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ECE EXPEDITION



NEW YEAR 2024

BIRLA INSTITUTE OF TECHNOLOGY MESRA
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

www.bitmesra.ac.in

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EDITOR IN CHIEF'S DESK MESSAGE



Dear Readers,

Seeing this third issue of the departmental newsletter 'ECE Expedition' is a real pleasure for the editorial team. I express my heartfelt thanks to all the members of the editorial team for their sincere efforts to prepare and publish this issue. I take this opportunity to congratulate everyone in the department for their achievements and thank them for their contributions to the 'ECE Expedition.'

Every one of us always has something worth sharing. A common platform for sharing not only provides an opportunity to share our notable achievements, contributions, and scholarly interests but also inspires others to widen their views and review their capabilities to contribute towards newer possibilities. 'ECE Expedition' provides such a platform. It is the contributions only that make us feel fulfilled, be it in the domain of teaching, research, innovation, projects, product development, entrepreneurship, outreach activities, collaborations, expert talks, contribution to the broader scientific community, organizing workshops, seminars and conferences.

The worthy faculty members of the department have always been blessed with bright students who are prepared to make significant contributions to nation-building. Their achievements are also brought into light through 'ECE Expedition'.

It is worth mentioning that the 'ECE Expedition' is truly bringing visibility towards the journey of the department and helping us archive notable activities and valuable information. It will continue doing so. The editorial team will keep working objectively towards this end.

I am thankful to all the members of the department for their involvement and support. Your feedback and suggestions will be truly appreciated.

Thank you.

EDITORIAL TEAM



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ECE EXPEDITIONS

DOWN THE MEMORY LANE

**BY DR. CHANDREYEE SARKAR,
EX-ASST.PROF, ECE**

“

September 2021, marked the commencement of a fulfilling chapter in my professional life as I joined the esteemed Birla Institute of Technology, Mesra, as an Assistant Professor in the Department of Electronics and Communications Engineering. On December 2023, as I bid farewell to the institution, I reflect upon a journey teeming with growth, discovery, and shared knowledge.

Teaching across five semesters, my experience at BIT Mesra has been a kaleidoscope of academic pursuits, with an immersive engagement at all levels — from undergraduate to postgraduate and doctoral courses. Each semester was a unique voyage, navigating through the intricate landscape of electronics and communications engineering, and enriching the lives of students under my tutelage. I found joy in laying the foundations of knowledge for budding engineers. The enthusiasm of these young minds, coupled with their thirst for understanding, injected each lecture with vibrancy.

Beyond the confines of the classroom, BIT Mesra's commitment to research and innovation provided a fertile ground for exploration. Guiding scholars through advanced coursework was both a challenge and a privilege, fostering an environment where curiosity thrived. Also, collaborating with fellow faculty members on cutting-edge projects broadened my horizons.

”





“

My tenure at BIT Mesra has been more than a professional obligation; it has been a journey of self-discovery.

As I step into a new chapter of my career at USA, the memories forged and relationships nurtured at BIT Mesra will continue to resonate, shaping my trajectory as an educator and researcher. The memories forged at BIT Mesra will undoubtedly resonate in my academic pursuits for years to come.

”

TECHNOLOGY VISION

THE EVOLUTION OF AN INSTRUMENTATION AMPLIFIER: AN OVERVIEW

Divya Sharma (PHD/EC/10053/20), ECE Department

Whether it's a vision-correction medical instrument or factory press, INAs offer an excellent way to amplify microvolt-level sensor signals while simultaneously rejecting high common-mode signals.

Instrumentation amplifiers are a fundamental component in electronic circuits, serving a critical role in measuring and processing analog signals. Their evolution over the years has been marked by advancements in technology and a deepening understanding of their applications. This overview delves into the historical progression and contemporary state of instrumentation amplifiers, shedding light on their significance in various fields.

In the past, the term instrumentation amplifier (INA) was often misused, referring to the application rather than the device's architecture. INAs are related to op amps, in that they're based on the same architecture, but an INA is a specialized version of an op amp. INAs are specifically designed and used for their high differential gain to amplify microvolt-level sensor signals while simultaneously rejecting high-common-mode signals that can be several volts. This is important since some sensors produce a relatively small change in voltage or current, and this small change must be accurately captured.

Fig. 1 depicts the three operational amplifier based instrumentation amplifier. The input-stage amplifiers also provide high impedance, which minimizes loading of the sensors. The gain-setting resistor (R_G) allows the designer to select any gain within the operating region of the device (typically 1 V/V to 1000 V/V). The output stage is a traditional difference amplifier. The ratio of internal resistors, R_2/R_1 , sets the gain of the internal difference amplifier, which is typically $G = 1$ V/V for most instrumentation amplifiers (the overall gain is driven by the amplifier in the first stage). The balanced signal paths from the input to the output yield excellent CMRR.

Let's consider a few applications that benefit from INAs such as medical instruments (ECGs, EEG, EMG etc), Industrial Control and Automation (precision measurements), Telecommunications, Aerospace and Defense (sensor interfaces and data acquisition).

