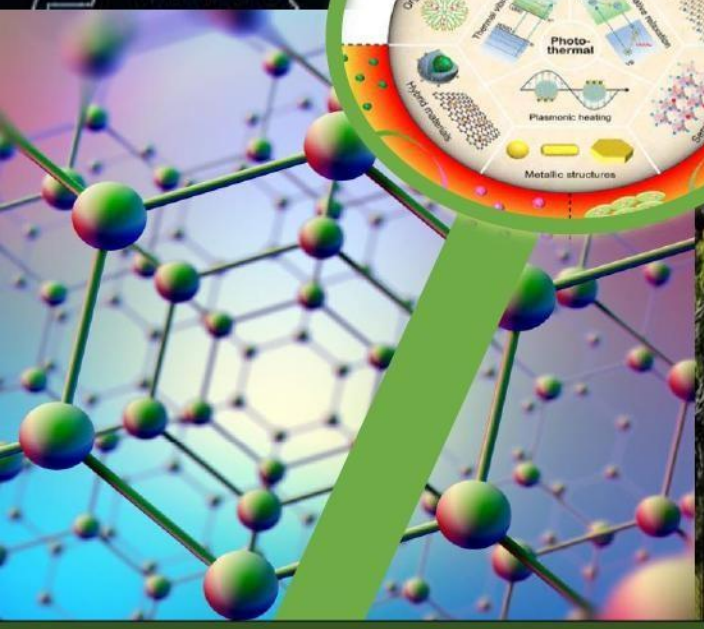
# 12th International Conference on Microelectronics Circuits and Systems.

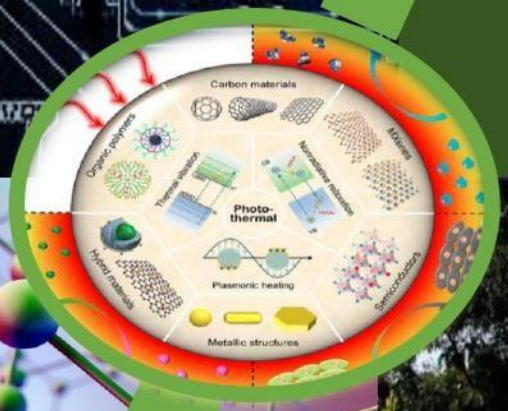
Abstract Proceedings of

## MICRO2025

www.actsoft.org/micro2025

10th to 11th of May, 2025





**Organizer and Venue:**
**Department of Information Technology, Jalpaiguri Government Engineering College, Jalpaiguri, West Bengal, India.**

**Joint-Organizer:**
**Applied Computer Technology, Kolkata, West Bengal, India.**

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

ACT

MICRO

# Abstract Proceedings of

# Micro2025

## 12th International Conference on

## Microelectronics, Circuits & Systems

## 10th and 11th May, 2025

## Organizer:

**Department of Information Technology,**

**Jalpaiguri Government Engineering College,**

**Jalpaiguri, West Bengal, India.**

## Joint-organizer:

**Applied Computer Technology,**

**Kolkata, West Bengal, India.**

**www.actsoft.org**

## In Association with:

**International Association of Science, Technology and Management**

# Micro2025

12th international conference on

Microelectronics, Circuits and Systems

10th and 11th May, 2025

Department of Information Technology,

Jalpaiguri Government Engineering College,

Jalpaiguri, West Bengal, India.

Proceedings Book with abstract of papers

Published dates: 10th May, 2025

Published by: Dulal Acharjee, Director, Applied Computer Technology,

53 Teachers' Colony, Agarpara, Kolkata-700109, India

Inaugural Song:

**Prayer**
Translated in English
By
Hillol Ray
http://www.iwvpa.net/rayh
http://www.iwvpa.net/rayh/index-hra.php
Desires are all yours,
You are the universal star-
You do your own works, mom,
People say, I do them from a far!!

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

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

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

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

# Editorial

This abstract Proceedings contain only the abstract of all registered paper of the conference, Micro2025. Some pages contain summary of invited Speakers and some pages contain biodata of the speakers of this conference. Names, Photos and affiliations of all Speakers are available at end of this Proceedings.

About 130 papers are received and around 70 are selected for presentation. Most of the papers are in the areas of Microelectronics, Circuits and Systems Technology, Micro-Nano Electro Mechanical Systems, Image Sensing and Processing, MEMS, Micro and Nano Materials, Memory Devices: SRAM, DRAM, RRAM, Optical Fibre, Communication, Optoelectronics and Photovoltaics, CMOS Scaling Issues, Sensor and IoT Networks, VLSI, Power Electronics, Optical Switch, Bio and Medical Electronics, Antenna Design etc.

Some good papers will be invited to forward to a special issue of the Journal of Microsystem Technologies of Springer-Nature, SCI indexed and having impact factor=2.5. Some other papers are planned to be invited for possible inclusion to the Proceedings of LNEE (Lecture Notes on Electrical Engineering) book series of Springer having SCOPUS index and impact factor=0.6.

With due thanks and best wishes to all our team members including the Chief Guest, Keynote Speakers, invited speakers, chair persons, authors, participants etc. for sparing their valuable time in making the event a success.

These abstract proceedings are prepared with the abstracts of all papers for the delegates of the conference and which will be available online also. After the conference, most of the papers will be forwarded for possible publications in different Journals or as Book Chapters, so full papers are not printed in this abstract proceedings.

The Editors
Prof. Aditya Kumar Samanta (HOD, Dept. of IT, Jalpaiguri Govt. Engineering College)
Dr. Thamarai Muthusamy (Department of ECE, Sri Vasavi Engineering College)
Mr. Arup Halder (Scientist, Applied Computer Technology)

# DAKSHIN DINAJPUR UNIVERSITY

**Prof. (Dr.) Pranab Ghosh**
FICCE, FRSC (UK), Research Fellow,
INTI IU (Malaysia)
*Vice-Chancellor*
*Dakshin Dinajpur University*

दक्षिण दिनाजपुर विश्वविद्यालय
न हि ज्ञानेन सदृशं पवित्रमिह विद्यते

Ph : +91 7047892539 (Off.)
+91 6294955520
Fax : +91 353 2699 001
Email: vc@dduniv.ac.in (Off.)
Website: www.dduniv.ac.in

Ref. No.- **DDU/VC/33/2025** Dated: **06/05/2025**

## MESSAGE

It is indeed a great pleasure to know that the Department of Information Technology, Jalpaiguri Govt. Engineering College, Jalpaiguri is organizing the 12th International Conference on Microelectronics Circuits and Systems (MICRO-2025) on 10 -11 May, 2025.

This prestigious conference has grown to become a significant platform for scholars, researchers, and professionals to converge, collaborate, and contribute to the advancement of microelectronics and circuit technologies. At a time when technological innovation continues to reshape the global landscape, such gatherings are essential for nurturing academic exchange and fostering meaningful research collaborations.

I commend the organizers, faculty, and students of Jalpaiguri Government Engineering College for their dedication and effort in bringing together a diverse community of experts and learners. The carefully curated sessions, insightful keynote addresses, and research presentations are sure to enrich our understanding and open new avenues for exploration in this dynamic field.

As we embark on two days of learning, sharing, and discovery, I extend my best wishes to all participants for a successful and inspiring conference. May MICRO-2025 spark new ideas, foster enduring partnerships, and contribute meaningfully to the advancement of science and technology.

With warm regards,
Prof. (Dr.) Pranab Ghosh, FICCE, FRSC
Vice - Chancellor
Dakshin Dinajpur University
Balurghat, Dakshin Dinajpur
West Bengal-733101

**Jalpaiguri Government Engineering College**
(An Autonomous & NAAC Accredited Govt. Institute)
Jalpaiguri-735102, West Bengal, India
**https://jgec.ac.in/**

# Message from the Principal and Patron's Desk

It is with great pride and immense pleasure that I extend my warm greetings to all the delegates, researchers, academicians, and industry professionals participating in the **12th International Conference on Microelectronics, Circuits and Systems (Micro2025)**, being held on **10th and 11th May 2025**.

The field of Microelectronics and Circuit design has witnessed remarkable advancements over the past decade, and it continues to be at the forefront of Technological innovation. This conference serves as a dynamic platform for the exchange of ideas, presentation of groundbreaking research, and exploration of emerging trends that shape the future of electronics and systems engineering.

At Jalpaiguri Government Engineering College, we have always been committed to fostering a culture of academic excellence and research-oriented learning. Hosting Micro2025 is a testament to our ongoing efforts to bring together intellectuals and practitioners from across the globe, enabling meaningful collaboration and discourse.

I extend my heartfelt gratitude to all the authors for their valuable contributions, the reviewers for their rigorous evaluations, the Technical committee for their dedication, and the Organizing Team for their tireless efforts in making this event a grand success.

A special word of thanks to all our distinguished Guests and Speakers across the Globe for gracing the occasion with their presence and encouragement.

I wish all participants a fruitful and intellectually stimulating experience at Micro2025. May this conference inspire new partnerships, ideas, and innovations that contribute positively to society and the advancement of Science and Technology.

With best wishes,

**DR. AMITAVA RAY**
**Principal, Jalpaiguri Government Engineering College Chief Patron, Micro2025**

# Index


| Sl. No. | Content | Page No. |
|---|---|---|
| 1 | About the Conference and Venue and date | i-ii |
| 2 | Inaugural Song | iii |
| 3 | Editorial | iv |
| 4 | Message from the Chief Guest | v |
| 5 | Message from the Principal and Patron's Desk | vi |
| 6 | Index | vii |
| 7 | Speech of, Prof. Dulal Acharjee, Executive Chairman | 1 |
| 8 | Message from the Organising Chair & Convenor's Desk | 2 |
| | Abstracts | |
| 9 | Invited Speaker, Prof. Dr. Arabinda Das | 3 |
| 10 | Invited Speaker, Prof. Abhijit Biswas | 4 |
| 11 | Invited Speaker, Dr. Rabul Hossain | 5 |
| 12 | Invited Speaker, Dr. Manisha Guduri, | 6 |
| 13 | Invited Speaker, Prof. Moumita Mukherjee | 7 |
| 14 | Invited Speaker, Dr. Rajesh Dey | 8 |
| | Biography | |
| 15 | Invited Speaker, Prof. Dr. Arabinda Das | 9 |
| 16 | Keynote Speaker, Prof. Abhijit Biswas | |
| 17 | Keynote Speaker, Dr. Rabul Hossain | 10 |
| 18 | Invited Speaker, Dr. Manisha Guduri, | 11 |
| 19 | Invited Speaker, Dr. Moumita Mukherjee | |
| 20 | Invited Speaker, Dr. Rajesh Dey | 12 |
| 21 | Invited Speaker, Dr Hab. Eng. Piotr Bojarczak | |
| 22 | Keynote Speaker, Dr. Jacopo Iannacci, | |
| 23 | Vidyasagar Awardee, Prof Ratnajit Bhattacharya | 13 |

| Sl.No. | PID | Title of Paper/Author | Page No. |
|---|---|---|---|
| 24 | 2 | A Modified Brushless Isolated Sepic Converter Fed With HB-LLC Resonant ConverterFor Power Factor Correction<br>Dharunkumar S, Dhivya Shri B V, Krushangini S, Sanjana Devi V S | 14 |
| 25 | 3 | Precision Vulnerability Analysis And Assessment Via Linux<br>Reddyvari Venkateswara Reddy(Associate Professor),<br>Abhi Bharatkumar Bhut , Devarashetty Jashwanth , A.Manaswini | |
| 26 | 12 | Malware Analysis and Reverse Engineering on Operational Technologies<br>Dr. R. Venkateswara Reddy(Associate Professor), Dr Punyaban Patel (Professor), Vindya Sri, P. Manaswi, B. Prem Kumar | 15 |
| 27 | 13 | "ALERTRA" ..... A real-Time location tracking alert solution on Smart-ID Card<br>Sudipta Basu Pal,Arnabh Sinha, Swarnavo Mukherjee,Samadrita Bhattacharya,Jaya Ganguly, Kundan Kumar | |
| 28 | 15 | The Role of Digital Technologies and Human-Computer Interaction for the Future of Education<br>Dr Naheeda Zaib, Ms Laltita Sharma, Mr Madhumay sen, Dr. Saiba Jan | 16 |
| 29 | 16 | Advanced Dynamic Malware Analysis System for Real-Time Threat Detection<br>Gajele Manisha(Assistant Professor), Punyaban Patel(Professor), Mittapelly Abhinay Reddy, | |
| 30 | 17 | Audio Embedded Media Security<br>Punyaban Patel(Professor), Reddyvari Venkateswara Reddy(Associate Professor),<br>T John Neel kumar, M Swetha Reddy, S Saipriya Reddy | 17 |
| 31 | 18 | Enhancement Of Cyber-Shied For Network Threat Detection<br>Dr. Punyaban Patel(Professor), Reddyvari Venkateswara Reddy(Associate Professor),<br>Lakkaram Rushikesh, Bekkanti Maruthi, Sirigani Harika | |
| 32 | 20 | Bypassing Next Generation Firewall Using Vpn And Proxy Chain<br>B. Praveen Kumar(Assistant Professor), Reddyvari Venkateswara Reddy (Associate Professor), Ch. Kruthik Reddy, Samhita Vemuri, Kolanu Paripoorna Laxmi | 18 |

| | | | |
|---|---|---|---|
| 33 | 21 | A Sustainable and Efficient Fast Charging Solution for Electric Vehicles in Rural India Using LLC Resonant Converter and Battery Swapping Station<br>Subha Bhattacharya, Arabinda Das, Samriddha Chakraborty, Bidrohi Bhattacharjee, Ankur Ganguly | |
| 34 | 23 | Unveiling the Drivers of Climate Change: An Analysis of Greenhouse Gas Emissions Across Sectors and Nations<br>Dr. M. Madhu Bala (Professor), Saddam Hussian (Assistant Professor), Mandadi Sai Varnika Reddy,Tangadpelli Lekhan | 19 |
| 35 | 25 | Design and Implementation of an Intelligent Automobile Congestion Monitoring System with the fusion of IoT technology<br>Myneni Madhu Bala, Haritha Akkineni | |
| 36 | 26 | The Performance of back-barrier engineered GaN-based Trigate HEMT at Elevated Temperature<br>Manish Verma, Ashutosh Nandi | 20 |
| 37 | 30 | Enhancement Of Malware Analysis Using Machine Learning<br>Punyaban Patel(Professor), Reddyvari Venkateswara Reddy(Associate Professor), Gujjala Santhi Vardhan, Bacha Srihitha | |
| 38 | 33 | Broadband photo detection in carbon allotropes-based heterostructure (C60/SWCNT)<br>Divyanshu Rathore, Arnab Hazra | 21 |
| 39 | 35 | Analyzing the Impact of Technology Nodes on Dynamic Comparator Performance in Advanced Applications<br>K.L.V Ramana Kumari, Ch.Ganesh, G.Shanthi | |
| 40 | 37 | A Rule Based System For Optimization Of Network Traffic<br>K. Sharath Kumar(Assistant Professor), Reddyvari Venkateswara Reddy(Assistant Professor), A. Lokesh, Shreya Sairi, G. Gnaneshwar | 22 |
| 41 | 41 | 2.67aJ/bit Write Energy Efficient GCC10T SRAM Cell for IoT applications<br>Ashish Panchal, Nidhi Tiwari,<br>Electronics and Communication, SAGE University, Indore – 452020, INDIA<br>Sneha Nagar, Priyanka Sharma, Aastha Gupta, Vaibhav Neema | |
| 42 | 43 | Ensemble Deep Learning Strategies for Eye Disease Detection A Comprehensive Comparative Study<br>Antara Malakar,Ankur Ganguly,Bidrohi Bhattacharjee | 23 |
| 43 | 44 | PV Penetrated Controller System for Greenhouse Farming Applications<br>Dhrubajyoti Banerjee, Sankha Majumder, Parthasarathi Satvaya, Bidrohi Bhattacharjee, Subhra J. Sarkar, Santanu Sadhukhan | |
| 44 | 45 | Design Synthesis and Performance Analysis of a High-Throughput Low-Power Turbo DecoderJagadeesh Pechetti(PG Scholar), Ramesh Chinthala(Assistant Professor (Sr. Gd.)), Navin Kumar(Professor) | 24 |
| 45 | 46 | Implementation Of Text Summarization Models In Both Extractive And Abstractive Ways On Resumes<br>Dr. M. Madhubala, K. Sai Akarsh, K. Tarun, B.Vimal, M. Sathvika | |
| 46 | 49 | Construction of Resume Screening Pipeline using NLP & NER<br>Madhu Bala Myneni, Pooja G, Gopi Sai Akshith, Deepthi V, Radha Kishore M | 25 |
| 47 | 52 | RFID And GSM Based Bank Locker Security System For Enhanced Access Control<br>Suman Chakraborty, Sandipan Patra, Sudeshna Nath, Bidrohi Bhattacharjee, Priya Adak | |
| 48 | 57 | High-Performance Schmitt Trigger Buffer with DTMOS Integration<br>G. Shanthi,K L V Ramana Kumari, Mohammed Abdul Haseeb, K.Srinivas Rao | 26 |
| 49 | 62 | Bridging the Gap between Integration of CMOS-MEMS Resonator-Based Oscillators with SoC: A Review<br>Jetti Raju Yadav, Shailendra Kumar Tiwari | |
| 50 | 63 | A High Linear Inductor Less Low Noise Amplifier for 5G IEEE 802.11ax wireless Application<br>Banoth Santhoshkumar, Dr. M.Bhaskar | 24 |
| 51 | 65 | An Intelligent Deep Learning-Based System for Multispectral Image Fusion and Skin Cancer Detection<br>Santosh Kumar (Professor), Upasna Jodhi | |
| 52 | 66 | OLED Application in Healthcare<br>Aruna Tomar, Devashree, Sukanya Chopra, Dhyani Patel,Kanchan Sharma, Brijesh Kumar | 28 |
| 53 | 67 | High-Performance, Power-Efficient dB-Linear Variable Gain Amplifier in 180 nm CMOS technology<br>Nivedha S, Bhaskar M | |
| 54 | 68 | CNN based Adaptive Sound Energy Harvesting System for Low Power Applications | |

| | | | |
|---|---|---|---|
| | | Thamarai Muthusamy, S N Poorvasivam | |
| 55 | 69 | Analysis of Ni/(AlxGa1-x)2O3/Ga2O3Heterostructure based Schottky Diode for Acetone Sensing Application<br>Shefali Mamataj, Bhaskar Roy, Deepshikha Datta, Ritam Dutta, Sunipa Roy, Bimal Das | 29 |
| 56 | 71 | Robust mid-infrared light transport in twisted topological optical fibers<br>Somashreeta Roy, Abhijit Biswas, Somnath Ghosh | 30 |
| 57 | 72 | Design and Comparative analysis of CMOS Full Adder using CPL and BiCMOS logic<br>Arnab Basak, Somasree Bose, Bijoy Kantha, Sayan Surul, Subhadeep Karmakar, Sunipa Roy | |
| 58 | 73 | Denoising of Noisy PPG Signal using Deep Learning framework<br>Karunamayee Dey, Sunipa Roy, Ritendra Bera, Biswabandhu Jana | 31 |
| 59 | 77 | DeepOptinet - An Optimised CNN Model with Wavelet Filtering and SE-Blocks for Robust Iris and Fingerprint Unimodal Authentication<br>Sagnik Chakraborty, Rahul Shaw, Mrinal Chandra Ghosh, Subrata Kumar Mandal | |
| 60 | 78 | Automatic Enhancing Brain Tumor Detection and Localization in Multimodal MRI Scans using 3D Convolutional Neural Networks: Early Brain Tumor Detection<br>Prof. Pooja Singh, Prof. Santosh Kumar | 32 |
| 61 | 80 | Reinforcement Learning Guided Transformer Framework for Adaptive Multi Modal Neuroimaging Fusion in Stroke Diagnosis<br>Raja S, Dr. G Kumaran (Professor) | |
| 62 | 81 | Social Distance Monitoring using SNet Embedded with Bottleneck Attention Model in Pandemic Areas<br>Thamarai Muthusamy, Gomathi Eswaran | 33 |
| 63 | 82 | Hardware Implementation of Digital Image Feature Extraction on Zc706<br>AkulaTrinadha Rao, Dr. M. Thamarai, Dr. B.T. Krishna | |
| 64 | 83 | Automated Handwritten Notes to Interactive Learning Framework Using Text Recognition and AI-Driven Assessment in Academic Environments<br>Mrs. S. Chandragandhi (Assistant professor), L.Harini, RK Pranaesh, S.Sathishkumar, G.Keerthika | 34 |
| 65 | 84 | Optimizing Career Decisions through Random Forest-Based Recommendation Systems<br>Mrs. S. Chandragandhi (Assistant professor), B.Avinash, L.Kavyalaxmi, S.Sanket, U.Sona | |
| 66 | 85 | Real-Time IoT-Based Energy Monitoring and Anomaly Detection in Industry Systems Using Random Forest Algorithm<br>Nalla Kumar R | 35 |
| 67 | 86 | Revolutionizing fish resource identification and management through AI technology<br>NallaKumar R | |
| 68 | 89 | Real-Time IoT-Based Energy Monitoring and Anomaly Detection in Industry Systems Using Random Forest Algorithm<br>Nalla Kumar R | 36 |
| 69 | 90 | FEM Analysis of Silicon Ultrasonic Transducer Implanted Top Electrode Attributes<br>C. Hmingthansanga<br>Mizoram University | |
| 70 | 92 | Integrating Eye Tracking and Facial Recognition: Innovations In Multi-Modal Biometric Systems<br>Sundaresan K(Assistant Professor), Shakthi Yaadav R, Vimal R, Dhaneswar R | 37 |
| 71 | 93 | Deep Learning And Blockchain: A Hybrid Approach For Digital Image Forgery Detection<br>Sundaresan K(Assistant Professor),Janarthan J,Jayalakshmi V,KishoreKumar S,Sameer S | |
| 72 | 94 | Automated Lung Cancer Detection Using MRI Images: A Convolutional Neural Network Approach<br>Dr.Sathiya M(Associate Professor), Ratheesh M, Sameerbasha K, Manoraj K, Rakeshwar B | 38 |
| 73 | 95 | TrustyReg- Secure and Transparent Online Registration System<br>Vignesh M(Assistant Professor), Deepika M, Dharshini S, Karthick S, VIshweshwaran S | |
| 74 | 96 | Enhancing Road Safety on Ghat Roads-An Integrated Approach<br>Vignesh M(Assistant Professor), Alosius R, Ragul GR, Ramprakash M, Alagiya Annamalai G | 39 |
| 75 | 97 | AI-Enhanced Hospital Operations Monitoring System<br>Abinaya V(Assistant Professor), Mathesh K, Billgates D, Yuvaraj L, Manishraj S | |
| 76 | 98 | An Efficient Algorithm for Automatic Impedance Matching And Antenna Tuning<br>M.Yuvaraju(Assistant Professor(Senior Grade)), K.Lekha | |

