



Volume 1, ISSUE 2, July 2023

ECE EXPEDITION



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,

I am extremely pleased on release of this second issue of the departmental newsletter 'ECE Expedition'. At the outset I wish to express my sincere thanks to the editorial team members who made it possible to bring out this issue. The time was challenging because of the climax of various academic activities. In spite of that, finding time to complete this assignment is truly commendable. I also thank and congratulate everyone in the department for their achievements and contributions to this issue.

You are aware that the 'ECE Expedition' is published quarterly in electronic version. The first issue was successfully launched on 28th April, 2023, which was welcomed with extremely cheerful notes in the department. Since then, one quarter has passed, and the second issue is before you. During this period a lot of remarkable developments and notable activities took place in the department in the domain of research contributions, sponsored projects, outreach activities, workshops, seminars, expert talks, student activities, and their achievements. This issue is an effort to abreast us about all that. I am sure this issue will reflect on how our department is progressing, and also it will give us an insight into what needs to be done to perform better. This issue will undoubtedly help to reinforce the objectives and goals of the department, which will enhance our commitment towards research, supporting students, and contributing to the broader scientific community. I hope you find this issue informative and engaging.

I am grateful to all the members of the department for their involvement and support. We will truly appreciate your feedback and suggestions.

Thank you.

Dr. Sanjay Kumar
EDITOR-IN-CHIEF

ECE EXPEDITIONS

EDITORIAL TEAM



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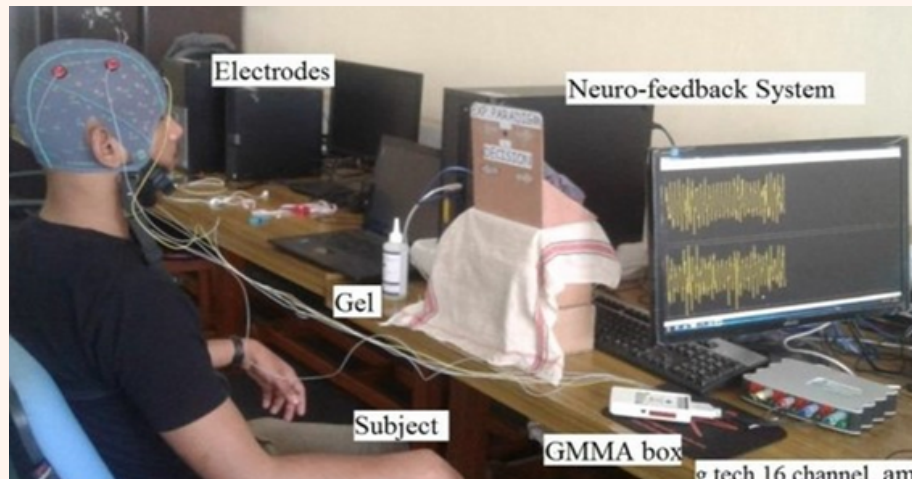


Rituraj

ECE EXPEDITIONS

FLASHBACK BCI WORKSHOP

Dr. M. K. Mukul organized SERB sponsored one week high-end workshop ("KAARYASHALA") on "BRAIN-MACHINE INTERFACE" from Aug 22 - Aug 28, 2022.





DOWN THE MEMORY LANE

M.TECH. ALUMNA

“

My name is Ankita De and I pursued the M.Tech program in Wireless Communication at Birla Institute of Technology, Mesra (BIT Mesra). The program aims to equip students with a strong understanding of wireless networking, signal processing, antenna design, and wireless protocols. This write-up aims to provide an overview of my experience and accomplishments during my time in the program.

Birla Institute of Technology, Mesra (BIT Mesra) is a renowned technical institution in India offering various undergraduate and postgraduate programs, including the Master of Technology (M.Tech) degree in several disciplines, including computer science and engineering, mechanical engineering, civil engineering, electrical engineering, and more.

Admission to the M.Tech program at BIT Mesra is competitive and based on various factors, such as the candidate's performance in the Graduate Aptitude Test in Engineering (GATE), followed by counselling and personal interviews.

The curriculum of the M.Tech program at BIT Mesra is designed to provide in-depth knowledge and specialization in the chosen field of study. It includes a combination of core courses, electives, and a research project or thesis.

”

“

The coursework is aimed at enhancing technical skills, research abilities, and problem-solving capabilities.

Additionally, BIT Mesra encourages students to engage in research projects, attend conferences, and publish papers in reputed journals. The institute also facilitates collaborations with industries and research organizations to provide practical exposure and opportunities for internships or placements.

As a requirement for the M.Tech program, I conducted an in-depth research project on the topic of "Performance Enhancement of UAV Network using Efficient Energy Distribution and Node Placement" under the guidance of Dr. Sanjeet Kumar. My guide provided clear and concise step-by-step instructions in each step of my project. This project involved analyzing the efficiency, capacity, and performance of UAV networks in different applications. I collected data, performed simulations using advanced software tools, and derived insightful conclusions. The research project not only enhanced my technical skills but also honed my analytical and problem-solving abilities and also help in my career.

”



M.TECH. ALUMNA

“

Bit Mesra has a huge campus size 780 acres with full greenery everywhere. Classroom, labs library, huge sports complex. It has one of the best laboratories among top institutions in India. Placements are outstanding for all branches. The placement cell is very active and has produced some of the most lucrative packages. The campus life here is very good and overwhelming. The club are very active and engaging.

”



TECHNOLOGY VISION

RADIATION-HARDENED MEMORY CELLS FOR SPACE AND TERRESTRIAL APPLICATIONS-A BRIEF OVERVIEW

Monalisa Pandey, ECE Department

Radiation-hardened SRAM (Static Random Access Memory) cells play a crucial role in aerospace, nuclear, and high-energy physics applications where radiation-induced bit errors can cause catastrophic consequences. This article briefs the recent advancements in this field, focusing on key techniques and strategies employed to enhance radiation tolerance and improve overall performance.

With continuous scaling in technology, the supply voltage, and other node capacitances are decreased accordingly, to control the power consumption in the IC's. Simultaneously, the probability of being vulnerable to the SET (Single Event Transient) increases, eventually the chance of an SEU (Single Event Upset), also known as 'Soft Errors' increases. When there is a charge disturbance (caused due to a radiation event) that can flip or alter the contents (stored data states) of a cell a soft error is said to have occurred. This error is so-called "soft" because there is no permanent damage caused to the cell by the radiation event. With technology scaling, there is also a decrease in the minimum spacing between two devices, which causes multiple devices vulnerable to the SEU. If the radiation strike is of high energy, it might also eventually lead to MBU (multibit upset) or SEMNU (single event multinode upset). These MBU's are generally of a small fraction compared to the total SEUs. A soft error is caused due to a radiation event that occurs close to a sensitive node, such that the $(Q_{coll} > Q_C)$, i.e., (if the collected charge is greater than the critical charge of the circuit).

