



Research Conclave 2020

(Sharing of research ideas)

28th February 2020

Souvenir



Organized by

National Institute of Technology Meghalaya

(An Institute of National Importance)

Shillong, Meghalaya-793003, India



The hardest problems of pure and applied science can only be solved by the open collaboration of the world-wide scientific community.

*Kenneth G. Wilson
Noble Prize in Physics [1982]*

<u>Contents</u>	<u>Page</u>
1. Message from Director	1
2. Message from Dean (AA)	2
3. Message from Dean (R & C)	3
4. About Research Conclave 2020	4
5. Keynote Speaker's Short Biography and Abstract	5-7
6. Esteemed Judges	8
7. List of Oral Presentations	9-16
8. List of Research Work Demonstration	17-20
9. List of Poster Presentations	21-34
10. Committee	35



Prof. B. B. Biswal
Director, NIT Meghalaya

MESSAGE

Research Conclave has become an excellent platform for nurturing and channelling young minds towards accelerated research and innovation that will be relevant to the socio-economic situations and challenges. It provides a forum for identifying multi-disciplinary problems and finding their solutions. It encourages the scholars to be more passionate about their research activities and enables them to bring out quality research outputs. The Conclave will also provide an opportunity to scholars of various institutes to share their ideas and perspectives on diverse topics that are related to the current trends and future advances in domain areas such as cyber security, machine learning, VLSI, signal processing & communication, power electronics, machine drives, smart grids, fluid & thermal engineering, manufacturing and machine design, structural engineering, water resource and geo-technology, linear algebra, smart materials, nanotechnology, humanities and many more.

These domains are potential drivers towards achieving sustainable development of a nation. The Conclave will also showcase the ongoing academic activities of the research scholars of NIT Meghalaya and other institutes. It will also motivate the research scholars to demonstrate their innovative research work.

I wish the Organising Committee of the Research Conclave a grand success.



Prof. Gayadhar Panda
Dean (AA), NIT Meghalaya

MESSAGE

National Institute of Technology Meghalaya is organising a Research Conclave for the year 2020 with a view to promote the spirit of sharing knowledge, ideas and innovation among distinguished guests, eminent academicians, industry personnel and research scholars of various disciplines and institutes.

I would like to thank the students, research scholars, faculty and non-faculty members of the institute for their cooperation and collective efforts in making the Conclave a grand success. I hope the Conclave will benefit and facilitate the young participants in their quest for both academic and practical excellence.



Prof. Ayon Bhattacharjee
Dean (R & C), NIT Meghalaya

MESSAGE

If one dreams to achieve excellence in the larger things, habit needs to be developed in the smallest of things. Excellence is not an exception, it is a prevailing attitude. And excellence is what we strive for at NIT Meghalaya and this attitude of excellence is what drives us. NIT Meghalaya started in 2010 and as a young institution, we are proud to find ourselves among the top 100 engineering institutes consequently from 2016 onwards in the NIRF ranking.

Research of the highest quality has been the hallmark of NIT Meghalaya. Challenges of space and limited instrumentation have not deterred us, rather we have converted challenges to opportunities. Publications in journals of international repute have been consistently increasing over the years and now many of our faculty are filing patents. Our faculty have gone to every part of the world to attend conferences and symposia, deliver expert lectures and chair sessions. Our students and scholars have won laurels wherever they have gone. We have been the preferred consultant for every department of the state and central government, and we brim with pride that we have given our expertise to the defence forces.

We have been organizing workshops and conferences regularly, and ‘Applications of Intelligence Methods’ is one more effort from the Department of Computer Science and Engineering of NIT Meghalaya. With the Collaboration of ISI and support from TEQIP, this workshop will definitely be another tale of success. Wishing the best for the event, we remember the words of Shri A. P. J Abdul Kalam,

"Excellence is a continuous process and not an accident."

About Research Conclave 2020

Research Conclave is organized by the National Institute of Technology Meghalaya for the benefits of Ph.D scholars of various institutes. Research Conclave has become an excellent platform to nurture young minds towards accelerated research and innovation. It intends to bring the scholars to address on research relevant to socio-economic problems. Research Conclave provides a forum to identify multi-disciplinary problems and also encourage the scholars to be passionate about their research and bring out quality research outputs.

