Abstract Proceedings of

CCSN2024

13th International Conference on

Computing, Communication and Sensor Networks

www.actsoft.org/ccsn2024

27th to 28th of September, 2024

Organizer:
Applied Computer Technology, Kolkata, West Bengal, India.

Joint-Organizer and Venue:
Department of Computer Science Engineering, Aliah University, Newtown, Kolkata, West Bengal, India.

In Association with:
International Association of Science, Technology and Management

Aliah University
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CCSN 2024

13th International Conference on

Computing, Communication and Sensor Networks

Date: 27th September 2024
Venue: Aliah University, Newtown,
Kolkata, West Bengal, India. (Offline Conference)
Date: 28th, September 2024
Venue: Online Conference

Website of conference: actsoft.org/ccsn2024

Proceeding Book with abstract of papers
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Inaugural Song:

Prayer

Translated in English
By
Hillol Ray
http://www.iwvpa.net/rayh
http://www.iwvpa.net/rayh/index-hra.php

Desires are all yours, you
are the universal star-
You do your own works, God,
People say, I do them from a far!!

You stuck elephant into clay,
And push a handicap to ascend hill-
To some, you offer "Brahmo" feet,
And make others descend
downhill!!

I am a machine, you are the machinist, I
am the home, you are the homemaker-

I am the chariot, you are the charioteer,
You drive as you like, and I am a happy taker!!

"Milestone"
June 25, 2019
Garland, Texas, USA

Editorial

This abstract proceedings book contains abstracts of all registered papers, a summary of keynote and invited talks, the program schedule, a list of speakers and session chairs, etc.

In light of the current exceptional circumstances, CCSN2024 has been re-envisioned as a hybrid mode of conference with facilities for online and offline presentations. The virtual format will provide an opportunity for our community to present their research works online, which can be followed by researchers across the globe.

About 85 papers were received, and among them, only 55 were selected for presentation. Papers are in the areas of wireless technology, applications of IoT, algorithms, software engineering, artificial intelligence methods, bioinformatics, cyber security, machine learning, applications of various types of sensor networks, VLSI design for wireless communication, antenna design, etc.

The CCSN2024 conference will convene experts in the field of Computing, Communication, and Sensor Networks for technical communication through presentations and discussions, providing a fantastic opportunity to network with like-minded professionals from around the world. This conference, in hybrid mode, will feature invited talks and keynotes, and will give the opportunity to exchange thoughts, share, and collaborate with different institutions to work together throughout the globe.

We look forward to the active participation of all our delegates and participants in the CCSN2024. With due thanks and best wishes to all our team including the Chief Guest, other invited speakers, chairs, authors, participants, etc., for sparing their valuable time in making the event a success.

These abstract proceedings are prepared with the abstracts of all papers for the delegates of the conference and for offline/online as print/PDF versions. After the conference, most of the papers will be forwarded for possible publication in a Special Issue of the Journal of Microsystem Technologies, SCI-indexed, published by Springer-Nature, or in different proceedings as book chapters according to the theme of the paper.

The EditorsCCSN2024

Dr. Nicholas Ude Eze, University of Nigeria, Nsukka 410105, Nigeria.
Dr. Usha Jain, Manipal University Jaipur, Jaipur, Rajasthan, India.
Dr. Khondekar Lutful Hassan, Aliah University, Newtown, Kolkata, West Bengal, India.
Dr. Rupali Atul Mahajan, Vishwakarma Institute of Information Technology, (Budruk), Pune, Maharashtra, India.

Aliah University
جامعة عالية
আলিয়া বিশ্ববিদ্যালয়

M Wahab, IPS (Retd.)
Vice-Chancellor

No. AU/VC/062/24 Date: 20/09/2024

FOREWORD

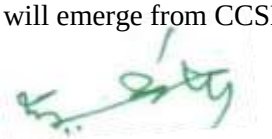
I am pleased to extend my warmest greetings to all the distinguished participants, speakers, and organizers of the 13th International Conference on Computing, Communication, and Sensor Networks (CCSN2024) hosted by Aliah University, Kolkata. This prestigious event, taking place on the 27th and 28th of September 2024, marks yet another milestone in our university's commitment to fostering academic excellence and innovation.

In today's rapidly evolving world, the fields of computing, communication, and sensor networks are at the heart of technological advancement. The contributions from these domains have transformed the way we live, work, and interact with our surroundings. By bringing together leading researchers, academicians, and industry experts, CCSN2024 serves as a dynamic platform to exchange ideas, share research findings, and discuss the future directions of these crucial areas.

I am particularly pleased to note that this conference features an impressive range of papers, presentations, and discussions that reflect cutting-edge research and global collaboration. It is also heartening to know that the proceedings will include a published book of abstracts, ensuring that the contributions made here will have a lasting impact.

On behalf of Aliah University, I would like to express my sincere gratitude to the organizing committee, the speakers, and all participants for their dedication and hard work. I have no doubt that this conference will be a resounding success and will contribute significantly to the advancement of knowledge in the fields of computing, communication, and sensor networks.

I wish all the participants a productive and engaging conference and look forward to the innovative ideas that will emerge from CCSN2024.



M. Wahab

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Index

Speech of

Prof. Dulal Acharjee
Executive Chairman, CCSN2024 and
Director, Applied Computer Technology, Kolkata, West Bengal, India.

Today, we are here to celebrate the inauguration of 13th international conference on 'Computing Communication and Sensor Networks', in short CCSN2024. This initiative is for advancing technology for the betterment of the society. Advances of technology provide more security, comfort in day to day lives and it can replace manual hard labors to automations.

Computing and Communication Science is used in everywhere in the modern world. It has revolutionized the way we connect, communicate, and process information. In today's interconnected World, communication science has provided all facilities of connections, message-transfer, and high speed data transfer with security with high speed computing facilities.

The invention of wireless communication, invention of telegraph, the rise of the internet, proliferation of smartphones, invention of Cloud Computing, sensing data and its Networking sciences have not only transformed the way we conduct business, education, and research but have also reshaped the fabric of our social and cultural lives. The PARAM Supercomputer development of India was another success in the history of Computing. The recent successful landing of Rocket of India on the surface of the Moon required very skilled software, interfacing of hardware-sensors and signal transporting technology.

Like past many years, for CCSN2024, we are planning to publish a special issue of the Journal of Microsystem Technologies, a SCI indexed journal of Springer-Nature publisher and some other papers will be invited for other Journals/ Proceedings/books for possible publications. Hope, after presentations and interactions with the experts-session chairs-Judges, authors will be able to improve the qualities of their papers.

Hope, by your active participation, research people of these subjects will get more efficient supports to furnish their research projects which will come as different applications of technologies with more advanced features in near future.

We work for developing the technology so that the World would be a better sustainable and a peaceful space for the human being.

Invited Speaker

Novel Design Strategies Based on Ga 2 O 3 MOSFETs for High Frequency Applications

Dr. Harsupreet Kaur,
Professor, Department of Electronics Engineering,
and Dean of Faculty of interdisciplinary and Applied Sciences.
University of Delhi, India.

Abstract-In recent years, the growing demand for faster and more reliable communication technologies has accelerated advancements and innovations in the area of high frequency domain particularly in areas like 5G, satellite communications, and high-speed data transfer etc. However, conventional materials such as silicon and germanium etc., have already reached the limit in meeting the stringent performance requirements in the applications requiring high frequencies. This has led to a shift towards more advanced materials such as GaN and Ga_2O_3 etc., which offer superior electrical properties. Among these, Ga_2O_3 stands out due to its exceptional performance potential in high-frequency applications. The talk will cover several novel state-of-art technologies based on Ga_2O_3 targeting high frequency applications. The effectiveness and potential of Ga_2O_3 to address the challenges posed by current technology bottlenecks along with its future prospects will also be discussed.

Keynote Speaker

Building Resilient Autonomous Space Exploration Missions

Professor Mike Hinchey University of Limerick, Ireland

Abstract- Abstract-Space exploration missions represent some of the largest, most ambitious, and most costly engineering systems yet developed. They attract public attention and enthusiasm but the potential for failure is great, resulting in great financial loss and the loss of potentially decades of effort and research. From the field of software engineering, we describe approaches to building autonomous missions that are more likely to be successful, are far more ambitious, and are more resilient in harsh environments.

Invited Speaker

Next-Generation Microwave Filters: Driving Compactness and Harmonic Control for 5G Communication and Beyond

Dr. Sayan Chatterjee
Professor, Dept. of Electronics and Telecommunication Engineering, Jadavpur University

Abstract- The rollout of 5G has transformed global communication infrastructure, enabling unprecedented data speeds, reduced latency, and improved connectivity. At the heart of this revolution lies the critical role of microwave filters, which serve as essential building blocks for 5G systems by managing the frequency spectrum and ensuring signal integrity. However, with the increasing demand for compact, energy-efficient devices, there is a growing need for filters that not only meet stringent performance requirements but also address the challenges of harmonics and size constraints.

Harmonic suppression is a key issue in 5G systems, where higher-order harmonics can distort signals, leading to interference and reduced efficiency. The ability to design filters that effectively mitigate these harmonics is essential for maintaining the high performance of 5G networks. Furthermore, as the trend towards miniaturization continues, there is a pressing need for compact filter designs that can be easily integrated into modern, space-constrained devices. Innovations such as surface-modulated impedance and the use of metamaterials have paved the way for more compact and high-performing filters, capable of offering both harmonic control and reduced size.

This keynote will explore the latest advancements in microwave filter technology, focusing on novel approaches to achieving compactness and harmonic suppression. We will delve into state-of-the-art solutions, including the design of planar transmission lines with modulated surface impedance, and discuss how these innovations are shaping the future of 5G and beyond. The goal is to highlight how these filters not only enhance current communication systems but also lay the groundwork for next-generation applications in wireless communication.

Invited Speaker

Problems with Inspecting Electrical Installations Using the Infrared Camera

Dr. Karol Kuczynski,
Assistant professor at the Institute of Radio electronics and Multimedia Technologies

Abstract-In recent years, there has been a significant increase in the number of photovoltaic installations generating electricity in both residential and non-residential buildings. Over time, individual cells can fail, and important components such as the inverter can be damaged by rodents or birds. As a result, the photovoltaic panel produces less electricity, and local overheating of the panel cells or an electric arc can cause damage and ultimately lead to a fire. Thanks to thermal imaging, these faults can be easily located thanks to their thermal signature, and then appropriate corrective measures can be taken. The principle of fault detection is based on the observation of the temperature increase at the location of a faulty current connection – associated with an increase in the connection resistance due to, for example, a loose screw, oxidation or other phenomena leading to poor contact [1, 2]. Observing PV installations directly with a thermal imaging camera is difficult due to interference from the environment. It should be remembered that the top glass in the photovoltaic panel is not transparent to 14 μm radiation. Although glass has an emissivity of 0,85-0,90 in the radiation range of 8-14 micrometers, thermal measurements on the glass surface are not easy to perform [3, 4]. The reflections in the glass are specular, which means that surrounding objects with different temperatures can be clearly seen in the thermal image. This often results in incorrect interpretation of thermal images, which contain false "hotspots" and measurement errors [5]. For example, the reflection of a cloud or sun can be treated as a defect that does not actually exist.

