EEG, SVM, Epilepsy, DWT, Artifacts, Classifier

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-228

Advanced Alcohol Sense and Smart Helm for Driver Safety

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ABSTRACT

Currently, accidents are a serious problem for everyone. Accidents are increasing day by day, so efforts are made to avoid them to minimize their consequences. We live in a world where the rules of the road have no importance for people and they are regularly violated. In addition, its human nature to resist what is imposed on them. Thus, using a different perspective, we provide safety with luxurious and intelligent features using a smart helmet. Smart Helmet is an AVR series microcontroller based project. It is a helmet with some smart features to improve driving experience and to make drive safer. This smart helmet has three main features and each feature has its own purpose like the purpose of first feature is to encourage or force rider to wear helmet, similarly the purpose of second feature is to prevent rider to drink and drive, and third feature is to save lives as many as possible when accidents by complete covering of head through helmet door controlling using servo motor. Two modules one on the helmet and bike each will work in synchronization, to ensure that the biker is wearing the helmet. The ALCHO-LOCK function is used to prevent drink and drive scenarios. This system having smoke sensor, vibration sensor when the smoke is detected automatically helmet having front door which is provide safety for driver when he is falling. The ARDUINO microcontroller gets the information regarding the alcohol through the alcohol sensor which is interfaced to the ignition of the vehicle receives the data and controls the vehicle using DC motor. By this way we can take the prevention steps before occur the major accidents and we can avoid the human losses and financial losses.

Keywords: Alcohol Sensor

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-229

Application of Machine Learning Algorithm in Medical Diagnosis

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ABSTRACT

After Covid 19 Pandemic people are more focusing on healthcare. Every person wants to get the solution related to any health issue from their doorstep, this is the reason that Machine learning techniques has been adopted very fast in the field of medical diagnosis which can provide fast and accurate diagnosis results at the time of disease diagnosis step this system will assist physician to predict the diseases in early stage. Machine learning works upon the concept of train and test the machine with the required algorithm which can provide efficient result for execution of this process first we need to train the machine with respect to the data collected and after collecting the data, data cleaning processing to be done efficiently so that weget the correct feature extraction when we follow the test step. In this research paper we are presenting comparative analysis of various machine learning algorithm ie. Linear regression. Decision tree, SVM, Random Forest etc. Applied in the field of medical diagnosis our analysis in focusing on the criteria with respect to the accuracy, performance and algorithmis applied for medical diagnosis. AI is already facilitating diagnosis, drug development, personalized treatments and gene editing. Increasingly, these insightful tools are revolutionizing healthcare, thanks to causal reasoning techniques in ML algorithms. Earlier models used only correlations between symptoms and the most likely causes. Computer vision and ML can enhance the valuable microscope work traditionally carried out by pathologists. Machine vision is a common thread in diagnostic applications, which evaluate physiologicaldata, environmental influences and genetic factors.

Keywords: Deep learning, Self supervised learning.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-230

Implementation Considerations for Active Noise Control in Ventilation Systems

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ABSTRACT

The most common method to attenuate noise in ventilation systems today is passive silencers. For these to efficiently attenuate frequencies below 400 Hz such silencers need to be large and a more neat solution to attenuate low frequencies is to use active noise control (ANC). The usage of ANC in ventilation systems is well known and there are several commercial products available. ANC is not, however, used on a wide basis due to its often high price and poor performance. Since the price is an important factor in ANC systems the expensive laboratory filters and the amplifier that is currently used in the experimental setup need to be replaced with cheaper ones, but without too much performance loss. For easier implementation in ventilation systems the placement of the reference microphone is important, the shorter distance from the anti-noise loud speaker the easier the ANC system is to implement. But if the distance is so small that the ANC system is no longer causal the performance will be decreased and if the reference microphone is close enough to pick up acoustic feedback from the anti-noise loud speaker the performance will also be decreased.