This Conclave provides an opportunity to the scholars of various institutes to share ideas in diversified topics related to current trends and future advances at domain areas such as cybersecurity, machine learning, VLSI, signal processing & communication, power electronics, machine drives, smart grids, fluid & thermal engineering, manufacturing and machine design, structural engineering, water resource and geo-technology, linear algebra, smart materials, nanotechnology, humanities and many more. These domains are potential drivers towards the sustainable development of the nation.

Keynote Speaker

Dr. Neena Gupta
Associate Professor
Theoretical Statistics and Mathematics Unit, Kolkata
Theoretical Statistics and Mathematics Division
Kolkata Headquarters



Biography

Neena Gupta is an Associate Professor at the Statistics and Mathematics Unit of the Indian Statistical Institute (ISI), Kolkata. Her primary fields of interest are commutative algebra and affine algebraic geometry. Gupta was previously a visiting scientist at the ISI and a visiting fellow at the Tata Institute of Fundamental Research (TIFR). She has won **Shanti Swarup Bhatnagar** award in the category of mathematical sciences, the highest honour in India in the field of science and technology.

Gupta received the Indian National Science Academy Young Scientist award in 2014 for the solution she proposed to the Zariski Cancellation Problem in positive characteristic. Her work on the conjecture had also earned her the inaugural Saraswathi Cowsik Medal in 2013, awarded by the TIFR Alumni Association.

Title of the talk: On Double Danielewski Surfaces: a counterexample to the generalised Cancellation problem.

Abstract: In this talk, we will present a new family of examples discovered by us which turned out to be a counterexample to the generalised cancellation problem. This family of examples is analogous to the well-known Danielewski surfaces and, we name them double Danielewski surfaces. We will also discuss its isomorphism class and its automorphism groups.

Keynote Speaker

Dr. Amitava Chatterjee, FNAE
 Professor, Electrical Measurement
 and Instrumentation Laboratory
 Electrical Engineering Department,
 Jadavpur University, Kolkata, India.
<https://sites.google.com/site/amitavachatterjee1968/>



Biography

Amitava Chatterjee did his BEE, MEE and PhD from Electrical Engineering Department of Jadavpur University, Kolkata, in 1991, 1994 and 2002, respectively. He is currently serving as a Professor in Electrical Engineering Department of Jadavpur University, Kolkata, India. He is a recipient of the Japanese Government (Monbukagakusho) Scholarship in 2003 and a recipient of the Japan Society for the Promotion of Science (JSPS) Post-Doctoral Fellowship in 2004. In 2004 and 2009 he visited University of Paris XII, Val de Marne, France, and in 2017 he visited University of Paris Est, as an Invited Teacher. Dr. Chatterjee became a Fellow of Indian National Academy of Engineering (FNAE) in 2018. He is a Fellow of the IETE (India), a Fellow of the Institution of Engineers (India) and a Senior Member of the IEEE (USA). Dr. Chatterjee's key research interests include *nonlinear control, intelligent instrumentation, signal processing, image processing and robotics*.

Dr. Chatterjee has co-authored two books and co-edited two books, all published by Springer Publishers. He presently serves as an *Editor* of *IEEE Transactions on Vehicular Technology* and *Engineering Applications of Artificial Intelligence Journal* (Elsevier) and as an *Associate Editor* of *IEEE Transactions on Instrumentation and Measurement* and *IEEE Sensors Journal*. He is a past *Associate Editor* of *Control Engineering Practice Journal* (Elsevier). He has authored/coauthored more than 160 technical articles, including 94 international journal papers. This includes 27 papers in IEEE and 45 papers in Elsevier. Dr. Chatterjee is a member of the Technical Committee on “Imaging Measurements and Systems” of *IEEE Instrumentation & Measurement Society, USA*.