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Invited Speaker

Cognitive Beam Management for Next Generation Wireless Communication: A Centralized Learning Approach to Multiuser Codebook Design with Multi Agent Reinforcement Learning.

Dr. Kandarpa Kumar Sarma
Professor and Head, Department of Electronics and
Communication Engineering, GUIST, Gauhati University, India

Abstract- Efficient performance in multi-user mmWave systems involves serving multiple pieces of user equipment (UE) from each base station (BS) simultaneously. The large number of antennas and very low signal-to-noise ratio (SNR) before beamforming in mmWave systems make it impractical to obtain full CSI for conventional closed-loop precoding matrix calculations. Therefore, alternative beamforming and precoding techniques are necessary to achieve efficient performance while managing cost, power, and CSI availability. Cognitive beamforming is central to the performance of next generation multiple-input-multiple-output (MIMO) systems, where efficient signal transmission requires precise channel state information (CSI) to determine optimal beam configurations. While high-frequency circuits make fully digital beamforming impractical for large antenna arrays, hybrid and analog beamforming solutions are commonly employed. These systems rely on predefined static beam codebooks, which may not always offer optimal performance under changing channel conditions. This work introduces a novel centralized learning approach for designing adaptive beam codebooks in multiuser hybrid MIMO downlink wireless communication systems, utilizing multi-agent reinforcement learning (MARL). By employing MARL, cooperative agents design a topography-aware codebook of non-interfering beams, overcoming the limitations of traditional CSI-based or reference signal received power (RSRP)-based methods. The proposed framework uses uplink CSI, along with RSRP feedback and binary acknowledgment from UE, to optimize downlink beamforming codebook at the base station. Simulations demonstrate that the approach dynamically adapts beam patterns to maximize efficiency across multiple user groups, avoiding inter-beam interference for simultaneous beams and enhancing overall system performance. This work advances beam management techniques for future wireless networks, showcasing the potential of MARL in creating environment-specific, efficient beam codebooks for multiuser hybrid MIMO systems.

Invited Speaker

Optical probing-based detection of Amyloid−β and Tau in human CSF using machine learning

NOAM LHIYANI[1], ABHIJIT SANJEEV[1], YEVGENY BEIDERMAN[2], JAVIER GARCIA[3] AND ZEEV ZALEVSKY[1]

[1]Faculty of Engineering, Bar-Ilan University, Ramat-Gan, 52900, Israel
[2]Faculty of Electrical Engineering, Holon Institute of Technology (HIT), Holon 5810201, Israel
[3]Departamento de Óptica, Universitat de València, c/Dr. Moliner, 50, 46100 Burjassot, Spain

Abstract: Alzheimer's disease is a neurological disorder that affects brain cells that progressively die which is resulting in memory loss. This is the most serious dementia that the world is facing now. Early detection of the disease is the only cure for the disease. Amyloid-β and Tau (proteins) are two biomarkers whose concentration in Cerebral Spine Fluid (CSF) indicates the presence of Alzheimer's disease. However, current clinical tools are not efficient enough in detecting low concentrations of these proteins when the disease is at a very early stage. Additionally, these techniques extract the proteins from the body causing a change in the properties of these proteins. Here, we present our novel computational technique in which we show the remote sensing of these proteins using Raman spectroscopy [1] performed through a scattering medium. This optical probing is obtained by focusing the shaped wavefront through the medium [2,3] followed by machine learning algorithm to the detect the biomarkers in the Raman spectrum.

Thus, we can measure the relevant biomarkers (proteins) without altering their environment by applying a simple non-invasive technique for focusing light through a scattering medium.

Keywords: Optical probing, Raman Spectroscopy, Focusing through scattering medium, Machine learning

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Invited Speaker

Transforming Healthcare with IoT and Federated Learning

Dr. Abhishek Das,
Associate Professor and former Head
Dept. of Computer Sc. & Engineering
Aliah University, Newtown, Kolkata, West Bengal, India.

Abstract- The integration of the Internet of Things (IoT) and Federated Learning (FL) is revolutionizing the healthcare industry, offering new avenues for patient care, diagnostics, and personalized medicine. This talk explores the transformative potential of these technologies in healthcare, highlighting their synergistic impact on data management, security, and the delivery of intelligent health services.

IoT in healthcare involves a network of interconnected devices such as wearable sensors, smart implants, and remote monitoring tools that collect and transmit real-time patient data. These devices enable continuous monitoring of vital signs, medication adherence, and lifestyle factors, providing a comprehensive view of patient health. IoT facilitates timely interventions, reduces hospital visits, and enhances the management of chronic conditions, leading to improved patient outcomes and reduced healthcare costs.

Despite its advantages, the widespread adoption of IoT in healthcare presents significant challenges, particularly concerning data privacy, security, and interoperability. The vast amount of sensitive health data generated by IoT devices is often siloed, making it difficult to harness its full potential for comprehensive analysis and decision-making. Moreover, conventional centralized data processing models raise concerns about data breaches and compliance with regulations like GDPR and HIPAA.

Federated Learning addresses these challenges by enabling collaborative machine learning across multiple decentralized devices without the need to transfer raw data to a central server. Instead, FL trains models locally on edge devices and only shares model updates, significantly enhancing data privacy and security. This decentralized approach is particularly beneficial in healthcare, where data sensitivity and compliance are paramount.

Combining IoT with Federated Learning creates a powerful framework for real-time, secure, and intelligent healthcare solutions. For example, in remote patient monitoring, IoT devices can continuously gather patient data, while Federated Learning can analyze this data locally to provide personalized insights without compromising patient privacy. This approach enables predictive analytics for early disease detection, personalized treatment plans, and adaptive health interventions.

Several use cases demonstrate the impact of IoT and Federated Learning in healthcare. For instance, in managing chronic diseases like diabetes, IoT devices can monitor blood glucose levels, while FL algorithms adjust insulin recommendations based on aggregated data from similar patients. Similarly, in pandemic response scenarios, FL allows for the development of predictive models for disease spread without sharing sensitive patient data across institutions.

While the combination of IoT and Federated Learning holds immense promise, challenges such as model accuracy, device heterogeneity, communication overhead, and the need for robust federated algorithms remain. Future research must focus on improving FL protocols, enhancing model robustness, and developing standards for interoperability among diverse IoT devices and platforms.

The convergence of IoT and Federated Learnin represents a transformative shift in healthcare, offering scalable, secure, and personalized health solutions. By addressing the challenges of data privacy and enabling real-time, decentralized analytics, this integration paves the way for a future where healthcare is more connected, patient-centric, and responsive.

This talk aims to provide insights into the current landscape, emerging opportunities, and the future of healthcare powered by IoT and Federated Learning, encouraging collaboration and innovation in this rapidly growing field.

Prof. (Dr.) Harsupreet Kaur,
Professor, Department of Electronics Engineering,
and Dean of Faculty of interdisciplinary and Applied Sciences.
University of Delhi, India.

She is currently Head, Department of Electronic Science, University of Delhi, New Delhi, India and Dean, Faculty of Interdisciplinary and Applied Sciences, University of Delhi. She received the B.Sc.(Hons.) and M.Sc. degrees in Physics and the Ph.D. degree in Electronics from the University of Delhi, New Delhi, India, in 2001, 2003, and 2008, respectively. She has authored or coauthored over 120 technical papers in international journals and various international/national conferences. She has supervised 03 Ph.D. students, 50 M.Sc. dissertations and currently 02 students are working under her supervision. Her current research interests are in the areas of analytical modeling, design, and simulation of advanced MOSFET devices like cylindrical/surrounding gate, FinFETs, ferroelectric materials based advanced devices, reconfigurable devices, devices with novel channel materials, Ga 2 O 3 devices power devices etc. She is reviewer to many journals including IEEE, IOP, Elsevier, Springer, etc. She is Senior Member of IEEE and life member of Semiconductor Society of India. She is the Secretary of IEEE EDS Delhi Chapter. She has served as TPC, Track chair in many reputed international conferences. She was the recipient of the Young Scientist Award in the XXIX General Assembly of the International Union of Radio Science (Union Radio-ScientifiqueInternationale) URSI-GA 2008.

Professor Mike Hinchey
University of Limerick, Ireland

He is Professor of Software Engineering at University of Limerick, Ireland. Prior to joining Lero, Professor Hinchey was Director of the NASA Software Engineering Laboratory; he continues to serve as a NASA Expert. In 2009 he was awarded NASA's Kerley Award as Innovator of the Year. Hinchey holds a B.Sc. in Computer Systems from University of Limerick, an M.Sc. in Computation from University of Oxford and a PhD in Computer Science from University of Cambridge. The author/editor of more than 15 books and over 200 articles on various aspects of Software Engineering, at various times Hinchey previously held positions as Full Professor in Australia, UK, Sweden and USA. He is a Chartered Engineer, Chartered Engineering Professional, Chartered Mathematician and Charted Information Technology Professional, as well as a Fellow of the IET, British Computer Society and Irish Computer Society. He is President of IFIP (International Federation for Information Processing) and Vice-Chair (and Chair-Elect) of IEEE UK & Ireland section. He is also Editor-in-Chief of Innovations in Systems and Software Engineering: a NASA Journal and Journal of the Brazilian Computer Society.

Dr. SayanChatterjee
Professor, Dept. of Electronics and Telecommunication Engineering
Jadavpur University

Sayan Chatterjee was born in Kolkata, India, in 1980. He received the B.E degree (gold medal) in ECE from Vidyasagar University, India, in 2003 and the M.E. degree in ETCE from Jadavpur University, Kolkata, India, in 2005. He has obtained Ph.D. degree in Engineering from Jadavpur University in 2015. He has served as Scientist in SAMEER, Kolkata, from 2005 to 2009 and was involved in design of strategic sub-systems for different defense agencies. In 2007, he has been deputed as Visiting Scientist in the California State University, Northridge, CA, USA. He has joined as Assistant Professor at the Department of Electronics and Telecommunication Engineering, Jadavpur University in December, 2009. Currently he is serving as Professor in Jadavpur University. He has served as secretary and treasurer of IEEE Kolkata section from 2014 to 2017. He is currently serving as Vice president of Institution's innovation council. JU. He was awarded outstanding volunteer for his service in IEEE Kolkata section in 2014 and 2019. He has received Career Award for young Teacher from AICTE in 2014-15. He has been awarded as SAKURA science alumni credential in 2020. He has also been deputed as delegation team member through faculty exchange programme under RUSA incubation, Jadavpur University to MUMA college of Business, University of South Florida in 2019. He has also been appointed as Coordinator of IC Design and Fabrication Centre, Jadavpur University. He is a senior member of IEEE and member of IEEE Special Interest Group on Humanitarian Technology (SIGHT), Institute of Engineers, Universal Association of Computer and Electronics Engineers. He has published 39 Journals, 4 book chapters. His research interest includes VLSI and RF system design, microwave and millimeter wave antennas, SIW technology, design of microwave passive devices, Low power VLSI.