Keywords: active noise control, ventilation systems

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-231

A guide to Deep learning in Wireless Power Transmission

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ABSTRACT

The concept of transferring electrical power to a load wirelessly is an intimidating and a challenging idea. The genius of powering system swirelessly has pulled the curtains to a new world. In the 19th century, Nikola developed 'Tesla Tower' in hope to transfer power wirelessly. Since then, the world is trying hard to say goodbye to wires. WPT using Inductive coupling which falls under the domain of NFWPT, uses a transmitter coil to transmit power to the receiver coil via a magnetic field. Inductive coupling is an efficient way to transmit power through short distances and making its way in smart phones and the health industry. Electric vehicle charging stations are also trending thanks to wireless power transfer. This paper discusses the theoretical foundation of Inductive coupling and presents results of an experimental work done on WPT via Inductive Coupling. In the process above, an efficiency of 72% was achieved.

Keywords: Wireless power transfer, Inductive coupling

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-232

ML-Driven Palm Print Authentication System for Security Applications

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ABSTRACT

Traditional authentication methods like passwords and fingerprints have limitations such as susceptibility to being forgotten, shared, hacked, or affected by adverse conditions. Machine Learning (ML) and image processing advancements are driving interest in palm print recognition systems for enhanced security. Palm print recognition is less intrusive, more reliable, and more secure compared to traditional methods, addressing issues like hacking and environmental factors. The proposed system uses ML algorithms like perceptron and extra tree classifier to identify and authenticate individuals based on unique palm print patterns. The motivation stems from the necessity to address the short comings of traditional security authentication methods. By harnessing the power of Machine Learning and palm print recognition technology, we aim to develop a system that not only enhances security but also provides a seamless and user-friendly authentication experience. The potential applications of such a system range from access control in high-security facilities to secure mobile device authentication.

Keywords: ML, Plam Print

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-233

DEA-Net: Single Image Dehazing Based on Detail-Enhanced Convolution and Content-Guided Attention

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ABSTRACT

Single image dehazing is a challenging ill-posed problem which estimates latent haze-free images from observed hazy images. Some existing deep learning based methods are devoted to improving the model performance via increasing the depth or width of convolution. The learning ability of Convolutional Neural Network (CNN) structure is still under-explored. In this paper, a Detail-Enhanced Attention Block (DEAB) consisting of Detail-Enhanced Convolution (DE Conv) and Content-Guided Attention (CGA) is proposed to boost the feature learning for improving the dehazing performance. Specifically, the DE Conv contains difference convolutions which can integrate prior information to complement the vanilla one and enhance the representation capacity. Then by using the re-parameterization technique, DE Conv is equivalently converted into a vanilla convolution to reduce parameters and computational cost. By assigning the unique Spatial Importance Map (SIM) to every channel, CGA can attend more useful information encoded in features. In addition, a CGA-based mix up fusion scheme is presented to effectively fuse the features and aid the gradient flow. By combining above mentioned components, we propose our Detail-Enhanced Attention Network (DEA-Net) for recovering high-quality haze-free images. Extensive experimental results demonstrate the effectiveness of our DEA-Net, outperforming the state-of-the-art (SOTA) methods by boosting the PSNR index over 41 dB with only 3.653 M parameters.

Keywords: DEAB, CGA

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-234

AI and Dental Remote Monitoring: From Challenges to Future Solutions

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ABSTRACT

The integration of Artificial Intelligence (AI) in dental remote monitoring has transformed the paradigm of oral healthcare, offering unprecedented opportunities for early diagnosis, personalized treatment, and enhanced patient outcomes. Despite its potential, dental remote monitoring faces significant challenges, including data variability, diagnostic accuracy, and regulatory compliance. This study aims to investigate the applications, challenges, and future directions of AI-powered dental remote monitoring. Leveraging a comprehensive review of existing literature and expert insights, this research identifies key areas of innovation, including AI-driven diagnostic algorithms, tele-dentistry platforms, and patient engagement strategies. The methodology involves a mixed-methods approach, combining qualitative thematic analysis with quantitative benchmarking of AI-powered diagnostic tools. The findings highlight the transformative potential of AI in dental remote monitoring, while also underscoring the need for standardized regulatory frameworks, robust data governance, and clinician-patient collaboration. The study concludes by outlining future research directions, including the development of explainable AI models, personalized treatment planning, and large-scale clinical trials to validate the efficacy of AI-powered dental remote monitoring solutions.