| | | | |
|---|---|---|---|
| 77 | 99 | Learning Management System For Personalized And Engaging Education<br>Dr.P. Mayil Vel Kumar(Professor), Manikandan M, Mohammed Anas M, Mohanraj B, Sandeep G | 40 |
| 78 | 100 | Automatic Number Plate Recognition System (ANPR)<br>Himanshu Sachan, Inzamamul Haque | 41 |
| 79 | 101 | Financial Fraud Detection In Mobile Money Using Machine Learning<br>Rudraakshya Chowdhary, Nitesh Singh Bhati | |
| 80 | 102 | Smart Petition – Grievance Redressal System Using AI<br>Abinaya V, Abinaya A, Pradeepa S, Santhoshini M, Kiruthika T | 42 |
| 81 | 104 | Telegram Chatbot Using Python<br>Vaishanavi Kumari, Nidhi Sharan, Nidhi Sharma (Assistance Professor) | |
| 82 | 105 | Design and Parameter Optimization of CMOS Operational Transconductance Amplifier (OTA)<br>Kumari Archana, Ram Kumar, Naushad Manzoor Laskar | |
| 83 | 107 | Smart Solar PV System with Temperature Dependent Cooling and Tracking<br>SriLakshmi Lavanya Kota, Bheeshma Geddapu, Lavanya Allu, Sahaja Ginjupalli | 43 |
| 84 | 109 | Designing of Memristor Emulator using FTFNTA<br>Ravendra Singh, Laxya, Md. Ayaz Alam, Saksham Kumar, Nitin Sharma, Kishan Yadav | |
| 85 | 110 | Stock Market Prediction using Fuzzy Logic and Deep Learning Techniques with Technical Indicators<br>Priya Sidhu, Dr. Himanshu Aggarwal, Dr. Madan Lal | 44 |
| 86 | 111 | TinyML-Powered Autism Spectrum Disorder Screening Using an Optimized CatBoost Model<br>Manjit Baishya, Rosy Sarmah | |
| 87 | 112 | SarvUday 1.0: AI-DRIVEN MENTAL HEALTH SUPPORT<br>Deepak Kumar Prajapati, Suraj Kumar, Rosy Sarmah | 45 |
| 88 | 113 | Analysis the performance of ZnO/Si/ZnCdTe material based hetero-structure PIN photo-detector for sensing light from UV through visible to IR<br>Debabrata Raha, Moumita Chakrabarty, Abhijit Kundu, Rupanwita Das Mahapatra, Moumita Mukherjee | |
| 89 | 114 | A Survey On Various Computational Tools And Steps In RNA-Seq<br>Prayakhi Emee Dutta, Nihar Jyoti Boro, Dr. Rosy Sarmah | 46 |
| 90 | 115 | Optimizing Reliability in Underwater Wireless Sensor Network (UWSN)<br>Akshita Dhiman, Rishika Suhag, Dr. Kanchan Sharma | |
| 91 | 116 | Design and optimization of tri-layer two-terminal lead free inorganic perovskite solar cells through strategic absorber layer engineering<br>Pramita Nath | 47 |
| 92 | 117 | Implementation of Deep Learning Approaches For Medical Image Interpretation And Analysis<br>Gurudatt Gupta, Avnish Kumar Sharma(Associate Professor) | |
| 93 | 121 | Load Frequency Control of Renewable Energy Sources based Power System using Kookaburra Optimization Algorithm Tuned Controller<br>Kota Srilakshmi Lavanya, Chilukoti Varaha Narasimha Raja | 48 |
| 94 | 122 | The Role of Real-Time Face Recognition in Enhancing Non-Contact Attendance Systems for Public Health Safety<br>Kota Srilakshmi Lavanya, Chilukoti Varaha Narasimha Raja | |
| 95 | 123 | Intelligent Speech-To-Sign Language Converter Using Ai and Avatars<br>Aathi Karthi PS, Anirudh K, Harish R, Thirunavukkarasu KM, Dr. P. Mayil Vel Kumar(Professor) | 49 |
| 96 | 124 | Design and Implementation of Robotic Navigation Using Yolo 4.0 and Image Processing on FPGA<br>Mudasar Basha, G Divya Vani, Konda Nithin, Kare Nikhila, Enje Thimoty, B Khaleelu Rehman | |
| 97 | 125 | Analysis of Image Classification using SVM and CNN<br>Aditya Pandey, Tejang, Vedant Singh, Mr. Rahul Swami (Assistant Professor) | 50 |
| 98 | 127 | Satellite Image Enhancement using MATLAB and Simulink with FPGA Implementation<br>Divya Vani, Mudasar Basha, Chinnaiah. M.C, Pendota Harini, Ande Swarthik Reddy, B. Nagaraju | |

| | | | |
|---|---|---|---|
| 99 | 130 | Satellite Image Enhancement using MATLAB and Simulink with FPGA Implementation<br>Divya Vani, Mudasar Basha, Chinnaiah. M.C, Pendota Harini, Ande Swarthik Reddy, B. Nagaraju | 51 |
| 100 | 135 | Investigation on high performance lead-free GA0.05FA0.93SnI3 based hybridhalide perovskite solar cell<br>Srinivas Mattaparthi, Didla Sristitha, Banothu Venugopal, Vijay Naik Mudavath, Himanshu Karan | |
| 101 | 136 | Implementing Secure BLE Signal Transmission through Antenna Design Techniques in Wearable IoT Devices<br>Aditya Kumar Samanta, Sagnik Chakraborty, Abhijit Satyaki | 52 |
| 102 | 139 | A Novel Quantum-Inspired Deep Learning Framework for Motor Imagery Classification Using Spatiotemporal Features<br>Hangsa Raj Das, Prashant Kumar Singh, Sumanta Bhattacharyya | |
| 103 | 144 | Modelling of Rectangular Microstrip Patch Antenna Operating at 4.6 GHz for 5G Communication<br>Aditya Kumar Saamanta,Kaushik Saha,Arijit Mitra | 53 |
| 104 | 145 | Deep Fake Detection using Context Aware Multi-CNN Feature Fusion and Temporal Transformer Attention<br>Somenath Dhibar, Sayandip Saha, Subihan Biswas, Sandeep Ray, Souvick Roy | |
| Sl. No. | Content | | Page No. |
| 105 | The Vidyanagar Award | | 54 |
| 106 | List of the Speakers | | 55 |
| Advertisement | | | |
| 107 | CCSN2025 | | 57 |
| 108 | ESDA2025 | | |
| 109 | Program Schedule of Micro2025 | | 58 |

Speech of:
**Prof. Dulal Acharjee**,
Executive Chairman, Micro2025

As an organizer of the conference of 12th international conference on 'Microelectronics, Circuits and Systems', in short Micro2025, and in favour of the organizing committee, I do offer my heart full thanks and welcome to all of you in this inaugural session. Our aim and objective for organizing this conference is to gather better academic resources which would be helpful for furnishing research works in micro and Nano electronic fields.

For developing a better future, we should think ahead, adopt and adhere modern tools which can provide us comfort and sustainable better means of lives. It is the demand of the World to adopt new technologies which are progressing very first. Gradually, we should abandon obsolete technology which causes quality of productions, time and quantities of materials.

Microelectronics has evolved to Nanotechnology with minimum spaces and high sensitivity. Civilization of human beings is due to means of advances of electronics which has applications in all fields of lives. All sensors and devices are the components of a system as elements of a circuit. Nano circuits are used within ATM card, ID card, memory chips, human body interfacing embedded devices, sensors, processors etc.
The objective of design and development of a circuit should be to use minimum power and to yield high performance like less heat dissipation, less induction-leakage of power and should be environment friendly. Circuits should not emit harmful radiations, if so, that should be capsuled by proper shield. All manufacturing concepts should be associated with waste collection and disposal in a safe way. Manufacturing unit must have separate processes for collecting and disposing of waste electronics in proper places and recycling for reproductions.

Hope, by active participation, researchers will be able to make a network with the related professionals which may help them to gather resources required for their research projects. In future, many of these inventions presented in this conference would be patented and applied within different instruments to make the machine more intelligent and in this way the World would be a better sustainable and peaceful space for the human being. All inventions of science should be used for peace, development and prosperity of the society.

Dated: 06/05/2025, Kolkata.

## Message from the
## Organizing Chair & Convenor's Desk

It is a matter of immense pride and honour to welcome all distinguished delegates, speakers, researchers, and participants to the **12th International Conference on Microelectronics, Circuits and Systems (Micro2025)**, hosted by **Jalpaiguri Government Engineering College** on the **10th and 11th of May, 2025**.

Micro2025 is envisioned as a vibrant platform to showcase innovative research and facilitate knowledge sharing in the rapidly evolving domains of microelectronics, embedded systems, VLSI, signal processing, and circuit design. This year's conference brings together leading minds from academia, industry, and research institutions to discuss cutting-edge advancements and real-world applications in the field.

The journey of organizing this international event has been both challenging and rewarding. From the call for papers to rigorous reviews and planning logistics, the conference has been shaped by the collective efforts of a dedicated team of faculty members, technical experts, student volunteers, and supporting staff. I express my deepest gratitude to all of them for their tireless commitment.

We are especially honoured to welcome distinguished **Guests** for Micro2025. Their presence has added significant value and inspiration to our efforts.

I would also like to thank the keynote speakers, session chairs, reviewers, and all contributors for their academic rigor and enthusiasm. Your participation has been vital in elevating the standard of this conference.

I sincerely hope that Micro2025 will foster new collaborations, spark innovative ideas, and leave a lasting impact on all attendees.

Wishing you a successful and enriching conference experience.

Warm regards,

**Prof. Aditya Kumar Samanta**

**Organising Chair & Convenor, Micro2025**

**Head, Department of Information Technology**

**Jalpaiguri Government Engineering College.**

Invited Speaker

**Prof. Dr. Arabinda Das**

Ph. D. (Tech.), M. Tech., B. Tech. (University of Calcutta, India)

Professor, Department of Electrical Engineering, Jadavpur University, India

## Title of Presentation:

# The EV Revolution: Innovations Powering a Greener Tomorrow

## Abstract:

Let's talk about electric vehicles (EV). The way we travel and get energy is changing fast. We're realizing that we need cleaner ways to live. One of the most exciting changes is electric vehicles. They run quietly and can help reduce pollution. EVs are a big step towards a greener future for how we get around. So, let's learn more about these amazing electric machines!

Invited Speaker

**Prof. Abhijit Biswas**

Professor, Department of Radio Physics & Electronics, University of Calcutta, Kolkata, West Bengal, India.
And General Chair (Publication, Micro2025).

## Title of Presentation:

## Advances in Photovoltaics: Unlocking the Potential of Perovskite Solar Cells

## Abstract:

Perovskite solar cells (PSCs) have revolutionized the field of photovoltaics, gaining immense interest due to their remarkable characteristics such as an adjustable bandgap and strong light absorption in the visible region. Combined with advantages like low-cost production processes, enhanced light-harvesting capabilities, and the ability to achieve high power conversion efficiencies (PCEs), PSCs are considered leading candidates for next-generation solar technologies, offering a compelling alternative to traditional silicon-based devices.

The architecture of PSCs generally involves a layered structure, where a perovskite material serves as the active light-absorbing layer positioned between two charge-selective layers: the Electron Transport Layer (ETL) and the Hole Transport Layer (HTL). This structural design promotes efficient absorption of incident photons and facilitates the generation and extraction of charge carriers, thereby enabling the conversion of solar energy into electrical energy with high efficiency.

Manufacturing PSCs involves multiple essential steps, including solution-based fabrication, layer-by-layer deposition, and thermal treatments. Techniques like spin-coating and inkjet printing are widely employed to create uniform perovskite films on substrates. Following this, ETL and HTL layers are commonly deposited through processes such as vacuum evaporation or chemical vapor deposition. Thermal annealing plays a critical role by improving the crystalline quality and surface morphology of the perovskite layer, leading to better device performance.

In recent years, substantial progress has been made in enhancing the PCE, operational stability, and scalability of perovskite-based devices. Innovations in material composition and interface engineering have contributed to significant improvements in device durability and reliability. Analytical modelling is essential for gaining a deeper understanding of PSC behaviour. In this work, a comprehensive physics-based model is proposed to compute the photogenerated current density by integrating concepts from materials science, semiconductor device theory, and optical physics. The model is employed to optimize the performance of two-dimensional (2D) Ruddlesden–Popper perovskite solar cells configured in both n-i-p and p-i-n architectures, considering variations in absorber layer thickness and different choices of ETL and HTL materials. Through this approach, critical insights are obtained into the effects of carrier transport, recombination losses, and light absorption on the current–voltage (J–V) performance of PSCs.

Future prospects for perovskite photovoltaics are highly encouraging. Ongoing research efforts are focused on further improving efficiency, enhancing device stability, and ensuring scalable manufacturing techniques. The integration of PSCs into tandem solar cells and building-integrated photovoltaic (BIPV) systems holds immense promise for accelerating their commercial viability, thereby contributing significantly to the advancement of sustainable and renewable energy solutions.

Invited Speaker

**Dr. Rabul Hossain**

Professor, department of ECE,
National Institute of Technology, Silchar, Assam, India.

## Title of the talk:
## Gesture Based Computing in Monocular Vision through Deep Networks

## Abstract:

Gesture is a bodily movement that conveys information. Different body parts are used for gesticulation such as head, hand, face, eye etc. Gesture can be both intentional and unintentional. For example, Hello and goodbye are some easily identifiable gestures. The gestures are culture and context dependent.

Gesture-based computing refers to interfaces where the human body interacts with digital resources. It does not require any common input devices, such as a keyboard, mouse, game controller or voice-entry mechanism. This kind of system usually scan in the interaction space, analyse human activities and interpret the motions of the body parts as input.

Gesture recognition technology is used in a wide array of applications. For example, the facial expressions to determine human emotional reactions to complex, augmented-reality simulations that evaluate whole-body movement. The gesture produced by dumb and deaf using sign language is a means of communication with the environment around.

The mouse allowed computer inputs an additional dimension beyond the linear dimension of the keyboard. The evolution of Gesture-based computing provides a 3D input that involves users in the computing activity. The gesture-based interfaces allow users to see results of actions taken, as and when they gesture to control the movement of robotic devices, converse with a system using sign language, a doctor with a crab nurse in operation theatre, or devices in smart home applications.

This talk mainly focuses on leveraging the classical text-entry-interface system using hand as gesticulating object for gesture based computing. It may be supplementary to the traditional keyboard and mouse based interface system. Designing a system to detect isolated English lower case, upper case letters and alphanumeric characters may be the first step towards this. An alphanumeric, Hex Keyboard and a numeric calculator are the examples that demonstrate the use of this technology. Continuous gesture recognition via discretization of gestures is a step forward to convey meaningful information.

Gestures based assisted technology uses gestures to control home appliances in smart home applications. This may be helpful for disabled or elderly people in managing their day-to-day activities. The integration of gesture technology with existing speech-based system may provide additional dimension for elderly care in a smart home environment settings.

The text engine/ speech engine integrated with gesture technology may provide a means of two-way communication between an otherwise-abled (dumb/deaf) people with a doctor for medical assistance. The sign language to speech/text translator and vice-versa may help the otherwise-abled people to communicate their diseases with doctor and get proper treatment. It may also help these kind of students to get their lessons in a better manner.

Designing such systems in real time under practical scenarios is very challenging. This talk will unfold some of the challenges and try to devise some solutions using state-of-art signal processing, machine learning and deep learning architectures

Invited Speaker

**Dr. Manisha Guduri,**

Faculty member, Department of ECE,
University of Louisiana, Lafayette, USA.

## Title of the talk:
## Designing the Future of Healthcare: Challenges and Innovations in Implantable Device Technology

## Abstract:

The rapid advancement of implantable medical devices is revolutionizing healthcare through enhanced disease management, real-time patient monitoring, and personalized treatment. This abstract synthesizes key challenges and innovations in implantable technology, focusing on interdisciplinary approaches to address power efficiency, data security, and intelligent system integration. A central challenge lies in designing ultralow power circuits to extend device longevity, exemplified by cardiac pacemakers optimized for nanowatt consumption in deep sub-threshold regions. Co-design strategies spanning circuit, system, and device levels enable energy-efficient architectures while maintaining diagnostic accuracy.

At the software layer, deep learning techniques such as Generative Adversarial Networks (GANs) demonstrate transformative potential, generating synthetic ECG signals with batch sizes of 32 and learning rates of 0.0002–0.0004 to augment training datasets. Machine learning integration extends to clinical applications, including breast cancer classification models achieving high accuracy through stratified K-fold cross-validation and class-balancing methods. Privacy-preserving innovations like block chain-based federated learning address critical security concerns, reducing encryption/decryption times to 84–147 ms across varying key sizes while protecting electronic health records from unauthorized access.

Emerging research directions highlight the fusion of synthetic data generation with naval combat simulations using Unity 3D and CycleGAN architectures, achieving 95% confidence scores in synthetic image realism. Future initiatives emphasize cardiovascular device optimization and fiber-integrated digital twin platforms for power systems, underscoring the need for collaborative, AI-driven solutions. These advancements collectively signal a paradigm shift toward secure, adaptive, and sustainable implantable technologies, poised to redefine patient care in the era of precision medicine.

Invited Speaker

## Prof. Moumita Mukherjee

Professor and Dean(R & D), Adamas University, Barasat, Kolkata, West Bengal, India and
Program Chair (Publication, Micro2025).

### Title of Presentation:

## Graphene IMPATT: Journey through First Terahertz Source Development for Defence Applications

### Abstract:

The creation of the inaugural graphene-based IMPATT (Impact Avalanche and Transit Time) diode as a terahertz (THz) source represents a notable advancement in the field of electronics, carrying substantial consequences for defence applications. This paper explores the development of graphene IMPATT technology, utilising the remarkable electrical characteristics of graphene to address the constraints of conventional semiconductor materials. The theoretical foundations underlying the design of the graphene IMPATT diode are examined, highlighting its distinctive capability to produce THz frequencies. The study examines the experimental techniques utilised in the fabrication and evaluation of the device, emphasising the difficulties faced, including material integration, device stability, and power efficiency. The analysis encompasses performance metrics including output power, frequency tunability, and operational bandwidth in a comprehensive manner. Moreover, the document highlights the possible uses of graphene IMPATT diodes in defence areas, such as secure communication, remote sensing, and sophisticated radar systems. The paper concludes by detailing prospective avenues for advancing graphene-based THz technology.

Invited Speaker
**Dr. Rajesh Dey**

Associate Professor,
Gopal Narayan Singh University, Sasaram, Bihar, India.

## Title of the talk: Application of Sensors in Modern EV

## Abstract:

Sensors are electronic devices that detect and respond to various inputs such as temperature, light, motion, pressure, and more. In electric vehicles, sensors collect real-time data from different parts of the system and transmit this information to electronic control units (ECUs), enabling intelligent decision-making and automation. In modern EVs, sensor integration is not just about improving efficiency but also about enhancing user experience, complying with safety standards, and supporting features like autonomous driving, energy optimization, and predictive maintenance. The increasing demand for connected and autonomous vehicles in India makes sensor applications more vital than ever.

Key Sensor Applications in Electric Vehicles

a) Battery Management System (BMS) The battery is the most critical and expensive component of an electric vehicle. Efficient battery management is essential for safety, performance, and longevity. Sensors embedded within the Battery Management System perform several key roles:

- Temperature Sensors monitor the thermal conditions of the battery cells.
- Voltage and Current Sensors measure each cell's charge/discharge status.
- State of Charge (SOC) and State of Health (SOH) Sensors help in estimating remaining battery capacity and overall battery condition.

b) Motor Control and Drivetrain Sensors Electric vehicles depend on electric motors instead of internal combustion engines. Sensors in the drivetrain and motor control systems enable smoother performance:

- Speed Sensors track the rotational speed of the wheels and motors.
- Position Sensors determine the rotor's position within the motor.
- Torque Sensors measure the load on the drivetrain.

c) Safety and Advanced Driver Assistance Systems (ADAS) Modern electric vehicles come equipped with Advanced Driver Assistance Systems (ADAS), which rely heavily on sensor integration:

- Radar, LiDAR, and Ultrasonic Sensors are used for adaptive cruise control and parking assistance.
- Cameras help in lane-keeping, pedestrian detection, and traffic sign recognition.
- Proximity Sensors detect obstacles or other vehicles around the car.

d) Environmental and Comfort Sensors To ensure a comfortable and user-friendly experience, EVs use various environmental sensors:

- Temperature and Humidity Sensors are used to control HVAC systems efficiently.
- Rain and Light Sensors enable automation of wipers and headlights.

e) Diagnostic and Predictive Maintenance Sensors The ability to predict and prevent failures is a major advantage of modern electric vehicles:

- Vibration Sensors detect wear in components like motor mounts.
- Current and Voltage Sensors monitor real-time performance.
- On-Board Diagnostic (OBD) Sensors help in early detection of faults.

f) Connectivity and Telematics Connected EVs are part of the larger ecosystem of smart cities and intelligent transport systems:- GPS Sensors help in route optimization and fleet tracking.

- Inertial Measurement Units (IMU) measure motion and orientation.
- IoT Sensors enable real-time monitoring and cloud connectivity.

3. Sensor Technology and the Indian EV Ecosystem India presents unique challenges and opportunities for the deployment of sensor-driven electric vehicles: Government initiatives such as FAME II and the PLI Scheme support EV adoption and local manufacturing of sensor components. Indian companies like Ather Energy, Ola Electric, and Tata Motors are leading the way in sensor-rich EVs tailored to Indian conditions. With smart city development, EVs integrated with sensor networks are key enablers of intelligent traffic systems, energy management, and public safety.

4. Challenges and the Way Forward Despite the progress, there are challenges in sensor deployment:

- Cost Sensitivity: High-end sensor systems can increase vehicle costs.
- Environmental Robustness: Sensors must function reliably across diverse climates.
- Skilled Workforce: Requires skilled technicians for sensor installation and maintenance.

India must invest in local R&D, education, and public-private partnerships to overcome these challenges. Sensors are the backbone of modern electric vehicles, enabling smarter, safer, and more efficient transportation. In the Indian context, where affordability, climate, and infrastructure challenges exist, sensor technology plays an even more crucial role. As India marches towards an electrified future, the integration of advanced sensor systems will be instrumental in making EVs mainstream, reliable, and truly intelligent.

Invited Speaker

**Prof. Dr. Arabinda Das**

Ph. D. (Tech.), M. Tech., B. Tech. (University of Calcutta, India)
Professor, Department of Electrical Engineering, Jadavpur University, India
Address: Electrical Engineering Department, Jadavpur University, 188, Raja S. C. Mullick Road, Kolkata 700032, India

Arabinda Das obtained his B. Tech. (1990), M. Tech. (1992) in Electrical Machines and Power System and Ph. D. (Tech.) (2000) from the University of Calcutta, India. He has received Junior Research Fellowship from the Department of Science and Technology, Government of West Bengal, Senior Research Fellowship from Council of Scientific and Industrial Research, Government of India for conducting his research. Presently, he is Professor in the Department of Electrical Engineering, Jadavpur University, India. Before joining Jadavpur University in 1999, he worked as a Lecturer in Regional Engineering College, Durgapur, India (presently National Institute of Technology, Durgapur) since 1996. His field of interest includes Electrical Machines and Drives, Power quality, Power system fault diagnosis, protection and signal analysis. He has published more than 100 research articles in National and International journals and conferences. Also he has published three books 'Overhead Electric Power Lines: Theory and practice' in The Institution of Engineering and Technology, UK, 'Design of 3-phase 3-winding transformer: An Optimization Approach' and 'Modeling of Electrical Machines: Synchronous and Induction' in LAP Lambert Academic Publishing, UK. Dr. Das is the recipient of Railway Board Prize (1998), The Union Ministry of Energy --- Department of Power Medal (1999), The Corps of Electrical and Mechanical Engineers Medal (2002), Tata Rao Prize (2021) and The Pandit Madan Mohan Malaviya Memorial Prize (2022) from The Institution of Engineers (India), Best Paper presentation award at the International Conference at Amsterdam, The Netherlands, from World Academy of Science, Engineering and Technology (2019). Dr. Das is the Fellow of 'The Institution of Engineers (India)' and 'The Institution of Electronics and Telecommunication Engineers'.

Invited Speaker

**Prof. Abhijit Biswas**

Professor, Department of Radio Physics & Electronics, University of Calcutta, Kolkata, West Bengal, India. And General Chair (Publication, Micro2025).

## Biography:

Abhijit Biswas earned his B.Tech., M.Tech., and Ph. D. (Tech.) degrees from the University of Calcutta. He is currently a Professor in the Department of Radio Physics and Electronics at the University of Calcutta, where he also served as Head of the Department from 2020 to 2022. Prior to this, he was a Reader in the Department of Electronics and Telecommunication Engineering at Jadavpur University from 2006 to 2008. Additionally, he worked at the Interuniversity Microelectronics Centre (IMEC) in Belgium in 2007. His research interests include semiconductor physics, as well as the modeling, simulation, and characterization of electronic and optoelectronic devices, including CMOS devices and circuits, LEDs, laser diodes, photovoltaics, and optical fiber communications. He has published 94 technical papers in SCI-indexed journals, contributed a book chapter to Nova Science Publications, USA, and presented over 150 papers at international conferences and workshops. His research excellence has been recognized with seven Best Paper Awards at international conferences. Since 2016, he has served as a Guest Editor for Microsystem Technologies and is an active reviewer for numerous peer-reviewed journals, including IEEE Transactions on Electron Devices, IEEE Transactions on Nanotechnology, Microelectronics Reliability, Optical Engineering, Solar Energy, and many more. Dr. Biswas has successfully supervised 12 Ph. D. candidates and is currently mentoring six Ph. D. scholars. He is a Fellow of the Institution of Engineers (FIE), India, and a life member of both the Indian Physical Society (IPS) and the Institute of Electronics and Telecommunication Engineers (IETE). His academic contributions have been recognized with several prestigious awards, including the UGC Research Award (2012–2014), the Best Citizen of India Gold Medal Award from the Global Economic Progress & Research Association (August 2019), and the Vidyasagar Award at the International Conference Micro 2024, held at Delhi Technological University (DTU) on May 16–17, 2024.