Dr. Eng. Karol Kuczynski
Warsaw University of Technology · Institute of Radio electronics and Multimedia Technology

He graduated from the Faculty of Mechatronics at the Warsaw University of Technology, in the field of "Automation and Robotics" and specialization "Industrial Measuring Systems". During the implementation of his master's thesis, he developed a concept and built a computer station for measuring magneto strictive strains. He was a scholarship holder of the development program of the Warsaw University of Technology. Since 2006 he has been writing articles in the nationwide monthly magazine "elektro.info" being the thematic editor of this magazine. For over 15 years he has participated in the development of fair guides for the International Trade Fair ENERGETAB in Bielsko-Biala. In 2015-2016 he collaborated in creating the weekly of the Association of Polish Electrical Engineers, entitled "Week in SEP". In 2017 he received the Medal of prof. Michał Doliwo-Dobrowolski from the President of the Association of Polish Electrical Engineers (SEP). He is the author of the highest rated scientific article (2nd prize) at the 9th International Computing, Communication and Sensor Network Conference in Calcutta in 2020. In 2022 he defended his doctoral thesis "Evaluation of Operating Parameters of the Magnetoelectric Sensor Using Artificial Intelligence Methods". On September the 29th, 2022 the Senate of the UTH in Radom awarded him the degree of Doctor of Engineering and Technical Sciences in the discipline of: automatic control, electronics and electrical engineering. In 2022 he received the Medal of the 100th Anniversary of the Association of Polish Electrical Engineers in recognition of his merits in promoting electrical knowledge and in gratitude for cooperation with SEP. Currently, he works as an assistant professor at the Institute of Radio electronics and Multimedia Technologies at the Faculty of Electronics and Information Technology of the Warsaw University of Technology. He deals with magnetoelectric sensors, energy harvesting and modeling of sensors.

Dr. Kandarpa Kumar Sarma
Professor and Head, Department of Electronics and
Communication Engineering, GUIST, Gauhati University, India

Dr. Kandarpa Kumar Sarma, currently Professor and Head, Department of Electronics and Communication Engineering, GUIST, Gauhati University, India specializes in computer vision, human computer interaction, cognitive and software defined radio, mobile communication, artificial intelligence, deep learning, speech processing and antenna design. He completed MTech in Signal Processing in 2005 from IIT Guwahati, India. He is a Senior Member of IEEE (USA) and a fellow of Institution of Electronics and Telecommunication Engineers (IETE) (India). Currently he is associated with research in the areas of pandemic compliant smart infrastructure development, AI aided approaches in MIMO-NOMA networks, cognitive electronic warfare and high data rate micro-strip patch antenna designs. Earlier he was associated with the design of high data rate wireless system design using software defined radio. He has been the editor in chief two international journals (International Journal of Intelligent System Design and Computing, Inder science and International Journal of Circuits and Electronics) and Associate Editor of Network: Computation in Neural Systems, Taylor and Francis.

Prof. (Dr.) Zeev Zalevsky
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He received his B.Sc. and direct Ph.D. degrees in electrical engineering from Tel-Aviv University in 1993 and 1996 respectively. Zeev is currently a full Professor and the Dean of the faculty of engineering in Bar-Ilan University, Israel. His major fields of research are optical super resolution, biomedical optics, nano-photonics and fiber-based processing and sensing architectures. Zeev has published more than 570 peer review papers, 340 proceeding papers, 9 books (6 authored and 3 as an editor), 32 book chapters and about 100 patents. Zeev gave about 620 conference presentations with more than 220 invited/keynote or plenary talks. He is a fellow of many large scientific societies such as SPIE, OSA, IEEE, EOS, IOP, IET, IS&T, ASLMS, AIMBE and more. He is also a fellow of the American National Academy of Inventors (NAI). For his work he received many national and international prizes such as the Krill prize, ICO prize and Abbe medal, SAOT prize, Juludan prize, Taubelnblatt prize, young investigator prize in nanotechnology, the International Wearable Technologies (WT) Innovation World Cup 2012 Prize, Image Engineering Innovation Award, NANOSMAT prize, SPIE startup challenge prize, SPIE prism award, IAAM Scientist Medal Award, International Photonic Award, Dr. Horace Furumoto Innovations Professional award, The Asian Advanced Materials Award, Edison Award, IEEE distinguished lecturer award, VEBLEO Scientist Award, Joseph Fraunhofer Award/Robert M. Burley Prize, Lotfi Zadeh Memorial Award, E&T Innovation Award, CES (Consumer Electronics Show) 2022 Innovation Awards, German Innovation Awards 2022, the Humboldt research prize, SPIE 2024 Chandra S. Vikram Award for Metrology and more.

Besides his academic research activity, Zeev is also very active in commercializing his inventions into start-up companies. Zeev was and is involved in technologically leading of more than 10 startup companies.

Dr. Abhishek Das
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Dr. Abhishek Das is currently working as an **Associate Professor** and Head **in the Dept. of Computer Sc. & Engineering** at **Aliah University, Kolkata.** His Research Area is in Medical Image Processing, Machine Learning, Data Science and IoT. He has received a Post Doctoral Research position from **University of West Scotland, UK** by a Fellowship received from the European Commission. He has also worked as an Assistant Professor in the Dept. of Information Technology, **Tripura University (A Central University), India**. He has worked previously as a Reader in Computer Sc. & Engineering, **Indian Institute of Space Science & Technology(IIST)** and Lecturer in Information Technology, Bengal Engineering and Science University, Shibpur (now **IIEST Shibpur**). He is a **Associate Editor** of **Microsystem Technologies** (**SCI** Indexed Journal), **Editorial Board** Member of IJCDS, Elsevier, Scopus Indexed (Univ. of Bahrain). **Associate Editor** of American Journal of Advanced Computing, USA. **Associate Editor** of S.I. in Indonesian Journal of Electrical Engineering and Computer (**Scopus** Indexed Journal), **Editor** of S.I. in IAES **International Journal of Artificial Intelligence**, (**Scopus** Indexed journal). He also has filed and published **9 (Nine) patents** and **1 copyright** in his name as co-inventor at India Patent Office, Govt. of India and Intellectual Property Office, U.K. His Ph.D is from the Dept. of Computer Sc. & Engineering, **Jadavpur University, India**. His M.S. in **Electrical & Computer Engineering** from **Kansas State University, USA** and B.Tech in Computer Science & Engineering from **Kalyani University, India.** He has worked as a Business System Analyst in **Blue Cross Blue Shield New York, USA** & as a Quality Analyst in **Vensoft Inc. Phoenix, USA** and also as a Consultant Project Manager in the Software Industry. He is also a **Visiting Scientist** at **Indian Statistical Institute, Kolkata**. He has also worked in Technical Educational Administration as Regional Officer and Asst. Director (on deputation) at **AICTE**(under MHRD, Govt. of India). He is an **NCERT National Scholar, New Delhi** and a **Tilford Dow Scholar, USA**. His Biography has been published in the 28th edition of **National Dean's List, USA**. He is a **Fellow** of IETE, **Fellow** of NBSP (Regd. under **Ministry of Corporate Affairs**, Govt. of India), **Fellow** of South Asian Chamber of Scientific Research & Development (SAIARD) (certified by MSME, Govt. of India) , Member of IEEE, Computer Society of India, ACM and an Honorary Senior Member of IACSIT Singapore. He has several publications in International and National Journals and peer-reviewed Conferences. He is also a TPC Committee Member of IEEE and other international conferences in Europe and South-East Asia. His PhD students have been awarded their Degree from Jadavpur University, Aliah University and working in different Govt. colleges and institutes.

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Dr. Zaira Zaman Chowdhury is working as a Senior Lecturer in Nanotechnology & Catalysis Research Centre (NANOCAT), a potential National HICOE and UM COE. Earlier, she was appointed as Senior Research Fellow under the same institution. She has completed her Post-Doctoral Research Fellowship from 1/10/2013-31/03/2015 in Nanotechnology & Catalysis Research Centre (NANOCAT), University Malaya. Previously, she was appointed as Research Officer in Nanotechnology & Catalysis Research Centre (NANOCAT), University Malaya from 1/04/2013 to 30/09/2013. She has started her career with University Malaya from November 2008 Research Assistant in the Department of Chemistry under supervision of Prof. Dr. Sharifuddin Mohd. Zain. She received her PhD in Environmental Analytical Chemistry from University of Malaya in 2013, whilst MSc. In Polymer Engineering and Technology from University of Dhaka, Bangladesh in 2003, and BSc. in Applied Chemistry and Chemical Engineering Technology from University of Dhaka, Bangladesh in 2001 and Bachelor in Education (BEd.) in 2007 from Royale University of Dhaka, Bangladesh. She has completed her training in Environmental Analytical Chemistry from TAFE, Sydney, Australia. She has received Cambridge International Diploma for Teacher & Trainers (CIDTT) from Cambridge University, UK with “Distinction” in 2006-2007. She has experience in the development of fiber polymer composites, waste water treatment and adsorbent preparation for batch and fixed bed adsorption system. She has worked for synthesis of micro and nano structured carbon and biomass processing using catalyst. She has conducted some research to illustrate the catalytic application of carbon as well as extraction of nano and micro dimensional cellulose. She has contributed more than 117 papers in ISI & Scopus top ranking journal with 95 international Conference Proceedings with H index 30 in scopus, publon 27 and google scholar 34. At present she is guiding 12 PhD and 11 Mphil scholars. She has 49,715.65 RM International Grant achieved from International Industries and Universities. As a Principal investigator, she had 163,336 RM earlier.

Dr. Zaira has received several esteemed award such as Dr. Zaira has received several esteemed award such as International Education Excellence Award in nanotechnology 2021 from CPAC from UK, , Distinguished Researcher Award in Nano-catalyis and Water Treatment, Excellent Scientific Award in 2020 for "Carbon Chemistry and Water Treatment, IMRF Brezileius Award in Nanotechnology and Catalysis 2019, India; Best Researcher Award in Applied Chemistry and Chemical Engineering 2019, India; ISPA Gunasekaran Award 2018, India; Best Scientist Award in Nanotechnology 2018, India; Elsevier’s Atlas award in 2015, Gold Award and Silver Award from Malaysian Inventions and Design Society (MINDS) and University Malaysia Perlis (UniMAP, 2013). She has received CIMA Appreciation Award from Malaysian Inventions and Design Society (MINDS) and University Malaysia Perlis (UniMAP, 2013). Recently she has received Bronze Award from International Engineering Innovation and Invention Exhibition (IENVEX), Universiti Malaysia Perlis (UniMAP 2014). In 2016, she has received best paper award on Fourth Generation Nanoantioxidant Synthesis from New Zealand.

Paper Id.: 04

CPW-Fed Microstrip Patch Antenna Design on Textile Substrate for Wearable Applications

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Abstract—In order to increase the bandwidth of a coplanar waveguide (CPW)-fed microstrip patch antenna on a textile substrate, an innovative design strategy is presented in this study. By incorporating innovative changes to the patch pattern, the suggested design expands on earlier studies and aims to greatly enhance the antenna's bandwidth performance. The improved antenna design maintains ideal radiation characteristics while achieving a considerable extension of bandwidth using rigorous modelling and optimization approaches. The antenna exhibits potential for integration into wearable and textile-based communication devices since it is constructed on a flexible textile substrate, or FELT. The effectiveness of the suggested design is validated experimentally, demonstrating significant bandwidth gains over conventional equivalents. The innovative design that is being presented not only advances textile-based antenna technology but also has potential for a number of applications that require wideband communication capabilities in compact form factors.

