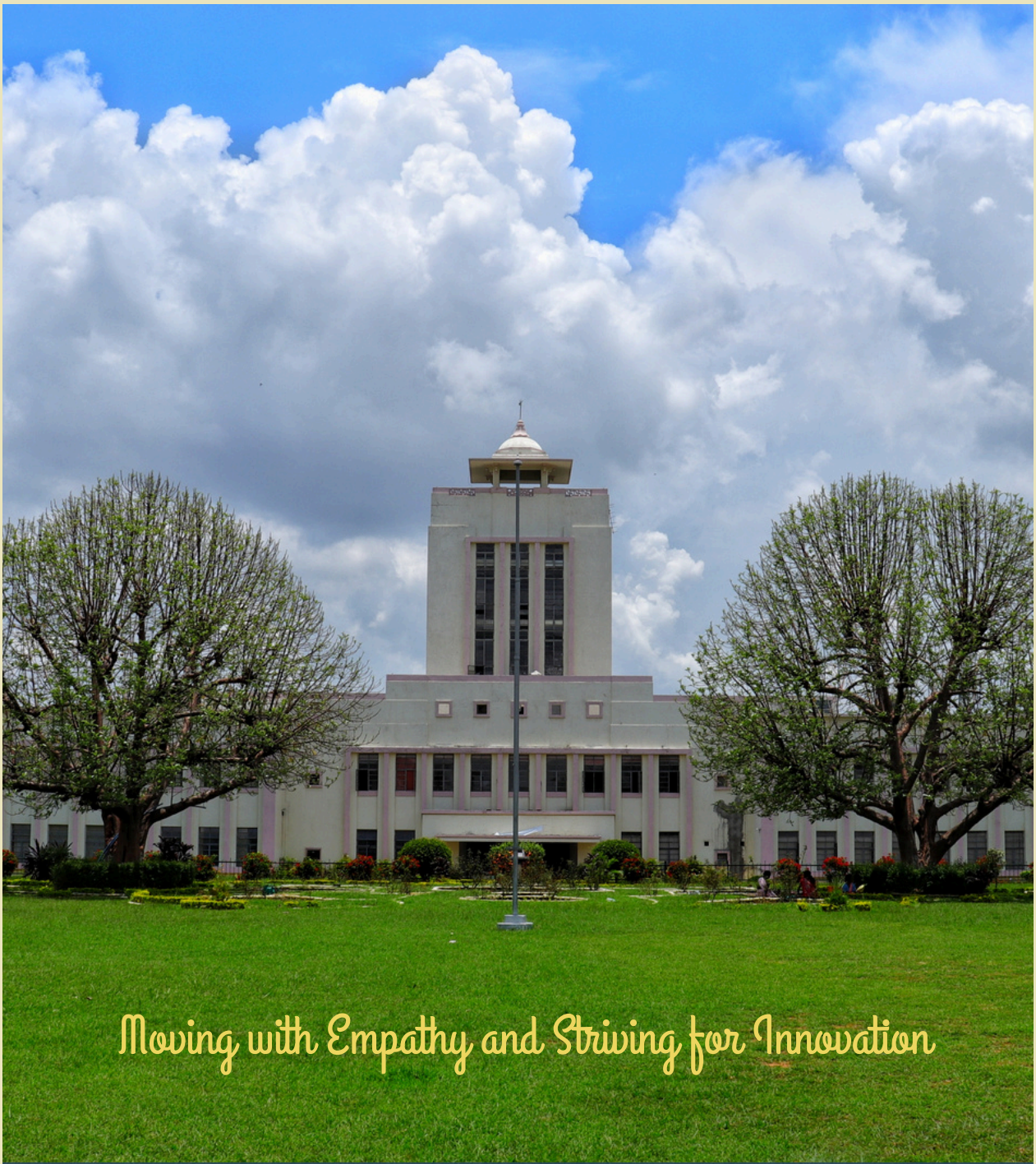
Volume 2, ISSUE 2, July 2024

ECE EXPEDITION



BIRLA INSTITUTE OF TECHNOLOGY MESRA

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

www.bitmesra.ac.in

CONTENTS

EDITORIAL
FROM EDITOR-IN-CHIEF'S DESK

With extreme pleasure I extend my heartfelt thanks to each member of the editorial team who used their own expertise generously and spent their time and effort with a sense of commitment to bring forth the issues of 'ECE Expedition', the newsletter of our department. This is the fourth issue. The first issue came out on 28 April 2022 with an aim to be published quarterly in electronic version. However, later it was realized that the half yearly issues will give a more holistic view semester wise. This issue is the first half yearly issue.

I am thankful to all the members of the department for their involvement and support, and I congratulate each one of them for their achievements and contributions to 'ECE Expedition.'

'ECE Expedition' has proved to be instrumental in achieving remarkable developments and notable activities taking place in the department with the help of vibrant pictorials and vivid illustrations. During the last six months the department has contributed significantly to the domain of research, product development, sponsored projects, outreach activities, workshops, seminars, expert talks, visits of eminent personalities, students' activities, and their achievements. It has helped capture the diverse scholarly interests of the department and everyone's contribution towards our department's Expeditions. I am sure this issue will definitely give a glimpse of the above.

'ECE Expedition' has also proved to be instrumental in helping us gain insight on what needs to be done to perform better and become a centre of excellence in teaching and research for creating technical manpower to meet the technological, societal, and environmental needs of the country in the field of Electronics and Communication Engineering. This insight is being reinforced frequently by 'ECE Expedition' and the editorial team will keep working objectively towards its fulfilment.

With "ECE Expedition", we are marching with empathy and striving for excellence.

Thank you and best wishes

Dr. Sanjay Kumar
EDITOR-IN-CHIEF

ECE EXPEDITIONS

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ECE EXPEDITIONS

TECHNOLOGY VISION

NANOSHEET FET

A type of field-effect transistor that uses wider and thicker wires than a lateral nanowire

Prity Bharti, Dr. Deepti Gola, Dr. S.S.Solanki

1. Introduction

Transistors are the basic building blocks of semiconductor industries. Transistors are the foundation of computer memories, microprocessors, and other integrated circuits. These are the semiconductor components that amplify or switch electrical signals. As per Gordon Moore prediction, the number of transistors on chip is doubled every 2 years. To keep up with Moore's law transistors technology has kept evolving over the past few decades. Field effect transistors were introduced in 1959.In the year 2012, when the industry made the first transition from planar CMOS to FinFET CMOS. Again, there was transition from FINFET to nanosheet FET. As the nodes progressed, the design was transformed to be able to produce faster and more powerful energy efficient microchips. This constant advancement has filled advances in everything like cloud computing, smartphone, virtual reality, robotics, internet of things. Hence, device performance became better in terms of increased fabrication cost.

2. How does a Fin like structure work as a Transistor?

In FinFET, channel between source and drain terminals are in the form of Fin and the Fin is contacted on three sides by the gate. The channel forms within the fin-like structure and due to the structure better channel control is achieved in FinFET when compared with planar MOSFET. As a result Finfet helps significantly with current leakage. Fin-height has been increased to obtain a higher device drive current at the same footprint. Upon designing and placing the gate stack directly above the channel area, one problem is that as this structure becomes smaller it becomes more difficult to block the charge leakage across the transistor. In FinFET, the gates around the rectangular silicon Fin on three sides leave the bottom side connected to the body of silicon. This leakage current degrades the chip performance as the device becomes hotter, less power efficient. Figures 1 and 2 given below show the schematic representation of FinFET on bulk and SOI respectively.

TECHNOLOGY VISION

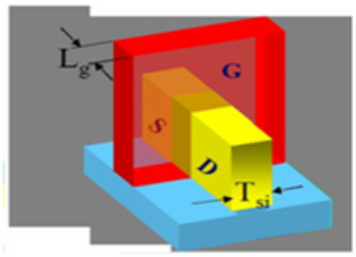


Figure 1: FinFET on bulk

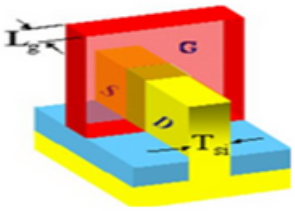


Figure 2: FinFET on SOI

As scaling is pushed beyond 5nm, the FinFET roadmap seems to be coming to an end. The new FET device with modified structure which will take the roadmap beyond 5nm is broadly part of the concept that is described as GAA transistor. The GAA transistor addresses several challenges around FinFET, for the 3nm node and beyond, promising better performance of more than 25% and power consumption reduction of more than 50%. Figure 3 given below shows the evolution of FET geometry.