Compared to other memory circuits the SRAM cells are more prone to these radiation-induced upsets due to their low node capacitances and have more sensitive volume per bit compared to other memory. Hence, these SRAM cells must be protected from the radiation effects.

Various alternatives have been proposed to tolerate the radiation effects. A Quarto 10T has been introduced which is more radiation tolerant compared to the standard 6T SRAM cell but has a high write failure probability.

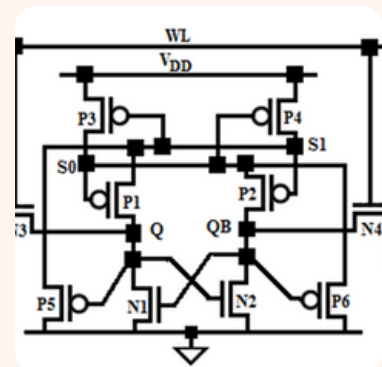


Fig 1. RHMD 10T

TECHNOLOGY VISION

To overcome these issues, a We-Quarto 12T is introduced which is the write enhanced version of the Quarto 10T cell but has a large area overhead. A 11T SRAM cell is later developed by cutting the feedback path to tolerate SEUs but has longer access delays and much overhead circuitry. Later cells with stacked structures, i.e., NMOS stacked 10T SRAM cell (NS10T) and PMOS stacked 10T SRAM cell (PS10T) are introduced which exhibit only partial robustness to SETs, i.e., either (0 to 1) or (1 to 0) transition is only tolerated depending on whether NMOS

or PMOS stack is implemented. A QUCCE 10T SRAM cell (Quadruple Cross Coupled storage cell) introduced has very good robustness to the radiation upsets making it very reliable but it suffers lower RSNM (Read Static Noise Margin - the stability of cell during a read operation). Furthermore, many miscellaneous and novel SRAM cell designs have been proposed over the years for improving radiation tolerance of the SRAM cell and many crucial design metrics like stability, power dissipation and access time of the cell. Two of them have been presented here in Figs. 1 and 2, i.e., RHMD 10T and HRRT 13T. They exhibit higher RSNM, shorter read delay, and higher critical charge thereby proving their robustness against single event upset.

Conclusion: The memory cell designed in such a way that it has higher critical charge proving its robustness against radiation strike. In addition, it also outperforms in terms of read delay, write delay, write margin, RSNM at nominal supply voltage.

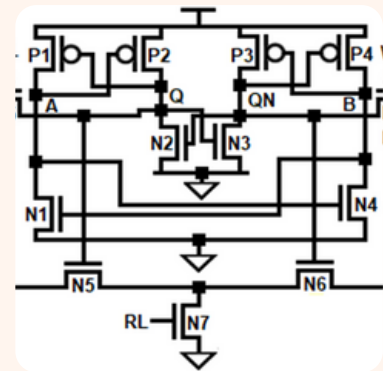


Fig 2. HRRT 13T

TECHNOLOGY VISION

TUNNEL FIELD-EFFECT TRANSISTORS (TFET): UNLOCKING THE POTENTIAL OF LOW-POWER ELECTRONICS

Mukesh Raj, ECE Department

Tunnel Field-Effect Transistors (TFETs) have emerged as a promising alternative to traditional MOSFETs, offering the potential to address the growing demand for low-power electronic devices. TFETs leverage quantum mechanical tunneling phenomena to enable efficient charge carrier transport, leading to improved energy efficiency and reduced power consumption.

Structure of MOSFET and TFET:

- The basic TFET structure is similar to a MOSFET except that the source and drain terminals of a TFET are doped of opposite types (shown in Fig. 1).
- The TFET belongs to the family of so-called steep-slope devices that are currently being investigated for ultra-low-power electronic applications. A key feature of the TFET, which is critical for low-power switching, is the possibility for an inverse subthreshold slope, below the limit of 60 mV/dec for normal FETs (shown in Fig. 2).

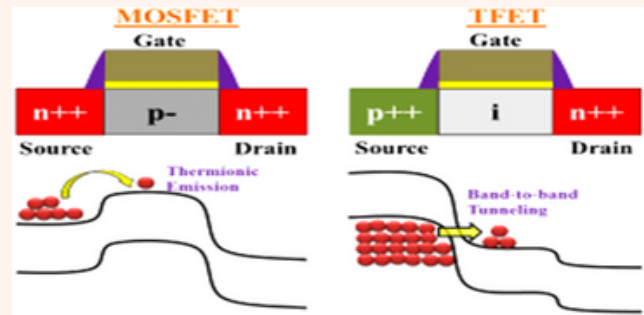


Fig. 1 TFET and MOSFET Structure

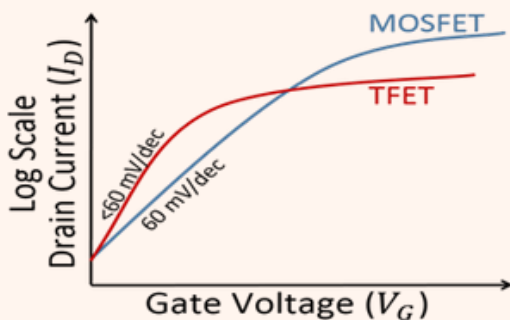


Fig. 2 Drain current vs. gate voltage curve

Principles of Operation:

TFETs operate based on the principle of band-to-band quantum tunneling. In a TFET, a narrow-bandgap material, such as III-V compound semiconductors or silicon-germanium (SiGe), is used to form the source and drain regions. The narrow bandgap enables electrons to tunnel through the barrier, facilitating efficient charge transport even at low voltages.

Advantages of TFETs:

TFETs have advantages such as low off-state current (I_{off}), low subthreshold swing (SS), and low power consumption.

TECHNOLOGY VISION

Applications and Future Outlook:

TFETs hold tremendous potential for low-power electronics and are expected to find applications in a wide range of fields. TFETs have the potential to operate reliably at low temperatures, making them suitable for cryogenic applications. They can be utilized in portable devices, implantable medical devices, energy harvesting systems, energy-efficient data processing units, quantum computing and Internet of Things (IoT) edge devices.

Conclusion:

Leveraging quantum tunneling phenomena, TFETs offer improved energy efficiency, reduced power consumption, and compatibility with existing CMOS technology. Continued research and development efforts aimed at material engineering, device optimization, and integration challenges will be instrumental in unlocking the full potential of TFETs and driving their adoption.