Invited Speaker

**Dr. Rabul Hossain**

Professor, department of ECE,

National Institute of Technology, Silchar, Assam, India.

Dr. Rabul Hussain Laskar received the B.E. degree in Electrical Engineering from Regional Engineering College, Silchar, India (presently NIT Silchar), in 1998, and the M.Tech degree in Signal Processing from the Indian Institute of Technology, Guwahati, India, in 2007, and the Ph.D degree in Electronics and Communication Engineering from the National Institute of Technology, Silchar, India, in 2013.

In the 1999, he joined the National Institute of Technology, Silchar, India, as a Lecturer in the then Electrical Engineering Department. At present he is working as an Professor in the Electronics and Communication Engineering from the National Institute of Technology, Silchar. He has more than 25 years of teaching experience at NIT Silchar. For more than two decades, he is involved in teaching, research and various other administrative activities at NIT Silchar

His broad area of research include Speech Processing, Image and Video Processing, Bio-medical Signal and Image Processing, Machine Learning, Soft Computing Techniques, Communication Engineering and the other areas related to Signal Processing. He has more than 100 papers in different reputed journals and 100 international conferences, and around 15 book chapters in image, video, speech, biomedical signal processing and other fields. He has also authored two edited volumes in the area of signal processing.

He has supervised 19 PhD students and 07 more PhD students are pursuing PhD under his supervision. He has/is carrying out 06 sponsored projects by various sponsoring agencies such as DieTy, BARC, SERB etc, and 03 more are under review process by various other funding agencies. He has also supervised 15 PG thesis and around 40 UG projects. He has more 08 numbers of Indian, Australian, German and South African patent in his credit.

He is the reviewer of various International journals and conference such as Applied Soft Computing, Imaging Science Journal, Applied acoustics, Speech Communication, IEEE Transaction on IEEE Industrial Informatics, IEEE Access, Neural Computing and Applications, Journal of King Saud University, Journal of Intelligent System, IETE Journal of Research, Signal processing are few of them. He is involved as TPC members in various conferences such as JIS conference, SPIN, ICONFEST 2025 and other conferences. He is the organizing chair of the International conference SIPCOV 2024 and 2025.

He is involved in various administrative activities at NIT Silchar such as Head of the Department, Chairman of CCMT/CCMN admission 2025, Chairman of the new UG/PG regulation committee, Chairman new grading policy etc. He is involved as member of board of studies of various Indian Institutes and universities such as NEHU Shillong, Tezpur University Assam, NIT Manipur etc. He has academic collaboration with various prestigious institutes in India and abroad such as IIT Guwahati, IIT Dharwad, NIT Meghalaya, Anna University, JNTU Hyderabad, GITAM Hyderabad, VIT-AP, VTU Karnataka, LICET Chennai, Technische Universität München (TUM) Imperial College London, King Saud University Saudi Arabia etc.

Invited Speaker

## Dr. Manisha Guduri,

Faculty member, Department of ECE,
University of Louisiana, Lafayette, USA.

**Dr. Manisha Guduri** is currently a Full Time Instructor at the University of Louisiana at Lafayette, USA. She is the author/ coauthor of more than 62 research papers in reputed journals, book chapters, and international conferences. Her research interests include Artificial Intelligence, Biomedical Applications, VLSI/CAD design. She is currently working on VLSI and AI in the biomedical field. She published 5 patents out of which 2 are under FER. She received one patent grant. She is the reviewer of IEEE TVLSI, Microelectronics Journal, IET digital circuits, IEEE Journal of Biomedical and Health Informatics, etc. She has one on-going funded project from the Department of Science and Technology. She is a senior member of IEEE, USA. She is also currently member of various IEEE Societies such as IEEE Young Professionals, IEEE Women in Engineering, Circuits and Systems, Computer Society, Sensor Council, etc. She is appointed as IEEE WiE CASS representative for 2023 & 2024. She is IEEE WiE DL program Coordinator and IEEE Computer Society Lafayette section Vice Chair for 2024. She has delivered more than 35 invited talk/tutorial speech/expert talk in various platforms like International Conference /technical programs. She has organized 10 international conferences under different roles.

Invited Speaker

## Dr. Moumita Mukherjee

Dean (R & D), Adamas University, Barasat, Kolkata, West Bengal, India.
(Ex. Sr. Scientist of DRDO Centre of Excellence) (under Ministry of Defence, Govt. of India).

**Biography:**

Dr. Moumita Mukherjee is alumni of R K S M Sister Nivedita Girls' School - Kolkata, Presidency College and Calcutta University. She received M.Sc. (Physics) with specialization in Electronics & Communication, M.Tech. in Biomedical-Engineering and Ph.D. (Tech.) in Radio-Physics and Electronics (2009), University of Calcutta, India. She did her doctoral & post-doctoral studies under DRDO, Ministry of Defence, Govt. of India. She received 'visiting scientist' & 'postdoc' positions from INEX, Newcastle University, UK & Technical University, Darmstadt, Germany. Dr. Mukherjee was attached with DRDO Centre under Ministry of Defence, Govt. of India (2009-2015) as Scientist (Reader grade). In continuation to that she joined Adamas University and presently working as Professor – Dept. of Physics & Dean (R&D) after completing her terms as Associate Dean & Academic coordinator (2016-2020), Associate Professor (2017-2020) & Assistant Professor III (2015-2017), in the same University. With a total seventeen years of R&D and teaching experience, she is Visiting / Adjunct Professor of JAP-BMI under Calcutta University and the West Bengal University of Health Sciences. She is empanelled examiner, moderator and PhD supervisor under public & private Universities in West Bengal. She has guided more than 35 Post-Graduate thesis & 12 Ph.D. theses as Supervisor/Jt. Supervisor. Her research interest is focused on THz-electronics, Semiconductor devices, Graphene electronics, Photo-sensors, nano-biosensors and Medical Electronics & instruments. She has published more than 150 peer-reviewed research papers, till date, in reputed international refereed journals and reviewed proceedings with citation globally (citation: 900+, h-index: 16). She is principal investigator of 7 (Seven) Government of India (DRDO) & start-up /industry funded research projects of ~111.30 Lakhs worth.

Invited Speaker

**Dr. Rajesh Dey**
Associate Professor,
Gopal Narayan Singh University, Sasaram, Bihar, India.

**Biography:**

His Post-Doctoral Fellow, IIUM Malaysia Associated with ELECTROVENT LLP as Director M. Tech & Ph. D From Kalyani Govt Engineering College Under Maulana Abul Kalam Azad University, 20 years of expertise in Teaching, Entrepreneurship, and 6 years of experience in Industry Guest Editor/, Reviewer- Springer Nature, Wiley, TMH, Elsevier etc. He has around 50 research papers in journals, conferences and book chapters He is co-author of around 12 Nos of edited and text books. His Research Interest Application of Batteries in EV, Sensor Technology, Adaptive Signal Processing, Biomedical Engineering, Embedded System, Robotics, Internet of things.

Invited Speaker

**Dr Hab. Eng. Piotr Bojarczak**
Professor, Faculty of Transport, Electrical Engineering and Computer Sciences, URad Casimir Pulaski University of Radom, POLAND.

**Biography:**

Hab. Dr. Eng. Piotr Bojarczak is working as a professor in the Faculty of Transport, Electrical Engineering and Computer Science at Casimir Pulaski Radom University, Poland. He graduated Doctor of Philosophy (Ph.D.) in Electrical Engineering from Warsaw University of Technology. His research areas include image processing, neural networks, deep learning, and the application of AI in the diagnostics of railway infrastructure. He has about 50 scientific publications. He has experience of working in industries like Graw, Infracert, Telesto, Signalling, and Telecommunications Department of Polish Railway Lines.

Invited Speaker

**Dr. Jacopo Iannacci,**
Centre for Materials and Microsystems (CMM),
Fondazione Bruno Kessler (FBK), Trento, Italy.

## Biography:

Jacopo Iannacci (Senior Member, IEEE) was born in Bologna, Italy, in 1977. He received the M.Sc. (Laurea) degree in electronics engineering from the University of Bologna, Bologna, in 2003, and the Ph.D. degree in information and telecommunications technology from the Advanced Research Center on Electronic Systems "Ercole De Castro" (ARCES), University of Bologna, in 2007.,He received the Habilitation as an Associate Professor in electronics from the Italian Ministry of Education, University and Research (MIUR), Rome, in 2017 and the Habitation as a Full Professor in electronics from the Italian Ministry of University and Research (MUR) in 2021. From 2005 to 2006, he worked as a Visiting Researcher at the DIMES Technology Center (currently Else Kooi Laboratory), Technical University of Delft, Delft, The Netherlands, focusing on the development of innovative packaging and integration technology solutions for radio frequency passives in micro-electromechanical system (MEMS) technology (RF-MEMS). In 2016, he visited as a Seconded Researcher at the Fraunhofer Institute for Reliability and Micro Integration IZM, Berlin, Germany, to conduct high-frequency characterization of RF-MEMS components jointly with the RF and Smart Sensor Systems Department. Since 2007, he has been a Researcher (permanent staff) at the Center for Sensors and Devices, Fondazione Bruno Kessler, Trento, Italy. He has authored more than 130 scientific contributions, including international journal articles, conference proceedings, books, book chapters, and one patent. His research interests and experience fall in the areas of finite-element method (FEM) Multiphysics modelling, compact (analytical) modelling, design, optimization, integration, packaging, experimental characterization, and testing for reliability of MEMS and RF-MEMS devices and networks for sensors and actuators, energy harvesting (EH-MEMS) and telecommunication systems, with applications in the fields of 5G, the Internet of Things (IoT), future 6G, tactile Internet (TI), and super-IoT. Dr. Iannacci has been a member of the Editorial Board of Microsystem Technologies (Springer) since 2015. He is currently an Associate Editor of Microsystem Technologies (Springer) and Frontiers in Mechanical Engineering. He is involved in several international conferences as the Symposium Chair/Co-Chair, the Session Chair, a Technical Program Committee Member, an International Advisory Board Member, a Tutorial Lecturer, and an Invited Speaker, among which the following few are mentioned: IEEE Sensors Journal; IEEE 5G World Forum (5GWF)/Future Networks World Forum (FNWF); Society of Photo-Optical Instrumentation Engineers (SPIE) Micro Technologies; European Solid-State Circuits Conference / European Solid-State Device Research Conference (ESSCIRC-ESSDERC).

Vidyasagar Awardee

# Prof Ratnajit Bhattacharya

Head of the Department from Department of Electronics and Electrical Engineering and Mehta family school of Data Science and Artificial Intelligence of IIT Guwahati

## Biography:

**Ratnajit Bhattacharjee** is a Professor in the Department of Electronics and Electrical Engineering, IIT Guwahati. He joined the Institute in the year 2002. His research interests include Wireless communication, Wireless networks, Microstrip antennas, Microwave Engineering and Electromagnetics. He has co-authored about two hundred research papers and two patents. Twenty-three research students have completed their PhD under his supervision. He has served as Head, Electronics and Electrical Engineering, IIT Guwahati, from 2011 to 2014 and Head for the Computer and Communication Centre, IIT Guwahati from 2021 to 2025. He is the founding Head for the Mehta Family School of Data Science and Artificial Intelligence, IIT Guwahati and also Head for the Manekshaw Centre of Excellence for National Security and Research, IIT Guwahati. He served as General Chair for 5th edition of IEEE Applied Electromagnetic Conference, AEMC 2015 and 22nd National Conference on Communications, NCC 2016. He has delivered invited talks in a number of conferences, symposia and workshops. He has developed a web course on Electromagnetic theory and MOOC video course on Microwave Engineering under NPTEL. He has also been PI and Co-PI for several research projects. He served as chief Investigator for Ministry of Electronics and Information Technology (MeitY) sponsored project for setting up of an Electronics & ICT academy at IIT Guwahati. He is a member of the Research Advisory Committee of SAMEER and a member of the Lab Research Council of LRDE, DRDO.

He did his B.E. (Hons) in Electronics and Tele-communication from REC (at present NIT) Silchar, M. Tech. degree (Microwave Engineering) from IIT Kharagpur, and the Ph.D. degree in Engineering from Jadavpur University, Kolkata. Prior to joining IIT Guwahati, he served as a faculty member in REC (at present NIT) Silchar from 1991 to 2002.

Paper ID: 02

## A Modified Brushless Isolated Sepic Converter Fed With HB-LLC Resonant ConverterFor Power Factor Correction

Dharunkumar S, Dhivya Shri B V, Krushangini S, Sanjana Devi V S
Department of Electrical and Electronics Engineering
Sri Krishna College of Technology, Coimbatore, India

**Abstract**: A modified bridgeless isolated Single-Ended Primary Inductor Converter (SEPIC) coupled with a Half- Bridge (HB) LLC Resonant Converter for Power Factor Correction (PFC) is designed and simulated in this project. By increasing the AC-DC conversions efficiency and power factor, the suggested system aims to make it appropriate for high- power applications with low harmonic distortion. Additionally lowering switching losses and improving overall system efficiency is the incorporation of the LLC resonant converter, which is renowned for its soft-switching capabilities. By decreasing the phase difference between voltage and current, the HB-LLC resonant converter also helps to increase the power factor by lowering power losses. In order to overcome the drawbacks of traditional PFC methods, the suggested system integrates resonant tank circuits, which provide zero- voltage and zero-current switching (ZVS and ZCS). This method enhances the power electronics thermal performance while successfully lowering electromagnetic interference (EMI). When paired with the HB-LLC resonant converter, the redesigned bridgeless isolated SEPIC converter provides a number of benefits for battery charging applications. The system guarantees effective and dependable charging by efficiently raising the input voltage from renewable sources, including photovoltaic systems, to levels appropriate for different battery types, such as lithium-ion and lead-acid. Its superior voltage management skills and high voltage gain reduce the chance of overcharging, extending battery life. The system is the perfect option for sustainable battery charging in contemporary energy systems because to its high-power factor and low harmonic distortion, which also enhance energy efficiency.

**Keywords:** Power Factor Correction, Single-Ended Primary Inductor Converter (Sepic), Half-Bridge (Hb) LLC Resonant Converter

Paper ID: 03

## Precision Vulnerability Analysis And Assessment Via Linux

Reddyvari Venkateswara Reddy (Associate Professor),
Abhi Bharatkumar Bhut, Devarashetty Jashwanth, A.Manaswini
Department of CSE (Cybersecurity),
CMR College of Engineering & Technology, Hyderabad, Telangana, India,

**Abstract**: Precision vulnerability analysis plays a crucial role in evaluating and reducing risks within intricate systems and environments. This process entails a thorough investigation to uncover vulnerabilities that could jeopardize the accuracy, dependability, or security of systems, software, or data. The goal is to identify loopholes that may not be detected through standard assessments, thereby strengthening the resilience of systems against potential threats. This project involves a Python-based web vulnerability scanner designed to automate the detection of common security flaws, such as cross-site scripting (XSS), in web applications. By systematically scanning web pages and creating comprehensive reports, this tool offers a proactive solution to bolster web application security.

**Keywords**: vulnerability assessment, risk mitigation, security issues, SQL injection, cross-site scripting (XSS), web application security, automated scanning, crawling, security reports, system resilience, threat detection

Paper ID: 12

## Malware Analysis and Reverse Engineering on Operational Technologies

Dr. R. Venkateswara Reddy (Associate Professor), Dr Punyaban Patel (Professor), Vindya Sri,
P. Manaswi, B. Prem Kumar
Department of CSE (Cyber Security)
CMR College of Engineering & Technology, Hyderabad, Telangana, India

Abstract: Operational Technology (OT) systems, such as SCADA and PLCs, are integral to critical industrial processes but are increasingly vulnerable to cyber threats as they converge with IT networks. These vulnerabilities can expose critical infrastructures to malware attacks, risking operational disruption and safety. This project explores Malware Analysis and Reverse Engineering techniques within OT environments to identify and mitigate these risks. A controlled OT environment, simulated using tools like ModbusPal and ScadaBR, analyzes malware behavior in a secure setup [1]. Through static and dynamic analysis with tools such as IDA Pro and Ghidra, this research investigates the structure, intent, and propagation methods of malware targeting OT systems. Indicators of Compromise (IOCs) are extracted to create customized detection rules and security strategies, including anomaly-based monitoring and network segmentation. The project provides insights into enhancing OT security by understanding malware dynamics and implementing proactive countermeasures to ensure the resilience of industrial operations against evolving cyber threats.

Keywords: Malware analysis, reverse engineering, operational technology (OT), SCADA, PLC, cybersecurity, Modbus, static analysis, dynamic analysis, anomaly detection, network security, critical infrastructure resilience, Industrial Control System (ICS).

Paper ID: 13

## "ALERTRA" ..... A real-Time location tracking alert solution on Smart-ID Card

Sudipta Basu Pal
Department of CST & CSIT,
Arnabh Sinha, Swarnavo Mukherjee
Department of CST,
Samadrita Bhattacharya, Jaya Ganguly, Kundan Kumar
Department of CSIT
University of Engineering and Management Kolkata, India

**Abstract:** Based on the current worldwide scenarios, real-time location tracking and emergency alert systems have become essential tools for personal security. It is a crucial identification (ID) system tool to provide users instant access to their current location and issue critical alerts whenever needed. These systems integrate accurate geolocation tracking with an intuitive alert mechanism, ensuring users have a reliable safeguard in potentially unsafe emergencies. These systems always use advanced geospatial technology, allowing users to instantly share their precise location data with trusted contacts, family members, or emergency services at the touch of a button. With the help of real-time location monitoring and emergency alert features, the authors of this research article have attempted to create a novel ID system that would improve personal safety. The system seeks to give users a dependable, easy means to access and share their location when necessary, providing a proactive approach to personal security in various scenarios, from everyday tasks to emergencies. This research paper aims to provide a real-time location tracking alert system implementation on Smart-ID Cards in work spaces to ensure women's safety at all times.

**Keywords:** Identification System tool, Smart-ID Card, real-time location tracking, Women's safety, alert, SOS

Paper ID: 15

## The Role of Digital Technologies and Human-Computer Interaction for the Future of Education

Dr Naheeda Zaib, Ms Laltita Sharma, Mr Madhumay sen
Department of Computer Science And Application.
Vivekananda Global University Jaipur
Dr. Saiba Jan
Department of Computer Science And Application.
Government Degree College Ganderbal
Jammu And Kashmir India

**Abstract**: Throughout the past fifty time period, digital technology has changed education. The creation and application of "digital" instructional and educational platforms, tools, and methodologies have involved a great deal of effort. Instructional technology during the past 20 years has been characteristic by digital educational administration solutions built on the Internet and a multitude of online information sources. The question of whether further important and practical developments will occur in the next decades is a matter of much discussion. AI systems that generate contextualization data from multiple sources are expected to have major effects and changes. Interactive virtual worlds are predicted by some to partially replace the real world in the future. Many believe that forums for communication and leadership education should be expanded. Because complex educational institutions develop slowly, some people do not expect any meaningful change at all. Recent research have even revealed that excessive digitization in education has caused a decline in educational quality during the previous five years. This study explores these positions with an emphasis on the roles of people and machines and their relationships, or human-computer action, during the rapid changes in technological innovation during the next 20 and 50 years.

**Keywords**: Digital Technologies, Human-Computer Interaction (HCI), E-learning, Online Learning Platforms, Virtual Reality (VR), Augmented Reality (AR), Artificial Intelligence (AI), Adaptive Learning.

Paper ID: 16

## Advanced Dynamic Malware Analysis System for Real-Time Threat Detection

Gajele Manisha (Assistant Professor), Punyaban Patel(Professor), Mittapelly Abhinay Reddy,
Kondeti Bharadhwaj, Daravath Chandrika
Department of CSE (Cybersecurity),
CMR College of Engineering & Technology, Hyderabad, Telangana, India

**Abstract:** The prevalence of sophisticated malware necessitates real- time detection and behavioral analysis systems. This paper outlines the design and development of a dynamic malware analysis system that utilizes tools like ETW (Event Tracing for Windows), Procmon, and Wireshark to monitor and analyze malware behavior effectively. The system tracks malware activity by monitoring system calls, file modifications, registry changes, and network traffic. By automating data collection and reporting, the system identifies both known and novel threats using signature-based and heuristic approaches. Results demonstrate the efficiency of real-time monitoring in uncovering malicious behaviors, providing a robust solution to modern cybersecurity challenges.

**Keywords:** Dynamic Malware Analysis, Real-Time Monitoring, Behavioural Analysis, ETW, Procmon, Wireshark, Threat Detection

Paper ID: 17

## Audio Embedded Media Security

Punyaban Patel (Professor), Reddyvari Venkateswara Reddy (Associate Professor),
T John Neel kumar, M Swetha Reddy, S Saipriya Reddy
Department of CSE (Cybersecurity),
CMR College of Engineering & Technology, Hyderabad, Telangana, India

**Abstract:** This paper introduces a secure communication platform combining advanced encryption with image-to-audio conversion. It enables real-time user communication by converting encrypted image data into audio signals using basic sound encoding techniques, ensuring secure transmission across diverse channels. The encrypted audio files are transmitted and decoded back into their original form, preserving data integrity and confidentiality. The approach blends modern encryption with sound encoding, enhancing multimedia security and supporting applications like digital forensics and secure communications in limited network environments. By embedding textual data in audio, the platform maintains the audio file's structure while ensuring security through cryptography. Overcoming limitations of existing systems, it offers an intuitive interface, supports longer messages, and enhances usability by allowing audio file reuse. Despite challenges like noise and latency, the paper represents a significant advancement in multimedia encryption and secure transmission. The platform's hybrid approach leverages both cryptographic techniques and audio encoding, making it suitable for environments with bandwidth constraints or where traditional data transmission methods may be unreliable.

**Keywords:** AES-CBC (Advanced Encryption Standard- Cipher Block Chaining), Steganography Techniques, Data Confidentiality, Sound Based Encoding, Man in The Middle Attacks (MITM), Encryption, Decryption.

Paper ID: 18

## Enhancement Of Cyber-Shied For Network Threat Detection

Dr. Punyaban Patel (Professor), Reddyvari Venkateswara Reddy (Associate Professor),
Lakkaram Rushikesh, Bekkanti Maruthi, Sirigani Harika
Department of CSE (Cybersecurity),
CMR College of Engineering & Technology, Hyderabad, Telangana, India

**Abstract:** This paper presents an enhanced approach to network threat detection through real-time analysis of network packets using Artificial Neural Networks (ANN). The process includes capturing network packets, preprocessing data by eliminating null values, normalizing features using StandardScaler, and dimensionality reduction using Principal Component Analysis (PCA) to ensure computational efficiency while preserving vital information. The ANN leverages ReLU, Tanh, and Sigmoid activation functions, employs Binary Cross- Entropy as the loss function for binary categorization, and utilizes the Adam optimizer for dynamic learning rate adjustments, with a specific classification threshold to categorize events as attacks or benign activity. Trained on the Network Intrusion Dataset, the model demonstrates high accuracy in identifying malicious events through performance standard including accuracy, precision, recall, and F1-score. While it does not classify specific attack types, the model reliably distinguishes between attack and benign scenarios, underscoring its effectiveness as a robust, real-time threat detection system that integrates advanced preprocessing techniques and machine learning to enhance modern network security.

**Keywords:** Network Threat Detection, Artificial Neural Networks, Binary Classification, Network Intrusion Detection, Data Preprocessing, Principal Component Analysis, Real-Time Analysis, Machine Learning Optimization.

Paper ID: 20

## Bypassing Next Generation Firewall Using Vpn And Proxy Chain

B. Praveen Kumar (Assistant Professor), Reddyvari Venkateswara Reddy (Associate Professor),
Ch. Kruthik Reddy, Samhita Vemuri, Kolanu Paripoorna Laxmi
Department of CSE (Cybersecurity),
CMR College of Engineering & Technology, Hyderabad, Telangana, India

**Abstract**: Palo Alto NGFWs hold the most premium position amongst the next-generation security open systems offering features as deep packet inspection, application-aware, and integrating with IPS capabilities. However, widespread use in both corporate as well as individual networks has, thus exposed vulnerabilities by an attacker exploiting those to break NGFW- based security. This paper addresses how VPNs can bypass Palo Alto NGFWs, risks associated with that bypass, and the steps to take in mitigating those risks. Based on real use cases and experimental information, this work shows actionable recommendations to improve firewall implementations and VPN integration.

**Keywords**: Next Generation Firewalls NGFWs Network Security Deep Packet Inspection DPI Application awareness and Control, Intrusion prevention system (IPS), SSL/ TLS inspection user Identity awareness advanced Threat Protection ATP, cyber threats and Security policies.

