



इलेक्ट्रॉनिकी एवं
सूचना प्रौद्योगिकी मंत्रालय
MINISTRY OF
**ELECTRONICS AND
INFORMATION TECHNOLOGY**



रा.इ.सू.प्रौ.सं.
NIELIT

3rd

NIELIT's International Conference on
Communication, Electronics & Digital Technologies
NICEDT-2025

14th-15th FEBRUARY 2025, Ropar Punjab



ABSTRACT BOOK

Conference Organizer :

National Institute of Electronics and Information Technology [NIELIT]
Ministry of Electronics and Information Technology (MeitY), Govt. of India

3rd NIELIT International Conference on Communication, Electronics and Digital Technologies 2025

14th & 15th February 2025

Abstract Book

Venue:

NIELIT Ropar

Organiser:

**National Institute of Electronics and Information Technology, Ministry of
Electronics and Information Technology (MeitY), Govt. of India**

© All Rights Reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or in any means - by electronic, mechanical, photocopying, recording or otherwise without prior written permission of the publisher. The scanning, uploading, and/or distribution of this document via the internet or via any other means without the permission of the publisher is illegal

Editing and Typesetting by: NIELIT, Ropar

Printed at: Ropar

Message from Hon'ble Secretary

I am delighted to extend a warm welcome to all attendees of the 3rd NIELIT's International Conference on Communication, Electronics and Digital Technologies [NICEDT-2025]. The NICEDT-2025 is being held on 14th and 15th February 2025 at NIELIT Ropar, the Main Campus of the recently notified NIELIT Deemed to be University under Distinct Category. I am delighted that NIELIT has focused on Research and Development in the changing technology scenario, especially disruptive advancements being seen in the AI domain. During the conference, we will explore the wealth of knowledge shared by researchers, Digital Technologies for Future Applications, Assistive Technology for Divyangjan and Strategy for Digital Skilling for building a Global Future Ready Workforce. As we navigate the rapidly evolving landscape of emerging digital technologies, it is crucial that innovation remains human-centric, ethical, and inclusive. This platform exemplifies our collective commitment to fostering advancements that empower every citizen, strengthen digital infrastructure, and secure our nation's technological future. I wish the conference great success in igniting meaningful discussions and collaborations.

S. Krishan, IAS

Secretary

Ministry of Electronics & IT,
Government of India

Message from Hon'ble Vice Chancellor & DG NIELIT

I am delighted to extend a warm welcome to all attendees of the 3rd NIELIT's International Conference on Communication, Electronics and Digital Technologies [NICEDT-2025], following the resounding success of our first two conferences held in New Delhi (2023) and Guwahati (2024). It gives me immense pleasure and a sense of homecoming that the NICEDT-2025 is being held on 14th and 15th February 2025 at NIELIT Ropar, the Main Campus of the recently notified NIELIT Deemed to be University under Distinct Category. During the conference, we will explore the wealth of knowledge shared by researchers in Artificial Intelligence, Machine Learning, Big Data Analytics, Cyber Security Forensic, Network and Mobile Security, Advanced Computing, Blockchain and Web Technologies, VLSI, Semiconductors, Electronic System, IoT, Microwave, Antenna and Communication. Focus will also be on Digital Technologies for Future Applications, Assistive Technology for Divyangjan and Strategy for Digital Skilling for building a Global Future Ready Workforce. The conference will provide a platform for the professionals and academicians working in the fields to interact, present their work and exchange ideas. I express my sincere gratitude to all authors, speakers and panellist for their invaluable contributions. Furthermore, we appreciate Springer's for extending their continued partnership in disseminating the knowledge shared at NICEDT-2025 through their esteemed, Book Series, 'Lecture Notes in Networks and Systems'. In closing, I extend my appreciation to all participants for your continued engagement and contributions to the conference and NIELIT Team for organising conference. The feedback and insights are invaluable as we strive for excellence and innovation in the realm of digital technologies.

Warm Regards,

Thank you

Prof. (Dr.) M. M. Tripathi

VC NIELIT Deemed University & DG NIELIT

Message from Conference Chairs

It is with great pleasure that we extend our warmest welcome to the 3rd NIELIT International Conference on Communication, Electronics & Digital Technologies (NICEDT-2025). Following the success of our first two conferences held in New Delhi (2023) and Guwahati (2024), we are thrilled to host this conference at Ropar, Punjab, offering an outstanding opportunity for researchers from universities and stakeholders associated with NIELIT. Our call for papers received an overwhelming response, resulting in the submission of 230+ full-length papers from academia, industry, and research facilities worldwide. Each submission underwent rigorous review by the Program Committee (PC), External Program Committee (EPC), External Review Committee (ERC), and additional expert reviewers, ensuring the highest quality standards. Authors were provided with an opportunity to address reviewer queries and resubmit their work during the review process.

After meticulous evaluation, 108 papers have been selected for the conference, while 15 papers have been chosen for poster presentations. The conference features papers from some of the renowned experts in academia and industry from across the globe. We trust that you will find the program both stimulating and thought-provoking, and that the co-located events will facilitate valuable exchanges of ideas among researchers and practitioners worldwide. We extend our heartfelt thanks to all staff of NIELIT, seniors from MeitY, panellists, academicians and Industry experts for their generous sponsorship, to our corporate supporters whose contributions are indispensable to the success of the conference, and to the steering committee for their unwavering support and guidance. Once again, we extend a very warm welcome to each and every one of you, and we eagerly anticipate productive discussions and collaborations at NICEDT-2025.

Sh. Deepak Wasan

Executive Director, NIELIT Ropar

Dr. Sanjeev Kumar Gupta

Executive Director, NIELIT, Ajmer

Dr. Jayaraj U Kidav

Executive Director, NIELIT Aurangabad

Message from Organizing Secretaries

It is with great pleasure and excitement that We extend a warm welcome to all participants and honourable guests to the 3rd NIELIT's International Conference on Communication, Electronics & Digital Technologies (NICEDT-25), set to take place on February 14th and 15th, 2025, at the serene premises of NIELIT Ropar. This gathering promises to be an enriching experience, bringing together industry leaders, scholars, and professionals from diverse sectors both nationally and internationally. Drawing inspiration from the remarkable achievements of NICEDT-24 held in Guwahati last year, we are thrilled to introduce an exciting lineup of engaging sessions that delve deep into the vanguard of technological progress. Covering a spectrum of topics ranging from Artificial Intelligence and Cyber Security to Quantum Computing and Blockchain, our conference aims to offer a holistic platform for navigating through the most recent advancements and shifts in our digital terrain.

As we convene in the vibrant city of Ropar, nestled along the picturesque banks of the majestic Sutlej River, we invite you to immerse yourselves in the rich cultural heritage and natural beauty that this region has to offer. The tranquil surroundings of Ropar, coupled with the flowing waters of the Sutlej, provide the perfect backdrop for meaningful discussions and fruitful collaborations. We are confident that NICEDT-25 will serve as a catalyst for knowledge exchange and innovation, fostering new ideas and partnerships that will drive progress in the ever- evolving landscape of communication, electronics, and digital technologies.

Once again, we extend heartfelt welcome to each and every one of you, and anticipate the insightful conversations and discoveries that await us at NICEDT-25.

Warm regards,

Dr. Manish Arora

Ms. Anita Budhiraja

Organising Secretaries, NICEDT-2025

Oganizers

Chief Patron

Shri S. Krishnan, IAS
Secretary, Ministry of Electronics and Information Technology (MeitY), Govt. of India.

Patron

Dr. Madan Mohan Tripathi
Hon'ble VC, NIELIT Deemed to be University & Director General, NIELIT.

Advisors

Shri Bhuvnesh Kumar, IAS, Additional Secretary, MeitY
Shri A. K. Pipal, Scientist-G, MeitY
Prof. S.N. Singh, Director, ABV-IIITM, Gwalior
Prof. Manoj Singh Gaur, Director, IIT Jammu
Smt. Sunita Verma, Scientist G, MeitY
Dr. Ranjan Maheshwari, Professor, Rajasthan Technical University, Kota

International Advisors

Prof. Rajkumar Buyya, University of Melbourne
Dr. Karel Sterxx Bangkok, University, Thailand
Prof. Valentina E, B.University Aurel Vlaicu of Arad

Conference Chairs

Sh. Deepak Wasan, Executive Director, NIELIT Ropar
Dr. Sanjeev Kumar Gupta, Executive Director, NIELIT, Ajmer
Dr. Jayaraj U Kidav, Executive Director, NIELIT Aurangabad

Technical Team/Advisors/Conveners

Shri Deepak Wasan, Executive Director, NIELIT
Shri V. Krishnamurthy, Executive Director, NIELIT
Shri Subhanshu Tiwari, Executive Director, NIELIT
Dr. Sanjay Kumar Dhurandher, Executive Director, NIELIT
Dr. Yumnam Jayanta Singh, Executive Director, NIELIT
Dr. Nitin Kumar Puri, Executive Director, NIELIT

Track Coordinators

Ms Jasbir Singh, NIELIT
Dr. Anirban Jyoti, NIELIT

Sh. Raminder Singh, NIELIT

Ms Shaweta Sharma, NIELIT

Sh Jitendra Bhatia, NIELIT

Sh. Akhil Arora, NIELIT
Sh. Prakash Pratik, NIELIT

Dr. Sanjeev Kumar Jha, NIELIT

Ms Jyoti Sharma, NIELIT

Ms Jyoti Sharma, NIELIT

Track 1 : Artificial Intelligence, Machine Learning, Big Data Analytics

Track 2: Cyber Security & Forensic, Network and Mobile Security

Track 3 : Advanced Computing- Cloud Computing, Edge Computing & Quantum Computing

Track 4 :Blockchain and Web Technologies

Track 5 :VLSI & Semiconductors, Electronic Systems, IoT, Microwave, Antenna and Comm.

Track 6 :Digital Technologies for Future Applications (Biotechnology, Augmented Reality and Virtual Reality, Metaverse etc.)

Track 7 :Assistive Technology for Divyangjan

Track 8 :Strategy for Digital Skilling for building a Global Future Ready Workforce

Organising Secretaries

Dr. Manish Arora, NIELIT
Ms. Anita Budhiraja, NIELIT

About National Institute of Electronics and Information Technology (NIELIT)

National Institute of Electronics and Information Technology (NIELIT), (erstwhile DOEACC Society), an autonomous scientific society under the administrative control of Ministry of Electronics and Information Technology (MeitY), Government of India was set up to carry out Human Resource Development and related activities in the area of Information, Electronics & Communications Technology (IECT). NIELIT is both in Formal and Non-Formal Education in the area of IECT besides development of industry-oriented quality education and training programmes in state-of-art areas. NIELIT has endeavoured to establish standards to be the country's premier institution form Examination and Certification in the field of IECT. It is also one of the National Examination Body, which accredits institutes/organisations for conducting courses in IT in the non-formal sector. As on date, NIELIT has 47+ centres located at Agartala, Aizawl, Ajmer, Alawalpur (Saksharta Kendra), Aurangabad, Bhubaneswar, Calicut, Chandigarh, Chennai, Chuchuyimlang, Churachandpur, Daman, Delhi, Dibrugarh, Dimapur, Gangtok, Gorakhpur, Guwahati, Haridwar, Imphal, Itanagar, Jammu, Jorhat, Kargil, Kohima, Kokrajhar, Kurukshetra, Lakhanpur (Saksharta Kendra), Leh, Luchnow, Lunglei, Majuli, Mandi, Pasighat, Patna, Pali, Ranchi, Ropar, Senapti, Shillong, Shimla, Shilchar, Srinagar, Tezpur, Tura and Tezu with its Headquarters at New Delhi. It is also well-networked throughout India with the presence of 700++ institutes.

NIELIT has been granted the status of Deemed to be University under distinct category from UGC with Ropar centre as main campus and 11 other NIELIT centres at Agartala, Aizawl, Aurangabad, Calicut, Gorakhpur, Imphal, Itanagar, Kekri(Ajmer), Kohima, Patna, Srinagar as its constituent units.

Over the last two decades, NIELIT has acquired very good expertise in IT training. through its wide repertoire of causes, ranging from 'O' Level (Foundation). 'A' Level (Advanced Diploma). 'B' Level (MCA equivalent), 'C' Level (MTech level), IT literacy courses such as CCC (Course on Computer Concept), BCC (Basic Computer Course), and other such long-term and short-term courses in the non-formal sector like courses on Information Security, ITeS-BPO (Customer Care/Banking), Computer Hardware Maintenance (CHM-O/A level), Bioinformatics (BI- O/AB level), ESDM, etc., besides high-end courses offered by NIELIT centres at Post-Graduate level (MTech) in Electronics Design & Technology, Embedded Systems, etc., which are not normally offered by Universities Institutions in the formal sector, in association with the respective state Universities.

The basket of activities of NIELIT is further augmented by the wide range of projects that it undertakes. NIELIT has demonstrated its capability and capacity to undertake R&D projects, consultancy services, turnkey projects in office automation, software development, website development, etc. NIELIT is also the nodal implementing agency on behalf of MeitY for Data Digitisation of the population of 15 assigned States and 2 Union Territories for the creation of National Population Register (NPR) project of Registrar General of India (RGI). NIELIT is also successfully executing the Agriculture Census and Input Survey project which tabulation of about 10 crore data records have to be done. NIELIT has planned a roadmap for adopting appropriate pedagogy for metamorphosing NIELIT into an Institute of National Importance.

About 3rd NIELIT's International Conference on Communication, Electronics and Digital Technologies (NICEDT-2025), 14-15 February 2025, Ropar, India

NIELIT's International Conference on Communication, Electronics and Digital Technologies NICEDT-2025, is the 3rd International level conference to be organised by the National Institute of Electronics and Information Technology (NIELIT) on 14th-15th February 2025 at Ropar, Punjab, India. This conference will cater recent research and development in Information, Electronics and Communication Technology, and allied areas. The international conference targets a wide range of audience and participants from across the globe covering Researchers, Academicians, Industry Professionals and enthusiastic students.

Papers are invited through 8 tracks as follows:

- Track 1: Artificial intelligence, Machine Learning, Big Data Analytics
- Track 2: Cyber Security & Forensic, Network and Mobile Security
- Track 3: Advanced Computing - Cloud Computing Edge Computing and Quantum Computing
- Track 4: Blockchain and Web Technology
- Track 5: VLSI, Semiconductors, Electronic System, IoT, Microwave, Antenna and Communication
- Track 6: Digital Technologies for Future Applications (Biotechnology, Augmented reality and Virtual Reality, Metaverse etc.)
- Track 7: Assistive Technology for Divyangjan
- Track 8: Strategy for Digital Skilling for building a global Future Ready workforce

This two-days conference will focus on sharing the finding of research and development in IECT and related areas. It will be an ideal platform for Industry Professionals, Researchers and Academicians from all over the Globe to share their views and present their findings under different tracks.

Guest of Honour:

Ms. Prerna Puri

Education Secretary, Chandigarh



Ms. Prerna Puri is a 2006-batch AGMUT-cadre IAS officer. Ms. Puri had earlier served in Chandigarh as IT secretary in 2011. Born on February 26, 1981, in Himachal Pradesh, she holds a Master's degree in Psychology from Panjab University, where she was a triple gold medalist. From 2014 to 2021, she was on central deputation, serving as Director (Census Operations) in the Office of the Registrar General and Census Commissioner of India. Upon returning from central deputation, she was appointed as Commissioner/Secretary to the Government in the Information Technology Department of Jammu and Kashmir in December 2021. In October 2024, Ms. Puri rejoined the Chandigarh Administration as the Education Secretary. She was also assigned additional responsibilities, including Secretary of Engineering, Food Supplies and Consumer Affairs, Public Relations, Printing and Stationery, Sports, and Cooperation.

Guest of Honour:

Dr. Kamaljeet Singh

Director General, Semi-Conductor Laboratory,
Ministry of Electronics & Information Technology, Govt. of India



Dr. Kamaljeet Singh serves as the Director General of the Semi-Conductor Laboratory (SCL) in Mohali, operating under the Ministry of Electronics & Information Technology (MeitY), Government of India.

In his role, Dr. Singh has been instrumental in advancing semiconductor research and development in India. He has emphasized the importance of supporting chip design startups by offering fabrication (fab) support, aiming to bolster the country's semiconductor ecosystem. Under his leadership, SCL has developed indigenous technologies, such as the Radiosonde Ground Station, contributing to atmospheric data collection and supporting initiatives like the Central University Jammu ISRO Centre's projects.

Dr. Singh actively engages with the academic and scientific community, delivering keynote addresses and participating in panel discussions at conferences like the International Conference on Emerging Technology and Sustainable Solutions (ICETSS 2024) at Chitkara University. His leadership continues to drive SCL's mission to enhance India's capabilities in semiconductor technology and innovation.

Dr. Kamaljeet Singh served as Scientist/Engineer 'G' in UR Rao Satellite Centre (URSC), ISRO before taking charge as Director General, Semi-Conductor Laboratory (SCL) at S.A.S Nagar (Mohali).

Guest of Honour:

Sh. V. K. Sharma

Director, C-DAC Mohali



Mr. V.K. Sharma serves as the Director of the Centre for Development of Advanced Computing (C-DAC) in Mohali. He has been associated with C-DAC for several years, previously holding the position of Associate Director at C-DAC Noida.

In his current role, Mr. Sharma emphasizes the transformative impact of the fourth industrial revolution on our daily lives. He advocates for the development of innovative solutions to address emerging challenges and opportunities in the field of advanced computing.

Guest of Honour:

Ms. Tulika Pandey

Scientist-G, Ministry of Electronics and Information Technology (MeitY)
Government of India



Ms. Tulika Pandey is a Scientist-G and Group Coordinator at the Ministry of Electronics and Information Technology (MeitY), Government of India. In her current role, she oversees the Human Resource Development (HRD) Division, matters related to the National Institute of Electronics and Information Technology (NIELIT) and Education and Research Network (ERNET), the Raj Bhasha Section, website and social media activities, gender budgeting, and serves as the nodal officer for media queries related to MeitY.

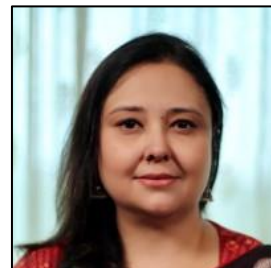
Ms. Pandey holds a degree in Electronics and Communications Engineering and has been with the Government of India since 1992. Throughout her tenure, she has been involved in various domains, including microelectronics development, e-learning, technology development for Indian languages, digital libraries, e-infrastructure, internet governance, and convergence, communications, and broadband technologies. She has also focused on harnessing technologies such as the Internet of Things (IoT), IPv6, and the convergence of cognitive radio frequency with the internet to enhance ubiquitous technology interventions in human life, while addressing security and privacy concerns.

In her current pursuits, Ms. Pandey addresses the security postures of the digital payment ecosystem in India and engages in global discussions on issues of cyber inclusion, cyber growth, cybersecurity, and cyber diplomacy.

Guest of Honour:

Shweta Khurana

Sr. Director APJ - Government Partnerships & Initiatives,
Global Government Affairs Group, Intel



Ms. Shweta is responsible for driving strategic programs and initiatives with governments across Asia Pacific & Japan. Her present focus is on building public-private-partnership programs to develop AI human capital to meet Intel's global commitment to make technology inclusive and empower 30million people with AI skills for current and future jobs.

She has 23 years of experience in driving trusted relationships with governments, development agencies, academia, and communities around the world. She has created smart models to address societal challenges, accelerate thought leadership, and enable business growth through strategic planning. She joined Intel in 2010 and has led various roles as managing Corporate Affairs for Intel in Indonesia and K12 education in India for promoting tech-enabled education.

Ms. Shweta has created many multi-stakeholder alliances for youth empowerment and education transformation. She has been recognized for leveraging core business to build social impact and gain regulatory wins, build powerful external partnerships to drive shared investments, and incremental reputational gains.

On a personal level, she is as passionate about studying the impact of emerging technologies on humanity as she is about creating colloquial Shakespearean adaptations for Gen Z.

Guest of Honour:

V. Ramakrishnan

Consultant



Since Jun 2024, Sh. V Ramakrishnan working as Independent Consultant for Semiconductor Industry with clients on improving operational efficiency and cost reduction. He is an innovative problem solver working across cultures and geographies. He has been involved in 4 successful fab startups in his career and has the unique experience of handling both process and equipment roles.

He was Director, Module Engineering, Global Foundries Singapore. He managed the startup for the new expansion for the 300mm wafer fab in Singapore taking care of CMP, Cleans and Diffusion. He was also consultant to Ellipsiz Singapore, and Manager, X-Fab Semiconductor, Manager Micron Technology.

Plenary Speaker:

Prof Paolo Ciancarini
University of Bologna, Italy



Paolo Ciancarini received the B.S. and Ph.D. degrees in computer science from the University of Pisa, Italy, in 1982 and 1988, respectively. He has held a visiting position with Yale University, from 1990 to 1991. Since 2000, he has been a Professor in computer science with the University of Bologna. He is member of the Faculty of the PhD School in Computer Science. His research interests include software engineering, artificial intelligence, and distributed computing. He is the author of more than 200 journals and conference papers, 20 of them invited contributions. He has been a PI of several national and international projects. He has been a grant reviewer for many national and international agencies.

Plenary Speaker:

Ms. Kirti Seth



Ms. Kirti Seth is a seasoned business leader with over 35 years of experience in entrepreneurship, management, and skill development. She recently served as the Chief Executive Officer (CEO) of the IT-ITeS Sector Skills Council at NASSCOM, India's premier industry association for the technology sector. In her role at NASSCOM, Kirti was instrumental in designing and implementing publicly funded skill development programs, representing industry perspectives during policy deliberations, and contributing to employability-focused policy formulation. She co-architected the National Technology Skilling Platform, FutureSkills Prime, a joint initiative between NASSCOM and the Ministry of Electronics and Information Technology, Government of India. This platform has been globally recognized as a successful public-private partnership in digital skilling.

Ms. Kirti's academic credentials include a Bachelor of Arts in Economics from Delhi University and an MBA from the Indian Institute of Management (IIM) Calcutta. She is also a certified Executive Coach and a Certified Practitioner of Learning and Performance from the Association for Talent Development (ATD). Her career trajectory reflects a commitment to innovative thinking and continuous learning, underscoring her belief in the transformative power of education and skill development.

Plenary Speaker:

Dr Satya Jaswanth Badri
Belgium



Dr. Satya Jaswanth Badri is a Postdoctoral Researcher at IMEC, Belgium, with a specialization in Non-Volatile Memories and Computer Architecture. He obtained his Ph.D. from the Indian Institute of Technology Ropar, where he was actively involved with the Multimedia Research and Innovation Group (MRIG) within the Department of Computer Science and Engineering (CSE). Dr. Jaswanth completed his undergraduate studies in Computer Science and Engineering at Jawaharlal Nehru Technological University (JNTU), Anantapur. His research interests focus on advancing the field of memory technologies and computer architecture, contributing to innovations in non-volatile memory systems.

Plenary Speaker:

Prof. Palaiahnakote Shivakumara

University of Salford, Manchester



Palaiahnakote Shivakumara received B.Sc., M.Sc., M.Sc Technology by research and Ph.D.degrees from the University of Mysore, Mysore, Karnataka, all in computer science. Currently, he is working as an Associate Professor in the Department of Computer System and Technology, University of Malaya (UM), Kuala Lumpur, Malaysia. He worked as a Research Fellow at the National University of Singapore. Besides, he worked as Research Consultant at Nanyang Technological University, Singapore for the period of one year. Based on his work, he has published more than 300 research papers in national, international conferences and journals. He has served as Editor-in-Chief for Artificial Intelligence and Applications (AIA). BonViewPress, Singapore. He has been serving as Associate Editor for IEEE Transactions on Multimedia (TMM), Pattern Recognition (PR), International Journal on Document Analysis and Recognition (JDAR), CAAI-Transactions on Intelligence in Technology, ACM Transactions on Asian and Low-Resource Language Information Processing (TALLIP), Springer-Nature of Computer Science (SNCS), Malaysian Journal of Computer Science (MJCS). Further, he was the recipient of a prestigious ""Dynamic Indian of the Millennium" award by KG foundation, India for his contributions to computer science field. He won "Top Reviewer" award from Pattern Recognition Letters. He has several international collaborators, namely, Nanjing University, China, Hohai University, China, Shantou University, China, Indian Statistical Institute, Kolkata, India, University of Essex, UK, Assiut University, Egypt, University of Technology Sydney, Australia. He has been serving as chairs at different levels for International Conference, namely, ICDAR, DAS, ICFHR, ACPR, ECCV, ACCV, ICCV, CVPR. ACMMM, ICFHR, ICPR etc. His area of research includes video text understanding, document analysis. image processing. personality traits identification and forged text detection related.

Plenary Speaker:

Dr Gurjit Walia

Scientist F, DRDO

Dr. Gurjit Singh Walia received his Ph.D. degree in the field of computer vision from Delhi Technological University, New Delhi, the M.E. degree in electronics from Punjab Engineering College, Chandigarh, and B.E. degree in electronics and communication from Guru Nanak Dev Engineering College Ludhiana. He received University Second Rank during graduation and University First Rank during post graduation.

He joined as Scientist 'B' at Defence Electronics Research Laboratory, DRDO, Hyderabad in 2001 and currently working as Scientist 'F' at Scientific Analysis Group, DRDO, Delhi. He has completed five research projects in the field of information security, electronics warfare and satellite communication. He received Lab Scientist of year award, Team award, Group Award, Titanium Medal and Commendation Certificate from DRDO.

He has published more than 30 research papers in SCI/SCIE journals and 05 Research scholar from DTU has completed PhD degree under his guidance. He is Fellow of IETE, Fellow of Institute of Engineering, Senior Member of IEEE, Member of CSI and CRSI.

Plenary Speaker:

Dr. Sanjeev Sofat

Professor, PEC Chandigarh



Dr. Sanjeev Sofat is Professor in Computer Science and Engineering Department of Punjab Engineering College (Deemed University) Chandigarh. He has worked on numerous projects including Advanced facility in Biometric Sensor Technologies, State of the Art Advanced decryption Facility, Design and Development of Dependable, Secure and Efficient Protocols for Wireless Mesh Networks (WMN), Development of Cloud Based Framework for delivering Security As A Service among others. He has published Books on C & C++ Programming languages, apart from many research publications.

Plenary Speaker:

Dr. Maninder Singh

Professor, Thapar Institute of Engineering & Technology, Patiala



Dr. Maninder Singh is a Professor and the Dean of Academic Affairs at the Thapar Institute of Engineering & Technology in Patiala, India. He specializes in Network Security, Software Engineering, and Parallel and Distributed Computing. Dr. Singh joined the Computer Science and Engineering Department at Thapar Institute in 1996. He has served as the Head of the department and currently holds the position of Dean of Academic Affairs. His research interests include Network Security, Cyber-Physical Systems & Security, Internet of Things (IoT). He has worked on numerous projects including Zero-day Worm Detection Framework, Network Design Consultancy, Network Penetration Testing and Security at DESIDOC, among others.

Plenary Speaker:

Dr. Ashish Seth

Inha University, S. Korea



Dr. Ashish Seth is an author, researcher, teacher and a consultant. He has been into academics for more than 17 years and have an exposure of working at various roles and responsibilities.

He has published research papers in reputed journals like ACM, ISTE, WSEAS, Inderscience, IEEE, Springer, etc. He is a senior member of IEEE and an active member of an International societies like ACM, CSI, IACSIT, IAENG, etc. He holds Technical Review committee and Editorial Review Board for many national and International Journals of Computer Science. He has been participating and organizing seminar, conferences, workshops, expert lecturers, technical events to share knowledge among academicians, researchers and to promote opportunities for new researchers. He is also an ACM distinguished speaker and has delivered many lectures and provided training programs for students and faculties on various areas of computer science. His interest includes information systems, data science, soft computing, cloud computing and blockchain technologies.