DEPARTMENTAL ACTIVITIES

LAUNCH OF ECE EXPEDITION



The first Issue of ECE Expedition was launched on 28th April, 2023

DRONE SHOW ORGANIZED BY ECE DEPARTMENT



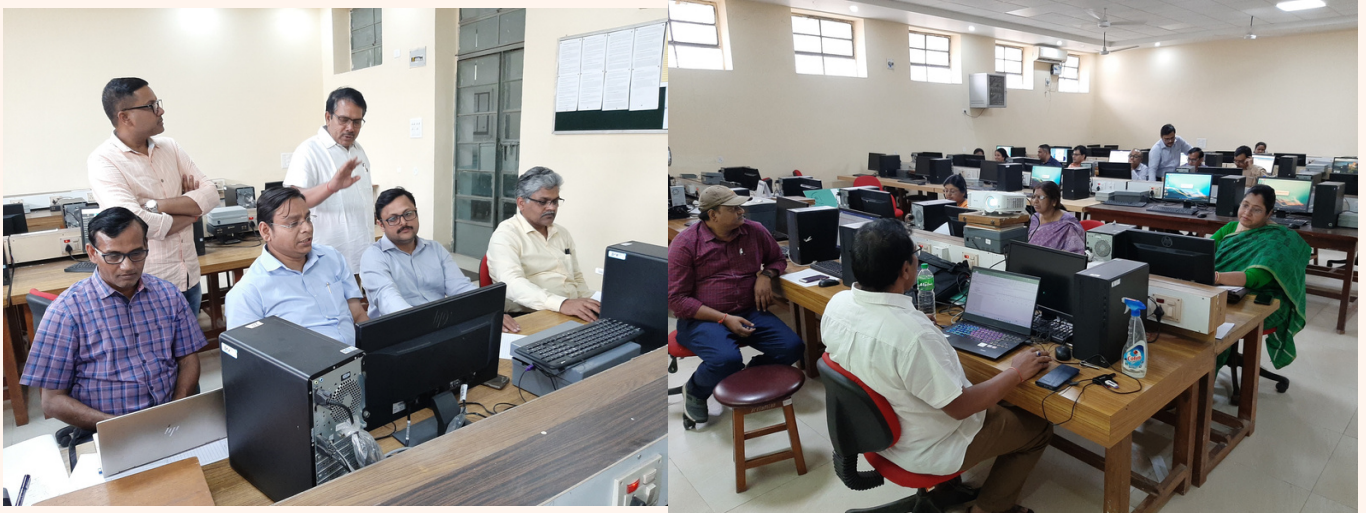
The UAV Lab of the Department in collaboration with Savitri Support & Services, Motihari, Bihar arranged a drone show on 26th April 2023 which included 5.0 inches/3.5 inches Racing Quad, Hexacopter, RC planes, and many more.

DEMO SESSION ON 5G ENABLED DRONE GIVEN BY DR. PRABHU CHANDHAR



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.

CO-PO ATTAINMENT : TRAINING-CUM-PRACTICE SESSION



A Training cum Practice Session on CO-PO attainment was conducted by Dr. Manoj Kumar Mukul on 4th May 2023 in the Microprocessors Lab of the department.

TRAINING ON IOT KIT BY EDGATE TECHNOLOGY: THE IOT TRAINING SESSION



Dr. Sitanshu Sekhar Sahu has organised a two-days training on the Internet of Things (IoT) in the Electronics and Communication Department from April 25th to April 26th, 2023. The inauguration was done by the Head of the Department, Dr. S.S. Solanki, in

the presence of all faculty members, PhD scholars, and PG students. The technical engineer from EdGate Technology has conducted the training. Hands on Training on the IOT board integrated with various sensors with the internet was conducted. Some machine learning models were also implemented.

IIC WORKSHOP



  	
One-Day Workshop on "Intellectual Property Rights for Young Innovators" Programme Schedule 26.04.2023	
10:30 am	Introduction & Welcome Address by Dr. Sanjaya Shankar Tripathy Workshop Co-ordinator
10:35am-10:40am	Address by Dr. K. Sridhar Patnaik Convener, IIC-BIT
10:40am-10:45am	Address by Prof. S.S. Solanki Head, Department of Electronics and Communication Engg.
10:45am-11:45am	Talk on "Intellectual Property Rights for Young Innovators" by Mr. Vedant Pujari Accures Legal's Founding Partner
11:50am-12:50pm	Talk on "Patentability of Innovation in Engineering & Technology" by Mr. Naveen Varma Senior Partner at ZeusIP Advocates LLP
12:50pm	Vote of Thanks by Dr. Anand Pd Sinha Associate Dean, RIE & Co-Convener IIC BIT
VENUE:	
Seminar Hall-II R&D Building, BIT Mesra Ranchi.	

Prof. S. S. Solanki, Head of the ECE Department, inaugurated the One day workshop on Intellectual Property Rights for young Innovators on 26th April, 2023, organized by Institution's Innovation Council, BIT Mesra, Ranchi.

NXP CAMPUS CONNECT

SESSION IS HOSTED BY
BIT MESRA, RANCHI INDIA

SoC Architecture, Reset Clocking, PLL, Level Shifter

LIVE SESSION

The session will introduce elements of SoC architecture in the context of RESET clocking and role of PLL and level shifters. There are a host of things that need to be addressed while starting the SoC after power up or doing a reset when the SoC is already working. Different elements of system need to coordinate the smooth operation.

SPEAKERS

PARUL SHARMA
Senior Principal Design Engineer
NXP Semiconductors

ANRIT PILANA
Principal Design Engineer
NXP Semiconductors

SAPNA MAHWANI
Principal Design Engineer
NXP Semiconductors

Attend the session in-person

Tuesday May 02
5:00 – 6:30 pm IST
Seminar Hall – 1
R&D Building

Or Join Virtually

Write to us at: nxpconnect@nxp.com
Connect with us at:
Website: www.nxp.com
LinkedIn: <https://www.linkedin.com/in/nxpconnect/>
YouTube: <https://www.youtube.com/@NXPIndiaCommunication>

NXP CAMPUS CONNECT SESSION- SOC ARCHITECTURE

A virtual session on SoC Architecture - Reset, Clocking, PLL, Level Shifter, and Memories" was hosted by the Department on May 2nd, 2023, as a part of the NXP India campus connect program. Campus Connect is an initiative to reach out to university faculty and students in India to share a technical overview of contemporary topics of interest in the semiconductors design and embedded electronics system design sector (hardware/software).