Paper ID: 21

## A Sustainable and Efficient Fast Charging Solution for Electric Vehicles in Rural India Using LLC Resonant Converter and Battery Swapping Station

Subha Bhattacharya, Arabinda Das
Department of Electrical Engineering
Samriddha Chakraborty
Department of Mechanical Engineering
Jadavpur University, Kolkata.
Bidrohi Bhattacharjee
Department of Electrical Engineering
Budge Budge Institute of Technology, Kolkata, 700137, West Bengal, India.
Ankur Ganguly
Dean Academics, Amity University, Kolkata, 700135, West Bengal, India.

**Abstract**: Nowadays, Electric Vehicles (EV) play a vital role for Passengers and goods transportation in rural India. But the main problem of electric vehicles is their very long charging time because battery charging method is of utmost important method in functioning of EVs. Therefore the conventional charging method will lead to reduced outcome from EV. In this work, a prototype fast charging topology is proposed using LLC resonant converter with Zero Voltage Switching (ZVS) effect which will be powered by solar energy. This proposal guarantees zero wastage of energy in the output region of the battery, allowing maximum efficiency to charge it. Also, to reduce issues arising due to high city density, less grid capacity, and varied economic condition hourly periphery within the country, our solution integrates battery swapping station (BSS) with renewable-powered off grid and new financial models ensuring changing discharged batteries with fully charged batteries which is much faster than charging in traditional method. Also this method relies on renewable energy and it can operate during off-peak times, thus saving high amount of electrical energy. This hybrid model ensures that fast and open access to EV charging is both available to urban and rural areas without straining the power grid. The proposed algorithm presents a solution to 3 wheeler electric cars of rural areas of West Bengal with the introduction of LLC resonant converter based BSS using solar energy as renewable source of energy, improving overall financial and economic condition while achieving sustainability goals.

**Keywords**: Battery Management System, Electric Vehicles, Sustainability, ZVS, LLC

Paper ID: 23

## Unveiling the Drivers of Climate Change: An Analysis of Greenhouse Gas Emissions Across Sectors and Nations

Dr. M. Madhu Bala (Professor), Saddam Hussian (Assistant Professor), Mandadi Sai Varnika Reddy, Tangadpelli Lekhan
Department of Computer Science and Engineering (CSE-CSBS),
Vallurupalli Nageswara Rao Vignana Jyothi Institute of Engineering and Technology (VNRVJIET),
Nizampet, Hyderabad, Telangana, India-500090.

**Abstract**: This research paper provides an in-depth discussion of greenhouse gas (GHG) emissions and their various sectors and countries, to try to unearth factors contributing to climate change. Using the Intergovernmental Panel on Climate Change Common Reporting Format, we analyze trends in major emitting sectors over time-from energy, industrial processes, agriculture, land use, waste, transportation, and buildings. Our comparison shows that the sector emitting the largest share is the energy sector, with major increases occurred around 1990 and periods of relative stabilization from 2000 to 2010. This suggests an important dip in emissions around 2020, suggesting broader effects of global events. One key focus area of the research is the fact that Germany emits twice as many GHGs as any other European country. Some reasons behind its high emissions are the significant industrial capacity of Germany, high percentage of coal-based power generation and the country's large population, making the country's emission nearly double that of the next country. Despite these challenges, Germany has implemented effective mitigation measures, including reducing agricultural emissions by 27.5 percent since 1990, closing coal plants, expanding renewable energy infrastructure, and achieving an 87 percent reduction in waste emissions. Correlating emission values with population and industrial activities of every single country, it would disclose the complex interplay between economic development and environmental impact. The results were produced by the necessity of implementing policies targeted at reducing GHG emissions effectively. Finally, this analysis provides insight into the primacy of drivers of climate change and thereby calls attention to the fact that apparent as well as hidden variables must be taken care of in order to control its advancement.

**Keywords**: Greenhouse Gas Emissions (GHG), Climate Change Mitigation, Carbon Dioxide (CO2) Emissions, Sectoral Emissions Analysis, COVID-19 Environmental Impact, European Union Climate Policy, Industrial Emissions, Energy Sector Emissions, Transport Sector Emissions, Environmental Sustainability, Emission Reduction Strategies, Climate Policy, Global Warming, Economic Growth Impact, Environmental Data Analysis

Paper ID: 25

## Design and Implementation of an Intelligent Automobile Congestion Monitoring System with the fusion of IoT technology

Myneni Madhu Bala
VNR Vignana Jyothi Institute of Engineering and Technology, Hyderabad– 500080, Telangana, India
Haritha Akkineni
PVP Siddhartha Institute of Technology, Vijayawada, Andhra Pradesh, India

**Abstract**: Congestion in the nation's roadways is a serious problem that, as a direct result of the rapid growth of the urban population is hurting the day-to-day lives of the average citizen. As a consequence of this, a variety of issues arise, such as an increase in the number of vehicles on the road, the growth of the city, and an increase in the amount of pollution in the surrounding environment. This results in a multitude of issues, including but not limited to air pollution, wasted fuel, and global warming. Therefore, intelligent automobile congestion monitoring is extremely important for regulating congestion issues and safeguarding the environment, particularly in a sprawling metropolis such as Hyderabad. This paper presents a framework for intelligent automobile congestion monitoring systems to address real-time vehicle congestion monitoring using the Internet of Things (IOT) and sensing technology. This framework ensures a high- quality indication of congestion levels, as well as the causes of automobile congestion.

**Keywords**: Smart cities, Internet, Sensors, Traffic monitoring, and controlling system.

Paper ID: 26

## The Performance of back-barrier engineered GaN-based Trigate HEMT at Elevated Temperature

Manish Verma
SCSE, Galgotias University, Gr. Noida, India
Ashutosh Nandi
ECE, NIT Kurukshetra, Kurukshetra, India

Abstract: In this study, we examined how high temperatures affect the performance of GaN-based trigate HEMTs with an AlGaN back-barrier layer (BB-trigate HEMT) at a gate length of 100 nm. It has been reported that the proposed HEMT design delivers lower gate and drain leakage current in comparison to conventional-trigate HEMT (C-trigate HEMT) at all temperatures (300K - 500K). Notably, we reveal additional improvements in breakdown characteristics, leading in a substantially better Jhonson Figure of Merit (JFOM) for BB- trigate HEMT compared to C-trigate HEMT, with negligible deterioration in fT/fmax at more elevated temperatures of operation. Added to that, the JFOM of the BB-trigate HEMT at 500K is significantly greater than that of the C-trigate HEMT at 300K, indicating the device's usefulness at high temperatures applications. Moreso, the minimal variation in noise metrics such as noise resistance (Rn) and overall Noise Figure (NF) with temperature is observed in the proposed HEMT structure at usable frequencies (> 100 MHz) due to incorporation of Al0.05Ga0.95N back-barrier layer.
Keywords: AlGaN/GaN trigate HEMT, AlGaN Back- Barrier Layer, Jhonson Figure of Merit (JFOM), Minimum Noise Figure, Noise Resistance.

Paper ID: 30

## Enhancement Of Malware Analysis Using Machine Learning

Punyaban Patel (Professor), Reddyvari Venkateswara Reddy (Associate Professor),
Gujjala Santhi Vardhan, Bacha Srihitha
Department of CSE (Cyber Security),
CMR College of Engineering & Technology, Hyderabad, Telangana, India

**Abstract**: The malicious malware types are contributing to the exponential rise in cybersecurity threats with increasing sophistication levels. These problems, coupled with the sheer volume of malware, have made it impossible for traditional malware analysis methods to keep pace. However, this paper aims to boost cybersecurity by developing and using smart ways to analyze malware. It looks into behavioral analysis, dynamic and static analysis, and machine learning to enhance the detection and handling of complex malware threats. The algorithms involved include the random forest classifier, CNN, and decision trees. The main goal is to build a functional prototype system for real-time malware analysis and detection that integrates these methods seamlessly. Ultimately, the objective is to safeguard essential digital assets and infrastructures by strengthening cybersecurity resilience against evolving cyber threats.

**Keywords**: Malware analysis, machine learning (ML), DT, random forest, sandbox, cyber defense strategies, Sysmon, Yara, PE Headers

Paper ID: 33

## Broadband photo detection in carbon allotropes-based heterostructure (C60/SWCNT)

Divyanshu Rathore, Arnab Hazra
Department of Electrical and Electronics Engineering,
Birla Institute of Technology and Science (BITS)-Pilani, Vidya Vihar, Rajasthan 333031, India

**Abstract**: In this study, we have developed a heterostructure photodetector designed for broadband photo detection (532–905 nm), utilizing two carbon allotropes: fullerene (C60) and carbon nanotubes (CNTs). The C60- functionalized single-walled carbon nanotubes (SWCNTs) were characterized using various microscopic and spectroscopic techniques to confirm their morphology and chemical structure. The developed C60/SWCNT photodetector possesses a responsivity of 5.84 A/W for visible (532 nm) light and 5.255 A/W for Near-infrared (905 nm, NIR) light. The detectivity of the C60/SWCNT photodetector was measured to be 4.5 × 1011 Jones and 3.33 × 1011 Jones under visible and near-infrared (NIR) light illumination, respectively. The light-to-dark current ratio (Ion/Ioff) of the photodetector was found to be 8.4 and 5.54 for visible and NIR light illumination, respectively. The rise and fall times for the C60/SWCNT photodetector were 20.21 ms and 1.41 ms under visible light and 1.45 ms and 2.95 ms under NIR light illumination, respectively.

**Keywords**: Visible photodetector, C60/SWCNT photodetector, NIR photodetector, Single-walled carbon nanotubes, Broadband photo detection, Carbon based photodetector.

Paper ID: 35

## Analyzing the Impact of Technology Nodes on Dynamic Comparator Performance in Advanced Applications

K.L.V Ramana Kumari, Ch.Ganesh, G.Shanthi
Electronics and Communication Engineering Department,
VNR Vignana Jyothi Institute of Engineering and Technology, Hyderabad, Telangana, India

**Abstract:** Conducting a comparative analysis of the 2-stage dynamic comparator and 3-stage Dynamic Comparator, this study explores the utilization of FinFET and CMOS technologies across various process nodes (16nm and 20nm) and supply voltage levels (ranging from 0.8V to 1.3V). The findings from this investigation underscore the relationship between higher supply voltages, heightened power consumption, and reduced delay times. When comparing FinFET and CMOS technologies within the same process node, the clear pattern that emerges is the consistent advantage of FinFET technology which shows low power dissipation and shorter delay times. The analysis reveals that higher supply voltages lead to increased power consumption and shorter delay times in both technologies. FinFET technology is preferred for 2-stage comparators and 3-stage dynamic comparators in the applications, which offers more performance. Two-stage CMOS, FinFET, and 3-stage CMOS, FinFET dynamic comparators have been meticulously designed and evaluated in terms of power dissipation, delay and offset by employing the 16nm and 20nm technological configurations. 2-stage and 3-stage comparators of 16nm and 20nm technologies are simulated using HSPICE. With the analysis, the FinFET 16nm Dynamic comparator achieved less Power dissipation by 9.73 μw and delay by 8.03ns as compared to CMOS 16nm Technology. These findings suggest the superior efficiency of FinFET technology, making it a preferred choice for scalable computing and IoT- based applications that demand high performance, low power, and minimized delays.

**Keywords**: Power dissipation, FinFET, delay, Width factor, Dynamic, Comparator, offset, scalability, IOT, CMOS.

Paper ID: 37

## A Rule Based System For Optimization Of Network Traffic

K. Sharath Kumar (Assistant Professor), Reddyvari Venkateswara Reddy (Assistant Professor),
A. Lokesh, Shreya Sairi, G. Gnaneshwar
Department of CSE (Cybersecurity),
CMR College of Engineering & Technology, Hyderabad, Telangana, India

**Abstract**: Firewalls are an important defense mechanism in securing networks by monitoring and controlling the flow of inbound and outbound traffic, which is done through predefined rules. However, due to the increasing network sizes and complexity of the networks, the traditional static rule sets struggle to keep up with dynamic traffic demands. Due to depending on inflexible and vast rule configurations the results are inefficiencies which creates bottlenecks that increase latency and increase computational burdens. These challenges highlight the need for a more adaptive and efficient approach to manage the traffic within firewalls, ensuring they can respond to growing network conditions without reducing performance or security of the firewalls.

**Keywords**: Firewall, Inbound and outbound network traffic, Binary Decision Diagram (BDD), Packet filtering, Rule optimization engine, Pattern matching engine, automated upgradation, iptables, flask, pyshark.

Paper ID: 41

## 2.67aJ/bit Write Energy Efficient GCC10T SRAM Cell for IoT applications

Ashish Panchal, Nidhi Tiwari,
Electronics and Communication, SAGE University, Indore – 452020, INDIA
Sneha Nagar, Priyanka Sharma, Aastha Gupta, Vaibhav Neema
Institute of Engineering and Technology, Devi Ahilya University, Indore – 452001, INDIA

**Abstract**: In the era of energy efficient computing, minimizing power consumption, maintaining data reliability is crucial challenge for Internet of Things (IoT) applications. Memory is the one of the essential components in an IoT system, it directly impacts the performance and efficiency of the System. Main memory block of IoT system mainly designed using SRAM cells, due to its high speed and matured process. Low energy IoT system mainly operates in low power mode, but it face many challenges at low voltage. This paper introduced a write energy-efficient Ground Cut off circuit (GCC) 10T SRAM cell that functions in the sub-threshold regime, making it ideal for IoT Applications in the low power mode. The Ground Cut off Control Circuit internally cut the ground during the write operation that eliminate race around condition between charging and discharging nodes. The proposed GCC10T SRAM cell design provides a number of improvements. In Particular, it reduced 7.5x write energy per bit, 2.25x hold energy per bit and 2.8x less power consumed as compare to 7T_ST SRAM cell. Additionally, it achieves 6.46x and 1.39x improvements in RSNM and WSNM, respectively, over standard 6T cells. The simulation result shows the applicability of proposed GCC10 T SRAM cell for low power IoT Systems.

**Keywords**: SRAM, Stability, IoT, Sub threshold Regime, Write Energy Efficiency, Ground cut-off control Circuit.

Paper ID: 43

## Ensemble Deep Learning Strategies for Eye Disease Detection A Comprehensive Comparative Study

Antara Malakar,
Department of Computer Applications, Assam Engineering College, Guwahati
Ankur Ganguly,
Dean Academics, Amity University Kolkata, Rajarhat, Kolkata
Bidrohi Bhattacharjee
Department of Electrical Engineering, Budge Budge Institute of Technology, Nischantapur, Kolkata

**Abstract**: Accurate automated eye disease detection maintains core importance because it enables speedier diagnosis alongside more effective medical approaches. This research presents the comparative analysis of multiple Deep Learning (DL) for eye disease detection. It includes preprocessing, segmentation, feature extraction, feature selection, and classification phases.

**Keywords**: Eye Disease Detection, DL, Hybrid Optimization, Ensemble Learning, Retinal Images

Paper ID: 44

## PV Penetrated Controller System for Greenhouse Farming Applications

Dhrubajyoti Banerjee
Electrical & Electronics Engineering
Heranmoy Maity
Computer Science & Engineering
Pailan College of Management & Technology
Kolkata, India

Sankha Majumder
Otis India Limited
Kolkata, India

Parthasarathi Satvaya
School of Illumination Science,
Engineering & Design
Jadavpur University
Kolkata, India

Bidrohi Bhattacharjee, Subhra J. Sarkar
Electrical Engineering
Budge Budge Institute of Technology
Kolkata, India

Santanu Sadhukhan
Regent Institute of Science & Technology
Kolkata, India

**Abstract**: The practice of growing crops in a controlled environment with glass or specialty materials that manage light, humidity, and temperature is known as greenhouse farming and is crucial in India due to climate change and resource constraints. It provides a controlled environment for crops, increasing productivity and efficiency. This work aims to improve greenhouse farming practices using microcontroller by developing an automated plant watering and soil quality testing system. The system maintains proper soil pH levels, conserves water, and maintains a suitable atmosphere, reducing labour and treatment errors. This system measures soil acidity and basicity, watering plants efficiently until the desired pH level is reached, and then spreading organic fertilizer. This system also includes soil moisture sensors so as to measure the soil moisture levels and trigger a pump system to water plants. Measurement of detecting light, temperature, humidity, conditions and presence of undesirable insects and live organisms is also included in the system for plant growth and safety. All the information will be displayed locally in an LCD display and the necessary actuation is done by the microcontroller. The work will be extended to ensure the protection of the system against dry run and controlling of the greenhouse openings.

**Keywords**: Microcontroller, Greenhouse Farming, Solar Panel, Irrigation Pump Switching

Paper ID: 45

## Design Synthesis and Performance Analysis of a High-Throughput Low-Power Turbo Decoder

Jagadeesh Pechetti, Ramesh Chinthala (Assistant Professor (Sr. Gd.)), Navin Kumar (Professor)
Dept. of ECE
Amrita School of Engineering, Bangalore, India

**Abstract**: Turbo codes are pivotal in enhancing the reliability of data transmission over noisy channels in modern digital communication systems. Developed in the early 1990s by Berrou, Turbo codes employ a combination of convolutional encoders and sophisticated decoding algorithms to correct errors. This study presents a Very Large Scale Integration (VLSI) design for a Turbo Decoder, utilizing the Maximum-a-Posteriori (MAP) algorithm. It has been implemented on a Zynq-7000 SoC (xc7z020clg484-1), the design achieves a remarkable throughput of 1.281 Gbps by consuming 118.2 mW of power. Xilinx Vivado is used for simulating the Turbo encoder and decoder, where the encoder is used for generating the code words to test the decoder and the Cadence Genus tool under 45nm technology to obtain comprehensive area and power reports. The power efficiency analysis of the Turbo decoder implementation reveals that the proposed design demonstrates balanced performance, processing 10.8 Mbps per milliwatt. Our implementation demonstrates significant improvements in power and throughput compared to existing technologies, positioning it as a viable solution for next-generation communication systems.

**Keywords**: Turbo Codes, Turbo Decoder, MAP algorithm, BCJR algorithm.

Paper ID: 46

## Implementation Of Text Summarization Models In Both Extractive And Abstractive Ways On Resumes

Dr. M. Madhubala, K. Sai Akarsh, K. Tarun, B.Vimal, M. Sathvika
Department of CSE
Vallurupalli Nageswara Rao Vignana Jyothi Institute of Engineering and Technology, Hyderabad, India.

**Abstract**: Text summarization is a key NLP technique that provides concise summaries for large texts. The text summarization can be used for resume summarization with a Large Language model, which helps to carry out the task of the recruitment process. Some of the Large Language models that are most commonly known are BERT, BART, T5, and Spacy can also be used for the text summarization. This paper will overview text summarisation models used for various real- time applications. It focuses more on text summarization approaches like abstractive and extractive using Large Language Models like BART and Spacy. The experimental results of both the abstractive summarization model (BART) and extractive summarization model (BERT) on resumes are provided.

**Keywords:** BERT, BART and T5, SpaCy, Large language Models.

Paper ID: 49

## Construction of Resume Screening Pipeline using NLP & NER

Madhu Bala Myneni, Pooja G, Gopi Sai Akshith, Deepthi V, Radha Kishore M
Computer Science Department
Vallurupalli Nageshwar Rao Vignana Jyothi Institute of Engineering, Bachupally – 500090, India

**Abstract**: Matching quality between candidates and opportunities becomes all the more important in a highly competitive job market. This project presents an intelligent resume categorization and ranking system that makes recruitment processes faster and easier. Resumes are parsed, key attributes extracted, and quickly categorized on the basis of skill sets, experience, and qualifications, using natural language processing techniques-the entire data is then structured into a searchable database, from where recruiters can perform querying of attribute- specific requirements to produce ranked resumes based on those requirements. Systems are created to automate this process through applications of named entity recognition, semantic analysis, contextual understanding, and other techniques for saving time from erring judgment. Other features include fraud detection, which allows for the attestation of resume inconsistencies. Cost-effective recruitment is simplified and accurate, allowing organizations to proceed quickly with informed hiring decisions.

**Keywords**: Natural Language Processing (NLP), Cosine Similarity, Named Entity Recognition (NER), Word Cloud Visualization, Resume Parsing, TF-IDF

Paper ID: 52

## RFID And GSM Based Bank Locker Security System For Enhanced Access Control

Suman Chakraborty, Sandipan Patra, Sudeshna Nath, Bidrohi Bhattacharjee, Priya Adak
Electrical Engineering Department, Budge Budge Institute of Technology, Nishchintapur, Budge Budge, West Bengal, India
Suhas Deb
Electrical Engineering Department, Hooghly Engineering & Technology College, Hooghly, West Bengal, India.

**Abstract**: In today's modern world, security plays an important role. Every person has precious accessories like gold, documents or cash. The prime objective of this research work is to construct and execute a bank locker security system pertaining to RFID and GSM mechanism. It will reduce dissipation of time for both bank officials as well as its valued customers with enhanced security where only the authorized person will be able to access the bank locker registered against his name. The proposed prototype utilizes the customer ID, locker ID, RFID enabled card and mobile number. If the customer ID, locker ID and ATM card matches, then four-digit code will be sent to the authorized person's mobile through GSM modem and the locker door will be opened then, otherwise it will be locked and will give an alarm in case of every step completion prominently.

Keyw**o**rds: RFID, GSM, ARDUINO UNO, Servo Motor, I2C LCD Display, Customer ID, Bank Locker ID, Smart Bank Locker.

Paper ID: 57

## High-Performance Schmitt Trigger Buffer with DTMOS Integration

G. Shanthi, K L V Ramana Kumari, Mohammed Abdul Haseeb
Department of Electronics and Communication Engineering,
VNR Vignana Jyothi Institute of Engineering and Technology, Bachupally, Hyderabad, India.
K.Srinivas Rao
Department of Electronics and Communication Engineering,
Koneru Lakshmaiah Educational Foundation, Vaddeswaram, Guntur, India.

**Abstract**: The paper presents a design of an optimized Schmitt trigger buffer with DTMOS for higher speed and low noise margin. The modified. One is a noise-immune DTMOS Schmitt trigger buffer that reduces noise.. The modified circuit is compared with CMOS technology-based Schmitt triggers, which have fewer advantages compared to DTMOS technology Schmitt triggers. This design is simulated in 90nm technology using the CADENCE tool and operates with a 0.3V power supply. The primary goal of the proposed DTMOS Schmitt trigger buffer is to reduce the number of transistors, minimize power consumption, lower noise in digital circuits, reduce delay, and minimize switching current. DTMOS devices offer the advantage of operating at lower supply voltages and high speed, making them suitable for low-power applications. The proposed design with a 0.3V power supply demonstrates efficient functionality even at low supply voltages. The DTMOS Schmitt trigger is intended to enhance circuit functionality by reducing power consumption, noise, and area requirements, ultimately improving overall performance. In the proposed noise-immune DTMOS circuit with feedback, the hysteresis width is 159 mV at 0.3V. When the voltage is increased to 0.5V, the hysteresis width increases to 254 mV. As the hysteresis width becomes larger, the circuit becomes more effective at removing noise.

**Keywords**: Buffer, Schmitt trigger, Dynamic Threshold Metal Oxide Semiconductor, hysteresis width, CMOS, upper threshold voltage, lower threshold voltage.

Paper ID: 62

## Bridging the Gap between Integration of CMOS-MEMS Resonator-Based Oscillators with SoC: A Review

Jetti Raju Yadav, Shailendra Kumar Tiwari
Department of E. C. E, Manipal Institute of Technology
Manipal Academy of Higher Education, Manipal, Karnataka, 576104, India

**Abstract**: The integration of Microelectromechanical Systems oscillators with System-on-Chip technology faces numerous challenges, including those related to fabrication, material compatibility, packaging, power integrity, and performance reliability. This review provides an in-depth analysis of the critical issues encountered during the integration of MEMS and SoC, and explores potential solutions to enhance compatibility, efficiency, and long-term stability. Additionally, the paper emphasizes the need for industry-wide standardization to enable seamless integration and promote the widespread adoption of MEMS-based oscillators in advanced electronic systems.

**Keywords**: MEMS Oscillators, System-on-Chip, CMOS-MEMS Integration, Miniaturization, Quality Factor, Wafer-Level Packaging.