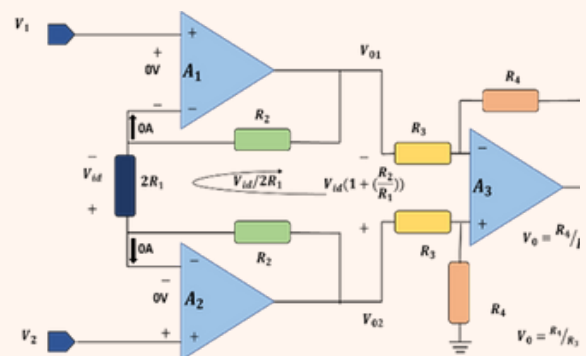


Fig 1. Three Operational amplifier based INA

TECHNOLOGY VISION

High accuracy is crucial, and other equipment in the operating room can't be allowed to compromise the sensor signals and cause unexpected results. Another example is a factory press. These machines apply thousands of pounds of force to bend metal into shapes. Using sensors, these machines are designed to stop if they detect a human hand. In this example, electrical noise from other factory equipment mustn't cause interference that could lead to a malfunction. In both cases above, the first step in the journey of the sensor

signal is through an instrumentation amplifier. The tiny sensor signals must be accurately amplified in all environments. Instrumentation amplifiers are specially designed to do exactly that to accurately amplify small signals resulting in high gain accuracy in an electrically noisy environment. Other considerations further enhance the performance of an INA. Low power consumption is important to extend battery life. A low operating voltage allows the battery to be used over more of its depletion curve, extending battery life. A wide input voltage range allows compatibility with more sensors and impedance matching at the input contributes to the seamless interface to sensors

In Fig. 2, the block diagram of the sensor interface to INA is depicted. The differential voltage (V_{id}) from the readout system is amplified by the amplifier (A) and given to an Analog to Digital Converter (ADC). ADC converts the information to a digital domain. This digital data can be processed by a micro-controller. As typical sensor signals are very small (in μV), an amplifier A is used to increase the signal before passing it to ADC. The main functions of the Instrumentation Amplifier in this system are to:

- (a) Amplify the differential voltage (V_{id}).
- (b) Reject the sensor common mode voltage (V_{CM}).
- (c) Level shift to ADC reference voltage (V_{ref}).

Key Characteristics and Advantages

Instrumentation amplifiers are commended for several important features that distinguish them from conventional op-amps:

- **High Common-Mode Rejection Ratio (CMRR):** Perhaps the most distinguishing feature, in-amps excel at rejecting common-mode signals, which are noise or interference present in both the inverting and non-inverting inputs. This makes them ideal for applications where signal accuracy is paramount.

- **Differential Gain:** In-amps provide the ability to amplify the difference between two input signals while rejecting any common-mode components. This is essential in scenarios where the desired signal is embedded in noise.

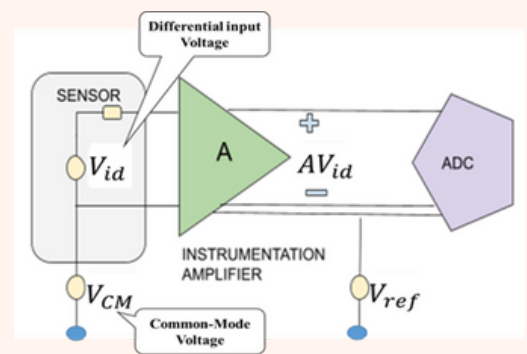


Fig 2. Block diagram of Sensor interface to INA

TECHNOLOGY VISION

•**High Input Impedance:** Instrumentation amplifiers typically exhibit high input impedance, reducing the loading effect on the signal source.

•**Gain Adjustment:** Many in-amp designs allow for easy adjustment of gain, making them versatile for a wide range of applications.

Historical Milestones

With an endless number of consumer, medical, and industrial applications, designs have evolved over the years to take advantage of the performance benefits offered by INAs. The evolution of instrumentation amplifiers has seen several important milestones:

Early Development: The concept of the instrumentation amplifier began with the basic three-op-amp differential amplifier circuit. Early in-amp designs used discrete components and were limited in terms of gain, bandwidth, and precision.

Integrated Circuit (IC) Era: With the advent of integrated circuits in the 1960s and 1970s, instrumentation amplifiers transitioned to compact and more precise IC-based designs. This led to significant improvements in performance, allowing for a broader range of applications.

Digital Signal Processing Integration: In the modern era, instrumentation amplifiers have integrated seamlessly with digital signal processing (DSP) systems. This convergence has enabled advanced filtering, calibration, and signal conditioning, expanding their applications in fields like telecommunications, medical devices, and industrial automation.

Challenges and Future Trends

Despite their wide-ranging applications, instrumentation amplifiers still face challenges, such as power consumption, size, and cost. The ongoing trend is to develop more compact, low-power, and cost-effective in-amp solutions while maintaining or improving their performance.

Furthermore, advancements in integrated circuits, MEMS technology, and nanoscale fabrication techniques are expected to drive the evolution of instrumentation amplifiers. These developments will result in even higher precision and integration with digital systems, ensuring that instrumentation amplifiers continue to be a vital component in various emerging technologies.

Conclusion

In conclusion, the evolution of instrumentation amplifiers has been characterized by a journey from discrete components to highly integrated, high-performance ICs. These devices have significantly contributed to the advancement of technology in fields as diverse as healthcare, telecommunications, and industrial automation. With ongoing developments and innovations, the future of instrumentation amplifiers promises to be both exciting and transformative.