Keywords—CPW-fed microstrip patch antenna, textile substrate, bandwidth enhancement, wearable antennas, FELT.

Paper Id.: 05

Design of a new Folding XOR algorithm based chaotic image cryptosystem

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Abstract- This study explores the predictive capabilities of three distinct machine learning algorithms—Autoregressive Integrated Moving Average (ARIMA), Long Short-Term Memory (LSTM), and an ensemble method that integrates both ARIMA and LSTM—using data from Microsoft's stock market performance. Focusing on forecasting stock prices for Microsoft over a 7-year period, our research evaluates the performance of each algorithm. Through meticulous analysis, we find that while ARIMA achieves an accuracy of 73%, LSTM demonstrates improved performance with an accuracy of 82%. Notably, our ensemble method, which combines ARIMA and LSTM, outperforms both individual algorithms, yielding a significantly higher accuracy of 87%. This research highlights the effectiveness of leveraging a hybrid approach, integrating ARIMA and LSTM, to enhance predictive accuracy in financial market forecasting, specifically for Microsoft's stock data.

Keywords- Stock market, Machine learning, Autoregressive Integrated Moving Average (ARIMA), Long Short-Term Memory (LSTM), Support Vector Regression (SVR).

Paper Id.: 06

Adaptive Interference Mitigation in Intelligent Transport Systems: Hadamard vs. Allan Variance Approaches

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Abstract- Vehicular Visible Light Communication (VVLC) presents a promising alternative to traditional radio frequency (RF) technologies in Intelligent Transport Systems (ITS) due to its immunity to electromagnetic interference and use of existing light-emitting diode (LED) infrastructure. This study investigates the performance of a Hadamard variance-based adaptive Normalized Least Mean Squares (NLMS) filter for noise cancellation in VVLC systems, comparing it to the previously established Allan variance-based filter. The analysis reveals that while Allan variance excels at low signal-to-noise ratios (SNRs) by efficiently handling white noise, Hadamard variance demonstrates superior performance at high SNRs by mitigating the impact of random walk noise and linear drifts more effectively. This study's results indicate that the Hadamard variance-based adaptive filter improves bit error rate (BER) performance significantly, especially in high SNR conditions, thus enhancing the reliability and efficiency of VVLC systems in varying noise environments.

Keywords- Intelligent Transport System (ITS), Visible Light Communication (VLC), solar interference, Allan variance, Hadamard variance.

Paper Id.: 07

Deep Learning Ensemble for Predicting Blood Glucose Levels in Type 1 Diabetes Patients

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Abstract- Anticipating Blood Glucose (BG) levels for patients can assist in averting hypoglycaemia and hyperglycemia episodes beforehand. Therefore, to predict Blood Glucose (BG) values in Prediction Limits (PHs) of 15, 15, 30, and 60 minutes, this study suggests a predictive for blood glucose management using a deep learning algorithm. The model proposed by the author uses past Blood Glucose values congregated by devices used for constant monitoring of glucose as an endogenic feature and information about insulin administration(times) and carbohydrate intake as an exogenic factor. In this study, authors developed a predictive model for Type-1 diabetes using clinical parameters. The four prediction models were taken, which are subjected to a Bat Algorithm (BA) to optimize the weights using ensemble approaches and provide the ultimate predicted BG values. The model performance was rigorously evaluated using RMSE and loss function metrics to assess the accuracy and convergence. RMSE value of 0.082 was achieved, indicating a high level of precision for blood glucose level prediction; while the loss function stabilized at 0.0068, demonstrating the model's effectiveness in learning from the dataset. These results surpass current benchmarks and suggest that further refinement, such a model could significantly enhance the predictive monitoring of Type-1 diabetes. The findings in the paper indicate that the suggested model performs noticeably better than the baseline after applying four different algorithms for further optimization of results.

Index- Deep Neural Network, Deep Learning, Ensemble Learning, Feature Selection, Prediction Model, Type-1 diabetes.

Paper Id.: 08

Smart Monitoring of Vegetable crop by Drone: A Cyber-Physical System Model in the Arena of Accuracy Agriculture

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Abstract- Cyber Physical System is showing a very important part in the arena of accuracy agriculture and it is predictable to progress productivity in order to provide food to all and prevent hunger. To accelerate the consciousness of CPS in the arena of accuracy agriculture it is essential to grow some devices, software tools and hardware components depend upon interdisciplinary methods, along with authentication of the ideologies through prototype. In this framework this paper offerings a precision agricultural supervision model through drone based on CPS design technology. Accuracy agriculture means to include the cleverness in the production of the harvest, by real-time identifying technique, optimization for improving health of soil-crop , as well as most efficient cyber-occupied tools for computerization and adeptness. Combined analysis of agricultural and ecosystem of soil is in promising stages, but increasing progressively with enhancements in sensing skills and data-influenced decision making. Our target to grow an adaptive Sensor based -Drone-Satellite system for endorsing agricultural operations and sustainability through matching often-conflicting purposes (e.g. price ecological or environmental and commercial). This integrated system is a theoretical prototype constructed on a cyber-physical interface to enable real multi-scale manual decision making by coupling innumerable existing and yet-to-be implemented data resources with AI techniques (e.g. artificial neural networks). The planned flexible system search for best solutions that can efficiently support fundamental, improve agriculture reliability and finally food safety.

Keywords- Microcontroller, Smart Agriculture, Sensors, Drone, Pesticide, Motors, Container.

Paper Id.: 09

Advances in Autonomous Robot Navigation: A Review of Time-of-Flight Camera Integration and SLAM Techniques

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Abstract— This paper provides a comprehensive review of the integration of Time-of-Flight (ToF) cameras in autonomous navigation for mobile robots. It highlights the critical role ToF cameras play in enhancing the navigation capabilities of robots, focusing on their ability to provide precise and rapid depth information essential for dynamic environments. The review addresses the inherent challenges of ToF cameras, such as limited field of view, low resolution, and mapping inaccuracies, and discusses various innovative solutions proposed in the literature. Additionally, the paper examines different Simultaneous Local- ization and Mapping (SLAM) algorithms compatible with ToF cameras, analyzing their benefits and limitations. By exploring these advancements, the paper aims to provide valuable insights into the future directions of ToF camera applications in robotic navigation.

Keywords— Time of Flight, SLAM, algorithm.

Paper Id.: 13

Object detection mechanism using Yolov8over the surface of solar panel

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Abstract- The use of artificial intelligence has significantly improved object detection in today's world. It has become a valuable tool for efficiently solving real- world problems. However, there is an area that has not received much attention yet – detecting objects on solar panels and finding effective solutions forthe removal of them. In this research paper, the Yolov8 methodology has been used to train an algorithm to identify such objects on the solar panel surface. The Roboflow Object Detection algorithm was employed for annotating the dataset and classifying multiple objects. After that, we rigorously trained, validated, and tested the model using Yolov8s, Yolov8l, and Yolov8n.

Keywords- Object detection, CNN, Yolov8, OpenCV, Solar Panel.

Paper Id.: 15

A reconfigurable wideband MIMO antenna combines RF energy harvesting

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Abstract—This article investigates a reconfigurable wideband MIMO antenna with dual band-notch features for RF energy harvesting. The optimized antenna, measuring 89×51.02×1.6 mm^3, comprises two semi-circular monopole components sharing a ground plane. Split ring resonators on the ground plane enhance isolation between the components. Modified C-shaped slots in the radiating patch and rectangular split-ring resonators provide band-notch characteristics at 3.5 GHz (WiMAX) and 5.5 GHz (WLAN). Reconfiguring the band-notch function is possible through PIN diodes in the notch structures. The mutual coupling remains below -18 dB across 1.5-13 GHz, with an impedance bandwidth of 158.62%. The antenna shows significant efficiency and gain drops at notch frequencies, ensuring effective interference suppression. Performance metrics such as envelope correlation coefficient, port isolation, radiation patterns, efficiency, gain, and diversity gain indicate suitability for MIMO systems. Additionally, the antenna achieves a maximum harvested energy of 4.88 V, making it viable for wideband, band-notching, MIMO, and RF energy harvesting applications..

Keywords—Band notch, MIMO antenna, PIN diodes, Reconfigurable, RF energy harvesting.

Paper Id.: 16

Advancement in FinFET as a Low-power Device and its Future Prospect

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Abstract— The advancements in CMOS technology stem from ongoing downscaling efforts aimed at achieving greater density, improved performance, and reduced power consumption. However, these efforts also lead to detrimental short-channel effects (SCEs). FinFET devices exhibit superior behavior regarding SCEs (<60 mV/dec SS, around 30 mV/V DIBL) as compared to MOSFET technology. In this study, the physical attributes of FinFET have been examined. The electrical properties of FinFET have been assessed. The effective mobility of charge carriers within the FinFET channel has been studied, considering Coulomb, phonon, and surface roughness scattering. The article also delves into the theoretical underpinnings of the negative capacitance (NC) effect. It provides the comparisons of various technology nodes (with FinFET at 5/14nm node). FinFET technology has been implemented to enhance overall performance, encompassing efficiency, power consumption, and area optimization. The market research report on FinFET Technology includes a statistical analysis of the top 7 companies based on revenue. However, this article examines various applications where FinFETs are utilized.

Index—Fin field-effect transistor (FinFET), Moore's law, negative capacitance (NC), Gate All Around (GAA) FET

Paper Id.: 21

Enhancing Image Processing Applications with Rounding in Recursive Approximate Multipliers

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Abstract-This paper presents a novel approach to recursive approximate multipliers (RRAM) tailored for digital image processing tasks in VLSI circuits, focusing on enhancing power efficiency and error control. Two multipliers i.e., RRAM-I and RRAM-II have been reported here and also been applied in image processing applications like smoothing and edge detection. These multipliers offers significant improvements in image quality, as evidenced by enhanced peak signal-to-noise ratio (PSNR) and structural similarity index (SSIM). RRAM-I demonstrates a remarkable 62.60% reduction in energy usage compared to traditional models, while RRAM-II further improves, achieving a 63.78% reduction in energy consumption. Additionally, for 16-bit multipliers, RRAM-I and RRAM-II offers substantial performance gains over existing models. By focusing on power efficiency and accuracy, our designs are positioned as the best choices for practical use in IoT devices, mobile devices, and embedded systems, offering superior performance and adaptability in various image processing applications.

Keywords- Recursive multiplication, Approximate multipliers, Rounding, Error metrics, Image smoothing.

Paper Id.: 23

Power Quality State Determination Based on Matrix Observation

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Abstract- This paper presents two new methods of power quality state determination (PQSD). These methods have been rigorously tested on several IEEE test systems, including 5-bus, 14-bus, 30-bus, 57-bus, and 118-bus, under a wide range of simulated operating conditions. The thorough testing process, when compared with the weighted least square technique, clearly demonstrates the effectiveness of the proposed methods under all test conditions, instilling confidence in their reliability.