Paper ID: 63

## A High Linear Inductor Less Low Noise Amplifier for 5G IEEE 802.11ax wireless Application

Banoth Santhoshkumar, Dr. M. Bhaskar
Department of Electronics and Communication Engineering
National Institute of Technology, Tiruchirappalli

**Abstract**- The emerging IEEE 802.11ax wireless communication system contains a large number of bands and high throughput, with a drawback of interferences in signal reception. The robust RF system is immune to interferences and is forthwith required by maintaining gain, linearity, and noise figure of low noise amplifier (LNA) to desirable values. In this paper, a high-linearity, inductor-less LNA is proposed, utilizing a single-to-double- ended common gate-common source (CG-CS) configuration that employs modified complementary derivative superposition techniques to enhance linearity. The proposed LNA circuit is designed and implemented using UMC 65nm CMOS process technology, and post- layout simulations are carried out in the Cadence virtuoso tool. From the post-layout simulations, it is observed that the proposed LNA has an IIP3 of +32.86dBm. The maximum gain of 17.19dB is achieved at 2.4GHz and its operating frequency ranges from 1.7GHz to 6.60GHz. The S11 is less than –7dB while maintaining the minimum Noise Figure of 3.24 dB. The proposed LNA consumes 12.65mW of power at a 1.2V supply voltage, and it has improved performance compared to other LNAs reported in the literature.

**Keywords**- Inductor less LNA, 802.11ax, CG-CS, Single- double ended, modified complementary derivative superposition techniques.

Paper ID: 65

## An Intelligent Deep Learning-Based System for Multispectral Image Fusion and Skin Cancer Detection

Santosh Kumar (Professor)
School of Computing Science and Engineering,
Galgotias University, Greater Noida, Uttar Pradesh, India
Upasna Jodhi
Department of Computer Science and Engineering,
Delhi Technical Campus, Greater Noida, Uttar Pradesh, India

**Abstract**: Asexual carcinoma represents a significant global medical challenge, where timely and precise identification is essential for improving efficiency of therapy and the longevity of patients. The inherent visual similarities between aggressive and harmless tumors provide substantial challenges to accurate classification. This research presents a unique deep learning combination called SkinNetX, which combines ConvNeXtV2 blocks with decoupled paying attention mechanisms to enhance extracted features and optimize classification precision. The integration of ConvNeXtV2 blocks in the initial stages is driven by their proficiency in collecting complex geographical attributes and subtle frameworks, crucial for distinguishing visually equivalent damage patterns. The concurrent use of separated focus in the later stages allows the framework to deliberately highlight academically relevant areas while decreasing processing requirements, hence alleviating the drawbacks typically associated with traditional self-attention methods. The model was rigorously trained and validated on the ISIC 2024 dataset, which includes eight distinct categories of cutaneous lesions. Advanced techniques, including data augmentation and reinforcement learning, were employed for improving modelling robustness and reliability. The proposed design achieved outstanding effectiveness measurements, featuring 93.48% reliability, 93.24% exactness, 90.70% recall, and a 91.82% F1-score, outperforming over ten algorithms constructed using Convolutional Neural Networks (CNN) in addition to more compared to ten algorithms depending on Vision Transformers (ViT) assessed under the same conditions. Despite its outstanding results, the model possesses a compact size of only 21.92 million characteristics, making it exceptionally efficient and suitable for deployment. The proposed method demonstrates exceptional accuracy and flexibility for different skin lesion types, establishing a reliable foundation for the timely and precise identification of skin cancer in clinical environments.

**Keywords**: Multispectral Imaging, Medical Image Fusion, Deep Learning, Multimodal Learning, Convolutional Neural Networks (CNNs), Image Classification.

Paper ID: 66

## OLED Application in Healthcare

Aruna Tomar, Devashree, Sukanya Chopra, Dhyani Patel, Kanchan Sharma
Department of ECE
Brijesh Kumar
Department of IT
Indira Gandhi Delhi Technical University for Women, Delhi, India.

**Abstract**: Organic Light-Emitting Diodes (OLEDs) are rapidly revolutionizing the dis- play technology, because of their large area electronic application, as well as their mechanical flexibility and high on-off current ratio, they are being used in advanced displays, modern lighting systems, healthcare, and even in detection of many diseases. They also feature infrared spectroscopy, which is capable of imaging tissues with high contrast and using optics. This research article explores the healthcare applications of OLEDs, highlighting their benefits and advantages compared to traditional inorganic devices. Organic Light Emitting Diodes have propelled further advancements in solid-state lighting and display technologies. It is now becoming a substitute for display technology because they are exceptionally thin, lightweight, and flexible. OLEDs utilize many levels of organized materials and processes such as injection of charge, exciton generation, charge transport, and photon emission to emit light. OLEDs are becoming a staple in several industries owing to their energy-saving capabilities and low power requirements. Based on various research studies conducted so far, while newer methods for treatment and surgeries are being developed, conventional procedures integrated alongside advanced technology are being adopted for better healing and recovery outcomes in patients.

**Keywords**: OLED, Healthcare, wavelength, biomedical, photo-biomodulation, health metrics, wearable device

Paper ID: 67

## High-Performance, Power-Efficient dB-Linear Variable Gain Amplifier in 180 nm CMOS technology

Nivedha S, Bhaskar M
Department of ECE
National Institute of Technology, Tiruchirappalli

**Abstract**: This work proposes a low-power, dB-linear variable gain amplifier (VGA) for RF front-end applications. A symmetrical unit cell VGA is presented, utilizing the cascode technique and common mode feedback (CMFB) in the load for improved bandwidth and performance stability. Diode connected PMOS and Constant PMOS current sources in the load network improve the gain range, while source degeneration (SD) increases the linearity of the VGA. This work is implemented in standard 180 nm CMOS technology with a 1.8 V supply by using The Cadence Virtuoso tool. The gain of unit-cell VGA varies from -14 dB to 15 dB, of which 20dB is dB-linear for the applied control voltage from 0.5 V to 0.85 V. This design offers flexible frequency coverage, with the upper 3-dB bandwidth reaching 434 MHz in high gain mode. The total power consumption is 180 μW.

**Keywords**: variable gain amplifier, cell-based CMOS, low power, RF front-end, VGA, dB-linear.

Paper ID: 68

## CNN based Adaptive Sound Energy Harvesting System for Low Power Applications

Thamarai Muthusamy, S N Poorvasivam
Sri Vasavi Engineering College, Andhra Pradesh, India

**Abstract:** The applications of portable, low-power devices are rapidly increasing day by day. At the same time, the necessity of power is also growing in parallel. Currently, Researchers are focusing on the utilization of environmental energy as an alternative to conventional batteries, since the traditional battery has a finite life span. So using ecological energy for the devices is one of the best alternative methods and is also a need of the hour. Traditional sound energy harvesting systems using loudspeakers and piezoelectric crystals generate only millivolt-level outputs. The proposed system introduces a Sound observer unit by modifying a loudspeaker for efficient sound energy harvesting. The system consists of sound observer units, a CNN-based noise classification unit, an electronic control unit, a rectifier circuit, and a battery. Three types of noise serve as input, classified using a CNN model. Based on the Noise classification output, the electronic control unit connects the suitable noise observer output to the rectifier circuit using relay for optimizing energy conversion. The system has three types of sound observer units and each sound observer unit is tuned to a specific noise frequency, maximizing voltage output. MATLAB Simulink simulations confirm that the proposed system generates outputs in volts, surpassing conventional millivolt-level systems. Additionally, CNN-based Noise classification and electronic control unit classification enhance system adaptability and efficiency in utilizing environmental noise for powering low-power devices.

**Keywords**: Sound energy harvesting, Noise classification, Machine Learning, Low power applications

Paper ID: 69

## Analysis of Ni/(AlxGa1-x)2O3/Ga2O3Heterostructure based Schottky Diode for Acetone Sensing Application

Shefali Mamataj
Department of Chemical Engineering & ECE, NIT Durgapur & MCET, Berhampore, West Bengal, India
Bhaskar Roy
Department of CSE(AIML), Asansol Engineering College, West Bengal, India
Deepshikha Datta
Department of Chemistry, Brainware University, West Bengal, India
Ritam Dutta
Department of CSE (IoT), Poornima Institute of Engineering & Technology, Jaipur, India
Sunipa Roy
Department of ECE, Guru Nanak Institute of Technology, West Bengal, India
Bimal Das
Department of Chemical Engineering, NIT Durgapur, West Bengal, India

**Abstract** This article proposes a Schottky diode based on a metal- semiconductor-metal (MSM) configuration using an (AlxGa1-x)2O3/Ga2O3 heterostructure device. The proposed structure proves effective for sensing acetone and identifying a variety of gases, including hydrogen, NOx, CO, and NH3. A symmetrical, bi-directional MSM Schottky diode sensor model is simulated to investigate acetone sensing and adsorption at temperatures ranging from 50 °C to 250 °C with various acetone vapor concentrations. The parameters of the Schottky diode at room temperature are extracted using the sensor model's current-voltage characteristics for different acetone concentrations. The sensitivity, Schottky barrier height, and its variation are examined and calculated at different temperatures. The maximum sensitivity is observed at an operating temperature of 150 °C, that is attributed to the acetone adsorption at the (AlxGa1-x)2O3 interface. To further assess acetone adsorption, the real rate constant for efficient acetone adsorption and the coverage of acetone adsorption sites on the (AlxGa1-x)2O3 surface are investigated. Finally, sensor responses and recovery times are measured. The recovery and sensor response times are found to be between 4 and 17.4 seconds and 6.7 and 7.8 seconds, respectively, for acetone concentrations between 100 and 400 parts per million. These findings show better performance than other sensors that have been documented in the literature.

**Keywords**: (AlxGa1-x)2O3/Ga2O3 heterostructure, Acetone sensor, Thermodynamics, Acetone adsorption, resistive device, Fast response.

Paper ID: 71

## Robust mid-infrared light transport in twisted topological optical fibers

Somashreeta Roy, Abhijit Biswas,
Department of Radio Physics and Electronics
University of Calcutta, 92 A. P. C. Road, Kolkata – 700009, West Bengal, INDIA
Somnath Ghosh
Department of Physics, Mahindra University, Hyderabad- 500043, INDIA

**Abstract**: With the advent of the Internet of Things (IoT), a ground-breaking communication technology, it is now possible to link devices with essential resources to the Internet. To remotely monitor and operate industrial applications, these devices are incorporated into a variety of industrial control systems. However, a major obstacle to the secure functioning of these systems is the public Internet's inherent susceptibility to hostile attacks. A lightweight and effective authentication mechanism is put forward as a solution to this problem. Using lightweight encryption operations, our proposed mechanism offers a comprehensive security solution that includes data integrity, secrecy, and authentication. Through message exchanges between the server, and smart embedded devices, it creates a secure channel that is necessary for the formation of a session key for safe data transmission. Thorough security analysis validates our proposed mechanism resilience, and performance analysis shows that it has a far lower operational cost and less communication overhead than other protocols. Our proposed protocol maintains robust security mechanisms that guarantee the confidentiality and integrity of data shared in the context of IIoT, even in spite of these efficiencies.

**Keywords**: Authentication, IIoT, Smart Device, Resource Constrained, Session Key.

Paper ID: 72

## Design and Comparative analysis of CMOS Full Adder using CPL and BiCMOS logic

Arnab Basak, Somasree Bose, Bijoy Kantha, Sayan Surul, Subhadeep Karmakar
Department of ECE, Netaji Subhash Engineering College, Kolkata
Sunipa Roy
Department of ECE, Guru Nanak Institute of Technology, Kolkata

**Abstract**: The paper presents a comparison study of a proposed BiCMOS full adder with conventional CMOS and CPL full adders with capacitive loads. CMOS technology offers low power consumption and high noise margin but slower speed, while BiCMOS combines Bipolar and CMOS benefits for higher speed and drive capabilities at the expense of power and area. CPL provides high speed and reduced transistor count but performs poorly with capacitive loads and has higher static power consumption. The proposed BiCMOS full adder aims to overcome CMOS speed limitations while maintaining low power consumption. The circuit design of full adder is done using MicroWind EDA tool, leveraging its suite of tools and standard 250 nm transistor models for accurate simulations and analysis. The efficiency of proposed BiCMOS full adder is evaluated with standard implementations in terms of power consumption, propagation delay and power delay product. The PDP values for CMOS, BiCMOS and CPL adders are 1.2733 pW-s, 0.9783 pW-s and 2.3296 pW-s, respectively, demonstrating the superior efficiency of the proposed BiCMOS design. The proposed BiCMOS circuit is suitable for high speed, low power digital circuit design.

**Keywords**: Full Adder, Complementary Metal-Oxide Semiconductor (CMOS), Bipolar Complementary Metal Oxide Semiconductor (BiCMOS), Complementary Pass Transistor Logic (CPL), power consumption, propagation delay, power delay product (PDP), MicroWind EDA tool.

Paper ID: 73

## Denoising of Noisy PPG Signal using Deep Learning framework

Karunamayee Dey
Department of ECE, University of Engineering and Management, Kolkata
Sunipa Roy
Department of ECE, Guru Nanak Institute of Technology, Kolkata
Ritendra Bera
Department of CSE, St. Mary's Technological Foundation, Kolkata
Biswabandhu Jana
Department of EEE, ABV-IIITM, Gwalior

**Abstract**: In recent years, photoplethysmography (PPG) has gained popularity for detecting heart-related conditions, mainly due to its affordability compared to other methods like electro- cardiograms. Due to the non-stationary nature of PPG signals, numerous types of noise may affect the world. The proposed study investigates denoising techniques by different filter methods and various deep learning models and compares their response in terms of signal-to-noise ratio, also showing the key factor that denoised response by deep learning models is better than traditional methods. A comparative study is also conducted using a dataset of raw PPG signals collected from 30 subjects from the MIMIC III database. Artificial noise was added to simulate real- world interference, and both traditional filters and deep learning models—specifically 1D-CNN, RNN, LSTM, CNN+LSTM, 2D- CNN, and LSTM GRU—were applied to clean the signals. The deep learning models outperformed conventional signal-to- noise ratio (SNR) methods, demonstrating improved denoising capabilities. Furthermore, they achieved lower mean absolute error (MAE), mean squared error (MSE), and standard deviation (SD). These findings highlight the robustness and generalizability of deep learning-based approaches for effective PPG signal denoising.

**Keywords**: PPG, denoising, deep learning, signal processing, 1D-CNN, LSTM, 2D-CNN, LSTM-GRU, signal-to-noise ratio.

Paper ID: 77

## DeepOptinet - An Optimised CNN Model with Wavelet Filtering and SE-Blocks for Robust Iris and Fingerprint Unimodal Authentication

Sagnik Chakraborty, Rahul Shaw, Mrinal Chandra Ghosh, Subrata Kumar Mandal
Information Technology
Jalpaiguri Government Engineering College, Jalpaiguri - 735102, India

**Abstract**: This research proposes an enhanced unimodal biometric authentication framework based on a deep convolutional neural network (CNN) architecture, independently evaluating iris and fingerprint modalities. The iris recognition model, trained on the CASIA-Thousand-IRIS dataset, operates end-to-end without requiring segmentation, streamlining the pipeline. The fingerprint recognition model, trained on a shortened version of the SOCOFing dataset, follows a similar approach. Minimal preprocessing steps, such as resizing while maintaining aspect ratio and normalisation, are employed for both modalities. Wavelet-based transformation is introduced in preprocessing to enhance feature representation. To bolster robustness and generalisation, Squeeze and Excitation (SE) blocks have been incorporated to refine feature extraction. Experimental results demonstrate the effectiveness of both models, with the iris recognition system achieving a test accuracy of 92.4% and a prediction accuracy of 95.83%, while the fingerprint model achieves a test accuracy of 99.3% and a prediction accuracy of 100% without the application of any augmentation. These parallel evaluations highlight the potential of deep learning in biometric authentication, providing independent insights into iris and fingerprint recognition.

**Keywords**: Iris, Fingerprint, Segmentation-Free, CNN, Haar wavelet, SE, Unimodal Recognition

Paper ID: 78

## Automatic Enhancing Brain Tumor Detection and Localization in Multimodal MRI Scans using 3D Convolutional Neural Networks: Early Brain Tumor Detection

Prof. Pooja Singh, Prof. Santosh Kumar
School of Computing Science and Engineering, Galgotias University, Greater Noida, India

**Abstract**: The primary objective of this research is to gain insights into the underlying causes of brain tumors and enhance their treatment. Brain tumors, characterized by abnormal growths of brain cells, can be malignant, posing significant health risks. Common diagnostic methods, such as ACT or MRI scans, are utilized to identify cancerous regions within the brain. Additionally, positron emission tomography and cerebral angiography, along with spinal taps and molecular tests, are employed to detect brain tumors. This study, focus on identifying abnormal images and accurately segmenting tumor areas using deep learning techniques. We recognize that deep learning is a powerful tool for identifying anomalies in MRI images. Specifically, we employ multi-level thresholding methods to effectively divide the regions surrounding the tumors. By leveraging deep learning techniques, we can provide indications of the density of affected areas based on the number of malignant pixels. This research aims to contribute to the field of medical imaging and brain tumor detection by employing advanced deep learning algorithms for image segmentation. The accurate identification and localization of tumor regions can lead to earlier and more precise diagnoses, enabling improved treatment strategies and better patient outcomes. Ultimately, our efforts are geared towards enhancing the understanding and management of brain tumors, paving the way for more effective therapeutic interventions in the future.

**Keyword**: Brain Tumors, Deep Learning, Image Segmentation, MRI, Medical Imaging, Diagnosis, Treatment, Abnormalities, Malignant Tumors, Multi-Level Thresholding, Deep Learning Techniques, Pixel Density.

Paper ID: 80

## Reinforcement Learning Guided Transformer Framework for Adaptive Multi Modal Neuroimaging Fusion in Stroke Diagnosis

Raja S, Dr. G Kumaran (Professor)
Department of ECE, Saveetha School of Engineering, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai.

**Abstract**: Early and accurate diagnosis of ischemic stroke is essential for timely intervention and effective patient care. However, traditional fusion techniques used to combine magnetic resonance imaging (MRI) and computed tomography (CT) often rely on static rules and shallow integration, leading to suboptimal diagnostic performance. This paper introduces a novel framework that integrates reinforcement learning with vision transformers to achieve adaptive multi modal neuroimaging fusion for stroke diagnosis. Vision transformers (ViTs) are employed to extract global contextual features from both MRI and CT scans, while reinforcement learning dynamically guides the fusion process by learning optimal strategies based on lesion visibility and classification confidence. The fusion policy is trained using a proximal policy optimization (PPO) algorithm, enabling the model to adaptively prioritize relevant features across modalities for each patient case. Experiments conducted on benchmark stroke imaging datasets demonstrate significant improvements in accuracy, sensitivity, and interpretability compared to conventional CNN and GAN-based fusion methods. The proposed reinforcement learning guided transformer framework shows strong potential for real-world deployment in automated stroke detection pipelines, offering a powerful tool for assisting radiologists in high-stakes clinical decision-making.

**Keywords**: Adaptive Neuroimaging, Ischemic Stroke Detection, Multi Modal Fusion, Proximal Policy Optimization, Reinforcement Learning, Vision Transformers

Paper ID: 81

## Social Distance Monitoring using SNet Embedded with Bottleneck Attention Model in Pandemic Areas

Thamarai Muthusamy
Sri Vasavi Engineering College, Andhra Pradesh, India
Gomathi Eswaran
Coimbatore Institute of Engineering and Technology, Tamil Nadu, India

**Abstract:** The performance and processing capacity of Deep Learning is increasing day by day and it is widely utilized in various fields. Deep learning has gained significant attention for its impactful applications in the medical field. Despite efforts like vaccination, disease spread remains uncontrolled, highlighting the importance of strict adherence to social distancing. While many studies have effectively monitored social distancing, they often struggle under challenges such as visual illusions and poor lighting in video recordings. Therefore our proposed method use thermal cameras to capture the image in order to overcome the foresaid problems. This study employs a deep learning-based approach to detect and monitor compliance with social distancing guidelines. Our proposed framework utilizes the SNet architecture along with the Bottleneck Attention Module for recognizing human. For implementing our algorithm we created our own dataset Thermal Image Dataset (TID) which contains images of human in various views such as, overhead, side pose etc. SNet is a light weight CNN model which is responsible to extract high-level features from the input image. The bottleneck attention module embedded in the SNet is used to enhance the feature maps extraction process by channel attention or spatial attention or by using both. Next, these feature maps are processed by Faster RCNN which acts as an object detection head. Threshold verification process computes the social distance between the detected objects. A predefined violation threshold, based on pixel-to-distance mapping, is used to determine instances of social distancing breaches. The process is verified using static RGB images to get the accurate position of the detected objects in parallelly. The system is evaluated using the MS- COCO and PASCAL VOC datasets, demonstrating superior monitoring effectiveness compared to existing state-of-the-art methods. Experimental results reveal that the proposed framework achieves a maximum accuracy of 97%, outperforming other benchmark algorithms.

**Keywords**: Deep learning, Faster R-CNN, SNet, Bottleneck Attention Module, Social distance monitoring

Paper ID: 82

## Hardware Implementation of Digital Image Feature Extraction on Zc706

AkulaTrinadha Rao
Department of ECE, JNT University, Kakinada, Andhra Pradesh, India
Dr. M. Thamarai
Department of ECE, Sri Vasavi Engineering College, Tadepalligudem, Andhra Pradesh, India
Dr. B.T. Krishna
Department of ECE, JNT University, Kakinada, Andhra Pradesh, India

**Abstract:** In the domains of target recognition, tracking, and image feature extraction, image edge extraction is a key component feature. The commonly used Robert, Prewit, LOG, Canny, Sobel and other algorithms belong to spatial detection. Prewit and Robert have the lowest edge positioning accuracy among them. LOG operators are noise-sensitive and unable to discern edge direction. Although their functionalities are superior, canny operators are complex to implement and using them in real-time hardware systems is challenging. It is difficult to use them in real time hardware systems. Traditional Sobel algorithms offer the benefit of simple detection principle and straightforward hardware implementation, and requires detection levels to be specified. This paper, proposes the reconfigurable hardware implementation of digital image feature extraction on ZC 706 EVALUATION KIT of ZYNQ SOC family using novel Sobel-Feldman edge extraction accelerator. The accelerator uses pixel level fine grain image parallel data processing and line buffer storage architecture to improve the processing ability of the accelerator. In order to encapsulate standardized IP cores and construct high-speed data exchange bridges between units within the Zynq-7000, advanced extensible interface (AXI) buses were implemented. Sobel edge detection contrast experiments are carried out through hardware, to verify the acceleration effect of the accelerator proposed in this paper. A comparative analysis of various acceleration methods was conducted, demonstrating that the proposed implementation provides superior acceleration performance and significantly improves processing efficiency.

**Keywords**: Image Feature Extraction, ZC 706 EVALUATION KIT, Hardware Implementation, Sobel algorithms

Paper ID: 83

## Automated Handwritten Notes to Interactive Learning Framework Using Text Recognition and AI-Driven Assessment in Academic Environments

Mrs. S. Chandragandhi (Assistant professor), L. Harini, RK Pranaesh, S. Sathishkumar, G. Keerthika
Department of Artificial Intelligence and Data Science, Karpagam Institute of Technology

**Abstract:** Handwriting continues to play a central role in classroom instruction and personalized teaching, yet its manual nature limits accessibility, reusability, and digital integration in academic settings. This paper presents an automated, role- based learning framework that converts handwritten notes into structured, interactive digital content using advanced text recognition and artificial intelligence. The system is designed with dual access modules—allowing staff to upload handwritten notes as PDFs and students to interact with them through multiple features including text conversion, content summarization, MCQ generation, YouTube video recommendations, and self-assessment tools. Optical Character Recognition (OCR) techniques are employed to extract clean, readable text from handwritten material, which is then processed using deep learning models for summarization and question generation. The evaluation component allows students to attempt generated MCQs and automatically forwards the performance scores to the respective teachers, completing the feedback loop. The framework aims to enhance learning efficiency, promote self-paced study, and reduce the digital divide between handwritten and AI-enhanced learning content in academic institutions. Experimental validation confirms the effectiveness of the proposed system in preserving content accuracy, improving student engagement, and facilitating intelligent academic workflows.