DEPARTMENTAL ACTIVITIES

STUDENT INDUCTION PROGRAMME



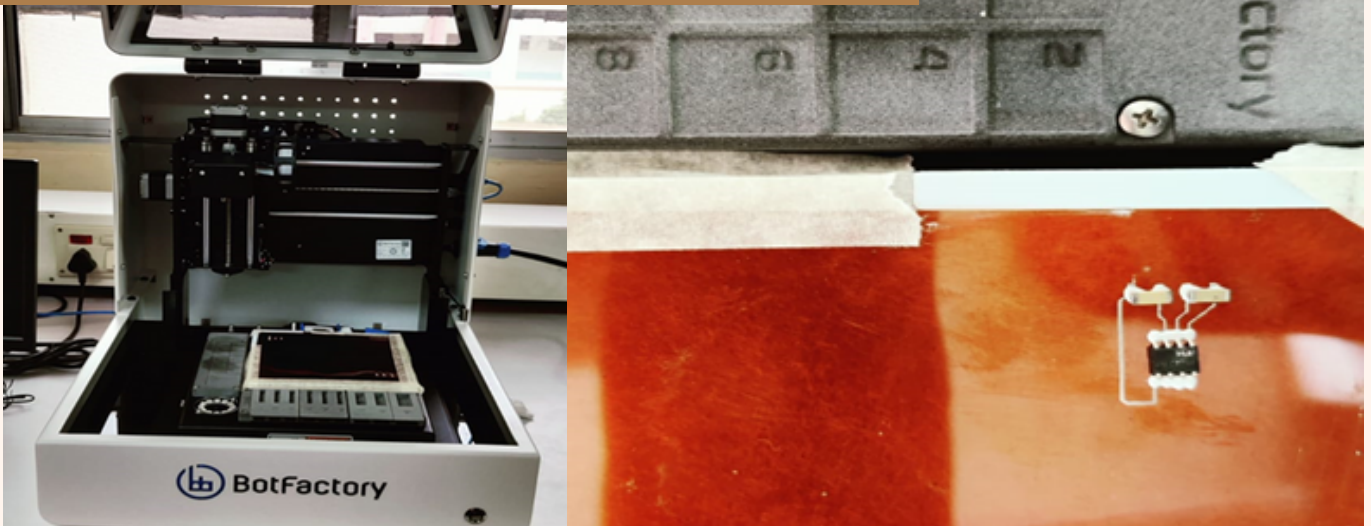
Dr. Sanjay Kumar conducted Students' Induction Program for the newly admitted UG and PG students of MO 2023 session, BIT Mesra, Ranchi, 01st to 22nd Sep 2023.

VISIT OF CHAIRMAN TO BIT AND DEPARTMENT OF ECE



The communication Lab of the Department in collaboration with Chandhar Research Labs, Chennai arranged a demonstration session on 5NR drone with 4G support and configuration with 5G on 24th April, 2023.

INSTALLATION OF BOTFACTORY PRINTER



BotFactory SV2 Circuit Printer was installed in ECE Department. BotFactory SV2 Circuit Printer allows users to print functional electronic circuits directly onto various substrates. It is suitable for a wide range of manufacturing needs, such as rapid prototyping, fabricating custom PCBs for robotics, automation, IoT applications, wearable electronics, and many more.

INAUGURATION FUNCTION OF 5G LAB



देश के 100 तकनीकी संस्थानों में बीआइटी मेसरा का चयन
बीआइटी मेसरा में स्थापित
होगी 5-जी यूज केस लैब

राष्ट्रपति प्रशिक्षण संस्थान

बीआइटी मेसरा में अगले रैंड
 देश में '5-जी यूज केस लैब' की
 स्थापना होगी. लैब का उद्देश्य
 स्थापित हो रहा है. लैब की स्थापना
 प्रगति मैदान, नई दिल्ली में होगी.
 प्रधानमंत्री नरेंद्र मोदी ने
 बीआइटी मेसरा में 5-जी
 यूज केस लैब की स्थापना का
 ऐलान किया. लैब का उद्देश्य
 5-जी के उपयोग के विभिन्न
 क्षेत्रों में अनुसंधान और
 विकास करना होगा. लैब
 का उद्देश्य 5-जी के उपयोग
 के विभिन्न क्षेत्रों में अनुसंधान
 और विकास करना होगा.
 लैब का उद्देश्य 5-जी के
 उपयोग के विभिन्न क्षेत्रों में
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 करना होगा. लैब का उद्देश्य
 5-जी के उपयोग के विभिन्न
 क्षेत्रों में अनुसंधान और
 विकास करना होगा.

5-जी से मशीनों के बीच की कनेक्टिविटी को मिलेगी मजबूती
बीआइटी मेसरा का आर्कोत्सव
तीन और चार नवंबर को

राष्ट्रपति प्रशिक्षण संस्थान

बीआइटी मेसरा का
 आर्कोत्सव तीन और चार
 नवंबर को होगा. लैब का
 उद्देश्य 5-जी के उपयोग
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 विकास करना होगा.

Dr. Sanjeet Kumar and Dr. G. K. Mishra coordinated a Video Conferencing Session to participate in the Inaugural function of India Mobile Congress-2023 held in Bharat Mandapam, Pragati Maidan, New Delhi, where sanctioning of 5G use cases lab to BIT Mesra, Ranchi was declared by the honorable PM Sri Narendra Modi.

INDIA MOBILE CONGRESS 2023

G. K. Mishra and Dr. Sanjeet Kumar were the Nodal Officers for the Online centre, BIT Mesra in the India Mobile Congress 2023 inaugurated on 27 Oct'23.

Small antenna expert from city to act as consultant on BEL projects

Jaideep Deogharia
@timesgroup.com

Ranchi: Jharkhand-based scientist Dr Srikanta Pal, who is known for inventing the world's smallest antenna and having a patent in his name, has been appointed consultant to Bharat Electronics Limited, the Navratna PSU of the ministry of defence.

Pal has to his credit four patents in electronics and communication and the distinction of repairing two of the world's largest radio telescopes — the US-based Green Bank Telescope (GBT) and the UK-based Jodrell Bank Telescope (JBT) engaged in the study of cosmic waves and pulsars. Eminent

Associate professor in the department of communication and electronics engineering, Pal received a letter from BEL on Thurs-



Dr Srikanta Pal is known for inventing the world's smallest antenna and having its patent in his name

day informing him of his selection as R&D consultant for BEL in the technology areas related to antenna and feed systems. "Based on project requirement, concerned BEL units/SBUs/labs will contact you for initiating development of projects on consultancy (forma-

tion of specs and design assistance etc) basis in the above technology areas," the letter read.