Keywords: Artificial Intelligence, Dental Remote Monitoring, Tele-dentistry, AI-powered Diagnosis, Oral Healthcare, Digital Dentistry

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-235

The Impact of Self-Driving Cars on Society and Infrastructure

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ABSTRACT

The rise of self-driving cars (AVs) is poised to significantly reshape both society and infrastructure. By reducing traffic accidents caused by human error, AVs promise to enhance road safety. However, they also present economic challenges, particularly job displacement in driving-related sectors, while potentially creating new opportunities in technology and infrastructure management. The widespread adoption of AVs could lead to major changes in urban design, including the repurposing of parking spaces and the development of smarter road systems. Additionally, AVs could reduce carbon emissions and improve traffic flow, contributing to environmental sustainability. Legal and ethical concerns, including liability, privacy, and decision-making in unavoidable accidents, will require careful consideration. Overall, the integration of self-driving cars will necessitate significant adjustments to transportation policies, infrastructure, and societal norms to maximize their benefits and address their challenges.

Keywords: Autonomous Vehicles, V2X Technology

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-236

Implementation of SHA-3 Algorithm in Verilog HDL

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ABSTRACT

Data transmitted between Internet of Things (IoT) applications over a public network is vulnerable to unauthorized access and modification. Encryption alone is not sufficient to prevent data from being altered during transmission, which can have serious consequences for IoT systems. To ensure data immutability, it is important to ensure data integrity using methods such as checksums, hashes and digital signatures. Hash functions, especially Secure Hash Algorithm 3 (SHA-3), play a vital role in maintaining data integrity and security. Built on a Sponge structure, SHA-3 is designed to provide strong protection against cryptographic attacks. This project investigates the implementation of SHA-3 in IoT applications to secure data transmission and highlights the speed and reliability of hardware solutions such as FPGA. In addition, the implementation of the SHA-3 algorithm in Verilog using Xilinx software is explored, and the practical aspects of implementing SHA-3 in IoT devices are highlighted. Xilinx FPGA platforms offer flexibility, cost-effectiveness and fast development cycles, making them suitable for the fast cryptographic operations required in real-time IoT applications. By integrating SHA-3 into FPGAs using Verilog coding, this project aims to improve data security and integrity, ensuring the reliable operation of IoT networks. The application of SHA-3 in various areas of the Internet of Things, such as healthcare and urban infrastructure, demonstrates its importance in ensuring data accuracy and reliability. By integrating 2nd strong data integrity measures, IoT applications can improve security and reliability, which is critical to their widespread adoption and performance.

Keywords: SHA-3 (Secure Hash Algorithm 3), Verilog Implementation, Cryptographic Security, IoT Security

