NIT DELHI RESEARCH BULLETIN

अनुसंधान

SHOWCASING INSTITUTES'S RESEARCH ACTIVITIES

VOLUME 2, ISSUES 1 & 2,

JANUARY - JUNE 2023

राष्ट्रीय प्रौद्योगिकी संस्थान दिल्ली

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National Institute of Technology Delhi

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LAUNCH OF "अनुसंधान" (VOL. 1, ISSUE 3 AND 4)

MESSAGE FROM THE PATRON

The year 2023 is not only the witness of the culmination of "***Azadi ka Amrit Mahotsav***" but also the year in which India is proudly holding the G-20 presidency. Under G-20 activities, India has set "***Disruptive Science for Innovative and Sustainable Development***" as the subject for **Science 20** which has the objectives "*toleverage scientific, technological, and intellectual interactions among nations, regions, and societies in order to address common problems and form solid international alliances*." In corroboration of the same, NIT Delhi has constantly involved in tuning its research activities to contribute to the fulfilment of **Science 20** objectives in the form of its research projects, consultancy works, and Ph.D./PG/UG thesis dissertations. NIT Delhi has recently succeeded in securing research funding from international forums like **BRICS** and **IUSSTF**, and is in the process of establishing major research collaborations with the universities/organizations oversees. We have also recruited several Institute Post-Doctoral Fellows in different departments to enhance the research work in various important fields.

While releasing this edition of our research bulletin '**अनुसंधान**', I am extremely proud to mention that with the tireless efforts of each and every member of NIT Delhi, our institute has secured **51st Rank** in recently-released **NIRF-2023**. It is no less than a quantum leap if we compare it with our NIRF-2022 ranking (194). Apart from all other components, it is remarkably noticeable that our score in research component has significantly increased, which shows our astute commitment towards continuous improvement in our research activities in line with the national vision.

As Director, I am committed to further enhance the development of state-of-the-art research infrastructure and resources at NIT Delhi. It fills me with enormous joy to share with you the next edition of '**अनुसंधान**'. I congratulate the editors for their tireless work behind '**अनुसंधान**'.

Prof. (Dr.) Ajay Kumar Sharma
Director, NIT Delhi

FOREWORD FROM THE EDITORS

Welcome to the latest edition of the NIT Delhi Research Bulletin '**अनुसंधान**', a compendium that embodies the indomitable spirit of inquiry and innovation driving our institution. In these pages, we unveil a mosaic of research endeavours that resonate with the very essence of societal and national progress.

The year 2023 has already seen a lot of research innovations in different areas such as the development of a new type of cancer immunotherapy called CAR T-cell therapy with more effectiveness and less toxicity (University of California, San Fransisco), and the development of a new type of batterythat is more efficient and longer-lasting than current batteries (University of California, Berkley). The year 2023 also marks the announcement of India's space policy that opens up the space sector to private companies, which is expected to boost innovation and investment in the space industry.

Research, the crucible of transformative ideas, fuels the engine of societal evolution. It is the crucible where innovation and knowledge amalgamate, birthing solutions to challenges that shape our future. In the context of our great nation, India, research serves as the cornerstone of our aspirations for growth and development.

Recent research undertakings have cast a spotlight on the pivotal role research plays in our nation's building process. Consider the strides made in sustainable energy technologies, propelling India towards a greener, more ecologically harmonious future. Our researchers have harnessed solar power efficiency, placing us at the forefront of renewable energy adoption. These paradigm shifts in energy sourcing underscores the profound impact of research on India's quest for energy security and environmental resilience.

Our scientific community's endeavours in artificial intelligence have ushered in a new era of unprecedented precision and effectiveness. Moreover, the digital age has unfurled a digital renaissance, and India stands poised at its epicentre. Our researchers have engineered telecommunications innovations that bridge urban-rural divides, fostering equitable access to information and opportunity. Simultaneously, our cybersecurity advancements fortify our digital infrastructure, safeguarding our national interests in an interconnected world.

This Research Bulletin serves as a chronicle of our commitment to pioneering innovation and nurturing intellectual curiosity. The details contained herein epitomize the transformative power of research in shaping our society and nation. They stand as a testament to our resolve to surmount challenges, unravel mysteries, and propel India towards a future laden with promise and progress.

As we delve into the pages that follow, let us be inspired by the tireless dedication of our researchers and the boundless potential that research holds. Let us embark on a journey of exploration and enlightenment, united in our pursuit of a brighter, more prosperous India.

The whole team of editorswhole-heartedly thank the Hon'ble Director, Prof. Ajay Kumar Sharma, for giving us this opportunity to work on the past and current editions of '**अनुसंधान**'.We are thankful to all the departments, their heads, faculty members, and students for sharing the research information and data for the bulletin.

Editorial Team
"अनुसंधान"

NIT DELHI – AT A GLANCE

National Institute of Technology Delhi (NITD) is one of the thirty NIT(s) established in the year 2010 by an act of the parliament and has been declared as an Institute of National importance. NIT Delhi is an autonomous Institute, which functions under the aegis of the Ministry of Education, Government of India.It aims to provide education and research facilities in various disciplines of Engineering, Science and Technology, Management, Social Sciences, and Humanities for advanced learning and dissemination of knowledge. The Institute is imparting holistic education, along with inculcating high moral values in its students.

NIT Delhi started its academic session in 2010 and it was operating from its transit campus at Narela, Delhi until recently. The institute is now fully operational at its permanent campus situated on NH-1 (GT Karnal Road), Narela sub-city, New Delhi. The institute already offers B. Tech. programmes in five areas of technology (Computer Science and Engineering, Electronics and Communication Engineering, Electrical Engineering, Mechanical Engineering, and Civil Engineering), M. Tech. programmes in six disciplines, along with Ph.D. programmes in all branches of Science and Engineering.

The institute makes all attempts to establish strong research collaborations in evolving fields of research in science and engineering. The programmes like joint thesis work, inter-institute collaborative projects, institute assistantship to PG and doctoral students, and administrative support to faculty members for taking up research and consultancy work (sponsored by external agencies). The institute has started the Institute Post-Doctoral Fellowship (IPDF) programme to further escalate the research activities and has recruited several IPDFs in recent months.

NIT Delhi takes immense pride in conveying that the guidelines of National Education Policy (NEP)-2020 have been implemented for all batches of UG and PG students. From the academic session 2023-24, the institute is all set to start new B. Tech. programme in 'Artificial Intelligence& Data Science' and M. Tech. programmes in 'Smart materials and technology', 'Mathematics and Computing', and 'Power and Energy Systems' which have been designed in line with the NEP-2020 guidelines.

BROAD AREAS OF RESEARCH AT NIT DELHI

Department/Stream	Research Areas
Physics	Nanophotonic Sensors and Devices, Plasmonics, Fiber Optics, Optical Device Modeling, Optical imaging & instrumentation, Biomedical optics, Digital Holography, Microwave imaging and instrumentation, EM Theory in different media, Antennasand wave propagation, MHD waves & Flow
Mathematics	Convection in Fluids, Heat Transfer, Nanofluids, Ferrofluids, Micropolar Fluids, Non-Newtonian Fluids, Porous Media, Computational Applied Mathematics, Climate Modeling,
Chemistry	Design and synthesis of new porous materials with metal skeleton and their application in catalysis, chemical technology, and host-guest chemistry (molecular adsorption and molecular recognition), electrical,optical and magnetic properties.
Civil Engineering	Concrete Structures, Bridges, Earthquake Engineering, Advanced materials like Composites, FGMs, CNTs etc., Environmental Science and Engineering, Environmental Biotechnology, Waste Management, Waste to Energy Conversion
Computer Science and Engineering	Wireless Sensor Networks, Network Theory, Data Analytics, Quantum Computing in Networks, Federated Learning, Machine Learning , Motion analysis, Computer Vision, Cloud Computing, Data Security, 5G, ArtificialIntelligence, Databases, Big Data Analytics, Data Science, Health Informatics, Data Mining, Data Warehousing, Databases, Big Data, Software Engineering
Electrical Engineering	Power System Restructuring/Deregulation, Electricity Market, Distributed Generation, Renewable Energy, Security Analysis, Fault Detection, Operation and Control of Power Systems, Smart Energy Network, Electric Vehicle, Power Electronics, Renewable Energy Systems, Electric Drives, Smart Grids (Micro/Nano), Modeling, Design and Digital Control of DC Conversion System, Embedded Systems, Modeling& Design of Converters, FPGA Design, Control Systems, SignalProcessing, Control Systems, Biomedical Signal processing, Artificial Intelligence, Renewable Energy, Image Processing, ReliabilityEngineering, Conventional and Hybrid Power Systems, Power Systems Analysis, and Smart Grid Analysis, RAMS.
Electronics and Communication Engineering	MOSFET and TFET Devices,Standard cell library characterization, Computer Architecture, VLSI Design, Embedded Systems andDigital Image Processing, RF And Microwave Circuits, Networking, Wireless Communication(4G and 5G), Neural Networks, Signal and Image processing, Computer vision, Robotics, Machine Learning and Pattern Recognition, Artificial Intelligence, Optical Communication and Networks, Wireless Communication, Optoelectronics, Digital VLSI, Game theory, Peer-to-Peer Networks, Blockchain, Peer-to-Peer electricity trading, Semiconductor Devices,Nanophotonics, Speech Processing, Communication and Instrumentation, Antennas and wave propagation etc.
Mechanical Engineering	Additive manufacturing, Non-Conventional machining, Metal matrix composites, Metrology, Manufacturing Science, Advanced Machining Processes, Composite Materials