Dr Pal said it would be a win-win situation for both. "BIT Mesra is an academic institution where scope for high-end research is limited whereas BEL is into research and manufacturing of radar and communication-related equipment where I can use my acumen and also guide research scholars using their state-of-the-art laboratory," he said.

BEL under the ministry of defence is known to manufacture high-end communication equipment used in satellites and finds deployment in Indian Space Research Organization (ISRO) and Defence Research and Development Organisation (DRDO).

Soon after being awarded patent for the world's smallest planar UWB and

OAM antenna, Pal had received offers for collaboration from private individuals, which he turned down. "Working for private firms meant that my scope for research and experiments would be limited by commercial interests so I humbly refused the offers. BEL for that matter is a prestigious Navratna company of the ministry of defence where working would be a pleasure," he said.

Having obtained a doctoral degree from Oxford University in 2003, Pal has worked at IIT Roorkee and IIT Delhi but to pursue his interest in research he chose BIT Mesra as the final destination. "I will continue here at BIT which gave me ample opportunity to continue with my research and based on the projects offered by BEL I would be delivering consultancy from time to time," he said.

R&D CONSULTANT OF BEL

Prof. S. Pal has been selected as R&D consultant of BEL.



JHARKHAND SEVA RATNA AWARD 2023

Prof. S. Pal has been felicitated with "JHARKHAND SEVA RATNA AWARD 2023" (in Science Seva), Vishwa Seva Parishad, Regd. State Govt., Central Govt., and S.C.I. approved NGO., 20th Oct 2023.

उत्कृष्ट कार्य करने पर मिला सेवा रत्न सम्मान

बधाई, शिव किशोर शर्मा

कार्यक्रम

रांची, संवाददाता। विश्व सेवा परिषद एवं एनएसएस रांची विधि के संयुक्त तत्वावधान में विधि के लीगल स्टडी सभागार में झारखंड सेवा रत्न अवार्ड-2023 और समाज सेवा रत्न अवार्ड-2023 का आयोजन किया गया।

इस समारोह में अलग-अलग क्षेत्रों में उत्कृष्ट कार्य करने वाले लोगों को शील, मोमेंटो व प्रशस्ति पत्र देकर सम्मानित किया गया। मुख्य अतिथि सांसद संजय सेठ ने कहा कि समाज सेवा करना एक पुण्य का काम है। यही, विशिष्ट अतिथि विधायक सीपी सिंह ने



आर्यु के लीगल स्टडी सभागार में शुक्रवार को सेवा रत्न अवार्ड से सम्मानित लोग।

सभी को बधाई व शुभकामनाएं दीं। कार्यक्रम में भाजपा की राष्ट्रीय मंत्री डॉ आशा लकड़ा, पद्मश्री मधु संसरी, पूर्व सांसद रामट्टल चौधरी, झारखंड

स्टेट ओपन यूनिवर्सिटी के कुलपति प्रोफेसर डॉ त्रिवेणी नाथ साहू, परिषद के संस्थापक अध्यक्ष डॉ बीबी राज, परिषद के राष्ट्रीय अध्यक्ष डॉ सुबास

ये हुए सम्मानित

- प्रो श्रीकांत पाल, वैज्ञानिक बीआईटी मेसरा, रांची, विज्ञान सेवा सम्मान
- डॉ अभिषेक सिंह, नेत्र विशेषज्ञ, चिकित्सा सेवा क्षेत्र
- मो गौश आलम, (शिक्षक), शिक्षक सेवा सुजीत कुमार केसरी
- विपिन कुमार, प्रतियोगी शिक्षा प्रबंधन, प्रतियोगी शिक्षा
- मनीष बरवार, गायन नृत्य एवं सांस्कृतिक सेवा क्षेत्र

साहू, झारखंड प्रदेश अध्यक्ष राहुल राज, परिषद के कोषाध्यक्ष सुरेश कुमार देवता, अंतराष्ट्रीय संयोजक डॉ पंकज सेठ, रूप लक्ष्मी मुंडा उपस्थित थे।

VISIT OF HARUYUKI HIRATANI, CEO, FUTURE CREATION COMPANY, TAKASAGO FLUIDICS SYSTEMS AND TOSHIHIKO KOMURA



Haruyuki Hiratani, CEO, Future Creation Company, Takasago Fluidics Systems and Toshihiko Komura visited Birla Institute of Technology for discussions on their products and future collaboration on 25th September 2023. Takasago Fluidics Systems is a Japan-based based company.

The core strengths of Takasago Fluidic Systems (TFS) are miniaturization, customization, and integration. They not only supply parts to major global analytical equipment manufacturers but also get involved in technically demanding projects. Discussions took place for their help and collaboration for developing application-based test benches for new products and the development of wearable drug delivery systems. The meeting was organised by Dr. Richa Mishra and attended by Prof. S.S. Solanki, Dr. N. Chattoraj, Dr. S.S. Sahu, Dr. K. Mahto, Dr. S.S. Tripathy and Dr. P. Saxena and Dr. R. Mishra.

ACHIEVEMENTS

"OroScreen"-A smartphone-based Oral cancer screening App released on World No Tobacco Day in RIMS for data collection. It was developed by our UG student Samridhi Kumari (BTECH/10506/19) under the guidance of Dr. Priyank Saxena.



CONSULTANCY:

- a) Dr. G. K. Mishra received consultancy project on "Development of Range Extender (Repeater) for Walkie-Talkie communication system" on 10.05.2023 of Rs. 2 Lakhs from MIMEC Electronics PVT LTD, Namkum Industrial Area, Namkum, Ranchi.
- b) Dr. Priyank Saxena received a consultancy project for the "Development of fire announcement system for mining applications" of Rs. 2 Lakhs from MIMEC Electronics Pvt. Ltd., Ranchi.