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-237

Bitstream Database-Driven FPGA Programming Flow Based on Standard OpenCL

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ABSTRACT

Field-programmable gate array (FPGA) vendors provide high-level synthesis (HLS) compilers with accompanying OpenCL runtimes to enable easier use of their devices by non-hardware experts. We propose an automated FPGA management tool AFOCL, with a guiding principle that the software programmer should only need to use the standard OpenCL API to manage FPGA acceleration tasks. This improves portability since the same OpenCL program will work on any OpenCL-compliant computation device able to execute the same kernels, including CPUs, GPUs, and FPGAs. The proposed approach is based on pre-optimized FPGA bitstreams implementing well-defined OpenCL built-in kernels. This enables a clean separation of responsibilities between a hardware developer preparing the FPGA bitstreams containing the kernel implementations, a software developer launching computation tasks as OpenCL built-in kernels, and a bitstream distributor providing preoptimized FPGA IPs to end-users. The automated FPGA programming tool fetches bitstream files as needed from the distributor, reconfigures the FPGA, and manages the communication with the accelerator. We demonstrate that it is possible to achieve similar performance as the current FPGA vendor OpenCL implementations, while abstracting all FPGA-specific details from the software programmer. The cross-vendor potential of AFOCL is shown by porting the implementation to FPGAs from two different vendors (AMD and Altera), and to two different FPGA types [PCIe and system-on-chip (SoC)], and controlling all these systems with the same OpenCL host program.

Keywords: FPGA, openCL, SoC.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-238

Strategies for Optimal Control in Networked Systems under Limited Communication

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ABSTRACT

The optimal control of networked control systems (NCS) with limited communication channels poses significant challenges, such as delays, packet losses, and constrained data rates, which degrade system performance. Recent advancements propose strategies to address the delimitations by focusing on communication-control codesign, adaptive scheduling, and robust optimization. A deep reinforcement learning (DRL) algorithm demonstrates superior scheduling and control input performance for large-scale wireless NCS, efficiently handling time-correlated channels (Pangetal.,2024). For connected vehicles, range-limited and time-delay communications are addressed through non-model-based control methods, ensuring system stability despite un- certainties(Wangetal.,2023). The presence of Markovian packet losses introduces complexity in the control problem, where stochastic difference equations are utilized to establish necessary conditions for stability and optimality (Han et al., 2023; Wang et al., 2023). Additionally, trade-offs in state estimation, balancing data rates and observability under dropout constraints, highlight the importance of tailored strategies for effective NCS performance (Liuetal.,2023). Despite the advances, computational complexity and real-time adaptability remain key areas for further research, particularly for dynamic environments where stringent response times are critical.

Keywords: NCS, DRL

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-239

Predictive Modeling for Crop Yield Estimation: Machine Learning Classifier Comparison

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ABSTRACT

The aims to enhance agricultural productivity through advanced predictive modeling. Leveraging machine learning techniques, the project seeks to analyze and compare various classifiers to accurately estimate crop yields. Traditional methods of crop yield estimation often rely on manual observation and historical trends. However, these approaches are often time-consuming, labor-intensive, and prone to inaccuracies due to the complex and dynamic nature of agricultural systems. The need for a more efficient and accurate crop yield estimation system that can leverage the power of machine learning algorithms. It aims to overcome the limitations of traditional methods by developing a predictive model capable of analyzing large datasets, identifying patterns, and making precise yield predictions based on various factors such as weather, soil conditions, and agricultural practices. The motivation behind this paper lies in the potential impact it can have on agriculture. Accurate crop yield predictions enable farmers to make informed decisions regarding planting, harvesting, and resource allocation, leading to improved productivity and resource utilization. By harnessing the capabilities of machine learning, the project seeks to empower farmers with valuable insights for better crop management and yield optimization. The proposed system involves the integration of machine learning classifiers to analyze historical agricultural data and predict crop yields. By leveraging advanced algorithms, the system aims to improve the accuracy and efficiency of crop yield estimation, providing valuable insights to farmers and stakeholders. Additionally, the system will facilitate decision-making processes, ultimately contributing to sustainable agricultural practices and food security.

Keywords: Crop Yield, ML

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-240

Security Assistance System for Women with GPS Tracking and Messaging System

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ABSTRACT

The Project presents "Security assistance system for women with GPS tracking and messaging system" using PIC16F877A microcontroller which is used to find the position of the person or vehicle where the user located on the earth. This information is provided by the GPS with the help of the data it receives from the satellites. The Microcontroller processes this information and the processed information is sent to a predefined phone number using GSM modem and position values displayed on LCD. The recordable camera helps to record everything which is happening at the surroundings.