MEMORANDA OF UNDERSTANDING (MOU)

1. NIT Delhi and The Institution of Civil Engineers (India)

On 10th May 2023, NIT Delhi (NIT-D) has signed an MoU with the Institution of Civil Engineers, (India), i.e., ICE(I). NIT-D and the ICE(I) have entered into this Memorandum of Understanding to promote the development of a working relationship and to enlarge the exchange of technical, scientific and professional knowledge for the advancement of civil engineering by empowering youth and help the "Amrit Peedhi" realize their dreams focused on skilling that facilitate Job creation at scale and have supported business opportunities. This will emphasize on - job training, industry partnership and alignment of courses with need of industry. It will also cover new age courses for industry 4.0 like AI, robotics, mechatronics, IOT, 3D printing, drones and soft skills, etc. It will help in making students industry-ready and more employable. NIT Delhi and The Institution of Civil Engineers (India) recognize their strengths in research and education in one or more disciplines of advancement of civil engineering and their mutual interest in engaging themselves in academic cooperation.

2. NIT Delhi and CSIR-National Physical Laboratory (India)

On 20th April 2023, NIT Delhi signed an MoU with the CSIR-National Physical Laboratory (NPL), Delhi (India) to promote:

- Short and long-term scientists/faculty exchange
- Training of students and faculty
- Collaborative research under the outreach programme
- Other mutually agreed programmes (e.g., popularization of metrology, rural development, social scientific responsibility etc.), and
- Joint project proposals to R&D funding agencies

The MoU was signed by Prof. Manoj Kumar (HoD, ECE department) from NIT Delhi and Dr. Rina Sharma (Head-HRD, CSIR-NPL) in the presence of faculty members from NIT Delhi and senior scientists from NPL.

AWARDS AND HONORS

- Dr. Shelly Sachdeva received theBest Paper award for "***Pollution Reduction and Vedic Science: Health Based Computer Scientist Perspective***"at NIET International Conference & Summit-2023 (NICSET), 23-24 June 2023, Noida Institute of Engineering and Technology, Greater Noida, India
- Dr. Anidev Singh acted as a Coordinator representing INDIA in the prestigious 63rd International Session for Young Olympic Ambassadors at the International Olympic Academy, Olympia, Greece, during 10th June-21st June 2023. He received a diploma for the above contribution as Coordinator.

- Dr. Anurag Singh was invited by NIT Jalandhar as Conference Chair of "***3rd International Conference on Secure Cyber Computing and Communications,***" during May 26-28, 2023.

- Dr. Prashant Kumar received the best paper award for "***Computational Analysis of Visakhapatnam Port with Variable Bathymetry using SBEM***" in the 1st INTERNATIONAL CONFERENCE ON ADVANCED OPTIMIZATION TECHNIQUES AND APPLICATIONS (AOTA - 2023) Organized by Ramgarh Engineering College, Jharkhand in collaboration with Sultan Moulay Slimane University, Morocco & City University, Malaysia, during 21st and 22nd January, 2023.
- Dr. Anuj Kumar Sharma (Associate Professor, Physics) has been included in "***World Scientists Rankings-2023***" released by AD Scientific Index, and has been ranked #1 within NIT Delhi.
- Dr. Rishav Singh was invited as an expert panelist for the session "***Post Construction Maintenance of Infra and Structural Health Monitoring through Use of Technology***" at the Annual Flagship Infrastructure Conference and Awards (Road, Highways and Underground Construction, Tunnelling) along with the plenary Session with Hon'ble Union Minister Shri Nitin Gadkari on May 17 and 18.

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EXPERT TALKS/SEMINARS/FDP/CONFERENCE/OTHER EVENTS ORGANIZED

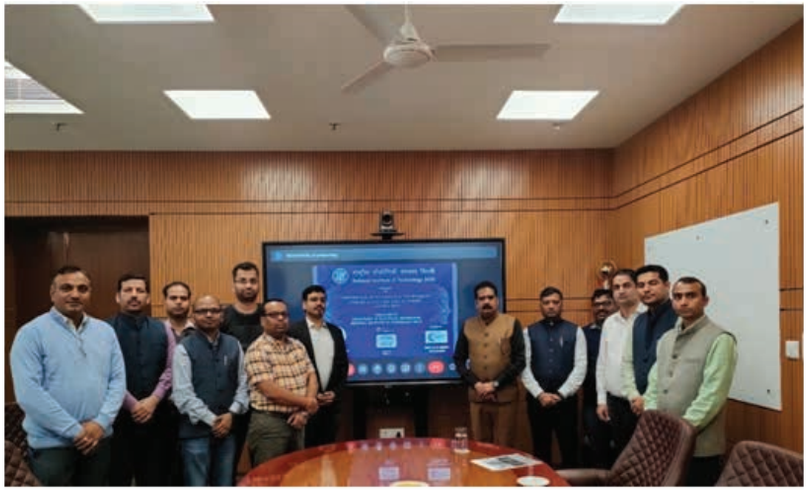
- National Institute of Technology Delhi organized the International conference on Power Engineering and Intelligent Systems (PEIS-2023) during June 24th -25th, 2023. The conference was technically sponsored by the Soft Computing Research Society. Accepted papers are to be published in SCOPUS Indexed Springer Book Series, Lecture Notes in Electrical Engineering. In the conference, approximately 100 and above papers were accepted out of 800. All papers were presented on during the conference in 13 sessions including two keynote sessions. The topics covered in the conference were as follows: Power and Energy Engineering, Transportation and Energy Storage, Grids, Smart Grids, Microgrids and AC & DC, Energy Managements, Electricity Market and Policy/ Regulatory Aspects, Data Analytics & AI ML, Big Data and Cyber Security in Power Systems, Power electronics components and their applications, Intelligent Systms, Real-World Applications. Dr. Vivek Shrivastava served as General Chair (Chairman) in the International conference on Power Engineering and Intelligent Systems (PEIS2023) during June 24-25, 2023. The conference was technically sponsored by the Soft Computing Research Society.

- Department of Mechanical Engineering organized a short term course (STC) on "Emerging Technologies in Thermo-Fluids and Energy Systems (ETTES-2023)" during April11-16, 2023.Emerging technologies have a significant impact on Thermo-Fluids and Energy systems by enhancing energy efficiency, reducing emissions, improving materials and manufacturing processes, Computational fluid dynamics (CFD) and facilitating real-time monitoring and control. These technologies include advanced sensors, additive manufacturing, and renewable energy systems. More than 80 participants got themselves registered in this STC from various IITs, NITs, CFTIs and other Institutions. It is pertinent to mention herewith that the STC had a participation from eminent speakers from the countries like USA, UK, South Korea, IITs/ NITs/ CSIR/ Institutes of repute in India.

- Department of Mechanical Engineering organized a faculty development programme (FDP) on "Modern Manufacturing in Industry 4.0 (MMI-2023)"during February7-12, 2023.Modern manufacturing systems play a crucial role in Industry 4.0 by providing the necessary infrastructure for integrating advanced technologies such as IoT, artificial intelligence, and big data analytics. Modern manufacturing processes such as 3-D Printing, advanced Machining processes and Nano-Technology etc. are desirable for the present era in the global competitiveness and considered major thrust areas for the innovative research. Overall, the integration of modern manufacturing systems in Industry 4.0 is helping manufacturers to create smart, connected factories that can produce goods and services more efficiently and effectively, ultimately leading to increased competitiveness and growth. More than 110 participants have been registered in this FDP from various IITs, NITs, CFTIs and other Institutions. It is pertinent to mention herewith the FDP includes eminent speakers throughout the globe from UK, South Korea, IITs/ NITs/ CSIR/ Institutes of repute in India.