GUEST FACULTY VISIT

Dr. Samit Ari, Professor, ECE Department NIT, Rourkela, and Dr. R. K. Mishra, Associate Professor, ECE Department, NIT Patna, visited our department to conduct UG final year project viva-voce examination on the 8th & 9th May 2023.



Sl No	Name	Internship Company	Title
1	Tanisha Singh	NXP Semiconductors	PDN one pager summary automation using python for Redhawk tool
2	Pinky Kumari Munda	NXP Semiconductors	Enabling DFT Connectivity Checks
3	Hemanshu Sogra	NXP Semiconductors	Analog & Mixed Signal Verification on IPs in i.MX95
4	Prem Pramanik	NXP Semiconductors	Analog Validation Methodology on IO Pads for i.MX95 and 5nmIPTV
5	Mahavadi Sri Shashank	Siemens EDA	Development of Verification Intellectual Property for Display Port Protocol Version 2.0
6	Prajwal Matukumali	Siemens EDA	Development of Verification Intellectual Property for Camera Serial Interface-2 protocol
7	Kartik Rai	Siemens EDA	Development of Verification Intellectual Property for Compute Express Link Protocol Version 3.0
8	Harsh Tripathi	Steradian Semiconductors	Design and Verification Booths Multiplier & Cordic's Algorithm
9	Kartik Agarwal	AIA FSM Labs IIT-D	FSM Smart Lab Introduction using AR
10	Amol Srivastava	Walmart Global Tech India	Walmart Search Backend - Polaris
11	Deeksha Sinha	Samsung	Implementation of file attachment tray in <u>knox</u> messenger

UDBODHAN - EXHIBITION ON INDIAN KNOWLEDGE SYSTEM DONE IN COORDINATION WITH ECE DEPARTMENT



As per the directives of AICTE in relation to the G20 Summit, a three-days exhibition on Indian Knowledge System (IKS) named Udbodhan was organized by Dr. Sanjay Kumar of the ECE department, the Chairperson, Value Education Cell, BIT Mesra in the institute during 13th to 15th April 2023.

The exhibition aimed to make the young minds aware of the scientific rigor and heritage of ancient India, which might excite them to boost their level of contribution in research and development, innovation, entrepreneurship, and assimilation and creation of new knowledge, which may greatly contribute to nation building.

FAREWELL TO DR. VIMAL K. S. YADAV



A get together was arranged in the department to bid farewell to Dr. Vimal Kumar Singh Yadav who will be joining MNIT Allahabad. He joined the ECE department on 01st Sep, 2021.



बीआईटी मेसरा के लालपुर सेंटर में एक दिवसीय कार्यशाला आयोजित



खबर मन्त्र व्यूरे

रांची। बीआईटी मेसरा के लालपुर सेंटर की ओर से मंगलवार को आयोजित एक दिवसीय कार्यशाला का आयोजन किया गया। इसका विषय था- वर्तमान परिदृश्य में शिक्षण-अधिगम प्रक्रिया की गुणवत्ता को समृद्ध करना। मुख्य वक्ता के रूप में वेल्यू एजुकेशन के अध्यक्ष और इस कार्यशाला के निदेशक डॉ संजय कुमार थे। उन्होंने शुरूआत में ही अपनी ओजस्वी बातों से शिक्षक और छात्रों ने महमरिक के बाद के परिदृश्य में शिक्षण अधिगम प्रक्रिया की गुणवत्ता और अधिगम पर प्रकाश डाला। लालपुर सेंटर की निदेशक डॉ वंदना भट्टाचार्य ने इस कार्यशाला में शिक्षक और छात्रों से कहा कि महामारी काल में आई दूरी

के लिए इस प्रकार की कार्यशाला का आयोजन दोनों के बीच के संबंधों को बेहतर बनाने में सेतु का कार्य करेगा। विजेताओं को डॉ संजय कुमार और निदेशक डॉ वंदना भट्टाचार्य ने पुरस्कृत किया। कार्यक्रम में डॉ प्रणव कुमार, डॉ अमृता प्रियम, डॉ श्रावणी मुखोपाध्याय, डॉ संजय कुमार, डॉ अभय रंजन श्रीवास्तव, डॉ सोमनाथ मुखर्जी, डॉ सिवा मोइत्रा, डॉ सोमित्रो, डॉ उमेश प्रसाद, डॉ संदीप, मनोज कुमार, स्वाति मिंज, अभिषेक तिग्गा, डॉ महुआ और डॉ पार्थो सहित काफी संख्या में छात्र और शिक्षकों ने भाग लिया। धन्यवाद ज्ञापन इस कार्यशाला के संयोजक डॉ प्रदीप मुंडा ने किया यह जानकारी डॉ मृणाल पाठक और राणा प्रताप मिश्र ने दी।

BRAINSTORMING SESSIONS FOR ENRICHING QUALITY OF TEACHING-LEARNING PROCESS

A series of one-day workshops on theme of 'Enriching the Quality of Teaching-Learning Process in the present scenario' was conducted by Dr. Sanjay Kumar of the ECE department, the Chairperson, Value Education Cell, BIT Mesra during 4th to 11th May 2023. The workshop included Brain Storming Sessions aiming to help teachers in soul searching and realizing their own roles and responsibilities in order to impact the Teaching-Learning Process in the current scenario. Total of 97 Faculty Members of the institute participated in the workshop.

The similar Workshop was conducted at BIT Extension Centre Lalpur on 16th May, 2023 in which 25 faculty members participated.

PROJECTS

SYSTEM USING IMAGE PROCESSING TECHNIQUE TASAR SILKWORM PEBRINE IDENTIFICATION

Pebrine Identification system is developed using the existing monocular compound microscope which can able to transmit the live image of the sample to the LCD screen where the image was processed and the identification of pebrine could be done effectively. The prototype is presented in the figure



Fig 1.FRONT VIEW



Fig 2.BACK VIEW

DEEP LEARNING-BASED HEALTH CARE FRAMEWORK FOR IOT-BASED ASSISTANCE OF ALZHEIMER'S PATIENTS

In NMICPS Dr. S.S. Tripathy and Dr. Priyank Saxena are involved in the development of machine learning-based algorithms to identify dementia and predict its severity based on the gait sensor's information

LOW-COST PROXIMITY SENSING SYSTEM USING 24-GHZ RADAR SENSOR FOR MINING APPLICATIONS

Dr. S. S. Tripathy received a consultancy project for low-cost proximity sensing system using a 24GHz radar sensor using ESP32 is developed for mining application. The sensing system is equipped with - a distance based LED indication, variable Buzzer sound, 4 digit LED display, time-stamped data storage with a 32 GB SD card. All are implemented with ESP-32 microcontroller using micropython. The product has been handed over to Rizitech India Pvt Ltd. The sensor detects both moving and stationary objects in a pre-defined coverage area and can report the distance of the closest object via visual range indicators (display) and an audible signal (buzzer) together with LED display to the equipment operator.

