# शिक्षा महाकुंभ 2025

पंचम संस्करण

"CLASSROOM TO SOCIETY BUILDING A HEALTHIER WORLD THROUGH EDUCATION"

**SHIKSHA MAHAKUMBH 2025** | **SOUVENIR**

Research paper presentation

## Multi Track Conference

**OCT 31 - NOV 2, 2025**

**VENUE: NIPER MOHALI**


**ORGANISED BY:**

Department of Holistic Education
(DHE)

&

National Institute of Pharmaceutical
Education and Research
(NIPER), Mohali

www.shikshamahakumb.co.in

## Preface

The Shiksha Mahakumbh Abhiyaan is a national movement conceptualized by Dr. Thakur Sudesh Kumar Raunija- an accomplished scientist of ISRO, under the able guidance of Sh. Vijay Nadda Ji- a visionary educationist and social reformer. This Abhiyaan aims at bringing together the people from across all sectors of education, thought leaders, researchers, corporate leaders, industry experts, policy makers, civil society, and the governance. Its goal is to reimagine and reform the Bhartiya education System and evolve a globally equitable and future ready learning eco-system. Under the umbrella of the Department of Holistic Education, the Shiksha Mahakumbh Abhiyaan is dedicated to Vimarsh Nirman and evolve the Bhartiya education system committed to contribute to the Viksit Bharat 2047.

The Shiksha Mahakumbh 2025 is being jointly organized by the Department of Holistic Education and National Institute of Pharmaceutical Education and Research Mohali during 31st October – 02nd November 2025. An array of events has been planned comprising Conclaves, Olympiads, and Multi-Track Conference under the aegis of Shiksha Mahakumbh.

The multi-track conference comprises fifteen thematic sections including Fundamentals and Applied Science Applications, Engineering and Technology, Management, Business, and Entrepreneurship, International Relations, Law, and Governance, Social Sciences and Humanities, EdTech and Digital Education, Health Sciences and Traditional Medicine, Sports, Physical Education and Well Being, Agri, Food, Vet Sciences, Environment, Sustainability and Water Resources, Culture, Arts and Heritage, Language and Linguistics, Vocational and Skill based Education, and Bhartiya Knowledge System.

We present souvenir-the collection of abstracts accepted for oral presentation in the conference. It comprises two parts each captures essence of research advancements in different domains in the realm of education. Having gone through review process, 150 research articles have been accepted and their abstracts compiled in the first part followed by second part featuring abstracts accepted in the national conference on 'Development, Democracy and Governance: Debating new Social Imaginaries'.

We communicate our heartfelt thanks to all the authors, participants, delegates, knowledge partners, faculty, students, and volunteers for their immensely valued contribution to organize this event in the most successful manner.

Regards

Organizing Team
Multi-Track Conference
Shiksha Mahakumbh 2025

## Message from the General Chair

We are delighted to welcome you all to the Multi-Track Conference- a paper presentation event at Shiksha Mahakumbh 2025, which is being organized at NIPER Mohali during 31st October– 02 November 2025.

Shiksha Mahakumbh 2025 is the 5th edition of Shiksha Mahakumbh Abhiyaan, which envisions the motto of "Classroom to Society: Building a Healthier World through Education." This motto reflects on the vision of integrating Bhartiya values and global best practices to transform the education system. Our humble attempt aims at bridging the gap from classroom to the society and building a healthier and inclusive world. The Shiksha Mahakumbh attracts and brings together all stakeholders in the education ecosystem to share their ideas, knowledge, and experience to empower the future generation through holistic education and a more sustainable world.

We thank all the authors who have responded to our call for papers and their enthusiastic participation. Having reviewed the articles received, 150 papers have been accepted for oral presentation. The paper presentation has been designed across fifteen thematic sections encompassing all dimensions and disciplines of the education system. This flagship event of Shiksha Mahakumbh Abhiyaan is dedicated to driving innovations in all spheres and every aspect of education. On this occasion, we are bringing out a souvenir of the abstracts highlighting research contributions of the authors.

It features 15 technical sessions scheduled on two days- 31st October and 2nd November 2025 where qualified accepted will be presented. The multi-track conference is ready to stimulate the exchange of innovative ideas and identification of future trends in different knowledge domains. The participates will get the opportunity to learn new challenges in their respective research areas.