- A "Research Orientation Workshop" was organized jointly by IGDTUW and NIT Delhi during 08-10 June 2023. Workshop oriented the participants toward research problem selection, literature survey, and other related processes in the research lifecycle. All the sessions during the workshop were conducted by industry professionals from Master card AI Garage. Speakers for Day-1 covered elements of Good Research. On Day-2, participants were given information regarding elements of effective writing. Finally, Day-3 was concluded with hands-on exercises, feedback, and valedictory session. The workshop was attended by Ph.D. students, other research-inclined PG/UG students, and faculty members.

- SERB DST funded workshop on the topic of "ARTIFICIAL INTELLIGENCE TECHNIQUES FOR HEALTHCARE APPLICATIONS (AITHA-2023)" was organized by the department of Electrical Engineering during January 22-27, 2023.



- One Week Online Short-Term (STC) Course on "Recent Trends in Computer Vision, Artificial Intelligence (AI) & Robotics (RTCVAIR-2023)" was organized by ECE Department of NIT Delhi during March 20–25, 2023. Dr. Dharmendra K. Jhariya and Dr. Mahesh K. Singh (Assistant Professor, ECE Department) coordinated this STC. The aim of this STC was to facilitate the participants regarding modern technological aspects in various fields of AI such as Data Annotation Capability, Natural Language Processing,

- Merged reality enhanced by augmented reality (AR), Data-centric artificial intelligence, Image Analysis Ability, Automated visual and Quality control systems, Handling Hazardous Tasks, etc. The STC included 10 expert talk sessions distributed among 6 days with the experts from academia and industry. Speakers from eminent institutes like IIT Kanpur, IIT Roorkee, IIT Ropar, IIT Mandi, IISER Bhopal, BITS Pilani, Thapar University, Patiala shared their knowledge with the students. An international Speaker (Dr Rekha Raja, Scientist from Wageningen University & Research USA) was also a part of the STC. More than 62 participants from various working/ teaching/ research professions participated in the online STC. Apart from outside participants, the department also involved the Master's students of ECE and ECE (VLSI) design, PhD research scholars to attend various technical sessions.

- The 1st International Conference on Recent Trends in Chemical Sciences and Sustainable Energy (RTCSSE-2023) was organized during March 24-25, 2023 by Department of Applied Sciences, NIT Delhi in collaboration with Department of Chemistry, Swami Shraddhanand College (University of Delhi). The main objective of the conference was to serve as a forum for the exchange of ideas and knowledge among individuals working at different frontiers of chemical sciences and sustainable energy. It was also meant to provide a platform for the researchers, scientists, professors from academia, and industry participants to showcase their research in the form of keynote addresses, lectures, discussions and presentations on cutting edge research and technology; and providing an opportunity for the participants to create networks among the peers that will strengthen collaborative interdisciplinary research. More than 150 abstracts for the oral and poster presentations were received. 30 oral presentations were accepted from various young academicians and researchers from various institutions nationwide. The event brought together four keynote speakers, eighteen invited lectures, hundred plus research scholars, members of faculty, students and other industry experts, nationally and internationally to discuss the recent advances in chemical sciences with focus on sustainability. It concluded with a set of presentations of real-world cases describing new and noteworthy initiatives relevant to the conference themes which revolves around environment and sustainable energy, green chemistry, sustainable food systems, catalysis etc. The first day of the conference started with an inaugural session by welcome address and opening remarks by Dr. Amit Pratap Singh, Convener of RTCSSE 2023, from NIT Delhi. This was followed by an address by the Chairman, Prof. Praveen Garg, Principal, Swami Shraddhanand College and Shri. Ravinder Kumar, Registrar, NIT Delhi. The Presidential Address was by Patron, Prof. (Dr.) Ajay K. Sharma, Director, NIT Delhi. Then, the Guest of Honor, Prof. Rajeev Gupta, CEO, Institute of Eminence (University of Delhi) addressed the gathering. This was followed by release of abstract book.

The inaugural address was given by Chief Guest Dr. Anil Kumar Mishra, Director, INMAS, DRDO. Afterwards, Dr. Anuj K. Sharma, Co-convener presented the vote of thanks. The technical sessions followed the inaugural session and the first keynote lecture by Prof. A. K. Bakhshi, founding Vice-Chancellor of PDM University, Haryana. The two-day conference comprised of six technical sessions which were conducted at two places in the campus in order to accommodate the large number of presentations. Each session had a Chair and Co-chair, who were experts in the domain. Invited speakers delivered their talks on various domains of the conference themes. Around 107 posters were presented by the students and other researchers on second day of the conference in the poster presentation session. Another keynote talk was delivered by Prof. Sourav Pal, Department of Chemistry, Ashoka University on the same day. The conference was structured to encourage discussion between participants.

- The two-day Conference ended with a valedictory session. The opening remarks in the session were delivered by Co-Convener Dr. Bhupinder Mehta (University of Delhi). Best oral and poster presentations were awarded by the certificates and prize money. This was followed by an address by Shri Ravinder Kumar, Registrar, NIT Delhi and Prof. (Dr.) Ajay Kumar Sharma, Hon'ble Director, NIT Delhi. Afterwards, chief guest Prof. A. K. Paul, CSIO Chandigarh addressed the gathering. Dr. Amit Pratap Singh, Convener (RTCSSE-2023) and Dr. Anuj Kumar Sharma, Co-convener from NIT Delhi threw light on the future of RTCSSE. The session concluded with a vote of thanks. A heartiest thanks was extended to our sponsors- American Chemical Society, Genius Enterprise, CSIR, SERB India, BHEL, LabIndia, Swadeshi civil infrastructure, Globe civil projects private limited and CDH. Hundreds of attendees, paper presenters, participants and students have benefited in many ways from this conference.

- Department of Civil Engineering organized an expert lecture from Prof. Andrew Whittaker, Department of Civil, Structural and Environmental Engineering, University at Buffalo New York, USA. The topic of his lecture was "Meeting carbon targets by 2050: the commodification of advanced nuclear reactors and the role of civil engineers and seismic isolation".

  Brief Abstract of Talk:

  Meeting carbon targets by 2050 will require near immediate action to reduce the use of fossil fuels to produce electricity and process heat, and for transportation, including vehicles, aviation, and maritime shipping. Renewables such as solar and wind have an important role to play but neither can produce base load power in the absence of large-scale energy storage, and building transmission infrastructure to move such electricity from source to user is expensive and challenging (at least in the United States). Civil engineers will play a leadership role in the delivery of this $5+T USD interdisciplinary endeavor, which seeks to combat climate change: the moon shot of our generation. Seismic isolation will play a key role in the commoditization of advanced nuclear power plants. The proposed approach could be expanded to repower other fossil plants, including natural gas, and to shuttered nuclear power plants.

- Dr. Vivek Shrivastava organized AICTE Training and Learning (ATAL) Academy sponsored Two Weeks FDP on "Reliability Studies for Engineering Applications" from Feb 13, 2023 to Feb 24, 2023 as Coordinator.

- Dr. Vivek Shrivastava served as General Chair (Chairman) in the 2nd International Conference of Undergraduate Students (ICUS 2023) from May 20-21, 2023.

- One Week Online STC Course on "Nascent Technologies in Signal Processing, Communication and VLSI (NTSPCV-2023)" was organized by ECE Department of NIT Delhi during April 24-29, 2023.Dr. Manisha Bharti (Associate Professor, ECE Department) and Dr. Sandeep Kumar (Assistant Professor, ECE Department) coordinated this STC. The aim of this STC was to facilitate the participants about modern technological aspects/developments in the field of Signal Processing, Communication and VLSI and provide an insight into how to do research in the above areas along with disciplined focus for various real-life applications. Special emphasis was given for the research challenges and advancement in the field of Signal Processing, Communication, VLSI technologies and their applications. 11 lectures/talks

were delivered by the Experts invited from various esteemed institutions like IITs, NITs, IIITs, CFTIs. More than 90 participants from various working/ teaching/ research professions participated in this online STC. Apart from outside participants, the department also made an effort to involve the PG research scholars of ECE and ECE (VLSI) design, to attend various technical sessions for their enhanced technical and professional skills.