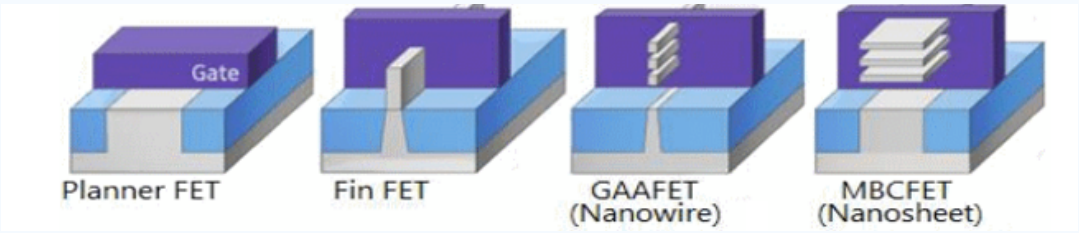


Figure 3: Evolution of FET.

3. How does Nanosheet FET Overcome the Shortcomings Of FinFET?

In NS technology, the gate surrounds the channel from all sides resulting in better control over leakage current. This structure of the channel supports more advanced semiconductor fabrication processes. In NS, the channel region consists of multiple horizontal (nm) thin sheets stacked up at one another. A gate fully wraps around the channel to provide better channel control compared to a multigate FinFET.

4. Conclusion

NSFETs have better design flexibility to control the required device performance. By adjusting the effective width of the transistor channel, we can get more drive current. Increased drive current means faster transistor switching. Continuous down scaling of feature size of MOSFETs leads to device performance issues and as a solution, industries have adapted high K-dielectric. After a lot of research across the world almost confirmed that big foundries are moving towards NSFET to push the scaling beyond 3nm, more research is still going on NSFETs and beyond.

DEPARTMENTAL ACTIVITIES

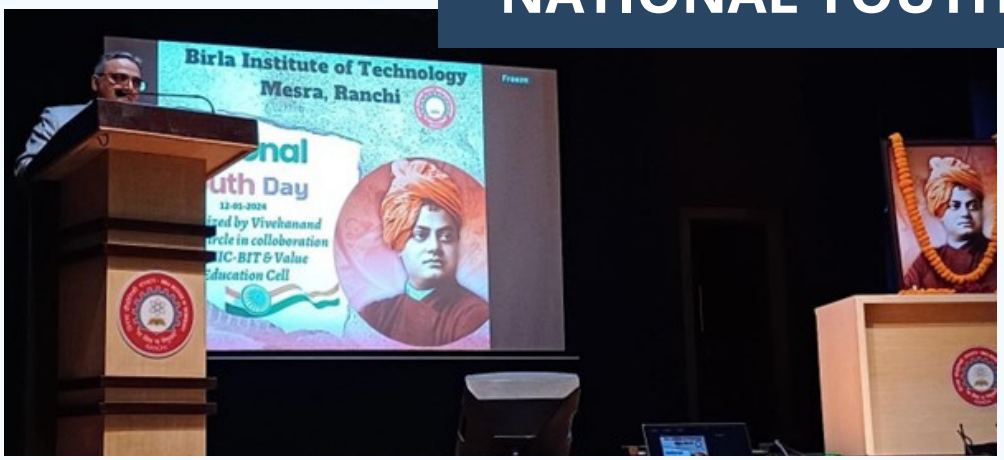
VIKSIT BHARAT@2047 MISSION

1. Dr. Sanjay Kumar was the Co-convener of the "Viksit Bharat@2047 mission", a three-day long program organized by BIT Mesra, Ranchi under the directives of UGC initiated by the Ministry of Education, Government of India, 3-5 April 2024.

2. Dr. Sanjay Kumar organized a Workshop on "Enhancing the Power of Performance through Self Transformation", held at BIT Mesra, Ranchi, 20 February 2024.

3. ·A Brainstorming session was organized in the department on 24 February 2024 on the theme of "Creating a Collective Vision towards Substantial, Continuous, & Sustainable Growth of the Department".

NATIONAL YOUTH DAY



4. National Youth Day was organized on 12 January 2024, in the Institute. Dr. Sanjay Kumar coordinated the program.

5. Dr. Sanjay Kumar [along with Dr S S Sahu and Dr Shashank Pushkar (CSE)] attended Amdocs Campus Conclave on Bridging Minds and Igniting Future via Academia-Industry Synergy held in Pune on 31 May 2024.

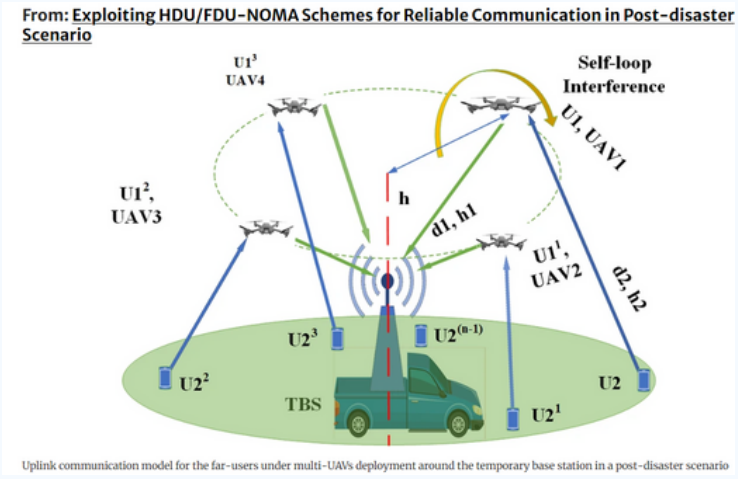
4 ECE EXPEDITIONS

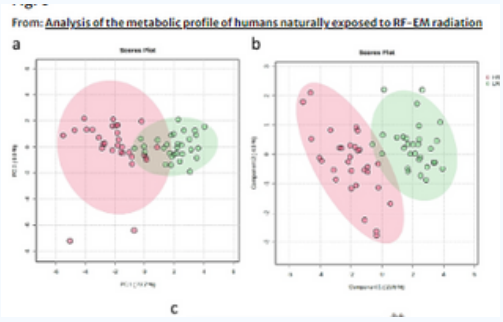
"INSTITUTIONAL DEVELOPMENT PLAN FOR HIGHER EDUCATIONAL INSTITUTION FOR VISION AND PLANNING AS PER THE NEP 2020

6. Dr. Sanjay Kumar [along with Dr Sukalyan Chakraborthy(CEE)] attended a one day workshop on "Institutional development Plan for Higher Educational Institution for vision and planning as per the NEP 2020" organised by University Grants Commission, held in Kaushal Bhawan, Government Office Building, New Delhi on 23 April 2024.

JOURNAL PUBLICATIONS

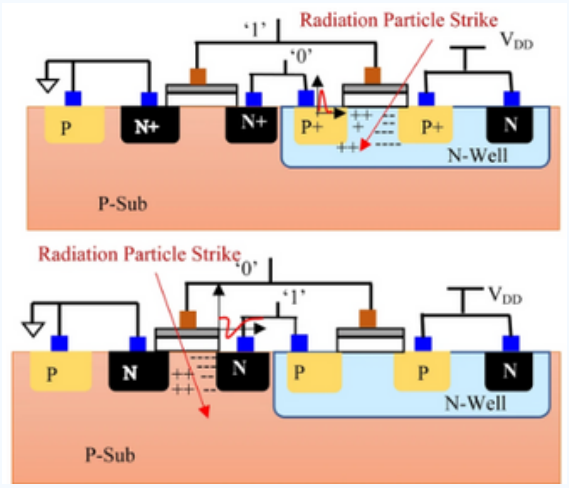
1. Rampravesh Kumar and Sanjay Kumar, "Exploiting HDU/FDU-NOMA Schemes for Reliable Communication in Post-disaster Scenario", in *International Journal of Wireless Personal Communications*, May 2024

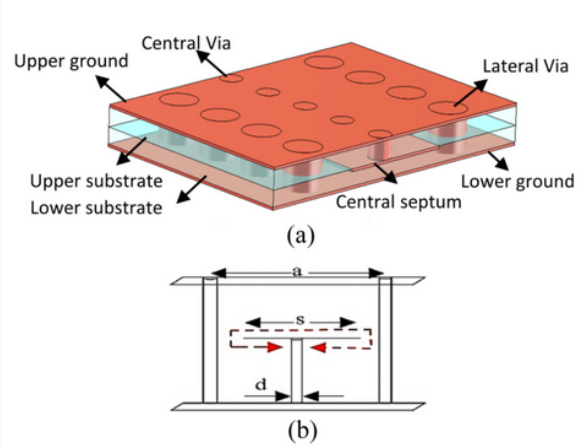




2. Neel Mani Rangesh, Arun Kumar Malaisamy, Nitesh Kumar and Sanjay Kumar, "*Analysis of the metabolic profile of humans naturally exposed to RF-EM radiation*", Metabolomics, Volume 20, Article Number 55, May 2024.