Plenary Speaker:

Dr. Vinaytosh Mishra
Gulf Medical University, UAE



Dr. Vinaytosh Mishra is Associate Professor for (Management, Digital Health, and Health Analytics) at the Thumbay College of Management and AI in Healthcare, Gulf Medical University, Ajman (UAE). He has more than 18 years of experience in industries like Healthcare, EdTech, Finance, and Information Technology. He was instrumental in making a diabetes specialty clinic into a Two-fifty-bed multi-specialty clinic during his tenure at Aaroha Healthcare (P) Ltd. In his last Assignment as Associate Professor at FORE School of Management, New Delhi he was program director for two successful long-duration programs namely “Building Intelligent Healthcare Analytics” and “PGPM in Healthcare Management and Analytics”. He is also a certified Diabetes Educator and Master Black Belt in Lean Six Sigma.

Dr. Mishra is certified by the Massachusetts Institute of Technology, USA in System Thinking. He is also holding advanced certification in System Dynamics Modeling from ATC-INNOVA, Spain. He is also a certified supply chain management expert (Micro Master from Massachusetts Institute of Technology, USA) and has a special interest in healthcare supply chains.

Dr. Vinaytosh Mishra has published journals of international repute (ABDC/Scopus/SSCI) and served as a reviewer for various international journals. Dr. Mishra is also part of the editorial board of leading journals such as Health Policy and Technology, Review of Management Literatures, Hospital Topics, and Frontiers in Digital Health.

He features regularly on 100.3 FM Talk Business and Sport Show as a Business Strategy and Technology Expert and is an invited columnist for Asia Development Bank Asia Pathway, Times of India, The Brew News, UAE.

Moderator:

Sh. Subhanshu Tiwari
Executive Director, NIELIT



Shri Subhanshu Tiwari serves as the Executive Director of the National Institute of Electronics and Information Technology (NIELIT) Delhi Centre. In this role, he oversees various training programs and initiatives aimed at enhancing digital literacy and technical skills among diverse groups.

He has overall experience of around 20 years in Requirement analysis, design, implementation, maintenance & operations of Telecom software & network services. He has made effective contribution to the development & deployment of Intelligent Network services and 3G Mobile services in Indian Network.

Speaker:

Dr. Anu Gupta

Director, Computer Centre, Panjab University

Dr. Anu Gupta, Professor in Department of Computer Science and Applications, Panjab University, Chandigarh. She is currently holding the additional charge as Director, Computer Centre, Panjab University. Dr. Gupta earned her Ph.D. in Computer Science from Panjab University. She completed her Master of Computer Applications (MCA) with distinction from Punjabi University, Patiala, where she was awarded the prestigious University Medal for securing the top position. As an educator and researcher, Dr. Gupta is dedicated to advancing the field of computing through innovative research and fostering academic excellence. She is passionate about mentoring students and inspiring the next generation of computer science professionals.

Speaker:

Dr. Shashi Shekhar Jha

Assistant Professor, Department of CSE, IIT Ropar

Dr. Shashi Shekhar Jha is an Assistant Professor at the department of CSE and the Director of Technology Business Incubator Foundation at IIT Ropar. Dr Jha obtained his PhD in computer science and engineering from IIT Guwahati on multi-robot systems. He worked at the Accenture Technology Lab Bangalore for a brief period after his PhD. Later, he moved to Singapore, where he was a Research Scientist at the Fujitsu-SMU Urban Corp Lab till 2018. Dr Jha has been the recipient of TCS fellowship, the Best Demo Award at AAMAS 2018, winner of CIKM AnalytiCup 2017, and finalist for the Innovative Applications in Analytics Award, IAAA-2020 at informs Analytics Society. He also holds two Indian patents out of his research work. His current research interests include multi-drone systems, autonomous drone systems, reinforcement learning and artificial intelligence. Dr Jha has extensively published his research at reputed national and international venues. In his current role, he also coordinates drone research and training activities as the accountable manager of DGCA authorized Remote Pilot Training Organisation (RPTO) at IIT Ropar.

Speaker:

Dr. Divya Bansal

Professor, Department of Computer Science,
Punjab Engineering College, Chandigarh

Dr. Divya Bansal is a distinguished Professor in the Department of Computer Science at Punjab Engineering College, Chandigarh, with a career spanning more than two decades. With her extensive expertise and leadership in cybersecurity, cognitive warfare, IoT, and social media analytics, she has made profound contributions to both academia and industry. She holds a Ph.D. from Punjab Engineering College and has been a transformative figure in the field of computer science.

As the Head of the Cyber Security Research Centre (CSRC) at PEC, Dr. Bansal has spearheaded impactful research in cybersecurity and interdisciplinary domains. Notably, Dr. Bansal has led a project to develop a first-of-its-kind framework for generating actionable intelligence from cyber social spaces, aimed at enhancing national security. Her research includes work on radicalization detection, secure wireless communication protocols, and the development of smart city solutions, with a particular focus on cybercrime investigations.

A prolific researcher, Dr. Bansal has authored over 100 publications in top-tier journals and conferences. She has received multiple awards for her academic excellence, including the Best Faculty Award (2018-2019, 2022-2023, 2023-2024) from PEC and the Young Faculty Research Award from Media Lab Asia, Government of India. Her research contributions in information security have also been recognized with the IBM Shared University Research Award. Her work extends beyond academia, with extensive collaborations with national security agencies and

Dr. Bansal's influence also spans across global platforms, having delivered over 100 expert lectures at national and international forums, including those organized by universities, medical research institutes, defense personnel, government agencies, and industry stakeholders. Her work has been featured in prominent media outlets, such as India Today, Economic Times, BBC, and CNN, reflecting her global reach and impact.

As a leader, researcher, and educator, Dr. Bansal continues to shape the future of cybersecurity and national security, making invaluable contributions to both technological innovation and societal wellbeing. Her dedication to interdisciplinary research and her commitment to bridging the gap between technology and national security has positioned her as a thought leader in the field.

Speaker:

Dr. Maitreyee Duta

Professor, Information Management and Emerging Engineering Department, NITTTR



Dr. Maitreyee Dutta was graduated in Electronics and Communication Engineering from Guahati University in 1993. She was the Gold medallist in her batch even All Branch topper of that year. She did her M.E in Electronics and Communication Engineering from Punjab Engineering College in 1999 through GATE Scholarship and obtained her Ph.D. degree from Punjab University in 2007. Her academic achievement was excellent throughout her life.

She joined in National Institute of Technical Teachers Training and Research, Chandigarh in 2001 and since 2003, she was the Head of the department of Computer Science Department of this institute. From July 2015 to 2017, she was Professor and Head of Electronics and Communication Engineering department of the same institute. She had initiated many activities in Computer Science Department. She backed two projects from Ministry of IT, New Delhi and one project from Ministry of Social Justice. She also received grant from AICTE under RPS scheme. Besides these she had backed grants from AICTE to conduct FDPS, ATAL Programmes, Grant for Conference etc.

She has set up Centre of Excellence Cyber Security Lab in the institute and now planning to give the international fame to that lab. She has guided 11 PhD students and 5 are in progress. She conducted free courses for the under-privileged students in collaboration with Social Welfare organization under UT Govt., Chandigarh and for this she was awarded Rota Women distinction Award by Rotary Club Chandigarh midtown in 2013. She had also received Best Teacher Award from Bharatiya Shikshan Mandal, Uttar Pradesh in 2013. She initiated hands on projects on Robotics by the students. Under her guidance, the students participated many robotics competition at IIT Bombay, IIT Kharagpur, Baba Farid University, Chandigarh University, Gharuan etc. She initiated to establish Innovation Laboratory in the institute and also established one Start UP named Enovate Skill in the institute. She also looked after the department of Educational Television Centre for 2 years and during that period she was given the charge of overall MOOC Coordinator and overall coordinator of ARPIT Courses by the director of NITTTR Chandigarh under which institute could launch 11 MOOC courses and 2 ARPIT courses till date out of which three are AICTE-NITTT modules. She is the coordinator of 3 MOOC courses which are uploaded in SWAYAM portal. She had published 150 papers in International and National Journals and conferences. She published four books till date. She is now Professor of Information Management and Emerging Engineering Department. She was Dean Academics and R and D of NITTTR Chandigarh for 2 years 8 months.

Speaker:

Suneel Wattal

Madhya Pradesh State Electronics Development Corporation

Suneel Wattal is an accomplished professional with over 30 years of industry experience in leading technology organizations, including Oracle Corporation, General Electric, Colt Telecom, and IBM. He holds an Engineering degree from BITS, Pilani, along with an MBA in Finance and an MCA. Throughout his career, Suneel has demonstrated extensive expertise in project management, consulting, and strategic business planning, with a strong focus on global delivery management, client relationships, skill management, and data analytics.

In addition to his work with multinational corporations, Suneel has contributed significantly to the public sector, having served as the Joint Chief Information Technology Officer for the Department of IT, Electronics & Communication in the Government of Haryana. In this role, he was instrumental in the development of eGovernance applications that aimed to improve government services and operations. Currently, he is serving with the Madhya Pradesh State Electronics Development Corporation, where he continues to leverage his extensive experience in technology and governance.

Beyond his corporate and public sector roles, Suneel is passionate about supporting startups and emerging businesses. He serves in an advisory capacity, mentoring startups on workforce development, coaching, and entrepreneurial strategy, helping them navigate the challenges of business growth and development. His broad experience across various technologies and functional domains has established him as a trusted expert in the fields of project management, strategic planning, and technology consulting.

Speaker:

Dr. Surya Narayan Panda

Pro Vice Chancellor (Research), Chitkara University, Punjab



Dr. Surya Narayan Panda is an accomplished academician and researcher with a Ph.D. in Computer Network Security from Kurukshetra University, Haryana. He currently holds the position of Pro Vice Chancellor (Research) at Chitkara University, Punjab. Dr. Panda has a distinguished career spanning over 30 years in teaching, administration, research, and innovation. He has held several leadership roles, including Executive Director & Professor of Research, Founder Director & Professor of Research, and Principal & Professor at various prestigious institutions, including Chitkara University and the Regional Institute of Management and Technology, Punjab.

His academic contributions are significant, with 18 Ph.D. students in Computer Science awarded under his supervision, in addition to guiding 30 M.Phil and M.Tech scholars. Dr. Panda has an extensive research portfolio, having published 210 research papers in SCI, SCOPUS, and peer-reviewed journals. He has also been highly innovative, filing 157 patents, with 49 published patents and 16 utility patents granted by the Indian Patent Office. Furthermore, he is actively involved in leading DST-funded projects worth over Rs. 4 crore and has overseen 13 industrial consultancy projects.

Dr. Panda is recognized for his expertise in academic evaluation, serving as a trained assessor for NAAC (National Assessment and Accreditation Council), and has led NAAC Peer Team visits at various colleges and universities across India. He is also an empanelled consultant for the Association of Indian Universities (AIU) and has made significant contributions to various professional bodies, being a Senior Member of IEEE, the World Leadership Academy, and a Life Member of IAENG.

His international exposure includes travels to the USA, Australia, New Zealand, Malaysia, Thailand, and Indonesia as part of high-level delegations, along with serving as a visiting professor at multiple foreign universities. Dr. Panda's innovative work has earned him the prestigious National Level Millennium Alliance Award in 2017 from the Ministry of Science and Technology, Government of India, for his invention of the Portable Intensive Care Unit. Additionally, he is the Founder Director of Ramanuj Technologies Pvt. Ltd., a startup incubated at Chitkara University.

Speaker:

Dr. Maninder Singh

Professor and Director (Research), Raya-Bahra University, Kharar, Punjab

Dr. Maninder Singh is an experienced academic and researcher with a specialization in wireless communication, digital/analog electronics, linear programming mathematical models, optical networks, and the Internet of Things (IoT). He completed his Post-Doctoral studies at Simon Fraser University, Canada, in the School of Engineering Science, focusing on the application of AI and Machine Learning algorithms for detecting network anomalies. Dr. Singh holds a Ph.D. in Electronics Technology from Guru Nanak Dev University, Amritsar, India, awarded in August 2016. Additionally, he earned an M.Tech. in Electronics and Communication from Punjab Technical University, Jalandhar, and a B.Tech. in Electronics and Communication from Sant Longowal Institute of Engineering and Technology (S.L.I.E.T.).

With 20 years of experience, Dr. Singh has held several academic positions. Currently, he serves as Professor and Director of Research at Rayat-Bahra University, Kharar, Punjab, since May 2023. Prior to this, he was a Professor in the School of Engineering at Chitkara University, Patiala, from June 2019 to May 2023. He also contributed to Rayat-Bahra Group from January 2005 to June 2019.

Dr. Singh has an extensive research portfolio, having published 32 articles in international journals and presented at 26 conferences. His work has been recognized with several awards, including the Best Paper Award at the IEEE IEMCON International Conference in 2015 and the Indian Society for Technical Education's Best Teacher Award in 2015. He has also delivered expert talks at various institutions, including the ISTE Convention at DAV University, GNDU Amritsar, NITTTR Chandigarh, CSIO Chandigarh, and CU, Gharuan. Dr. Singh has filed a total of 8 patents, some of which include innovations in UWB antenna design, smart and intelligent scarecrows, and automatic roller chain wrenches. His research projects include a proposal titled "Memristor-based Biosensor Design for COVID-19," submitted for funding under the Shastri Institutional Collaborative Research Grant (SICRG), in collaboration with IIT Dhanbad, University of British Columbia, Canada, PGIMER Chandigarh, and Chitkara University. He has also completed a research project on "Machine Learning Algorithms for Detecting Network Anomalies" during his post-doctoral studies at Simon Fraser University, Canada. Dr. Singh is currently working on an ongoing research project titled "AI-powered Solutions for Poultry Health Analytics in India."

Speaker:

Palash Bhattacharya

Director of Analytics, Samsung Data Systems (SDS), Gurgaon

Palash Bhattacharya is an accomplished professional with over 29 years of experience in advanced analytics, artificial intelligence (AI), business intelligence (BI), and market research. He specializes in areas such as machine learning, deep learning, optimization, simulation, computer vision, natural language processing (NLP), and generative AI. Palash holds a Post Graduate degree in Management from Xavier's Labour Relations Institute (XLRI) and a Bachelor of Technology (B-Tech) degree in Chemical Engineering from the Indian Institute of Technology (IIT), Kharagpur.

Throughout his career, Palash has honed expertise in various modeling techniques, including forecasting, predictive and prescriptive analytics, customer relationship management (CRM), predictive maintenance, and image analytics. He is proficient in Python, R, SPSS, SAS, and basic SQL, and has demonstrated leadership capabilities in client service, project delivery, solution architecture design, and business development. His work spans across industries such as consumer electronics, FMCG, telecom, banking, pharma, retail, and more.

Currently, Palash serves as the Director of Analytics at Samsung Data Systems (SDS) in Gurgaon (Delhi NCR), a role he has held since June 2018. In this capacity, he leads AI and BI initiatives for Samsung Electronics and other clients while providing thought leadership, delivery support, and vendor management. Prior to this, he worked with IBM India Pvt. Ltd. as an Associate Partner in Advanced Analytics and Optimization, where he led the Advanced Analytics CoE and supported client engagements, innovations, and automation functions. His earlier roles include leadership positions at marketRx (Cognizant Technology Solutions), HANSA Research, The Nielsen Company, TNS (now KANTAR TNS), and IMRB, where he managed client services, business development, and market research projects across multiple sectors.

Before transitioning to analytics and market research, Palash gained hands-on experience in the manufacturing sector, having worked at Indian Oxygen Limited (IOL) and Steel Authority of India Ltd. (SAIL) as an engineering officer and management trainee. Throughout his career, he has demonstrated a strong ability to lead teams, manage projects, and drive innovation in both client-facing and internal functions, making him a seasoned leader in advanced analytics and consulting.

Speaker:

Rohit Sharma

Professor, IIT Ropar



Rohit Sharma joined the Electrical Engineering department at IIT Ropar in 2012, where he is currently a professor. In the past, he has been a Visiting Professor at the Small-Scale Systems Integration and Packaging Center, Binghamton University (May - Jul 2022), and the Packaging Research Center, Georgia Institute of Technology (Sep 2022 - Feb 2023). He was a Research Professor in the Department of Electrical Engineering at Pennsylvania State University, USA (Mar 2023 - Apr 2024). He is a Distinguished Lecturer of the IEEE Electronics Packaging Society, an Associate Editor for the IEEE Transactions on Components, Packaging and Manufacturing Technology, and a referee for several leading IEEE journals. He is a Program Committee member for major IEEE EPS conferences including ECTC, EDAPS, EPEPS, and SPI. He has chaired the IEEE CPMT Technical Committee on Electrical Design, Modeling and Simulation. He is a Fellow of the Institution of Engineering and Technology (IET), UK, and the Institution of Electronics and Telecommunication Engineers (IETE), India, as well as a Senior Member of the IEEE. His research interests include the design of high-speed chip-chip and on-chip interconnects, graphene-based nanoelectronic devices and interconnects, signal and thermal integrity in high-speed interconnects, and the application of machine learning in advanced packaging and systems.

Speaker:

Dr. Geeta Yadav

Assistant Professor, IIT Ropar

Dr. Geeta is an Assistant Professor in the Department of Computer Science & Engineering at the IIT Ropar. She specializes in cybersecurity, vulnerability management, and digital forensics, with a keen interest in attack propagation analysis, configuration-related vulnerabilities, and adversarial machine learning defense mechanisms. Before joining IIT Ropar, Dr. Geeta worked as a Cybersecurity Researcher at Hitachi India Pvt. Ltd., Bengaluru, and as a Post-doctoral Research Fellow at C3i Hub, IIT Kanpur. She completed her Ph.D. from IIT Delhi under Prof. Kolin Paul, where her research was on vulnerability management, and ML-based security assessment of critical infrastructures. She also holds a bachelor's degree in computer engineering from MNIT Jaipur.

Speaker:

Dr Suman Avdhesh Yadav

Assistant Professor, IILM University

Dr Suman Avdhesh Yadav received her Ph.D. in Computer Science and Engineering and currently working as an Assistant Professor at IILM University, Uttar Pradesh, India. She has published over 42 articles in peer-reviewed Scopus Indexed journals and conferences of international repute. Apart from that, 04 SCI Journal papers, 04 Edited books, 06 Copyrights, and 04 Patents are under her credit. Her current research interests include IoT, Wireless Sensor Networks, Cloud Computing, and AI. She is also an AWS Certified Cloud Practitioner. She serves as a reviewer of many peer-reviewed journals and conferences. She has served as a Conference Convener of several International Conferences and also served as a Technical Program Committee Member of several conferences of international repute.

Speaker:

Mohd Asim Saeed

Head – Advance Design Division of VLSI Design Group at SCL



Sh. Mohd Asim Saeed received his M. Tech degree in Electronic Circuits and Systems Design from Aligarh Muslim University, Aligarh, India in 2006 and joined Indian Space Research Organization (ISRO), India in 2006 as Scientist/ Engineer. Throughout his extensive 18-year tenure in VLSI design, he has been actively involved with the development of diverse high reliability and radiation hardened CMOS devices and ASICs for various ISRO missions. Currently, he is working as Head – Advance Design Division of VLSI Design Group at Semi-Conductor Laboratory, India.

Speaker:

Vikram R Singh

Founder & CEO - Antier



Sh. Vikram is a seasoned entrepreneur and renowned speaker known for establishing Antier, a premier full-stack blockchain consulting firm. In 2005, Sh. Vikram embarked on his entrepreneurial odyssey by founding his IT startup, initially comprising a select cadre of 5 professionals. Through his visionary acumen, Antier has emerged as India's blockchain juggernaut, growing stronger with a workforce of 700+ team members. A sought-after keynote speaker, he has addressed audiences at prestigious events such as the Web3 Conference GOA, Hyperledger India Chapter, Your Story Techsparks, BFSI MENA Dubai, Indian Blockchain Conclave, Nasscom, TIE and more. In 2025, he signed up as one of the Founding Members of the DavosWeb3 Roundtable, a community of premium web3 entrepreneurs. Sh. Vikram has established Antier School of BlockTech into a launchpad for blockchain talent, accelerating Mohali's rise as India's blockchain capital. Focused on closing the skills gap, he is building an ecosystem where professionals gain hands-on expertise and industry-ready knowledge. Through industry-aligned curricula, hands-on training, and mentorship, he aims to create a talent hub driving Web3 transformation. In his leadership, Antier built a successful blockchain solution, called Edublock Pro, to combat question paper leaks for the Govt. of Punjab.

Speaker:

Sh. Dildeep Singh

Director, 2B Innovations Technology Services



Sh. Dildeep possesses 15 years of experience in cybersecurity, ICT, and national security, with a strong focus on advancing cyber defense innovations. As the Founder and Chief Technology Officer of 2B Innovations, he is responsible for the development of cutting-edge cybersecurity solutions tailored for governments, enterprises, and SMEs. Furthermore, Dildeep is the Founder of 4C Security, a company specializing in threat management, intelligence, and response strategies.

He has successfully led multimillion-dollar national security projects, designing comprehensive security blueprints and frameworks for national governments across Asia and the Middle East. Through 2B Academy, Dildeep advocates for a cognitive-first approach to cybersecurity, addressing critical skill gaps through hands-on training and professional development.

In addition to his professional pursuits in cybersecurity, Dildeep is actively engaged in community development. He collaborates with esteemed social organizations such as Sarbat Da Bhala and Dasham Foundation, focusing on initiatives aimed at uplifting marginalized communities through free food distribution and educational programs.

Patron:

Prof. (Dr.) Madan Mohan Tripathi

Hon'ble Vice Chancellor & Director General, NIELIT



Dr. Madan Mohan Tripathi is the first Vice-Chancellor of NIELIT Deemed to be University and Director General of National Institute of Electronics & Information Technology (NIELIT). Before joining NIELIT, Dr. Madan Mohan Tripathi served as Professor with Delhi Technological University (DTU), New Delhi. In DTU he also worked as Director Internal Quality Assurance Cell (QAC) and Coordinator of Intellectual Property Rights Cell. He started his carrier as Research Scientist with Institute for Plasma Research (IPR), Gandhinagar (Department of Atomic Energy, Govt. of India) in 1994 and worked for 5 years on many R&D projects. In the year 1999, he joined Centre for Electronics Design & Technology of India, Gorakhpur as Senior Design Engineer and worked for 10 years on various design and development projects in the areas of Information, Electronics and Communication Technology (IECT). From 2009 to 2012 he was Joint Director at NIELIT HO, where he worked on various projects such as Digitization and Biometric capture of usual residents of India (NPR), development of manpower in IECT Skills, ICT based Skill Testing and Certification.

Contents

PAPER ID 7: Cardiac Status Prediction using Machine Learning	1
PAPER ID 8: A Comprehensive Exploration of Medical Drones for Rapid Response and Patient Care	1
PAPER ID 13: Design and Comparative Analysis of CMOS and Various Adiabatic Logic Circuits of 8:1 Multiplexer	2
PAPER ID 14: High-Performance Arithmetic Logic Unit (ALU) Based On Vedic Multiplier	2
PAPER ID 17: Design and Development of Tissue Aware Beamformer Architecture for Ultrasound Imaging Applications	3
PAPER ID 18: Design of a reconfigurable hardware platform for Medical Ultrasound Imaging and Research	3
PAPER ID 24: Intelligent Sign Language Detection System with Deep Learning	4
PAPER ID 29: OpenMP-Based Parallelization Using the MVDR Algorithm	5
PAPER ID 33: Intelligent Flood Warning and Dam Operating System	5
PAPER ID 34: Towards Smart Navigation using QR Code for Visually Impaired Person	6
PAPER ID 35: Newton methods based convolution neural networks using parallel processing	6
PAPER ID 37: Prediction Of Mental Health Using Machine Learning	7
PAPER ID 38: An approach to an intrusion detection system that involves the deployment of a multilayer perceptron	8
PAPER ID 41: Enhancing Mammogram Image Quality Using Various Noise Removal Techniques And Improvised Kuan Filter	8
PAPER ID 43: Recommendation Modeling for Complementary Furniture Products Based on Customer Preferences	9
PAPER ID 44: Actuator State Estimator based Cascade Control for Process Automation	10
PAPER ID 46: Comparative Evaluation of Deep Learning Architectures for Multi-Class Classification of Kidney Pathologies and Kidney Stone Detection	10
PAPER ID 47: Fair and Transparent Student Placement Predictions: A Machine Learning and Explainable AI (XAI) Approach	11
PAPER ID 48: Enhancing Crop Recommendation System: SVM Modeling With Z-Score Normalization And PCA Feature Extraction	12
PAPER ID 49: Evolutionary Profiling and Study of Gut Microbial Species in Liver Regeneration and Diseased Conditions with 16 s rRNA using Bioinformatics	12
PAPER ID 50: Comparative Study of Machine Learning for Fault Prediction in Solar Water Pumps	13
PAPER ID 51: A Comprehensive Review on Popular CNN-based Deepfake Detection Models, Performances, and Challenges	14
PAPER ID 52: A Smart Irrigation System for Agriculture Land Utilizing Image Processing and AI	15
PAPER ID 53: Intelligent Control On Weeds- A Developmental Approach For Rice, Wheat, Potato Farms At Kurukshetra That Would Be Leading To A Scalable Solution To Different Crops In Various Geographies	15
PAPER ID 54: Automatic Machine Learning Driven Anomaly Detection for Predictive Maintenance and Fault Diagnosis in Urban Metro Systems	16
PAPER ID 55: Comparative Analysis of LSTM, GRU, and Random Forest Regression for Air Quality Prediction	17
PAPER ID 56: Switching Losses Reduction and Enhancement of Predictive Direct Torque Control Drives using 2-level Inverter with BLDC Motor	17
PAPER ID 57: Face Liveness detection using CNN model	18
PAPER ID 58: Liveness detection in Iris using CNN model	19
PAPER ID 59: Real Time soil surveillance	19
PAPER ID 60: Implementation of Augmented Reality to Visualize Cell Organelles	20
PAPER ID 61: Chronic Kidney Disease Detection using QSVM and Comparative Analysis with Classical SVM	20
PAPER ID 62: Drowsiness Detection System	21