- ECE Department organized a 6- Days IEEE-sponsored International Workshop on "Electronics, Photonics, and IC at the 75th Birth Anniversary of Transistorat NIT Delhi during February 20-25, 2023, in blended mode. The IEEE Photonics Society (Delhi Section-Rajasthan Chapter), India, technically and financially (partial) supported the event. The Prakash Bharati (a consortium of IEEE Photonics Society Chapters of India), IEEE Circuits, IEEE NITD Student Branch, IEEE Systems Society- Delhi Section and GREAT Alliance Foundation supported this event technically.

The main aim of the workshop was to give a glimpse of various important developments that occurred in the areas of electronics, photonics and ICs during the last 75 years and projections for the future. Due to the vast nature of the subject, a few topics listed below have been chosen, but the list may cover a few more.

The tentative list of topics to be covered is

a. Historical sketches

b. BJTs and HBTs

c. FETs in various forms including nanostructured devices

d. Integrated Circuits and sensors

e. Growth, fabrication and characterization

f. Photonic devices: LEDs, Laser Diodes, Photodetectors, and their use in communication

g. Future directions

There were 19 expert talk/hands-on sessions distributed over six days with the expert talks from academia and industry persons from National Yang-Ming Chiao Tung University, Taiwan, University of Illinois, Urbana-Champaign, USA, Korea Military Academy, Seoul, Republic of Korea, IIT Delhi, IIT Kharagpur, IIT Bombay, IIT Indore, IIT Roorkee, IIT Jodhpur, MNIT Jaipur, NIT Rourkela, NIT Jalandhar, NIT Hamirpur, NXP semiconductors, Applied Materials, Bennet University, University of Calcutta, SRM University, AP etc. There was a hands-on-session regarding the simulation of solar cell and a short oral presentation among the young researchers. More than 50 participants from various working/ teaching/ research professions have registered and successfully attended the workshop.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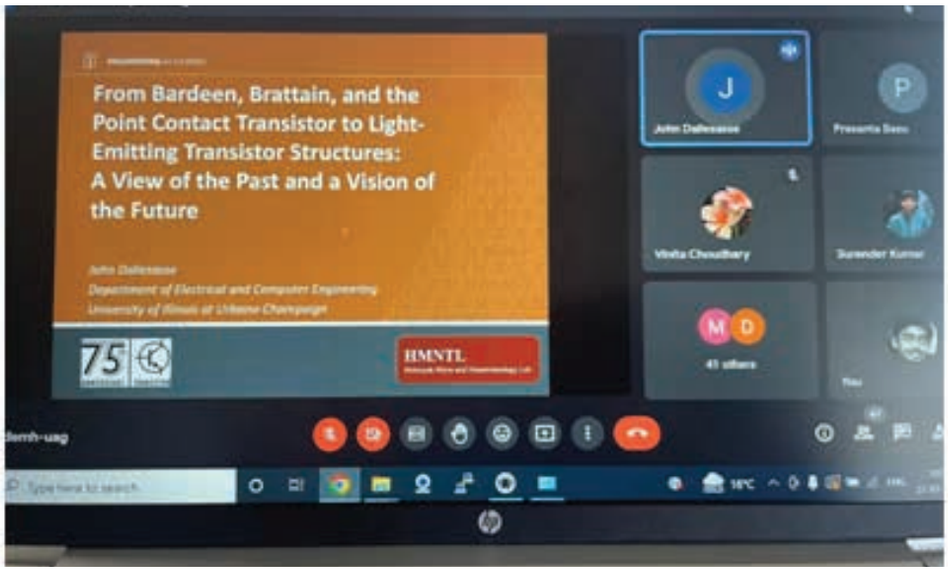
From Bardeen, Brattain, and the Point Contact Transistor to Light-Emitting Transistor Structures: A View of the Past and a Vision of the Future
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NEWS COVERAGE OF THE INSTITUTE'S RESEARCH ACTIVITIES

- The **Statesman** newspaper has published a full-length article on January 4, 2023 highlighting the research work (*"Rainfall impacts India as much as it does the world Climate change has a wide range of potential implications across the world"*) from Dr. Prashant Kumar, Dr. Kapil Kumar, and the concerned research team.
  Brief summary: Human-induced global warming and large-scale natural variability cause significant variations. in localized temperatures, which in turn govern the occurrence of intense rainfall events. In December 2015, the majority of countries ratified the Paris Agreement. The pact called for continued efforts to limit global temperature rise to 1.5 °C. Human-induced warming has already surpassed pre-industrial levels by 1.1°C. As per the Intergovernmental Panel on Climate Change (IPCC) estimates, an average warming of 1.5 °C across the globe enhances the risk of rainfall events amongst many other potential consequences. Such increases in average global temperature are emerging as a key risk to the macroeconomic outlook of both advanced and emerging economies. A coordinated effort to strengthen research to assess the impact of climate change on agriculture, forests, animal husbandry, aquatic life, and other living beings is urgently needed.

Perspective

The Statesman
KOLKATA, WEDNESDAY 04 JANUARY 2023

Rainfall impacts India as much as it does the world

DIVYA SARDANA, SURESH YADAV, PRASHANT KUMAR, KAPIL KUMAR AND ARMIN ROSENCRANZ

- Dr. Anmol Ratna Saxena presented his thoughts in a webinar on "New resources of energy to save our future generations". (Weblink: https://youtu.be/hJD3eDt9nfk.)

- Our startup Palanam Technology team was a part of 2nd National Workshop on Technology Innovation in Cyber-Physical Systems (TIPS) under National Mission on Interdisciplinary Cyber Physical Systems (NM-ICPS) organized by Department of Science and Technology, Government of India hosted by Indian Institute of Technology, Delhi, during 6-8 April 2023. Vilnius Tech University delegates visited our startup Palanam Technology at NIT Delhi.

PHD DEGREE AWARDED

S. No.	Name of PhD Student	Roll No.	Name(s) of Supervisor (s)	Department	Title of PhD thesis	Date of award of PhD degree
1	Prabhakar Agarwal	183221104	Dr. Sandeep Kumar	ECE	Development of Efficient Algorithms for the Classification of Imagined Speech	13 January 2023
2	Suruchi Sharma	173221210	Dr. Baljit Kaur and Dr. Rikmantra Basu	ECE	Design of Tunnel Field Effect Transistor for Low-Power and High-Performance Application	21 January 2023
3	Alok Kumar Mishra	183221101	Dr. D. Vaithiyanathan and Dr. Baljit Kaur	ECE	Design and Analysis of Low Power Memory Elements for High Speed VLSI Circuits	08 February 2023
4	Hemant Parashar	163431101	Dr. Amit Mahajan	AS	Penetrative Convection in a Ferrofluid Saturated Porous Layer	03 April 2023
5	Rajesh Kumar	163211202	Dr. Anurag Singh and Prof. (Dr.) Manju Bala	CSE	Dynamics on Multilayer Networks: Synchronization and Robustness	28 April 2023
6	Ashima	173221202	Dr. D. Vaithiyanathan and Dr. Balwinder Raj	ECE	Design and Analysis of Charge Plasma Induced Graded Channel Nanotube FET and its Biosensor Applications	16 May 2023
7	Alok Ranjan	173311201	Dr. Harish Kumar and Dr. Abhishek Mishra	ME	Mechanical and Tribological Investigations of Aluminium Metal Matrix Composites	17 June 2023

RECENTLY AWARDED EXTERNALLY FUNDED RESEARCH PROJECTS

- ***Research Project Title:3D photonic bioprinting assisted by 2D materials for the new generation of biomedical devices***