Keywords- Bad-data analysis, co-variance matrix, power quality determination, weighted Least Square technique

Paper Id.: 24

Innovative Coordination Control Approach for Enhancing Grid Connected Inverters' Resilience to Voltage Unbalance

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Abstract- Voltage unbalance in electrical grids presents a substantial challenge that directly impacts grid-connected inverters' operational efficiency and reliability, which are integral for the seamless integration of renewable energy resources. In response to this issue, this paper develops a sophisticated, coordinated control strategy that harnesses the dynamic synchronization capabilities of the d-q rotating coordinate system, specifically designed to counteract grid fluctuations. This innovative approach, which represents a novel application of dynamic synchronization techniques in the context of grid-connected inverters, facilitates the meticulous regulation of active and reactive power through a synergistic integration of advanced power management techniques and adaptive tuning mechanisms, thereby significantly enhancing the system's responsiveness and overall reliability. The strategy's effectiveness in substantially improving the fault ride-through capabilities of grid-connected inverters, even under conditions of marked voltage unbalance, is rigorously validated through a series of comprehensive experimental procedures, instilling confidence in the robustness of the results. The findings represent a pivotal advancement in the field, underscoring the originality of the research. By offering an advanced control solution that markedly improves the resilience and stability of grid-connected inverters, this work significantly contributes to the existing body of knowledge, addressing a critical gap in the literature and paving the way for future research in this area. The implications of this study are far-reaching, providing a robust framework for enhancing the integration of renewable energy sources into the power grid, thereby supporting the global transition towards sustainable energy systems.

Keywords- Grid-Connected Inverters, Voltage Unbalance, Decoupled Double Synchronous Reference Frame, Coordination Control Strategy, Positive and Negative Sequence Separation.

Paper Id.: 25

Secure IoT Sensor Networks through Advanced Anomaly Detection with Kolmogorov-Arnold Networks (KANs)

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Abstract- In the field of the Internet of Things (IoT), the security and reliability of sensor networks is rather lacking, open to Denial of Service (DOS), scanning, malicious control, malicious operation, spying, and data probing. This paper explores the use of Kolmogorov-Arnold Networks (KANs) for advanced anomaly and attack detection in IoT sensor networks. For real-time application, The implementation makes use of Gaussian Radial Basis Function (RBF) alongside with Reflectional Switch Activation Function (RSWAF). The RBFs allows the network to capture local non-linear relationships, improving the performance of model, both in terms of accuracy and computational efficiency. The RSWAF provides a computationally efficient activation mechanism that facilitates faster learning and inference. Our experiments demonstrate that the faster-KAN implementation significantly reduces training and inference times while maintaining high accuracy and robustness in detecting anomalies and attacks.
Index Terms—Internet of Things,.

Keywords- Internet of Things, Kolmogorov-Arnold Networks, Machine Learning, Attack Detection, Anomaly Detection, Gaussian Radial Basis Function, Reflectional Switch Activation Function.

Paper Id.: 26

A Simulation Study of Gate-Pocket Overlap Dual Metal Hetero- junction Tunnel Field-Effect Transistor

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Abstract - This study proposes a new configuration called Hetero-stacked Dual Metal Gate Tunnel Field-Effect Transistor (HS-DMG-TFET). The suggested device showcases enhanced ON-state current (ION), a heightened ION/IOFF current ratio, and decreased sub-threshold swing, representing a substantial advancement in both DC and switching performance compared to existing TFET topologies. The proposed design includes a dual-metal gate featuring Molybdenum and Aluminum, which overlaps with the Si-Ge pocket. The resulting modifications in electron flow and tunneling behavior within the device lead to improvements in various performance metrics. Significantly, an ION/IOFF ratio of ~1014 is attained, with an ON-state current of 1.818×10-3A/μm and an OFF-state current of 1.174×10-17 A/μm. The device also exhibits a significantly reduced sub-threshold slope, measuring 8.61 mV/dec, indicating superior transient performance. These DC characteristics underscore the potential of utilizing composite material gates for low-power applications, showcasing their advantages over traditional single-metal counterparts. Besides, enhanced trans conductance and other RF performance metrics have been obtained for suggested device which confirms the device's suitability for a variety of analog and RF applications.

Keywords: Subthreshold Slope, ION, IOFF, Composite-Gate, Molybdenum, Tunnel-Field-Effect-Transistor (TFET).

Paper Id.: 29

Enhancing Power Transfer Efficiency of Wind Energy to the Grid Using a Three-Phase Matrix Converter with Optimization-Based Delta PWM Control

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Abstract- Nowadays, renewable energy is gaining consumer interest because of its rising global energy consumption and environmental concerns. This article focuses on improving Wind Energy Conversion Systems (WECS) by employing Permanent Magnet Synchronous Generators (PMSG) for their benefits, including minimized size and weight. The traditional two-stage conversion process, involving rectification and inversion connected by a DC link capacitor, leads to efficiency loss and power quality issues. This paper suggests a variable speed WECS with a PMSG coupled to the grid through a matrix converter (MC) to resolve these issues with traditional approaches. The novelty of this lies in the incorporation of PMSG in a WECS through a three-phase matrix converter using the Emperor Penguin-based Dynamic Evolving Intelligent Control (EPDEIC) approach with Delta Pulse with Modulation (DPWM) strategy. This hybrid mechanism addresses the drawbacks of traditional two-stage conversion processes by eliminating the need for a DC link capacitor, reducing size and weight, and improving overall system efficiency. The proposed system has been created and tested in the MATLAB/Simulink environment with positive results. Finally, simulation findings at various operating points consistent with the observed effects are displayed and compared with the conventional methods. It shows that the power transfer efficiency of wind form to grid is improved and parameters such as THD, energy loss, and computational complexity are minimized in this proposed system.

Keywords- wind power generation, matrix converter, total harmonic distortion, pulse width modulation, artificial intelligence, and optimization.

Paper Id.: 30

Cryptanalysis of a secure and efficient aggregate signcryption scheme

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Abstract- For drone based communication, Verma et al. proposed an effective and reliable aggregate signcryption scheme to preserve the confidentiality, integrity, and authenticity of the shared data. They demonstrated that their scheme achieves confidentiality. However, we have proven that their scheme can be compromised by an A1 adversary. We provide a detailed explanation of the security issues and propose an improved scheme that addresses these vulnerabilities. Through a performance evaluation, we demonstrate that our proposed scheme offers superior computational and communication efficiency than the Verma et al. scheme.

Keywords- Certificateless aggregate signcryption, Cryptanalysis, Pairing free, Confidentiality attack.

Paper Id.: 32

Satcom Earth station DAta Repository Management (SEDAR) System

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Abstract-The SATCOM ground segment infrastructure enables delivery of satellite communication services. Ground segment is extensively tested and validated for meeting all the specifications and functional requirements. Acceptance Test results of Satcom Hub projects are presently documented manually within ISRO. In addition, Satcom Hub data such as link budget, history/log of CAMC activities and VSAT terminal rollout details are all present in documented form and are not easily accessible within ISRO. SEDAR provides a centralized repository & management system of all the above-mentioned Artefacts and earth station data. It aids in centralizing, organizing, and leveraging records currently present in scattered manner to support efficient and effective earth station operations. By providing a unified platform for data management, analysis, and collaboration, SEDAR contributes to enhanced productivity, compliance and decision-making. SEDAR is a web-based solution developed using Django framework based on MVT (Model view template) architecture and PostgreSQL database in backend.

Keywords- Satcom (Satellite communication), CAMC (Comprehensive Annual maintenance contract), and VSAT- Very Small Aperture Terminal), Django, web framework, MVT, database.

Paper Id.: 35

AC-DC Power Flow Problem: Effect of Control Parameters

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Abstract- The paper addresses the evolving needs of power system analysis in the context of increasing adoption of DC technologies and renewable energy sources. It introduces a novel AC-DC load flow methodology designed to overcome the limitations of traditional AC-only models and to provide a more comprehensive framework for analyzing mixed AC-DC networks. The proposed methodology integrates conventional AC load flow techniques with DC system requirements. It systematically evaluates the performance of this approach against traditional AC-only models and other hybrid methods through detailed test case applications. This includes comparing solution accuracy and computational efficiency.

The AC-DC load flow method demonstrates significant improvements over traditional AC-only models in terms of both accuracy and computational efficiency. The method effectively addresses the challenges associated with integrating AC and DC components, providing a more robust and adaptable solution for modern power systems. This paper introduces a novel approach that combines the strengths of conventional AC load flow techniques with the specific needs of DC systems. The proposed method offers enhanced accuracy and efficiency in power flow calculations, representing a significant advancement in the field of power system analysis.

Keywords- AC-DC Load Flow; Power System Analysis; Load Flow Methodology; Electrical Networks; Hybrid Power Systems; Computational Algorithms.

Paper Id.: 37

Finite Element Method Study of Acoustic Pressure Effect on MEMS Based Micromachined Ultrasonic Transducer

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Abstract- Consideration is given to the investigation of Microelectromechanical System (MEMS)-based CMUT for simulation and modeling. The characteristics and behavioural analysis of circular CMUT, where the acoustic pressure influences the behavioural traits, are provided in this research report. This paper presents three different types of CMUT: CMUT without a perforation, CMUT with a perforation in the center, and CMUT with four side perforations are examined and compared the sound pressure level and the output pressure. This paper uses COMSOL Multiphysics for simulation while examining the properties of the three CMUTs..

Keywords- CMUT, COMSOL, MEMS, ultrasound, circular, acoustics pressure, perfectly matched layer (PML), membrane, displacement, frequency, capacitance, insulation,

Paper Id.: 38

A Comprehensive Study of Junctionless TFETs as a Low Power Device

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Abstract- In the domain of emerging transistor technologies, Junction less Tunnel Field Effect Transistors (JL TFETs) have gained significant attention for their potential to revolutionize electronic devices by offering steep subthreshold swings and ultra-low power consumption. Unlike traditional transistors, JLTFETs operate without a conventional junction, providing unique advantages in terms of fabrication simplicity, enhanced scalability, and reduced variability in threshold voltage. This paper explores various JLTFET device structures, focusing on their distinct characteristics, including carrier transport mechanisms, energy band alignment, and tunneling efficiency. The research investigates optimizing tunneling distances to improve ON current, while effectively mitigating short-channel effects and minimizing off-state leakage. Through a comprehensive comparative analysis of different JLTFET architectures, this research contributes valuable insights into the evolving era of transistor technology, addressing both the promising features and the technical challenges associated with JL TFETs in practical applications.

Keywords- Junctionless TFET, Moore's law, MOSFET, Heterojunction, Leakage Current, BTBT.

Paper Id.: 39

Analysis on The Collapse Voltage Using Different Structural Parameters of Ultrasonic Micromachined Transducer

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Abstract- The purpose of the present study is to determine the variation in the physical behaviour of micromachined ultrasonic transducer (MUT) corresponding to collapse voltage of device. Capacitance MUT have potential applications in non-contact, non-destructive examiner of thin metal films, gas flow metering, high intensity ultrasonic therapy and non-invasive medical imaging. In this study, we investigated by COMSOL Multiphysics for modeling and studying the physical behaviour of CMUT which is then compared by analytical model. Different collapse voltages are obtained with the device structural parameters as well as with the materials used for the membrane and electrode. From our study, it is observed that using Si3N4 rather than SiC and Diamond as the membrane material let us achieve the desired performance of the device.

Keywords- CMUT, COMSOL, MEMS, ultrasound, circular, Silicon Carbide, Membrane, Electrode, FEM.