PAPER ID 63: Precision Diagnosis: Leveraging KNN for Breast Cancer Detection	21
PAPER ID 64: ECG Arrhythmia Detection using Lightweight 1DCNN-Bi-LSTM Technique for Cardiovascular Disease	22
PAPER ID 66: AI Chatbot for Medical Care using Machine Learning with Python	22
PAPER ID 67: AI-Powered Adolescent Health: Dimensions, Current Trends and Future Prospects	23
PAPER ID 68: Evaluating Cybersecurity Risks in Modern Healthcare: Quantitative Assessment of Biomedical Device Compromises and Electronic Health Records Tampering	24
PAPER ID 69: Real-Time Landslide Risk Assessment Using IoT	24
PAPER ID 71: Advanced Image Segmentation Framework	25
PAPER ID 72: Smart Agriculture System for Optimal Crop, Fertilizer Recommendation and Irrigation System	25
PAPER ID 73: Enhanced Text to SQL Query Generation for Data Analysis using LLM	26
PAPER ID 74: A Comprehensive Analysis of the Cloud-Based Method for Using Salesforce Technology to Optimize Event Venue Reservations	26
PAPER ID 76: A Review of YOLOv7-Based Multimodal Biometric Frameworks: Scalability, Robustness, and Identification Performance	27
PAPER ID 78: AI-Powered Mental Health Solutions: Exploring Opportunities and Addressing Challenges	27
PAPER ID 80: Sustainable Cloud Solutions for Digital Transformation	28
PAPER ID 81: Hybrid Deep Learning Techniques for Student Performance Prediction: A Comprehensive Review	29
PAPER ID 83: Enhancing the protection of consumer as well as provider for fair data commerce	29
PAPER ID 89: Forensic Insights into Noise Smartwatches: A Pioneer Study	30
PAPER ID 91: Analyzing Diverse Machine Learning Models for Silent Heart Attack Prediction	30
PAPER ID 92: Weather Adaptive Traffic Prediction using Gradient Boosting	31
PAPER ID 93: Traffic Violation Detection	31
PAPER ID 97: Benchmarking Malware Detection Tools: A Study on Tool Efficiency and Real-Time Feedback	32
PAPER ID 98: Artificial Intelligence: Transforming Key Industries and Shaping the Future of Technology	32
PAPER ID 100: RISC-V Processor Design: A Comparative Analysis Of HDL Versus HLS Techniques	33
PAPER ID 103: Dynamic Trust and Reputation-based Framework for Opportunistic Networks	33
PAPER ID 104: Effect of Compression on the Detection of Deepfake Videos with Facial Features	34
PAPER ID 105: Machine Learning-Driven Cyber Threat Intelligence: A Study on Anomalous Network Traffic Patterns	35
PAPER ID 106: Flood Prediction using Time Series Forecasting and Machine Learning Techniques with Linear Discriminant Analysis.	35
PAPER ID 107: Evaluating the Impact of Machine Learning Models on Short-Term Trading Strategies	36
PAPER ID 109: A Comprehensive review on Explainable AI: Where it was, is and will	37
PAPER ID 110: A Survey on Analyzing Deepfake Detection Methods: Patterns, Difficulties, and Possibilities	37
PAPER ID 111: Adaptive Deep Learning for OSCC Histology: Leveraging Deformable Convolutions for Improved Segmentation	38
PAPER ID 114: Enhanced Augmented Reality using Multimodal Interaction: Heritage of Assam	38
PAPER ID 115: AI-Driven Surveillance Drones: An Overview of Capabilities and Applications	39
PAPER ID 117: Urban Planning and Designing Using AI services: a review	39
PAPER ID 121: XMD:Leveraging Explainable AI Techniques for Malware Detection	40
PAPER ID 122: Thermal modelling and analysis of thermal profile of photovoltaic module using FEM Analysis	40
PAPER ID 123: AI- Powered Note Generation Application	41

PAPER ID 124: SRR Loaded CPW Fed Split Octagon Antenna with Isolated 5G Sub-6 GHz n77/78 and n79 Bands	41
PAPER ID 125: Dual-Band CSRR Loaded Ring Antenna for ISM, Wi-Fi, and Sub-7 GHz Wireless Applications without In-band Applications Interference	42
PAPER ID 126: Analysis and Investigation of CPW Fed Parasitically Loaded Rectangular Patch Antenna for Wi-Fi5 in 5G and 6G Applications	43
PAPER ID 128: An Analysis of Edge Communication Architectures for Ultra-Dense Fog Networks	44
PAPER ID 131: Review on Chronic Diseases Detection Tool	44
PAPER ID 134: Real Estate Price Prediction	45
PAPER ID 135: Copy-Move Image Forgery Detection Using Deep Learning Techniques	45
PAPER ID 137: Advancements in AI-Based Botnet Detection Techniques for IoT Networks: A Comprehensive Review	46
PAPER ID 139: University Documents Verification through QR Code and Digital Signature Using Blockchain	46
PAPER ID 140: Secure Application Development for Zigbee-Based IoT Systems Using ECC on ARM Cortex Microcontrollers	47
PAPER ID 145: Verification of low precision arithmetic for AI Coprocessor using Universal Verification Methodology	47
PAPER ID 147: Comparative Analysis of Generative AI Models for Determining Medicine Applicability Based on Medicine Names	48
PAPER ID 149: Leveraging Big Data Analytics for Crime Prediction and Prevention: A Comprehensive Review on Techniques, Applications, and Ethical Challenges	49
PAPER ID 150: Robust Adversarial Patterns to Defeat Deep Learning Malware Detection Systems	49
PAPER ID 151: HRSCasNet: Illustration of Hybrid Residual Serial Cascaded Network for Detecting the Cyber Anomalies	50
PAPER ID 160: Enbot: Robust Bot Detection in Industrial Internet-of-things using Intelligent Techniques	50
PAPER ID 162: Orchestrating Distributed Data and Computing in Decentralized Environments: A Unified Approach	51
PAPER ID 165: Comparative Evaluation of Sentiment Analysis Methods: Manual Annotation, Crowd-Coding, Dictionaries, and Machine Learning	52
PAPER ID 167: Enhancing Functionality Awareness in Spreadsheets Through Collaborative Filtering-Based Function Recommendations	52
PAPER ID 169: IoT-Powered Emergency Automatic Battery Charging System for Vehicles	53
PAPER ID 175: Revolutionizing Skin Lesion Segmentation: The Synergy of Multi Resolution UNet and K-Fold in Deep Learning	53
PAPER ID 176: Analysis of Deep Learning-based Models for Badminton Shuttlecock Detection	54
PAPER ID 177: Cloud Based Intelligent Water Filling System using NodeMCU	54
PAPER ID 178: Systematic review for analyzing the Dark Patterns International Regulations, Guidelines and India's aligned actions in these directions	55
PAPER ID 182: Machine Learning Models for Traffic Flow Prediction at Urban Junctions: A Comparative Analysis of RNN and LSTM Approaches	55
PAPER ID 187: A Systematic Review on Convolutional Neural Network Based Face Recognition	56
PAPER ID 188: Advancing Healthcare Security through Blockchain-Driven Smart Contracts	57
PAPER ID 189: Digital Transformation and Leadership: Managing Transition to a Tech-Driven Business with Big Data	57
PAPER ID 191: Literature Survey on Assistive Technology for Blind and Visually Impaired (BVI) Individuals Using Deep Learning	58
PAPER ID 192: An Extensive Review of Internet of Things (IoT) Applications in Revolutionizing Healthcare Systems	58

PAPER ID 196: A Comprehensive Review of Beamforming Techniques: Establishing Beam Multiply and Sum (BMAS) as the Superior Method	59
PAPER ID 197: The Pandemic Paradox: Meddling in incidents of improper synchronization of theory and technique – foreboding or worthy?	60
PAPER ID 198: Assessing the Digital Readiness of Primary Education in India: Pathways to a Technologically Empowered Future	60
PAPER ID 201: IoT-Driven Innovations in Railways	61
PAPER ID 202: Enhancing Accuracy of Corn Leaf Disease Detection: Machine Learning Approach	61
PAPER ID 204: Machine Learning Framework for Battery Performance Prediction and Optimization in Drone Applications	62
PAPER ID 205: Prosthetic hand actuation using the beta frequency of EEG signal	63
PAPER ID 206: A Comparative Analysis of Convolutional Neural Network Architectures for Excess Grass Detection on Playground	63
PAPER ID 208: Predictive Maintenance In WSN Based On Machine Learning	64
PAPER ID 210: Pioneering Advances in AI, Machine Learning, and Big Data Analytics: A Review	64
PAPER ID 211: Performance Overview of Routing Protocol for Flying Ad-hoc Networks (FANETs) considering Energy Efficiency and Security - A Study	65
PAPER ID 212: Optimization of VM migration and Energy Consumption using Adaptive Particle Swarm Optimization Algorithm	66
PAPER ID 213: Generating House Floor Layout Images Using Diffusion Model	66
PAPER ID 214: A Virtualized Approach to Intrusion Detection in SCADA Systems with an Implementation of ICS Lab Setup	67
PAPER ID 216 : AI-Augmented Data Science Pipelines for Holistic Business Transformation	68
PAPER ID 217: Malware Detection Using Deep Learning	68
PAPER ID 218: FISH : Run-Time Configurable Burst Fault Injection Self-test Hardware for FPGA	69
PAPER ID 220: AdptM :A Fault-Tolerant Adaptive Approximate Multiplier for Neural Network Hardware Accelerators	70
PAPER ID 226: Leveraging Machine Learning for Speech Classification Using Librosa and Neural Networks	70
PAPER ID 227: Traffic Violation Detection and Monitoring Using YAMNet Model for Acoustic Signal Recognition	71
PAPER ID 228: A Systematic Review on Data Leakage in Cloud Computing	71
PAPER ID 229: IoT Based Thermal Model to Predict Operating Temperature of PV module	72
PAPER ID 232: Explainable AI for Web and Text Mining	72

Abstracts NICEDT-2025

PAPER ID 7: **Cardiac Status Prediction using Machine Learning**

Aditya Bhoyar, Atharva Batwe, Saurabh Bansod, Shashank Kumar Singh, Anirban Jyoti Hati

Abstract:

This work focuses on creating an IoT platform using machine learning to predict cardiac status with a Raspberry Pi. The system uses a DS18B20 sensor for temperature measurements and a MAX30100 sensor for monitoring heart rate and oxygen saturation. It incorporates various user-specific health features such as age, gender, smoking status, cigarettes per day, hypertension prevalence, blood pressure medication usage, diabetes status, BMI, heart rate, and temperature to improve prediction accuracy. The data collected is processed on the Raspberry Pi using a pre-trained machine learning model (Logistic Regression) to predict cardiac health status. A Flask-based web application provides an intuitive user interface, allowing users to input their health data and receive cardiac status predictions. This work aims to offer a low-cost, efficient, and user-friendly tool for early detection and monitoring of cardiac health, with potential benefits in preventive healthcare and personalized medicine.

Keywords: Machine learning, Logistic Regression, Cardiac Status Prediction.

PAPER ID 8: **A Comprehensive Exploration of Medical Drones for Rapid Response and Patient Care**

Tejas Borwal, Riya Sikarwar, Rishidas E.V, Saurabh Bansod, Anirban Jyoti .Hati and Shashank Kumar Singh

Abstract:

This paper presents the design and implementation of an autonomous drone system tailored for the efficient delivery of first aid kits to locations requiring urgent medical assistance. Leveraging advanced navigation algorithms and sensor technologies, the drone identifies emergency situations promptly and navigates to the precise location indicated. Equipped with essential medical supplies, it serves as a crucial first responder in various scenarios, such as accidents, natural disasters, or remote areas lacking immediate medical access. Through rigorous testing and validation procedures, the reliability, efficiency, and safety of the autonomous drone system are demonstrated. Collaboration with healthcare professionals, emergency services, and regulatory authorities ensures compliance with applicable standards and regulations governing

unmanned aerial vehicles. This innovative solution promises to significantly enhance emergency response protocols, ultimately saving lives and mitigating the impact of critical situation.

Keywords: Autonomous Drone System; Emergency Response; Navigation Algorithms; Healthcare Innovation; Unmanned Aerial Vehicles (UAVs).

PAPER ID 13: Design and Comparative Analysis of CMOS and Various Adiabatic Logic Circuits of 8:1 Multiplexer

Shivani Singh, Lalit Kumar Dabi, Ankit Kumar, Manoj Kumar

Abstract:

The rapid evolution of digital circuits necessitates low-power, high-performance designs. Traditional CMOS technology, although widely used, faces limitations in power efficiency, particularly in scaled-down processes. Adiabatic logic circuits offer a promising alternative, leveraging energy recovery principles to reduce power dissipation. This study provides a comparative analysis of CMOS and various adiabatic logic circuits, specifically focusing on the design and performance of an 8:1 multiplexer. The comparative metrics include power consumption, speed, and design complexity, highlighting the potential benefits and challenges of adiabatic logic. An overview of the 8:1 multiplexer and its applications sets the stage for understanding the significance of this study. The 8:1 multiplexer, often abbreviated as MUX, is a digital circuit component that selects one of eight input signals and routes it to a single output line based on the selection inputs. This versatile component finds widespread use in various applications across industries, including telecommunications, data routing, and control systems. In telecommunications, for instance, multiplexers play a crucial role in combining multiple data streams into a single channel for transmission over a shared medium, thereby maximizing bandwidth utilization and minimizing infrastructure costs.

Keywords: Adiabatic Logic, CMOS, Delay, ECRL, Low-Power Design, PFAL, Power Delay Product 8:1 Multiplexer

PAPER ID 14: High-Performance Arithmetic Logic Unit (ALU) Based On Vedic Multiplier

Lalit Kumar Dabi, Kamlesh Kumar, Manoj Kumar, Priyanshu Lakra, Mansi Jhamb

Abstract:

The proliferation of battery-powered devices necessitates energy-efficient hardware design to maximize operational lifespan. Arithmetic Logic Units, while fundamental to computation, contribute significantly to power consumption in these devices. This paper

proposed an ALU architecture designed to address this challenge. By integrating a Vedic multiplier, renowned for its computational efficiency, and implementing low-power design techniques for other core components, we achieve substantial improvements in both performance and energy efficiency. Our proposed design exhibits a remarkable 93.983% reduction in power dissipation and a 66.479% decrease in delay compared to conventional ALU architectures. This work highlights the potential of Vedic mathematics and low-power design strategies for significantly extending the battery life of portable electronic devices.

Keywords: Vedic multiplier, ALU, Power-efficient, CMOS.

PAPER ID 17: Design and Development of Tissue Aware Beamformer Architecture for Ultrasound Imaging Applications

Jayaraj U Kidav, Shankar and Sreejeesh SG

Abstract:

Ultrasound imaging systems generally use delay and sum (DAS) beamforming scheme for generating the Brightness-mode (B-mode) image from the RF-echoes reflected back from the tissues. However, the images produced from DAS has poor contrast and low resolution. For mitigating the disadvantages offered by DAS, the Delay Multiply and Sum (DMAS) beamforming scheme was introduced. It generates images having superior contrast and improvised resolution. In case of DMAS, information generated from the second harmonics has to be preserved in order to generate the final image. Therefore, the ultrasound imaging system's sampling frequency must accommodate second order echoes which may not be possible in all the cases. Apart from this, the hardware requirement is comparatively more for DMAS scheme because of its computation complexity. However, if US systems could give the flexibility to reconfigure beamforming while taking into account the limitations of DAS and DMAS beamforming schemes, it would be feasible to pick the best beamforming based on system constraints and clinical requirements. A novel algorithm for such tissue aware beamformer is introduced and along with this the architecture for the same is proposed in this paper.

Keywords: Delay and Sum, Delay Multiply and Sum, Tissue Aware beamforming, Ultrasound Imaging, Beamforming architecture.

PAPER ID 18: Design of a reconfigurable hardware platform for Medical Ultrasound Imaging and Research

Jayaraj U Kidav, Rajesh M , Deepak V and Sreejeesh SG

Abstract:

This paper presents the design and development of a 128-channel digital reconfigurable hardware for medical ultrasound imaging systems and research. The proposed digital hardware solution incorporates a high-end field programmable gate array (FPGA) alongside a high-speed FPGA mezzanine connector (FMC), PCIe 2.0 x 8, and Gigabit Ethernet links. Additionally, essential components such as clock, power tree sections, and power management and debugger logic are integrated into the hardware design. This FPGA-based hardware solution facilitates the exploration of medical ultrasound signal processing hardware implementations on an FPGA platform. To prototype an ultrasound imaging system, this developed hardware can be linked with a 128-channel ultrasound transceiver hardware and a PC. The FPGA-based nature of this hardware solution offers flexibility in realizing reconfigurable hardware for medical ultrasound imaging systems. Furthermore, this work achieves a single-board solution for multi-channel ultrasound system implementation.

Keywords: Digital beamformer Hardware, Reconfigurable hardware, FPGA, PCIe, Gigabit Ethernet, PMBus™.

PAPER ID 24: **Intelligent Sign Language Detection System with Deep Learning**

Sarnav Saikia, Subhrojit Saikia, Monita Wahengbam

Abstract:

As digital transformation rapidly alters many facets of everyday life, finding effective ways to connect physical gestures with digital interfaces has become increasingly important. In this context, this research presents a comprehensive approach to hand sign detection using advanced image processing and deep learning algorithms. A novel preprocessing pipeline for accurate hand landmark detection is proposed, ensuring diverse and representative datasets. The hand sign recognition model achieves a classification accuracy of 96%, leveraging innovative techniques for robust feature extraction and classification. The system demonstrates significant improvements in reliability and efficiency, with potential applications in sign language translation and accessibility technology. The research includes the integration of advanced image processing techniques and the optimization of deep learning algorithms to enhance detection performance. This approach demonstrates significant improvements in both the reliability and efficiency of hand sign recognition systems, with potential applications in areas such as human-computer interaction, sign language translation, and accessibility technology.

Keywords: Hand Sign Detection, Machine Learning, Deep Learning, Convolutional Neural Network, Open CV, Real-time Recognition, ISDD model.

PAPER ID 29: OpenMP-Based Parallelization Using the MVDR Algorithm

Gedam Tarun Kumar ,Bhukya Maruthi Prasad Naik , Ravi Ranjan ,Anirban Jyoti Hati ,Shashank Kumar Singh

Abstract:

The rapid advancements in communication technologies have led to a significant increase in the demand for efficient and high-performance algorithms. Beamforming, a signal processing technique used in antenna arrays for directional signal transmission or reception, plays a critical role in modern wireless communication systems. The computational complexity of beamforming algorithms, however, poses a challenge for real-time applications, necessitating the exploration of parallelization techniques to enhance performance. This project investigates the parallelization of the beamforming algorithm using OpenMP, an industry-standard API for shared-memory parallel programming in C/C++ and Fortran. The primary objective of this project was to leverage the capabilities of OpenMP to parallelize the most computationally intensive parts of the beamforming algorithm. The methodology involved identifying parallelizable sections of the algorithm, particularly focusing on loops and weight computations that could benefit from concurrent execution. By breaking down the algorithm into smaller, independent tasks, we aimed to distribute the computational load across multiple threads effectively. We began by analyzing the beamforming algorithm to pinpoint the sections amenable to parallelization.

Keywords: MVDR (Minimum Variance Distortion less Response), DAS (Delay and Sum) Parallel Delay Lines, Signal Processing, Beamforming, Parallelization, OpenMP, Wireless Communication, Antenna Arrays, Signal Processing, Shared-Memory Parallel Programming, Computational Complexity, Real-Time Applications, Optimization, Loop Transformations, Synchronization Constructs, Scheduling Policies, Performance Evaluation, Scalability, DSP.

PAPER ID 33: Intelligent Flood Warning and Dam Operating System

Bhargava Ramarao Gunapu, Banothu Prathap Singh, Anirban Jyoti Hati, Shashank Kumar Singh, Saurabh Kesari

Abstract:

Floods are among the most destructive natural disasters, causing significant loss of life, property, and infrastructure. The need for efficient flood monitoring and management systems has become paramount with the increasing frequency of extreme weather events due to climate change. This paper presents an Intelligent Flood Warning and Dam Operating System that leverages ultrasonic sensors, FTDI232 modules, ESP32-CAM, and SIM modules to provide real-time monitoring and automated decision-making for flood

mitigation. The proposed system integrates Internet of Things (IoT) technology with advanced data analytics to monitor water levels, predict flood risks, and control dam operations. This cost-effective and scalable solution aims to enhance disaster preparedness, ensure timely warnings, and optimize water resource management.

Keywords: Flood warning system, dam operations, IoT, ultrasonic sensors, ESP32-CAM, SIM module, real-time monitoring, disaster management.

PAPER ID 34: Towards Smart Navigation using QR Code for Visually Impaired Person

Binoy Das, Imnasungit, Muhammad Hasim S, Bibhash Sen, Jayanta Pal

Abstract:

A Smart Guided Navigation system utilizes technology to provide users with intuitive support for navigating from one place to another. It must find the optimal route in real-time by considering user needs and environmental conditions, leading to increased safety, time savings, and ease of mobility for all. Visually impaired people (VIPs) benefit from a combination of traditional tools, such as canes for obstacle detection, and advanced technologies like smart canes with sensors and GPS apps with voice guidance. However, successful navigation also depends on accessibility, which includes affordable and user-friendly assistive devices, training programs, and public awareness initiatives that empower VIPs to navigate confidently and independently. This report presents an exploration of the development of a navigation system for VIPs. The system integrates Quick Response (QR) codes, mobile technology, and sensor-equipped looking glasses. This article represents a preliminary step towards deploying and refining a scalable navigation solution for VIPs. Early evaluations will be conducted to assess the potential effectiveness of the proposed approach in addressing the navigation challenges faced by VIPs.

Keywords: Navigation System, QR Code, Assistive Technology, Specially-Abled Persons, Visually Impaired Person

PAPER ID 35: Newton methods based convolution neural networks using parallel processing

Ujjwal Thakur and Anuj Sharma

Abstract:

The optimization of convolutional neural network (CNN) training poses a formidable challenge due to its high-dimensional and non-convex nature. This issue is particularly pronounced when setting parametric learning rates lacks confidence, leading to

inefficiencies in the training process. Prior research has explored the integration of Newton's methods to address such challenges encountered in deep neural network training. However, the application of Newton's methods to CNNs entails intricate operations, especially in computing the requisite Hessian matrix for second-order methods. This complexity is further compounded when employing finite differences methods, particularly with image data. To address these computational challenges, Newton's methods for CNNs commonly leverage sub-sampled Hessian Newton methods. However, in this investigation, we deviate from conventional approaches by opting for the utilization of complete data sets instead of handling partial data subsets at each iteration. Furthermore, we enhance computational efficiency by introducing parallel processing techniques in lieu of serial processing during mini-batch computations. Our experimental findings underscore the efficacy of parallel processing, as it significantly surpasses the time efficiency achieved by previous methodologies. We demonstrate improved convergence rates and overall performance in CNN training using our proposed approach.

Keywords: Deep Learning, CNN, Parallel Processing, Image Classification, Neural Networks, Newton's Method, Optimization

PAPER ID 37: **Prediction Of Mental Health Using Machine Learning**

Yashwant Kumar, Shashank Kumar Singh, Sagar Mishra, Anirban Jyoti Hati, Yogesh Kumar

Abstract:

Mental health disorders have emerged as a paramount problem worldwide, affecting millions and presenting substantial hurdles to healthcare systems. In this research, a method for predicting mental health disorders utilizing extensive machine learning (ML) and artificial intelligence (AI) models is proposed. The proposed system integrates a range of sophisticated machine learning algorithms to analyze user inputs and predict potential mental health issues. By selecting the feature importance, we can select the best suitability model for prediction with high accuracy. The algorithms, K-Neighbors Classifier, Decision Tree Classifier, Random Forest, Boosting and Stacking, are used to predict mental health. Among them, Boosting appears to be the best model based on its highest F1 score. The anticipated likelihood condition was evaluated to make an appropriate recommendation. We focus on college students and older adults, specifically adults older than 18 years. This demographic is at higher risk of mental health challenges due to academic and workplace stress, making early intervention crucial.

Keywords: Mental health, Machine learning Prediction, Stacking, Random Forest, Boosting.

PAPER ID 38: An approach to an intrusion detection system that involves the deployment of a multilayer perceptron

Usham Sanjota Chanu and Angom BubooSingh

Abstract:

Cyberattacks have the potential to significantly disrupt millions of people by focusing on critical services including healthcare systems, the financial industry, corporations, and government agencies. An organization's reputation can be seriously damaged by a cyberattack, which can result in a decline in stock markets, a decline of client faith, and diminished revenue. When vulnerabilities are exposed by hackers, governments and other public institutions also lose credibility. Security measures such as firewalls, encryption, and safety reviews require significant investments from organizations. Administrative expenses are raised by the demand for regular upgrades and qualified cybersecurity experts. To identify and notify the security administrator of these cyberattacks, we presented in the research a multilayer layer perceptron (MLP)-based intrusion detection system. Applying the suggested technique to the NSL-KDD benchmark dataset yields a 98.3% detection accuracy over the attacks.

Keywords: Cybersecurity, Intrusion detection, Multilayer Perceptron

PAPER ID 41: Enhancing Mammogram Image Quality Using Various Noise Removal Techniques And Improvised Kuan Filter

Tonjam Gunendra Singh, Monita Wahengbam, S.Sivashankar, A. Agnes Pearly, P. Abirami

Abstract:

When it comes to imaging in medicine, the quality of the picture is vital for precise evaluation particularly breast cancer identification. The full examination of the noise elimination methods used to improve the appearance of breast tumor pictures is presented in this paper. Several popular filtrations were compared and evaluated: standard WF(Wiener filter), MF(Median filter) and an improvised Kuan filter. Those filters' performance is examined using the MSE, PSNR, and SSIM metrics. Our results showed that when it came to MSE, PSNR, and SSIM, the Improvised Kuan filter functioned better than the Wiener and median filtration. The Improvised Kuan filter showed excellent noise mitigation powers by leverage, leading to noticeably better photo quality. It is anticipated that these improved pictures will offer physicians and other healthcare professional's sharper and additional comprehensive representations, enabling more precise diagnoses and well-informed treatment choices for individuals with breast cancer. From the results obtained Improvised Kuan filter gave PSNR of 45.35, SSIM of 0.999 and MSE of 0.000124. The results of the research highlight the value of customized noise reduction

methods and highlight the Improved Kuan filter's effectiveness in improving breast cancer imaging and eventually, enhanced medical results.

Keywords: Breast Cancer, Image Quality, Noise Removal, Wiener Filter, Median Filter, Kuan Filter, Enhanced Imaging, Medical Imaging, Digital Enhancement, Image Processing, Noise Reduction, Biomedical Imaging

PAPER ID 43: **Recommendation Modeling for Complementary Furniture Products Based on Customer Preferences**

Sheetal Bukkawar, Leena Rajan Katkar, Aryan Sanjay Nagbanshi, Aryan Subhash Dalvi, Pushkar Manoj Mhatre, Atharva Sushil Bhawe

Abstract:

The challenge of time consumption during the furniture selection process is a significant pain point for many clients. Existing sources often fail to address this issue effectively, leading to prolonged decision-making and dissatisfaction. Our project aims to tackle this problem by presenting a comprehensive solution that combines cutting-edge technology with user-centric design. At the core of our solution is a requirement analysis for both new furniture and complementary items. This involves understanding the specific needs of the client and tailoring options accordingly. To facilitate a more engaging and efficient selection process, we incorporate 3D augmented reality (AR) technology. This allows clients to visualize furniture in their own spaces before making a decision, providing a more interactive and realistic experience. Our platform is designed to be multilingual, ensuring accessibility for a global audience and eliminating language barriers that might hinder user experience. This inclusivity is critical for reaching a diverse market and accommodating various linguistic preferences. A key component of our approach is the use of conditional generative adversarial networks (CGANs) alongside extensive image datasets. CGANs will generate high-quality, customizable furniture designs based on user preferences, text prompts, and input images, enabling clients to explore unique and tailored options. The image datasets will support this by offering a wide range of styles and variations, ensuring that clients have access to an extensive array of choices. By integrating these advanced technologies, we aim to streamline the furniture selection process, making it more efficient and enjoyable. The combination of 3D AR, multilingual support, and GANs with rich image datasets will provide a seamless, interactive experience that significantly reduces the time clients spend choosing the right furniture. Our solution represents a forward-thinking approach to enhancing client satisfaction and optimizing the decision-making process in the furniture industry.

Keywords: Text to text, image to image, GANS, CNN, AR, multilingual, image inpainting.