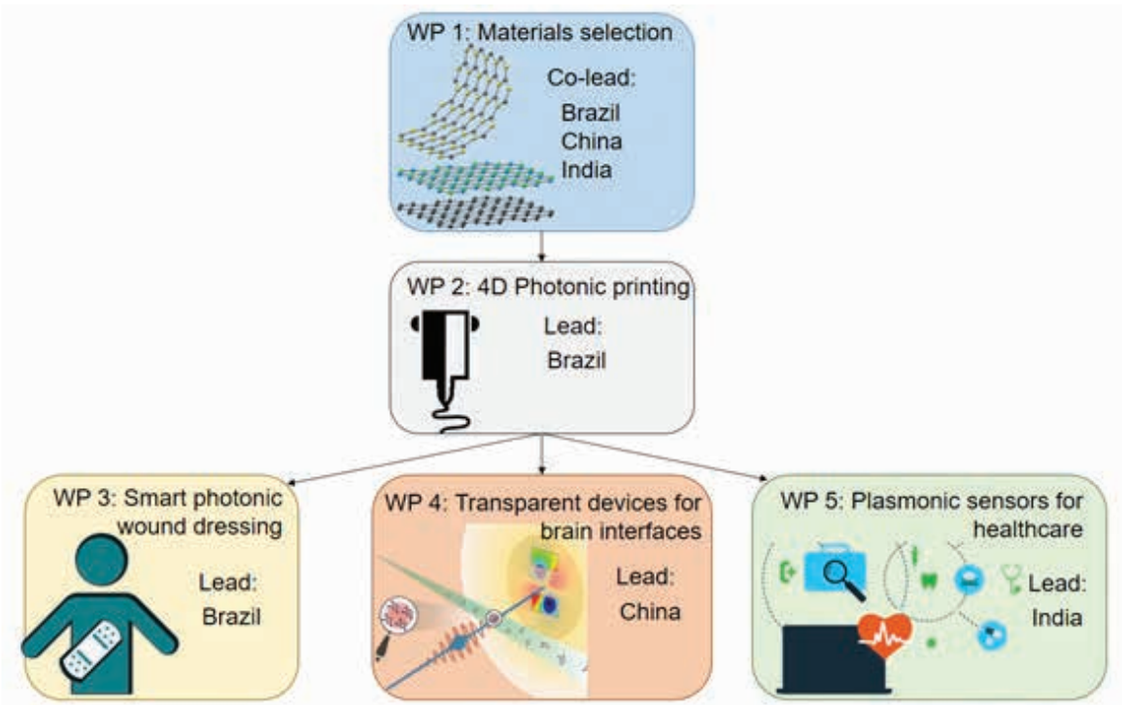
  Funding agency: DST (India) under BRICS Call for proposals

  Name of faculty member(s): Dr. Anuj K. Sharma (PI) and Prof. (Dr.) Ajay K. Sharma

  Name of the department(s): Applied Sciences and CSE

  About the project: This BRICS project will be jointly implemented by the research teams from India (NIT Delhi and Bennet University), Brazil (University of Espirito Santo), and China (Beijing Normal University).

  - This joint project proposes the development of a new degree of freedom for 3D bioprinting and combining its important features with photonic technologies, resulting in the so-called 4D optical bioprinting, where the additional degree of freedom is related to structural variations and multiple functionalities of transparent 3D-printed structures when subjected to optical stimuli.
  - A new generation of flexible photonic devices is proposed, enabling new affordable and sustainable technologies for healthcare.
  - Such technologies include smart dressings with optically active properties for medication and wound healing monitoring.
  - Further, wearable and transparent biosensors for remote patient monitoring and BCIs will be developed using optical technologies in bio functionalized 4D structures. The proposed technologies are directly related to the thematic area "Innovation and entrepreneurship on Photonic, Nanophotonics and metamaterials for addressing bio-medicine, agriculture, food industry and energy harvesting issues".



Outcome of the project: (if any so far) – Project to be started soon

- **Research Project Title:** Startup grant for Palanam technologies Pvt. Ltd.

  Funding agency: TIH IIT Patna

  Name of faculty member(s): Anurag Singh

  Name of the department(s): CSE
- **Research Project Title:** MHD Waves and flows interaction and its possible role in heating the solar coronal plasma and its diagnostics

  Funding agency: SERB-DST, Government of India

  Name of faculty member(s): V S Pandey (PI), Harish Kumar & A K Sharma

  Name of the department(s): Applied Sciences (Physics)
- **Research Project Title:** Development of flexible white organic light emitting diodes FWOLEDs

  Funding agency: DST, Government of India

  Name of faculty member(s): Aparna Tripathi (PI) & V S Pandey (Mentor)

  Name of the department(s): Applied Sciences (Physics)
- **Research Project Title:** A novel power on pilot IC for ultra-low power wireless IoT devices

  Funding agency: Ministry of Electronics and Information Technology and M/s Tsilicon Design Pvt. Ltd.,

  Name of faculty member(s): C2S – Cluster Project, NIT Delhi is Participating Institute, Dr.Baljit Kaur (CI)& Dr.D.Vaithiyanthan(Co-CI)

  Name of the department(s): ECE (NIT Delhi) – in collaboration with IIT Roorkee, NIT Goa, IIIT Banglore, NIT Uttrakhand, and Tsilicon Design Pvt. Ltd.
- **Research Project Title:** History of Semiconductor Research in India

  Funding agency: Indian National Science Academy (INSA)

  Name of faculty member(s): PI - Prof. P. K. Basu (Calcutta University), Co-PI: Dr. Rikmantra Basu, NIT Delhi

  Name of the department(s): ECE Department, NIT Delhi

CONSULTANCY WORKS UNDERTAKEN

- Dr. Kapil Kumar "Received grant of 3 Lakhs from GVK Power Ltd, Taran Taran, Punjab for Compliance Audit of Fly Ash".

- Dr. Kapil Kumar "Received grant of Rs. 20000 from Aplinka Solutions Pvt. Ltd for Adequacy Report for 75 KLD Sewage Treatment Plant".

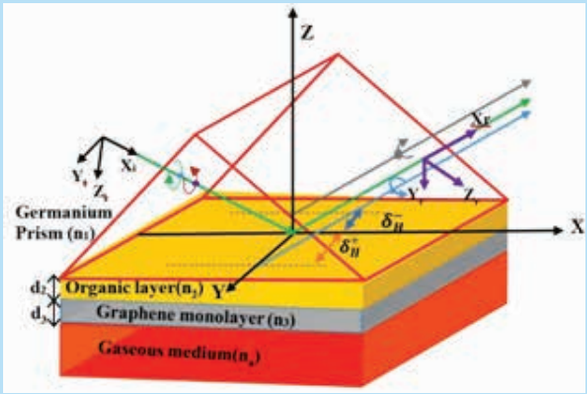
SPONSORED RESEARCH PROJECTS COMPLETED

In March 2023, Dr. Anuj Kumar Sharma (PI) completed a research project entitled "*Investigations on surface plasmon resonance (SPR) based optical sensing with an emphasis on the role of spinwaves and magnonics in related materials*" sponsored by SERB (India). The duration of the project was December 27, 2019 – March 26, 2023. The major objectives of this completed project were:

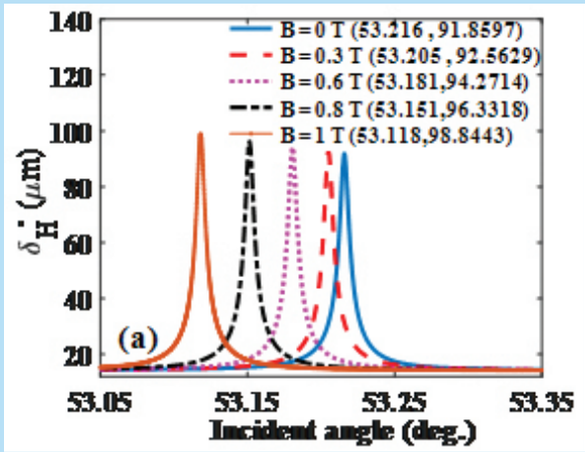
- As its prime objective, the project succeeding in developing and numerically validating the novel opportunities for plasmonics-based sensing in a broad frequency range that appear from spin waves

(i.e., photonic spin Hall effect or PSHE).

- Comprehensive modelling and simulations of photonic crystal fiber (PCF) for refractive index sensing applications (biosamples and gases) were carried out.
- The project explored, in detail, the "Magnonics", an emerging area in spin waves electronics, for magnetic field sensing application using PSHE (see figure below)



Schematic of 4-layer PSHE based plasmonic sensor. Graphene monolayer is considered to be under the variable magnetic field.



Variation of SDS (spin-dependent shift) magnitude (δ_H^-) for different magnetic field (B) values for the proposed sensor.