3. Monalisa Pandey and Aminul Islam, "Circuit-Level Technique to Design Robust SRAM Cell Against radiation strike," in *Microsystem Technologies-Micro and Nanosystems-Information Storage and Processing Systems.* SCI Journal.

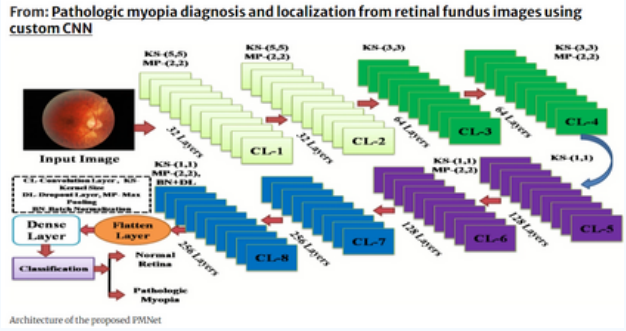




4. A. K. Singh and S. Pal, "Compact Self-Isolated Extremely Low ECC Folded-SIW Based Slot MIMO Antenna for 5G Application," in I*EEE Antennas and Wireless Propagation Letters. a)DOI: 10.1109/LAWP.2023.3321065, 02 October 2023 (Early Access).*

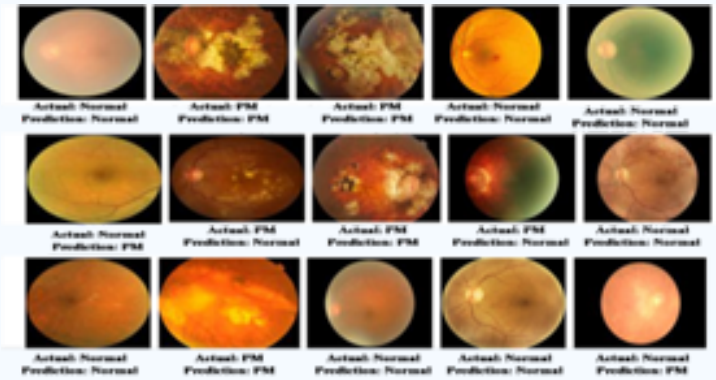
JOURNAL PUBLICATIONS

5. Pammi Kumari and Priyank Saxena, "*Pathologic Myopia Diagnosis and Localization from Retinal Fundus Images using Custom CNN*", Neural Computing and Applications, May 2024, Springer. (DOI: https://doi.org/10.1007/s00521-024-09851-3)



6. Himadri Nirjhar Mandal and Soumya Sidhishwari, " Optimization and Analysis of Apodized Fiber Bragg Grating Properties for Quasi-distributed Sensing", in *Physica Scripta (IOP Science)*, Volume. 99, Number. 7, pp. 075504 (1-23), 2024. (DOI: https://doi.org/10.1088/1402-4896/ad4f26). [SCI Indexed]

7. Snehil Baba, Pammi Kumari, and Priyank Saxena, Retinal Disease Classification Using *Custom CN Model from OCT Images*, Procedia Computer Science, Elsevier, Vol. 235, PP-3142–3152, 2024.



8. Pammi Kumari and Priyank Saxena, "*An Efficient Hybrid Model for Localization and Grading of Diabetic Retinopathy using Fundus Images*, International Journal of Computational Vision and Robotics, Interscience, (Accepted For publication on Feb. 9th, 2024)

9. Himadri Nirjhar Mandal and Soumya Sidhishwari, "Design of an Apodized Fiber Bragg Grating Sensor for Sensitivity Analysis of Physical Parameters using Support Vector Machine",in Brazilian Journal of Physics (Springer), Volume. 54, Number. 58, pp. 1-11, 2024. (DOI:https://doi.org/10.1007/s13538-024-01431-z.) [SCI Indexed]

JOURNAL PUBLICATIONS

10. Pandit Vivek Kumar Pandey, Sitanshu Sekhar Sahu, Biswajit Karan, Sudhanshu Kumar Mishra, “Parkinson Disease Prediction Using CNN-LSTM Model from Voice Signal” *in SN Computer Science*, Volume. 5 (4), pp:381, 2024.

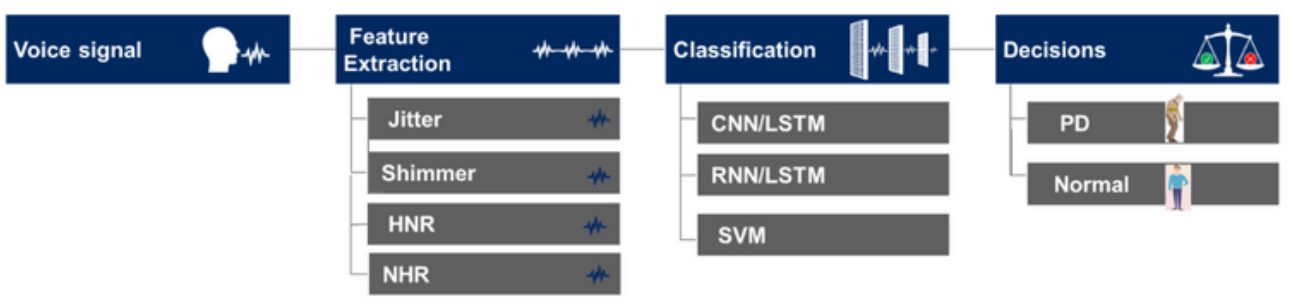
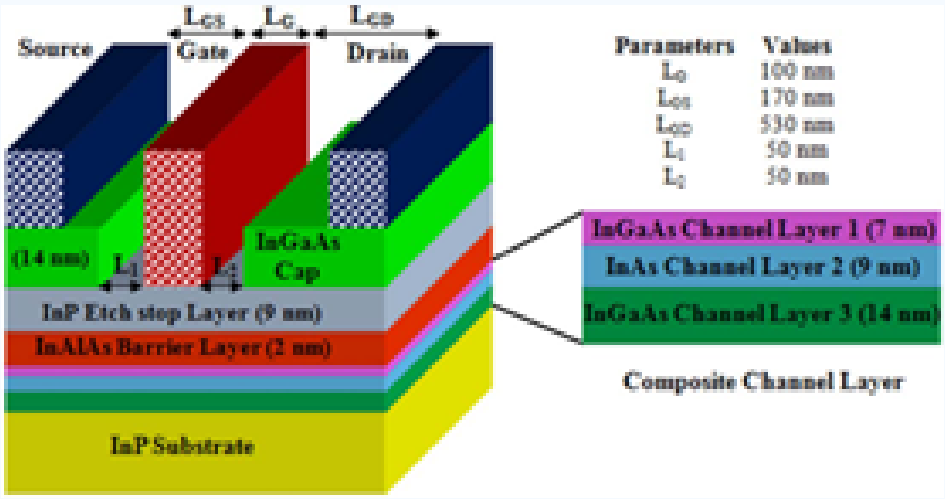