We would like to express our sincere thanks to the organizing committee of the multi-track conference, reviewers, and volunteers for their hard work, passion, and constant efforts to make this event successful. We also would like to thank all the authors for sharing their innovative ideas, research results, latest trends, and advancements in different domains of education including in science, technology, social sciences, and humanities.

Let us come together and make the conference a successful event with enriched experience of learning. Looking forward to meeting you all in Shiksha Mahakumbh 2025 at NIPER Mohali.

Sincerely

Brahmjit Singh
General Chair, Multi-Track Conference
Shiksha Mahakumbh 2025

## Organizing Committee

| | | |
|---|---|---|
| Vidya Bharti Representative<br><br>Sh. Vijay Nadda, Organsing Secretary (North Zone) | Patron<br><br>Prof. Dulal Panda<br>Director<br>NIPER Mohali | Director, DHE<br><br>Dr. Thakur SKR<br>Scientist / Engineer SF, ISRO |

| | |
|---|---|
| Convener<br>Dr. Shamsher Singh<br>AB College Pathankot | Secretary<br>Dr. Jatinder Garg<br>Central University Himachal Pradesh |

| | | |
|---|---|---|
| General Chair<br>Prof. Brahmjit Singh<br>NIT Kurukshetra | Co-chair<br>Dr. Krishan Gopal<br>NIPER Mohali | Co-Chair<br>Dr. Deepak B Salunke<br>NIPER Mohali |

| **Conveners** | | | | |
|---|---|---|---|---|
| Dr. Vikash Kumar Garg<br>SLIET Longowal | Dr. Kapil Sood<br>Govt College Dhaliara (HP) | Dr. Dhirender<br>CBL University Bhiwani | Dr. Pankaj Kumar<br>CU Himachal Pradesh | Dr. Pankaj Verma<br>NIT Kurukshetra |
| **Track Chairs /Co-Chairs** | | | | |
| Dr. Praveen Kumar<br>Central University of Jammu | Prof. Anish Sachdeva<br>Dr. B R Ambedkar NIT Jalandhar | Prof. Sanjeev Bansal<br>SLIET Longowal<br>Dr. Samriti Mahajan | Adv. Poornima Singh Pawar<br>Legal Consultant, DPIIT, Ministry of Commerce | Prof. Bala Lakhendra<br>Banaras Hindu University Varanasi |
| Dr. P K Singh<br>IIT Delhi<br>Dr. Vikas Chaudhary<br>NIT Kurukshetra | Dr. Rajneesh Talwar<br>Chitkara University<br>Chandigarh | Dr. Nitin Bansal<br><br>Dr. Shweta Chaurasia<br>PGIMER Chandigarh | Dr.<br>Lakha Singh<br>CBL University Bhiwani | Prof. Neelesh Sharama<br>Sher-e-Kashmir University of Agriculture Sciences & Technology Jammu |
| Dr. Ashwani Sharma<br>NIT Hamirpur | Dr. Ravi Prakash<br>CBL University Bhiwani<br>Dr. Rubvita Chadha | Dr. Anshu<br>CBL University Bhiwani | Prof. Kamlesh Prasad<br>SLIET Longowal | Dr. V K Singh<br>SAC, ISRO<br>Ahmedabad |