Paper Id.: 40

Optimum Speed-dependent Variable Inertance Profile considering Vehicle Dynamics Performance Criteria

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Abstract- This paper presents a novel approach to optimize vehicle suspension system through the introduction of a speed-dependent variable inertance profile. Unlike conventional passive suspension systems, which offer limited characteristic to changing driving conditions, this study explores the adaptability of variable inerter to improve the overall vehicle suspension performance. It focuses on optimizing two major performance metrics in vehicle suspension such as ride comfort and road holding ability through determining the optimal range of variable inertance profile. However, the selection of appropriate variable inertance profile remains as a challenging task due to the complex interplay between these performance metrics. A multi-objective genetic algorithm optimization was employed to optimize the trade-off between them using a quarter vehicle model, resulting in a Pareto front solution. Through extensive analysis, the effects of variable inerter and its configurations on suspension performance metrics were investigated. Our findings reveal that a linearly-increasing variable inerter provide superior improvement in parallel suspension configuration, offering better ride comfort compared to both passive inerter and non-linearly-increasing variable inerter based on a typical quarter passenger car model. .

Keywords- Optimum variable inertance, Speed-dependent profile, Vehicle dynamics, Multi-objective optimization, Ride comfort.

Paper Id.: 42

Challenges in Big Data and Proposed Algorithm for Sustainable Management

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Abstract- Big Data is the new driving force in every sector, e.g. defense, pharmaceutical, transportation, e- commerce, agricultural, education, tourism, entertainment, energy, finance & banking etc. Besides the unprecedented usage of social media platforms (Whatsapp, X, Facebook, YouTube, TikTok, WeChat, Telegram, Instagram etc.), dealing with petabytes of (mainly, unstructured) data have become a routine work for service providers. Managing Big data involves a complex workflow, including collection, storage, analysis, and maintenance that require not only the cutting-edge technologies but also personnel with competent knowledge and skill at different stages of Big Data eco-system. Although Big Data is useful in extracting insights and enables making informed decision in different applications; but it has some serious inherent challenges. In this paper, we strongly emphasize on the present challenges in the field of Big Data, i.e. storage, maintenance, energy consumption, land requirement, security and other logistics and also propose an algorithm for sustainable data management. The proposed algorithm if followed, sustainable development goals (SDGs) can be achieved to a great extent by cloud service providers (CSPs).

Keywords- Big Data, Datacenter, sustainability.

Paper Id.: 43

Modeling and Simulation of Surface Potential of DMDG SOI MOSFET with Fringing Capacitance and High-k Material

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Abstract- In modeling the surface potential of Dual Material Double Gate Silicon-On-Insulator Metal Oxide Semiconductor Field Effect Transistor (DMDG SOI MOSFET) the concept of fringing capacitance is included to increase the capacitance computations' accuracy. Back gate capacitance, silicon substrate capacitance and front gate capacitance are the three forms of capacitance that are taken into consideration. Both with and without the inclusion of fringing effect, the capacitance are calculated. The findings demonstrate that adding fringing capacitance enhances the accuracy when compared with TCAD simulation result. Furthermore, the model also takes the effect of the high-k gate dielectric (HfO2) into account. The model is presented based on 2D Poisson's equation.

Keywords- Double Gate, Fringing capacitance, High-k, Surface potential

Paper Id.: 44

Green Computing: Optimized Data Center Infrastructure for Entrepreneurial Service-Oriented Growth

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Abstract- As data center infrastructures experience increasing power dissipation, power management and efficiency have grown in importance and are influencing system architecture as a whole. This issue is relevant to data centers since cooling and power supply expenses are major considerations. New advances in hardware features and designs have given incorporated energy-saving measures priority, along with the ability to disable specific device functionality or reduce speed while not in use For businesses to assess their energy-saving efforts, standard are necessary. Unfortunately, the development of workload metrics, benchmarks, or standards to assess the effectiveness o energy optimization from a system perspective has receive little attention. To this end, this study examines how dat centers can reduce operating costs and save energy b successfully utilizing performance-tracking growth indicators We mainly focus on employing Power Usage Effectivenes (PUE) measures in a tier 4-level data center in Nigeria explain observed phenomena. Based on the power consumption and workloads that each primary category carries out, we develop a virtualized classifier. The total power usage by the data center facilities and IT equipment was calculated using the corpus. 3.1 was the facility's total performance value, which indicates subpar and ineffective operations in comparison to previous recommended ways. Future energy-efficiency enhancements in data centers were recommended.

Keywords- Data-center, Energy-efficiency, Green-Computing, PUE, Entrepreneurship, Virtualization.

Paper Id.: 47

A Design of Synaptic Interconnection Method in CMOS for Spiking Neural Network

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Abstract- Synaptic interconnections are essential for neural communication and support learning and recall phases in the spiking neural networks (SNNs). An interconnection between neurons communicates the information using spikes via synapses that influence neural properties like synaptic weight values (strength), synapse current, spike firing, and refractory period. This paper introduces a method for designing an analogical circuit of synaptic interconnection that operates as a memristor, which can be designed by a CMOS-based trans conductance model, providing a low-loss conduction path that offers less energy consumption per spike during signal transformation. The method allows synapse communication with the desired delay and optimal spike propagation. Moreover, it leads to an interconnect protocol called address event representation (AER) that connects the neurons to perform inter-neural communication, ensuring continuous connectivity in the spiking neural networks (SNNs). The proposed model was simulated using Cadence GPDK 45nm technology, providing a spike delay of 241.42ns and an excitatory synaptic current of 24.72μA and 0.754pJ of energy per spike consumption when supplied with 1V power.

Keywords- Spiking Neural Network (SNN), synaptic connection, pre-neuron, post-neuron, silicon synapse, Neural core, spike-timing dependent plasticity (STDP), leaky integrate-and fire (LIF).
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Paper Id.: 49

CMNV2: Compact MobileNet-V2 towards Hardware Deployment for Colorectal Diseases Classification

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Abstract-Polyp classification is essential for early detection and treatment of colorectal cancer. Computational complexity and performance accuracy are always challenging for traditional classification models. In this work, we have proposed a lightweight Compact MobileNet-V2 (CMNV2) deep learning architecture designed for efficient performance on resource-constrained devices. The proposed Mobile-Net effectively uses the depthwise separable convolution that performs efficiently and is suitable for edge devices like FPGA. We have evaluated the performance of CMNV2 on the Kvasir dataset, which effectively distinguishes between three classes: polyps, normal cecum, and ulcerative colitis. The proposed architecture achieved a precision of 93.4% while significantly reducing the computational complexity. The model's effectiveness is validated through comparisons with stateof- the-art (SOTA) architectures. The model is deployed on FPGA ZCU104, performing better than other conventional models with a throughput of 521.11 frames per second..

Keywords: polyps, segmentation, biomedical, FPGA, deep learning.

Paper Id.: 50

District wise Paddy Crops Yield Prediction in West Bengal State of India through Bayesian Ensemble Learning Method

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Abstract—Producing agricultural commodity plans for import-export strategies and raising farmer incomes requires quantitative and economic assessment, which depends on field-level paddy crop yield prediction. It always takes a lot of time and money to produce paddy crops. A crop yield prediction model is designed to predict increased crop yields. In this study, we used different types of model including Long Short-Term Memory (LSTM), CNN, Dense Model, Simple Averaging Ensemble model, Bayesian Ensemble Model and Random Forest Model for predicting paddy crop yield prediction in West Bengal, a state of India. Here, mainly focused on Bayesian Ensemble model as it decomposed historical yield data to estimate the effects of both technological trends and climate change on crop yield. It gives the accuracy of 85% which is better than other models. Another model i.e. Random Forest gives the result in accuracy of 98% on the same historical yield data. The novelty of this study is that the farmer can cultivated paddy crops without any risk in the region of different districts of West Bengal and faced minimum loss.

Keywords— Bayesian Ensemble, Random Forest, LSTM, Paddy crops yield prediction.

Paper Id.: 51

Ground Glass Opacities (GGO) Segmentation in Lung CT Images Using Frangi Vesselness Measure and Adaptive Region Growing Algorithm

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Abstract-This paper proposes an automated technique for quickly and accurately identifying Ground Glass Opacities (GGO) in chest CT scans. Initially, mathematical morphology-based techniques with Otsu's thresholding were utilised to segment the lung elds. Then, considering the anatomical characteristics of bronchioles, the Frangi Multiscale Vesselness Measure is used to detect and eliminate them. To ensure accurate GGO region identication, a novel adaptive region growing algorithm with a locally adaptive threshold to stop the growing process is involved that e-ciently divides the area of interest according to intensity values. In this study, 155 lung CT scans of COVID-19-infected pneumonia patients are used to evaluate the performance of the proposed method. The proposed algorithm outperformed existing approaches with sensitivity, specicity, and accuracy above 96%. This automated testing method can help radiologists quickly and accurately detect GGOs in lung CT scan images. It could also be used as candidate for machine learning models to identify GGOs in lung CT scans.

Keywords- Medical Image · Lung CT scans · Segmentation · Ground Glass Opacity · Frangi Vesselness measure · Region Growing Algorithm

Paper Id.: 56

Machine learning algorithms enabled data-driven decision-making by Internet of Things device

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Abstract- This study presents a comparative analysis of machine learning (ML) techniques for Internet of Things (IoT) applications, focusing on stacking ensemble meta learners. We evaluate various ML algorithms including decision trees, random forests, SVMs, k-NN, and neural networks, both individually and in ensemble settings. The assessment criteria include accuracy, computational efficiency, memory requirements, and adaptability to IoT constraints.

Using benchmark datasets relevant to IoT applications, our experiments compare individual algorithms against stacking ensembles with different meta learners. Results show that stacking ensembles consistently outperform single models across various IoT tasks, demonstrating superior generalization capabilities, especially with heterogeneous data sources. However, we also identify challenges related to increased computational complexity on resource-constrained IoT devices.

This study provides valuable insights for selecting appropriate ML algorithms in advanced IoT applications, contributing to the field's advancement.

Keywords- Intelligent Decision-Making, Internet of Things, Machine Learning, Stacking Ensemble, Meta Learners, Comparative Analysis

Paper Id.: 58

Reliability and Cost Optimization of Systems withLinear dependent components using Levy walk based Multi-objective Differential Evolution

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Abstract- This work aims to comprehensively analyze and investigate the potential of reducing development costs by adjusting the near-optimal reliability and level of active redundancy in a complex system design that includes non-repairable linearly dependent components. The problem exhibits a high level of computational complexity. Thus, we have selected Levy walk basedmulti-objective differential evolution (LevyDEMO) as the solver. Nevertheless, multiobjective differential evolution tends to become trapped in local optima, resulting in premature convergence. Therefore, our suggested system integrates the Levy walk-based scaling factor to balance exploration and exploitation, effectively improving outcomes. Significant improvements in reliability and cost have been seen in the performance of the suggested technique in simulations of series systems with linearly dependent components. The positive maximum performance improvement values (MPI) on dependability and cost for the proposed algorithm effectively characterize the conditions for aof the settings mentioned above. The solutions produced by the proposed algorithm are all practical as the proposed algorithm competes with MOEA/D, NSGA-II, and MOPSO efficiently..