PAPER ID 44: Actuator State Estimator based Cascade Control for Process Automation

Sasidharan P T and Ranjan Maheswari

Abstract:

In process automation, fluid flow, level and pressure systems have major importance. In conventional process automation, PID control strategies are employed. The manipulated variables are often fluid flow rates. In these applications processes that are open loop unstable such as integrating process with dead time (IPDT) having actuator nonlinearity and dead time pose great challenges. Control of process units with such elements demand combinations of PID and model-based methods such as cascade, feed forward, internal model control etc. Internal Model Controllers (IMC) based PID gain calculations are widely used for processes with dead time. Cascade PID control can give disturbance reduction and faster response but requires additional measuring instruments. In this paper, an actuator state space model-based estimator along with conventional cascade control with IMC tuned PIDs are used. Actuator nonlinearities such as friction are modeled and included in the estimator calculations. The actuator state variables are estimated using an Extended Kalman Filter. One major advantage of the present method is that nonlinear actuator characteristics can be included; also the state estimation is limited to actuator model only. Using state estimates and low cost measuring instruments results in reduced cost and is an advantage. Since measurement is taking place at the point of process manipulation, delay is small. Also, implementation is easy using PID control loops. An in-house developed process automation training plant is used to demonstrate the effectiveness of the proposed method. The simulation and experimental study shows that the proposed method is robust and is performing well with better results.

Keywords: Process control, Internal Model Control, Actuator nonlinearity, dead time, Estimation, PID control, cascade control.

PAPER ID 46: Comparative Evaluation of Deep Learning Architectures for Multi-Class Classification of Kidney Pathologies and Kidney Stone Detection

Abhiraj Singh Thakur, Nitin Gupta, Preeti Soni and Kuldeep Singh Jadon

Abstract:

The increasing demand for precise and timely diagnosis of kidney abnormalities has caused a significant increase in research on counterfeit intelligence-driven frameworks. Recent advances in profound learning have opened up modern avenues for examining different kidney diseases. This study evaluates the performance of four popular convolutional neural network (CNN) architectures - MobileNet, VGG-16, VGG-19, and ResNet50 - in distinguishing between normal cases and abnormal conditions such as

kidney stones, tumors, and cysts. Furthermore YOLO-NAS, is employed to precisely locate kidney stones within images. The results of this study show that MobileNet outperforms the other pre-trained models, achieving an accuracy of 99.60%. Additionally, YOLO-NAS detects kidney stones with a high mean Average Precision (mAP) score. This study illustrates deep learning's potential to assist clinicians in making decisions and improve the ongoing management of patient health.

Keywords: Deep Learning Multi-Class Classification, Kidney Abnormalities (Tumors, Cysts, Stones), Convolution Neural Networks(CNN), YOLO-NAS

PAPER ID 47: Fair and Transparent Student Placement Predictions: A Machine Learning and Explainable AI (XAI) Approach

Anjali Jindia, Sonal Chawla

Abstract:

Career path prediction plays a vital role in guiding students towards successful careers by providing them personalized recommendations based on their academic performance, skills, interests, and market trends. Early career path identification allows students to develop relevant skills and gain necessary experience, increasing their competitiveness in the job market. This study aims to ensure fair and transparent predictions by exploiting Machine Learning (ML) and XAI techniques on student career dataset. Initially, ML algorithms were applied to predict placement status, followed by an assessment of the model for bias using XAI. Upon detecting bias, mitigation strategies were implemented to enhance fairness. The use of XAI techniques improved model transparency and trustworthiness. The methodology involved identifying and addressing dataset imbalances that could skew predictions. By applying oversampling techniques, the dataset was balanced, leading to significant improvements in model performance. The initial model showed poor performance metrics due to data imbalance, but after oversampling, the F1 score improved from 91.76% to 93.42%. The application of XAI techniques, such as LIME (Local Interpretable Model-Agnostic Explanations) and SHAP (SHapley Additive Explanations), offered a deeper insight into the model's decision-making process. This analysis highlighted specific features that, when oversampled, further enhanced the F1 score to 96.08%. The study emphasizes the importance of using XAI to not only improve model performance but also provide a trustworthy framework for stakeholders. By evaluating models using various evaluation metrics the study demonstrated that integrating fairness and transparency into predictive models is achievable and beneficial for ensuring equitable student placement outcomes.

Keywords: Bias Mitigation, Career Path Prediction, XAI, LIME, ML, SHAP.

PAPER ID 48: Enhancing Crop Recommendation System: SVM Modeling With Z-Score Normalization And PCA Feature Extraction

S. Nirmala Sugirtha Rajini, K. Anuradha, E. Mercy Beulah, T. Kirubadevi, Monita Wahengbam, Tonjam Gunendra Singh

Abstract:

Agricultural productivity is highly influenced by the choice of crops, which should be aligned with the soil and climatic conditions. A reliable crop recommendation system can significantly aid farmers in making informed decisions, enhancing yield and sustainability. Outdated methods of crop selection often rely on experimental knowledge and past data, which may not always account for the difficult, multidimensional nature of agricultural data. To address this challenge, modern ML (Machine Learning) techniques offer powerful tools for analyzing and interpreting large datasets, enabling more precise and data-driven recommendations. This study explores the effectiveness of SVM for crop recommendation, supplemented by advanced preprocessing techniques including Z-score normalization and PCA for feature extraction. In this work, we use Support Vector Machines (SVM) as the classification technique to construct a Crop Recommendation System. Principal Component Analysis (PCA) is used for feature extraction while Z-score normalization is used to standardize the dataset. The Crop Recommendation Dataset from Kaggle is used to assess this model. Accuracy measurements serve as the primary basis for evaluating the system's performance. According to our research, Z-score normalization, PCA, and SVM work better than other classification models like Random Forest (RF) and Decision Tree (DT). Z-score normalization combined with PCA and SVM provides a powerful foundation for crop recommendation systems. This combination guarantees a more streamlined and effective model while also improving accuracy.

Keywords: Crop Recommendation System, Z-score Normalization, Feature Extraction, Machine Learning, Agricultural Data, Classification Models, Random Forest, Decision Tree

PAPER ID 49: Evolutionary Profiling and Study of Gut Microbial Species in Liver Regeneration and Diseased Conditions with 16 s rRNA using Bioinformatics

Sarmistha Pathak, Jyotirmoy Deka, Monita Wahengbam

Abstract:

The gut microbiota plays a crucial role in liver regeneration and disease progression, with specific microbial taxa impacting liver health. This study explores the evolutionary relationships and functional roles of gut microbiota involved in liver regeneration and disease states, using bioinformatics tools like Biopython. We retrieved 16S rRNA

sequences from NCBI and EMBL databases, compiling a dataset of 23 microbial species affecting liver metabolism, inflammation, and regeneration. Data preprocessing included manual curation, sequence alignment with BioEdit and ClustaW, and evolutionary analysis with MEGA 11 to construct phylogenetic trees. The study focuses on evolutionary relationships through nucleotide frequency distribution, interactions, and p-distance calculations to assess genetic divergence among the selected species. Species like *Roseburia hominis* and *Bacteroides fragilis* showed strong positive correlations, suggesting cooperative relationships enhancing liver regeneration, while competitive interactions were observed in others. Distinct clades of bacteria linked to liver health and diseases were identified e.g. (*Lactobacillus*, *Faecalibacterium*, *Enterobacteriaceae*, *Clostridium*, etc.). Genomic analyses, including nucleotide distribution, highlighted the microbiota's functional significance in liver health, suggesting and will help to get potential therapeutic strategies targeting the microbial communities to improve liver regeneration and diseased conditions. Our findings revealed distinct clades of bacteria associated with liver health, such as *Lactobacillus* and *Faecalibacterium* linked to liver diseases, such as *Enterobacteriaceae* and *Clostridium* based on bioinformatic analysis. These insights underscore the gut microbiota's evolutionary and functional significance in liver health, providing potential therapeutic strategies targeting microbial communities to enhance liver regeneration

Keywords: NCBI (National Center for Biotechnology Information) databases, Biopython, 16S rRNA, Nucleotide frequency distribution, p-distance, MEGA 11, ClustaW algorithm, Entrez module, SPSS.

PAPER ID 50: **Comparative Study of Machine Learning for Fault Prediction in Solar Water Pumps**

Yogesh Kakasaheb Shejwal, Jayraja U. Kidav, Lakshaman Korra, Manjiri Lavadkar

Abstract:

Solar water pumps play a crucial role in sustainable agriculture, especially in rural areas where reliable access to water and energy is limited. These systems, powered by renewable solar energy, offer an eco-friendly and cost-effective solution for irrigation. However, like any technological system, solar water pumps are susceptible to various faults, including electrical, physical, and environmental issues, which can compromise their efficiency and reliability. This research paper focuses on the application of machine learning techniques to predict and diagnose faults in solar water pump systems. In this paper, five machine learning models—Logistic Regression, Support Vector Machine (SVM), K-Nearest Neighbors (KNN), Decision Tree, and Random Forest—are evaluated for their effectiveness in predicting three key fault types: electrical faults, such as open circuits; physical faults, including module degradation and cleaning needs; and environmental faults, influenced by factors like wind velocity and temperature. This

research study uses sensor data collected from solar water pump systems, including parameters such as current, voltage, temperature, and solar power. The results show that random forest and logistic regression always achieve the best accuracy in all fault parameters, which is suitable for fault prediction and preventive maintenance. By accurately predicting potential failures, the intelligent system aims to reduce downtime, lower operating costs and increase the efficiency of solar water pumps. This research paper provides important insights into the optimization of machine learning models for fault prediction in renewable energy systems and contributes to the broader goal of promoting sustainable agriculture through technology

Keywords: Solar Powered, Solar Water Pump, logistic Regression, Machine Learning, Intelligent Monitoring, Maintenance, Power Electronics, KNN, SVM.

PAPER ID 51: A Comprehensive Review on Popular CNN-based Deepfake Detection Models, Performances, and Challenges

Surajit Paul, P. Rangababu and Bishnulatpam Pushpa Devi

Abstract:

With the increased search for deepfakes, society and its stakeholders, institutions, governments, and even democracy come under threat. It could be false political addresses to fake corporate announcements, and such reasons make deepfakes a threat in that they will reduce confidence in digital media. Thus, researchers apply AI and ML to create systems that may detect deepfakes as effectively as possible. These detection systems are critical as they act as data guardians in today's complex environment, combat fraud, guard privacy, and counter fake news. This review provides an overview of several cutting-edge deep learning-based methods for the recognition of human actions on six different kinds of CNN models. This work presents the history and current state-of-the-art CNN architectures with a thorough investigation of the model's performance in image classification tasks. This paper aims to provide an analysis of the prevailing AI-based approaches for detecting deepfake-generated data. Thus, within this research, various machine learning models with a focus on CNN are demonstrated to learn the difficulties of detecting deepfakes and the shortcomings of existing solutions. This work will provide the groundwork for future discussion and analysis of the findings and how they affect the choice of the best models for deepfake detection.

Keywords: Machine learning, Deepfake, CNN, fake videos, neural Cyber Forensic, Authentication

PAPER ID 52: A Smart Irrigation System for Agriculture Land Utilizing Image Processing and AI

Surajit Paul, Raktim Acharjee, Binoy Das

Abstract:

Agriculture is very essential to the economy. Some of the computational approaches utilized to construct the smart irrigation system, which mixes software, hardware, and firmware, include the Internet, AI, and machine learning. An intelligent irrigation system based on image processing techniques has been developed specifically for farmland. The system seeks to minimize the use of water by monitoring crop moisture levels and only irrigating when necessary. The interconnected collection of soil moisture sensors is one of numerous components that comprise the smart irrigation system, which is distributed across the agricultural area. These sensors regularly measure soil moisture levels at various locations. Additionally, the system has an image processing module that evaluates crop water stress and plant health using satellite or aerial photographs. Based on information gathered from the image processing module and soil moisture sensors, the smart irrigation system schedules when to irrigate. With the use of algorithms and decision-making criteria, the optimal irrigation schedule and duration are determined for every distinct area within the agricultural field. Through the use of real-time data and crop water requirements, the approach guarantees that irrigation is only applied when the crops actually require it. To regulate the water flow to various agriculture areas, the technique can be used with an automated irrigation system. The approach improves system scalability and efficiency by integrating a cloud-based platform for remote data analysis and control. The system's potential to transform sustainable irrigation techniques in resource-constrained regions is shown by field testing that show notable water savings (up to 40%) while preserving crop health.

Keywords: Image processing · Artificial Intelligence · Intelligent irrigation system · Farmland.

PAPER ID 53: Intelligent Control On Weeds- A Developmental Approach For Rice, Wheat, Potato Farms At Kurukshetra That Would Be Leading To A Scalable Solution To Different Crops In Various Geographies

Sandeep kumar Ahlawat

Abstract:

High concentration of presence of weeds into crops is resulting in production mixed with impurities and lesser in yield. Chemicals (Pesticides and Herbicides) are used mainly to get rid of weeds and that is entailing to ecological imbalances. Smart solution for controlling the menace of weeds is the demand of the day. An approach to develop user

friendly smart system for controlling weeds is conceived comprising various activities including auto capturing of data regarding environmental condition of soil using IoT sensors, AI based identification of weeds and capturing their growth pattern by using aerial surveys, capturing of soil health based upon available information on soil health cards with farmers and various weed control mechanisms exercised by farmers in their respective fields through crowd sourcing and developing AI based model establishing relationship of weeds' growth with other factors. Factors affecting weeds growth are soil health parameters, seasons and environmental conditions of soil. One of the main objectives is to establish and validate impact patterns of using control mechanisms like use of chemicals on weeds at its different levels of growths viz a viz different conditions of soil comprising health factors, environmental factors and seasons etc. This would facilitate in reaching to impactful and effective weeds control mechanism with least use of chemicals.

Keywords: Weeds Control, Rice, Wheat, Farming, IOT, Image Processing, AI, Crowd Sourcing, Soil Parameters, Efficacy of Herbicides, Pesticides

PAPER ID 54: Automatic Machine Learning Driven Anomaly Detection for Predictive Maintenance and Fault Diagnosis in Urban Metro Systems

Ankit Kumar, Anurag Choubey, Shivendu Mishra, Maheshkumar H Kolekar, Rajiv Misra and Gaddi Suresh Kumar

Abstract:

Predictive maintenance leverages critical machinery's data generated from sensor in real-time and past data to identify potential failures and mitigate their impact. While machine and deep learning techniques are increasingly used for accurate fault detection, the manual selection of models and hyperparameter tuning remains time- consuming and requires significant domain expertise, affecting model generalization. To overcome these challenges, this paper introduces an automated machine learning (AutoML) framework that autonomously designs an effective pipeline, minimizing human intervention. In this paper time series data generated from sensors integrated on the Metro Do Porto train network's Air Production Unit (APU) is utilized to create a versatile pipeline for the rail transportation sector. Achieving accuracy of 99.98% and an F1-score of 0.999, the H2O AutoML technique outperforms other models.

Keywords: Predictive maintenance, Air production unit, Deep learning, Anomaly detection, AutoML.

PAPER ID 55: Comparative Analysis of LSTM, GRU, and Random Forest Regression for Air Quality Prediction

Shoukath Cherukat, Gandreddi Niharika, Raghavendran S, Ishant Kumar Bajpai, K S Lalmohan

Abstract:

This paper presents the air quality level by calculating air quality index by using historical data. Air pollution is a pressing environmental issue affecting millions of people in India. Major cities like “Delhi, Mumbai, Kolkata, and Bangalore” frequently experience hazardous air quality levels, posing severe health risks to their inhabitants. Air pollution in Indian cities has emerged as a critical public health concern. Accurate forecasting and analysis of air quality are crucial for implementing timely measures to mitigate these risks. Precise and prompt forecasting of “Air Quality Index (AQI)” is essential for effective mitigation strategies. This research offers a detailed comparison of “Long Short-Term Memory (LSTM), Gated Recurrent Unit (GRU), and Random Forest Regression” models to improve AQI forecasting for cities in India. The sequential character of air quality data is versioned by LSTM, which can capture temporal dependencies, Similar functionality is provided by GRU, which streamlines the procedure while preserving excellent temporal pattern recognition performance, while Random Forest makes use of its capacity to manage intricate interactions between meteorological and air quality parameters.

The evaluation of the models is carried out with historical AQI data from multiple Indian cities, incorporating “pollutant concentrations such as PM2.5, NO, NO2, NOX, NH3, CO, SO2, O3, Benzene, Toluene, and Xylene”. Experimental results show that integrating “Long Short-Term Memory (LSTM) networks, Gated Recurrent Units (GRUs), and Random Forest Regression” models presents a promising approach to enhancing the accuracy and reliability of “Air Quality Index (AQI) predictions”.

Keywords: Air Quality Index, Machine Learning, Deep Neural Network, Recurrent Neural Network, Long-Short Term Memory, Gated Recurrent Unit, Random Forest Regression.

PAPER ID 56: Switching Losses Reduction and Enhancement of Predictive Direct Torque Control Drives using 2-level Inverter with BLDC Motor

SurajKarpe, Ganesh Dongre, YogeshShejwal

Abstract:

Predictive Direct Control of Electric Current takes into account the discrepancies between the cost function's measured current and current reference, and Predictive Direct Control of Electromagnetic Torque assesses electromagnetic torque and stator flux in the cost function to regulate a brushless direct current motor. In order to reduce the discrepancy between the references and the anticipated values, the switching vector that is chosen for

usage in IGBTs. The most effective direct control techniques are the predictive direct control of electromagnetic torque and the predictive direct control of electric current, with the brushless direct current motor approach providing ten to thirty percent greater torque compared to an induction motor and obviating the need for a modulator. Forecast-Based Direct Management of Electromagnetic Torque and Forecast-Based Direct Management of Electric In comparison to Predictive Direct Control of Electromagnetic Torque and Predictive Direct Control of Electric Current methods, the current methods method with a an inverter with two levels and brushless direct current motor reduces 36% more THD in torque, speed, and stator current. This design improves efficiency and reduces transmission losses. In contrast to direct control methods of electronic power prediction and direct control of electronic power prediction an inverter with two levels converter, direct control methods of electronic power prediction as well as direct command of electronic power prediction electricity using a zero-voltage DC motor in this article and excellent, robust, and stable performance torque and flow feedback are obtained. The simplicity of the method and its good performance in stable conditions and common areas quickly attracted experts to this unique approach.

Keywords: Brushless Direct Current Motor, Induction Machines (IM), Voltage Source of the Inverter (VSI).

PAPER ID 57: **Face Liveness detection using CNN model**

Niladri Das, Poulomi Deb, Swanirbhar Majumder, Debika Das

Abstract:

Face liveness detection is a pivotal component in modern biometric security systems, aimed at distinguishing between genuine human faces and spoofing attempts using static images, videos, or 3D models. The most recent methods and strategies for detecting face liveliness are outlined in this paper, with an emphasis on advancements in the software and hardware domains. Various approaches including texture analysis, motion-based techniques, and deep learning (DL) methods that leverage convolutional neural networks (CNNs) and other machine learning (ML) algorithms to enhance detection accuracy are explored. Additionally, the paper discusses the flaws and limitations of recent advances in technologies, including the trade-offs between detection performance and computational efficiency. Future directions for research are also proposed, focusing on the integration of multimodal liveness detection systems and the adoption of emerging technologies like augmented reality and blockchain for improved security.

Keywords: Face Liveness Detection, Biometric Security, CNN, Face Recognition.

PAPER ID 58: Liveness detection in Iris using CNN model

Niladri Das, Poulomi Deb, Swarnirbhar Majumder, Priyanka Debntah

Abstract:

The rapid growth of biometric authentication systems has raised concerns about their vulnerability to spoofing attacks, especially in Iris recognition. This thesis proposes a novel approach to Iris Liveness Detection using Convolutional Neural Networks (CNNs) to identify differences between authentic and fraudulent Iris images, enhancing the security of these systems. A custom dataset was created, featuring authentic images of Iris from five individuals, taken at various angles, along with fake images synthesized from their photographs. The CNN model, trained on this dataset, achieved an impressive 92.51% accuracy. Its robustness was tested on unseen data under diverse conditions, demonstrating strong generalization potential. The thesis also explores the model's interpretability, aiding in refining the liveness detection mechanism to counter evolving spoofing techniques effectively.

Keywords: Iris Liveness Detection, CNN, Iris Recognition, Deep Learning

PAPER ID 59: Real Time soil surveillance

Chennuru Jagadeeswar reddy , Rajesh Yadav , Monita Wahengbam

Abstract:

Below, ideas that served as a basis for developing and implementing a real-time soil monitoring system, specifically for agricultural applications, are presented. Critical soil parameters are continuously monitored by integrating a multiple number of sensors, such as soil moisture sensors, humidity sensors, and water temperature sensors, onto an Arduino Uno microcontroller. The data collected by the sensors are then processed in real-time to automate irrigation and fertilization processes. The Arduino Uno controls when the water and chemicals are dispensed to the crops according to the set limits and time intervals. This will ensure that the soil stays healthy and the yield increases in crops. This system will lead to proper water consumption and the decrease in chemical waste while increasing crop yield. It will be designed to be both cost-effective and scalable to be adopted easily by small to medium-sized farmers, thus developing a more sustainable agricultural practice. Preliminary results of the testing indicate that the system is very effective in maintaining optimal ranges of soil conditions and, therefore, has a good potential to improve agricultural operations.

Keywords: Real time monitoring of the soil, Arduino Uno, Soil moisture sensor, Humidity sensor, Water temperature sensor, Smart irrigation, Smart fertilization, Sustainable agricultural practices, Optimized crop yield, Precision agriculture.

PAPER ID 60: Implementation of Augmented Reality to Visualize Cell Organelles

Ai Myachha Chawloo, Monita Wahengbam, Subhrojit Saikia

Abstract:

Cell biology is a foundational subject in the life sciences, yet traditional education methods often fail to convey the complexity and spatial relationships of cell organelles. This paper addresses this educational challenge by developing an augmented reality (AR) application that provides an immersive, interactive experience for exploring cell organelles. The primary objective of this application is to find an alternative method to enhance learning and engagement through AR technology, offering detailed 3D models that users can manipulate to understand cellular structures and functions better. The project is being developed primarily utilising Blender and Unity Editor for creating 3D models and integrating them into an android application. The application provides a user-friendly approach to interact with the digitally produced 3D models of the various organelles, to study their structures. This project is an attempt to pave the way for future expansions to include additional topics and more advanced interactive features, ultimately providing a novel approach to study cell biology.

Keywords: cell biology, cell organelles, education, learning, augmented reality, blender, unity

PAPER ID 61: Chronic Kidney Disease Detection using QSVM and Comparative Analysis with Classical SVM

Himanshu Kamdi, Abhishek Shinde, Vipul Chaudhari, Amit D. Joshi, Suraj Sawant and Sunil Bhirud

Abstract:

Chronic Kidney Disease is one of the serious global health issue worldwide as it has high mortality rate and yet most of the population is unaware of this disease. Therefore early detection and treatment of the chronic kidney disease to avoid its harsh effects on patients' health. Various classical machine learning techniques and algorithms have been implemented for classification of chronic kidney disease. Quantum machine learning is an emerging field which uses superposition and entanglement of qubits, and thus has higher computation power than classical machine learning algorithms improving the performance and computation speed. This study aims to explore quantum machine learning for successful classification of chronic kidney disease. Hence, Quantum support vector machine is implemented and compared with classical support vector machine on UCI chronic kidney disease dataset. Quantum support vector machine is implemented

and simulated by two approaches, first using PennyLane library, and second using Qiskit library. PennyLane approach involves generation of quantum kernel which is then fed to support vector classifier. Whereas Qiskit involves generation of quantum kernel which is then fed to quantum support vector classifier. The results of both these approaches are at par with the classical support vector machine. The model using angle embedding in PennyLane achieves highest accuracy of 100% and f1 score of 100% which is equivalent to the classical implementation. While the model trained using YZ PauliFeatureMap with 3 repetitions achieves both accuracy and f1 score of 99.00%.

Keywords: Quantum Computing, Quantum Machine Learning, Chronic Kidney Disease, Quantum Support Vector Machines, Qiskit, PennyLane

PAPER ID 62: **Drowsiness Detection System**

Prashant Gupta, Shailesh Kumar Agrahari, Indulata Gupta, Anshul Choudhary

Abstract:

Accident prevention systems are essential in transportation and industrial safety, where operator drowsiness can lead to dangerous outcomes. This study proposes a non-intrusive drowsiness detection system using Haar Cascade classifiers for real-time facial and eye detection. The system monitors eye closure to assess fatigue, triggering an audio alarm using Pygame when prolonged eye closure is detected. The results showed that the system can effectively detect drowsiness, providing an efficient solution to prevent accidents caused by driver fatigue or operator negligence.

Keywords: Drowsiness Detection, Haarcascade, Pygame, OpenCV, Driver Fatigue

PAPER ID 63: **Precision Diagnosis: Leveraging KNN for Breast Cancer Detection**

Salka Debbarma, Md. Reyad Hossain, Niladri Das

Abstract:

Breast cancer is a class of disease which is the most common type of cancer nowadays in women and this kind of cancer has millions of new diagnoses globally each year. This research study is focused on early diagnosis for raising cure rates and increasing survival rates among patients. This project will discuss the use of various machine learning models to predict breast cancer, which includes Logistic Regression, Naive Bayes, SVM, K-Nearest Neighbour (KNN), Decision Tree, and Random Forest. KNN outperformed other models with an accuracy of 98.54%, precision of 0.98, and an F1-score of 0.98. To translate this model into a real-world web application, a Flask based web interface was

developed to be used by health professionals and patients with real-time predictions. Future work will involve optimization of models, refining features, and integrating the medical system to assist clinical decision-making.

Keywords: Breast Cancer Detection, Machine Learning, KNN, SVM, Logistic Regression, Naive Bayes, Decision Tree, Random Forest, Flask Web Application

PAPER ID 64: ECG Arrhythmia Detection using Lightweight 1DCNN-Bi-LSTM Technique for Cardiovascular Disease

Payel Sarmah, Piyush Kaushik Bhattacharyya, Rana Chandra Dey, Rashmi Dutta and Anil Kumar Shaw

Abstract:

The World Health Organization (WHO) claims that every year 17.9 million deaths are attributed to cardiovascular diseases (CVDs), making them the primary cause of death rates. Electrocardiogram (ECG) is considered the fundamental criterion for assessing heart conditions and also capable for arrhythmia detection. With the recent advancements, artificial intelligence (AI) has become a transformative technology in the area of healthcare with accuracy comparable to human experts. However, deep-learning (DL) models have achieved several notable advancements in medical diagnosis. In this work, we considered 1DCNN with an integration of Bi-LSTM for the classification of 12-lead ECG's of 45,152 patients recorded comprising of 45152 samples to detect 5 types of classification. The proposed model has achieved an accuracy of 98.9% which is significantly higher. However, these models are computationally intensive and demand a large amount of memory for deployment. Therefore, a lightweight pruned model has been developed for on-device implementation for real-time ECG monitoring with minimum inference time. The lightweight model achieved an accuracy of 99.4% which is higher than the original DL model.

Keywords: Deep Learning (DL), Edge Device, Lightweight, one-dimensional convolutional neural network (1DCNN), Bidirectional LSTM (Bi-LSTM)

PAPER ID 66: AI Chatbot for Medical Care using Machine Learning with Python

Subhash Kumar Wary, Rajendra Oraon, Mandwip Baruah, and Bipul Roy

Abstract:

This study introduces "Talk-A-Bot," an advanced AI chatbot developed in Python to improve healthcare accessibility and support through intelligent, user-friendly interactions. Leveraging machine learning techniques like LSTM-based response generation, TF-IDF

vectorization, and cosine similarity, "Talk-A-Bot" can interpret complex user intent, delivering contextually accurate responses that enhance user experience. Built around a Seq2Seq model, the chatbot is specifically tailored for healthcare applications, including preliminary symptom assessment, information dissemination, and real-time patient guidance, enabling private, accessible, and responsive health support. Additionally, it incorporates text preprocessing and adaptive learning capabilities, allowing it to evolve based on user interactions. The flexible codebase supports customization, extending its utility to fields like customer service and information retrieval. In pilot testing, "Talk-A-Bot" has shown high accuracy in handling diverse health-related inquiries, underscoring its potential to improve access to health information for underserved populations and aid healthcare professionals in efficiently addressing common questions. This project exemplifies the potential of AI in healthcare, enhancing patient engagement, broadening access to essential information, and ultimately advancing the quality of care.