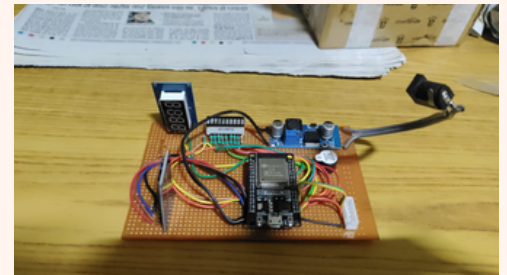


Fig 1. Prototype of a Sensing system



Fig 2. Sensing system mounted in a mining truck

RESEARCH

DEVELOPMENT OF A VISUAL QUESTION ANSWERING SYSTEM USING MACHINE LEARNING TECHNIQUES

Medical VQA intends to support clinical decision-making and improve patient engagement. ImageCLEF has announced MEDVQA-GI . 2023 in which sub-task 1 is VQA MED. VQA MED 2019 is a publicly available dataset. We have participated in the VQA MED 2023 challenge with the team's name BITM. The designed model extracts image features from VGG19 and LBPH and concatenates them to get feature vectors. For text, Bio BERT is used which has been trained on medical images. The image and text features are fused using attention and then classified. The accuracy of the VQA MED 2023 dataset is 86.27%.

PLANT HEALTH MONITORING SYSTEM USING MACHINE LEARNING AND FUZZY LOGIC APPROACH.

In this research work plant disease identification and quantification are done using leaf images. The data utilized in this thesis are leaf images obtained from PlantVillage open data repository. This work includes disease identification by utilizing deep convolutional neural networks and quantification using a fuzzy inference system.

RECENT PUBLICATIONS (JOURNALS)

01

SENSITIVITY ENHANCEMENT OF APODIZED FIBER BRAGG GRATING FOR TEMPERATURE MEASUREMENT", PHYSICS OF WAVE PHENOMENA (SPRINGER)

Himadri Nirjhar
Mandal and Soumya
Sidhishwari

04

DESIGN AND OPTIMIZATION OF 4-BIT ARRAY MULTIPLIER WITH ADIABATIC LOGIC USING 65NM CMOS TECHNOLOGIES

Divya Sharma, Amrita Rai, Sunita Debbarma, Om Prakash, Mukesh Kumar Ojha, Vijay Nath, IETE Journal of Research Published online 15th April 2023, Impact Factor =1.877, (SCI).

02

INFORMATION STORAGE AND PROCESSING SYSTEMS

Dr. Aminul Islam along with his student Shashank Kumar Dubey, SCI indexed journal Microsystem technologies - Micro and Nanosystems having impact factor 2.012 in Vol. No. 29, Issue No. 4, pp. 515 - 525, Issue date Apr. 2023.

05

A NOVEL DESIGN OF LOW POWER & HIGH SPEED FINFET BASED BINARY AND TERNARY SRAM AND 4*4 SRAM ARRAY

N Shylashree, M S Amulya, Gulur R Disha, N Praveena, Vijay Kumar Verma, Muthumanickam S, Kannagi V, Sivachandar K, Vijay Nath, IETE Journal of Research Published online 21st April 2023, Impact Factor =1.877, (SCI).

03

MULTI-LEVEL IMAGE SECURITY USING MODIFIED RUBIK'S CUBE ALGORITHM

Rupesh Kumar Sinha, Sitanshu Sekhar Sahu, International Journal of Information and Computer Security, Inder Science, May 2023.

06

A NOVEL TECHNIQUE FOR DETECTING CROP DISEASES WITH EFFICIENT FEATURE EXTRACTION

Smita Desai, Rajendra Kanphade, Rahul Priyadarshi, K.V.B.V. Rayudu, Vijay Nath, IETE Journal of Research Published online 29th May 2023, Impact Factor =1.877, (SCI).

RECENT PUBLICATIONS (JOURNALS)

07

DETECTION OF PEAK WAVELENGTH OF MULTI-FBG USING HIGHER-ORDER DERIVATIVE OF WAVELETS MULTIREOLUTION ANALYSIS AND MAXIMUM LIKELIHOOD ESTIMATION.

Sunil Kumar and Somnath Sengupta, estimation, Optics Communications, Elsevier, vol 544, p.129621, May 2023.

08

LOW-COST ELECTROMAGNETIC ABSORBERS FOR SHIELD

Avinash and Nisha Gupta, in IEEE Transactions on Components, Packaging and Manufacturing Technology, vol. 13, no. 3, pp. 374-381, (2023), doi: 10.1109/TCPMT.2023.3265706.

RECENT PUBLICATIONS (CONFERENCE)

09

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

Dr. Aminul Islam along with his students S. Nandi, S. K. Dubey, and M. Kumar, in 2023 IEEE Devices for Integrated Circuit (DevIC) conference organized during 07-08 April 2023 and published in IEEE Xplore

10

IOT BASED SOIL HEALTH MONITORING SYSTEM USING SOIL MOISTURE SENSOR AND PH SENSOR

Mrinalini Barik, Sitanshu Sekhar Sahu, Rupesh Kumar Sinha, in International Conference on Data Science and Intelligent Applications ICDSIA-2023, 28-29 th April 2023.

11

SWITCHING SYSTEM WHICH OPERATES AUTOMATICALLY ON REAL TIME LIGHT INTENSITY OF ANIMAL/BIRD FARM

Preeti Lakhani, R. Kumar, M. Ghosh, Rupesh Kumar Sinha, in 31 st SAPI Annual Conference & National Symposium, Kashmir 3-5 th May 2023. (Won Best paper in Oral presentation)

AWARDS / ACHIEVEMENTS

01

Total citation of Dr. Aminul Islam exceeded a landmark of 2000 along with an h-index of 22 and an i-10 index of 56.

04

Himadri Nirjhar Mandal Awarded first prize in the "Wireless Communication" track for presenting research work entitled "Fiber Optic based Sensing Techniques and Machine Learning for Structural Health Monitoring" in the Research and Innovation Conclave 2023 at Dept. of ECE, BIT Mesra on 28th February 2023.

06

Dr. Aminul Islam is one the editors of a Springer book "Microelectronics, Circuits and Systems" which has been published online on 27th June 2023.