Fig. 1. Architecture of the Proposed Model

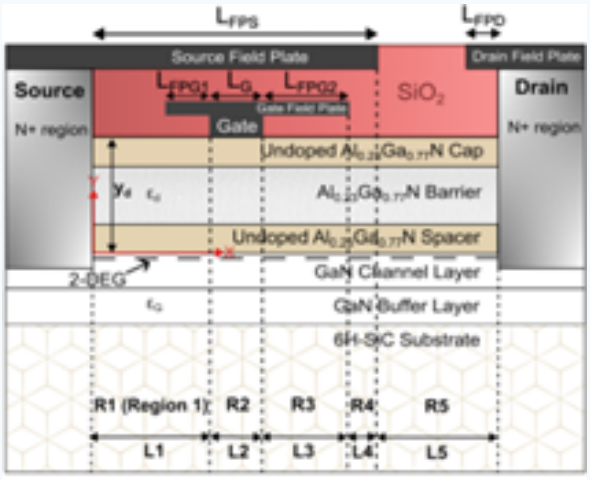
11. Mukesh Kumar, Gautam Bhaskar, Aditya Chotalia, Chhavi Rani, P Ghosh, Soumak Nandi, Shashank Kumar Dubey, Kalyan Koley and Aminul Islam, "Design, Simulation and Analog/RF Performance Evaluation of a Hetero-Stacked Source Dual Metal T-shaped Gate Tunnel-FET in Thermally Variable Environments" in Microsystem T*echnologies-Micro-and Nanosystems-Information Storage and Processing Systems*, May 2024, Springer. (DOI: https://doi.org/10.1007/s00542-024-05677-0).



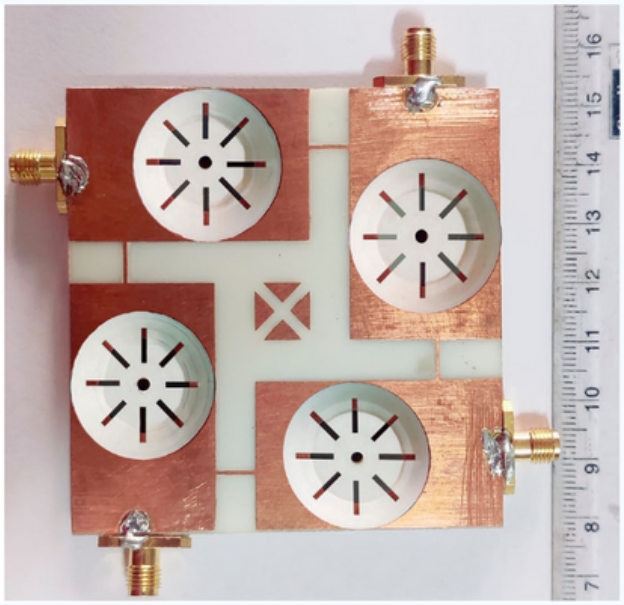
12. Soumak Nandi, Shashank Kumar Dubey, Mukesh Kumar and Aminul Islam, “Composite Channel 100 nm InP HEMT with Ultrathin Barrier for Millimetre Wave Applications” in Engineering Research Express, Volume. 6, no. 1, pp. 015316, Mar. 2024, Publisher: IOP Science. (DOI: 10.1088/2631-8695/ad2efa, SharedIt:https://iopscience.iop.org/article/10.1088/2631-8695/ad2efa/pdf)

JOURNAL PUBLICATIONS

13. Soumak Nandi, Shashank Kumar Dubey, Mukesh Kumar and Aminul Islam, "Design and Electrical Modelling of a Depletion-Mode P-type Triple Field-Plated AlGaN/GaN on SiC HEMT with 2.45 kV Breakdown Voltage," in Microsystem Technologies-Micro-and Nanosystems-Information Storage and Processing Systems, Springer. (DOI:https://doi.org/10.1007/s00542-024-05609-y



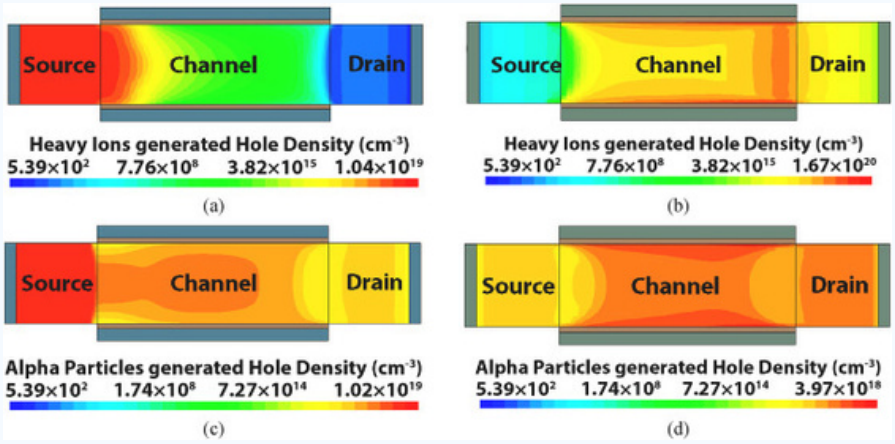
14. Sukanta Kumar Dash, S. S. Solanki, and Soubhik Chakraborty, “Deep Convolutional Neural Networks for Predominant Instrument Recognition in Polyphonic Music Using Discrete Wavelet Transform”, *Circuits, Systems, and Signal Processing*, Springer, 2024. (DOI:https://doi.org/10.1007/s00034-024-02641-1,)

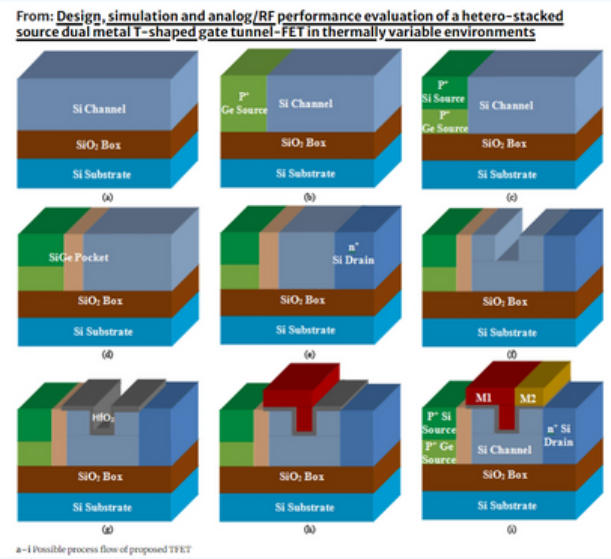


15. R. Chandra and D. K. Upadhyay, “A slotted frustum-shaped 4 × 4 MIMO dielectric resonator antenna with enhanced isolation for 5G Wi-Fi applications,” *Journal of Electromagn*. Waves Appl., pp. 1–26, 2024.

16. Pankaj Kumar, Kalyan Koley, Ashish Maurya, and Subindu Kumar, "Heavy ions and alpha particles irradiation impact on III-V broken-gap gate-all-around TFET," Microelectronics Reliability (Elsevier), Volume 158, pp. 115426, July 2024.

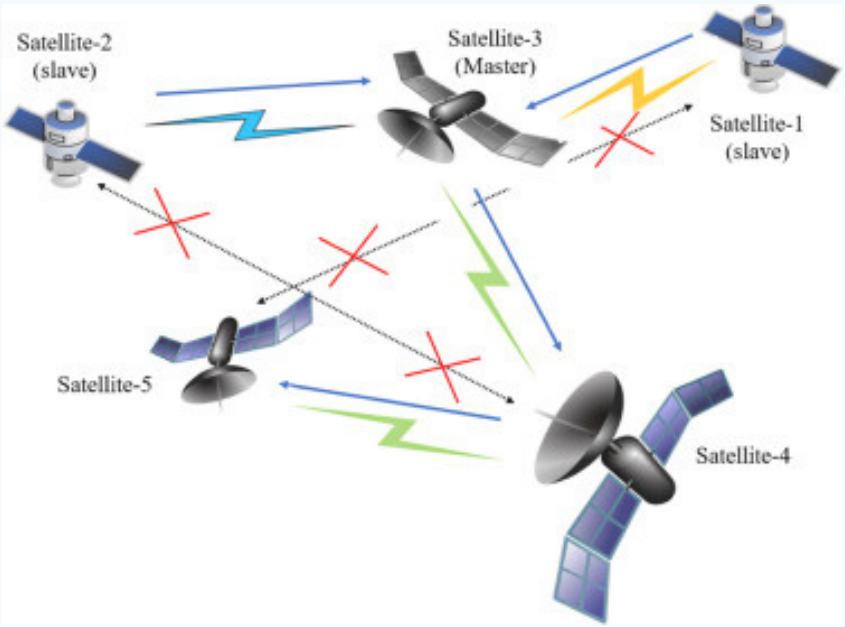
17. Pankaj Kumar, Kalyan Koley, and Subindu Kumar, "Comparative Analysis of Heavy Ions and Alpha Particles Impact on Gate-All-Around TFETs and Gate-All-Around MOSFETs," Micro and Nanostructures (Elsevier), Volume 192, pp. 207875, May 2024





18. Mukesh Kumar, Gautam Bhaskar, Aditya Chotalia, Chhavi Rani, Puja Ghosh, Soumak Nandi, Shashank Kumar Dubey, Kalyan Koley, and Aminul Islam, "Design, simulation and analog/RF performance evaluation of a hetero-stacked source dual metal T-shaped gate tunnel-FET in thermally variable environments," *Microsystem Technologies*, Springer, June 2024.