**Keywords**: AI-driven evaluation, educational framework, handwritten text recognition, MCQ generation, OCR, role-based access, summarization, YouTube recommendation

Paper ID: 84

## Optimizing Career Decisions through Random Forest-Based Recommendation Systems

Mrs. S. Chandragandhi (Assistant professor), B. Avinash, L. Kavyalaxmi, S. Sanket, U. Sona
Department of Artificial Intelligence and Data Science, Karpagam Institute of Technology

**Abstract**: In the modern era, selecting an appropriate career path is a complex and challenging task for students and professionals due to the rapid evolution of technology and the dynamic nature of industry requirements. Traditional career counselling methods often fail to provide personalized and data- driven suggestions, leading to confusion and dissatisfaction among individuals. The proposed system accepts user inputs such as educational background, skills, interests, and work experience, and provides suitable career recommendations based on these attributes. The Random Forest model is trained on a carefully curated dataset containing various career roles and their corresponding skill sets. The system architecture consists of data pre-processing, feature extraction, model training, and career prediction modules. The tool not only assists users in identifying suitable career paths but also guides them in understanding the required skills to achieve their goals. This research contributes towards building intelligent career guidance systems that can empower students, professionals, and educational institutions in making informed career decisions.

**Keywords**: Career Prediction, Random Forest, Machine Learning, Career Guidance, Skill Mapping, Recommendation System.

Paper ID: 85

## Real-Time IoT-Based Energy Monitoring and Anomaly Detection in Industry Systems Using Random Forest Algorithm

Nalla Kumar R
Karpagam Institute of Technology

**Abstract**: As the world faces global energy crises and environmental degradation minimizing energy waste is an important goal for industries and families alike. With the growth of the Internet of Things (IoT) and the development of artificial intelligence (AI) specifically in the field of machine learning (ML) a new generation of energy monitoring platforms is on the horizon. Not only do they monitor usage behavior but also smartly identify anomalies, which makes them invaluable for energy efficiency cost optimization and security. This work introduces an innovative system incorporating real-time energy monitoring from IoT and intelligent anomaly detection based on the Random Forest algorithm deployed via Scikit-learn, a popular Python library for machine learning. The project aims to design a trusted responsive and resource-conscious embedded system that continuously monitors energy usage data and detects irregular behavior that could signal system faults wastage of power or misuse. The combination of sensor nodes and microcontrollers with Wi-Fi support (ESP32) enables smooth data transmission to local servers or cloud platforms. The Random Forest classifier which is robust and accurate in classification tasks is used as the central component for anomaly detection. The system employs different sensors such as voltage and current sensors and environmental sensors such as DHT11 for temperature and humidity to collect multidimensional data pertaining to energy consumption. These inputs are processed and sent in real-time through the ESP32 development board which provides effective power management and wireless communication capabilities. A custom dataset was created from real-time sensor readings under normal and abnormal conditions of operation. After data pre-processing using scaling and encoding, the Random Forest model was trained and tested. The trained model showed excellent classification accuracy indicating its ability to distinguish effectively between normal and anomalous energy consumption patterns. The prototype of the system under consideration was physically developed and tested in a controlled setup with a bulb as a variable load and the whole setup was mounted on a PCB for stability and compactness. An LCD display gives instant local feedback on system status, while alarms for anomalies are managed through onboard logic. This is particularly important in industrial settings where electrical failures may cause damage to equipment or pose safety risks.

**Keywords**: Real-Time Energy Monitoring, Anomaly Detection, Internet of Things (IoT), Random Forest, Scikit-learn, Smart Grid, Embedded Systems, ESP32, Power Consumption Analysis, Edge Computing, Fault Detection, Energy Efficiency, Sensor Fusion, Predictive Maintenance.

Paper ID: 86

## Revolutionizing fish resource identification and management through AI technology

NallaKumar R
Karpagam Institute of Technology

**Abstract**: The depletion of oceanic resources has necessitated the implementation of innovative technologies for the management and identification of fish stocks. The integration of Artificial Intelligence (AI) and the Internet of Things (IoT) holds significant promise for revolutionizing the fisheries sector by enhancing data precision and facilitating real-time decision-making. This paper outlines a system that utilizes AI for fish detection and location forecasting, employing ultrasonic sensors in conjunction with IoT cloud computing. The system operates with solar- powered equipment that not only detects fish but also geotags their locations, transmitting real-time information to the cloud for further analysis. The data collected is subsequently processed through machine learning algorithms to identify areas abundant in fish, thereby contributing to sustainable fishing practices. Numerous studies have validated the effectiveness of AI in sonar image classification (Beni & Rabhi, 2021) and in monitoring marine ecosystems (Chen, Liu & Zhou, 2020), demonstrating the feasibility of this approach. The proposed system is designed to be energy- efficient and cost-effective, offering a promising yield-based strategy for the management of marine resources while also being easily scalable. In summary, the combination of AI and IoT technologies presents a transformative opportunity for the fisheries industry, enabling better resource management and supporting sustainability efforts. By leveraging advanced data processing techniques and real-time monitoring capabilities, this system aims to enhance the overall efficiency of fishing operations and promote the conservation of marine ecosystems.

**Keywords**: Artificial Intelligence, Internet of Things, Fish Detection, Location Forecasting, Ultrasonic Sensor Cloud Computing, Real-time Monitoring, Machine Learning, Sustainable Fishing, Marine Resource Management, Sonar Image Classification, Energy- efficient System, Geotagging, Smart Fisheries, Marine Ecosystem Conservation.

Paper ID: 89

## Implementation of Deep Learning Model for Prediction Risks of Pests and Diseases in Tropical Fruits Crops

Rahul Sharma, Arvind Panwar
School of Computing Science and Engineering, Galgotias University, Greater Noida, India

**Abstract**: Traditional methods of machine learning have trouble identifying photographs of crop infestations and illnesses, particularly when there are a lot of categorizations few examples, and unclear features. Identifying and treating crop pests early on is essential since they reduce yields. Nowadays, crop disease forecasting is done utilizing deep learning technologies and data from various places. Since knowledge is so easily obtained, many attempts have been made to use embryonic milieu evidence to predict diseases and parasites. Utilizing previous cultivation and microclimate data, including air temperature, amount of moisture, dryness mark, and CO2 %, we suggest a deep learning model in this study that forecasts diseases using machine learning techniques. We showed that the model has the ability to predict. Using a wealth of publicly available data on tropical fruit crops, such as papaya, pineapple, banana, and guava, we showed that the model is capable of predicting a likelihood factor of crop diseases and pests. It showed excellent accuracy in predicting with a 95.7% prediction success rate, and based on the anticipated results, it might help with pest or post-event avoidance. It is expected that the prediction crop illness model and technique developed using environmental information will be widely applicable to many crops and organizations for infection and pest control.

**Keywords**: Deep learning model, Tropical Fruits Crops, pest and disease recognition, image recognition.

Paper ID: 90

## FEM Analysis of Silicon Ultrasonic Transducer Implanted Top Electrode Attributes

C. Hmingthansanga
Mizoram University

**Abstract**: The study of an ultrasonic transducer based on a Microelectromechanical System (MEMS) for simulation is taken into consideration. An ultrasonic transducer with a top electrode placed on a membrane is studied for its properties and behavioral analysis. This paper explains how the device operates by varying the various parameters pertaining to the electrode position, thickness, and bias voltage. The features of the transducer are determined by simulation in this paper using COMSOL Multiphysics.

**Keywords**: COMSOL, transducer, ultrasound, top electrode, membrane, displacement, frequency, capacitance, insulation,

Paper ID: 92

## Integrating Eye Tracking and Facial Recognition: Innovations In Multi-Modal Biometric Systems

Sundaresan K (Assistant Professor), Shakthi Yaadav R, Vimal R, Dhaneswar R
Department of AI&DS,
Karpagam Institute of Technology, Coimbatore.

**Abstract**- The hybrid multimodal system outlined in this paper integrates facial expression analysis with eye identification to enhance user engagement in real-time. This system adeptly processes visual and emotional signals, thereby increasing both accuracy and responsiveness. It begins with the detection of faces and eyes utilizing algorithms such as Haar Cascades, MTCNN, or YOLO, followed by crucial pre-processing steps that include alignment, cropping, and normalization. For facial recognition, feature extraction is performed using sophisticated deep learning models like OpenFace, VGG-Face, or FaceNet, while eye states—such as blink patterns and gaze direction—are assessed using specialized models. Facial expressions are categorized to identify emotions like happiness or sadness. The system compares the extracted facial embeddings against a database for identity verification, and a hybrid decision layer combines eye and facial data to improve accuracy. The final output includes the identified individual along with insights into the user's emotional state, making this system particularly effective for real-time authentication and emotion recognition in both interactive and security applications.

**Keywords**: Hybrid Multimodal System, Eye Recognition, Facial Expression Recognition, Deep Learning Model, Emotional State Analysis, Feature Embedding.

Paper ID: 93

## Deep Learning And Blockchain: A Hybrid Approach For Digital Image Forgery Detection

Sundaresan K(Assistant Professor), Janarthan J, Jayalakshmi V, KishoreKumar S, Sameer S
Department of AI&DS, Karpagam Institute of Technology

**Abstract**: In today's age, digital images are an important role in circulating information about social media platforms. However, the rise of malicious software has caused the complexity of prevalence of fake images to spread misinformation. If we recognize the urgency in identifying these counterfeit products, we provide a new approach to enhance detection of digital tampering through transfers, aiming at simultaneous recognition of two types of images: image level and copy movement. Using deep learning models and CASIA2 datasets, discrepancies between the original and compressed images are calculated, and four different upstream models (VGG16, MobileNETV2, Efficive, Inception ResetV2) are used to compare accuracy between you.

**Keywords**: Image manipulation, forgery detection, splicing recognition, CASIA2 dataset, VGG16, MobileNetV2.

Paper ID: 94

## Automated Lung Cancer Detection Using MRI Images: A Convolutional Neural Network Approach

Dr. Sathiya M (Associate Professor), Ratheesh M, Sameerbasha K, Manoraj K, Rakeshwar B
Department of Artificial Intelligence and Data Science
Karpagam Institute of Technology, Coimbatore, India

**Abstract**: Timely and accurate identification of lung tumors is crucial for lowering mortality and enhancing patient care. With the rise of high-resolution MRI scans and rapid advances in machine learning, automated detection techniques have become increasingly viable. This study aims to build an ML framework that leverages MRI data to accurately identify lung cancer. A diverse dataset comprising both cancerous and non-cancerous lung tissues is collected and preprocessed to enhance image quality. Relevant features, including texture analysis and shape characteristics, are extracted from the MRI images. The effectiveness of a Convolutional Neural Network (CNN) in image analysis is the reason for its selection. Through training, validation, and testing on annotated datasets, the model's ability to detect lung cancer lesions is demonstrated. Assuring regulatory compliance and adherence to medical standards, the study places a strong emphasis on working in tandem with healthcare professionals to integrate the model into clinical workflows. For the model to be more accurate and dependable in practical medical applications, it must be updated frequently and adjusted to reflect new trends. Lung cancer diagnosis could be advanced with the help of the suggested machine learning technique, which would ultimately lead to better patient care and results.

**Keywords**: MRI imaging, CNNs, computer-aided diagnosis, image processing, clinical integration, and lung cancer detection.

Paper ID: 95

## TrustyReg- Secure and Transparent Online Registration System

Vignesh M(Assistant Professor), Deepika M, Dharshini S, Karthick S, VIshweshwaran S
Artificial Intelligence and Data Science
Karpagam Institute of Technology
Coimbatore, Tamil nadu, India

**Abstract**: Faceless property registration systems enhance efficiency but create difficulties in confirming the seller's authentic consent without their physical presence. This paper introduces a secure and transparent digital framework designed to guarantee voluntary participation and mitigate potential disputes related to coercion. The proposed system incorporates video consent verification, AI-driven sentiment analysis, and digital signature authentication to reliably ascertain the seller's intent. The process incorporates dual authentication for both administrators and sellers, utilizing identity verification through Aadhaar or PAN. After successful verification, a seller ID is generated, and a read-only agreement is provided to the seller. The seller then vocalizes key clauses and records a video to give consent, which is analyzed for emotional stability through sentiment analysis. Once validated, the seller digitally signs the document, and all consent materials are forwarded to the administrator for record-keeping. This comprehensive system fosters trust, mitigates legal risks, and upholds integrity in anonymous property registrations within contemporary digital governance.

**Keywords**: Faceless registration, consent verification, video authentication, sentiment analysis, digital signature, identity validation, coercion prevention, secure framework, e-governance, legal compliance.

Paper ID: 96

## Enhancing Road Safety on Ghat Roads-An Integrated Approach

Vignesh M(Assistant Professor), Alosius R, Ragul GR, Ramprakash M, Alagiya Annamalai G
Artificial Intelligence and Data Science
Karpagam Institute Of Technology
Coimbatore, Tamil nadu, India

**77Abstract**: Improving road safety on Ghat roads requires a thorough, coordinated strategy that takes into account the special difficulties presented by steep terrain. This project lays out a multifaceted plan that includes aggressive traffic management and enforcement, with a focus on lane discipline and speed control; infrastructure improvements, such as road widening, reinforced retaining walls, and better signage; strong driver education and awareness campaigns; the deployment of cutting-edge technologies, such as intelligent transportation systems and early warning systems; improved emergency response and medical services; and active community involvement. This initiative seeks to greatly lower the number of accidents and fatalities on Ghat roads by integrating these components in a way that works well together, making travel safer and more secure.

Paper ID: 97

## AI-Enhanced Hospital Operations Monitoring System

Abinaya V(Assistant Professor), Mathesh K, Billgates D, Yuvaraj L, Manishraj S
Department of Artificial Intelligence and Data Science,
Karpagam Institute of Technology, Coimbatore-641105

**Abstract**: Doctor Appointment System is a web based application for patients or any user to easily book a doctor's appointment online. This web based application solves the problem of monitoring and booking the appointments according to the user's choice/request. Sometimes that burden gets too heavy for compounder or the doctor himself who have to manually allot the users' appointments according to the availability of the users. Hence this project provide an appropriate solution wherein the user can view different booking slots available and select the preferred date and time. The main idea of Doctor Appointment Management System project is to make doctor appointment management easier and get appointment online that save much time. Efficient hospital management has become a critical need in modern healthcare systems, especially with increasing patient loads and demand for real-time service delivery. This paper proposes an AI-Enhanced Hospital Operations Monitoring System designed to replace traditional manual appointment workflows with a smart, web-based, and automated solution. Developed using Python's Django framework and powered by a structured MySQL database, the system provides a modular architecture for administrators, doctors, and patients. The platform supports online doctor appointment booking, automated schedule management, digital patient tracking, and clinical workflow optimization. Notably, the system integrates AI-powered chatbots and voice interfaces to facilitate natural language interaction, enabling patients to book appointments and access medical assistance without human mediation. The system ensures secure data handling, seamless user experience, and scalability, making it adaptable to various hospital sizes and operational complexities

Paper ID: 98

## An Efficient Algorithm for Automatic Impedance Matching And Antenna Tuning

M. Yuvaraju (Assistant Professor (Senior Grade)), K. Lekha
Dept of Electrical and Electronic Engineering Dept of Electronics and communication Engineering
Anna University regional campus, Coimbatore Anna University regional campus, Coimbatore

**Abstract**: The paper presents a novel approach to antenna tuning by integrating quantum-inspired optimization into conventional matching networks. Specifically, it replaces the typical iterative search of genetic algorithms with a Quantum Genetic Algorithm (QGA) that encodes candidate solutions as qubit superpositions. By doing so, it achieves faster convergence, greater resilience against getting trapped in local optima, and improved matching accuracy—demonstrated through simulations at 1.8 GHz and 2.4 GHz using a low-pass LC network. The algorithm iteratively adjusts component values until the desired matching conditions are achieved. Unlike conventional genetic algorithms (CGA), QGA demonstrates faster convergence with fewer iterations due to its probabilistic nature and quantum-inspired parallelism. It effectively avoids local optima and ensures optimal power transfer by maximizing the overall fitness function. To validate the approach, the QGA-based tuner is implemented to match impedance at specific cut-off frequencies. Simulations are conducted at two operational frequencies, 1.8 GHz and 2.4 GHz, common in mobile communication. The findings confirm that the QGA outperforms traditional GA methods in both speed and accuracy of convergence.

**Keywords**: Antenna Tuning, Impedance Matching, GA, QGA algorithm.

Paper ID: 99

## Learning Management System For Personalized And Engaging Education

Dr.P. Mayil Vel Kumar (Professor), Manikandan M, Mohammed Anas M, Mohanraj B, Sandeep G
Department of AI&DS1, Karpagam Institute of Technology, Coimbatore

**Abstract**: Digital education is an evolving paradigm and requiring intelligent systems that promote learning engagement at the same time ensure the sustainable monetization of instructors. We propose an AI driven Learning Management System (LMS) to address two key opportunities in modern e-learning services: passive content consumption and constraints on the revenue model of instructors. The proposed system combines a TypeScript/React frontend with a Prisma- managed MySQL backend. It utilizes Mux for scaling up video hosting, Stripe for fast payment processing, and Clerk for secure authentication. Key innovations include a Recommendation Engine that dynamically suggests courses based on student interests, skill levels, and peer ratings, optimizing enrolment outcomes. Additionally, the PlayWithPDF chatbot— powered by NLP-driven embeddings (e.g., Word2Vec, BERT) and vector database retrieval—enables semantic search within instructor-provided or external PDFs, allowing students to resolve doubts contextually. Instructors benefit from a two-tier monetization framework, where Stripe automates revenue sharing for paid courses, fostering equitable compensation. Empirical evidence for improved query resolution accuracy of 83% compared to traditional FAQ systems has been provided, down to sub-2-second response times for document-based queries. The system also automatically initiates certificates that are validated by assessment metrics against the outcomes of the learning course. Pilot data evidenced for reduced instructor workload and increase in student satisfaction among AI- assisted learning showed a synergistic effect of adaptive pedagogy and instructor-centered monetization.

**Keywords**: AI-Powered LMS, Semantic Search, Recommendation Systems, NLP Embeddings, Automated Monetization, Blockchain Certification.

Paper ID: 100

## Automatic Number Plate Recognition System (ANPR)

Himanshu Sachan, Inzamamul Haque
SCSE, Galgotias University Greater Noida, India

**Abstract**: Automatic Vehicle Number Plate Recognition (ANPR) has emerged as a crucial technology for real-time vehicle identification in various applications, including traffic management, law enforcement, and smart city systems. This paper proposes an advanced ANPR system that integrates image processing, machine learning, and optical character recognition (OCR) to achieve high accuracy and efficiency in detecting and recognizing vehicle number plates. The system leverages a multi-step approach, including image preprocessing, sliding window-based plate detection, and convolutional neural network (CNN)-based character recognition, to address challenges such as varying lighting conditions, vehicle orientation, and partial occlusion of plates. Experimental results demonstrate that the proposed system achieves 97.4% detection accuracy and 94.8% character recognition accuracy under diverse real-world conditions. Additionally, the system processes each image in under 0.5 seconds, ensuring real-time performance. This research highlights the potential of ANPR for automated traffic monitoring, toll collection, and vehicle surveillance, while also suggesting future improvements in deep learning models and system scalability for broader applications.

**Keywords**: Automatic Number Plate Recognition, Image Processing, Optical Character Recognition, Machine Learning, Traffic Management, Vehicle Identification, Real-time Processing.

Paper ID: 101

## Financial Fraud Detection In Mobile Money Using Machine Learning

Rudraakshya Chowdhary, Nitesh Singh Bhati
School of I.C.T, Gautam Buddha University, Greater Noida, India

**Abstract**: Over time, technology has advanced at an unbelievable pace. These days, financial services come with many conveniences at one's fingertips. This is a revolutionary change from longer queues to simple clicks; financial services can be used at home through the online platforms of banks. However, Fraudsters are always searching for chances of any possible fraudulent activity causing harm to the privacy and money of users. This is a huge international challenge for cross-border agencies throughout the globe. This research is centered on applying machine learning techniques for analyzing the data and predicting the financial fraud in the given dataset. Various model is used in this research, and they are compared on performance metrics. We aim to then separate fraud and Deceptive transactions and also to find the best model for classifying data with high imbalance with the highest accuracy.

**Keywords**: Fraud Detection, Machine Learning, Mobile Money

Paper ID: 102

## Smart Petition – Grievance Redressal System Using AI

Abinaya V, Abinaya A, Pradeepa S, Santhoshini M, Kiruthika T
Artificial Intelligence and Data Science
Karpagam Institute of Technology
Coimbatore, Tamilnadu, India

**Abstract**: The web portal for government petitions handling, grown enormously in various government sectors internationally. The premier goal of the paper is to provide a well- mannered web portal by using various machine learning theories to provide both government and the citizens to experience seamless actions on problems. To fulfil this, the web portal should be carried out with various machine learning models integrated with web applications. It has to be initially set up as a user-friendly web portal hosted on web. Then we elevate with tracking, flag urgent cases, categorizing problems to respected departments for further actions. The whole project should be accomplished with a mindful scheme considering the department's policy, harnessing updated trends and technologies to build an effective tool for petition categorization.

**Keywords**: Web portal, government, citizens, models, department, tool, petitions.

Paper ID: 104

## Telegram Chatbot Using Python

Vaishanavi Kumari, Nidhi Sharan, Nidhi Sharma (Assistance Professor)
School of Computer Science &Engineering Galgotias University, Greater Noida

**Abstract**: Chatbots now play a vital role across various sectors because text messaging platforms developed rapidly. They anchor their position in customer service operations and data restoration functions and entertainment domains. The informing application Wire serves as a robust platform to develop logical chatbots through its framework. The research paper focuses comprehensively on developing a Message chatbot through implementation of Python programming language. This paper provides comprehensive guidelines on developing functional chatbots for Message using Python programming language that addresses both design principles and execution procedures.

Paper ID: 105

## Design and Parameter Optimization of CMOS Operational Transconductance Amplifier (OTA)

Kumari Archana
Department of ECE, School of Engineering, Aryabhatta Knowledge University, Patna – 800001, Bihar, India
Ram Kumar
Department of EEE, Katihar Engineering College, Katihar – 854109, Bihar, India
Naushad Manzoor Laskar
School of Electronics Engineering, Vellore Institute of Technology, Vellore, Tamil Nadu – 632014, India

**Abstract**: One of the essential components of an analog implementation using an OP-amp is an OTA. This work looks into the behavior and properties of OTA. The OTA circuit utilizes the design methodology that considers analog circuit sizing and automatic selection of analog components. Researchers in the OTA design due to its low supply voltage, linearity, and low power dissipation. The design of OTA has been widely studied and utilised in research and industry since the early days of integrated circuits. In this review, various techniques and approaches have been presented for the design of these components. The integration of massive numbers of components has made it challenging to create ideal analog circuits. An analog integrated circuit using the CMOS technology could be created by using an evolutionary approach to size a device. This review focuses on the various operations of the OTA circuits.

**Keywords**: Analog circuits, CMOS, OTA.

Paper ID: 107

## Smart Solar PV System with Temperature Dependent Cooling and Tracking

SriLakshmi Lavanya Kota, Bheeshma Geddapu, Lavanya Allu, Sahaja Ginjupalli
Electrical and Electronics Engineering
Lakireddy Balireddy College of Engineering
Mylavaram, India

**Abstract**: Solar power is the most widespread and enduring renewable energy source. In optimizing the efficiency of solar photovoltaic systems, sophisticated cooling and tracking systems have to be integrated that ensure optimal energy production. This project involves the design and development of an advanced solar PV system with temperature-controlled cooling and dual-axis solar tracking operated using an ATMEGA 328 controller. It has a dynamic cooling system and an automatic dust-cleaning system to maximize panel efficiency. The DC cooling fans and the water-cooling system are regulated based on real-time temperatures delivered by temperature sensors. In the meantime, there is a sun tracking mechanism with two axes changing the panel direction using light-dependent resistors and servo motors to maximize solar irradiance absorption. The ATMEGA 328 is the processor, which controls both the cooling and monitoring systems and Internet of Things functionality for remote monitoring and Bluetooth module for Manual control of Cooling systems. The IoT offers real-time data acquisition, visualization, and system diagnostics via a cloud-based platform with user accessibility and operational effectiveness.

**Keywords**: Solar Photovoltaic Systems, Dual-Axis Solar Tracking, ATMEGA 328 Microcontroller, Renewable Energy, Internet of Things.

Paper ID: 109

## Designing of Memristor Emulator using FTFNTA

Ravendra Singh, Laxya, Md. Ayaz Alam, Saksham Kumar
Department of Electrical & Electronics Engineering
Galgotias College of Engineering & Technology, Greater Noida- 201306, India
Nitin Sharma, Kishan Yadav,
Department of Electronics & Communication Engineering
Maharaja Agrasen Institute Of Technology, Delhi- 110086, India

**Abstract**: This article presents the designing of a resistor less grounded memristor emulator (GME) by utilizing single FTFNTA along with two grounded capacitors. As grounded capacitors are employed hence the presented design is compatible for IC development. The effectiveness of the proposed GME is checked through PSpice simulation using 180nm technology with a supply voltage of ±1.65V. The memristor emulator that is being demonstrated can run up to 2.5 MHZ. The non-volatility characteristic of memristor is also investigated.