Keywords- Controllable inverter pair, Differential interconnect, Method of logical effort, Repeater insertion, Self-controllable, Serial link, Surfing, Wave-pipelining

Paper Id.: 59

Gaussian Mixture Model Induced UNet Architecture for Breast Cancer Image Segmentation

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Abstract- Breast cancer is one of the most common types of cancer diagnosed in women which ranks the second most leading cause of cancer death among women worldwide. Computer-assisted detection system has already demonstrated promising outcomes in digital mammography and is employed in clinical practice to enhance diagnosis accuracy. Automated lesion segmentation can improve the diagnosis accuracy by precise localization of tumour regions and avoid the misperception with other areas. In recent times, Deep Learning (DL) based medical image segmentation has shown superior results than traditional approaches. The UNet architecture has gained considerable attention in breast cancer image segmentation. Different customization is made over the base UNet model to improve its accuracy. In this paper we present a Gaussian Mixture Model induced Attention UNet (GMA-UNet) model that combines fine-grained features of convolution layers with GMM separated features, and context features of deep layers using an attention module. An experimental study is performed to compare the performance of the proposed model with the state-of-the-art DL models. It is observed that our model has performed better than the transferlearned benchmark models customized to similar number of layers.

Keyword- Breast cancer image segmentation, UNet, GMM, Transfer learning, Attention network

Paper Id.: 60

Enhancing the Indoor Air Quality in an Urban Apartment as in the Case of Chennai using native plants

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Abstract- Pollution in highly populated areas in metro cities like Chennai, needs to be addressed as it affects the physical, psychological, social wellbeing of the dwellers. Land being a major constrain, has contributed to the development of closely spaced high-rise apartment complexes which lead to poor indoor air quality. Native indoor plants serve as a natural medium in absorbing air pollution entering indoors mainly through balcony spaces and also enhance the aromatic and visual quality of indoor space. A pilot study consisting of a planting palette comprising of flowering, air-purifying medicinal and vertical wall plants have been used in an urban apartment balcony space in Chennai, Tamilnadu, India. The level of absorption of pollutants such as carbon dioxide, carbon monoxide, total volatile organic compounds, benzene and formaldehyde were monitored in the planted and non-planted balcony through Internet of Things for a period of one month. The results achieved indicate that the level of carbon dioxide, carbon monoxide and benzene in planted balcony reduced considerably in comparison with the non-planted balcony at any given point of time. The selected plant palette has displayed minimal absorption of formaldehyde and total volatile organic compounds. But both the pollutants are found to reach the permissible limt within two hours in the planted balcony and four hours in the non-planted balcony after the floor mopping activity. Hence the study proves that plants as a natural medium are inexpensive and best in absorbing air pollutants thereby improving the quality of the indoor environment.

Keyword- Benzene, Carbon Dioxide, Carbon Monoxide, Formaldehyde, Indoor Air Pollution, Indoor Pollutants, Total Volatile Organic Compounds, Tropical Native Plants.

Paper Id.: 61

AI Driven Predictive Analytics for Multi-Cloud Management

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Abstract- Cloud computing has revolutionized IT infrastructure management by providing scalable and efficient solutions through remote data centers accessible via the internet. The integration of Artificial Intelligence (AI) with cloud optimization has further enhanced resource management capabilities, enabling dynamic allocation of computing resources based on fluctuating workloads. This abstract explores how AI-driven predictive analytics facilitates proactive resource allocation, workload scheduling, and security management in multi-cloud environments. Through case studies and real-world examples like Netflix and General Electric, the efficacy of AI in optimizing performance, reducing downtime, and enhancing cost-efficiency is demonstrated. Key implementation strategies include selecting appropriate AI tools, robust data preprocessing, continuous model training, and seamless integration with existing cloud management systems. Looking forward, the evolution of AI technologies promises further advancements in multi-cloud management, empowering organizations to leverage data-driven insights for sustainable growth and competitive advantage in the digital age.

Keyword- Privacy-Preserving, Machine Learning, Framework, Models Dataset

Paper Id.: 62

Enhancing Enterprise Architecture with AI Powered Decision Support System

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Abstract- This paper explores how integrating artificial intelligence (AI)-powered decision support systems (AI-DSS) with enterprise architecture (EA) can improve decision-making and overall organizational performance. AI-DSS analyze vast amounts of data to provide real-time insights and recommendations, leading to benefits such as improved decision quality, enhanced agility, optimized resource allocation, and increased operational efficiency. The paper outlines a framework for implementing AI-DSS within an EA, including assessing current needs, designing the system, data collection and management, and integration with existing systems. Case studies showcase how AI-DSS is being utilized in financial services, manufacturing, and healthcare. The paper concludes by discussing the benefits and return on investment (ROI) of AI-DSS, along with the challenges of implementation.

Keyword- Enterprise, Architecture, Artificial intelligence, System

Paper Id.: 62

FinOps Optimization Strategies in Multi-Cloud Deployments

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Abstract- Optimizing cloud costs in a multi-cloud environment requires a strategic approach that balances cost efficiency with performance requirements. This paper explores key techniques for achieving this balance, emphasizing the importance of FinOps practices. We delve into concepts like right-sizing resources, leveraging auto-scaling for dynamic allocation, and strategically utilizing multi-cloud pricing models to minimize expenditure. Furthermore, we explore strategies for managing data transfer costs and outline best practices for continuous optimization and governance, including budget setting, cost alerts, and regular cost reporting. By implementing these strategies and fostering a culture of cost awareness throughout the organization, businesses can harness the full potential of FinOps to achieve significant cost savings and ensure financial accountability in their multi-cloud deployments..

Keyword- Enterprise, Architecture, Artificial intelligence, System

Paper Id.: 64

Design and Development of compensation circuit for Efficient Wireless Power Transfer System

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Abstract- This paper illustrates how a Wireless Power Transfer (WPT) system transfers electricity from the primary/input side to the secondary/output side. Utilizing a varying load, the device's efficiency is examined. Additionally, the reduction in induced voltage as the primary and secondary distance changing is examined. There is a lot of convenient process for this method of charging electric vehicles. After being converted to high frequency, the power is delivered via an HF converter circuit. Both the compensation circuit and the converter circuit have a significant impact on efficiency. The efficiency rises to an ideal level as the load increases. As the load increases, the produced voltage decreases to a certain point, at which point the secondary coil experiences no induced potential. This study included a general and methodical assessment of the eight fundamental compensation systems in addition to the aforementioned methodologies. The five criteria, which are crucial in the majority of WPT, were first used to the evaluation of source frequencies. After conducting thorough evaluations, it was discovered that I-SS (current series-series compensation) is the only compensation plan that successfully achieves the best efficiency. In other words, it can ensure the safe operation of the inverter in the absence of a magnetic coupling because its frequencies for optimal efficiency, maximum load power transfer, and load-independent output characteristic are all the same and regardless of the coupling coefficient k. Second, at the maximum efficient frequency, or secondary resonance frequency, the efficiency, load power, and component ratings were assessed for each of the eight fundamental compensation methods. Plans for pay that meet every efficient criterion at once. A design guideline for real-world I-SS applications was proposed based on the analysis results, and it was experimentally validated using a 1200 W air coil prototype operating at 33 kHz.

Paper Id.: 66

Noise Suppressing Cascaded Digital Filter Design for Removal of ECG Artifacts

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Abstract- The mortality rate due to cardiovascular disease (CVD) is increased globally in recent times. Electrocardiogram (ECG) is an effective tool to monitor electrical activity of heart, hence it is important to detect cardiac disease. ECG signal is often contaminated with noise because of its low frequency and low power nature and this leads to faulty prediction of cardiac disease. Thus a de-noising mechanism is utmost important to record clean ECG signal. A cascaded digital filter comprised of IIR-FIR-IIR structure is designed in this paper. To test the performance of proposed model we used 18 ECG recordings from MIT-BIH Normal Sinus Rhythm database and mixed those signals with Baseline Wander noise, Electrode Motion noise, Power Line noise, Muscle Noise and Additive White Gaussian noise. We compared our test results with existing works based on metrice Improved in SNR (SNRimp) and found our designed model outperforms the others with an average 18.79% efficiency.

Keywords- ECG, De-noising, IIR Filter, Moving Average Filter, SNRimp.

Paper Id.: 68

Model-Based System Identification for Characterizing Respiratory Response to External Stimuli

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Abstract- Characterizing respiratory reactions to external stimuli is essential for understanding the complicated respiratory system, especially in clinical diagnosis and treatment. This research uses model-based system identification to correctly record and assess the respiratory system's reaction to mechanical ventilation, environmental changes, and pharmaceutical drugs. We use advanced system identification methods to create a dynamic model that accurately captures the respiratory system's nonlinear and time-varying behavior.

Data-driven modelling and physiological insights are used to determine respiratory function parameters in the proposed strategy. The model is validated using controlled laboratory and clinical trial data. The results show that the model-based method accurately predicts respiratory responses, improving respiratory dynamics comprehension and management in healthy people and respiratory problem patients.

This study advances respiratory physiology and biomedical engineering by improving respiratory function monitoring, prediction, and optimization in response to external stimuli. The system identification framework may improve patient-specific treatment techniques and individualized respiratory medicines.

Keywords- Respiratory System, System Identification, Respiratory Dynamics, External Stimuli, Nonlinear Modeling, Time-Varying Systems.

Paper Id.: 69

Secure Data Transmission Protocol in Multi Cloud Environments

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Abstract- In today's rapidly evolving digital landscape, multi-cloud environments have emerged as a pivotal strategy for organizations seeking to optimize their IT operations, enhance flexibility, and ensure resilience. This paper delves into the complexities and security challenges associated with multi- cloud environments, with a specific focus on secure data transmission protocols. We explore the fundamental aspects of encryption techniques, such as AES and RSA, and secure communication protocols like TLS, SSL, and IPsec, which are essential for safeguarding data across diverse cloud platforms. Additionally, the critical roles of authentication and authorization mechanisms, including multi-factor authentication and role-based access control, are discussed in ensuring robust security. Regulatory compliance and data sovereignty issues are examined, highlighting the importance of adhering to regulations like GDPR and HIPAA while managing data across multiple jurisdictions. Through real-world case studies of companies like Netflix and Capital One, we illustrate practical implementations, and the lessons learned from their multi-cloud strategies. The paper also addresses emerging threats such as advanced persistent threats and supply chain attacks, alongside technological advancements in AI, blockchain, and zero-trust architectures that offer enhanced security solutions. Finally, recommendations for practitioners are provided, emphasizing the need for continuous monitoring, proactive management, and adherence to best practices to effectively navigate the complexities of multi-cloud environments and ensure secure data transmission.

Keywords- Transmission, Protocol, Multi-Cloud.

Paper Id.: 70

Real-time Anomaly Detection in Cloud Infrastructure using AI.

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Abstract- Real-time anomaly detection plays a crucial role in safeguarding and optimizing cloud infrastructure. This work explores the application of various AI models for anomaly detection in the cloud, including statistical methods, machine learning approaches, and deep learning techniques. We discuss the strengths and limitations of each approach, highlighting their suitability for different types of anomalies and data characteristics. Furthermore, the document emphasizes critical implementation considerations, such as selecting the appropriate AI model, establishing effective alert notification systems, and ensuring scalability and performance for handling large data volumes within cloud environments.