19. Saurabh Srivastava, Prajna Parimita Dash, Deepak Kumar Rout, Dinesh Madhukar Chandwadkar, and Sunita Pandit Ugale. "Constellation design for PD-NOMA-based mmWave inter-satellite communication", in Computers and Electrical Engineering, 116,109187, Elsevier 2024.



CONFERENCE PUBLICATIONS

1. R.Chandra and D.K. Upadhyay, “A Wideband SDIFS-DR-MIMO Antenna with Pattern Diversity for 5G Sub-6 GHz and 6G Band Applications”, in IEEE Students Conference on Engineering and Systems (SCES), Prayagraj, India, 2024. (Accepted)

2. Pandey, P.V., Karan, B., and Sahu, S.S., “Parkinson’s disease Prediction using Intrinsic Mode Function Instantaneous Amplitude Deviation”, in National Conference on Intelligent Systems, IoT, and Wireless Communication for the Society, Feb 2024

3. Pandit Vivek Kumar Pandey, Sitanshu Sekhar Sahu, “Speech Signal Analysis Using Hybrid Feature Extraction Technique for Parkinson’s Disease Prediction”, International Conference on Data science and Applications, 15 July 2023.

4. Shweta Kashyap and Nisha Gupta. "Machine learning in satellite communication.", in AIP Conference Proceedings. Vol. 3164. No. 1. AIP Publishing, 2024. DOI: 10.1063/5.0214200

5. S.K. Singh, S.M. Ali, R. Kumar, R. Mishra, “Feasibility study on hollow steel microneedle assembly and IOT enabled Peristaltic Pump”, in International Conference on Recent Trends in Engineering and Sciences (RTES-2024), 29th-30th March, 2024, Birla Institute of Technology, Mesra, Ranchi, India.

6. S.K. Singh, G. Rajaram, R. Mishra, “Sputter Etch Rates of Photoresist OIR 620M and MEGAPOSIT SPR 220 using ICP RIE”, in International Conference on Recent Trends in Engineering and Sciences (RTES-2024), 29th-30th March, 2024, Birla Institute of Technology, Mesra, Ranchi, India.

7. Sistla Omkar Sri V Siva Kesava, Ragidi Deepak, S. Maneesh Raju, Priyank Saxena, "Autonomous Vehicle Security Using Blockchain and Artificial Intelligence," in 4th International Conference on Machine Learning and Big Data Analytics (ICMLBDA), In Proc. Springer (to be published) May 9th-11th, 2024, NIT, Kurukshetra

PROJECTS IN THE DEPARTMENT

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

WORKSHOPS/SEMINARS ATTENDED BY FACULTY MEMBERS

01

Dr. S. S. Solanki attended 6th International Conference on Smart Computing and Informatics (SCI-2024) Springer organized by Anil Neerukonda Institute of Technology & Sciences (A), Sangivalasa, Bheemunipatnam(M), Vishakhapatnam-531162 from 19-20th April 2024 (Online).

02

Dr. S.S Solanki attended Workshop on Embedded DSP conducted by Trident Techlabs Limited, New Delhi organized by Dept. of ECE, BIT Mesra, Ranchi from 19 to 22nd February 2024.

03

Dr. Aminul Islam attended Familiarization workshop of UG VLSI Curriculum organized by Visvesvaraya Hall, AICTE HQ, Nelson Mandela Marg, New Delhi-110070 on 16th May 2024.

04

Dr. Richa Mishra attended INUP-i2i Online Familiarization Workshop on Nanofabrication & Characterization from 22nd April to 24th April 2024.

05

Dr. Richa Mishra attended Workshop on Prototype Process Design organized at Idea Lab , BIT MESRA, RANCHI from 5th to 6th April 2024.

06

Dr. Sanjay Kumar participated in AICTE incorporated 8-days offline FDP on UHV-II at Punjab University, Chandigarh during 18-25 Jun, 2024.

WORKSHOPS/SEMINARS ATTENDED BY FACULTY MEMBERS

07

Visit of Dr. Gajendra Kant Mishra and Dr. Sanjeet Kumar to IIT Guwahati to attend 5G lab Installation training programme " Workshop on 5G Use Case Lab :Awareness and Pre-commissioning Reediness" from 12th and 13th February 2024. This activity was related to 5G use case lab awarded to BIT Mesra from Hon'ble Prime Minister Mr. Narendra Modi.

08

To promote the Industry-Academia Partnership and for transferring the technology developed in the institute, BIT Mesra arranged a visit to PALASTREE Catalyst and a showcase presentation organized for faculty who were interested in transferring their technology on 5th February, 2024 from 10am onwards in the Institute Conference Hall. Dr Gajendra Kant Mishra participated in that.

09

Dr. Sanjay Kumar participated in UGC's North Eastern and Easter Zone Vice Chancellor's conference on the theme of "Implementation of NEP 2020" organized by Pragjyotishpur University in collaboration with Nagaland University at Guwahati on 28 Jun 2024.

OUTREACH ACTIVITIES - INVITED TALKS

01

Dr. Sitanshu Sekhar Sahu delivered an invited talk on the topic of " Speech Analysis: A New Perspective in Predictive Healthcare " at Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology, Chennai on 12 Jan 2024

02

Dr. S.S Solanki invited for the talk on " International Conference on Recent Trends in Engineering and Sciences (RTES-2024) " organized at Birla Institute of Technology Mesra, Ranchi on 29-30th March, 2024.

03

Dr. Deepti Gola delivered an invited lecture on the topic "MOS Device Modelling" in a Short-Term Training Program on Microelectronics & VLSI Design (MVD-2024) organized by Department of ECE, Birla Institute of Technology, Mesra on 4th April 2024.

04

Dr. Richa Mishra delivered an invited speech on the topic of "Short-Term Training Program on Microelectronics & VLSI Design (MVD-2024)" organized at Birla Institute of Technology, Mesra on 4th April 2024.

15 ECE EXPEDITIONS

05

Dr Sanjay Kumar was panel speaker on the theme of “Effective Governance: Secure Nation and Secure Society” during Viksit Bharat@2047 mission a three-day long program organized by BIT Mesra, Ranchi under the directives of UGC initiated by the Ministry of Education, Government of India, on 5th April 2024.

06

Dr. Sanjay Kumar was Committee expert and expert talk on “Implementation of nation wide 5G network” in a conference on India’s International Movement to Unite Nations (I.I.M.U.N.), GD Goenka Public School, Ranchi, held on 27 April 2024.

07

An Expert talk on the topic of “Outcome based education and attainment of CO-PO” was delivered by Dr. Sanjay Kumar in the department on 18 Mar 2024.

08

Dr. Sanjay Kumar delivered a keynote speech on the topic of"Connecting Intelligence: the Future of Communication Systems" in the International Conference on Device Intelligence, Computing and Communication Technologies (DICCT-2024)", Graphic Era University, Dehradun held on 16 March 2024.