Title Of The Talk: Learning Strategies For Human-Robot Collaboration

Abstract

Human environment, in which a robot usually operates, is mostly unstructured and dynamic in nature. In such a scenario, robots operating in collaborative modes are gaining more and more prominence compared to robots operating in autonomous mode. For decades, robots in autonomous mode were the preferred solution because it required minimal or no support from humans. But it has been gradually realized that such operations can be too challenging to achieve desired objective and performance under diverse conditions and hence utilization of robots for different purposes ultimately remain confined in some limited problem domains only. On the other hand, in collaborative robotics, the human-robot collaboration can actually help in achieving the desired goal under many challenging situations. A successful implementation of human-robot collaboration very much relies on the sophisticated sensors and actuators employed in such robotic systems, the control systems associated, and collaborative interfaces and strategies in place. New generation of collaborative, intelligent robots rely more and more on machine learning strategies and hence the development of suitable learning strategies for such human-robot collaboration is becoming more and more important. In fact one needs to appreciate the fact that it is almost impossible to pre-learn a robot for all types of actions to be performed in sync with the humans in an actual situation in a dynamic environment which further necessitates development of more sophisticated learning strategies to cope with those unforeseen scenarios. Another very important aspect is the maintenance of safety in a common environment involving both humans and robots in operation. More sophisticated the learning strategies are, human-robot collaboration becomes more adept in producing desired repeatability and precision in operation, at the same time involving less human workload and provide increased productivity, whether it is in industrial automation, or in manufacturing industries, or in developing robotic intelligent assisted devices and so on. The present talk will touch upon all the main aspects of state-of-the-art human-robot collaboration and will particularly concentrate on discussing different learning strategies which are employed in collaborative robotics in practice in a variety of domains, to solve a variety of problems.

Esteemed Judges



Prof. L. Joyprakash Singh
Dean School of Technology, NEHU
Electronics and Communication
Engineering



Dr. Juwesh Binong
Assistant Professor, NEHU
Electronics and Communication
Engineering



Prof. S. Mitra
Professor, NEHU
Department of Chemistry



Dr. Atanu Singha Roy
Assistant Professor and
Head of Department
Department of Chemistry



Dr. Arpita Nath
Assistant Professor and
Head of Department
Department of Physics



Dr. M. Longshithung Patton
Assistant Professor and
Head of Department
Department of Civil Engineering



Dr. Yogita Ph.D.
Assistant Professor and
Head of Department
Department of Computer
Science And Engineering



Dr. Supriyo Das
Assistant Professor and
Head of Department
Department of
Electrical Engineering



Dr. Rabindra Narayan Mahapatra
Associate Professor and
Head of Department
Department of
Mechanical Engineering

ORAL PRESENTATION

[Parallel tracks]

Track One [T1]

Departments: ME, EE and CE

Venue: Lecture Hall

Track Two [T2]

Departments: CSE and ECE

Venue: CTEL

Track Three [T3]

Departments: CY, PH, MA and HSS

Venue: Conference room

Track One [T1]

Oral Presentation [T1-01]

Performance Improvement Techniques in Shell-and-tube Type of LHS Unit

Berihu Geberyohannes Abreha¹, Pinakeswar Mahanta^{2,3}, Gaurav Trivedi⁴

¹Center for Energy, IIT Guwahati, Assam-781039 India

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Oral Presentation [T1-02]

Performance Enhancement of a falling Film Liquid Desiccant Dehumidifier

Aabir Das, Rajat Subhra Das, Koushik Das

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Oral Presentation [T1-03]

Ultrasonically Welded Green Composite: Failure Load Analysis

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Oral Presentation [T1-04]

Fabrication of Micro-Channel in CFRP Composite by μ ED-Milling Process

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Oral Presentation [T1-05]

Bicoherence analysis based detection of defect frequency in composite structures

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Oral Presentation [T1-06]

Role of Duct Position to Improve Propeller Efficiency in Combine Effect of Propeller Boss Cap Fin (PBCF) and Propeller Duct

Pritam Majumder¹, Dileep Kumar Avanapu², Subhendu Maity³
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Oral Presentation [T1-07]

A Single DC Power control of the small scale variable speed variable pitch wind turbine

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Oral Presentation [T1-08]

Francis turbine igv control under force estimation

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Oral Presentation [T1-09]

Reduced Switch Triple Voltage Boost Multilevel Inverter for Photovoltaic System

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Oral Presentation [T1-10]

An adaptive current control based active power filter for power quality improvement of grid connected PV system

Narendra Babu P¹, Rangababu Peesapati², Gayadhar Panda¹

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Oral Presentation [T1-11]

Control Scheme for Grid-tied and Islanded Mode Operation of DG System

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Track Two [T2]

Oral Presentation [T2-01]

The UTBSOI Transistor based Two-Stage Operational Transconductance Amplifier Design as the function of Sensitivity Analysis

Rekib Uddin Ahmed, Prabir Saha

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Oral Presentation [T2-02]

A Directional and Scalable Streaming Deblocking Filter Hardware Architecture for HEVC Decoder

Swamy Baldev^a, Pradeep Kumar Rathore^a, Rangababu Peesapati^a, Kiran Kumar Anumandla^b

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^bDepartment of Electronics & Computer Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, India