Keywords: Chatbot · Machine Learning · Natural Language Processing · Python · Seq2Seq Model · TF-IDF

PAPER ID 67: AI-Powered Adolescent Health: Dimensions, Current Trends and Future Prospects

Mandeep K. Chawla, Ridhi Sharma and Navdeep Kaur

Abstract:

Adolescence is a critical developmental stage, marked by rapid physical, emotional, and psychological changes, which may give rise to unique health challenges. Artificial intelligence has emerged as a transformative force in addressing these challenges, offering innovative solutions for improving adolescent healthcare. This paper provides significant insights into key dimensions, current trends and future prospects of AI in adolescent health. It explores applications in mental health interventions, remote monitoring, personalized nutrition and fitness, and substance abuse prevention, highlighting the potential for AI-driven systems to enhance healthcare outcomes for adolescents. In particular, AI-powered tools such as machine learning algorithms, predictive analytics and personalized health plans have shown promise in early diagnosis, treatment optimization, and lifestyle management. The paper also addresses significant challenges in the adoption of AI, including ethical concerns, data privacy issues, interoperability and the need for trust and acceptance among adolescents. The review concludes by discussing future directions in fully harnessing AI capabilities to modernize adolescent healthcare.

Keywords: Adolescent Healthcare, Artificial Intelligence, Remote Monitoring, personalized nutrition, Mental Health Intervention, Substance Abuse Prevention.

PAPER ID 68: Evaluating Cybersecurity Risks in Modern Healthcare: Quantitative Assessment of Biomedical Device Compromises and Electronic Health Records Tampering

Kumar Amitabh and Anurag Mathur

Abstract:

The adoption of digital technologies in the health sector has provided better operational effectiveness and care to patients while presenting critical cybersecurity vulnerabilities. The work presented here is the analysis of the cyber risks to the electro-medical devices used in the healthcare sector. An investigation has been done into the occurrences, cost implications, and implications on patient safety due to cyber-attacks on biomedical devices and Electronic Health Records (EHR). The significant data set of industry reports, case studies, and hospital breach records were analyzed and investigated using statistical methods. It provided a data-driven understanding of the relative risks imposed by compromising of biomedical devices and EHR tampering. The financial impact and burden imposed by the cyber-attack and EHR tampering have been elaborated. The findings of the work emphasize the differences and similarities between attack vectors, consequences, and mitigation strategies. It also provides evidence-based recommendations towards fortifying healthcare providers' cyber security measures.

Keywords: Biomedical, Cybersecurity, Electronic Health Records, Financial Impact, Healthcare, Tampering.

PAPER ID 69: Real-Time Landslide Risk Assessment Using IoT

Manoj.N, Rajesh M,Ambili C,Muhammed Alshan

Abstract:

Landslides pose significant risks to infrastructure and safety, necessitating innovative solutions for early detection and monitoring. This paper presents a comprehensive sensor network designed for real-time landslide detection, leveraging a combination of soil moisture sensors, accelerometers, and rain gauges. The network comprises multiple sensor nodes, each equipped with a microcontroller, solar power systems, and long-range communication capabilities through LoRa technology, each sensor data is collected and transmitted to a central node, which processes the data and transmits it to a cloud platform for further analysis and visualization. By using GPRS connectivity, the system ensures continuous monitoring of parameters and send alert to the local communities and emergency department. The main highlight of the study are of using advanced sensor technology for landslide prediction and response strategies, ultimately contributing to improved safety and disaster management.

Keywords: LoRa, GPRS

PAPER ID 71: Advanced Image Segmentation Framework

Devendra Rane, Nagesh Raykar, Sujeet Suryawanshi

Abstract:

Few of the biggest challenges in Image Segmentation are manual marking of objects and the segmentation accuracy. Due to multiple manual iterations, performance degrades, and real time segmentation can't be achieved in digital images or videos. Best way to achieve automation is to use Deep Learning based ML techniques like RMASK-CNN, YOLO etc. Accuracy is another challenge where we have to deal with the False Positives and False Negatives. Segmentation process must be very accurate with near to zero FPs and FNs especially if it is going to get used in medical field or in security field. Certain pre-processing is required to enhance quality of input image or video to achieve high accuracy during segmentation. The objective of this paper is to design a framework to achieve automated and accurate segmentation in digital image also gives clear guidelines on configurations and process flows which can help users to customize and use it in any field. Automation using deep learning brings another challenge i.e. to maintain big datasets and keep enhancing it to achieve more accuracy. To deal with heavy datasets we have proposed to use ensembling techniques. Also, it should be based on open source technology to have control on overall cost. At the end clear roadmap and limitations to be declared so that researchers get clear directions on future work

Keywords: RMASK-CNN, YOLO, Image Segmentation, Ensembling Techniques;

PAPER ID 72: Smart Agriculture System for Optimal Crop, Fertilizer Recommendation and Irrigation System

Prema Sahane, Nagesh Raykar, Shrutika Amzire, Arya Ganorkar, Pawan Kulkarni, Pawan Bondre, Uditkumar

Abstract:

The economy of India is largely based on the agriculture domain. Hence, to strengthen the economy, agricultural production should increase. Farmers use traditional ways of farming techniques. But these ways have certain loopholes that directly affect farmer's production. Due to rapidly changing environmental conditions farmers are unable to predict the weather conditions that are required for the crop to harvest. The practice of identifying the previous patterns and cultivating according to them fails here due to uncertain change in weather conditions. To overcome this, farmers need to shift from traditional farming to new technology based smart farming. The proposed system seeks

to help farmers by empowering them with insights. Factors such as temperature, soil moisture, PH levels and fertility are taken into account. Proposed system utilizes Machine learning Algorithms to recommend best crops, its varieties and fertilizers. It also provides automatic irrigation management powered by IoT.

Keywords: Smart Farming, Internet of Things, Crop Recommendation System, Automatic Irrigation Management.

PAPER ID 73: Enhanced Text to SQL Query Generation for Data Analysis using LLM

Sheetal Phatangare and Parth Mule and Siddhi Rajeshirke and Sanskruti Morey

Abstract:

This project aims to develop a text-to-SQL query generator and conversational chatbot leveraging advanced language models like Mistral and Retrieval-Augmented Generation (RAG). The system will enable non-technical users to interact with databases using natural language, simplifying data access and analysis. By integrating these state-of-the-art models, the solution will generate accurate SQL queries from user inputs, execute them on the database, and provide natural language responses. This approach reduces the reliance on costly data analysts, enhances decision-making capabilities, and boosts productivity for small businesses. The project encompasses fine-tuning the models, seamless database integration, and iterative improvements to ensure high performance and user satisfaction.

Keywords: Text-to-SQL Query Generation, Natural Language Processing (NLP, Retrieval-Augmented Generation (RAG).

PAPER ID 74: A Comprehensive Analysis of the Cloud-Based Method for Using Salesforce Technology to Optimize Event Venue Reservations

Sonali Rangdale, Nagesh Raykar, Jayesh Mohnrao Sarwade, Savita Adhav, Kishore Sakure, Ganesh Arbad

Abstract:

Securing venues and rooms for meetings is a tedious challenge that many face when it comes to event planning. Planning is delayed and unpredictable when using traditional booking techniques because of drawn-out phone conversations, inattentive vendors, and a lack of real-time availability information. It suggests developing a web-based platform with Salesforce, Lightning Web Components, and Apex Programming to solve this common issue. By providing users with a user-friendly interface to search for venues, look over real-time availability, and rapidly complete bookings, the platform seeks to

speed up the venue booking process. The platform will centralize venue data, such as availability schedules, pricing details, and customer information, by utilizing Salesforce's CRM features. By integrating with Salesforce, users will receive accurate and current information as venue availability is instantly updated. Every user type will find the application's GUI to be easy to use and effective. The user needs to sign up and set up his or her profile, including choices, an email address, and additional details.

Keywords: Online portal, Salesforce, Apex Programming, individual's hall, web base, administrative end, E-Commerce, Venue Booking, venue, reservation system, Position Detection, cloud.;

PAPER ID 76: A Review of YOLOv7-Based Multimodal Biometric Frameworks: Scalability, Robustness, and Identification Performance
Sheetal Shevkari, Kelapati Poonia, Sharmila more, Yogesh Kakasaheb Shejwal

Abstract:

The demand for robust biometric identification systems, especially in high-security sectors like airports and banking, has led to the development of multimodal systems that combine various biometric features to enhance accuracy and adaptability. YOLOv7, a state-of-the-art object detection model known for its speed and accuracy, shows promise for integration into multimodal biometric frameworks. This review explores the potential of using YOLOv7 to improve scalability and robustness in biometric identification systems, particularly in real-time applications. It discusses the advantages of fusion techniques that merge data at different levels and highlights the strengths of YOLOv7 in feature extraction and dataset management. The review also examines the limitations of YOLOv7 in biometric tasks and suggests future research directions, including the development of hybrid fusion methods and privacy-preserving techniques, as well as the use of edge computing for large-scale deployment. Overall, the paper aims to provide a comprehensive understanding of how YOLOv7 can contribute to cutting-edge multimodal biometric systems to meet the evolving challenges in identification and security.

Keywords: YOLOv7, Biometrics, Multimodal, identification, dataset, etc

PAPER ID 78: AI-Powered Mental Health Solutions: Exploring Opportunities and Addressing Challenges
Ritika Bansal, Deepti Sharda

Abstract:

Artificial Intelligence (AI) is revolutionizing mental health care by offering advanced tools for early diagnosis, personalized treatment, and scalable patient management solutions.

This paper critically examines the latest trends in AI applications within the mental health field, focusing on innovative use cases such as machine learning algorithms for early disorder detection, AI-powered therapeutic interventions, and predictive analytics for tailored treatment plans. While AI's potential to enhance mental health outcomes is vast, significant challenges persist, including concerns about data privacy, algorithmic bias, and the need for clinical validation. This study contributes to the growing body of research by addressing these challenges and proposing pathways for overcoming them. Additionally, the paper highlights ethical considerations essential for the responsible implementation of AI-driven mental health solutions. By navigating these issues, AI can play a crucial role in improving the accessibility, efficiency, and ethical standards of mental health services. The study also outlines future directions for AI technologies, aiming to ensure equitable and effective care for diverse populations.

Keywords: AI in Mental Health, Predictive Analytics in Mental Health, Early Detection, Machine Learning

PAPER ID 80: Sustainable Cloud Solutions for Digital Transformation

Pratik Jain

Abstract:

Cloud computing has emerged as a crucial enabler of digital transformation, providing organizations with scalable, flexible, and cost-effective solutions. However, as the demand for cloud services grows, so does the concern over their environmental impact. Sustainable cloud solutions have become a pivotal area of focus, integrating energy-efficient technologies and green practices into cloud infrastructure. This paper explores how cloud-enabled digital transformation can support sustainability goals across various industries. It examines the role of energy-efficient data centers, carbon tracking tools, and green cloud initiatives that aim to reduce the carbon footprint of organizations. The study further discusses the adoption of cloud based sustainability tools, the importance of regulatory compliance, and the potential of emerging technologies like AI and quantum computing in driving sustainable cloud practices. By analyzing case studies and best practices, this research highlights the intersection of digital transformation and sustainability, offering insights into how businesses can leverage cloud solutions for both innovation and environmental responsibility. The findings emphasize the importance of a strategic approach to cloud adoption, enabling organizations to meet their sustainability targets while enhancing operational efficiency.

Keywords: carbon footprint, cloud computing, digital transformation, energy efficiency, green cloud, renewable energy, sustainability, technology innovation

PAPER ID 81: Hybrid Deep Learning Techniques for Student Performance Prediction: A Comprehensive Review

Aashita Jain, Indu Arora, Sonal Chawla

Abstract:

In an era where data-driven decision-making has entered nearly every sector, education is no exception. Predicting student performance is a crucial task in educational settings, as it allows educators to identify at-risk students, personalize learning experiences and improve overall academic outcomes. In the last five years, the use of deep learning techniques has gained significant traction in the area of student performance prediction, particularly for blended and online learning environments. With the growing availability of large-scale educational data and advancements in deep learning, researchers have investigated hybrid deep learning methods that leverage the strengths of multiple techniques to enhance prediction accuracy. This review paper aims to offer a comprehensive survey of the recent developments in hybrid deep learning techniques for predicting student performance by synthesizing findings from research studies published over the past five years (2020-2024) using PRISMA guidelines. By examining the recent literature, this paper seeks to offer insights into the current hybrid predictive models and methods being applied for student performance prediction, the datasets and features used for modelling, the evaluation metrics employed to measure their performance and the emerging trends and challenges in the area.

Keywords: Online Learning, Deep Learning, Hybrid Models, Learning Analytics

PAPER ID 83: Enhancing the protection of consumer as well as provider for fair data commerce

Keshav Sharma and Arushi Nagarkoti

Abstract:

This paper presents a secure and decentralized protocol for exchanging data through blockchain-based smart contracts. The protocol enables data providers to sell encrypted data while ensuring integrity and fairness for both providers and consumers. The provider uploads a Merkle tree of the encrypted data and encryption keys to a smart contract, ensuring verifiability without revealing sensitive information. Upon purchase, a subset of data is selected at random for validation by the consumer, who is then provided with decryption keys and Merkle proofs to verify the authenticity of the data. The protocol includes mechanisms for conflict resolution in case of fraud, using additional Merkle proofs to guarantee the validity of decryption keys and data samples. The protocol enhances trust in decentralized data markets by ensuring transparency and providing both parties with cryptographic guarantees for fair data transactions.

Keywords: Big Data, Data Market, Distributed Ledger Technologies, Data Exchange, Merkle Tree

PAPER ID 89: Forensic Insights into Noise Smartwatches: A Pioneer Study

Amala R, Renin Roy K and Alina Rose Philip

Abstract:

Technological advancements are progressing at an unprecedented pace, permeating every aspect of our lives, including integration with the human body. Among the most ubiquitous of these advancements are smartwatches, wearable devices that are rapidly becoming entrenched in daily life, with their adoption accelerating without hesitation. The profound influence of smartwatches on human activity, coupled with their capacity to store vast amounts of personal data, renders them critical sources of evidence for forensic investigators. These devices archive a wealth of information, including messages, call logs, notifications, and user health parameters. While numerous smartwatch brands exist globally, Noise stands out as a prominent brand native to India. Although prior research has extensively explored smartwatch forensics, none have focused on the Noise brand. This study conducts a forensic analysis of two foundational models from Noise: the NoiseFit Rugged Force and the ColorFit Pulse Grand. This research, therefore, proposes a comprehensive data acquisition framework incorporating chip-off methods, linked device acquisition, and connectivity packet analysis. Given Noise's significant market share in India, this study holds particular importance for forensic investigators in the country. Furthermore, this paper will serve as a foundational reference for future research in the forensic analysis of Noise brand smartwatches.

Keywords: Embedded Device Forensics, IoT Forensics, Noise Smart Watch Forensics, Smart watch Forensics, Wearable device Forensics

PAPER ID 91: Analyzing Diverse Machine Learning Models for Silent Heart Attack Prediction

Shreya Kalta and Guladab Bawa

Abstract:

Cardiovascular disease remains one of the most important health challenges worldwide, contributing substantially to the rising death rates each year. In 2021, cardiovascular diseases (CVDs) were responsible for approximately 20.5 million deaths, representing 32% of all global fatalities. Among these 85% of fatalities were accounted for due to strokes and heart attacks, demonstrating the alarming severity of cardiovascular diseases. However, the twenty-first century has led to some serious advancements in terms of

technology that can be leveraged further to advance medical sciences making it more effective and accurate. Emerging technologies, such as artificial intelligence (AI) and machine learning (ML), serve as important tools in making life more convenient for humans. However, alongside these advancements, several ailments have arisen, one of which is the silent heart attack—a condition that poses unique challenges due to its subtle symptoms. Despite having medical treatments for this condition, if medication or treatment is not provided at the proper time it can also prove to be fatal. But there are only a few approaches that are capable of forecasting the silent heart. This study analyses various technologies and methodologies, and based on that conducts comprehensive research mainly focusing on the path toward predicting and detecting heart disease using methods like artificial neural networks. Additionally, this research examines the role of key parameters such as age, sex, and cholesterol levels, in predicting the probability of encountering a silent heart attack.

Keywords: Cardiovascular disease, Heart disease prediction, Silent heart attack, Artificial Intelligence, Machine Learning, Neural Network

PAPER ID 92: Weather Adaptive Traffic Prediction using Gradient Boosting

Nisha Kandhoul, Sanjay K. Dhurandher, Aditya Mangal, Akshit Dhoundiyal, and Tushar Bansal

Abstract:

Growing towns and cities have always struggled with traffic congestion. Therefore, in the field of intelligent transportation management systems, traffic prediction is crucial. This study investigates whether traffic pattern prediction using machine learning techniques is feasible. The Gradient Boosting model is used to estimate the flow of urban traffic. The model uses generic features, such as date, time, and holiday information, for prediction. The presence of precipitation and snowfall is known to have a substantial impact on traffic conditions, hence weather-related features like snow, precipitation, and weather description are also included in the model.

Keywords: Traffic prediction · Big data · Random forest · Gradient boosting.

PAPER ID 93: Traffic Violation Detection

Saurabh Sinha, Nitin Pilkhwal, Rohit Verma, Sunil Kumar, Pawan Kumar Mall

Abstract:

Traffic violations pose significant safety risks and are a growing concern in urban areas. It requires a scalable solution for monitoring and enforcement. There is no alternative for being on the roads but automation may undoubtedly aid the traffic police by reducing the

workload associated with booking offenses. Even while this can aid in the recording of violations. The presence of interceptors and police officers on the road tends to serve as a deterrent to traffic violations. This study examines the artificial intelligence role in traffic violation detection. The overall summary of the literature in this field is about classifying different types of detection models over traffic violations and comparative analysis of previous work done in this field.

Keywords: Traffic Violation Detection, Computer Vision, Object Detection, YOLO, Machine Learning, Road Safety, Automated Surveillance.

PAPER ID 97: Benchmarking Malware Detection Tools: A Study on Tool Efficiency and Real-Time Feedback

Harshal Valvi and Tamil Selvan, Arun Mohan and Sini S Nair

Abstract:

The velocity with which malware has been developing over the years has a direct effect on innovative malware analysis techniques which in turn assists in eradicating any potential threats in today's dynamic digital space. This review examines how emerging technologies such as cloud-sandboxing, behavior-based detection systems, and threat intelligence affect the performance of the software solution. With the help of a detailed comparative approach, one should draw attention to the most typical windows of the above tools within one or several key performance indicators such as efficiency, expandability, rate of convergence with a real-time fingerprint, adequacy of cost, and network analysis. It further argues the essence of Arm's wide coverage, greater automation, and more real-time support to contain more advanced and sophisticated threats to the security of computer systems and networks. In addition, use of these solutions in the context of more general security models is considered in order to evaluate their capabilities for active protection and active defense. Addressing the various strengths and weaknesses of each tool against such a critical set of criteria is one way this review assists to help organizations implement practical, flexible, and robust malware detection and mitigation policies. Their research helps to whose number of the devices in the network increases drastically lessen the gaps on further cyber warfare.

Keywords: Cyber Security, Cyber Threats, Sandbox. Real-Time.

PAPER ID 98: Artificial Intelligence: Transforming Key Industries and Shaping the Future of Technology

L. Lanuwabanga , Daniel Meren

Abstract:

Artificial Intelligence (AI) has revolutionized various industries, driving innovation and efficiency across multiple technological domains. This review paper explores the impact and applications of AI in ten key technology sectors: Healthcare, Finance, Manufacturing, Transportation, Retail, Cyber Security, Education, Agriculture, Entertainment, and Energy. By examining the current state of AI integration in these fields, this paper highlights the transformative power of AI and discusses future trends and challenges that may shape its continued evolution.

PAPER ID 100: RISC-V Processor Design: A Comparative Analysis Of HDL Versus HLS Techniques

Chandralakha R Pillai, Sanjana S , Ishant Kumar Bajpai, Shoukath Cherukat and Lalmohan KS

Abstract: RISC-V, a modern open-source Instruction Set Architecture (ISA), is gaining significant traction in the computing landscape, particularly for Internet-of-Things (IoT) and System-on-Chip (SoC) applications. The increasing adoption of RISC-V has driven interest in leveraging field-programmable gate arrays (FPGAs) as a flexible, cost-effective solution for implementing custom hardware. However, conventional hardware description languages (HDLs) require extensive expertise and development time, prompting the exploration of High-Level Synthesis (HLS) as an alternative. This study presents a comparative analysis of HLS and HDL in implementing a RISC-V processor supporting the RV32I instruction set. The comparison is based on firmware development time, measured by lines of source code (LCS), and FPGA resource utilization. The findings reveal that HLS reduces the LCS by 65%, significantly accelerating development. However, it also results in over three times higher lookup table (LUT) usage and nearly double the flip-flop consumption of HDL. While both methods successfully synthesize and function correctness is ensured through behavioral simulation of the RISC-V ISA, the resource efficiency of HDL allows for the implementation of additional parallel ISAs, which HLS struggles to accommodate due to its higher resource demands. Therefore, while HLS proves advantageous for rapid development, HDL remains indispensable for applications requiring optimal performance and efficient resource utilization.

Keywords: RISC-V, RV32I, ISA, Instruction set architecture and Vivado HLS

PAPER ID 103: Dynamic Trust and Reputation-based Framework for Opportunistic Networks

Amit Dutta, Satya Jyoti Borah, Jagdeep Singh

Abstract:

OppNets are a type of wireless network where the nodes interact with one another in an opportunistic manner without requiring a dedicated link to connect the source and the destination. It comes from the subclass of Delay-Tolerant Networks (DTN) known as mobile ad hoc networks (MANET). With OppNets, nodes are completely dependent on neighboring nodes for packet forwarding because there is no end-to-end communication. However, if these nodes are non-cooperative or malicious, it severely impacts the performance of the network, thus posing severe challenges in OppNet. This paper introduces DyTRON, ("Dynamic Trust and Reputation Framework designed for Opportunistic Networks") that utilizes the Beta distribution's probability density function (p.d.f.) to compute trust and reputation values, considering various network contexts. Trust is calculated dynamically by integrating two components: direct trust, which is the trust a node has in itself, and indirect trust, which is based on the recommendations from neighboring nodes. Simulation results, conducted using the ONE Simulator, show that DyTRON outperforms established models such as Epidemic, BTRES, and PPHB+ across several key performance metrics, including average latency, message drops, overhead ratio, average hop count, and message delivery probability. The enhanced performance achieved by DyTRON contributes to the security of the network by reducing the likelihood of malicious nodes being involved in packet forwarding.

Keywords: Opportunistic network, Security, Trust, Beta Distribution, Reputation, Security, ONE Simulator

PAPER ID 104: **Effect of Compression on the Detection of Deepfake Videos with Facial Features**

Chaitali Jadhav, Varsha Ratnaparkhe, Rajesh Kumar

Abstract:

In today's era of fake news, the easy access to vast public databases and the rapid advancement of deep learning techniques, particularly Generative Adversarial Networks (GANs), have led to the creation of highly realistic fake content with significant societal implications. Numerous effective methods for facial alteration in videos have been developed and widely disseminated. Deep fake algorithms can generate fake videos that are so convincing that distinguishing them from real ones becomes challenging. This phenomenon has facilitated various crimes, including sextortion, digital fraud, and the spread of fake news. Platforms like WhatsApp and Instagram are commonly used to disseminate these fake videos. It has been observed that these platforms compress the data, meaning that when any video or image is shared, it undergoes compression. This paper investigates the effect of compression on the detection of deepfake videos, focusing specifically on faces. EfficientNet is utilized to evaluate the accuracy of a DCT-based lossy compression technique with varying degrees of compression. Additionally, the study explores the impact of compression when videos are shared through WhatsApp

and Instagram. The experiments were conducted using the publicly available DFDC dataset. The results indicate a significant decline in accuracy due to compression compared to uncompressed videos.

Keywords: Deepfake videos, Facial features, Compression.

PAPER ID 105: Machine Learning-Driven Cyber Threat Intelligence: A Study on Anomalous Network Traffic Patterns

Tarun Pandey, V. Anil Kumar

Abstract:

This work enhances Cyber Threat Intelligence (CTI) by integrating machine learning with passive monitoring systems, including network telescopes and Internet Background Radiation (IBR). By analyzing unsolicited traffic and leveraging non-stationary autoregressive models, the proposed model improves threat detection accuracy for malware, botnets, and DDoS attacks. Results demonstrate significant advancements in identifying port scanning and botnet activity compared to traditional CTI methods. The work underscores the value of AI-driven automation and predictive analytics for scalable, cost-effective cybersecurity solutions, highlighting future research opportunities in broader IBR applications and enhanced automation.

Keywords: Cyber Threat Intelligence (CTI), Network Telescope, Internet Background Radiation (IBR), Machine Learning, Threat Detection, Passive Monitoring, Botnets, Predictive Analytics

PAPER ID 106: Flood Prediction using Time Series Forecasting and Machine Learning Techniques with Linear Discriminant Analysis.

Laishram Trinity , KL Rita Kho, Gangmei Gailunglu Kabuini, S Athisii Kayina , Heisnam Kavitha Singh, Usham Sanjota Chanu

Abstract:

Flood forecasting constitutes an essential element of disaster response, aimed at alleviating the severe repercussions of floods on communities and infrastructure. This research introduces an innovative methodology for flood forecasting by combining time series analysis with advanced machine learning methodologies. By utilizing historical hydrological metrics such as river flow, precipitation levels, and temperature readings, the suggested framework employs models including Long Short-Term Memory (LSTM) networks, Random Forests, Hybrid models of ML , Hidden Markov Models, XGBoost, RF , extremely Extra Trees, Generative Adversarial Networks (GANs) and Support Vector Machines (SVM) to achieve precise flood forecasting. The approach integrates feature

engineering and realtime sensor data assimilation to tackle issues such as data sparsity and fluctuating environmental conditions. Further IOT based sensors were also used to enhance the outcome with proper optimization. Performance assessment indicates that the amalgamation of time series techniques and machine learning substantially enhances prediction accuracy relative to conventional statistical methods. Significant outcomes include improved early warning capabilities, effective management of non-linear relationships, and flexibility across various hydrological environments. The proposed frameworks represents in each review paper is a scalable and efficient approach for flood risk evaluation and early warning systems, delivering vital insights for disaster preparedness and resilience. This study contributes to the continued endeavors in utilizing artificial intelligence and data analytics for sustainable disaster management.

Keywords: disaster response, Linear Discriminant Analysis, data sparsity, IOT based sensors, hydrological metrics, time series analysis, Linear Regression, SVM, LSTM, hidden markov models.