PATENTS

Dr. S.S Sahu has published the following patents:

i) A piezoelectric based energy harvesting system and method thereof (Published)

i)A photo biomodulation device for attenuating obesity, and method thereof (Published)

An Autonomous Vehicle Navigation System and Method Thereof (Published)

OUTREACH ACTIVITIES - SEMINARS / WORKSHOPS

01

A two-day workshop sponsored by DST SERB was organized by Department of electronics and Communication Engineering, Birla Institute of Technology, Mesra from 30 to 31st May, 2024. The theme of the workshop was to understand and be aware on the implications and importance of electromagnetic Interference that is a significant problem after the increase in use of gadgets and wearable devices. The problems and design considerations were the main focus of the workshop. The workshop was organized by Professor Nisha Gupta and Dr. Itu Snigdh. Prof C. Jeganathan Dean (Research Innovation and entrepreneurship) and Prof. S. S Solanki, Dean (Post Graduate Studies) presided over the function as the chief guest and guest of honor. On the first day, Prof Nisha Gupta deliberated on the topic “Electromagnetic interference and Electromagnetic Compatibility in wearable IOT devices.” and Dr. Santosh Kumar Mahto, Assistant Professor Department of Electronics and Communication Engineering, Indian Institute of Information Technology, Ranchi discussed Antenna design for wearable IOT devices. The second day of the workshop featured talks by Dr. Bhargav Appasani Associate Professor and Research Faculty, School of Electronics Engineering, Kalinga Institute of Industrial Technology, Bhubaneshwar and Dr. Itu Snigdh, of BIT Mesra. They delivered their talks on “Optimization of AMC for wearable IOT devices” and “software approaches to EMC Diagnosis” respectively. Experimental sessions were also conducted on both the days for the workshop participants.

OUTREACH ACTIVITIES - SEMINARS / WORKSHOPS

02

Dr. Deepti Gola and Dr. P.P. Dash organized a one-week Short Term Course (STC) on "Neuroevolution-based Advanced Semiconductor Devices" from March 7thto 11th , 2024 in hybrid mode at the Department of Electronics and Communication Engineering, BIT Mesra, Ranchi. The primary goal of the STC was to offer research scholars, faculty members, and industry personnel a unique opportunity to delve into the intersection of Artificial Intelligence and Machine Learning (AIML) within the Semiconductor devices domain. The course was structured to bridge the gap between theoretical understanding and practical implementation in the dynamic realm of AIML within Semiconductor devices. Academicians/experts in the concerned field from IITs/NITs/Industry (R&D) and other reputed institutes were invited to deliver lectures in the program. Hands-on training sessions were conducted by experts from industry/academia. The event attracted participants from various corners of India, including students and faculties eager to delve into the dynamic realm of Artificial Intelligence and Machine Learning (AIML) within the Semiconductor devices domain. As feedback, the participants appreciated the STC as a well-rounded learning experience which will enable them to apply the acquired knowledge effectively in both academic and industrial settings.

Following Eminent Speakers delivered lectures in Hybrid Mode:

1. Dr. S.S. Sahu (BIT Mesra), delivered a Lecture on “Introduction to AIML and Applications.”
2. Dr. K. P. Pradhan (IIITDM, Kanchipuram), delivered Lecture on “Mimicking of Biological Behaviour through CMOS and Beyond CMOS based Devices.” Along with his team, he gave a Hands-on Session on “AI based FET Devices using PYTHON”.
3. Dr. Satyabrata Jit (IIT BHU), delivered a Lecture on “History and Development of Transistor Technology”.

OUTREACH ACTIVITIES - SEMINARS / WORKSHOPS

Following Eminent Speakers delivered lectures in Hybrid Mode (contd..)

4. Dr. Balraj Singh (BBAU, Lucknow), delivered a Lecture on “FET based biosensors”.
5. Dr. M. K. Mukul (Delhi University), delivered a Lecture on “Machine Learning in Semiconductor Devices”.
6. Dr. P. P. dash (BIT, Mesra) delivered a Lecture on “Introduction to Artificial Neural Networks”.
7. Dr. P. K. Tiwari (IIT, Patna) delivered a Lecture on “Unified oxide capacitance and current modelling for MG MOSFET”.
8. Dr. Avirup Dasgupta (IIT, Roorkee) delivered a Lecture on “Machine Learning Augmented Device Modeling”.
9. Dr. Amit Saini (Cadre Design Systems) gave Hands-on Training Session on Advanced MOS Devices using TCAD.
10. Dr. Subham Sahay (IIT Kanpur) delivered a Lecture on “Neuromorphic Computing: Mapping Neural Networks to Hardware”.
11. Dr. Sandip Mondal (IIT, Bombay) delivered a Lecture on “Biological learning in semiconductor devices”.
12. Dr. S. Srivastava (K.K. Wagh Institute of Engineering Education And Research) took Lecture-cum-Training session on “Exploratory Data Analysis using MATLAB and PYTHON”.
13. Dr. Debanjan Bhowmik (IIT, Bombay) delivered a lecture on “Spintronics-Based Neuromorphic and Ising Computing”.

03

Dr. Richa Mishra Organised World creativity & Innovation Day on 21st April 2024 at IDEA Innovation labunder Institution’s Innovation Council, BIT Mesra at IDEA Innovation lab, BIT Mesra, Ranchi.

04 - EMBEDDED DSP

A workshop on “Embedded DSP” was organized by the Electronics and Communication Engineering department at BIT, Mesra from February 19 - 22 February 2024. The event was coordinated by Dr. Sitanshu Sekhar Sahu, Associate Professor, Dept. of ECE. The event was focused on hands-on training on the areas of Speech, Audio, Video and Image Processing through Embedded DSP 6048 Processor and Code Composer Studio.

Mr. Pritam Banerjee, Technical Engineer from TechLabs Ltd, Kolkata has conducted the workshop. A diverse group of 24 participants, including undergraduate, postgraduate, and PhD students, alongside faculty members, attended the workshop.

05 - MVD 2024

In alignment with the National Mission to make India self-reliant in VLSI Technology and Semiconductor Manufacturing, the Department of Electronics and Communication Engineering at BIT Mesra organized a Short-Term Training Program (STTP) for UG/PG students, PhD candidates, faculty members, scientists, and working professionals from April 2nd to 6th, 2024.

Eminent speakers from both within and outside the campus shared their extensive knowledge, sparking greater interest among participants in this field of work. These sessions included insights from industry experts on the latest trends and future directions in VLSI technology, providing a broad perspective on current and emerging challenges.

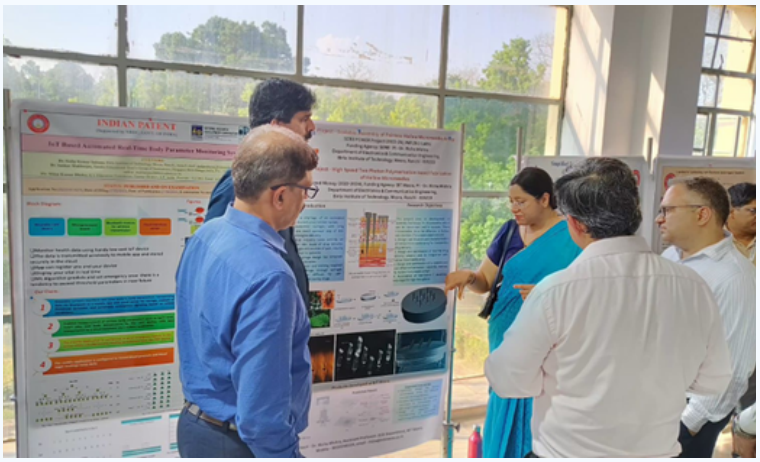
The STTP covered comprehensive theoretical aspects along with practical training on advanced tools and technologies in VLSI, such as Cadence VLSI design, TCAD, Prime sim, HSPICE. Hands-on exposure to various software tools such as Cadence, allowed participants to gain practical experience and identify the tools best suited for their specific needs.

A visit to the Central Instrumentation Facility (CIF) lab provided an impressive and practical insight into the functioning of various devices, greatly enhancing the learning experience. Participants had the opportunity to see state-of-the-art equipment and fabrication processes, further solidifying their understanding of microelectronics manufacturing. The hybrid mode of the program, combining both in-person and online sessions, enabled many external participants to benefit from the lectures, significantly broadening their knowledge and skills.

Overall, this program offered an intensive and immersive learning experience, equipping participants with the necessary knowledge, skills, and resources to excel in microelectronics and VLSI design. It aimed to enhance their contributions to teaching, research, and industry innovation in this critical field.