PROJECTS

SETTING UP 5G USE CASE LAB

AGENCY: DEPARTMENT OF TELECOMMUNICATIONS (DOT). GOVT OF INDIA

DATE: DEC, 2023 – DEC, 2027 (4 YRS)

Department of ECE has been selected to set up 5G use case lab in line with the budget announcement and funded by DoT with an objective to build competencies and engagement in 5G technologies for students & startup communities. The DoT shall fund 80% of CAPEX for the Lab Setup and 100% of OPEX expenses for the subsequent 4 years. The institution has to contribute for the remaining 20% of the CAPEX as per the price discovery from financial bids.

At present following are the team members

Dr. Sanjay Kumar, Assoc. Prof., Dept of ECE (Principal Investigator)

Dr. Sanjeet Kumar, Asst. Prof., Dept of ECE (Co-PI)

Dr. Gajendra Kant Mishra, Asst. Prof., Dept of ECE (Co-PI)

Dr. Neela Chatteraj Assoc. Prof., Dept of ECE (Member)

Dr. S S Sahu, Assoc. Prof., Dept of ECE (Member)

Dr. D. K. Upadhyay Asst. Prof., Dept of ECE (Member)

Dr. Priyank Saxena Asst. Prof., Dept of ECE (Member)

Dr. K. K. Senapati Asst. Prof., Dept of CSE (Member)

Dr. Deepak Kumar Asst. Prof., Dept of EEE (Member)

STATE-OF-THE-ART UWB ANTENNA R&D SOLUTION HUB

Dr. S. Pal submitted a project proposal entitled “Establishment of a state-of-the-art R&D solution hub on Ultra-Wideband (UWB) antennas design, development, fabrication, and measurement (amplitude and phase) in Jharkhand” to His Excellency, The Governor of Jharkhand in a personal meeting on 24/08/2023. The budget of the project is INR 47,78,92,880.

AI BASED INTERACTIVE TOY FOR CHILD SURVEILLANCE

Dr. G. K. Mishra received project grant of Rs 5,69,000 on “AI based interactive toy for Child surveillance” in September 2023 from NMICPS.

RECENT PUBLICATIONS (JOURNALS)

01

CIRCUIT-LEVEL
TECHNIQUE TO DESIGN
ROBUST SRAM CELL
AGAINST

Monalisa Pandey and **Aminul Islam**, "Circuit-Level Technique to Design Robust SRAM Cell Against," in Microsystem Technologies-Micro-and Nanosystems-Information Storage and Processing Systems (proofread has been done on 02/11/2023) SCI Journal

02

VARIOUS EXPRESSIONS
OVER NOVEL
K-M/INVERSE GAMMA
LOS SHADOWED FADING

Shilpi Gadi, S. Pratap Singh, **Sanjay Kumar**, Ghanshyam Singh, Anurag Singh Baghel, "Various Expressions over Novel k- μ /Inverse Gamma LOS Shadowed Fading", International Journal of Wireless Personal Communications, Volume 132, Issue 3. Pg 863-1886, Aug, 2023.

03

INKJET-PRINTED
BROADBAND FSS-
BASED ABSORBER WITH
IMPROVED
ABSORPTION
CHARACTERISTICS

M. M. Tirkey and **N. Gupta**, "Inkjet-printed broadband FSS-based absorber with improved absorption characteristics," in International Journal of Microwave and Wireless Technologies, 1-9, 2023, doi:10.1017/S175907872300051X

04

COMPACT SELF-
ISOLATED EXTREMELY
LOW ECC FOLDED-SIW
BASED SLOT MIMO
ANTENNA FOR 5G
APPLICATION

A. K. Singh and **S. Pal**, "Compact Self-Isolated Extremely Low ECC Folded-SIW Based Slot MIMO Antenna for 5G Application," in IEEE Antennas and Wireless Propagation Letters DOI: 10.1109/LAWP.2023.3321065, 02 October 2023 (Early Access).

05

EFFICIENT
RESTORATION OF
MAGNETIC RESONANCE
IMAGES CORRUPTED
WITH IMPULSE NOISE
USING SPATIAL
CONSTRAINTS BASED
FUZZY DECISION FILTER

Priyank Saxena and R. S. Kumar, "Efficient Restoration of Magnetic Resonance Images Corrupted with Impulse Noise using Spatial Constraints based Fuzzy Decision Filter," Journal of Scientific & Industrial Research, Vol. 82, pp. 642-651, June 2023

06

PERFORMANCE
ANALYSIS OF IRS-ASSIST
WIRELESS
COMMUNICATION
SYSTEM WITH
ALAMOUTI TRANSMIT
DIVERSITY SCHEME

Moumita Jana, **Sanjay Kumar** "Performance analysis of IRS-assist wireless communication system with Alamouti transmit diversity scheme", AEUE - International Journal of Electronics and Communications, Volume 171, Pg 1-10, Sep 2023.

RECENT PUBLICATIONS (JOURNALS)

07

MILLIMETER-WAVE
BROADBAND
ANTENNA: A REVIEW
AND CURRENT STATE
OF THE ART

Sneha Tiwari and
Srikanta Pal,

"Millimeter-Wave
Broadband Antenna: A
Review and Current
State of the Art",
Microwave Review,

10

A NOVEL APPROACH OF
RECONFIGURABLE
BAND-PASS FILTER
WITH ACTIVELY
LOADED BANDWIDTH
FOR ULTRAWIDE WI-FI
COMMUNICATION

S. S. Sharma, **A. K. Tiwary** & R. Kumar, "A
Novel Approach of
Reconfigurable Band-
pass Filter with Actively
Loaded Bandwidth for
Ultrawide Wi-Fi
Communication",
Circuits, Systems and
Signal Processing,
Springer, pp. 1-12, 2023.