PAPER ID 107: **Evaluating the Impact of Machine Learning Models on Short-Term Trading Strategies**

Iniyan Andrews Joseph, Vimala Mathew

Abstract:

This study investigates the application of advanced machine learning techniques to predict short term stock price movements, aiming to identify stocks likely to increase or decrease by 1(%) or more in value the following trading day. The stock market is a dynamic platform influenced by a complex interplay of economic, political, and psychological factors, making precise predictions challenging. To evaluate the efficacy of our methods, we benchmark our results using well-established indices such as the Nifty 50, representing the Indian equity market, and the S&P 500, a key measure of the U.S. stock market's performance. These indices provide a reliable foundation for assessing our models' generalizability and practical utility. Our research leverages historical stock data to develop predictive models that offer actionable insights for both upward and downward price movements. Specifically, we implement and compare the performance of Linear Regression (LR), Random Forest Regressor (RFR), Support Vector Regressor (SVR), and Long Short-Term Memory (LSTM) networks. These models are trained on diverse datasets, capturing intricate relationships and trends to forecast future price changes. Through extensive testing, we found that Linear Regression consistently demonstrated superior performance in both upward and downward predictions across our benchmark indices. However, our findings are not limited to the Nifty 50 and S&P 500 and can be extended to other equity markets. This study highlights the robustness of our methodology and provides a flexible

framework for traders and analysts seeking to enhance decision-making in volatile and dynamic market conditions.

PAPER ID 109: A Comprehensive review on Explainable AI: Where it was, is and will

Karuna Wangkhem

Abstract:

Artificial Intelligence has transitioned significantly from being a mere subject within Computer Science to becoming a distinct field of study of its own. The journey has started from basic logic designing and traditional programming to soft computing algorithms to sophisticated machine learning techniques, encompassing smaller artificial neural networks and advancing towards an epitome of deep learning methodologies. However, a notable challenge has emerged: the problem of transparency in many of the AI systems, which obscures their decision-making processes. This opacity acts like a block to the full realization of AI's potential and its applications. As an approach of mitigating such concerns, explainable AI (XAI) is seen to be the ultimate game changer in this modern world of digital connectivity. Explainable AI intend to provide insightful deliveries of information refining better judgement that is easier to grasp by humans, clarifying the reasoning and the perspectives. There has been an increase in influx of research recently focusing on AI due to its promise of delivering results that are transparent, accountable, unbiased, authentic, and ethically sound. This paper also surely tries to capture the various aspects of XAI, with special focus on its existing taxonomies, current status and trends, application areas, opportunities, and limitations, and most importantly where it is going. This paper analyses the papers published post-COVID and tries to bring out the visible as well as soft shift of paradigm in different fields like healthcare, finance, education, AI itself too.

Keywords: AI, Deep Learning , Machine Learning , Explainable AI (XAI), SHAP

PAPER ID 110: A Survey on Analyzing Deepfake Detection Methods: Patterns, Difficulties, and Possibilities

Pougailung Gangmei , Sunil Angom , Maharabam Micky Devi , Regan Waikhom , Laishram Thadoi , Khagendra Sharma, A.B.Singh , Henerita Khumallambam

Abstract:

The abuse of deepfake technology, which uses developments in computer vision and deep learning to produce incredibly realistic fake media, has sparked serious concerns. The most recent deepfake detection strategies are examined in this evaluation, including

CNN-based models, GAN-specific strategies, and cutting-edge approaches like edge-based feature extraction and biological signal analysis. We categorize these methods according to their application scope, performance metrics, design, and datasets used. Significant advantages and disadvantages are shown by comparative analysis, underscoring the difficulties in developing reliable, scalable, and real-time detection systems. In order to combat emerging deepfake risks, future directions will give priority to multi-modal methodologies and cross-domain generalization.

Keywords: Image manipulation, deepfake detection, NASNetLarge, convolutional neural networks (CNNs), Generative Adversarial Networks (GANs), and the Celeb-DFv2 dataset.

PAPER ID 111: **Adaptive Deep Learning for OSCC Histology: Leveraging Deformable Convolutions for Improved Segmentation**

Rupesh Mandal, Prithvijit Das, Hrishiraj Modi, Ankit Prasad Verma, Nupur Choudhury, Mrinmoy Mayur Choudhury, Muktanjalee Dekka, Jyoti Kumar Barman, GITU Das

Abstract:

In histological image analysis for Oral Squamous Cell Carcinoma (OSCC), stain normalization as a preprocessing step is underutilized. This study explores the impact of Reinhard's color transfer method on the performance of deep learning models in semantic segmentation tasks. Using Hematoxylin and Eosin (H&E) stained images, we hypothesize that stain normalization enhances model robustness and serves as an effective data augmentation strategy, addressing the scarcity of OSCC datasets. We employ a lightweight UNet with an EfficientNet backbone, achieving performance comparable to ResNet-based architectures. To better capture OSCC's complex cell structures, we integrate Deformable Convolutions, allowing adaptive receptive fields for improved segmentation. Results show that stain normalization and Deformable Convolutions significantly enhance model performance, making them effective for histological image segmentation in OSCC.

Keywords: Stain Normalization, OSCC, CNN, Convolution, Deformable Convolutions.

PAPER ID 114: **Enhanced Augmented Reality using Multimodal Interaction: Heritage of Assam**

Shahil Singh, Kirti Kaushal, Aakash Ramchiary, Nupur Choudhury, Rupesh Mandal, Jyoti Kumar Barman, GITU Das

Abstract:

This project utilizes Augmented Reality (AR) technology to develop an interactive digital representation of selected heritage sites in India, focusing on the Kamakhya Temple in

Assam. The primary objective is to create an immersive and inclusive platform which will use features such as speech recognition and hand gesture control, enhancing accessibility for all users, including those with physical disabilities. So that it can provides an engaging and informative journey, encouraging users from all over the globe to connect with and appreciate India's cultural legacy on a deeper level. Through these features, users are empowered to independently explore and interact with the site, navigating the cultural landscape in a way that feels both intuitive and engaging. With a focus on accessibility, the project demonstrates the potential of AR as a powerful tool for cultural preservation and inclusivity, breaking down physical and sensory barriers to offer an immersive and enriching experience for audiences of all backgrounds.

Keywords: Augmented Reality, Speech Recognition, Gesture Recognition, AR Interaction

PAPER ID 115: AI-Driven Surveillance Drones: An Overview of Capabilities and Applications

Norris Haobam, Naorem Jenifer Devi, Shougaijam Christina Devi, Themyardi Varengnao, Jayanta Singh Yumnam

Abstract:

Unmanned Aerial Vehicles (UAVs), commonly known as drones, are being used commonly as their applications continue to expand across various fields. The introduction of Artificial Intelligence (AI) has evolved these drones into powerful surveillance tools. Central to their effectiveness is using sensors like advanced CMOS (Complementary Metal-Oxide-Semiconductor) sensors, which provide high-resolution imaging, low power consumption, and adaptability in various lighting conditions, other sensors like thermal sensors. This paper explores innovative approaches to the development and deployment of AI-powered drone systems for surveillance. By reviewing the latest advancements and future trends, this paper aims to showcase the immense potential highlighting key areas and challenges.

Keywords: drones, surveillance, sensor, object detection

PAPER ID 117: Urban Planning and Designing Using AI services: a review

Thimtha Ruwndar, Asset A S Zimik, Yarmaya L.W, Daniel Moirangthem Singh, Ralngam Seltun, Yumnam Jayanta Singh

Abstract:

The goal of city planning and design is to create resourceful, sustainable, and efficient cities by managing resources, infrastructure, and areas that improve quality of life. By

strengthening information and communication technology and enhancing decision-making abilities based on data-driven insights, the incorporation of AI into urban planning makes cities more competitive. Better development is accelerated by artificial intelligence (AI) techniques including Building Information Modelling (BIM), Big Data Analytics, AI models, Traffic and Mobility Management, Energy and Environmental Impact Analysis, and Disaster Resilience Planning. AI-powered urban planning has been a subtle topic with many facets, including privacy and ethical issues, low awareness, and accessibility challenges. It deserves more attention, though, because it has enormous potential to build smarter, more sustainable cities with the right research and application.

Keywords: AI Models; Decision-Making; Data-Driven Insights; ICTs (Information Communication Technologies); Big-Data Analytics.

PAPER ID 121: XMD:Leveraging Explainable AI Techniques for Malware Detection

Abinav Mishra, Anuj Gupta, Pawan Kumar Mall, Vipul Narayan

Abstract:

Malware programs now pose a serious danger to our privacy and security since they seek to do a variety of things, including stealing our private information and taking down our systems. In the past few years, driven by data artificial intelligence techniques, such as Machine Learning (ML) and Deep Learning (DL) approaches, have shown promise in detecting malware by leveraging its behavior in terms of API calls. This contrasts the ineffective and time-consuming nature of traditional signature-based malware detection methods or statistical analysis. Malware programs now pose a serious danger to our privacy and security since they seek to do a variety of things, including stealing our private information and taking down our systems. This article includes an in-depth examination of the several XAI algorithms used in malware analysis. Additionally, we have covered the traits, difficulties, and specifications in malware analysis that conventional XAI techniques cannot satisfy. the performance of KNN, Decision Tree (DT), and Multi-Layer Perceptron (MLP) across Accuracy, MCC, and F1-score. KNN and DT consistently perform well, with high accuracy and F1-scores close to 99.93%, and strong MCC values indicating reliable predictions.

Keywords: Explainable AI, Malware Detection, XAI, LIME, SHAP, Cybersecurity, Machine Learning, Model Interpretability

PAPER ID 122: Thermal modelling and analysis of thermal profile of photovoltaic module using FEM Analysis

Prakash Pratik

Abstract:

In this work, a 3D thermal model of poly-silicon PV module is developed in Altair HyperMesh software and analysed the thermal characteristics in ANSYS Fluent software under varying climatic conditions. While analysing the thermal images, the edges have a lower temperature and the aerial fluctuation in module temperature (T_{mod}) is minimal. It also shows that T_{mod} increases with increase in solar insolation (UPOA) while an opposite scenario exists for windspeed (WS). The variation of ambient temperature (T_a) shows that the differential between T_{mod} and T_a decreases with increase in temperature. Additionally, the simulation of the effect of sky conditions and ground temperature shows that a clear sky and a lower ground temperature assist to keep T_{mod} at a lower temperature. Based on the results, we have developed an analytical model that correlates T_{mod} with UPOA, T_a , and WS, with taking into consideration sky condition and ground temperature and observed significantly good match with experimental and published results.

Keywords: 3-D Modelling, FEM analysis, CFD analysis, Photovoltaic module, p-Si Solar module

PAPER ID 123: AI- Powered Note Generation Application

Rishikesh Rajbhar, Sanchita Singh, Sanya Singh, Shaina Saifi, Pawan Kumar Mall

Abstract:

This paper introduces an AI application that could automatically generate comprehensive notes from audio and video sources through superior NLP techniques and machine learning algorithms. This application conducts transcription of multimedia content into text and provides summary through transcripts of lengthy video and audio data that can be read and written coherently as notes. It uses the power of models like transformers to significantly heighten the accuracy and coherence of notes, optimizing this tool for both academic and professional use cases. Initial testing proves 15% stronger than the truth and provides a 20% efficiency gain over traditional note-taking methods, which raises the potential for contributions to efficiency and rate of information recall.

Keywords: Note Generation; Natural Language Processing; Summarization; Machine Learning; Automated Transcription

PAPER ID 124: SRR Loaded CPW Fed Split Octagon Antenna with Isolated 5G Sub-6 GHz n77/78 and n79 Bands

Satyam Kumar, Atul Varshney, Satyam Tiwari, Pratham Mishra, Aniket Pandey, and Anurag Kumar

Abstract:

This study presents a coplanar waveguide (CPW) fed octagonal split ring antenna (OSRA) that is augmented with a split ring resonator (SRR) for 5G sub-6 GHz applications, effectively mitigating in-band interference between n77/78 (3.30-4.20 GHz), and n79 (4.40-5.0 GHz). A solitary SRR effectively creates a notch band from 4.20 GHz to 4.40 GHz in an antenna that is downsized by 82.58% (20 mm × 20 mm) compared to a circular patch antenna intended for 3.50 GHz. The n77/78 and n79 bands are effectively delineated by the introduced notch bands, which assist in reducing interferences among in-band applications. The impedance matching and tuning of lower frequencies are modified by adjusting the CPW gap, ground length, and breadth of the extended ground, respectively. The notch band for interference reduction in in-band applications is achieved by relocating the position of the SRR along the antenna's length. The dual-band, cost-effective antenna attains gain values of 5.59 dBi and 4.16 dBi at resonance frequencies of 3.50 GHz and 5.06 GHz, respectively, with impedance bandwidths of (3.26-4.22 GHz) and (4.41-5.50 GHz). Consequently, the proposed antenna is highly suitable for 5G NR bands n77 (3.30-3.80 GHz), n78 (3.30-4.20 GHz), n79 (4.40-5.0 GHz), and the new Wi-Fi 5 bands: (5.17-5.19 GHz), (5.19-5.21 GHz), (5.21-5.23 GHz), (5.23-5.25 GHz), (5.25-5.27 GHz), (5.29-5.31 GHz), (5.31-5.33 GHz), (5.35-5.37 GHz), (5.37-5.39 GHz), (5.39-5.41 GHz), (5.41-5.43 GHz), (5.43-5.45 GHz), (5.45-5.47 GHz), (5.47-5.49 GHz), (5.49-5.51 GHz). The measurements of the antenna results obtained from the Microwave Analyzer N9916A and the anechoic chamber are in great concordance with the simulated antenna results.

Keywords: CPW-fed, in-band-interference reduction, n77/n78/n79, SRR, Sub-6GHz, wideband.

PAPER ID 125: Dual-Band CSRR Loaded Ring Antenna for ISM, Wi-Fi, and Sub-7 GHz Wireless Applications without In-band Applications Interference

Satyam Kumar, Atul Varshney, Aniket Pandey, Satyam Tiwari, and Pratham Mishra

Abstract:

The research work proposed an economic ring planar antenna for Wi-Fi, industrial scientific and medical (ISM) band, and sub-7 GHz applications. A fractal technique is utilized to develop the patch geometry. The antenna is made-up of Flame Retardant-4 (FR-4) substrate of size 27.16 mm × 37.54 mm × 1.6 mm. A dual-band antenna is proposed that separately covers Wi-Fi and ISM (2.4 GHz) band, and sub-7 GHz applications. Introduced notch band (2.49-2.89 GHz) among two bands (2.40-2.49 GHz), and (2.89-6.46 GHz) eliminates the applications interference issues of wide-band antennas. The antenna is loaded with a fractal inner patch having radius half of the inner radius of ring. Interconnection of the outer ring with the inner patch ascribed dual band

and eliminates in-band applications interference but it lowers the gain near 3.5 GHz. This reduced gain is further enhanced by loading of inner patch with the complementary split ring resonator (CSRR). The peak gains achieved by the antenna are 6.86 dBi, 5.24 dBi, and 7.46 dBi at 2.45 GHz, 3.28 GHz, and 5.50 GHz frequencies with -10 dB fractional bandwidths (FBW) of 0.04%, and 76.24% respectively. The first FBW is perfectly suitable to use antenna for Wi-Fi, and ISM band, and the second FBW is suitable to cover a wide portion of sub-7 GHz and covers wireless bands n77/78/79, Wi-Fi 5/5.2 GHz for 5G, and emerging 6G applications. The antenna is tested by Microwave Analyzer and Anechoic chamber. The associated results are found an excellent match and validated the designed antenna.

Keywords: Applications Interference, Circular ring patch, CSRR, Dual-band, Fractal, ISM, Miniaturized Antenna, Sub-7GHz (FR1), Wideband, Wi-Fi.

PAPER ID 126: Analysis and Investigation of CPW Fed Parasitically Loaded Rectangular Patch Antenna for Wi-Fi5 in 5G and 6G Applications

Satyam Kumar, Atul Varshney, Pratham Mishra, Satyam Tiwari, Aniket Pandey and Sanyam Rathor

Abstract:

This work presents an analysis and investigation of coplanar waveguide-fed (CPW-fed) parasitically loaded mutually coupled rectangular planar antenna for Wi-Fi5. This antenna geometry is fabricated on a 27.857 mm × 26.784 mm piece of 1.6 mm thickness FR-4 substrate. The 5.0 GHz designed antenna parameters are analyzed and investigated with parasitic loading of two rectangular stubs. This loading raises mutual coupling in the main patch and stubs and their length helps to tune the antenna at any desired frequency range between 4 GHz to 6 GHz. The low-cost antenna attains a reflection coefficient -21.76 dB, peak gain 7.48 dBi, directivity 7.76 dBi, and -10 dB fractional bandwidth (FBW) of 14.39% with an efficiency of 94% at 5.28 GHz. The bandwidth from 4.96 GHz to 5.72 GHz makes the suggested antenna appropriate candidate for high-speed Wi-Fi5 (5.15-5.17 GHz), (5.17-5.19 GHz), (5.19-5.21 GHz), (5.21-5.23 GHz), (5.23-5.25 GHz), (5.25-5.27 GHz), (5.29-5.31GHz), (5.31-5.33 GHz), (5.35-5.37 GHz), (5.37-5.39 GHz), (5.39-5.41GHz), (5.41-5.43 GHz), (5.43-5.45 GHz), (5.45-5.47 GHz), (5.47-5.49 GHz), (5.49-5.51 GHz), (5.53-5.55 GHz), (5.57-5.59 GHz), (5.61-5.63 GHz), (5.63-5.65 GHz), (5.65-5.67 GHz), (5.67-5.69 GHz), and (5.69-5.71GHz) bands in 5G and 6G applications. The antenna testing is obtained using a microwave analyzer (VNA), and an Anechoic chamber. The reflection coefficient, and radiation in E and H-planes are found in matching with the simulated results.

Keywords: CPW-fed, rectangular patch, monopole antenna, wideband, Wi-Fi5.

PAPER ID 128: An Analysis of Edge Communication Architectures for Ultra-Dense Fog Networks

Dr D.K.Mishra ,Ravi Rastogi , Ghanshyam Mishra

Abstract:

In ultra-dense fog networks, faceted conversation architectures are crucial because they provide low latency, high capacity, and electricity-green speech communication. Several component verbal exchange topologies, such as distributed antennas, mesh networks, and multi-hop ad hoc networks, have been the focus of recent research. Along with open mobilecoverage, lower latency, and more potential, these also bring blessings. An overview of the benefits and drawbacks of the current nation of part verbal exchange architectures is provided in this study. We examine the three most well-known side communication designs and talk about how well they workoverall in extraordinarily thick fog networks. We analyze the architectures with respect to strength performance, capability, latency, and coverage. While multi-hop advert hoc networks are better suited for excessive potential and energy efficiency, meshnetworks provide a great way to distribute antennas for low latency and coverage. In general, it is important to understand the advantages and disadvantages of each structure in order to choose the best structure for an exceptionally thick fog network. We present a thorough examination of the various edge conversation architectures and suggest directions for further research.

Keywords: Antennas, Communication, Structure, Guidelines, Network

PAPER ID 131: Review on Chronic Diseases Detection Tool

Samarth Omar, Pragya Rajput, Sachin Upadhyay, Raunak Singh Dhanai, Pawan Kumar

Abstract:

Chronic diseases, particularly diabetes and obesity, continue to pose significant challenges to global health systems. These disease affects millions of individuals and leading to severe economic and social consequences. Early diagnosis and timely intervention are essential to mitigate the progression and complications of these conditions. The detection tool integrates advanced data analytics and artificial intelligence to deliver fast, accurate, and user-friendly diagnostic capabilities. Utilizing clinical parameters such as glucose levels, body mass index, and other key indicators, the system employs machine learning algorithms to enhance precision and reliability. The tool's design emphasizes accessibility, making it suitable for use by healthcare professionals and individuals alike, thereby promoting widespread adoption and proactive health management. This paper provides a comprehensive review of the development process, algorithmic framework, and the technical architecture of the detection tool. Furthermore, it

discusses its potential to alleviate the burden of diabetes and obesity on public health infrastructure by enabling earlier interventions and improving patient outcomes. The results highlight the transformative role of technology in chronic disease management and its broader implications for the future of healthcare delivery.

Keywords: Artificial intelligence; Chronic diseases; health coaching; Human-AI Interaction; Wellbeing

PAPER ID 134: **Real Estate Price Prediction**

Sheen Sharma ,Pratyush Kumar Choudhary ,Aditya Kumar Sharma ,Pratham Bhutani ,Mr. Pawan Kumar Mall

Abstract:

This paper presents a robust machine learning framework that aims to predict housing prices based on the changing scenario of the Indian real estate market. The paper includes the implementation of multiple machine learning algorithms, such as Linear Regression, Decision Trees, Random Forest, Gradient Boosting, Support Vector Machines (SVM), K-Means clustering, Neural Networks. The model is a production-level algorithm that relies on advanced feature engineering, cross-validation, and hyperparameter tuning, as well as consideration of property size, location, amenities, and historical market data as key inputs. The result is a real-time predictive tool that enables buyers and sellers to make data-driven decisions in the real estate market.

Keywords: House Price Prediction, Machine Learning, Real Estate Valuation, Data Mining, Python, Feature Engineering, Cross Validation, Hyperparameter Tuning.

PAPER ID 135: **Copy-Move Image Forgery Detection Using Deep Learning Techniques**

Henerita Khumallambam, A.B. Singh , Durgamohon Polem, and Rajeev Rajkumar

Abstract:

Digital images are becoming a tangible information source as imaging technology advance rapidly. Due to this, it is often a complicated task to maintain the authenticity of the digital images as there are several powerful and sophisticated tools that can tamper these images efficiently leaving no trace to the end-users. Copy-move forgery detection (CMFD), which detects the tampered region, is an effective method of recognising the modified image region. In this study, we proposed an approach based on the state-of-the-art deep learning architecture of MobileNetv2. In this regard, the study employs MICCF2000 and MICCF220 that contains both original and tampered images. The performance of the study is assessed through recall, precision, accuracy, F1 score and False Positive Rate(FPR)

which shows that the applied technique in this study is applicable for future use as it has more accuracy and lesser computational time.

Keywords: Image forgery, Deep learning, CMFD

PAPER ID 137: Advancements in AI-Based Botnet Detection Techniques for IoT Networks: A Comprehensive Review

Rintu Das, Vaskar Deka , Rima Devi, Apurbo Dey, Mayuri Sharma and Gom Taye

Abstract:

The rapid progression of the Internet of Things (IoT) has transformed the process of devices being interconnected, contributing enormous benefits in various ways. However, this growth has also introduced notable security challenges, mainly in the form of botnet attacks. Botnets are networks of endangered devices controlled by a botmaster that pose significant threats in the IoT landscape. As IoT devices often have limited computational resources, traditional cyber security methods are not always effective. Machine learning (ML) and deep learning (DL) have emerged as promising approaches for detecting botnet activities in IoT networks. This systematic review surveys the state-of-the-art ML and DL paradigms employed in botnet detection in IoT environments. The paper highlights key trends including hybrid classifiers, explainable ML, and innovative feature selection techniques, methodologies, and datasets. This work demonstrates progress in enhancing detection accuracy and proposes inventive methodologies to address specific challenges and future directions for this critical area of research.

Keywords: Botnet Detection, Cyber Security, Machine Learning, Deep Learning, Detection Accuracy, IoT Security

PAPER ID 139: University Documents Verification through QR Code and Digital Signature Using Blockchain

Dr. Charansing N. Kayte

Abstract:

The traditional methods of verifying university documents often involve manual processes, which are time-consuming, prone to errors, and susceptible to fraudulent activities. Blockchain technology, with its decentralized, transparent, and immutable nature, offers a promising solution to address these challenges [1]. This research paper explains a novel document verification system that integrates QR codes, digital signatures, and blockchain technology to enhance the security, efficiency, and reliability of the verification process. Using these technologies, the system ensures the authenticity and integrity of university documents while streamlining the verification process.

Keywords: Blockchain technology, Document verification, QR codes, Digital signatures, Security

PAPER ID 140: Secure Application Development for Zigbee-Based IoT Systems Using ECC on ARM Cortex Microcontrollers

Rajesh M, Ummer Iqbal, P. Rangababu, Riya Rajeevan C and Amal Krishna U. R.

Abstract:

Zigbee is the standard communication protocol for the Internet of Things (IoT), which has a smaller code size and reduced memory requirements. It is implemented in wireless control systems and applications like home environment control, industrial plant monitoring, and security systems. Its specification has security features to protect against various threats, but it lacks complete end-to-end security, which is necessary in the upcoming applications of the IoT, like smart cities. This paper implemented a system to develop secure applications for Zigbee-based IoT systems, using a widely accepted lightweight security approach of using Elliptic Curve Cryptography on a Cortex-M series microcontroller. It handles both confidentiality and authentication aspects at the network and application layers of Zigbee. Galois Counter Mode is used for encrypting the messages, which helps in preventing attacks due to the properties of XOR and truncation. Zigbee application layer security and link layer key generation, joining, privacy, and authentication attributes are selected. The use of ECC with ARM's Thumb-2 instruction set enables faster computations and smaller code sizes. The ARM architecture security features are implemented alongside the ECC to provide more robust security in the system. This system was designed, developed, and tested for its complete functioning. To conclude, the Zigbee microcontroller-based IoT system developed a secure system that gave application acceptance a boost.

Keywords: IoT, WiFi, Zigbee, IoT Gateway, RPI, Cube IDE, ECC.2 Rajesh M. and Ummer Iqbal

PAPER ID 145: Verification of low precision arithmetic for AI Coprocessor using Universal Verification Methodology

Devi sri priya Bobba, Shashank Kumar Singh, Satyanarayana Talam, Saurabh Kesari, Ravi Ranjan kumar, Jayaraj U Kidav

Abstract:

Low precision arithmetic is a key approach in AI coprocessors, offering significant benefits in computational efficiency and power reduction, particularly for edge and resource-constrained applications. However, reduced precision formats like 8-bit and 16-

bit introduce challenges, such as rounding and quantization errors, which can lead to accuracy loss. This highlights the need for a robust verification framework to ensure functionality and precision without compromising performance. This paper introduces a verification strategy based on the Universal Verification Methodology (UVM) to address the challenges of low precision arithmetic in AI hardware. The modular and reusable nature of UVM is leveraged to create a comprehensive verification environment that includes tailored components such as drivers, monitors, scoreboards, sequencers, and transaction classes for low precision data processing. The framework supports a variety of testing strategies, including random testing and precision-focused corner case analysis, ensuring broad functional coverage. The proposed approach emphasizes precision-specific adaptations, including custom checkers for detecting subtle errors, parameterized verification to handle various precision formats, and detailed coverage metrics for validation. The methodology integrates effectively with AI coprocessor architectures, addressing operational constraints and supporting scalability for more complex designs. Simulation results validate the UVM-based framework's ability to detect precision-related faults and maintain accuracy, providing a reliable solution for verifying AI coprocessors.

Keywords: Low Precision Arithmetic, AI Coprocessor, Universal Verification Methodology (UVM), Hardware Verification, Functional Coverage, VLSI Design, Fault Detection

PAPER ID 147: Comparative Analysis of Generative AI Models for Determining Medicine Applicability Based on Medicine Names

Roshan R P, Swetha K, Vimala Mathew

Abstract:

Generative AI models are transforming biomedical research by enabling thorough analysis of medical literature to evaluate the relevance of medications. This study compares three sophisticated models: BioGPT, GPT-4, and PubMed BERT, in terms of their understanding of medication names and their recognition of applications. Each model is evaluated based on accuracy, contextual relevance, and flexibility using a curated dataset that includes annotated medication names and their corresponding uses. BioGPT, designed specifically for biomedical tasks, excels with specialized terminology but struggles in ambiguous contexts. GPT-4, as a general-purpose model, demonstrates remarkable adaptability and language understanding but lacks deep specialization in biomedical domains. PubMed BERT, tailored to PubMed literature, achieves a compromise between accuracy in domain-specific contexts and contextual awareness, benefiting from extensive training on biomedical texts. This analysis highlights the trade-offs between general versatility and specialized expertise, providing insights into choosing suitable models for various healthcare and pharmaceutical applications. These findings

guide the integration of generative AI into clinical decision-making and medical research activities.