- The concise research accomplishments through the project are:
- Extremely fine detection limit of magnetic field sensing is achievable with plasmon sensor.
- Photonic crystal fiber (PCF)-based magnetic field sensor with power interrogation provides high sensitivity and fine resolution.
- The potential of Photonic Spin Hall Effect (PSHE) has been explored and realized in designing high-performance plasmonic biosensors. Our design provides considerably better biosensing performance than the available PSHE based sensors.
- Use of Silicon (Si) and Germanium (Ge) in PSHE-based sensor designs opens up new ways in magnetic field sensing and bio sensing.
- Terahertz (THz) frequency region is explored and is found to be a suitable range for designing graphene based magnetometers.
- Magnonic crystal with spin wave propagation is explored in high-performance magnetic field sensors.

The project resulted in as many as 15 research papers in reputed international journals such as ***Journal of Physics D: Applied Physics, IEEE Transactions on Magnetics, IEEE Sensors journal, and Optical & Quantum Electronics*** etc. Dr. Yogendra Kumar Prajapati (Associate Professor, ECE Department, MNNIT Allahabad) was the Co-PI of the above project.

MAJOR RESEARCH HIGHLIGHTS

S. No.	Name of work	Client	Completed on
1	Vetting of Design Calculation Report for Pedestal, Beam and Foundation for Load Box Shed	ANG Engineering	20.03.2023
2	Testing of Bitumen VG-10 sample	TAURUS ASSOCIATES	25.03.2023
3	Testing of Bitumen VG-10 sample	NITYA PETROCHEM INDUSTRIES	18.02.2023
4	Vetting of G+3 Building structural design and its drawing at DPSARU, PUSP VIHAR, Saket,Delhi	Delhi Tourism & Transportation Development Corporation LTD.	31-03-2023
5	Structural stability audit of ESIC Establishment in Delhi Region	Employees' state insurance corporation	14-02-2023
6	M25, M30 Design Mix	Krishna BuildspacePvt. Ltd.	30-01-2023
7	Testing of TMT Bars	Krishna BuildspacePvt. Ltd.	21-04-2023
8	Vetting of Structural Drawings of Conference Hall & Shopping Complex, Pulwama	Sushumna Consultancy Services LLP	03-02-2023

BOOKS/BOOK CHAPTERS PUBLISHED

- Hina F. Badgujar and Anuj K. Sharma, "II-VI Semiconductor QDs in surface plasmon resonance sensors", in "Handbook of II-VI Semiconductor-based sensors and radiation detectors" edited by G. Korotcenkov,Springer Nature Switzerland AG, April 2023, ISBN: 978-3-031-23999-1). DOI: https://doi.org/10.1007/978-3-031-24000-3_23
- Preeti Mehta, Mahesh K Singh, Nitin Singha, "Computer Vision based Machine Learning (ML) Models for Healthcare System" in Computer Vision and AI-Integrated IoT Technologies in Medical Ecosystem, June, 2023, doi:10.1201/9781003429609.
- Shelly Sachdeva, Yutuka Watanobe, Subhash Bhalla, "Big Data Analytics in Astronomy, Science, and Engineering" (10th International Conference on Big Data Analytics, BDA 2022, Aizu, Japan, December 5–7, 2022, Proceedings), Springer-Verlag Berlin, Heidelberg, March, 2023, 978-3-031-28349-9.
- Rahul Jaiswal, Anshul Agarwal, Richa Negi, Komal Agrawal "A Comparative PWM Analysis of MMC",

Recent Developments in Electrical and Electronics Engineering: Select Proceedings of ICRDEEE 2022, Pg no; 41-49, Springer Nature, Apr 2023.

- Varun Agarwal, Venkata Madhava Ram Tatabhatla, Anshul Agarwal "An Analytical Study to Evaluate the Performance of Different PV Configurations Under Various Partial Shading Conditions" Recent Developments in Electrical and Electronics Engineering: Select Proceedings of ICRDEEE 2022, Pg no; 51-64, Springer Nature, Apr 2023.
- Preeti Verma, Ajay K Sharma, Swatantrata Shukla, Alok K Mishra, D. Vaithiyanathan, Baljit Kaur, Title of book/book chapter: Distributed Intelligent Circuits and Systems /Study and Analysis of Low Power Dynamic Sequential Circuits, Publisher details: World Scientific Publisher, Accepted – 26thJanuary 2023.
- Mohammad Ashad Ghani Nasim, Mohd Parvez, Osama Khan, Gulam Hasnain Warsi, Md Hassaan, Ashok K Dewangan, "Performance Evaluation of Diesel Engine with Fuels Prepared from Hydrogen and Nanoparticle Blended Biodiesel by Varying Injection Pressure" Thermal Energy Systems Design, Computational Techniques, and Applications, CRC Press, Taylor & Francis, June 2023, ISBN: 9781003395768, DOI: https://doi.org/10.1201/9781003395768.
- Osama Khan, S MojahidUl Islam, Tauseef Hassan, Hozaifa Ahmad, Md Adib Ur Rahman, Ashok K Dewangan, "Optimization of Solar Collector System Based on Different Nanofluids" Thermal Energy Systems Design, Computational Techniques, and Applications, CRC Press, Taylor & Francis, June 2023, ISBN: 9781003395768, DOI: https://doi.org/10.1201/9781003395768.
- Ashok K Dewangan, Syed Quadir Moinuddin, Muralimohan Cheepu, Sanjeev K Sajjan, Ashwani Kumar, "Thermal Energy Storage" Thermal Energy Systems Design, Computational Techniques, and Applications, CRC Press, Taylor & Francis, June 2023, ISBN: 9781003395768, DOI: https://doi.org/10.1201/9781003395768.
- "Recent Developments in Mechanics and Design: Select Proceedings of INCOME 2021", Editors: Shriram Hegde, Abhishek Mishra, D. K. Singh, Lecture Notes in Mechanical Engineering (LNME), Springer, 2023, ISBN: 978-981-19-4139-9.
- Manju Khari, Manisha Bharti, M. Niranjanamurthy, Wireless Communication Security: Mobile and Network Security Protocols by Scrivener Publishing House, Wiley, Scopus Indexed in 2023.
- Kritika Upadhyay, Manisha Bharti, 6G-Enabled IoT and AI for Smart Healthcare, 2023, CRC Press, Influence of AI and 6G-Enabled IoT in Smart Healthcare (Page No: 183-197).
- Pramod Kumar, Neha Paras, Manisha Bharti, Tunneling Field Effect Transistors, 2023, CRC Press, Designing of Nonvolatile Memories Utilizing Tunnel Field Effect Transistor (Page No: 235-250).
- Ashima Sharma, Pydi Ganga Bahubalindruni, Manisha Bharti, Pedro Barquinha, Mobile Radio Communications and 5G Networks, 2023, Springer Nature Singapore, Unified Physical Parameters-Based Analytical Drain Current Model of Amorphous-InGaZnO TFTs for Emerging Display Technology (Page No: 535-542).
- Priya Katiyar, Sandeep Kumar, Upendra Kumar Acharya, Prabhakar Agarwal, "Study and Implementation of efficient Pseudorandom Number Generator", Intelligent Systems and Smart Infrastructure, CRC Press, Taylor & Francis, Feb 2023. ISBN- 978-1-032-41287-0.
- Asha Rani, Bhavnesh Kumar, Vivek Shrivastava, Ramesh C. Bansal, "Signals, Machines and Automation" Springer Singapore, May 2023 Hardcover ISBN 978-981-99-0968-1.
- Priya P., Kumar P., Rajni, Wave Spectral Analysis of Visakhapatnam Port Under the Resonance Conditions, Advances in Transdisciplinary Engineering, vol. 32, page 708 - 715, Year 2023, Doi:DOI: 10.3233/ATDE221335.
- Sandeep Mandia, Ashok Kumar, J.K. Deegwal, Karan Verma, 3D Convolution for Driver Yawning Detection, in: Intelligent Systems and Smart Infrastructure, 587-594, February 2023, ISBN: 978-1-032-41287-0, DOI.: 10.1201/9781003357346-65