08

A NOVEL SLOTTED
DUMBBELL-SHAPED
DIELECTRIC RESONATOR
ANTENNA WITH
ENHANCED BANDWIDTH
FOR C-BAND AND 5G
SUB-6 GHZ
APPLICATIONS

Ravi Chandra, **Dileep Kumar Upadhyay**, "A
novel slotted dumbbell-
shaped dielectric
resonator antenna with
enhanced bandwidth for
C-band and 5G sub-6
GHz applications"
Frequenz, Published
online on 31st Oct 2023.

11

A FRACTAL MONOPOLE
ANTENNA WITH DUAL
POLARIZATION
RECONFIGURABLE
CHARACTERISTICS FOR
X-BAND APPLICATIONS

Sashi Shankar, **Dileep Kumar Upadhyay**, "A
Fractal Monopole
Antenna with Dual
Polarization
Reconfigurable
Characteristics for X-
Band Applications," IEEE
Access, Vol. 11, pp.
95667-95680, Sept.
2023. (SCIE)

09

MICROWAVE GROOVED
SRR SENSOR FOR
DETECTING LOW
CONCENTRATION
ETHANOL-BLENDED
PETROL

D. Prakash and **N. Gupta**, "Microwave
Grooved SRR Sensor for
Detecting Low
Concentration Ethanol-
Blended Petrol," in IEEE
Sensors Journal, vol. 23,
no. 14, pp. 15544-15551,
15 July 2023

12

INVESTIGATION ON
FRACTIONAL
BANDWIDTH
ENHANCEMENT OF A
RESONANT ABSORBER

M. M. Tirkey and **N. Gupta**, "Investigation on
Fractional Bandwidth
Enhancement of a
Resonant Absorber," in
IEEE Electromagnetic
Compatibility Magazine,
vol. 12, no. 2, pp. 63-67,
2nd Quarter 2023, doi:
10.1109/MEMC.2023.10
201437.

RECENT PUBLICATIONS (JOURNALS)

13

CATARACT DETECTION AND VISUALIZATION BASED ON MULTI-SCALE DEEP FEATURES BY RINET TUNED WITH CYCLIC LEARNING RATE

HYPERPARAMETER

1. Pammi Kumari and **Priyank Saxena**,

"Cataract detection and visualization based on multi-scale deep features by RINet tuned with cyclic learning rate hyperparameter."

Biomedical Signal Processing and Control (September 2023)

14

DISEASE LOCALIZATION AND ITS PREDICTION FROM RETINAL FUNDUS IMAGES USING EXPLICITLY DESIGNED DEEP LEARNING ARCHITECTURE

Pammi Kumari and **Priyank Saxena**

"Disease localization and its prediction from retinal fundus images using explicitly designed deep learning architecture",

Multimedia Tools & Applications (September 2023), DOI:

10.1007/s11042-023-16585-2

15

BREAST CANCER AND PROSTATE CANCER DETECTION CONSIDERING TRANSCONDUCTANCE GENERATION FACTOR (GM/IDS) AS A SENSING METRIC FOR III-V GATE-ALL-AROUND TUNNEL FET BIOSENSOR

Pankaj Kumar, and **Kalyan Koley** "Breast Cancer and Prostate Cancer Detection

Considering Transconductance Generation Factor (gm/IDS) as a Sensing Metric for III-V Gate-all-around Tunnel FET Biosensor," IEEE Sensors Journal, Volume - 23, Issue - 19, Page 22723 - 22730, August 2023

RECENT PUBLICATIONS (CONFERENCE)

01

MILLIMETER-WAVE
BROADBAND
ANTENNA: A CHANNEL
CAPACITY FOR IRS-
ASSIST WIRELESS
COMMUNICATION
SYSTEM FOR 5G AND
BEYOND

M Jana, A Das, **Sanjay Kumar**, 3rd IEEE Conference on Applied Signal Processing (ASPCON 2023), Haldia Institute of Technology, Haldia, W.B, 23-24 Nov, 2023.

02

SPEECH SIGNAL
ANALYSIS USING HYBRID
FEATURE EXTRACTION
TECHNIQUE FOR
PARKINSON'S DISEASE
PREDICTION

Pandit Vivek Kumar
Pandey, **Sitanshu
Sekhar Sahu**,
International Conference
on Data science and
Applications, 15 July
2023.

03

AUTOMATED DETECTION
OF ALZHEIMER'S USING
TRANSFER LEARNING
MODELS BASED ON THE
MOTION SENSOR DATA

Junaid Gouher, Sushmita
Upadhyay, **Sanjaya
Shankar Tripathy**,
Priyank Saxena, in
International Conference
on Data Science and
Intelligent Applications
ICDSIA-2023. (presented
by PG student)

04

CLASSIFICATION OF
TEMPERATURE-STRAIN
EFFECTS ON APODIZED
FIBER BRAGG GRATING
SENSOR USING
ARTIFICIAL NEURAL
NETWORK

Himadri N. Mandal and
Soumya Sidhishwari,
2023 IEEE Silchar
Subsection Conference
(IEEE SILCON 2023), 3rd-
5th November 2023 at
National Institute of
Technology (NIT) Silchar.

05

ANALYSIS OF SOURCE,
DRAIN AND GATE
FIELD PLATED
ALGAN/GAN BASED
HEMT FOR HIGH
BREAKDOWN
VOLTAGE

S. Nandi, S. K. Dubey,
M. Kumar and **A.
Islam**, 2023 IEEE
Devices for Integrated
Circuit (DevIC), Kalyani,
India, 07-08 April 2023,
pp. 526-530, doi:
10.1109/DevIC57758.2
023.10135024. IEEE
conference.