Keywords: BioGPT, Clinical Decision Support, Generative AI, Medicine Applicability, Medicine Name Recognition, PubMed BERT, GPT-4

PAPER ID 149: Leveraging Big Data Analytics for Crime Prediction and Prevention: A Comprehensive Review on Techniques, Applications, and Ethical Challenges

Mohammed Azeem Khan, S. Shwetha Iyer, Daivik Jayan Mampally and Rishabh Kinhikar

Abstract:

The review paper focuses on applying big data analytics (BDA) in crime prediction and prevention. Traditional crime prevention methods often fail to address modern crime complexities. Integrating BDA with image processing, the Internet of Things (IoT), and cloud computing allows authorities to anticipate and mitigate crimes using real-time detection. Various methods are currently being implemented, along with successful case studies such as predictive models in the United States, and crime pattern analysis has been discussed to demonstrate the effectiveness of BDA. Recent methods deployed by the Indian law enforcement agencies have also been described. The paper concludes with an analysis of the challenges that persist while integrating data, privacy protection, and the costs associated with the upgrades, along with future directions for research that will optimize crime prevention strategies.

Keywords: Big data analytics, crime prediction, crime prevention, data privacy.

PAPER ID 150: Robust Adversarial Patterns to Defeat Deep Learning Malware Detection Systems

Pierre-François Maillard, Sudipta Das, and Bimal Kumar Roy

Abstract:

Over the years machine learning, particularly deep learning, has become a key component in the malware detection paradigm. These models are very effective to detect harmful software by identifying recurring malicious patterns within the executables. However, detection models often remain opaque and their boundaries may not align with expected behaviors. Consequently, malicious actors can fine-tune their malware to evade machine learning based detection models and perform malicious operations. Thus, the study of the adversarial attacks can help to identify the limitations of existing malware detection systems to improve their robustness. This paper introduces a new attack methodology on

deep learning based detection systems with the objective of generating adversarial patterns with high transferability properties. This attack operates in a white-box context using a gradient-based optimization process and considers a set of malware to maximize the transferability of the pattern. The result indicates that our patterns can be injected to any malware at any address within the .data section prior compilation and deceive the Malconv detection model in 80% of the test cases.

Keywords: Adversarial machine learning, Optimization, Cybersecurity, Security

PAPER ID 151: HRSCasNet: Illustration of Hybrid Residual Serial Cascaded Network for Detecting the Cyber Anomalies

Abhijit Debnath

Abstract:

In cybersecurity networks, detecting cyber anomalies and attacks is becoming a more challenging task. These problems can be solved with the application of artificial intelligence and machine learning techniques. Anomaly detection is essential to increase the security of Cyber-Physical Systems (CPS). But, anomaly detection methods face challenges due to massive data volumes require domain-specific knowledge. It is not directly designed to address these challenges due to the increasing complexity of CPSs because of the growing complexity of CPSs and more sophisticated attacks. Hence, this paper aims to develop a serial cascaded network for detecting cyber attacks. Initially, the corresponding input data source is taken from the reputed information sources. Further, the raw information is subjected to the Hybrid Residual Serial Cascaded Network (HRSCasNet). It includes the autoencoder and Long Short-Term Memory (LSTM). This proposed HRSCasNet is deployed for cyber-attack detection. The evaluation of the suggested system is done using different metrics and compared among conventional methods. Therefore, the recommended attack detection system aids in rapidly identifying the attack before getting involved in the system to evade the performance.

Keywords: Cyber Anomaly Detection; Hybrid Residual Serial Cascaded Network; Long Short-Term Memory; Autoencoder

PAPER ID 160: Enbot: Robust Bot Detection in Industrial Internet-of-things using Intelligent Techniques

Vishnu Prakash Sharma and Jyoti Gajrani

Abstract:

In the last decade, many industries are utilizing the Internet of Things(IoT). Use of IoT is enhanced in most industries to maximize the production and development. However, as

its popularity continues, it has become an increasingly attractive target for industrial network damage and various cyber attacks. These increasing number of cyber attacks in Industrial IoT (IIoT) systems, can lead to significant business failures and damages, sometimes even posing life-threatening situations. Network attacks and their timely detection has become crucial among research community. Numerous attempts to counteract these threats through intelligent detection techniques have been developed. However, ever-evolving cultivation of network attacks and evaluation on latest datasets have rendered many approaches obsolete. Confronting these challenges, this paper introduces a modern framework for Bot Detection in IIoT that harnesses the power of machine learning algorithms through ensemble modeling. The proposed ensemble model integrates the upsides of three machine learning models, i.e., K-nearest neighbor (kNN), Gradient Boosting Decision Trees (GBDT), Random Forest (RF), and one deep learning model, Multilayer Perceptron (MLP). The results of validation show the resiliency of our proposed method in identifying the most recent attacks. On the ToN-IoT dataset having 127 features and 35,975 samples, our approach achieves an impressive accuracy rate with the ensemble model. The dataset includes IoT and IIoT sensor generated seven Bot attacks, providing comprehensive dataset for the proposed model's effectiveness. Compared to state-of-the-art, our approach outperformed and achieved 98.20% accuracy and 1.7% Mean Squared Error (MSE). Further, we analyzed the proposed approach and other approaches to find utilized time, and memory using Scalene, a Git project.

Keywords: Bot Detection · Ensemble Model · IIoT · Machine Learning · Intrusion

PAPER ID 162: **Orchestrating Distributed Data and Computing in Decentralized Environments: A Unified Approach**

Sai Pavan Veluguri

Abstract:

With the ongoing evolution of decentralized data and computing paradigms, achieving effective coordination and synchronization of these components has emerged as a critical research challenge in distributed systems. In localized environments characterized by multiple data sources, the imperative arises to query and manage data in a harmonized manner. To tackle this, I propose a tailored solution that presents a unified system for the efficient management and aggregation of data, ensuring scalability and statelessness. Through meticulous evaluation and comparison with both centralized and decentralized alternatives, my approach showcases comparable performance in terms of request Round Trip Time while surpassing other solutions in Total Traffic Flow. My findings underscore the capability of the proposed solution to effectively address the latency trade-off within specific localized scenarios, wherein data is distributed across multiple instances. The solution embraces the principles of a stateless, on-demand aggregation and query system.

Keywords: Decentralized Systems, Data Coordination, Data Aggregation, Scalability, Statelessness, Distributed Computing

PAPER ID 165: Comparative Evaluation of Sentiment Analysis Methods: Manual Annotation, Crowd-Coding, Dictionaries, and Machine Learning

Aishwarya Singh

Abstract:

This study investigates the validity of different sentiment analysis approaches by comparing manual annotation, crowd-coding, various dictionary methods, and machine learning algorithms using a Dutch language dataset of economic news headlines. Through a detailed analysis, we assess the performance of these methods against a gold-standard set of manually coded headlines. Our results show that human annotation, whether by trained coders or crowd coders, remains the most reliable method for sentiment analysis, achieving the highest accuracy. Machine learning, especially deep learning techniques, significantly outperforms dictionary-based approaches but still lags behind human performance. Our findings highlight the limitations of dictionary approaches and suggest that machine learning models require further validation before use in practical applications. We propose a step-by-step framework for implementing sentiment analysis to ensure both efficiency and validity, emphasizing the importance of human oversight in automated sentiment classification projects.

PAPER ID 167: Enhancing Functionality Awareness in Spreadsheets Through Collaborative Filtering-Based Function Recommendations

Aishwarya Singh

Abstract:

This paper explores the challenge of functionality awareness among spreadsheet users, particularly end-user programmers who often underutilize built-in functions. I propose a recommendation system that employs collaborative filtering algorithms to suggest relevant spreadsheet functions. By analyzing a large dataset of spreadsheet usage, I extract user preferences and assess the performance of two collaborative filtering techniques in comparison to a baseline algorithm. The findings demonstrate that the item-based collaborative filtering approach achieves the highest recommendation accuracy with fewer suggestions, enhancing user efficiency and functionality awareness. Future work will expand on these results by integrating diverse spreadsheet corpora and conducting real-world evaluations to refine recommendation precision and usability.

PAPER ID 169: IoT-Powered Emergency Automatic Battery Charging System for Vehicles

Abdul Samad Khan, Divya Asija and Rajkumar Viral

Abstract:

To improve vehicle reliability and avoid battery-related malfunctions, a state-of-the-art solution is an emergency automatic battery charging system for automobiles that runs on the Internet of Things. This system combines car battery management with Internet of Things (IoT) technologies to offer automated reactions and real-time monitoring. Sensors monitor voltage levels, overall performance, and battery health continuously. In order to maintain vehicle functionality, the system immediately initiates an onboard charging process when it senses that the battery charge drops below a key threshold. The system can interface with a central server through the Internet of Things, facilitating remote monitoring and diagnostics. With the help of this function, users and fleet managers can receive comprehensive data and timely notifications about battery state, any problems, and maintenance requirements. The system may also be configured to maximize charging cycles, which will increase battery life and boost energy economy.

Keywords: Internet of Things (IOT), Battery Monitoring System (BMS), Battery Charging Module, ThingSpeak

PAPER ID 175: Revolutionizing Skin Lesion Segmentation: The Synergy of Multi Resolution UNet and K-Fold in Deep Learning

Deependra Rastogi, Sumit Singh Dhanda, Anand Singh, Suman Avdhesh Yadav, Abhinav Raghav

Abstract:

Skin lesion segmentation is a critical step in the early detection of skin cancer, a condition with rapidly increasing global incidence. This study introduces an advanced method leveraging the complementary strengths of Multi-Resolution UNet and K-Fold cross-validation within a deep learning framework. The multi-resolution architecture excels in capturing intricate lesion patterns through enhanced feature extraction, while K-Fold cross-validation ensures robust training and minimizes overfitting, improving generalizability across datasets. Using the PH2 dataset of dermoscopic images, the proposed approach demonstrates significant improvements in segmentation accuracy compared to traditional U-Net and state-of-the-art methods. The inclusion of K-Fold validation not only ensures reliable performance metrics but also reinforces the model's robustness. Experimental results highlight the superior performance of the Multi-Resolution UNet, emphasizing its potential for clinical dermatology applications and

underscoring the value of innovative architectures and rigorous validation in medical image analysis. The model shows strong performance with accuracy (0.9733) and precision (0.9738) indicating few errors. IoU (0.7287) and Dice (0.6101) show good but moderate overlap, while recall (0.9434) reflects high detection. Overall, the model performs well with slight room for improvement.

Keyword: Skin Lesion, Segmentation, Deep Learning, Multi Resolution Unet, K-Fold.

PAPER ID 176: Analysis of Deep Learning-based Models for Badminton Shuttlecock Detection

Payal Mittal, Mukesh Dalal, Vedant Anand, Naman Sood

Abstract:

The shuttlecock is a key component in badminton, a sport that is popular around the world. For several uses, including coaching, training, and performance monitoring, it is crucial to accurately identify the shuttlecock in badminton videos. This study focuses on improving gameplay analysis through the use of artificial intelligence-powered badminton video/frames analysis. The technique examines player actions, shot choices, and game strategy while analyzing badminton game footage using one-stage You Only Look Once (YOLO) v8 detector algorithms. Comparing the most recent YOLO variants in order to determine which is best is the goal of this paper. The results assist coaches in recognizing patterns and trends in their athletes while offering players tailored comments and suggestions for development.

Keywords: Video analysis, YOLO, Deep learning, Badminton, Object detection, Computer Vision

PAPER ID 177: Cloud Based Intelligent Water Filling System using NodeMCU

Prateek Dhar Dwivedi, Saksham Sharma, Aditya Singh, Prakash Pratik

Abstract:

Water is an exhaustible resource and hundreds of cities will face water scarcity by 2050. Therefore, water conservation and preservation are essential. In this paper, cloud-based water filling system in water tank using NodeMCU have been proposed to solve the traditional way of water filling system that have many drawbacks like water overflowing, manual processes, human intervention, higher electricity consumption. The proposed system consists of Ultrasonic sensor HC-SR04, 16*2 LCD, 1-channel relay, ESP8266 based NodeMCU, jumper wires and ThinkSpeak cloud. The proposed design based on IoT technology will give accurate value of water level of the tank in real time and minimize

the human intervention, once the water level reaches beyond threshold value, it automatically turn on or off the motor pump using relay.

Keywords: IIoT, Intelligent Water Filling system, NodeMCU, Cloud Based IoT System

PAPER ID 178: Systematic review for analyzing the Dark Patterns International Regulations, Guidelines and India's aligned actions in these directions

Kanti Singh Sangher, Arjun, Mary Jacintha M, V.K. Sharma

Abstract:

Dark patterns are deceptive design strategies employed in digital interfaces to manipulate users into actions they may not have intended, such as sharing personal data, making unplanned purchases, or subscribing to unwanted services. While these tactics can yield short-term gains for companies, they often result in long-term negative consequences, including reputational damage, erosion of customer trust, and potential legal repercussions. As awareness of these practices grows, businesses continuing to use dark patterns face increasing risks from stricter regulatory enforcement. Studies indicate that one in four internet users have encountered dark patterns, prompting international attention from government guidelines. Countries including the US, India, South Korea and the EU have issued guidelines or directives addressing this issue. Analysis of these recommendations reveals varying approaches to combating dark patterns, considering national guidelines, pattern types, and compliance standards. However, there appears to be a lack of consistent enforcement of legislation designed to counter deceptive design patterns. The ethical application of user experience design is becoming more and more important for upholding user trust and adhering to new rules as digital interfaces continue to develop. In this research paper comparative analysis various countries actions taken in the form of regulations, guidelines, acts and best practices are covered. India's actions to handle the dark patterns based applications has been also covered, and how these legal measures can take shape to make ethical user interface design practices.

Keywords: Dark Patterns, Regulation, Guidelines, Laws, Privacy.

PAPER ID 182: Machine Learning Models for Traffic Flow Prediction at Urban Junctions: A Comparative Analysis of RNN and LSTM Approaches

Vinay Gadila , Kanaparthi Sai Chandhu

Abstract:

Urban traffic congestion is a growing challenge, and accurate traffic flow prediction at junctions plays a pivotal role in optimizing public transport and reducing delays. This study explores the application of machine learning models to predict traffic flow at various junctions, with a focus on freeways and highways. The research evaluates different Recurrent Neural Network (RNN) variants, including Long Short-Term Memory (LSTM) models, to determine their effectiveness in traffic prediction. By analyzing traffic waves and congestion patterns, this work compares the performance of these models with other machine learning techniques. The findings underscore the superiority of RNN-based models, particularly LSTM, for enhancing prediction accuracy. The study also highlights the significance of deep learning model structures, data preprocessing, and error matrices in improving traffic flow forecasting. Implementing these models can optimize traffic management, contributing to more efficient and sustainable urban transportation systems.

PAPER ID 187: A Systematic Review on Convolutional Neural Network Based Face Recognition

Pooja Bansal and Dr. Dinesh Chandra Misra

Abstract:

Face recognition is crucial for practical uses such as security systems, human-machine interfaces, and video surveillance. When it comes to industrial automation, face recognition systems becoming more and more important. The Deep learning-based techniques performed the greatest in terms of processing, speed, and accuracy for human face recognition. They can manage entry in restricted areas by conforming to the identities of individuals and issuing immediate notification for any security violations. The deep learning method which is mostly used for image recognition is known as CNN. CNN is trained on massive datasets to identify faces accurately in a wide range of situations including varying degrees of illumination, orientation, and occlusion. This paper highlights the introduction of Convolutional Neural Networks, CNN models, data sets, research focuses, and prospects for enhancing CNN-based facial recognition and is beneficial for researchers and scholars for future work in CNN. Research also discusses the role of image compression and noise removal in reducing space and time consumption. Moreover, the role of image quality enhancement using noise removal has been discussed. The research paper also considers the significance of hyper-parameters such as learning rate, epoch, batch size, and optimizer in accuracy and performance enhancement.

Keywords: CNN, Alex Net, VGG Net, Res Net, Le Net.

PAPER ID 188: Advancing Healthcare Security through Blockchain-Driven Smart Contracts

Swati Gupta , and Dinesh Chandra Misra

Abstract:

The increasing digitalization of healthcare systems makes ensuring the integrity of healthcare transactions and protecting of private patient data more challenging. Blockchain technology combined with smart contracts offers a hopeful solution to address these problems by giving a decentralized, open, and tamper-resistant framework. This paper explores the design of a block-chain-powered smart contract security architecture specifically for healthcare. The suggested design is superior to earlier solutions in important aspects such as operational economy, scalability, and data breach security. These areas include better dependability metrics for contract execution, data consistency, and transaction integrity. The suggested blockchain-based architecture is more effective at finding and fixing security flaws than existing techniques. As a consequence, the execution time is shortened and the fault tolerance is improved. The proposed architecture is robust, according to evidence from tests and case studies. This implies that it has the potential to completely transform the way healthcare data is managed and secured. This technology makes it possible for digital healthcare operations to be safe, effective, and scalable by solving major flaws with current systems.

Keywords: Blockchain, Smart Contracts, Healthcare Security, Data Integrity, Accuracy, Decentralized Framework, Fault Tolerance, Data Authenticity.

PAPER ID 189: Digital Transformation and Leadership: Managing Transition to a Tech-Driven Business with Big Data

Vivek Veeraiah, C.Naga Ganesh, Lekharaju Bhavagna, S Pradeep, Jay Kumar Pandey, Ankur Gupta

Abstract:

Companies can only thrive in this quickly changing technological age by means of digital transformation. This study examines how digital transformation and leadership interact with an eye towards how Big Data can enable a company to migrate to a tech-driven environment be managed. Companies looking for Big Data's benefits will need visionary executives to steer them over the challenges of merging new technologies with tried-through systems. Those who want to thrive in the digital age must use among other basic tools and techniques change management, strategy matching, and vision casting. Moreover shown are problems with data governance, talent acquisition, and company cultural shift. By means of case studies and industry examples offering insights on best practices and typical mistakes in handling digital transformation, this paper offers a

comprehensive framework for leaders trying to maximise the possibilities of Big Data and guarantee a seamless transition to a technology-driven business model.

Keywords: Digital Transformation, Leadership, Tech-Driven Business, Big Data, Change Management, Data Governance.

PAPER ID 191: Literature Survey on Assistive Technology for Blind and Visually Impaired (BVI) Individuals Using Deep Learning

Shivlok Singh

Abstract:

Blind and Visually Impaired (BVI) individuals (Divyangjan) encounter numerous difficulties in mobility and performing daily life activities independently. Though assistive technologies have made significant strides over the past decades, a major issue remains with designs that address the specific need of the BVI population concerning rare situations, particularly in circumstances of poor illumination. The recent advances in AI, deep learning, and computer vision technologies have opened new avenues for consideration to enhance the independence and quality of life of people with visual disabilities. This literature reviews the most advanced technologies in computer vision, deep learning models of various approaches as well as assistive devices, targeting the real problems of the BVI population. Based on a review of some cutting-edge work, the paper describes several major gaps in the solutions available and proposes an integrated vision for a system. The suggested system merges novel low-light enhancement techniques, real-time object-detection algorithms, and natural auditory feedback modalities. These innovative set of solutions will enable the BVI portion of the population within the region to easily apply various cost-effective navigation solutions to enhance mobility with safety and independence in diverse conditions. It is, therefore, concluded that there is an immense need for a variety of mobility technologies that should be made easily available to BVI individuals since these will surely improve their independence and quality of life.

Keywords: Deep Learning, BVI, AI, Object Detection, Navigation, Divyangjan, Quality of Life

PAPER ID 192: An Extensive Review of Internet of Things (IoT) Applications in Revolutionizing Healthcare Systems

Shagun Arora and Yasmin Chopra

Abstract:

The Internet of Things (IoT) is a network of interconnected devices, software, and hardware that communicate with each other. With the aging population, diminishing healthcare resources, and rising medical costs, IoT-based solutions are increasingly crucial to address these challenges in healthcare. Various studies have been conducted to improve the monitoring efficiency of IoT-enabled healthcare systems. This paper examines the IoT architecture, focusing on cloud-integrated systems and the security of IoT devices. Key issues such as accuracy and power consumption are critical concerns, and research aimed at improving the performance of IoT-based healthcare systems is highlighted. The paper also explores data management strategies for IoT healthcare systems with cloud integration, assessing their performance, advantages, and limitations. Additionally, a comparative analysis of existing healthcare technologies is provided. Previous research shows that IoT protocols, such as 6LoWPAN, are widely used in healthcare. Many studies have proven effective in detecting symptoms and accurately predicting diseases. IoT-based healthcare systems designed specifically for the elderly offer an efficient means of monitoring their health needs. However, high power consumption, resource limitations, and security issues are significant drawbacks of current systems, which are addressed in this study.

Keywords: Internet of Things · Healthcare · Smart Home · Big data

PAPER ID 196: A Comprehensive Review of Beamforming Techniques: Establishing Beam Multiply and Sum (BMAS) as the Superior Method

Akhila Karanam and Jayaraj U Kidav

Abstract:

Beam forming is a key technique in signal processing, enabling precise control over signal directionality to enhance communication efficiency, imaging quality, spatial resolution and detection accuracy. It plays an essential role in diverse applications such as wireless communication, medical imaging, and radar systems. Over the years, several beam forming methods have been developed, including Delay and Sum (DAS), Minimum Variance Distortionless Response (MVDR), Delay Multiply and Sum (DMAS), and Filtered Delay Multiply and Sum (FDMAS), each with unique advantages and limitations. While DAS is computationally simple, it has limited resolution; MVDR, though offering improved resolution, is computationally intensive; and DMAS and FDMAS enhance resolution and noise suppression but introduce more complex calculations and processes that make it harder to apply them in real-time situations. This paper presents a comprehensive review of these conventional techniques and introduces Beam Multiply and Sum (BMAS) as a superior method that outperforms its predecessors. BMAS achieves superior resolution, enhanced signal-to-noise ratio (SNR), and reduced computational complexity, making it highly suitable for real-time systems. Through comparative

analysis and application insights, we establish BMAS as the superior beamforming technique, paving the way for advancements in modern signal processing.

Keywords: Beamforming, Delay-and-Sum, Minimum Variance Distortionless Response, Delay Multiply and Sum, Filtered Delay Multiply and Sum, Beam Multiply and Sum, Signal Processing, Real-Time Systems.

PAPER ID 197: The Pandemic Paradox: Meddling in incidents of improper synchronization of theory and technique – foreboding or worthy?

Dr. Sharmistha Bhattacharjee, Dr. Debasish Majumder

Abstract:

The COVID-19 pandemic exposed significant gaps in the alliance between theoretical models and their practical applications across various sectors, presenting what this paper terms as the "Pandemic Paradox". Frequently, process of implementation affects model performance. Some scholars commented in the post-pandemic intellectual discourse that biases can creep into the process when the method tends to popularize a specific type of statistical/optimization /programming/networking technique at the wrong time. Few of them resonated more profoundly with the idea and commented "Politicalized Implementation". Nonetheless, casual and opaque practices unequivocally have pernicious effects in creating bad reputations, degrading credit ratings, and affecting sources of future funding. While these discrepancies led to inefficiencies and challenges during the pandemic, they also offered critical lessons on the limitations of intelligent automation (e.g., artificial intelligence (AI), robotics) in dealing with complex, unpredictable nature of real-world crises. Occasionally, rigorous criticism of methodologies adopted, and unpremeditated remarks multiplies anxiety and have long term negative impacts. This study investigates whether discrepancies and contradictions signal a foreboding trend in systemic failure or offer valuable lessons for future resilience and adaptation.

Keywords: Pandemic Paradox, Intelligent Automation, Nowcasting models, Grid search algorithm, Bootstrapping, Model misspecification

PAPER ID 198: Assessing the Digital Readiness of Primary Education in India: Pathways to a Technologically Empowered Future

Vidya Arnav, Anita Budhiraja, Sarwan Singh, Lovnish Verma,

Abstract:

Global competitiveness relies on a digitally skilled workforce, with primary education serving as the foundation for equipping students with essential skills. In India, digital learning has great potential to improve educational outcomes, but challenges such as

inadequate infrastructure, limited access to devices, and insufficient teacher readiness remain. This paper proposes two solutions: the Community-Led "Digital Guardians" Initiative to empower local communities and enhance digital literacy, and Solar-Powered Ed-Tech Kiosks to provide sustainable access to digital resources. Together, these solutions aim to address infrastructure gaps, ensure equitable access to devices, and improve teacher preparedness, helping create a future-ready education system in primary schools.

Keywords: Access, Community, Digital Literacy, Education, Infrastructure, Kiosks, Primary Schools, Sustainability, Teachers, Technology

PAPER ID 201: **IoT-Driven Innovations in Railways**

Ritika Sharma, Gourab Das, Smriti Rekha Dutta

Abstract:

The integration of Internet of Things (IoT) in the railway industry has revolutionized the way railways operate, manage assets, and ensure passenger safety and comfort. This paper presents a comprehensive survey of existing trends and technologies in railways, employing IoT. Various applications of IoT in railways were reviewed, including predictive maintenance, real-time monitoring, safety enhancements, and passenger experience improvements. In this paper discussion about diverse scenarios in the rail industry is carried out and comparative differences among the various IoT technologies introduced in other papers are identified. Additionally, this paper presents a proposed system that consists of an Aadhaar based Ticket reservation and Biometrics based ticket verification system, along with biometrics-based casualty and corpse identification system. This system will enhance the ticket reservation & verification system making it more robust. Furthermore, the applications of IoT in the railway sector are discussed.

Keywords: IoT, Railway, Aadhar, UIDAI, Biometrics, Ticket-Reservation, Ticket-Verification, Casualty-Verification, Corpse-Identification.

PAPER ID 202: **Enhancing Accuracy of Corn Leaf Disease Detection: Machine Learning Approach**

Gourab Das, Ritika Sharma, Smriti Rekha Dutta

Abstract:

Agriculture has undergone a transformation because of the combination of the 'ML algorithms' and the 'IoT' technologies, especially in the sector of disease diagnosis in crops like maize. In this paper it discusses about recurring problem in agricultural production by presenting a preferable technique that takes use to reliably detect diseases

in maize leaves. Through the use of IoT sensors gather the data in 'real-time' and the machine learning algorithms to analyze the data. This paper improves the accuracy of illness diagnosis with the 'machine-learning-techniques' and a comparative analysis of detection accuracy at different levels. The average accuracy of batch size 32 at 60 epoch level is resulted as 93.80%. Similarly at 30 epochs resulted as 92.19% and at 10 epochs it was 90.18%. In addition to being technically novel, our concept has significant ramifications for food security, cost-effectiveness, and agricultural sustainability. Farmers may lessen crop losses, lessen their need on chemical treatments, and eventually promote more resilient agricultural methods by detecting problems early and treating them specifically and protect the world's food supply.

Keywords: IoT, Agriculture, Corn leaf disease detection, Machine Learning, Accuracy.