EXPERT TALKS DELIVERED AND CONFERENCE PAPERS PRESENTED

Faculty Member(s)	Name and place of Event	Duration	Topic of talk
Dr. Amit Mahajan	Short Term Course (STC) on "Current Trends in Mathematics and Applications" (STCCTMA-2023) organised by National Institute of Technology Kurukshetra	13-17 February 2023	Energy Method for Analyzing Hydrodynamic Stability
	Short Term Course (STC) on "Current Trends in Mathematics and Applications" (STCCTMA-2023) organised by National Institute of Technology Kurukshetra	13-17 February 2023	Convection and Heat Transfer in Ferrofluids
Dr. Anuj Kumar Sharma	One Week Short Term Course on 'Optical Materials and Devices' at NITTTR Chandigarh (India)	16.01.2023 to 20.01.2023	Plasmonics sensors and the role of 2D materials
Dr. Pratibha	ATALFDP on "Reliability Studies for Engineering Applications", NIT Delhi	13/02/2023 to 24/02/2023	Teaching Practice
Dr. Anurag Singh	Monthly research meeting, Deptt. of CSc, University of Delhi	May 24, 2023	Social Network Analysis
	Delivered an expert lecture on, "Social Network Analysis"one-week Faculty Development Programme on "Intelligent Computing and Communications" as a guest speaker on April 12th, 2023 at Banasthali Vidyapith, Rajasthan	April 12, 2023	Social Network Analysis
	Online SEMINAR on "Artificial Intelligence Techniques for Healthcare Applications (AITHA) sponsored by SERB at NIT Delhi.	22Feb.-2023 to 27th Feb.-2023	Federated Learning
	Online SEMINAR on "Artificial Intelligence Techniques for Healthcare Applications (AITHA) sponsored by SERB at NIT Delhi.	22Feb.-2023 to 27th Feb.-2023	Optimization Techniques in Machine Learning
	Center on "Data, Complex Networks & Cybersecurity Sciences" of the URJCUniversidad Rey Juan Carlos, Despacho 008 Ed. Departamental IICalle Tulipán, 28933 Móstoles, Madrid	Jan 24, 2023	Research presentation

Dr. Nitin Singh Singha	Department of Computer Science (Cyber Security), RGNIYD, Nemili, Tamil Nadu	1 day (31 January 2023)	Cryptographic Primitives and Distributed Databases
Dr. Geeta Sikka	ARTIFICIAL INTELLIGENCE TECHNIQUES FOR HEALTHCARE APPLICATIONS (AITHA-2023) during 22nd to 27th Feb. 2023 at NIT Delhi	2 hrs	Recent Trends in AI
Dr. V.S. Pandey	IEEE International conference on Microwave, Antenna and Communication (IEEE MAC 2023)	24 -26 March, 2023	Planar SIW Antenna for ISM Band Applications loaded with two tilted Rectangular slots
Dr. Shelly Sachdeva	AICTE Training and Learning FDP, IGDTU	20th Feb 2023 - 3rd Mar 2023	Healthcare Trends and Challenges using Blockchain Technology
	National Technology Day, Gurugram University	11 May 2023	Technological Perspective of Databases
	Faculty Development Program, Guru Jambheshwar University of Science & Technology, Hisar, Haryana, India	May 15-20, 2023	Internet of Things and its Applications
	NIET International Conference & Summit-2023 (NICSET), Noida Institute of Engineering and Technology, Greater Noida, India	23-24 June 2023	Pollution Reduction and Vedic Science: Health Based Computer Scientist Perspective
Dr. Anshul Agarwal	Recent Trends in Power Electronics Applications to Renewable Energy, Smart Grid, and Electric Vehicles" at Department of Electrical and Electronics Engineering, B. M. S. College of Engineering, Bangalore	March 27-31, 2023	Recent Trends in Power Electronics Applications to Renewable Energy

Dr. D. K. Jhariya	FDP on "Challenges and Research Opportunities in Wireless Communication"	8th-12thMay 2023 , India	Ultrawideband Technology withAnalysis and Design of Microwave BandpassFilters
Dr. A.P. Singh	Emergent Material for Energy and Environment (EMEE-2023), Department of Chemistry, IIT Roorkee	March 04-05, 2023	"MCM-41 Functionalized Ordered Mesoporous Materials: Application in Catalysis and Sensing"
Dr. Ashok Kumar Dewangan	Expert talk at Department of Mechanical Engineering,College of Engineering Roorkee, Haridwar, India	24-02-2023	Overview of Boiling Heat Transfer
Dr. Mahesh K. Singh	Second International Conference on the Paradigm shifts in Communication, Embedded Systems, Machine Learning and Signal Processing (PCEMS 2023)	05th - 06th April, 2023	Visvesvaraya National Institute of Technology, Nagpur, India
Dr. Dhandapani Vaithiyanathan	National Level Seminar On VLSI Design – Trends and Practices, Organized by Centre for Nanoelectronics & VLSI Design VIT Chennai Sponsored by Science and Engineering Research Board Department of Science and Technology Govt. of India	27.06.2023 (26.06.2023 to 28.06.2023)	SoC Design
	Vel Tech High Tech Dr.Rangarajan Dr.Sakunthala Engineering College (Autonomous), Chennai, Tamil Nadu, India	07.03.2023	Artificial Intelligence for Embedded Systems
	Rajalakshmi Institute of Technology, Chennai, Tamil Nadu, India	04.03.2023	Recent Trends in VLSI Design
	SSN College of Engineering, Chennai, Tamil Nadu, India	09.02.2023	Recent Trends in VLSI Design

	Six Day Faculty Empowerment Program on Recent Trends in Electronics, Signal Processing & Networks (RTESPN2023) organized by Madras Institute of Technology, Anna University, Chennai. India	08.02.2023 (06.02.2023 to 11.02.2023)	Recent Trends in VLSI Design
	RMK Engineering College, Kavaraipettai, Tamil Nadu, India	03.02.2023	Basics of Linear Integrated Circuits & Applications
	Six Day Faculty Development Training Programme on, "Empowering IoT using Raspberry Pi or Arduino" organized by College of Engineering Guindy, Anna University, Chennai, India	31.01.2023 (30.01.2023 to 04.02.2023)	Embedded System Design
	Arithmetic building blocks Implementation strategies and testing	24.01.2023 28.01.2023 23.01.2023 to 28.01.2023	Six Day Faculty Development Training Programme on, "VLSI Design" organized by St. Peter's College of Engineering & Technology, Chennai, India
Dr. Prashant Kumar	National Conference on Polar Sciences, NCPOR, Goa, India	May 16-May 19, 2023	Impact of ENSO, SAM and AMO over Extreme Wave Climate in Southern Ocean
Dr. Ajay Kumar	Technological Advancements in CivilEngineering,Madan Mohan Malaviya University of Technology Gorakhpur-273010	09.12.2022	Analysis of sandwich laminates
Dr. Manoj Kumar	Invited talk in One Week Faculty Development Programme on Recent Advancement in Machine Learning and Artificial Intelligence, at Maharaja Surajmal Institute of Technology, Janakpuri, New Delhi	February 06, 2023 to February 10, 2023	Role of AI/ML in VLSI Design and Technology

	Attended one-week Online Faculty Development Programme (FDP) jointly organized by the Association of Indian Universities (AIU) and Guru Gobind Singh Indraprastha University (GGSIPU), Academic and Administrative Development Centre (AADC), New Delhi.	February 13, 2023 to February 17, 2023	Online Education: An Evolving Paradigm
	Session chair in 1st International Conference (RTCSSE-2023), NIT Delhi.	24th – 25th March, 2023	Recent Trends in Chemical Sciences & Sustainable Energy
	Session chair in International Workshop at NIT Delhi.	February 20-25, 2023	Electronics, Photonics, and IC at the 75th Anniversary of Transistor
	International Conference on Expert Clouds and Applications (ICOECA 2023), Bengaluru, India, 9-10, February 2023.	February 9-10, 2023	Segmentation and Area Calculation of Brain Tumor Images Using K-Means Clustering and Fuzzy C-Means Clustering
Dr. Manisha Bharti	International Conference on Device Intelligence, Computing and Communication Technologies, (DICCT), Dehradun, India, 2023, pp. 494-499, doi: 10.1109/DICCT56244.2023.10110086	March 17-18, 2023	Strengthening Data Security of India using a mixed approach of Cryptography and Steganography Techniques: A Review
	International Conference on Microwave, Antenna and Communication (MAC 2023), Motilal Nehru National Institute of Technology, Allahabad, India, March 24-26, 2023.	March 24-26, 2023.	Performance Evaluation of 32 Channel Wavelength Division Multiplexed Radio over Fiber (RoF) Communication System
	International Conference on Microwave, Antenna and Communication (MAC 2023), Motilal Nehru National Institute of Technology, Allahabad, India, March 24-26, 2023.	March 24-26, 2023.	Planar SIW Antenna for ISM Band Applications loaded with two tilted Rectangular Slots
	2nd International Conference on Paradigm Shifts in Communications Embedded Systems, Machine Learning and Signal Processing (PCEMS), Visvesvaraya National Institute of Technology, Nagpur, April 5-6, 2023	April 5-6, 2023	Investigation of Direct Source to Drain Tunneling in 5nm Nanotube Junctionless Field Effect Transistor