We showcase the versatility of real-time anomaly detection through use cases in diverse cloud computing services like IaaS, PaaS, and SaaS. Finally, the work explores challenges and limitations associated with real-time anomaly detection, including data quality, anomaly threshold setting, and mitigating false positives. By addressing these challenges and embracing advancements in AI technology, real-time anomaly detection can become an even more powerful tool for comprehensive cloud security and performance management.

Keywords- Enterprise, Architecture, Artificial intelligence, System.

Paper Id.: 71

Management-Oriented Growth Model of Small Manufacturing Firms Using Deep Belief Network (DBN)

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Abstract- This study presents a hierarchical generative model of deep belief network, to scale the gating structure of management in small manufacturing firms using a circular neural network. Both top-down and bottom-up probabilistic inference are efficiently facilitated by this translation-invariant model. Our solution relies heavily on probabilistic max-pooling, a novel technique that decreases the representations of higher level management functions in a probabilistically sound way. After that, a comparative experiment is carried out, and the small manufacturing firm's experimental indexes for the management model are created. After 60 rounds, our testing shows an average absolute error of 64.53 USD for the business value projection. This indicates that our algorithm works well and has a positive impact because it performs exceptionally well on the business growth value of small manufacturing enterprises. Our experiment also shows that the absolute percentage error of the business growth value projection of a small manufacturing firm is 3.68% when the number of iterations reaches 60 demonstrating once more the positive management impact of the corporate management paradigm based on this technique. Thus, we deduce that our model is capable of conducting hierarchical (top-down and bottom-up) inference on small manufacturing companies.

Keywords: Algorithm, Deep-Belief-Network, Management-oriented Growth, Manufacturing firms, max-pooling, Informatization.

Paper Id.: 72

Assessing the Impact of Vibration-Based Music Therapy on the Hearing impaired Using Digital Signal Processing and Machine Intelligence.

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Abstract- An innovative method for improving auditory and sensory experiences is the incorporation of vibration-based music therapy into the rehabilitation process for those with hearing impairments. This study uses machine intelligence and advanced digital signal processing (DSP) techniques to assess the efficacy of this therapy. Through the analysis and processing of vibration-based music signals, the research endeavors to measure the influence of these signals on hearing-impaired individuals, emphasizing enhancements in sensory perception and general well-being. As part of the process, a DSP framework is created to precisely record and adjust vibrations that the hard of hearing experience. To provide individualized therapeutic experiences, machine intelligence algorithms are used to understand and modify these vibrations based on each person's unique sensory profile. The three main criteria that are measured are cognitive engagement, emotional well-being, and sensory responsiveness. According to preliminary findings, vibration-based music therapy has potential advantages in enhancing sensory integration and emotional reactions in hearing-impaired individuals when linked with advanced DSP and machine learning methods. This study adds to our knowledge of complementary and alternative therapies and emphasizes how digital technologies might support conventional rehabilitation techniques. The main goals of future study will be to improve these methods and apply them to larger groups of people.

Paper Id.: 73

A Simulation Based modelling in collating the air pollution of a highly commercialised street – A case of Mint Street, Chennai

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Abstract- An Air Quality Index (AQI) that regularly exceeds 190, well over acceptable values, is a sign of the serious environmental problems that Mint Street, a heavily populated mixed-use neighbourhood in Chennai, suffers. Dust, increased urbanization, traffic congestion, and other human activities can all cause pollution in this area, which makes it especially vulnerable. In order to replicate Mint Street's current environmental conditions and assess the effects of including cutting-edge green infrastructure initiatives, such as aeroponic gardening, algae farming, and green roofs, this study uses ENVI-met software. This paper presents a simulation-based approach utilizing Envi Met software to assess and mitigate air pollution in Mint Street. Envi Met offers a robust platform for modelling microclimates and pollutant dispersion

Keywords- Respiratory System, System Identification, Respiratory Dynamics, External Stimuli, Nonlinear Modeling, Time-Varying Systems.

Paper Id.: 75

CMOS Translinear Topology Based Bio-transformation Reaction Design and Analysis

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Abstract- Cytomorphic engineering is an interdisciplinary field that employs engineering tools and expertise to mimic complex cellular processes with the aim of deeper understanding. This paper outlines the design of synthetic models that mimic essential cellular biochemical reactions, enabling the recreation of complex biological pathways in vitro. Utilizing 0.18 μm CMOS technology, these artificial cellular models are artificially designed and simulated. The detailed design and analysis of the basic building blocks using CMOS technology for biochemical reactions are discussed. Transformation reaction is considered a sample to demonstrate the synthetic model accurately which describes the dynamics of these biochemical processes. Validation of the synthetic model's behavior is achieved by comparing it with Matlab SimBiology tool, thereby establishing confidence in the predictive capabilities of these synthetic models.

Keywords- Bioelectronic circuit, Bio-molecular reaction, Translinear topology, CMOS technology, SimBiology tool.

Paper Id.: 78

Meta-Module Discovery from Multiple Data Sources to Identify Gene Modules Associated with Human Diseases

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Abstract- Extensive evidence recognizes that proteins associated with several diseases frequently interact with each other. This leads to the development of different network-based methods for uncovering the molecular workings of human diseases. These methods are based on the idea that protein interaction networks act as maps where diseases manifest as localized perturbations within a neighborhood. Identifying these areas, known as disease modules, is essential for in-depth research into specific disease characteristics. While many computational methods have been developed the underlying connectivity patterns within these modules are still yet to be explored. This work aims to fill this gap by integrating multiple biological data sources through non-negative matrix factorization (NMF) technique. This article proposes a framework for predicting disease-associated modules by integrating multiple biological data sources. Specifically, disease-associated protein-protein interactions (PPIs) and Gene Ontology-based similarity are used as sources of information, which are integrated using non-negative matrix factorization (NMF) based clustering. To maintain the similar structure of all the data sources, they are first converted into the respective biological network, where PPI information and Gene Ontology information are transformed into the PPI network and GO semantic similarity network, respectively. The NMF-based approach is used to integrate two types of modules to obtain a set of meta-modules that retain the important characteristics of interaction information and functional similarity of genes or proteins. A multi-label classification technique is utilized to assign new disease labels to genes within each meta-module. A total of 3131 gene-disease associations are identified and validated through a literature survey in PUBMED.

Keywords human Disease Network, Disease-Associated genes Module Detection, Gene Ontology, NMF, Multilabel Classification.

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The Lotfi A Zadeh Memorial Award

The Lotfi A Zadeh Memorial Award was being given to **Prof. (Dr.) Avijit Kar, Professor, Department of Computer Science Engineering, Jadavpur University, Kolkata, West Bengal, India,** in 13th International Conference on Computing, Communication & Sensor Networks. CCSN2024. Joint Organizer & Venue: Aliah University, Newtown, Kolkata, West Bengal, India. Date: 27th and 28th September, 2024. as Hybrid mode. Organizer: Applied Computer Technology, Kolkata, West Bengal, India.

The Vidyasagar Award

The Vidyasagar Award is being given to **Prof. Ganapati Panda, Deputy Director (Retired), IIT Bhubaneswar, Director (Ex), NIT Jamshedpur, Dean (Ex), NIT Rourkela, India.** in 13th International Conference on Computing, Communication & Sensor Networks. CCSN2024. Joint Organizer & Venue: Aliah University, Newtown, Kolkata, West Bengal, India. Date: 27th and 28th September, 2024. as Hybrid mode. Organizer: Applied Computer Technology, Kolkata, West Bengal, India.

CCSN2024

12th International Conference on Computing Communication and Sensor Networks.
15th of October 2024 offline mode in hotel Novotel Mumbai Juhu Beach
and
16th & 17th of October 2024 online mode.
List of Invited Speakers/ Session Chairs

Invited Speaker

Dr. Harsupreet Kaur,

Professor, Department of Electronics Engineering,
and Dean of Faculty of interdisciplinary and Applied Sciences.
University of Delhi, India.

Talk Title: **Novel Design Strategies Based on Ga 2 O 3 MOSFETs for High Frequency Applications**

Keynote Speaker:

Dr. Mike Hinchey.

Professor of Software Engineering University of Limerick, Ireland, Professor Hinchey was Director of the NASA Software Engineering Laboratory; he continues to serve as a NASA Expert. In 2009 he was awarded NASA's Kerley Award as Innovator of the Year. Hinchey holds a B.Sc. in Computer Systems from University of Limerick, an M.Sc. in Computation from University of Oxford and a PhD in Computer Science from University of Cambridge.

Talk Tile: Building Resilient Autonomous Space Exploration Missions.

Invited Speaker:

Prof. Sayan Chatterjee,

Professor,
Department Of Electronics and Telecommunication Engineering,
Jadavpur University, Kolkata, West Bengal, India.

Talk Title: **Next-Generation Microwave Filters: Driving Compactness and Harmonic Control for 5G Communication and Beyond**

Invited Speaker**:**

Dr. Karol Kuczynski,
Assistant professor at the Institute of Radio electronics and Multimedia Technologies, Faculty of Electronics and Information Technology, Warsaw University of Technology. He deals with magnetoelectric sensors, energy harvesting and modelling of sensors.

Talk Title: **Problems with Inspecting Electrical Installations Using the Infrared Camera**

Invited Speaker

Dr. Kandarpa Kumar Sarma,

Professor, ECE, Gauhati University, Assam, India.

Talk Title: **Cognitive Beam Management for Next Generation Wireless Communication: A Centralized Learning Approach to Multiuser Codebook Design with Multi Agent Reinforcement Learning**

Keynote Speaker:

Prof. Zeev Zalevsky
Professor and the Dean of the faculty of engineering Bar-Ilan University, Israel. His major fields of research are optical super resolution, biomedical optics, nano-photonics and fiber-based processing and sensing architectures. His Google Scholar Citation is: 14685 (on 29/04/2021).

Talk Tile: Optical probing-based detection of Amyloid−β and Tau in human CSF using machine learning

	Invited Speaker: **Dr. Abhishek Das** General Chair of CCSN2024 Associate Professor, H.O.D. Department of CSE, Aliah University,New Town, Kolkata, West Bengal, India **Talk Tile: Transforming Healthcare with IoT and Federated Learning**
	Plenary Talk by: **Dr. Zaira Zaman Chowdhury,** Nanotechnology and Catalysis Research Center(NANOCAT), Institute of Advanced Studies(IAS), University of Malaya, Kuala Lumpur, Malaysia.
	Session Chair **Dr. Souvik Sengupta**, Associate Professor, Department of CSE, Aliah University, New Town, Kolkata, India.
	Session Chair **Dr. (Mrs.) Rupali Atul Mahajan,** Associate Professor & Head, CSE(Data Science Department), Associate Dean (R&D), Vishwakarma Institute of Information Technology, Pune, Maharastra.
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	Session Chair **Dr. Sabyasachi Bhattacharyya,** Assistant Professor, Department of ETE, Barak Valley Engineering College, Karimganj, Gauhati, Assam.
	Session Chair **Dr. Quazi Mohmmad Alfred,** Associate Professor, Department of CSE, Aliah University, New Town, Kolkata, India.
	Session Chair **Dr. J. Deny.** B.E., M.Tech., Ph.D., IEEE Professional Member, Kalasalingam Academy of Research and Education, (Deemed to be University), Tamilnadu.
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