02

Dr. Aminul Islam sessioned a chair in the 2023 IEEE Devices for Integrated Circuit (DevIC) conference organized during 07-08 April 2023 at Kalyani, India.

05

Dr. Vijay Nath is now Editor in Chief of International Journal of Microsystems and Internet of Things(IJMIT)

03

Dr. S. S. Tripathy with his team participated in the VQA MED 2023 challenge with the team's name BITM. The designed model extracts image features from VGG19 and LBPH and concatenates them to get feature vectors. For text, Bio BERT is used which has been trained on medical images. The image and text features are fused using attention and then classified. The accuracy of the VQA MED 2023 dataset is 86.27%.

07

Dr. Aminul Islam along with his student published 4 chapters in a Springer book "Microelectronics, Circuits and Systems" which has been published online on 27th June 2023.

AWARDS / ACHIEVEMENTS

08

World's smallest planar UWB antenna: Professor Srikanta Pal developed super compact planar UWB antenna for short-range high-speed communications with his PhD scholar Mrinmay Chakraborty in the laboratories of BIT Mesra. This antenna has wide scale applications in indoor, military, medical etc. Development of smallest planar UWB antenna from INDIA became a HOT NEWS in print and visual media. Global giant Samsung Inc. and Georgia Institute of Technology had approached for the design in 2013. Recently the patent, titled- "AN ULTRA- WIDEBAND ANTENNA AND PROCESS OF FABRICATION OF THE ANTENNA" Srikanta Pal, Mrinmoy Chakraborty, BIT Mesra is granted. Patent: 409866, Date of Grant: 26/10/2022, Date of Filing: 09/07/2013, Patent ID: 814/KOL/2013. The patent news on the button- size wireless antenna is remarked to be as the "revolution in wireless technology which has huge potential to replace existing Bluetooth technology in many applications. The invention is lauded by about a million professionals and created front page headline stories in national dailies. Many national and international private, multinational and government agencies are interested in bringing the product into the market.



TIMES OF INDIA, 30.11.2022



DAINIK JAGRAN, 07.11.2022



PATENT, 26/10/2022

PATENTS

DR. NEELA CHATTORAJ

01

TITLE OF INVENTION:
ULTRAWIDE BAND
RRDA WITH A BEVEL-
SHAPED PATCH AND A
METHOD

02

TITLE OF INVENTION:
A
COMPACT ULTRA-
WIDE-BAND M.SRDR

03

TITLE OF INVENTION: WIDEBAND
RDRA COVERING DIELECTRIC
RESONATOR ,MATCHING
DIELECTRIC SLAB,COPPERGROUND
PLANE , CHAMFERED EDGES.

22 ECE EXPEDITIONS

OUTREACH ACTIVITIES - INVITED TALKS

01

Dr. Aminul Islam delivered a lecture on "Semiconductor Memory and Applications" for One-Week Outreach Program on "Microelectronics and VLSI Design (MVD-2023)" organized by the Department of Electronics and Telecommunication Engineering, BIT, MESRA, Ranchi, during 15-19 May 2023 on 17 May 2023.

02

Dr. Richa Mishra delivered invited talk on "Need for connected Bioinspired Microsystems" at Electronics & Communication Engineering Department, National Institute of Technology, Meghalaya in person on 9th June 2023.



02

Dr. Sanjay Kumar Delivered an Expert Talk on the theme of "Teaching To Transformation" on 06th June 2023 at Shri Mata Vaishno Devi University, Katra, Jammu. This talk aimed to help teachers in realizing their own roles and responsibilities in the current scenario to impact the Quality of Teacher-Student interaction.

SMVDU organizes a talk on 'Teaching to Transformation'

■ NW REPORT
JAMMU, JUN 9

The Directorate of Quality Assurance (DQA), Shri Mata Vaishno Devi University organized an interactive session with faculty members of the University. Dr. Sanjay Kumar, Chairperson, Value Education Cell, Birla Institute of Technology, Mesra, delivered a guest lecture on "Teaching to Transformation".

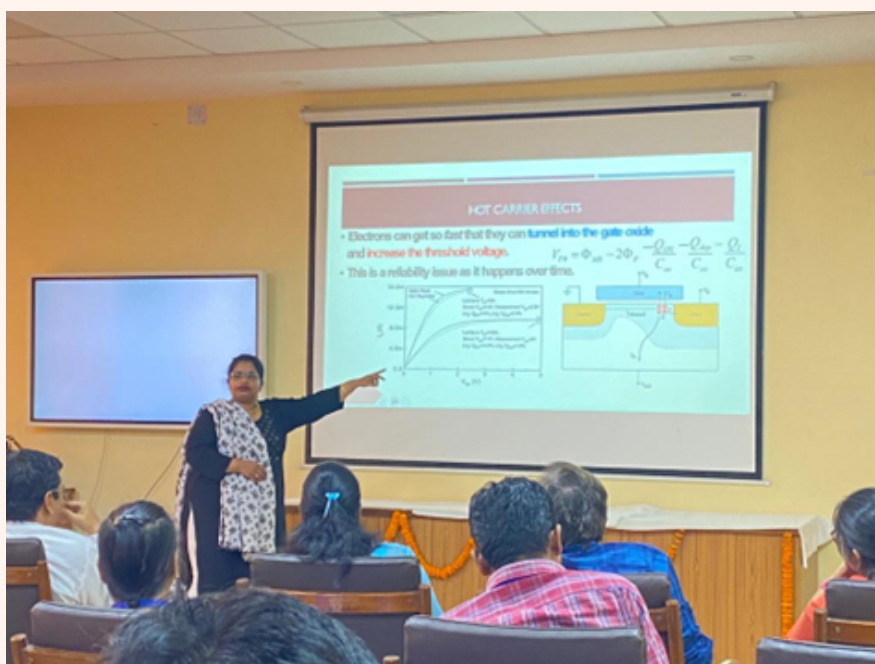
Moreover, Dr. Kumar highlighted that teaching is creating conditions that have the potential to transform the learner on many different levels (cognitive,



their full potential as learners, as members of society, and as of all human, plant, and animal life. At the end, Dr. Balbir Singh,

05

Dr. Deepti Gola delivered an expert lecture on "MOSFET Modeling" at One Week Outreach Program Microelectronics & VLSI Design (MVD-2023) organized by ECE Department and Institution's Innovation Council, BIT Mesra during 15th – 19th May 2023.



06

Dr. Richa Mishra delivered an expert lecture at One Week Outreach Program Microelectronics & VLSI Design (MVD-2023) organized by ECE Department and Institution's Innovation Council, BIT Mesra during 15th – 19th May 2023.