Keywords: GPS Receiver, GSM Modem, Microcontroller (PIC16F877A), Recordable Camera with a memory card, LCD.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-241

Autonomous Vehicles by using Image Processing Techniques

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ABSTRACT

As the technology updates new things in every day. The Automobile industry also updates gradually by looking forward to the busy schedule of everyone. The invention of an incredible thing in the field of the automobile industry is the Autonomous vehicles. It uses the concept of deep learning. Deep learning is the type of supervised machine learning. It is the concept of image processing where the image can be compared with the stored examples. The example with which that image matches the output of that example is considered as result of the situation. This technology is used in the invention of driverless vehicles. Deep learning is basically a multi-layer in which each layer helps in identifying and recognizing the exact solution of the problem. In this paper we will discuss how we can use deep learning behind the driverless vehicles and the various image processing techniques.

Keywords— Machine learning, Deep Learning, Automotive industry, Industrial sector etc.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-242

Intelligent Alert Device for Women's Security

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ABSTRACT

Every day, every woman, young girls, mothers and women from all walks of life are struggling to be safe and protect themselves from the roving gaze of the horribly insensitive men who molest, assault and violate the dignity of women on a daily basis. The streets, public transport, public places in particular have become the dominion of the hunters. Due to these atrocities that women are subjected to in the present scenario, a smart security wearable device for women based on Internet of Things is proposed. It is implemented and comprises of Raspberry Pi[1], Raspberry Pi camera and button to activate the services. This device is extremely portable and can be activated by the victim on being assaulted just by the click of a button that will fetch her current location and also capture the image of the attacker via Raspberry Pi camera. The location and the link of the image captured will be sent to predefined emergency contact numbers or police via smart phone of the victim thus preventing the use of additional hardware devices/modules (GPS Module[2] and GSM Module[3]) and making the device compact.

Keywords: Raspberry Pi, GPS Module, GSM Module.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-243

A Novel Harmonics Elimination Method for Industrial Applications

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ABSTRACT

There are many ongoing researches in the field of harmonic compensation using active and passive power filters or the combination of the two, which are known as hybrid power filters? These filters can be implemented as series or shunt units. For shunt compensation, the voltage rating of the components is usually higher, and the impedance of the filtering unit should be very high to block the flow of the fundamental harmonic. For the series compensation, the impedance for the fundamental components should be minimal. In order to improve the power quality, many control algorithms have been proposed for automatic and selective harmonic compensation. In this project to ensuring power quality both in the grid current and PCC by harmonic elimination is presented. The proposed method is developed to take care of harmonics in grid- connected (GC) mode, as well as in the islanded or standalone (SA) mode of operation, where the main objective is to remove the harmonics from the grid current and the point of common coupling (PCC) voltage. The suggested placement of the harmonic reduction unit dictates the use of a special controller structure that uses the harmonics magnitude in the d-q reference frame. In the proposed control algorithm, the required amount of attenuation for harmonics is determined to meet the total harmonic distortion. Fast and efficient algorithm for phase detection irrespective of the presence of harmonics has been utilized for the system. The effectiveness of proposed method is further implemented by connecting induction motor to the output and performance of the motor is studied using Matlab/simulink software.

Keywords: Adaptive Compensation, Distributed Renewable Energy Sources, Grid-Connected Micro Grid, Harmonics, Power Quality, Standalone Microgrid.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-244

Design and Implementation of FPGA-Based Systems

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ABSTRACT

This paper reviews the state of the art of field programmable gate array (FPGA) with the focus on FPGA-based systems. The paper starts with an overview of FPGA in the previous literature, after that starts to get an idea about FPGA programming. FPGA-based neural networks also provided in this paper in order to highlight the best advantage by using FPGA with this type of intelligent systems, and a survey of FPGA- based control systems design with different applications. In this paper, we focus on the main differences between software-based systems with respect to FPGA-based systems, and the main features for FPGA technology and its real-time applications. FPGA-based robotics systems design also provided in this review, finally, the most popular simulation results with FPGA design and implementations are highlighted