Oral Presentation [T2-03]

A Novel Search Approach for Associative Memory

Telajala Venkata Mahendra and Anup Dandapat
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Oral Presentation [T2-04]

A Pseudo-Static Storage and Segmented Match-Line for Performance-Efficient CAM Design

Sheikh Wasim Hussain¹, Telajala Venkata Mahendra¹, Sandeep Mishra² and Anup Dandapat¹

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Oral Presentation [T2-05]

A Novel Hardware Oriented Motion Estimation Algorithm for HEVC/H.265

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Oral Presentation [T2-06]

Hardware Implementation of RSA Algorithm

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Oral Presentation [T2-07]

Enabling Indirect Link Discovery between SDN switches

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Oral Presentation [T2-08]

Nearest Neighbour Realization of Quantum Circuits using Weighted Look-Ahead

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Track Three [T3]

Oral Presentation [T3-01]

Synthesis and application of novel superacid oleophilic catalyst for biodiesel production from waste cooking oil

Sunita Singh*, Jitamanyu Chakrabarty

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*Corresponding author: Sunita Singh; Email: sunitasingh280@gmail.com

Oral Presentation [T3-02]

Exploring the labile nature of 2,4,6-trimethoxyphenyl group in allylic systems under acidic condition

Dipankar Paul and Paresh Nath Chatterjee*

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Oral Presentation [T3-03]

Synthesis of Au-V₂O₅-MnO₂ Nanoflower Composite for Symmetric Supercapacitor Device

Siddheswar Rudra, Mukul Pradhan*^{1,2}

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Oral Presentation [T3-04]

Multi-Stimuli Responsive Smart Molecular Crystalline Material

Poonam Gupta, Naba K. Nath*

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Oral Presentation [T3-05]

Detection of protein by liquid crystals and measurements based on optical, dielectric and vibrational studies

Priyanki Kalita, Ayon Bhattacharjee^a

^aDepartment of Physics

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Oral Presentation [T3-06]

Computational, electro-optical, birefringence and dielectric studies of an orthoconic antiferroelectric mesogen having superstructure in its reduced symmetry phase

Deepak Gupta¹, Prezemyslaw Kula², Ayon Bhattacharjee¹

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Oral Presentation [T3-07]

A low-cost rechargeable aqueous aluminum-metal battery

Sunny Nandi¹ and Shyamal K. Das*

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Oral Presentation [T3-08]

Financing Frictions and Demand for External Finance

Nabendu Paul

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**RESEARCH WORK
DEMONSTRATION**

1. High-voltage gain multilevel inverter using reduced number of components

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Abstract

Multilevel inverters (MLIs) with self-balanced switched-capacitors (SC) have received wide recognition in the recent years. Enhanced power quality, low voltage stress, improved efficiency, and high modularity are the key factor behind the tremendous growth and demand of MLIs in industries, electric vehicles, high-frequency ac power distribution, and renewable power generation. In this demonstration, a new SC MLI structure using a reduced number of switches and a single dc source is developed. By suitable charging-discharging patterns, the SCs are self-balanced and high voltage boosting is achieved. Moreover, only about 50% of the switches are in conduction for any voltage level generation and four switches operate at a fundamental frequency. Thus, the total power loss is very less. Comparing with the recent-art MLIs in terms of the number of components, standing voltage, boosting factor, and cost factor demonstrate the merit of presented topology. The experimental results confirm the workability of the proposed MLI under linear, non-linear loading and dynamic test conditions using fundamental frequency modulation technique.

2. Tape-out Flow of CMOS Integrated Circuits with SCL 180 nm Technology using CADENCE Spectre Simulator (Backend Design)

Telajala Venkata Mahendra and Anup Dandapat
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Abstract

A VLSI design flow of CMOS integrated circuits at the back end level, from basic schematic (transistor/MOSFET) level to final result of the design process, is demonstrated in this video considering the design example of a 64×20-bit content addressable memory (CAM). The primary modules constituting the said CAM architecture namely, CAM cell, match-line (ML) precharge circuit, ML sense amplifier (MLSA) and the input-output (I/O)

peripherals such as encoder, decoders, and drivers are altogether designed and integrated using Semi-Conductor Laboratory (SCL) 180-nm based foundry. Circuit implementations, error checking and corrections, metal and pin area utilization steps involved in the entire design process are discussed in brief in this video. These steps have been recorded using CADENCE Analog design environment (ADE) for circuit design, and CADENCE Spectre simulator for design rule check (DRC), layout versus schematic (LVS) verification, parasitic extraction and SPICE simulations. As per the foundry, an appropriate die-area is chosen to fit in the CAM circuit and I/O pins based on the channel length and width of the transistors. The final stage obtained as tape-out could be then processed for fabrication subject to creation of graphic for the photomask of the circuit. Although this research demonstration illustrates about the design of CAM circuit, the same can also be applied to any other digital and analog CMOS circuits with necessary design rules and pin changes.