OUTREACH ACTIVITIES - CONFERENCES / WORKSHOPS

07

Dr. Richa Mishra participated in the INUP-i2i 2023 2nd Hands-on Training on Fabrication & Characterization of Nanoelectronics Devices, organized by the Centre for Nanotechnology, Indian Institute of Technology Guwahati, from 2nd-11th June 2023.



PHD DEGREES AWARDED

Following students have successfully defended PhD work :

1. Abhishek Kumar (PhD/EC/10054/2016) student of Dr. D. K. Upadhyay Defended PhD viva on 8th May 2023
2. Vishal Kumar (PhD/EC/10009/12) student of Dr. R. K. Lal Defended PhD viva on 20th March 2023

ONE-WEEK OUTREACH PROGRAM ON MICROELECTRONICS & VLSI DESIGN (MVD-2023) FROM 15-19TH MAY 2023

A one-week outreach program on Microelectronics and VLSI Design (MVD-2023) for UG/PG/PhD/Faculty/Scientists was offered by the Department of ECE at BIT Mesra and Institution's Innovation Council (IIC), Ministry of Education Initiative from May 15-19, 2023, in support of the national aim to make India self-reliant in the production of semiconductors, displays, and VLSI technology. First of all, we extend our heartfelt gratitude towards our honorable Vice Chancellor: Prof. I. Manna, for allowing us to organize this outreach program and also thankful to Prof. S.S

Solanki, HOD ECE for his encouragement and positive support. The Program was inaugurated by Prof Kunal Mukhopadhyay, Dean Faculty Affairs BIT Mesra. We are thankful to the Institution's Innovation Council, BIT Mesra for their support with the aiming to make India self-reliant in the production of semiconductors, displays, and VLSI technology.

This curriculum included in-depth theoretical as well as practical elements of cutting-edge VLSI tools and technology. The applicants were given access to a small number of seats. The selection process was first come, first served. Only offline mode was offered for the event. Further details for participations are as follows:

One-Week Outreach Program on Microelectronics & VLSI Design (MVD-2023)
Department of Electronics & Communication Engineering
Birla Institute of Technology, Mesra, Ranchi-835215(Jharkhand) India
Duration: 15th - 19th May, 2023

Time/Day	10:00 AM to 11:00 AM	11:15 AM to 12:30 PM	12:45 PM to 02:00 PM	02:15 PM to 03:30 PM	03:45 PM to 05:00 PM	05:15 PM to 06:30 PM
15/05/23 Monday	Inaugural Session Prof. S. S. Solanki & Dr. Sanjay Kumar	Dr. Vijay Nath (India Semiconductor Mission)	Dr. Samuel J Harrison (Uses of VLSI Design in IoT)	Dr. Amit Krishna Dwivedi (Embedded System)	VLSI Lab (Dr. Vijay Nath & HK, DS, TSR, NA) & ESD Lab (Dr. Santosh Prasad & DK, MLP, MK)	
16/05/23 Tuesday	Dr. Vijay Nath (Chip Design)	Dr. Deepati Gola (NOS Modeling)	VLSI Lab (Dr. Vijay Nath & HK, DS, TSR, NA) & ESD Lab (Dr. S. Prasad & Dr. Deepati Gola & DK, MLP, MK)		VLSI Lab (Dr. Vijay Nath & HK, DS, TSR, NA) & ESD Lab (Dr. Santosh Prasad & Dr. Deepati Gola & DK, MLP, MK)	
17/05/23 Wednesday	Dr. Richa Mishra (IC Fabrication Technologies)	Dr. Dilip Kumar Singh (Nanoscale Devices)	CEFA Physics Lab Visit : (Dr. Dilip Kumar Singh JMK, MS, RKP)		VLSI Lab (Dr. Vijay Nath & HK, DS, TSR, NA) & ESD Lab (Dr. Anand Islam & DK, MLP, MK)	
18/05/23 Thursday	Dr. Anand Islam (Memory Design)	Dr. Vinod Kumar Singh Yadav (Printed Mono Resistors and Diodes)	VLSI Lab (Dr. Vijay Nath & HK, DS, TSR, NA) & ESD Lab (Dr. Anand Islam & DK, MLP, MK)		VLSI Lab (Dr. Vijay Nath & HK, DS, TSR, NA) & ESD Lab (Dr. Anand Islam & DK, MLP, MK)	
19/05/23 Friday	Prof. S.S. Pathak (Signal Processing)	Dr. Raj Kumar Singh (Semiconductor, MOOC)	Technology Demo by Integrated Microsystem		Feedback & Valedictory Session	

Dr. M. Bhargava Kumar; HK; Dr. Hiranmayi Kaur; DS; Dr. Biraja Sharma; TSR; Ms. T. Sushikha Reddy; NA; Mrs. Nikhar Arjuna; MLP; Mrs. Monisha Pandey; MK; Mahesh Kumar; MK; Dr. Manish Kumar; DK; Dr. Manish Kumar Singh; RKP; Dr. Rajesh Kumar Prasad

(Prof. I. Manna, VC)





Following is the profile of the speaker/expert, their affiliation and their presented talk in this One Week Outreach program on MVD-2023:-

1. Dr. Vijay Nath (Associate Prof., B.I.T, Mesra)- Chip Design.
2. Dr. Dilip Kumar Singh (Assist. Prof., B.I.T,Mesra)- Nanoscale Devices
3. Dr. Richa Mishra (Assist. Prof., B.I.T, Mesra) - IC Fabrication Technologies.
4. Dr. Vimal Kumar Singh Yadav (Assist.Prof., MNIT, Allahabad) - Printed Micro Resistors and Diodes.
5. Dr. Deepti Gola (Assist. Prof., B.I.T, Mesra)- MOS Modeling.
6. Dr. Aminul Islam (Associate Prof., B.I.T, Mesra)- Memory Design
7. Dr. Amit Krishna Dwivedi (Assistant Professor, School of Engineering, University of Warwick, Coventry CV4 7AL) - Embedded System.
8. ETB. Samuel J Harrison (Fellow (ISVE) &Semiconductor Professional, Singapore)- Uses of VLSI Design in IoT.
9. Prof. Sant Sharan Pathak (Professor, B.I.T,Mesra)- Signal Processing.
10. Dr. Santashraya Prasad & Dr. Kalyan Koley (Assist. Prof., B.I.T, Mesra)

On the last day of the five day program a quiz was taken to know the how much they grab from this program and feedback form was also given to the participants to know how we could further improve the program further. After the successful completion of the program the participant's certificates were distributed in valedictory ceremony in Seminar Hall-2. The feedback given by all the participants are very encouraging and helping us a lot in organizing such events in the future.