Key words: FPGA-based, Control systems, neural networks, robotics systems design, Programming with FPGA, FPGA Design and implementations

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-245

An Analytical Research on Machine Learning-based Battery Management Systems

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ABSTRACT

Global warming and global pollution can consequence in many severe changes to the environment, ultimately challenging environmental problems and impacting human health. Human activities that result in an electronic-based population are the primary causes of the sharp rise in waste, particularly battery waste. Massive releases of heavy metals from battery waste impact health and ecosystems as a whole. Hence there is need to work on battery lifecycle and its affecting measuring factors. However, there are many challenges to enhance the lifecycle of battery and to sustain environmental balance. Machine learning is a form of artificial intelligence that is fundamentally present in almost every area of our lives. It increased automation and increased productivity. This research article provides an overview of exemplary research efforts for efficient Machine Learning-based Battery Management Systems (BMS) to improve battery life cycles and address their measurement factors in the context of ecological development.

Keywords— battery lifecycle, measuring factors, Artificial Intelligence, BMS, Machine Learning, RUL.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-246

Survey on Crop Prediction using Machine Learning

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ABSTRACT

Agriculture, a vital sector for sustaining global food security, faces significant challenges due to the growing population and environmental changes. Traditional practices often struggle with inefficiencies and adaptability issues. This survey examines recent advancements in crop prediction through the integration of machine learning (ML) and other technologies. It highlights how ML algorithms analyze diverse datasets, including satellite imagery and soil data, to enhance prediction accuracy and optimize resource use. The review underscores the impact of these technologies on improving decision-making for farmers, stabilizing food prices, and promoting agricultural sustainability.

Keywords: Crop yield prediction, Machine learning algorithms, Process based model, Statistical models, Remote sensing, Neural networks.

ISBN: 978-93-94246-44-7

PAPERID: ICSMEC24-247

Leveraging Decentralized Identity with ZKSNARKS for Cloud Data Security

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ABSTRACT

The advent of cloud computing has revolutionized the way data is stored, processed, and accessed. However, this shift towards centralized cloud infrastructure has raised significant concerns regarding data privacy and security, particularly in the management and authentication of identities. Decentralized Identity (DID) systems, coupled with advanced cryptographic techniques like Zero-Knowledge Succinct Non-Interactive Arguments of Knowledge (ZK-SNARKs), offer a promising solution to these challenges. Decentralizing identity management and leveraging cryptographic proofs, our solution aims to enhance security for cloud data while preserving user privacy. The present work emphasizes the fundamental concepts of decentralized identity and ZK-SNARKs, along with basic algorithms, and propose an architecture for their implementation. This work also explores the integration of Decentralized Identity (DID) and ZK-SNARKs. The proposed model aims to provide robust identity verification while preserving user privacy and reducing the risk of data breaches.

Keywords: Blockchain, Cloud computing, ZK-SNARKS, Decentralized Identity.

ISBN: 978-93-94246-44-7

ABOUT CONFERENCE

6th International conference on "Smart Modernistic in Electronics and Communication" (ICSMEC-24) will be organized by St. Martin's Engineering College, Secunderabad, Telangana, India, on 17th & 18th December 2024. ICSMEC-24 will serve as a colloquy for sharing the proficiency among academicians, researchers, scientist and industrial personnel from all over the world in the areas of engineering and technology for estimation and prevention of complex situation. All papers will be reviewed by eminent researchers and all accepted papers will be sent to UGC care/ Scopus journal publication. All the abstracts will be published in conference proceedings with ISBN & UGC Care Journal. Participants can present papers in online/offline mode.

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Dhulapally, Near Kompally, Secunderabad - 500 100, T.S. www.smec.ac.in

ISBN:
978-93-94246-44-7

Editor in chief
Dr.P.Santosh Kumar Patra