3. Biomimetic Smart Responsive Materials Powered by Light and Heat

Poonam Gupta, Naba K. Nath*

Department of Chemistry

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Bijni Complex, Laitumkhrah, Shillong-793003, Meghalaya, India

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Abstract

The basic trait of living organisms is their locomotion and hence to incorporate the same in artificial systems such as molecular crystals and polymeric materials is of great interest to material scientists. Various external stimuli (heat, light and mechanical force) are used to perform mechanical function in order to induce motion in molecular crystals as well as polymers. Materials which are mechanically responsive to external stimuli such as light, heat, pH, humidity, magnetic field or electricity are known as stimuli responsive materials. Stimuli responsive materials are capable of direct transforming energy into mechanical energy and hence are invaluable for energy harvesting and can be used in the making up of mechanically tuneable materials for actuation such as artificial muscles, displays and flexible electronics, dynamic components in soft robotics, microfluidic valves and gates, and tuneable components for contact printing etc. For materials to be practically used as actuators they should possess reversible and fatigueless mechanical functionality, accelerated response, durability and restrained operation.

4. Towards a low cost rechargeable aqueous aluminium-metal battery

Sunny Nandi¹ and Shyamal K. Das*

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Abstract

Rechargeable batteries based on largely earth abundant elements are generally regarded as one of the promising candidates in achieving high energy/power and ultra-durable energy storage device. A recent example is the chloroaluminate electrolyte based Al-ion battery with graphene cathode. However, certain demerits of chloroaluminate electrolytes such as high reactivity to most of the metals, moisture sensitivity and high cost will be impediments for mass-scale production of Al-ion battery. Therefore, utilization of water based electrolyte in rechargeable Al battery is expected to mitigate these challenges. Herein, the working of a rechargeable aqueous aluminum-metal battery is demonstrated for the first time by electrochemically pairing metallic aluminum as anode with graphite as cathode.

POSTER PRESENTATION

Venue: Mini Auditorium

Poster Presentation [PP-01]

The UTBSOI Transistor based Two-Stage Operational Transconductance Amplifier Design as the function of Sensitivity Analysis

Rekib Uddin Ahmed and Prabir Saha

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Poster Presentation [PP-02]

Low Power High performance Hardware Architectures of Deblocking and Sample Adaptive offset Filter for HEVC Video Coding

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Poster Presentation [PP-03]

Auditory inspired Acoustic Features for building Robust ASR System

Anirban Dutta

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Poster Presentation [PP-04]

Design and Development of CMOS-MEMS Based Current Mirror Integrated Pressure Sensor

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Poster Presentation [PP-05]

Precharge Free Content Addressable Memory: Binary and Ternary

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Poster Presentation [PP-06]

Content Addressable Memory with Hybrid Matchline Control Scheme

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Poster Presentation [PP-07]

A Novel Hardware Oriented Motion Estimation Algorithm for HEVC/H.265

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Poster Presentation [PP-08]

Reversible Implementation of Densely Packed Decimal Numbers

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Poster Presentation [PP-09]

Estimation of Fundamental Frequency of Noisy Speech Signals using Correlogram based on Subband Filtering

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Poster Presentation [PP-10]

Image De-Noising using Inexact Multi-Bit Adder

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Poster Presentation [PP-11]

Effects of qualitative and quantitative variations of semiconducting screen on wave propagation through cable

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Poster Presentation [PP-12]

Islanding Detection and Control Scheme for Seamless Operation of AC Microgrid

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Poster Presentation [PP-13]

A Single DC Quadruple Boost Inverter for Photovoltaic System

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Poster Presentation [PP-14]

Effect of Sampling on Steady-State Time-Varying Output of DPWM Controlled Buck Converter

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Poster Presentation [PP-15]

Optimization of Local Ordering Technique for 2D Nearest Neighbour Quantum Circuits

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Poster Presentation [PP-16]