AN INSIGHT

METAMATERIAL-INSPIRED MICROWAVE SENSORS: AN INSIGHT

Prof. Nisha Gupta, Professor, ECE Department

The sensors have become an integral part of modern developments. Ranging from small high-performance electronic devices such as mobile phones, home appliances, electronic toys to monitoring and control systems in industrial premises, and medical diagnosis systems, sensors show their existence everywhere. One class of sensors, the microwave sensors are gaining popularity since they are compact, have limited power capabilities and can also be connected wirelessly.

The working principle of microwave sensors is based on the interaction of the materials under test (MUT) with the confined electromagnetic waves at the resonant frequencies. Using metamaterial concept in microwave sensors is gaining popularity due to several advantages. One of the key advantages of using metamaterials for sensing is to increase the sensitivity of the microwave sensors. Besides, these sensors are low-cost, have simple configurations, high sensitivity and quality factor, contactless operation, reliability, and easy to fabricate. Additionally, metamaterial-inspired microwave sensors facilitate the scaling down of the size and frequency, making them useful for various possible applications.

Since at resonance, the electric fields near the resonator become sensitive to dielectric changes, therefore, placing the MUT near the resonator causes a shift in the resonance frequency of the metamaterial structure. The sensitivity of the sensor increases as the shift in the resonant frequency becomes greater. The shift in the resonant frequency is caused by changes in the permittivity of the analyte medium, variations in the over-layer thickness, changes in the refractive index, or alterations in other physical parameters of the MUT, such as temperature, density, moisture, or any other parameter which affects the dielectric property of the substrate or the region near the resonator. Split-ring resonators (SRR) and complementary split ring resonators (CSRR) are the commonly used metamaterial structures apart from other structures.

Achieving high sensor sensitivity, developing an efficient and cost-effective method for placing the material under test (MUT) in areas with high electromagnetic field concentrations, and simplifying the sensing process by eliminating the need for costly and bulky instruments are the important and desired attributes in the design of any metamaterial-inspired microwave sensors. Achieving these desired attributes through simple and small-scale designs that utilize easily accessible materials, fabrication techniques, and use of primitive machine learning techniques is the focus of our current research work.



Our current research activities focus on design and development of several metamaterial-inspired sensor structures for various applications such as sensing the concentration of the Ethanol-Water solution, to detect low concentrations of ethanol in petrol, etc. to name a few. Additionally, Linear Regression models are developed using machine learning, to predict the chemical concentrations and soil moisture contents with high accuracy.

INSTITUTE PRAYER

MEANING OF THE INSTITUTE PRAYER

This is a prayer to the almighty, which is in two parts, the first part is in Sanskrit and the second part in Hindi.

Yam Shaivah Samupasate Shiva Iti, Brahmeti Vedantino
Buaddha Buddha Iti Pramanpatavah, Karteti Naiyayikah
Arhan Nityatha Jain-Shasan-Ratah, Karmeti Mimansakah
So Yam Novid-Dhatu Vanchhit-Phalam,
Trailokyanatho Hari (3)

Hey Jag Trata, Vishwa Vidhata, Hey Sukh Shanti Niketan Hey (2)
Prem Ke Sindhu Din Ke Bandhu, Dukh Daridra Vinashan Hey
Hey Jag Trata, Vishwa Vidhata, Hey Sukh Shanti Niketan Hey
Nitya Akhand Anant Anaadi, Puran Brahm Sanatan Hey (2)
Jagashray Jagpati Jagvandan, Anupam Alakh Niranjana Hey
Pran Sakha Tribhuvan Pratipalak, Jeewan Ke Avlamban Hey
Hey Jag Trata Vishwa Vidhata, Hey Sukh Shanti Niketan Hey (2)

Meaning of the First Part

Who is worshiped by Shaiv as Shiv,¹ by Vedanti in the form of Brahma, by Bauddh⁴ in the form of Buddha, by Naiyayik⁵, who believes in testimony, in the form of Doer, by the followers of Jainism in the form of Jain, by Mimansak⁶ in the form of Karm,⁷ He, the owner of the three worlds⁸ may fulfil our wishes.

1: Those who worship Lord Shiv.

2: Those who follow Vedanta.

3: The absolute truth which is the cause of the creation, nourishment and demolition of the universe.

4: Those who follow Buddhism.

5: Follower of the Nyaya Philosophy. There are six schools of Philosophy in Indian Knowledge Tradition : Vaisheshika, Nyaya, Sankhya, Yog, Purva Mimansa and Vedant or Uttar Mimansa. The Nyaya Philosophy believes in testimony as the reliable means of gaining knowledge.

6: Follower of the Philosophical School of Mimansa.

7: A sum of a person's good and bad actions in this and the previous lives, affecting destiny.

8 : The three worlds are Physical world, Astral world and Celestial world.

Meaning of the Second Part

Hey Savior of the World, Creator of the Universe, Abode of the Peace and Happiness. Hey Ocean of Love, Friend of Helpless, Destroyer of Sorrows and Misfortune. Hey Eternal, Seamless, Infinite, Beginningless, Perpetual and the Whole Brahma. Hey Support of the Universe, Owner of the Universe, Worshipped by the Universe, Incomparable, Invisible, Blemish less. Hey Companion of Life, Nurturer of the three Worlds, Basis of Existence.

The Almighty can not be known by the five Senses and the four Antahkaran⁹. The Ishavashyopanishad gives only a hint about the Almighty by saying "Om Purnamadah Purnmidam, Purnat Purnmudachyate, Purnasya Purnmaday Purmevavashishyate" that is, he is Whole, from the wholeness comes the wholeness and if the wholeness is taken away from the wholeness, what remains is the wholeness.

9: Antahkaran refers to the inner state of being. It has four Elements Mind, Intellect, Inherent Tendency (Chitt) and Ego (Ahankar).

---XXX---

The Motto of the Institute "Sa Vidya Ya Vimuktaye" means it is the Vidya¹⁰ that liberates, liberates from Ego, Greed, Jealousy, Misconduct, Discourteousness, Ignorance, Inability and Misfortune. This Motto inspires pride and fills in a sense of duty and devotion toward the supreme goal of being a teacher. Teaching is not a job but a calling. Teachers are supreme in Nation building, as the most powerful tool for Nation building is with them, that is Education. A Nation gains Consciousness and Vigor only when a teacher is filled with Pride and Self-respect.

10: The Learning, Knowledge, Education and Wisdom.

Dr. Sanjay Kumar, Associate Professor &
Chairperson, Value Education Cell, BIT Mesra, Ranchi