PAPER ID 204: Machine Learning Framework for Battery Performance Prediction and Optimization in Drone Applications

Arun T Nair , Nandakumar R, Sreejesh S G

Abstract:

Drones require effective battery management, especially when using lithium-polymer (Li-Po) batteries, which are favoured due to their high energy density and portability. Using NASA's lithium-ion (Li-ion) battery datasets, this research develops a hybrid machine learning framework that can be used to Li-Po batteries to solve the problem of forecasting battery performance indicators like State of Charge (SoC) and State of Health (SoH). The approach combines an interactive Dash-based dashboard for battery performance visualization with ARIMA for time-series forecasting, LSTM for sequence modelling, and reinforcement learning for dynamic optimization. The study demonstrates how well the ARIMA and LSTM models can forecast battery behavior, with ARIMA demonstrating short-term accuracy and LSTM demonstrating long-term trend identification. Additionally, it shows how effective reinforcement learning is at maximizing energy use, particularly in dynamic drone environments. In order to improve practical application and refine forecasts, future research will concentrate on integrating real-world drone operating conditions and comprehensive Li-Po battery properties. This project demonstrates the framework's scalability and adaptability, providing a solid means of enhancing real-time performance and precisely forecasting battery health, which makes it extremely useful for drone applications.

Keywords: Battery Performance Prediction, Machine Learning, Drone Applications, SoC, SoH

PAPER ID 205: Prosthetic hand actuation using the beta frequency of EEG signal

Prashant Prakash, Prashant Jindal, Mamta Juneja

Abstract:

Brain-Computer Interface (BCI) technology has undergone a transformative evolution in recent years, enabling increasingly intuitive and direct control of prosthetic devices. This research paper introduces a novel system that leverages Electroencephalography (EEG) signals for prosthetic hand control by extracting salient motor-related brainwave frequencies. The system's control algorithm is based on the established roles of the beta (13–30 Hz) and gamma (30–100 Hz) frequency bands in motor planning and execution; specifically, it detects spikes in beta activity to trigger state transitions in the prosthetic hand. EEG data was collected from a subject using non-invasive EEG electrodes placed on the scalp, and signal processing techniques were employed to isolate the beta and gamma bands. A dynamic threshold was established to identify actionable neural patterns. Each instance of beta wave amplitude exceeding this threshold resulted in a change in the hand's state, from open to closed or vice versa. Through real-time processing and a practical testing configuration, the system achieved a response time of 500 ms and an accuracy rate of 85%, thereby demonstrating its potential for real-world application. This study not only affirms the feasibility of EEG-based prosthetic control but also elucidates the inherent benefits and limitations, including the necessity of user training and the challenge of signal variability. The findings augment the rapidly growing corpus of research on non-invasive BCIs, advancing the development of more accessible and patient-centric prosthetic solutions that promote mobility and independence.

Keywords: Amputation, Brain-Computer Interface (BCI), Electroencephalography (EEG), Prosthetics, Signal Processing

PAPER ID 206: A Comparative Analysis of Convolutional Neural Network Architectures for Excess Grass Detection on Playground

Saksham Sharma, Anita Budhiraja, Sarwan Singh and Raj Kumar Sharma

Abstract:

This research investigates the application of Convolutional Neural Networks (CNNs) for detecting excess grass in playgrounds, with a focus on evaluating the impact of varying network structures on performance. Images captured by security cameras around playgrounds served as the primary dataset, providing realistic scenarios for model training and testing. CNN architectures with one, two, three, four, and five layers were trained to identify areas with excess grass. Performance metrics, including accuracy, precision, recall, F1-score, and AUC, were calculated to evaluate the models using a confusion

matrix. The results revealed that deeper models with three or more layers captured intricate features but suffered from overfitting, impacting generalization. The two-layer CNN emerged as the optimal configuration, achieving an accuracy of 99% and an F1-score of 0.99, striking the best balance between computational complexity and prediction accuracy. The single-layer model trained quickly, with the highest accuracy, whereas models with three, four and five-layer model demonstrated diminishing returns in performance. These findings suggest that the one or two-layer architecture is most suitable for automated grass detection tasks, offering insights for future applications in landscape analysis and optimization. This study highlights the importance of selecting appropriate CNN architectures for specific real-world image recognition tasks.

Keywords: CNN, Deep Learning, Supervised Learning, Image Processing, Playground Grass Detection

PAPER ID 208: Predictive Maintenance In WSN Based On Machine Learning
Shweta Sharma and Shailja Agnihotri

Abstract:

Predictive maintenance is one of the key concerns in the field of wireless sensor networks. The purpose of predictive maintenance is to reduce unplanned energy consumption, to increase lifetime of the network and to reduce costs and delays. Predictive maintenance system is a new concept that aids the system to monitor and evaluate the status of those systems for which they are being developed. They also assist in maintaining the actions of these systems by predicting the future quality. With applications in industrial monitoring, smart cities and environmental sensing, the integration of AI and predictive maintenance in WSNs presents a promising path towards intelligent, economical and scalable network management. In order to tackle the issues of sensor failures, network instability and system deterioration, this paper investigates the predictive maintenance in WSNs and along with the predictive maintenance and machine learning concepts.

Keywords: Artificial Intelligence, Machine Learning, Predictive maintenance system, Wireless Sensor Networks

PAPER ID 210: Pioneering Advances in AI, Machine Learning, and Big Data Analytics: A Review

Lovnish Verma, Anita Budhiraja, Sarwan Singh, Muneer Ahmad Dar

Abstract:

This study examines the challenges of organizing, analyzing, and processing data in an era of rapid technological advancement by combining Big Data analytics, Machine

Learning, and Artificial Intelligence (AI). It starts by looking at how neural networks have developed and how important they are to deep learning applications, especially because of their capacity to handle and adjust to massive, complicated datasets. The study also studies computational vision modeling, which is vital for recognizing patterns and correlations among both structured and unstructured data. This study guarantees the precision and dependability of the final analyses by highlighting the significance of data quality management. Important advancements in government education are highlighted in the report, especially those that enable training decentralized information models while protecting user privacy. It also looks at how Big Data and Quantum Computing work together, demonstrating how the latter can speed up the resolution of issues that were previously intractable. It also emphasizes how AI-powered prediction and decision-making require real-time data processing. Ethical concerns are examined to encourage ethical technology use, such as lowering prejudice and enhancing the transparency of AI models. The study also makes recommendations for how to advance modern technology to attain productivity, scalability, and efficiency in a range of computational scenarios. Future research will be influenced by the possibilities and difficulties of big data analytics. Cloud computing, real-time analytics, and web mining, along with advancements in deep learning and state learning, demonstrate how these technologies could completely transform several industries and promote creativity.

Keywords: Artificial Intelligence, Big Data Analytics, Cloud Computing, Data Quality Management, Deep Learning, Ethical Technology, Neural Networks

PAPER ID 211: Performance Overview of Routing Protocol for Flying Ad-hoc Networks (FANETs) considering Energy Efficiency and Security - A Study

Chhamanjit Kaur and Navdeep Kaur

Abstract:

In present scenario, Unmanned Aerial Vehicles have been employed for non-military and defence applications. Any recently developed technology takes place with its part of challenges and concerns. As known, high flexibility of UAVs changes topology frequently further leading to dropping of packets or failure of routing path. The large movements of nodes cause a more notable task in keeping dynamic communication links among the nodes. FANETS are dynamic networks of UAVs that communicate without a fixed infrastructure. Effective routing protocols are prime for FANETS to ensure reliable communication while optimizing energy usage and maintaining security. This research study describes a detailed performance analysis of present protocols for routing w.r.t. FANETS, focusing on their energy efficacy and security characteristics. The paper evaluates key parameters for example energy usage, packet delivery ratio, end-to-end

delay, and security mechanisms to provide understandings w.r.t. the strength and limitations of these protocols in FANET environment.

Keywords: ad-hoc networks, Flying ad-hoc networks (FANETS), routing protocols, energy efficiency, security, performance analysis.

PAPER ID 212: Optimization of VM migration and Energy Consumption using Adaptive Particle Swarm Optimization Algorithm

Harmeet kaur, Shubham Gargrish

Abstract:

The high energy consumption of cloud computing systems affects both cloud providers and users. Virtualization is needed to save energy. VM consolidation efficiently manages cloud resources for users and cloud providers. It also improves server efficiency and reduces data centers energy use. However, needless VM consolidation efforts lead to poor VM selection and assignment, lowering performance, QoS, and SLAs. Data centers need energy-saving solutions without impacting other metrics. This paper introduces an adaptive Particle Swarm Optimization methodology for energy-efficient Virtual Machine (VM) migration within cloud environments. The technique optimizes energy usage and ensures SLA compliance by optimizing VM-to Physical Machine (PM) allocations. The evaluation of the proposed method has been done considering the metrics like energy consumption, SLA and resource usage. The results highlight that after incorporating the optimization an enhancement has been observed for all the metrics for the effective VM management.

Keywords: Virtual Machine, Particle Swarm Optimization, Service Level Agreements, Cloud Computing, Quality of Service

PAPER ID 213: Generating House Floor Layout Images Using Diffusion Model

Chandan Saroj , Anita Budhiraja And Sheetal Chopra

Abstract:

This paper explores the synthesis of house floor map layouts through the implementation of the Stable Diffusion model augmented with ResNet50 and DINO to enhance and guide image quality. The generation of architectural layouts is inherently complex due to issues such as spatial efficiency functional zoning and aesthetic coherence. These challenges demand innovative methodologies to overcome conventional constraints and open creative possibilities in floor layout design. The proposed approach leverages the generative capabilities of the Stable Diffusion model which is particularly suited for high-

resolution and contextually coherent image generation tasks making it an ideal candidate for architectural visualization. The integration of ResNet50 and DINO enhances the system's perceptual understanding by enabling detailed comparisons and refining outputs to align with both structural logic and artistic vision. This project provides a powerful tool to architects and designers facilitating the automated creation of diverse and optimized floor layouts tailored to specific needs and preferences. The employment of state-of-the-art diffusion models in tandem with advanced feature extraction frameworks like ResNet50 and DINO signifies a notable advancement over traditional CAD systems and heuristic design tools. Furthermore this study discusses the applicability of complementary technologies including CLIP-based text-to-image models and autoencoder-driven refinement pipelines to enhance the creative and practical utility of the proposed system. This interdisciplinary convergence not only enriches the design process but also underscores the potential of machine learning models to revolutionize the field of architectural planning and visualization.

Keywords: Stable Diffusion model, ResNet50, DINO, house floor map synthesis, architectural visualization, CLIP-based models, text-to-image, floor layout.

PAPER ID 214: A Virtualized Approach to Intrusion Detection in SCADA Systems with an Implementation of ICS Lab Setup

Gurjot Singh, Gagandeep Singh, Anchal Nayyar

Abstract:

Industrial Control Systems (ICS) and Supervisory Control and Data Acquisition (SCADA) access to corporate IT networks and the internet provides critical infrastructure security risks which continue to increase. Past designs limited these systems within separate operating niches that sought protection. The current danger landscape featuring sophisticated cyberattacks revealed substantial security vulnerabilities in these systems which create disruptions to critical infrastructure services. The proposed framework capitalizes on the combination of historian systems and Intrusion Detection Systems (IDS) for conducting real-time threat identification and forensic investigations in ICS networks. This framework combines a historian system that logs and aggregates data along with an IDS that detects anomalies and attacks passing through ICS traffic. By adopting virtualization technologies, a secure, scalable, and isolated environment is created, allowing the safe deployment and testing of security measures without risking the integrity of live systems. The proposed solution is evaluated through a virtualized ICS setup, where simulated attacks are carried out to test the system's response. The integration of these technologies improves the ability to detect and mitigate cyber threats early, provides detailed incident logs for forensic analysis, and enables rapid response mechanisms. The findings from this study suggest that adopting such an integrated approach can significantly enhance the cybersecurity posture of ICS networks. The paper concludes by

exploring future enhancements, including the integration of AI and Machine Learning for more advanced anomaly detection and the application of blockchain for ensuring data integrity in historian systems.

Keywords: ICS, SCADA, Intrusion Detection, Cyber Forensics, Virtualization, Historian Systems, Critical Infrastructure.

PAPER ID 216 : **AI-Augmented Data Science Pipelines for Holistic Business Transformation**

Anil Kumar Jonnalagadda and Praveen Kumar Myakala

Abstract:

The growing complexity of data management in Information and Communication Technology (ICT) industries presents significant challenges in achieving real-time insights, scalability, and operational efficiency. To address these challenges, this paper proposes an AI-augmented data science pipeline framework tailored for ICT-driven industries. The framework incorporates advanced techniques such as automated feature engineering, adaptive machine learning models, and real time analytics to enhance data quality, optimize predictive performance, and support critical applications like predictive maintenance and cyber security. By integrating AI methodologies with traditional data processing workflows, the framework tackles key pain points, including handling large-scale datasets, improving decision accuracy, and enabling proactive risk management. Case studies across domains such as finance, retail, and supply chain management demonstrate measurable outcomes, including enhanced agility, reduced downtime, and improved operational resilience. In addition, the study explores ethical considerations, scalability constraints, and deployment strategies, offering actionable insights for ICT professionals and industry stakeholders. By bridging research and practice, this work positions AI-augmented pipelines as a transformative tool to leverage data as a strategic asset to drive innovation and competitiveness in dynamic global markets.

Keywords: AI-augmented pipelines, Cybersecurity, Data quality, ICT industries, Machine learning, Predictive analytics, Predictive maintenance, Real-time analytics, Scalability

PAPER ID 217: **Malware Detection Using Deep Learning**

Rahul Rajroop, Sarwan Singh, Pranav Singhal, Ravi Kant

Abstract:

The exponential growth of digital technology has heightened the prevalence of cybersecurity threats, with malware emerging as a formidable challenge. Traditional detection systems, relying on signature-based and heuristic techniques, have struggled to

address the complexities of modern malware, including obfuscated, polymorphic, and zero-day variants. To bridge this gap, this research employs deep learning techniques to develop a robust and scalable malware detection system using the EMBER (Endgame Malware Benchmark for Research) dataset. The methodology integrates extensive preprocessing, including feature selection and normalization, followed by the design and training of a deep learning model using TensorFlow and Keras. The model, featuring dense layers with ReLU activations and dropout regularization, achieves a remarkable 95% accuracy, with an AUC-ROC of 97%. Comprehensive evaluations demonstrate its ability to effectively classify benign and malicious Portable Executable (PE) files, showcasing high precision and recall. This study highlights the potential of deep learning in advancing malware detection capabilities. The results underscore the model's practical applicability, paving the way for its integration into real-world cybersecurity frameworks. By providing a scalable and accurate solution, this research contributes significantly to the fight against evolving malware threats.

Keywords: AUC-ROC, cybersecurity, deep learning, feature selection, malware detection, normalization, Portable Executable, preprocessing, TensorFlow

PAPER ID 218: FISH : Run-Time Configurable Burst Fault Injection Self-test Hardware for FPGA

Rahul Shandilya and R.K. Sharma

Abstract:

Fault injection technique is commonly used to intentionally introducing attack on embedded systems, specifically advanced FPGAs and microcontrollers. The FPGA-based embedded system uses SRAM for storage of configuration data. Due to technology scaling and growing complexity in FPGA bit files, multiple-bit upset is a primary threat to FPGAs. These devices are also vulnerable to radiation threats in space environments. To address these issues, this paper proposes burst error modeling and a Fault Injection Self-test Hardware (FISH). FPGA is utilized in the proposed fault injection architecture to efficiently inject Multiple-Bit Upset (MBUs) onto the design's interconnect without altering the value of flip-flops associated with the design path. There is no need to reload the same flops and memory with correct values since their values are unchanged. The Xilinx Zynq-7000 FPGA has been used to evaluate the proposed FISH architecture, and It is able to perform two times faster than existing techniques. The FPGA resource utilization overhead also less as compared to other exiting design but it depends on number of fault injection points used.

Keywords: Fault Injection, FPGA, Single Event Upset , Multiple-Bit Upset, LFSR.

PAPER ID 220: **AdptM :A Fault-Tolerant Adaptive Approximate Multiplier for Neural Network Hardware Accelerators**

Rahul Shandilya and R.K. Sharma

Abstract:

The importance of convolutional neural networks is increasing in applications that require safety and mission-criticalness. Using accelerators for CNNs requires balancing various design parameters and reliability. While CNNs exhibit some fault-tolerant and error-resilient properties, their dependability must be evaluated considering the features of the hardware accelerator, especially for critical applications. A novel reliability technique for reducing soft errors in an AI computing core's combinational logic is presented in this paper. The key contributions are: 1) A new approximate and adaptive multiplier is designed specifically for CNN accelerators, and it features an adaptive adder that optimizes adder resources and detects and mitigates faults, 2) the implementation and verification of the multiplier, and 3) Analyzing the multiplier's reliability and comparing it to precise and approximate multipliers design with the help of standard CNN benchmarks. The proposed multiplier is able to achieve a reliability level that is similar to that of TMR based multipliers, while reducing its area by 66.42% and having a 39.84% lower power-delay product than the precise multiplier, as shown in the results.

Keywords: Fault-Tolerant; FPGA; Reliability; Approximate Multiplier, Convolutional Neural Network

PAPER ID 226: **Leveraging Machine Learning for Speech Classification Using Librosa and Neural Networks**

Jasleen Bedi , Chandan Saroj, Jasvinder Singh And Sarwan Singh

Abstract:

Machine learning has emerged as a powerful tool for audio analysis, enabling applications such as pitch detection, speech understanding, musical instrument recognition, and music generation. By transforming sound waves into spectrograms, which represent audio frequencies visually, machine learning techniques can identify intricate patterns within audio data. This research explores audio classification, specifically the differentiation between speech and music, employing Librosa, an open-source Python library for audio and music analysis. Librosa facilitates preprocessing by resampling audio to a default rate of 22050 Hz and converting signals to mono, ensuring uniformity in data representation. Additional tools such as Scipy for feature extraction, Numpy for array processing, and Matplotlib for visualization complement this process. The audio classification task utilizes a neural network model developed with Keras and employs Sklearn for splitting data into training and testing sets. This study emphasizes the integration of these libraries and

frameworks, illustrating the systematic approach required to construct robust machine learning models for audio classification.

Keywords: Machine learning, audio classification, pitch detection, speech recognition, music analysis, Librosa, spectrogram, neural networks, audio preprocessing, Keras, Scipy, Numpy, Sklearn, data visualization, sampling rate.

PAPER ID 227: Traffic Violation Detection and Monitoring Using YAMNet Model for Acoustic Signal Recognition

Saurabh Bharti, Nikshep Paliwal, Priya Sharma, Dr. Sarwan Singh ,Anita Budhiraja

Abstract:

This research explores the potential of a sound recognition-based system designed to detect traffic signal violations at intersections. By leveraging advanced artificial intelligence and machine learning techniques the system identifies the distinct acoustic signatures produced by vehicles breaking traffic lights during red signals. This innovative approach offers a practical solution to the limitations of conventional image recognition and CCTV surveillance which are often challenging to deploy at every intersection. The system not only counts the frequency of traffic violations but also classifies the type of vehicle involved. By incorporating sound recognition into traffic monitoring this study aims to enhance safety and traffic regulation compliance. The project contributes to the development of a more efficient traffic management system capable of providing real-time data to authorities helping maintain public order and improve road safety

PAPER ID 228: A Systematic Review on Data Leakage in Cloud Computing

Geetinder Saini and Dr. Navdeep Kaur

Abstract:

An increasing number of researchers, academic institutions, government agencies and businesses adopt cloud computing because of its low initial investment, scalability and other benefits. However, despite these advantages, data protection remains a significant concern in the context of data security and cloud computing. Although many solutions are proposed to solve this problem, a comprehensive review examining these existing methods is lacking. This creates a need to explore, categorize and evaluate the effectiveness of these solutions in meeting the requirements of cloud data security. This review work provides a detailed and comparative analysis of the leading methods used to secure and share data in the cloud. It examines each technique, highlighting its function in data protection, its innovative solutions, core details such as workflow, accomplishments, scope, limitations, and future potential. A thorough comparison of these

techniques is also presented. The paper concludes with an evaluation of how these methods can be applied to real-world scenarios, addressing existing research gaps and offering future directions in the field of cloud data security.

Keywords: Computing, Data Leakage, Data Sharing, Data Security

PAPER ID 229: IoT Based Thermal Model to Predict Operating Temperature of PV module

Prakash Pratik, Saurabh Bharti, Raminder singh, Aman Choudhary

Abstract:

Ambience condition plays a significance role in determining the operating temperature of the PV module installed in outdoor. In this paper, a IoT based forecast model is proposed that can predict the operating temperature of the photovoltaic module using Faiman's formula. To forecast the working temperature of the solar PV module, the proposed thermal model will require few inputs such as Environmental temperature where the PV module is installed, wind speed blowing at that particular location and the amount of solar irradiance falling on the glass layer of the module. The proposed design consists of NodeMCU ESP8266 based IoT board, DHT 11 sensor that measure environment temperature, anemometer to measure wind speed and pyranometer to measure Solar radiation falling on that particular location and 16*2 LCD to display the forecast temperature of the PV module. Based on these sensor inputs from weather station, the model will calculate the Module temperature using Faiman's equation.

Keywords: 3-D Modelling, FEM analysis, CFD analysis, Photovoltaic module, p-Si Solar module, David Faiman, Operating Temperature, IoT, Internet of Things.

PAPER ID 232: Explainable AI for Web and Text Mining

Vidya Arnav, Lovnish Verma, Anita Budhiraja, Sarwan Singh

Abstract:

This study introduces an Explainable AI (XAI) framework specifically developed for web and text mining applications, addressing the critical challenges of transparency and understandability in AI systems. While advanced Artificial Intelligence models, particularly deep learning architectures, excel in predictive capabilities, their "black-box" nature often hinders trust, accountability, and regulatory compliance. The proposed framework bridges this gap by integrating interpretable models with post-hoc clarification methods such as Local Interpretable Model-agnostic Explanation (LIME) and SHapley Additive exPlanations (SHAP). It also incorporates interactive visualization tools to elucidate outputs like sentiment analysis, topic modeling, and keyword significance, empowering

stakeholders to validate and refine AI-driven insights effectively. Through case studies in domains such as healthcare, e-commerce, and legal services, the framework demonstrates its adaptability and practical utility in enhancing user trust and promoting ethical AI practices. Experimental results reveal its ability to balance interpretability with performance, ensuring usability across diverse applications while addressing challenges like scalability and domain-specific explanations. This research advances the field of XAI by providing a structured, transparent, and adaptable solution for web and text mining tasks. Future work will focus on optimizing scalability, tailoring explanations for specific industries, and integrating ethical considerations such as bias mitigation to ensure the responsible deployment of AI systems.

Keywords: Explainable AI , Interpretability, LIME, Post-hoc Explanations, SHAP, Text Mining, Transparency

Track Schedule

Day 1 (14th Feb, 2025) Session -1 (2:00PM - 5:30 PM)		
Room No 208	Room No 227	Room No 216
Track 1: Artificial Intelligence, Machine Learning, Big Data Analytics	Track 2: Cyber Security & Forensic, Network and Mobile Security	Track 5: VLSI & Semiconductors, Electronic Systems, IoT, Microwave, Antenna and Communication
Paper ids: 7,37,46,47,48,52,55,57,58,61, 62,63,66,67,78,81, 91,92	Paper ids: 38,51,54,68,73,89,97,103, 105,121,135,137,149, 150,151,160,178,214	Paper ids: 8,13,14,41,44,50,56,69,100, 115,122,124,125,126,140,16 9,192,196
Plenary Talk: Prof Paolo Ciancarini, University of Bologna, Italy	Plenary Talk: Prof. (Dr) Maninder Singh, Thapar Institute of Engineering	Plenary Talk: Dr Satya Jaswanth Belgium
Expert Chair/Co-Chair: • Dr. Shubhranshu Vikram, Amity University • Dr Shweta Jain, IIT Ropar • Sh. Pankaj Shukla, NIELIT	Expert Chair/Co-Chair: • Dr. Geeta Yadav, IIT Ropar • Sh. Dildeep Singh, Director, 2B Innovations Technology Services Pvt. Limited. • Dr Pooja, Rayat Bahra University, Mohali	Expert Chair/Co-Chair: • Prof Rohit Sharma, IIT Ropar • Mr Asim Saeed, Scientist SF, SCL • Dr. Suman Avdesh Yadav, IILM University
Track Coordinator: • Mr. Jasbir Singh	Track Coordinator: • Sh. Raminder Singh, NIELIT	Track Coordinator: • Mr Akhil Arora, NIELIT
Poster Paper ids: 29,59,75,76,80,98,106,110,128,139,165, 177,182,217,227		
Cultural event followed by dinner 6.00-8.00PM		

Day 2 (15th Feb, 2025) Session -1 (09:30 AM - 11:30 AM)		
Room No 208	Room No 227	Room No 216
Track 1: Artificial Intelligence, Machine Learning, Big Data Analytics (cont)	Track 7: Assistive Technology for Divyangjan Track 8: Strategy for Digital Skilling for building a Global Future Ready Workforce	Track 5: VLSI & Semiconductors, Electronic Systems, IoT, Microwave, Antenna and Comm.
Paper ids: 93,107,123,134,176,187,202, 206,213,226	Paper ids: 24,34,109,111,117,147,191, 197,198,205	Paper ids: 201,204,208,211,212,218, 220,229
Plenary Talk: Prof. Palaiahnakote Shivakumara University of Salford, Manchester	Plenary Talk: Ms Thilini De Silva Dean - NSBM, Green University, Sri Lanka	Plenary Talk: Dr Gurjit Walia, Scientist F, DRDO
Expert Chair/Co-Chair: • Dr. Neeraj Goyal, IIT Ropar • Dr Shashi Sekhar Jha, IIT Ropar • Dr Sharmistha Bhattacharjee	Expert Chair/Co-Chair: • Prof Divya Bansal, PEC University • Sh. Suneel Wattal, Principal Consultant,MP State Electronics Development Corporation • Dr. D. K. Mishra, NIELIT	Expert Chair/Co-Chair: • Mr Asim Saeed, Scientist SF, SCL • Dr. Maninder Singh, Research Head RBU • Dr. Pratap Kumar S, NIELIT
Track Coordinator: • Mr Anirban Jyoti	Track Coordinator: • Ms Jyoti Sharma, NIELIT	Track Coordinator: • Sh Prakash Pratik, NIELIT
High Tea 11.30 AM– 11.45 AM		

Day 2 (15th Feb, 2025) Session -2 (11.45 AM -1:45 PM)		
Room No 208	Room No 227	Room No 216
Track 3: Advanced Computing- Cloud Computing, Edge Computing & Quantum Computing	Track 4: Blockchain and Web Technologies	Track 6 : Digital Technologies for Future Applications (Biotechnology, Augmented Reality and Virtual Reality, Metaverse etc.)
Paper ids: 33,35,74,83,162,189,210, 228	Paper ids: 43,71,104,145,167,188, 216,232	Paper ids: 17,18,49,53,60,64,72, 114,131,175
Plenary Talk: Dr. Ashish Seth, Inha University, S. Korea		Plenary Talk : Dr. Vinaytosh Mishra, Gulf Medical University, UAE
Expert Chair/Co-Chair: • Prof Anu Gupta, Punjab University • Prof. Maitreyee Dutta, NITTTR • Dr. Anirban NIELIT	Expert Chair/Co-Chair: • Prof Surya N Panda, Pro Vice Chancellor Research, Chitkara University • Mr Vikram R Singh, Antier Solutions • Dr. Sunita Chib, NIELIT	Expert Chair/Co-Chair: • Sh. Palash Bhattacharjee, R&D Samsung • Dr. Sarwan Singh, NIELIT • Dr. Saurav Mohanta, NIELIT
Track Coordinator: • Ms. Shweta Sharma, NIELIT	Track Coordinator: • Sh Jitender Bhatia, NIELIT	Track Coordinator: • Dr. Sanjeev Jha, NIELIT
Lunch Break (1.45 PM– 2.45PM)		
Valedictory Session (2.45 PM – 3.45 PM)		