**Keywords**: Memristor Emulator, FTFNTA, Pinch hysteresis loop.

Paper ID: 110

## Stock Market Prediction using Fuzzy Logic and Deep Learning Techniques with Technical Indicators

Priya Sidhu, Dr. Himanshu Aggarwal, Dr. Madan Lal
Department of Computer Science & Engineering, Punjabi University, 147002, India

**Abstract**: The present paper demonstrates a hybrid stock marketplace prediction model that integrates Long Short-Term Memory (LSTM) alongside Gated Recurrent Unit (GRU) networks with technical indicators and fuzzy logic. The model was explored on four Nifty 50 stocks observation that are Tata Consultancy Services (TCS), ICICI Bank, Infosys and HDFC Bank. Using historic stock prices along with a range of technical indicators and incorporating the fuzzy logic that helps in handling the unpredictability and volatility of the market, the proposed model accomplished an accuracy between 82% and 88%, with low MAE and RMSE values and strong R2 findings. The findings demonstrated that the hybrid method includes long-term and short- term dependencies by manages uncertainty in monetary information, and adapts different sectors. The graphs showing the Actual price vs. Expected price clarifies the robust alignment, validating the forecasting capability of the model. The framework gives a reliable and scalable technique for short-term price prediction and presents a foundation for future improvements the use of interest mechanisms or macroeconomic features.

**Keywords**: Stock Market Prediction, Fuzzy Logic, Deep Learning, Technical Indicators, Nifty 50, Accuracy, Artificial Intelligence, Time Series Forecasting.

Paper ID: 111

## TinyML-Powered Autism Spectrum Disorder Screening Using an Optimized CatBoost Model

Manjit Baishya, Rosy Sarmah
Dept. of Computer Science and Engineering
Tezpur University, Tezpur, Assam – 784028, India

**Abstract**: One in 68 children in India suffers from autism spectrum disorder (ASD), one of the prevalent neurodevelopmental disorders. In India, the biggest obstacles to early ASD screening are a lack of knowledge, restricted access to resources and social stigma. Implementing early intervention measures, which may be customized to meet the needs of each child and benefit them in their own unique way, is greatly aided by early diagnosis. The proposed design emphasizes the development of an efficient, portable and highly optimized solution for the early detection of ASD in toddlers. The dataset comprises 10 behavioral questions, as well as age, gender, jaundice status, and family history of ASD, for a total of 6075 toddlers aged 1 month to 80 months. To select features and retain only those that were significant to the target feature, the statistical correlations between each input feature and the target feature were examined. After testing and training several machine learning (ML) models, the CatBoost classification model with almost flawless recall and precision was ultimately selected. After further optimization, hyper-parameter tuning and soft quantization, the final model size was 11.7 kB with 100% recall and precision. The model was deployed in a Microchip ATmega328P microcontroller (Arduino NANO) with an average inference time of 1093.91 µs and an average power consumption of 60mW.

**Keywords**: Autism Spectrum Disorder (ASD), TinyML, CatBoost Classifier, Hyper-Parametric Tuning, Soft-Optimization, Soft-Quantization.

Paper ID: 112

## SarvUday 1.0: AI-DRIVEN MENTAL HEALTH SUPPORT

Deepak Kumar Prajapati, Suraj Kumar, Rosy Sarmah
Department of Computer Science & Engineering
Tezpur University, Tezpur-784028, India

**Abstract**: Mental health is a vital part of overall well-being, yet many individuals face barriers to timely and personalized support. This paper presents, SarvUday 1.0, an AI-driven platform designed to offer comprehensive mental health assistance through features like a conversational chatbot, mental health knowledge resources, self-assessment tools, surveys, emotion tracking, and personalized counselor recommendations. The AI chatbot enables real-time interaction, providing relevant guidance based on user input. Built-in self-assessment surveys, based on validated psychological scales, help users gain insight into their mental state. An integrated emotion recognition system uses natural language processing and sentiment analysis to monitor mood shifts over time, allowing users to track their emotional journey and identify potential concerns. For those in need of professional support, the platform offers counselor suggestions tailored to individual needs, enhancing access to appropriate care. Developed by fine-tuning the Llama 3.2 (3B) language model on mental health-focused data, the mental health framework, SarvUday 1.0, is supported by both a web and mobile interface, backed by a robust backend system. This work aims to bridge the mental health support gap by fostering self-awareness, encouraging early intervention, and delivering personalized, AI-powered care.

Paper ID: 113

## Analysis the performance of ZnO/Si/ZnCdTe material based hetero-structure PIN photo-detector for sensing light from UV through visible to IR

Debabrata Raha
Department of ECE, Chaibasa Engineering College Jharkhand, India,
Moumita Chakrabarty
Department of CSE, University of Engineering & Management, West Bengal, India
Abhijit Kundu
Department of ECE, Chaibasa Engineering College, Jharkhand, India
Rupanwita Das Mahapatra
Program of ECE, Department of EEE, Adamas University, Kolkata 700126, India
Moumita Mukherjee
Department of Physics, Adamas University, Kolkata 700126, India

**Abstract**: This study investigates the impact of alternatively incorporated ZnO/Si/ZnCdTe layers in the active region of the device, a finding that has not been previously reported in detail. The performance of the Quantum-well based hetero-structure ZnO/Si/ZnCdTe PIN photo-detector has been explained in UV-Visible- NIR wavelength region. The Nonlinear Quantum Modified Drift-Diffusion (QM-D-D) model is employed for electro-optical characteristic studies in the devices, which find application in UV-Visible-NIR detection. The results indicate that the designed hetero-structure ZnO/Si/ZnCdTe PIN photo-detector offers higher external/internal quantum efficiency and photo-responsivity in UV-Visible-NIR wavelength region. The noise reduction in the designed photo-detector makes it more suitable for use as low-noise photon detectors. Furthermore, the study evaluates the suitability of 3x5 array-based photo-detectors in terms of photo responsivity and external/internal quantum efficiency. The validity of the indigenously developed (QM-D-D) model is confirmed through experimental verification. In addition, the fabrication feasibility of the new class of designed PIN photo-detector is presented in this paper. To the best of the authors' knowledge, this is the first report on quantum-well based hetero-structure ZnO/Si/ZnCdTe PIN photo-detector which can be used to detect UV- Visible-NIR radiation.

**Keywords:** hetero-structure, ZnO/Si/ZnCdTe layers, UV- Visible-NIR wavelength, photo-detector, external/internal quantum efficiency, photo-responsivity photo-detector.

Paper ID: 114

## A Survey On Various Computational Tools And Steps In RNA-Seq

Prayakhi Emee Dutta, Nihar Jyoti Boro, Dr. Rosy Sarmah
Department of Computer Science and Engineering
Tezpur University, Assam – 784028, India

**Abstract**: RNA-Seq is a technique that uses Next-Generation Sequencing technology to comprehensively profile gene expression patterns. This survey provides a comprehensive overview of the computational pipelines and tools used in RNA-seq from preprocessing to differential expression till pathway enrichment.The emerging role of Machine learning and Deep learning in RNA-seq is highlighted offering new perspective to feature extraction, predictive modeling and multi-omics integration.

**Keywords**: RNA seq, Differential Gene Expression, Machine Learning, Deep Learning

Paper ID: 115

## Optimizing Reliability in Underwater Wireless Sensor Network (UWSN)

Akshita Dhiman, Rishika Suhag, Dr. Kanchan Sharma
Department of Electronics and Communication Engineering
Indira Gandhi Delhi Technical University For Women, Kashmere Gate, New Delhi – 110006, India

**Abstract**: Underwater Wireless Sensor Networks (UWSNs) are especially challenging to maintain due to their physical characteristics and environmental conditions such as high pressure and limited communication range. These challenges often result in high risk of node failure, energy consumption, and degraded performance. This work aims at leveraging the use of Graph Neural Networks (GNNs) and Reinforcement Learning (RL) to predict the optimal routing paths and reliable network configurations under varying underwater conditions. The hybrid GNN-RL model approach is proposed to improve the efficiency of UWSNs. Here, the GNNs are employed to capture the relationships among the sensor nodes through the depiction of the network architecture whereas, RL allows the network to learn optimal paths by interacting with the environment. This combined model offers a promising trajectory for smart administration of UWSNs.

**Keywords**: UWSN, Reliability, Optimal paths, GNN, Reinforcement Learning

Paper ID: 116

## Design and optimization of tri-layer two-terminal lead free inorganic perovskite solar cells through strategic absorber layer engineering

Pramita Nath
Department of Electronics and Communication Engineering, University of Engineering & Management,
B/5, New Town Rd, Action Area III, West Bengal 700160
Abhijit Biswas
Department of Radio Physics and Electronics, University of Calcutta,
92 Acharya Prafulla Chandra Road, Kolkata-700009, India

**Abstract**: In this study, a high-efficiency trilayer perovskite solar cell has been proposed and investigated. Initially, the absorber layer selection has been performed by comparing monolayer, bilayer, and trilayer configurations, with the trilayer structure demonstrating superior performance. Subsequently, thickness optimization of each absorber layer has been conducted, leading to an optimized design featuring Cs3Bi2I9 (top, 0.4 μm), CsSnBr3 (middle, 0.8 μm), and CsSnI2Br (bottom, 0.5 μm). SnO2 was employed as the electron transport layer (ETL) and Cu2BaSnS4 (CBTS) as the hole transport layer (HTL). The optimized device exhibited an outstanding open-circuit voltage (Voc) of 1.46 V, a short-circuit current density (Jsc) of 30.40 mA/cm2, and a fill factor (FF) of 82%, resulting in a remarkable power conversion efficiency (PCE) of 36.3%. These findings highlight the promise of carefully engineered trilayer, lead-free perovskite architectures for next-generation, high-efficiency, and environmentally sustainable solar cells.

**Keywords**: Absorber layer, hetero-junction trilayer Perovskite solar cell, PCE.

Paper ID: 117

## Implementation of Deep Learning Approaches For Medical Image Interpretation And Analysis

Gurudatt Gupta, Avnish Kumar Sharma (Associate Professor)
Marathwada Institute of Technology, Bulansahar, India

**Abstract**: Accurate interpretation of medical images is crucial for the early detection and treatment of critical conditions such as brain tumors and thyroid abnormalities. This study presents the the structure of CNN and its advances and explores the different types of transfer learning strategies as well as classic pre-trained models and also discusses how transfer learning has been applied to different areas within medical image analysis. The model was adapted and evaluated on two benchmark datasets: a brain tumor MRI dataset comprising three tumor types (glioma, meningioma, and pituitary), and a thyroid ultrasound dataset containing images labeled as benign or malignant. SkinNetX achieved a classification accuracy of 96.2% on the brain tumor dataset and 94.5% on the thyroid dataset. Precision, recall, and F1-scores exceeded 93% across all classes. Model interpretability was ensured using Grad-CAM, which highlighted pathology-relevant regions to aid clinical decision-making. Future work will focus on multi-modal integration, real-time clinical deployment, and expanding the model for broader disease classification tasks.

**Keyword**: CNN, SkinNetX, Medical Images, Deep learning, Transfer Learning.

Paper ID: 121

## Load Frequency Control of Renewable Energy Sources based Power System using Kookaburra Optimization Algorithm Tuned Controller

Kota Srilakshmi Lavanya
Department of Electrical and Electronics Engineering, Andhra University, Visakhapatnam, India.
Chilukoti Varaha Narasimha Raja
Department of Electrical and Electronics Engineering, Anil Neerukonda Institute of Technology & Science, Visakhapatnam, India.

**Abstract**: This work solely focused on the design and the development of the soft computing algorithm tuned proportional-integral-derivative (PID) controller to maintain the frequency of interconnected power system (IPS) under load disturbances. In this context a novel soft computing approach of kookaburra optimization algorithm (KOA) is chosen for PID tuning and its operational efficacy is tested on power system models of dual area hydrothermal system (DAHT) and two area diverse sourced (TADS) power system available in the literature. These systems are developed in MATLAB/SIMULINK and the analysis is conducted for the injection of 10% step load perturbation (SLP) in area-1 for both the test system models. The integral square error (ISE) objective index is enforced for the PID tuning with KOA and its dominance is exhibited against the other performance indices by conducting the comparative study. The results of the simulation research showed that KOA tuned PID outperformed the other controllers and optimization algorithms that are recently listed in the literature. Moreover the study on TADS model of IPS is extended to the integration of high voltage direct current tie-line (HVDC) and the analysis confirmed the improvement in dynamical behavior. At last, to verify the resilience of the suggested control method, the sensitivity test is carried out by altering the load and system parameters.

**Keywords**: Kookaburra optimization algorithm; PID controller; integral square error; HVDC line; load frequency control.

Paper ID: 122

## The Role of Real-Time Face Recognition in Enhancing Non-Contact Attendance Systems for Public Health Safety

Kota Srilakshmi Lavanya
Department of ECE, Andhra University, Visakhapatnam, India.
Chilukoti Varaha Narasimha Raja
Department of ECE, Anil Neerukonda Institute of Technology & Science, Visakhapatnam, India.

**Abstract**: In response to concerns for public health and growing interest in contactless solutions, the paper explores the use of face recognition technology in real time for enhancing attendance management systems with consideration for maximum security. The manual sign-in and fingerprinting tradition involves physical touch, which presents health issues, especially in light of the COVID-19 pandemic. Following the face recognition technology, a contactless system allows automatic detection of individuals in real time with decreased risks of infection and improved hygiene. The project aims to establish a face recognition-based attendance management system using Python and OpenCV, with a camera for real-time video feed, a processing unit for recognition, and a database for attendance logging. Trials have shown the system to perform optimally in normal conditions with easy roll call. Issues such as the effects of changes in lighting conditions and face masks have also been resolved in the paper, with solutions for higher accuracy. The contactless solution offers a safer and more scalable alternative for schools, workplaces, and health care facilities, in line with public health standards and making it an ideal choice for the future.

**Keywords**: Face Recognition, Non-Contact Attendance System, Public Health Safety, Biometric Technology, Real-Time Face Recognition Attendance Management, COVID-19, Hygiene and Automation, Python-Based System OpenCV, Data Privacy, Ethical Biometric Systems, Public Health Technology, Contactless Solutions

Paper ID: 123

## Intelligent Speech-To-Sign Language Converter Using Ai and Avatars

Shivam Sengar, Kunal Kumar Singh, Akhilesh Kumar Singh (Associate Professor)
Department of Computer Application and Technology, Galgotias University, Greater Noida, India

**Abstract**: Speech recognition technology enables machines to transform spoken words into written text, serving as a critical component for real-time sign language translation. This system utilizes Automatic Speech Recognition (ASR) models, including Hidden Markov Models (HMMs), Recurrent Neural Networks (RNNs), and Transformer-based architectures, to transcribe speech into text. Once transcribed, Natural Language Processing (NLP) techniques structure the text into sign language-compatible syntax. A 3D animated avatar then visually represents the corresponding sign language gestures, facilitating communication for the hearing-impaired community.

**Keywords**: AI-Powered Sign Language Interpretation, Real- Time Speech-to-Sign Conversion, Speech-to-Text (STT) System, Semantic Text Processing ,3D Animated Avatars, Sign Language Translation System, Machine Learning for Accessibility, Assistive Communication Technology, Inclusion and Accessibility AI, Gesture-Based Sign Language Synthesis, Live Event Sign Language Interpretation, Government Accessibility Solutions, Human-Computer Interaction (HCI), Digital Inclusivity for Hearing Impaired community.

Paper ID: 124

## Design and Implementation of Robotic Navigation Using Yolo 4.0 and Image Processing on FPGA

Mudasar Basha, G Divya Vani, Konda Nithin, Kare Nikhila, Enje Thimoty
Department of Electronics and Communication Engineering
B V Raju Institute of Technology Telangana, India.
B Khaleelu Rehman
Department of Electronics and Communication Engineering
Chaitanya Bharathi Institute of Technology, Telangana, India.

**Abstract**: This paper presents an FPGA-based robot navigation system that harnesses advanced image processing techniques for robust obstacle detection and avoidance in static environments. A YOLO 4.0 pretrained model, implemented in MATLAB, is used to analyze a series of pre-captured images, accurately detecting and labeling obstacles. The detected objects are annotated on the images and then converted into a digital format that encapsulates detailed pixel-level information in a hardware-friendly data structure optimized for FPGA processing. This data is stored in the FPGA's RAM and processed via custom Verilog modules, which extract object boundaries and spatial coordinates to generate precise navigation commands. Extensive experimental evaluations on multiple images with diverse labels demonstrate that the system achieves high detection accuracy and efficient image processing, thereby enhancing overall navigation reliability. Moreover, the approach significantly improves processing speed and power efficiency while offering scalability for applications such as automated inspection, warehouse robotics, and surveillance systems.

**Keywords**: Image Processing ,FPGA, Robot Navigation, YOLO 4.0, MATLAB, Obstacle Detection, Obstacle Avoidance.

Paper ID: 125

## Analysis of Image Classification using SVM and CNN

Aditya Pandey, Tejang, Vedant Singh, Mr. Rahul Swami (Assistant Professor)
School Of Computer, Application and Technology, Galgotias University, Greater Noida, India

**Abstract**: Into todays, modern era, face identification technologies are a necessity in many industries. Face recognition is one of the most widespread biometric systems used for security, authentication, and identification purposes among others. Though not as accurate as iris detection and fingerprints, face recognition is mostly preferred to its non-contact and nonintrusive nature. Facial identification systems can also, assist in school, college, or company attendance. This system presents an intention to develop class attendance based on the ideas of face recognition technology to eliminate the old tiresome methods that are time consuming and hard to maintain, with the potential to easily take alternate attendance. The requirement of this automated network is very apparent. The system comprises of four stages: database generation; face detection; face identification; and attendance updating. The data bank is created from photographs of the pupils in the class. The Haar Cascade morpheme detects faces and the Local Biform Pattern diagram method recognizes them. Profiles are identified and estimated from live-telecast footage in classroom, and presence records are transmitted to appropriate staff after each gathering.

**Keywords**: Face Identification, Face Detection, Attendance System.

Paper ID: 127

## Satellite Image Enhancement using MATLAB and Simulink with FPGA Implementation

Divya Vani, Mudasar Basha, Chinnaiah. M.C, Pendota Harini, Ande Swarthik Reddy, B. Nagaraju
Electronics and Communication Engineering
B V Raju Institute of Technology, Narsapur – 502313, India

**Abstract**: Enhancing satellite images plays a vital role in areas like remote sensing, geosciences, and disaster management, where high-resolution images are necessary for precise analysis. Conventional enhancement methods, including Discrete Wavelet Transform (DWT) and Singular Value Decomposition (SVD), can enhance image quality but are often computationally intensive, making them less suitable for real-time applications. This paper presents an FPGA- based approach to satellite image enhancement using Simulink and Xilinx System Generator, leveraging model- based design for efficient algorithm development and hardware implementation. The proposed method integrates inversion, brightness, and contrast adjustment techniques within Simulink's intuitive framework, enabling rapid prototyping and seamless deployment onto FPGA hardware. While previous related works implemented enhancement techniques like negative, brightness, and contrast adjustments independently, the current project uniquely integrates all three into a unified Simulink model, enabling efficient and simultaneous processing on FPGA. Hardware co-simulation validates the system's effectiveness, demonstrating its potential for real-time processing with improved efficiency over traditional software-based methods. The results highlight Simulink's capability in developing scalable, high-performance FPGA-based solutions, providing a practical alternative for real-time satellite image enhancement.

**Keywords**: Simulink, Image enhancement, Contrast Stretching, Gray Scale Conversion, Image negative, Field Programmable Gate Array (FGPA).

Paper ID: 130

## Satellite Image Enhancement using MATLAB and Simulink with FPGA Implementation

Divya Vani, Mudasar Basha, Chinnaiah. M.C, Pendota Harini, Ande Swarthik Reddy, B. Nagaraju
Electronics and Communication Engineering
B V Raju Institute of Technology, Narsapur – 502313, India

**Abstract**: The Serial Peripheral Interface (SPI) is a widely used synchronous communication protocol designed for fast data exchange between microcontrollers and peripheral devices. This project explores the implementation of SPI using Verilog Hardware Description Language (HDL), with a key focus on an adaptive baud rate feature. This adaptive mechanism allows the communication speed to adjust dynamically based on the requirements of the connected devices, improving both performance and compatibility. The Verilog-based SPI design consists of essential modules such as Master-Slave configuration, clock generation, data transmission, and reception. Additionally, it includes an adaptive baud rate controller, which fine-tunes the SPI clock frequency using programmable settings. This ensures smooth communication between devices operating at different speeds, making the system more versatile and efficient.

**Keywords**: SPI, MOSI, MISO, SCLK, Baud Rate verilog.

Paper ID: 135

## Investigation on high performance lead-free GA0.05FA0.93SnI3 based hybridhalide perovskite solar cell

Srinivas Mattaparthi, Didla Sristitha, Banothu Venugopal, Vijay Naik Mudavath, Himanshu Karan
Department of Electronics and Communication Engineering,
National Institute of Technology Silchar, Assam- 788010, India

**Abstract**: In this paper, we present a lead-free perovskite solar cell (PSC) by considering guanidinium-formamidinium tin iodide (GA0.05FA0.93SnI3) as the perovskite absorber layer and its performance metrics is studied on the light of short-circuit current (Isc), power conversion efficiency (PCE), and open circuit voltage (Voc) and fill-factor (FF). Utilizing the SCAPS-1D numerical program, we have optimized the material parameter of the absorber layer such as thickness, electron affinity, defect density, doping concentration and series and shunt resistances. The GA0.05FA0.93SnI3 absorber layer exhibits more stable and non-toxic in nature. The proposed hybrid halide-based PSC achieved an enhanced performance with a PCE of 27.55% compared to reported PSCs, under the AM1.5G spectrum.

**Keywords**: Perovskite, guanidinium formamidinium tin iodide, SCAPS-1D.

Paper ID: 136

## Implementing Secure BLE Signal Transmission through Antenna Design Techniques in Wearable IoT Devices

Aditya Kumar Samanta, Sagnik Chakraborty, Abhijit Satyaki
Department of Information Technology
Jalpaiguri Government Engineering College, Jalpaiguri – 735102, India

**Abstract**: Bluetooth Low Energy (BLE) is a cornerstone of modern wearable IoT systems, particularly in healthcare and fitness domains. However, its omnidirectional signal propagation introduces substantial physical-layer vulnerabilities, allowing signal leakage and metadata interception even in encrypted environments. This paper proposes a novel cross-layer security framework that integrates antenna design techniques—including directional radiation, impedance tuning, and SAR-aware placement—with existing BLE software-level protocols. Our design leverages a modified meandered inverted-F antenna (MIFA) structure optimised for wearable scenarios, enabling spatial confinement of BLE signals to reduce eavesdropping risks. Through literature-supported analysis and inferred performance benchmarks, we show that this hybrid approach can reduce effective interception range by up to 40% without compromising BLE throughput or latency. The study lays foundational groundwork for secure-by-design wearable systems that merge physical-layer resilience with protocol-level protection.

**Keywords**: BLE, Wearable IoT, Physical-Layer Security, Signal Leakage, MIFA Antenna, SAR, Impedance Matching, Polarisation Diversity, IoMT, Cross-Layer Security..

Paper ID: 139

## A Novel Quantum-Inspired Deep Learning Framework for Motor Imagery Classification Using Spatiotemporal Features

Hangsa Raj Das
Department of Electronics and Communication Engineering
Jharkhand University of Technology, Ranchi, Jharkhand-834010, India
Prashant Kumar Singh
Department of Electronics and Communication Engineering
BIT Sindri, Dhanbad, Jharkhand-828123, India
Sumanta Bhattacharyya
Department of Electronics and Communication Engineering
Budge Budge Institute of Technology, Kolkata, West Bengal-700138, India

**Abstract**: Motor imagery (MI)-based brain-computer interfaces (BCIs) have emerged as powerful tools for non-invasive neurotechnology applications, yet accurate classification of EEG signals remains a significant challenge due to their noisy, high-dimensional, and non-stationary nature. The paper introduced a novel quantum-inspired deep learning framework that was designed to enhance the classification of motor imagery (MI) tasks by utilizing a combination of spatiotemporal feature extraction and a Recurrent Quantum Neural Network (RQNN) enhanced with a Quantum Attention (QATT) mechanism. The proposed methodology integrates Common Spatial Pattern (CSP) for extracting discriminative spatial features and Short-Time Fourier Transform (STFT) for capturing dynamic temporal-frequency patterns. The extracted features are optimized through Minimum Redundancy Maximum Relevance (mRMR) selection and subsequently processed using an RQNN-QATT hybrid model. This deep learning architecture is designed to mimic quantum dynamics and probabilistic attention, enabling effective modeling of temporal dependencies and salient activation in EEG sequences. A support vector machine (SVM) classifier is then used for final decision-making. The system is evaluated on the benchmark BCI Competition II Dataset III. The final model, trained on all available training data, achieved a test set classification accuracy of 90% and mutual information of 0.6013, outperforming many existing methods reported in the literature for the same dataset. These results underline the effectiveness of combining quantum-inspired learning strategies with conventional feature extraction techniques for robust EEG signal decoding. The proposed framework shows promising potential for future real-time BCI systems and clinical neuro-rehabilitation applications.