# LIST OF ABSTRACTS

## Part-A

### Section 1: Fundamentals and Applied Sciences Applications

## Section 2: Engineering and Technology

## Section 9. Sports, Physical Education and Well Being



## Section 10. Agriculture, Food, Veterinary Sciences

**Section 11. Environment, Sustainability and Water Resources**



**Section 12. Culture, Arts and Heritage**



**Section 13. Language and Linguistics**

## Section 1:

## Fundamentals and Applied Sciences Applications

***Track Chair: Dr. Praveen Kumar***

Education is the foundation of national development and the most influential device to mould the destiny of a country. In the 21st century, as India aims to become a global knowledge leader, catalytic changes in education are the need of the hour in order to endow students with critical thinking, creativity, and digital literacy. This section on the Basic and Applied Sciences is designed to fill in the gap between pure scientific research and its actual applications in the real-world situations. It is an active platform for scholars, academicians and industry experts to share ideas, innovations and advances between different disciplines of physics, chemistry, biology, mathematics and engineering sciences. This part emphasizes the crucial role of basic knowledge in getting the applied research for social development and long-term growth. As stated by UNESCO (2023), investment in science learning is directly proportional to public health and social welfare improvements, particularly when research results are oriented towards the needs of the community. India's emerging scientific ecosystem—fuelled by the NEP 2020 and efforts such as "Vigyan 2030"—is set to revolutionize classrooms to become centres of creativity and problem-solving. With teamwork, innovation, and imagination, we can make Shiksha Mahakumbh 2025 a turning point in rethinking India's education system—where learning becomes lifelong, inclusive, and transformative. The message of "Classroom to Society: Building a Healthier World through Education" is one that encourages us to remember that scientific awareness should not be limited to laboratories or books; it should be converted into practical solutions that improve the quality of life and foster sustainable development. Let us pledge today to create an education system that not only provides knowledge but also infuses purpose, values, and global citizenship.

Paper id: SM25.1.1

# A Study of Pharmaceutical Wastes as Emerging Contaminants in Aquatic Systems

Vandna Singh, Alok Kumar
Dept. of Chemistry, School of Vocational Studies, and Applied Sciences
Gautam Buddha University, Greater Noida
*malikvandna@gmail.com*

Pharmaceutical residues have emerged as one of the most concerning classes of contaminants in aquatic ecosystems. Their continuous input through domestic sewage, hospital effluents, and pharmaceutical industry discharge leads to persistent and bioactive pollutants in surface water, groundwater, and even drinking water sources. Unlike conventional pollutants, pharmaceutical compounds are designed to be biologically active at low concentrations, raising concerns about their long-term ecological and human health impacts. In this article we present a study, which provides an overview of the occurrence, sources, and pathways of pharmaceutical wastes in aquatic systems, with emphasis on antibiotics, analgesics, and hormonal drugs. It further highlights their potential effects on aquatic organisms, such as endocrine disruption, antimicrobial resistance, and alteration of aquatic food webs. Current treatment methods in wastewater plants are often inadequate to eliminate these micro pollutants, allowing their accumulation in the environment. A review is also presented on the recent advances in innovative remediation strategies. This includes nanomaterials, advanced oxidation processes, and bioremediation, for mitigating pharmaceutical contamination. The major findings underline the urgent need for integrated monitoring, stricter regulations, and eco-friendly treatment technologies to safeguard water quality and public health.

*Key words: Pharmaceutical Wastes, Emerging Contaminants, Antimicrobial Resistance, Wastewater Treatment, Nanomaterials*

**Paper id: SM25.1.2**

# Beyond Standard model: The Exotic Hadrons

Pallavi Gupta
Dept. of Physics, Thapar Institute of Engineering and Technology, Patiala
*10gupta.pallavi@gmail.com*

Recent observations by the LHCb experiment are pointing toward numerous new particle states that demand both rigorous validation and comprehensive theoretical analysis. Among these exotic states, tetraquarks and pentaquarks are emerging as especially promising candidates for physics beyond the Standard Model. In this work, we focus on tetraquarks, particularly studying their wavefunctions and exploring the properties of one of the simplest multiplets — the color-octet. Our study will not only validate the experimental results but also clarify the internal structure, such as spatial, spin, and color components of the octet wavefunction, and provide predictions to guide future experiments.

*Keywords: Tetraquarks, Pentaquarks, Standard model, Multiplets, Wavefunction*

Paper id: SM25.1.3

# A Fluorescence Turn-On Bio-sensing Strategy for Sensitive and Rapid Determination of Alkaline Phosphatase in Human Blood Based on the Photo-physical Phenomenon of Aggregation Induced Emission

[1]Jasvir Kaur, [2]Prabhat Singh
[1]Punjabi University, Patiala, [2]Bhabha Atomic Research Centre, Mumbai
*kaurjasvir8787@gmail.com*