Dr. Sandeep Kumar	2023 International Conference on Device Intelligence, Computing and Communication Technologies, (DICCT), Dehradun, India	17-18 March 2023	Strengthening Data Security of India using a mixed approach of Cryptography and Steganography Techniques: A Review
	Renewable Energy Sources and their future aspects in India At Himalayan Group of Professional Institutions	-	Current Scenario and Future Aspects of Renewable Energy Resources Concerning Indian Perspective
Dr. Amnol Ratna Saxena	International Conference on Computer, Electronics and Electrical Engineering and their Applications (IC2E3-2023), held at National Institute of Technology Uttarakhand, India	from 8th to 9th June, 2023	Paper Title: DC NANO-GRID WITH POWER MANAGEMENT SYSTEM
Dr. Pankaj Mukhija	Internet of Things and its applications in different areas CSIR-National Physical Laboratory, New Delhi	12th May 2023	Introduction to IoT
Dr. Vivek Kumar Shrivastava	International Conference on Computer, Electronics and Electrical Engineering and Their Applications NIT Uttarakhand Srinagar Garhwal,Uttarakhand	June 8th-9th, 2023,	Efficient condition monitoring of offshore wind turbines using deep networks
Dr. Karan Verma	Online International Faculty Development Programme (FDP) at Department of Computer Science, Graphic Era(Deemed to be) University, Dehradun	May 8-12, 2023	AI Empowered Futuristic Computing Paradigm

➢ ***More Papers presented in Conferences:***

Eva Guglani, Gaurav Kumar, Nikhil Agrawal & Anshul Agarwal "Power Prediction of Wave Energy Converter Using Regression Model" in Second International Conference on SUSTAINABLE ENERGY & GREEN TECHNOLOGY-SEGT-2023.

Eva Guglani, Gaurav Kumar, Nikhil Agrawal & Anshul Agarwal "A Review of Wave Energy Converters: Status, Challenges, and Opportunities" in Second International Conference on SUSTAINABLE ENERGY & GREEN TECHNOLOGY-SEGT-2023.

Rutuja Mhaiskar, Vaithiyanathan Dhandapani, Preeti Verma, Baljit Kaur, "Performance Analysis of Human Activity", 2023 First International Conference on Data Science and Advanced Computing (ICDSAC 2023) held at KPR Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India during 23 - 24, June 2023.

Dhandapani Vaithiyanathan, Britto Pari James, Karuthapandian Mariammal, "Comparative Study of Single MAC FIR Filter Architectures with Different Multiplication Techniques", 2023 Second International Conference on Electrical, Electronics, Information and Communication Technologies (ICEEICT), K. Ramakrishnan College of Engineering, Tiruchirappalli, Tamil Nadu, India, April 05 - 07, 2023. DOI: 10.1109/ICEEICT56924.2023.10157620.

Dhandapani Vaithiyanathan, Muniraj Manigandan, "Real-time-based Object Recognition using

SIFT algorithm", 2023 Second International Conference on Electrical, Electronics, Information and Communication Technologies (ICEEICT), K. Ramakrishnan College of Engineering, Tiruchirappalli, Tamil Nadu, India, April 05 - 07, 2023. DOI: 10.1109/ICEEICT56924.2023.10157675.

LABORATORY NEWS

CSE Department inaugurated the **Ubiquitous Computing Research Laboratory** at NIT Delhi. The laboratory is equipped with the facilities like HBE-IoT Smart Server, HBE-IoT Xnode Home with Edge Server, QUBE-SERVO-2-USB Workstation, OMNI Bundle, IoT Smart Health Lab (with suitable PC: i7, 16 GB RAM, 1TB SSD, WIN PRO).

Ubiquitous Computing was the centre of discussion in the one-month training and skill internship conducted between **01st - 28th June, 2023** organized by **the CSE Department**. The training and skill internship was funded by **SERB**. Dr. Karan Verma was the convener of the above event.

The specific objectives of the training and skill internship were:

- To provide exposure and hands-on research skill development experience in Ubiquitous Computing.
- To train the manpower that will push the development of smart innovation and providing knowledge awareness session for communities.
- The event was helpful in increasing the knowledge of ubiquitous computing security.
- To strengthen the ICT infrastructure to support various IoT-enabled smart services and computing.

CORRIGENDUM TO VOL. 1 (ISSUE 3 AND 4)

Due to some unforeseen reasons, the following research data of Dr. Anshul Agarwal (Assistant Professor, EE Department) could not be included in the Vol. 1, Issue 3 and 4:

- **Expert talks delivered/conference papers published**

- Mandara C K, Vinay Kumar Jadoun & Anshul Agarwal "Load Forecasting of Electric Power Distribution System using Different Techniques: A Review" in 7th Student's Conference on Engineering and Systems (SCES 2022), July 1-3, 2022 at MNNIT Allahabad, India. (Scopus) (IEEE Xplore).
- Nitish Kumar, Anshul Agarwal, Shubham Kumar Singh & Rup Ray"Modified Boost Converter for High Power Applications" in 2022 IEEE10th Power India International Conference (PIICON), 25-27 November 2022, NIT Delhi, (Scopus)(IEEE Xplore).
- Rahul Jaiswal, Anshul Agarwal, Richa Negi and Komal Agrawal "A Comparative Analysis of Modulated Multilevel Converter at variable Arm Inductance" in 2022 IEEE10th Power India International Conference (PIICON), 25-27 November 2022, NIT Delhi, (Scopus)(IEEE Xplore).
- Nikhil Agrawal, Anshul Agarwal and Tirupathiraju Kanumuri "Performance Analysis of 7- Level Cascade H-Bridge Multilevel Inverter with Symmetrical & Asymmetrical Configuration" in 2022 IEEE10th Power India International Conference (PIICON), 25-27 November 2022, NIT Delhi, (Scopus)

(IEEE Xplore).

- Anshul Agarwal, Bhupendra Kumar, Nikhil Agrawal and Shubham Kumar Singh "A Comparative Analysis of Wind Energy Conversion Systems Based on PMSG for Maximum Power Extraction" in 2022 IEEE10th Power India International Conference (PIICON), 25-27 November 2022, NIT Delhi, (Scopus) (IEEE Xplore).
- Nitish Kumar & Anshul Agarwal "Real-Time Modelling and Controlling of Boost Converter Using Supervised Learning" in 2022 IEEE10th Power India International Conference (PIICON), 25-27 November 2022, NIT Delhi, (Scopus)(IEEE Xplore).
- Anshul Agarwal, Venkata Madhava Ram Tatabhatla and Varun Agarwal "Optimized Reconfiguration Strategy of Partial Shaded Photo-Voltaic Arrays: Experimental Study" in 2022 IEEE10th Power India International Conference (PIICON), 25-27 November 2022, NIT Delhi, (Scopus)(IEEE Xplore).

- **Publications in Refereed Journals (SCI/SCOPUS indexed):**

- Venkata Madhava Ram Tatabhatla, Anshul Agarwal and Tirupathiraju Kanumuri "A Chaos Map based Reconfiguration of Solar Array to Mitigate the Effects of Partial Shading" in IEEE Transactions on Energy Conversion, Vol. 37, No.2, pp. 811-823, 2022.
- Shubham Kumar, Anshul Agarwal and Tirupathiraju Kanumuri "Power Quality Improvement of a Fuel Cell-Powered Filterless Distributed Generation System Using Sinusoidal Pulse Width Modulation" in Indian Journal of Pure & Applied Physics (IJPAP), Vol. 60, pp. 754-762, 2022.
- Anshul Agarwal, Nitish Kumar & Pawan Dubey "Machine Learning Based Maximum Power Prediction for Photovoltaic System"in Indian Journal of Pure & Applied Physics (IJPAP), Vol. 60, pp.: 892-898, 2022.

PATENT GRANTED

S.N.	Title	Name of Faculty member(s)	Patent no.	Certificate issue date
1	A System for Efficient MPPT Tracking with Variable Wind Speed Using an Artificial Neural Network	Anshul Agarwal	2022/02857	2022

The above data has been included in the current issue as corrigendum to Vol. 1 (Issue 3 and 4).

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(शिक्षा मंत्रालय, भारत सरकार के अधीन एक स्वायत्त संस्थान)

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