OUTREACH ACTIVITIES - PATENT PROMOTION

1. Top Executives from Birla Tower New Delhi, visited BIT Mesra on 23rd-24th April 2024 to see research and innovation activities in the institute. Regarding it, a poster presentation session along with a display of products for recent patents were organized in the R&D Building Seminar Hall -2. The team from Birla Tower along with VC sir and Deans had visited the poster presentation and product display arena on 23rd April. Dr. Gajendra Kant Mishra also participated in the same



2.Patent Poster presentation to Birla Tower Executives during their visit on 23rd -24th April 2024 by Dr Richa Mishra.

OUTREACH ACTIVITIES - SUMMER INTERNSHIP

ECE Department has organised a Summer internship program of 4-8 Weeks on various topics like VLSI Design and Embedded system, Microwave Engineering, Wireless Communication, Image Processing, etc.

NEP-2020 FRAMEWORK

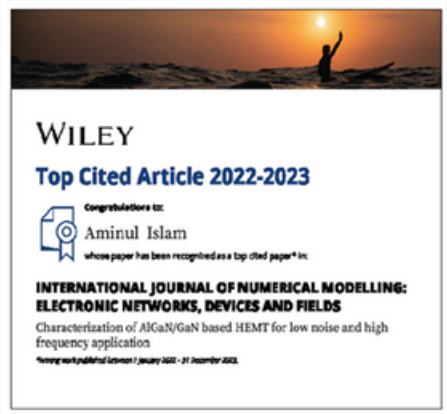
NEP-2020 Framework Planning & Implementation Committee (NEP-2020 FPIC) was constituted in the institute on 07 Feb 2024 to implement the NEP 2020 recommendations in the curriculum, which was headed by Dr. Sanjay Kumar, HOD, Department of ECE. Following is the composition of the committee:

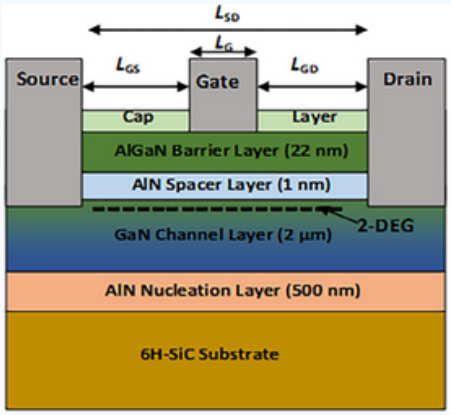
1. Dr. Sanjay Kumar, HOD, ECE, Chairman
2. Dr. Laxmi Narayan Pattanaik, ADPGS, Member
3. Dr. Sukalyan Chakraborty, ADUGS, Member
4. Dr. Dev Mani Pandey, Assoc. Prof., BE & BT, Member
5. Dr. Prem Prakash, Asst. Prof., EEE, Member
6. Mr. Md. Nadim Quaiser, AR (SA), Member Secretary

ACHIEVEMENTS/AWARDS/RECOGNITIONS/ACTIVITIES

01

Dr. Aminul Islam received congratulations for the top cited article during 2022-2023 for the paper titled “Characterization of AlGaN/GaN based HEMT for low noise and high frequency application”. vol. 35, no. 1, pp. 1–12, Jan-Feb. 2022, by International Journal of Numerical Modelling: Electronic Networks, Devices and Fields.





02

Ph.D. submission of Sashi Shankar on 31 January 2024 (Thesis Titled: Design, Analysis, and Experimental Verification of Fractal-Based Reconfigurable Antennas for Wireless Communication) under D. K. Upadhyay.

ACHIEVEMENTS/AWARDS/RECOGNITIONS/ACTIVITIES

03

1st Position in Innovative Prototype Product Model Display Exhibition & Competition on the occasion of “National Technology Day 24” , on 8 May 2024 organized by Institution’s Innovation Council, Birla Institute of Technology, Mesra awarded to Research Scholar Sachin Kumar Singh, Supervisor - Dr. Richa Mishra.

04

Best Paper Award to Dr. Richa Mishra at International Conference on Recent Trends in Engineering and Sciences (RTES-2024), India for the paper titled, “Feasibility study on hollow steel microneedle assembly and IOT enabled Peristaltic Pump”, organized on 29-30March, 2024, Birla Institute of Technology, Mesra, Ranchi.

05

Dr Priyank Saxena received a certificate of merit for Basics of Embedded Systems and Robotics, conducted by IIT, Bombay, as a part of MOOC through the e-Yantra Lab Setup Initiative (eLSI).

DEPARTMENT DEVELOPMENTAL ACTIVITIES

RECENT ADDITIONS TO DST FIST SPONSORED SENSOR FABRICATION LAB

DST FIST Project implementation Team Members

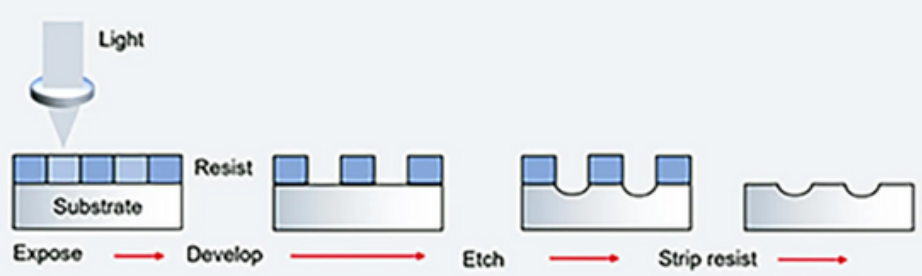
1. Dr. Sanjay Kumar, HOD, ECE,PI
2. Dr. Sandeep Singh Solanki, Co-PI & Member
3. Dr. Neela Chattoraj, Co-PI & Member
4. Dr. Sitanshu Shekhar Sahu, Co-PI & Member
5. Dr. Kartik Mahto, Co-PI & Member
6. Dr. Sanjaya Shankar Tripathy, Co-PI & Member
7. Dr. Priyank Saxena, Co-PI & Member
8. Dr. Richa Mishra, Co-PI & Member
9. Dr. Vimal Kumar Singh Yadav, MNNIT, Allahabad, Co-PI & Member

- **Maskless Laser Writer**

Make – Heidelberg, Germany

Traditional photolithography requires the fabrication or purchase of a photomask and then the use of a stepper or mask aligner to transfer the CAD pattern onto a resist-covered wafer or plate. The maskless lithography technique allows you to bypass the long process of ordering a photomask and enables you to transfer the design directly to the wafer without the need for a photomask.

Direct -write lithography uses a laser write modulator to write the features on the surface. Any type of photolithographic feature or resist can be used, opening the entire world of photolithographic microstructuring to the maskless lithography approach.



Maskless photolithographic processing

- **Tabletop Plasma Cleaner,**

Make - Harrick

Plasma treatment may be applied to a wide variety of materials, including glass, semiconductors, polymers, and metals. Useful applications include surface cleaning of substrates for enhanced adhesion, plasma activation for microfluidic device fabrication, and surface chemistry modification of biomaterials and polymers.

Deionised Water Setup

- **Deionised Water Setup**

Make- Adrona, Latvia, Europe

The deionised water setup system is capable of producing both Grade 1 and Grade 2 water. The system is based on reverse osmosis and ion exchange technologies optimized for the best quality.

● **Spin coater System** Make – Elveflow, France

The coating of a photoresist on a substrate can be made in several ways, the most used is clearly the spin coating that coats a liquid photoresist on a rotated substrate. Spin coaters are used in the photolithography of a microfluidic mold to coat a photoresist layer (such as SU-8) on a substrate. However, they are made to be versatile for all kinds of photoresists.

Spin coater System

- **Syringe Pump, make Navson, India**

Syringe pumps, or syringe drivers, are motorised devices that accurately control the movement of fluid from a syringe by mechanically inserting or retracting the plunger. Syringe pumps feature stepper motors that accurately move the platform attached to the plunger of a syringe.