06

PATHOLOGIC MYOPIA
DETECTION AND
VISUALIZATION BASED
ON MULTI-SCALE DEEP
FEATURES BY PMNET
TUNED WITH CYCLIC
LEARNING RATE
HYPERPARAMETER

Pammi Kumari and
Priyank Saxena, in 8th
International Conference
on Computing in
Engineering and
Technology (ICCET 2023),
July 14-15, 2023

BOOK CHAPTERS

A

Dr. Aminul Islam along with his students has published following articles as chapters (Lecture Notes in Electrical Engineering) in a Springer book “Energy Systems, Drives and Automations” which have been published online on 21st August 2023.

01

Gupta, V., Kapre, A., Dubey, S.K., **Islam, A.** (2023). Implementation and Analysis of CNFET-Based PCRAM Cell Using 32 nm Technology. In: Szymanski, J.R., Chanda, C.K., Mondal, P.K., Khan, K.A. (eds) Energy Systems, Drives and Automations. ESDA 2021. Lecture Notes in Electrical Engineering, vol 1057. Springer, Singapore. https://doi.org/10.1007/978-981-99-3691-5_21

02

Jain, R., Malpani, H., Jain, S., Pandey, M., **Islam, A.** (2023). Characterization of Dynamic C-Gate Using GNR-FET @ 16-nm Technology Generation. In: Szymanski, J.R., Chanda, C.K., Mondal, P.K., Khan, K.A. (eds) Energy Systems, Drives and Automations. ESDA 2021. Lecture Notes in Electrical Engineering, vol 1057. Springer, Singapore. https://doi.org/10.1007/978-981-99-3691-5_19

03

Kumar, S., Saraiyan, S., Saurabh, A., Dubey, S.K., Prasad, S., **Islam, A.** (2023). Design of a 2.45 GHz Cascode Low Noise Amplifier with π Matching Technique. In: Szymanski, J.R., Chanda, C.K., Mondal, P.K., Khan, K.A. (eds) Energy Systems, Drives and Automations. ESDA 2021. Lecture Notes in Electrical Engineering, vol 1057. Springer, Singapore. https://doi.org/10.1007/978-981-99-3691-5_18

04

Firdoush, S., Mishra, I., Xalxo, R., Dubey, S.K., Prasad, S., **Islam, A.** (2023). Study and Analysis of AlGaIn/GaN-Based HEMT and MOSHEMT. In: Szymanski, J.R., Chanda, C.K., Mondal, P.K., Khan, K.A. (eds) Energy Systems, Drives and Automations. ESDA 2021. Lecture Notes in Electrical Engineering, vol 1057. Springer, Singapore. https://doi.org/10.1007/978-981-99-3691-5_20

05

Saraiyan, S., Saurabh, A., Kumar, S., Dubey, S.K., **Islam, A.** (2023). A 2.45 GHz Low Noise Figure CMOS-Based LNA Using Constant gm Biasing Technique. In: Szymanski, J.R., Chanda, C.K., Mondal, P.K., Khan, K.A. (eds) Energy Systems, Drives and Automations. ESDA 2021. Lecture Notes in Electrical Engineering, vol 1057. Springer, Singapore. https://doi.org/10.1007/978-981-99-3691-5_17

BOOKS

B

Richa Mishra, TK Bhattacharyya, " MEMS-based Transdermal Drug Delivery", 1st Edition, CRC Press, 11th December, 2023.

 Dec 2023: 266pp 158 B/W illustrations Hb: 978-1-032-06423-9 \$110 eBook: 978-1-003-20226-4	<i>MEMS-based Transdermal Drug Delivery</i> 1ST EDITION MEMS-based Transdermal Drug Delivery By Richa Mishra, T.K. Bhattacharyya This book introduces transdermal drug delivery and what developments have taken place in various transdermal drug delivery techniques including system level design approach of a novel miniaturized medical device to offer precise and painless drug delivery via a skin-based transdermal route. It discusses the Microelectromechanical systems (MEMS) based fabrication technique and the design, fabrication and characterization of different MEMS based components like microneedle and micropump. It further includes MEMS based component micropump with design, analysis, fabrication and characterization of the transdermal drug delivery device and challenges encountered in the design improvements. Hb: 978-1-032-06423-9 \$110
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PATENTS

DR. S.S SAHU

01

TITLE OF INVENTION:

A piezoelectric based energy harvesting system and method thereof

02

TITLE OF INVENTION:

A photo biomodulation device for attenuating obesity, and method thereof

03

TITLE OF INVENTION:

An Autonomous Vehicle Navigation System and Method Thereof

DR. G. K. MISHRA

01

Dr. G. K. Mishra has filed a patent entitled, "An IoT based multipurpose wearable spectacle" on November 4, 2023.

PHD DEGREES AWARDED

Following students have successfully defended PhD work :\

1)KM Neeshu defended her PhD Thesis entitled, "Design and Development of Metamaterial-based Antennas" on 7th July, 2023 under the guidance of Dr. A. K. Tiwari.

2) Md Shahnawaz Hussain defended his PhD Thesis entitled, "Study of Statistical Signal Processing for Radar Signals" on 14th Aug, 2023 under the guidance of Prof. S. Pal.

3) Shashank Kumar Dubey defended his PhD Thesis entitled, "Study of High Electron Mobility Transistor (HEMT) for Amplifier Applications" on 1st Sept, 2023 under the guidance of Dr. Aminul Islam.

4) Geetanjali Singh defended her PhD Thesis entitled, "Design of Efficient Power Conditioning Circuit for Piezoelectric Energy Harvester" on 13th Sept., 2023 under the guidance of Prof. S. Pal.

5)Saurabh Srivastava defended his PhD Thesis entitled, "Enhanced NOMA Networks for Next-Generation Communications" on 1st Nov, 2023 under the guidance of Dr. P. P. Dash.