**Keywords**: Brain-Computer Interface (BCI), Common Spatial Pattern (CSP), Electroencephalography (EEG), Motor Imagery (MI), Quantum Attention Mechanism, Recurrent Quantum Neural Network (RQNN), Spatiotemporal Features.

Paper ID: 144

## Modelling of Rectangular Microstrip Patch Antenna Operating at 4.6 GHz for 5G Communication

Aditya Kumar Saamanta
Department of Information Technology
Kaushik Saha
Department of Electronics & Communication Engineering
Arijit Mitra
Department of Electronics & Communication Engineering
Jalpaiguri Government Engineering College, Jalpaiguri, West Bengal, India

**Abstract**: 5G is an emerging technology aimed at enabling high-speed communication. Among the available frequency bands for 5G, the n79 band (4.5 GHz) is particularly popular due to its suitability for integration into compact devices such as mobile phones and radios, thereby enhancing the overall 5G communication experience. This band has also been tested and deployed for 4G communication. With the increasing demand for high-speed connectivity and miniaturized devices, microstrip patch antennas have become a preferred choice for antenna design. In this study, a rectangular microstrip patch antenna was designed with a target center frequency of 4.69 GHz. The antenna was simulated using CST Studio 2024 and constructed with an FR4 (lossy) substrate, a copper ground plane, a copper patch, and an inset feeding technique. By fine-tuning dimensions such as substrate length and width, optimal results were achieved. The best-case scenario showed the S11 curve reaching -38.66 dB at 4.69 GHz, with a corresponding bandwidth of 904 MHz—an ideal outcome for 5G communication in the n79 band.

Paper ID: 145

## Deep Fake Detection using Context Aware Multi-CNN Feature Fusion and Temporal Transformer Attention

Somenath Dhibar, Sayandip Saha, Subihan Biswas, Sandeep Ray, Souvick Roy
Department of Information Technology
Jalpaiguri Government Engineering College (Autonomous) – 735102, India

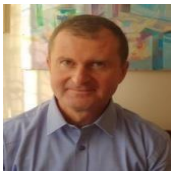
**Abstract**: Deep Fakes are AI-generated synthetic videos that manipulate facial expressions and speech to convincingly portray false content. Their proliferation poses a serious threat to digital integrity and public trust. In this work, we propose an advanced deepfake detection framework that combines spatial and temporal feature extraction using multiple CNN backbones (ResNet-50, VGG-19, XceptionNet) and a Transformer-based attention mechanism. Our model detects fine-grained visual artifacts and temporal inconsistencies in manipulated videos. Experimental results on the DeepFakeDetection (FaceForensics ++) dataset demonstrate state-of-the-art accuracy (97%) with high precision, recall, and ROC-AUC, establishing our model as highly reliable for real-world deepfake forensics.

# The Vidyasagar Awardee

The Vidyasagar Award to **Prof Ratnajit Bhattacharya**, Head of the Department from Department of Electronics and Electrical Engineering and Mehta family school of Data Science and Artificial Intelligence of IIT Guwahati. 12th International Conference on Microelectronics Circuits and Systems. Micro2025 Conference Dates: 10th to 11th of May 2025. Organizer and Venue: Jalpaiguri Government Engineering College, Jalpaiguri, West Bengal, India. Joint Organizer: Applied Computer Technology, Kolkata, West Bengal, India.

Micro2025, 10th – 11th May, 2025.
Organizer and Venue: Department of Information Technology, Jalpaiguri Government Engineering College, Jalpaiguri, West Bengal, India.
Co-organizer: Applied Computer Technology, Kolkata, India

**List of invited Speakers/ Session Chairs**

| | |
|---|---|
| | Keynote Speaker<br>**Dr. Gaurav Trivedi**<br>Associate Professor,<br>Department of Electrical Engineering Indian Institute of Technology Guwahati, Assam, India. |
| | Keynote Speaker<br>**Prof. Abhijit Biswas**<br>Publication Chair of Micro2025,and<br>Professor, Department of Radio Physics and Electronics, University of Calcutta, West Bengal, India. |
|  | Keynote Speaker<br>**Dr. Hab. Eng. Piotr Bojarczak**<br>Professor, Faculty of Transport, Electrical Engineering and Computer Sciences, Urad Casimir Pulaski University of Radom, POLAND. |
| | Keynote Speaker<br>**Dr. Moumita Mukherjee**<br>Professor and Dean(R&D), Adamas University,<br>Barasat, Kolkata, West Bengal, India. |
| | Session Chair<br>**Dr. Abhijeet U. Banode**<br>Head of Apple Product Development, DISH Wireless, Colorado, USA. |
| | Keynote Speaker<br>**Dr. Rabul Hossain**<br>Professor, department of ECE, National Institute of Technology, Silchar, Assam, India.<br>Talk Title: Gesture Based Computing in Monocular Vision through Deep Networks |
| | Keynote Speaker<br>**Dr. Jacopo Iannacci**<br>Center for Sensors and Devices (SD), Fondazione Bruno Kessler (FBK),Trento, Italy and Organizing Chair of Micro2025<br>Talk Title: Prospects of Micro/Nano technologies in the 6G scenario with focus on RF-MEMS. |

| | |
|---|---|
| | Invited Speaker<br>**Dr. Rajesh Dey**<br>Associate Professor, Department of ECE<br>Gopal Narayan Singh University ,Bihar, India |
| | Invited Speaker<br>**Dr. Manisha Guduri**<br>University of Louisiana, Lafayette, USA |
| | Session Chair<br>**Dr. Soumi Dutta**<br>Associate Professor, Department of CSE,<br>Sister Nivedita University, Kolkata, West Bengal, |
| | **Dr. Sabyasachi Bhattacharyya**<br>Department of ETC, Barak Valley Engineering College, Karimganj, Department of ETC, Residential Girls' Polytechnic, Golaghat, Govt. of Assam |
| | Invited Speaker<br>**Prof. Dr. Arabinda Das**<br>Professor, Department of Electrical Engineering, Jadavpur University, India |
| | Organizing Chair and Convenor<br>**Prof. Aditya Kumar Samanta**<br>Head, Department of Information Technology, Jalpaiguri Government Engineering College Jalpaiguri, West Bengal |
| | Executive Chairman<br>**Prof. Dulal Acharjee**<br>Editor, Journal of Microsystem Technologies, SCI, Springer.<br>Director, Applied Computer Technology, Kolkata. |
| | Conference Coordinator<br>**Mr. Arup Halder**<br>Scientist, Applied Computer Technology. |

# Advertisement:

## CCSN2025

14th International Conference on

**Computing, Communication and Sensor Networks**

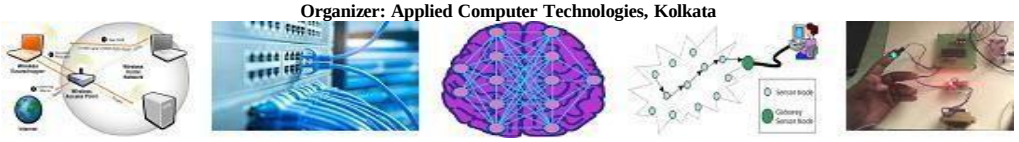
**(Physical mode / Online mode Conference)**

**Venue: Indira Gandhi Delhi Technical University for Women, New Delhi, India.**

**Website: actsoft.org/ccsn2025**

**Conference date: 12th to 13th September, 2025**

**Organizer: Applied Computer Technologies, Kolkata**



**Contacts:**

1. **Prof. D Acharjee**, Executive Chairman, CCSN2025, and Director, Applied Computer Technology, Kolkata, India. Email: ccsn2012@gmail.com, info@actsoft.org
2. **Prof. Brijesh Kumar**, General Chair, CCSN2025, and Director (Planning), & Professor (IT), IGDTUW, Delhi, India.
3. **Dr. Kanchan Sharma**, Organizing Chair, CCSN2025 Associate Professor, ECE, IGDTUW, Delhi, India.

---

## ESDA-2025

8th International Conference on

**Energy Systems, Drives and Automations**

**(Physical mode / Online mode Conference)**

**Venue: not decided**

**Website: Under Processing**

**Conference date: December, 2025**

**Organizer: Applied Computer Technologies**

**Contacts:**

1. **Dr. Sandip Chanda,** Associate Professor Department of EE, Ghani Khan Choudhury Institute of Engineering, West Bengal, India. Email: sandipee1978@gmail.com
2. **Prof. D Acharjee,** Executive Chairman, ESDA2024, and Director, Applied Computer Technology, Kolkata, India. Email: esda.conference@gmail.com, info@actsoft.org

# Program Schedule of Micro2025

<table>
<tr><th colspan="3">Day1 (10/05/2025) (All dates/times are as per IST )</th></tr>
<tr><td colspan="3">Inaugural Session:(10:00am-11:15am)Google Meet Link: meet.google.com/uwc-tctf-wnc<br>Chief Guest: Prof. (Dr.) Pranab Ghosh, Vice - Chancellor, Dakshin Dinajpur University, Balurghat , West Bengal, India(Offine)<br>Special Guest: Prof. Celia Shanaz, Professor, Department of EE, BUET, Dhaka, and Chairman OF IEEE, Bangladesh.(online)</td></tr>
<tr><td colspan="3">TEA BREAK(11:15am-11:30am)</td></tr>
<tr><td>Session 1A(11:30am-1:00pm)<br>Hall Name:<br>Google Meet<br>Link: meet.google.com/uwc- tctf-wnc<br>Keynote Talk:(11:30am-12:00pm) Prof. Abhijit Biswas<br>Professor, Department of Radio Physics and Electronics,<br>University of Calcutta, West Bengal, India. Talk Title: "Advances in Photovoltaics: Unlocking the Potential of Perovskite Solar Cells "<br>Paper Presentation IDs: 71, 111, 26, 69,<br>Session Chair:.<br>Session Expert: Dr. Goutam Kumar Panda, Professor, Department of EE, Jalpaiguri Government Engineering College, Jalpaiguri, West Bengal.<br>Session Expert: Prof.Rishu Chaujar, Professor, Department of Applied Physics, Delhi Technological University, Delhi, India.</td><td>Session 1B(11:30-1:00pm)<br>Hall Name:<br>Google Meet<br>Link: meet.google.com/nnr- ggtd-rcf<br>Keynote Talk:(11:30-12:00pm)Dr. Arabinda Das,<br>Professor , Department of Electrical Engineering,<br>Jadavpur University, Kolkata, West Bengal, India.<br>Talk Title: The EV revolution: Innovations Powering a Greener Tomorrow"<br>Paper Presentation IDs: 02, 41, 94, 107<br>Session Chair: Dr. Abhijeet U. Banode, Head of Apple Product Development,<br>DISH Wireless, Colorado, USA. (as online)<br>Session Chair: Dr. Bidrohi Bhattacharjee, Budge Budge Institute of Technology,<br>Department - Electrical Engineering.<br>Session Expert: Prof. Srinivasa Rao, Professor, Department of ECE, K L University, Guntur, Andhra Pradesh.</td><td>Session 1C(11:30am-1:00pm)<br>Hall Name:<br>Google Meet<br>Link: meet.google.com/zfi-pckt-jta<br>Paper Presentation IDs: 109, 65, 30, 100, 105, 23<br>Session Chair: Dr. K. L. Hasan,<br>Department of CSE, Aliah University, Kolkata, West Bengal.<br>Session Expert: Dr. Sonam Rewari, Department. Of ECE, Delhi Technological University, Delhi.<br>Session Expert: Dr. Mohd Faizul Bin Mohd Sabri, Professor, University of Malaya, Malaysia.</td></tr>
<tr><td>Session 2A(1:00pm-2:00pm)<br>Hall Name:<br>Google Meet<br>Link: meet.google.com/uwc- tctf-wnc<br>Invited Speaker: (1:00-1:30pm) Dr. Rabul Hossain,<br>Professor, department of ECE,<br>Nationl Institute of Technology, Silchar, Assam, India.<br>Talk Title: Gesture Based Computing in Monocular Vision through Deep Networks<br>Paper Presentation IDs: 21, 112, 3, 62,<br>Session Chair: Dr. Dipak Kumar Kole, Department of Computer Science and Engineering, Jalpaiguri Government Engineering College, Jalpaiguri, West Bengal-735102.<br>Session Expert: Prof. Celia Shahnaz, Professor, Department of Electrical and Electronics Engineering, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh and Chairman IEEE Bangladesh.</td><td>Session 2B(1:00pm-2:00pm)<br>Hall Name:<br>Google Meet<br>Link: meet.google.com/nnr- ggtd-rcf<br>Invited Speaker: Dr. Rajesh Dey<br>Associate Professor, Department of ECE<br>Gopal Narayan Singh University, Bihar, India<br>Paper Presentation IDs: 77, 13, 17, 67, 95, 101<br>Session Chair: Dr. Soumi Dutta,<br>Associate Professor, Department of CSE,<br>Sister Nivedita University, Kolkata, West Bengal,<br>Session Expert: Prof. Soma Barman (Mandal),<br>department of Radio Physics and Electronics, University of Calcutta,WB.(as Online) Session Expert: Dr. Nicholas Ude Eze, Department of Computer and Robotics, University of Nigeria Nsukka, Enugu State, Nigeria(as Online)</td><td>Session 2C(1:00pm-2:00pm)<br>Hall Name:<br>Google Meet<br>Link: meet.google.com/zfi-pckt-jta<br>Paper Presentation IDs: 12, 15, 16, 46, 84, 102, 25<br>Session Chair: Dr. Nitin Sharma,<br>Dept of ECE,<br>Maharaja Agrasen Institute of Technology(MAIT),<br>Rohini, Delhi.<br>Session Expert: Prof. Kamrul Alam Khan,<br>Vice- Chancellor,<br>Bangamata Sheikh Fojilatunnesa Mujib Science & Technology University,<br>Melandah, Jamalpur, Bangladesh.<br>Session Expert: Dr. Chandrima Mondal,<br>Department of ECE,<br>Jadavpur University, Kolkata, WB.</td></tr>
<tr><td colspan="3">2:00pm - 3:00pm: LUNCH BREAK</td></tr>
<tr><td>Session 3A(3:00pm-4:30pm)<br>Hall Name:<br>Google Meet<br>Link: meet.google.com/uwc- tctf-wnc<br>Invited Speaker: (3pm-3:30pm)<br>Dr. Jacoppo Iannacci,<br>Center for Sensor and Devices,<br>Fondazione Bruno Kessler, Trento, Italy.<br>Paper Presentation IDs: 33, 82, 90, 113, 89,<br>Session Chair: Dr. Usha Jain,<br>Manipal University, Jaipur, Rajasthan, India<br>Session Expert: Dr. Olga Jaksic,<br>Senior Research Associate, Technology and Metallurgy, ICTM, National Institute of the Republic of Serbia, Center of Microelectronic Technologies,<br>University of Belgrade, Serbia, (Europe)(as Online)</td><td>Session 3B(3:00pm-4:30pm)<br>Hall Name:<br>Google Meet<br>Link: meet.google.com/nnr- ggtd-rcf<br>Invited Speaker: (3pm-3:30pm) Prof. Kandarpa Kumar Sarma,<br>Professor and HOD, Department of ECE,<br>Gauhati University, Assam, India.<br>Talk Title: Role of AI in the wearable Healthcare Devices.<br>Paper Presentation IDs: 66,68,104,13<br>Session Chair: Dr. Jishan Mehedi, Head, Department of Electronics and Communication, Jalpaiguri Government Engineering College, Jalpaiguri, West Bengal and<br>Dr. Aprna Tripathi,<br>Asso. Professor, Manipal University, Jaipur, Rajasthan. (as online)<br>Session Expert: Dr. Marta Zurek-Mortka, Lukasiewicz Research Network - Institute for Sustainable Technologies, Department of Control Systems, Poland.</td><td>Session 3C(3:00pm-4:30pm)<br>Hall Name:<br>Google Meet<br>Link: meet.google.com/zfi-pckt-jta<br>Keynote Talk:(3:00-3:30pm)Prof. Piotr Bojarczak,<br>Professor, URad Casimair Pulski University of Radom, POLAND.<br>Paper Presentation IDs: 73, 81, 98, 114, 123<br>Session Chair: Dr. Sabyasachi Bhattacharya,<br>Asst. Professor, Department of ETC, Barak Valley Engineering College, Karimganj, Assam. (Online).<br>Session Expert: Dr.(Hab.) Jerzy Szymanski,<br>University Professor, EE and Computer Sciences,<br>Casimir Pulaski Radom University, Radom, Poland.(as Online)</td></tr>
</table>

<table>
<tr><th colspan="3">Day2 (11/05/2025)</th></tr>
<tr>
<td>Session 4A( 10:00am-12:00pm)<br>Hall Name:<br>Google Meet<br>Link: meet.google.com/uwc-tctf-wnc<br>Invited Speaker: (10:00-10:30pm)Dr. Manisha Guduri<br>University of Louisiana, Lafayette, USA<br>Paper Presentation IDs: 20, 35, 43, 80, 110<br>Session Chair:<br>Balaji Shesharao Ingole, Project Manager at Gainwell technologies, WI, USA.<br>Session Expert:<br>Dr. (Mrs.) Reshmi Maity,<br>Associate Professor, Dept. of ECE, Mizoram University (A Central University, Govt. of India), Tanhril, Aizawl,</td>
<td>Session 4B( 10:00am-12:00pm)<br>Hall Name:<br>Google Meet<br>Link: meet.google.com/nnr-ggtd-rcf<br>Invited Speaker: (10:00-10:30pm)<br>Paper Presentation IDs: 37, 45, 57, 121, 96, 99,63<br>Session Chair: Dr. E. Kusuma Kumari,<br>Professor & Head<br>ECE Department (NBA Accredited)<br>Sri Vasavi Engineering College - Autonomous- (A8), West Godavari Dt. Andhra Pradesh<br>Session Expert: Dr. Ahmad Saifizul Abdullah, University of Malaya, Kuala Lumpur, Malaysia.(Online)</td>
<td>Session 4C(10:00pm-12:00pm)<br>Hall Name:<br>Google Meet<br>Link: meet.google.com/zfi- pckt-jta<br>Paper Presentation IDs: 125, 122, 115,116<br>Session Chair: Prof. Kovuri Karthik,<br>Professor and Dean, School of Engineering and Techology, Assam Kaziranga University.<br>Session Expert: Dr. P. Usha, Professor, EEE department, Dayananda Sagar College of Engineering, Bangalore.<br>Session Expert: Dr. Duvvuri B K Kamesh , Dean Accridation & Professor, MLR Institute of Technology, Dundigal, Hyderabad, Telangana.</td>
</tr>
<tr>
<td>Session 5A( 12:00pm-2:00pm)<br>Hall Name:<br>Google Meet<br>Link: meet.google.com/uwc-tctf-wnc<br>Invited Speaker: (12:00-12:30pm)<br>Dr. Gaurav Trivedi<br>Associate Professor, Department of Electrical Engineering,<br>Indian Institute of Technology, Guwahati, Assam, India<br>Paper Presentation IDs: 52, 72, 93, 117,130<br>Session Chair: Dr. Kanchan Sharma, department of ECE,<br>Indira Gandhi Delhi Technical University for Women, Delhi.<br>Session Expert: Dr. Soupayan Mitra, Professor & Head, Department of Mechanical Engineering, Jalpaiguri Govt. Engineering College, West Bengal.</td>
<td>Session 5B( 12:00pm-2:00pm)<br>Hall Name:<br>Google Meet<br>Link: meet.google.com/nnr-ggtd-rcf<br>Invited Speaker: (12:00-12:30pm):<br>Dr. Aditya R Chandre<br>Research Scientist and CTO Priority Technologies, Delaware, USA.<br>Paper Presentation IDs: 18, 49, 83,92,44,139,136<br>Session Chair: Dr. K.L. Hasan,<br>Department of CSE, Aliah University, Kolkata, West Bengal.<br>Session Expert: Mr. Rajshaker Reddy Kankula, Senior Electrical Engineer, Abbott Laboratories, Los Angeles, CA., USA.</td>
<td>Session 5C(12:00pm-2:00pm)<br>Hall Name:<br>Google Meet<br>Link: meet.google.com/zfi-pckt- jta<br>Paper Presentation IDs: 85, 86, 97, 78,124,127,135,104<br>Session Chair: Prof. (Dr.) Yaduvir Singh,<br>School of Engineering (SoE), Harcourt Butler Technical University (HBTU),(A state technical university of Government of Uttar Pradesh), Kanpur Uttar Pradesh-208002<br>Session Expert: Dr. Kapil Chaudhary,<br>Department Of CSE, BTKIT,(An Autonomous Institute of Govt.of Uttrakhand).<br>Session Expert: Dr. Karol Kuczyński,<br>Warsaw University of Technology, Faculty of Electronics and Information Technology, Institute of Radioelectronics and Multimedia Technology Nowowiejska street, Warszawa, Poland.</td>
</tr>
<tr><td colspan="3">2:00pm - 3:00pm: LUNCH BREAK</td></tr>
<tr><td colspan="3">VALEDICTORY and Certificate distributions( 3pm-4:00pm)<br>Hall Name:<br>Google Meet Link: meet.google.com/uwc-tctf-wnc</td></tr>
<tr><td colspan="3">(4:00pm) TEA and CLOSE OF MICRO2025</td></tr>
</table>

# Abstract Proceeding of Micro2025

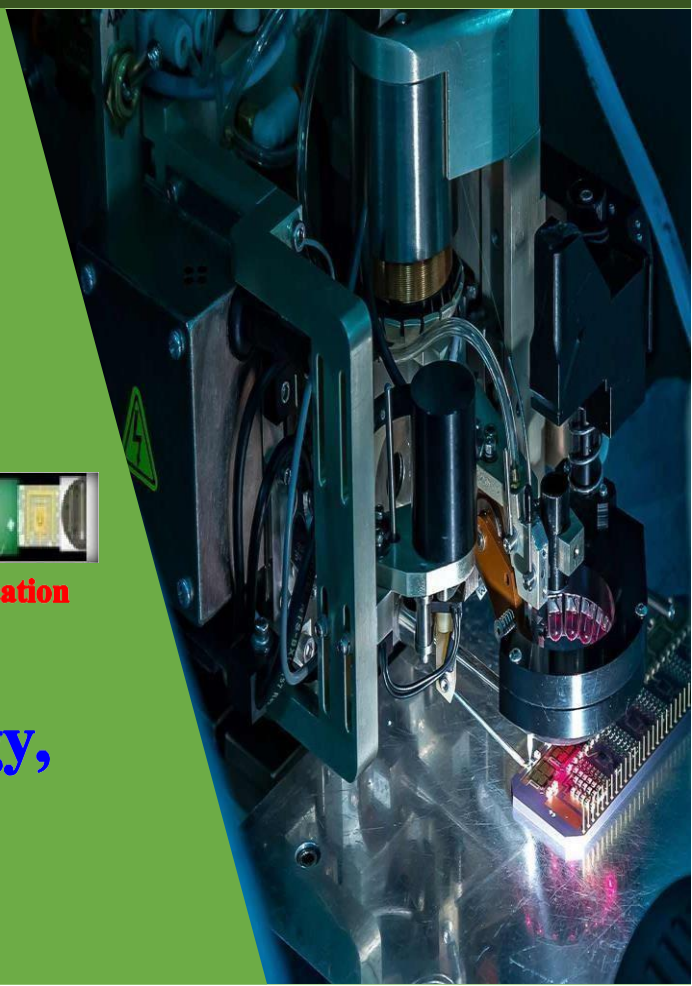
## Editors:


**Prof. Aditya Kumar Samanta**
**Dr. Thamarai Muthusamy**
**Mr. Arup Halder**

Nanomaterials

Optoelectronics

Chip Fabrication



**Joint-Organizer:**

**Applied Computer Technology,**
**Kolkata, West Bengal, India.**