● **Spin coater System** Make – Navson India

● **Fume Hood** Supplier – Widson, India

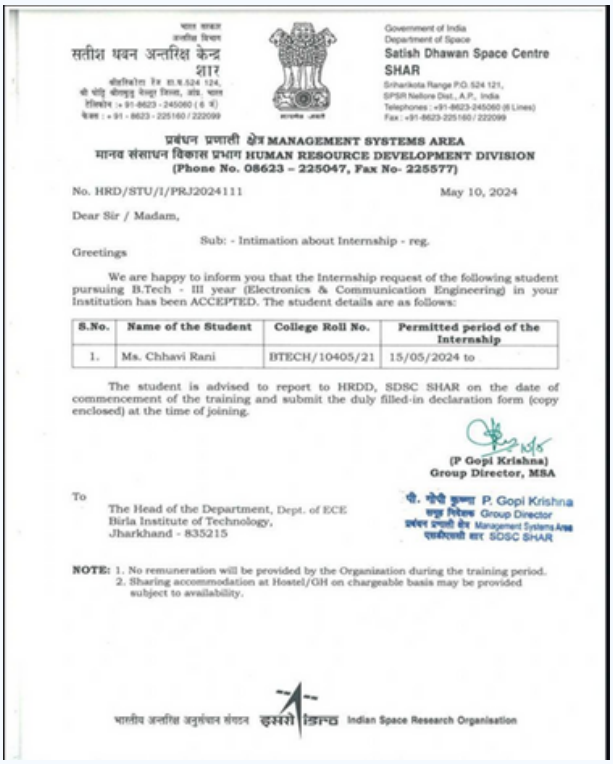
A fume hood is especially designed to exhaust toxic or otherwise harmful vapours etc. for protecting laboratory personnel & equipment.

- **Chemical Refrigerator,** Supplier – Widson, India

STUDENT SECTION

STUDENT ACHIEVEMENTS

1. Mr. Soumak Nandi (BTECH/10378/20) has successfully secured admission to the prestigious University of Illinois for his Ph.D. program. His acceptance into this esteemed institution marks a significant milestone in his academic journey, reflecting his dedication and hard work. He will receive Full scholarship for MS + Ph.D. in addition to a Research Assistantship (RA) with a Stipend



सतीश धवन अन्तरिक्ष केन्द्र
शार
Satish Dhawan Space Centre
SHAR

प्रबंधन प्रणाली क्षेत्र MANAGEMENT SYSTEMS AREA
मानव संसाधन विकास प्रभाग HUMAN RESOURCE DEVELOPMENT DIVISION
(Phone No. 08623 – 225047, Fax No- 225577)

No. HRD/STU/1/PRJ2024111 May 10, 2024

Dear Sir / Madam,

Sub: - Intimation about Internship - reg.

Greetings

We are happy to inform you that the Internship request of the following student pursuing B.Tech - III year (Electronics & Communication Engineering) in your Institution has been ACCEPTED. The student details are as follows:

S.No.	Name of the Student	College Roll No.	Permitted period of the Internship
1.	Ms. Chhavi Rani	BTECH/10405/21	15/05/2024 to

The student is advised to report to HRDD, SDSC SHAR on the date of commencement of the training and submit the duly filled-in declaration form (copy enclosed) at the time of joining.

(P Gopi Krishna)
Group Director, MSA

To
The Head of the Department, Dept. of ECE
Birla Institute of Technology,
Jharkhand - 835215

पी. गोपी कृष्णा P. Gopi Krishna
समूह निदेशक Group Director
प्रबंधन प्रणाली क्षेत्र Management Systems Area
एसडीएससी शार SDSC SHAR

NOTE: 1. No remuneration will be provided by the Organisation during the training period.
2. Sharing accommodation at Hostel/GH on chargeable basis may be provided subject to availability.

भारतीय अन्तरिक्ष अनुसंधान संगठन इसरो ISRO Indian Space Research Organisation

2. Ms. Chhavi Rani (BTECH/10405/21) has successfully secured an internship at the renowned Indian Space Research Organisation (ISRO) in Sriharikota. Her acceptance into this prestigious program is a testament to her exceptional skills and dedication to her field.

STUDENT ACHIEVEMENTS

3. Mr. Vikram Verma (BTECH/10161/21) has been selected for a prestigious research internship at Northeastern University, marking a significant achievement in his academic career.

4. Three 6th semester students namely, Mr. Rajas Deshpande, Mr. Arnav Roy and Mr. Vikram Verma, have cleared the GATE exam with impressive ranks. Their exceptional performance showcases their dedication and mastery in their respective fields, setting a strong foundation for their future endeavors in higher education and professional careers.

5. Mr. Ayush Raj (BTECH/10045/22) has secured third position in the self-composed poetry slam competition 'Madhurima' at IIT BHU's annual fest, Kashiyatra24, on January 23, 2024.

STUDENT PLACEMENT DETAILS

1.The highest placement package of 52 Lpa was offered by “CRED” to Chandrachud Shrivastava (BTECH/10086/20) of K20 batch.

2.The Second highest package was offered by “Texas Instruments ” of Rs. 34,64,285 to Dibyaranjan Mishra (BTECH/10303/20) and Rahul Srivastava (BTECH/10080/20) of K20 batch.

3.“Atlassian” offered the third highest package of Rs.34,28,446 to Samarth Pathak (BTECH/10076/20) and Ashutosh Jawanpuria (BTECH/10505/20).

4. Other top placements were offered by “Salesforces”, “Zscaler”, “Cisco”, “Walmart Global Tech” to 6 students in the range of Rs. 20Lpa to 30Lpa.

5.There are significant placement offers by companies like “Oracle GBU”, “British Telecom”, “Fastenal”, “Publicis Sapient”, “NPCI”, “UKG(Ultimate Kronos Group)” to 13 students of K20 batch with package in the range of 15 Lpa to 20 Lpa.

6.Other decent placement offers came from companies like “Logic Fruit Technology Private Limited”, “Fastenal”, “Tredence”, “TATA Steel”, “Tejas Networks”, “Truminds Software Systems”, “Amdocs India Pvt. Ltd.” To 13 students with packages in the range of 10-15 Lpa.

STUDENT CLUB ACTIVITY

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.

PhDs Awarded

1.Ms. Shikha Swaroop Sharma (PhD/EC/10004/2014) defended her PhD thesis entitled, “Reconfigurable Active Filters for Wireless Communication” , on March 18th 2024, under the Guidance of Dr. A. K. Tiwary.

2. Mr. Rampravesh Kumar (PhD/EC/10052/2016) defended his PhD thesis entitled, “Analysis of Cooperative Non-Orthogonal Multiple Access Scheme in Improving Cellular System Performance”, on May 7th 2024, under the Guidance of Dr. Sanjay Kumar.

3. Mr. Saurabh Sarkar (PhD/EC/10060/2013) defended his PhD thesis entitled, “Classification of Hindustani Music using Signal Processing and Machine Learning" Techniques”, on May 29th 2024, under the Guidance of Prof. S. S. Solanki (Guide) and Prof. Soubhik Chakraborty (Co-guide).

4. Mr. Ashish Raj (PhD/EC/10053/17) defended his PhD thesis entitled, “Some Investigations on Electromagnetic Interference Mitigation Techniques", on June 11th 2024, under the Guidance of Prof. Nisha Gupta.

5. Mr. Sashi Shankar (PhD/EC/10002/2017) defended his PhD thesis entitled, “Design, Analysis, and Experimental Verification of Fractal-Based Reconfigurable Antennas for Wireless Communication" , on June 20th 2024, under the Guidance of Dr. D. K. Upadhyay.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

BIRLA INSTITUTE OF TECHNOLOGY MESRA

Study M.Tech.

Specializations

- VLSI Design & Embedded Systems
- Wireless Communication
- Instrumentation Engg.
- Microwave Engg.

DST FIST SUPPORTED DEPARTMENT

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

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DST FIST SUPPORTED DEPARTMENT

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WHY

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- Cutting edge research infrastructure.
- Strong industrial ties.
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- Industry and academia placement.
- Course work can be done using MOOC courses available on swayam portal

WHO

- B.Tech / M. Tech in relevant areas
- M.Sc. (Electronics / Physics with Electronics / Radiophysics / Computer Science/- Biomedical Instrumentation / Biophysics)
- **Seats available for both fulltime and part time candidates.**

HOW

Shortlisting based on written test and interview

ADMISSIONS OPEN

www.bitmesra.ac.in

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This vibrant Pattachitra painting of Shiva as Nataraja, created by Ms. Khushi Kumari (BTECH/10659/22), showcases the intricate detailing and vivid colors typical of this traditional art form.