6)Divya Prakash defended his PhD Thesis entitled, "Design and Implementation of Metamaterial-Inspired Microwave Sensors for Various Applications" on 12th Dec., 2023 under the guidance of Dr. Nisha Gupta.

7)Sunil Kumar defended his PhD Thesis entitled, "Development of Peak Detection Techniques for Fiber Bragg Grating Sensors using Signal Processing and Machine Learning" 22nd Dec., 2023 under the guidance of Dr. Somnath Sengupta

OUTREACH ACTIVITIES - INVITED TALKS

02

01

Dr. G. K. Mishra delivered expert lecture on "Recent Trends in Engineering" at RTC Institute of Technology on 21.09.2023.

Dr. Sanjay Kumar delivered an invited talk on the topic of "Symbiotic Communication" at Vishwaniketan, Kumbhivali Navi Mumbai, Maharashtra on 17 Nov, 2023. The Symbiotic Communication will deeply impact the Research, Design and Development of the Future of Wireless Communication Technology.

03

Dr. Sanjay Kumar delivered expert lecture on "Excellence in Hospitality Services" during Management Development Program on "Excellence in Tourism & Hospitality Service" organized in collaboration with the Department of Tourism, Government of Jharkhand, at BIT Mesra, Ranchi on 19 Oct, 2023.



04

Dr. Sanjay Kumar delivered expert lecture on “Teaching to Transformation” at Noida Institute of Engineering and Technology, Greater Noida, UP on 30 Oct, 2023.

05

Dr. Sanjay Kumar delivered expert lecture on “Current Trends in Wireless Communication” at Noida Institute of Engineering and Technology, Greater Noida, UP on 30 Oct, 2023.

06

Dr. S. Pal delivered an invited motivational lecture to inspire young minds to the areas of science and technology at Indas High School, Bankura, West Bengal on 12th Aug. 2023.



OUTREACH ACTIVITIES - SEMINARS / WORKSHOPS

07

Dr. Soumya Sidhishwari attended National Librarians' Day 2023-cum-National Seminar 2023 (JILASEM'23) on "Artificial Intelligence (AI) in Library & Information Services" organized by State Institute of Rural Development (SIRD), Ranchi on August 13, 2023.

09

Dr. G. K. Mishra attended a two-day workshop on "Acquiring Intellectual Property Rights for Innovators" is scheduled from 2nd to 3rd November, 2023 in hybrid mode organised by the Department of Electrical and Electronics Engineering.

08

Dr. G. K. Mishra attended a two-day workshop on "Acquiring Intellectual Property Rights for Innovators" is scheduled from 2nd to 3rd November, 2023 in hybrid mode organised by the Department of Electrical and Electronics Engineering.

10

Dr. Sanjay Kumar attended India Mobile Congress (IMC), 2023 organized by Department of Telecommunications (DoT) in association with the Cellular Operators Association of India (COAI) held at Bharat Mandapam, Pragati Maidan, New Delhi on 27-29 Oct, 2023.



OUTREACH ACTIVITIES - SEMINARS / WORKSHOPS

11

Dr. Sanjay Kumar handing over the certificate of the Distinguished Alumni Award to Prof. Ramjee Prasad for Excellence in Teaching and Research in Engineering and Technology during the 41st Global ICT Standardization Forum for India (GISFI) series meeting and Two days International Workshop. (The certificate was bestowed to Prof. Ramjee Prasad on the foundation day of the Institute on 15th July 2023, but he could not receive in person.)



Dr. Sanjay Kumar attended the 41st Global ICT Standardization Forum for India (GISFI) series meeting and Two days International Workshop on "Bridging Technology and Business Modelling" at Vishwaniketan, Kumbhivali Navi Mumbai, Maharashtra, during 16-17 Nov, 2023.

OUTREACH ACTIVITIES - FACULTY MEMBERS

12

In his personal visit to Uttarakhand Dr. G.K. Mishra visited "Birla Institute of Applied science, Bhimtaal and met faculty members of ECE and Computer Science Deptt. He discussed research possibilities in BIT Mesra and invited them for research collaboration

14

Dr. Sanjay Kumar had an interaction with Dr. Sri Ganesh Rao, Director, Strategy, Calligo Technologies Pvt. Limited, Bangalore for future in the domain of 5G, Smart Cities, IoT/ M2M, Industries 4.0, Digital Healthcare, Digital Transformation.

13

Dr. Sanjay Kumar has an interaction with Prof. Madhukar M. Deshmukh, Director of Industry Integration & Knowledge Exchange Cell (IIKEC), Sharda University, Greater Noida, for possible collaboration in the domain of Industry Integration & Knowledge Exchange.

15

Dr. Sanjay Kumar had an interaction with Prof. Sibaram Khara, Vice Chancellor, Sharda University, Greater Noida to establish close cooperation towards possible implementation of NEP 2020 in Higher Educational Institution. 30 Oct, 2023.



OUTREACH ACTIVITIES - FACULTY MEMBERS

16

Dr. S. Pal had an invited meeting with His Excellency, Governor of Jharkhand's. He was appraised for the major scientific contributions in the field of Radio Astronomy and wireless Communication.



STUDENT CLUB ACTIVITIES

HOW TO WRITE A GOOD SOP



A seminar was conducted by ECE society on 3rd Nov. 2023 at ECE seminar room on the theme 'How to write a good SOP'. Mr. Anish Kumar, System Software Engineer at Santa Clara, California , USA delivered a talk on the theme. Around 30 UG and PG students attended the seminar.

ANALOG AND DIGITAL WORKSHOP

ECE Society, Technical Student Club of BIT Mesra, organised a 3-days long rigorous workshop- "Analog and Digital Workshop". This workshop focused on teaching the basics of electronics and the digital domain to the young, bright minds of ECE B.Tech students. All the topics from subjects like, Basics of electronics and communication as well as basic electricals were covered in this workshop.