Enabling Indirect Link Discovery between SDN switches

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Poster Presentation [PP-17]

Performance of Diesel Engine by Application of Porous Material on its Piston Bowl

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Poster Presentation [PP-18]

Effect of free surface on a Myring AUV

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Poster Presentation [PP-19]

Solar Air Heater with Truncated Half Conical Vortex Generators

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Poster Presentation [PP-20]

Failure load Analysis in Hybrid Joint of Green Composites

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Poster Presentation [PP-21]

CFD Analysis of a Novel Propeller Design to Improve Ship Propulsion

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Poster Presentation [PP-22]

Performance enhancement of LiCl-H₂O based falling film dehumidifier using surface modification

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Poster Presentation [PP-23]

Performance Analysis of μ EDM of CFRP Composite using Rotating Tool

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Poster Presentation [PP-24]

Dynamic Calibration of a stress wave force balance using finite element analysis

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Poster Presentation [PP-25]

State Simulation of Hydrostatic Transmission System using Variable Displacement Pump and Fixed Displacement Motor

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Poster Presentation [PP-26]

Influence of Intake Manifold Curvature on the Homogeneity of Air and Bio-CNG in a Dual Fuel Diesel Engine

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Poster Presentation [PP-27]

Dual excitation based bicoherence analysis for detecting Local defect resonance (LDR) frequency

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Poster Presentation [PP-28]

Modelling and control of the Hydraulically Actuated horizontal axis wind turbine Pitch System

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Poster Presentation [PP-29]

Control and force estimation of Francis turbine IGV system

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Poster Presentation [PP-30]

A Two-dimensional (2D) numerical model for flow simulation of different flow regimes

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Poster Presentation [PP-31]

Flexural behaviour of lean duplex stainless steel tubular beams with web openings

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Poster Presentation [PP-32]

Allelopathic Effect of Aqueous Extract of Leaves of *Duranta erecta* Linn.

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Poster Presentation [PP-33]

Utilization of Waste Plastic for Ultrafiltration Membrane Fabrication and its Characterization

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Poster Presentation [PP-34]

Hemoglobin-Polyphenol Interactions: Binding, Thermodynamics and Dynamical Properties

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Poster Presentation [PP-35]

Nitrogen-Doped Porous Carbons: Synthesis and Applications in Energy Storage Devices.

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Poster Presentation [PP-36]

Exploring the labile nature of 2,4,6-trimethoxyphenyl group in allylic systems under acidic condition

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Poster Presentation [PP-37]

Smart Molecular Crystal of Acylhydrazone with Multiple Mechanical Responses

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Poster Presentation [PP-38]

Non-enzymatic glycation affects the binding of bio-active flavonoids with human serum albumin: Further investigation into the anti glycating properties of flavonoids *in vitro*

Sharat Sarmah, Sourav Das and Atanu Singha Roy*

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Poster Presentation [PP-39]

Study of effect of Aluminium substitution on the Magnetic and Dielectric Properties of Cobalt Ferrites

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Poster Presentation [PP-40]

Temperature And Time Dependent Studies Of Protein Dispersion In Liquid Crystals By Dielectric, Optical And Raman Studies

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Poster Presentation [PP-41]

Computational, electro-optical, birefringence and dielectric studies of an orthoconic antiferroelectric mesogen in its reduced symmetry phase

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Poster Presentation [PP-42]

Liquid Temperature Influence Onto Synthesis Of Nionanocolloids Via Pulsed Laser Ablation At Ni-H₂O Interface

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Poster Presentation [PP-43]

Formation Of A-Mn₂O₃ phase Nanocolloids Using Laser Ablation In Liquids

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Poster Presentation [PP-44]

An ultra-light low-cost rechargeable aqueous aluminum-ion battery

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Poster Presentation [PP-45]

Dynamics of stage-structure predator-prey systems under density-dependent effect

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Poster Presentation [PP-46]

Navier's slip effect on tangent hyperbolic nanofluid flow past a convectively heated stretching wedge

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Poster Presentation [PP-47]

Menger Convex Metric Spaces and Fixed Point Theorems

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Poster Presentation [PP-48]

Nil-Reversible Ring

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Poster Presentation [PP-49]

**To be and not to be: a discourse on Guilt and Resentment in Primo Levi's
*The Drowned and the Saved***

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Poster Presentation [PP-50]

**Design and Optimization of Multimode Microwave Applicator for
e-waste and Nuclear Waste Treatment**

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