Alkaline phosphatase (ALP), membrane bound glycoprotein, catalyses the hydrolysis of phosphoester linkage from carbohydrates, proteins, or nucleic acids in basic conditions. ALP is widely distributed in human body. Therefore, the enzyme is also used for biological applications, such as, gene expression and antibody conjugate immunoassays. ALP levels remain 40-160 U/L in healthy adults and ,~500 U/L in children and pregnant women. Several abnormalities, such as, anemia chronic nephritis, hepatobiliary diseases, and hypothyroidism are caused if the level of ALP is disturbed in the body. Thus, ALP detection is highly significant for diagnostic and pathological assays. In this regard, there exist a variety of assays for ALP detection. However, these methods exhibit major drawback of complex and expensive design, and low sensitivity. Therefore, it is still very important to develop some inexpensive, sensitive, and simple ALP detection approaches. In this work, using the phenomenon of aggregation induced emission (AIE), a rapid, easy, sensitive, and highly selective fluorescence "Turn-On" probe is developed to monitor ALP activity. The sensing units of the probing system are made up of an AIE probe dye, di-anionic 1,2-Bis[4-(3-sulfonatopropoxyl)phenyl]-1,2-diphenylethene salt (BSPOTPE) and poly-cationic protamine sulphate (PrS) that electro-statically interact with each other to make a highly fluorescent BSPOTPE-PrS supra-molecular complex. Subsequently, the fluorescence of the complex is efficiently quenched by hexa-anionic hexa-meta-phosphate (HMP). A rapid recovery in the fluorescence, referred as, fluorescence "Turn-On" is obtained by adding ALP in the basic buffer conditions. The sensing platform has been thoroughly investigated using various spectroscopy-based techniques. The sensing probe exhibits limit of detection of 28.7 (±3) µU/mL and linear concentration range of 0–36 mU/mL. The potential application has also been demonstrated in human serum samples.

*Keywords: Bio-Sensing, Alkaline phosphatase, Photophysical phenomenon*

Paper id: SM25.1.4

# Fractal Geometry and Fractional Dynamics in Planetary Few-Body Interactions

Sanjeev Kumar
Dept. of Mathematic, Govt. PG College, Dhaliara
*skjjaswal@gmail.com*

Planetary few-body systems exhibit complex dynamical behavior, including chaotic scattering, resonance capture, and sensitive dependence on initial conditions. Classical integer-order models often fail to capture long-term memory effects, anomalous transport, and dissipative processes inherent in real astrophysical systems. In this work, we integrate fractal analysis and fractional-order dynamics to investigate the stability, escape, and orbital evolution in planetary few-body interactions. Using numerical simulations, Lyapunov spectra, Poincaré sections, basin entropy, and fractional differential equations, we demonstrate that fractal structures quantify the geometry of unpredictability, while fractional dynamics capture memory-driven processes and nonlocal interactions. Our results provide a unified framework for understanding chaotic scattering, resonance phenomena, and long-term evolution in planetary systems, offering insights relevant to exoplanetary dynamics, small-body transport, and mission trajectory design.

*Keywords: Planetary few-body systems, Chaotic scattering, Fractal basins, Fractional, dynamics, Basin entropy, Orbital stability, Memory effects*

**Paper id: SM25.1.5**

# Electrochemistry of Vitamins using Cyclic Voltammetry for Biosensing Applications

Shiva Sharma
Shobhit Institute of Engineering and Technology, Meerut
*shiva@shobhituniversity.ac.in*

Vitamins are essential micronutrients that play critical roles in tissue growth, metabolic regulation, and immune health. Rapid and reliable detection methods are vital for monitoring nutritional status and supporting biomedical applications. Electrochemical techniques, particularly cyclic voltammetry (CV), offer high sensitivity, simplicity, and potential for miniaturization. In this study, the electrochemical behavior of selected water-soluble (vitamins B12 and C) and fat-soluble (vitamins A, D, E, and K) compounds was investigated using carbon screen-printed electrodes under controlled scan conditions (100 mV/s, 3 cycles, 20 mA current range, final voltage 500 mV, scan limits −350 to 500 mV). Distinct oxidation peak currents were observed at Vitamin C (0.03113 V, $1.51 \times 10^{-5}$ A), Vitamin B12 (0.01511 V, $8.71 \times 10^{-6}$ A), Vitamin A (0.03211 V, $9.06 \times 10^{-6}$ A), Vitamin D (0.04611 V, $9.52 \times 10^{-6}$ A), Vitamin E (0.03907 V, $9.27 \times 10^{-6}$ A), and Vitamin K (0.02911 V, $8.79 \times 10^{-6}$ A). Among these, Vitamin C exhibited the highest electrochemical response, attributed to its enediol functional group that undergoes a two-electron, two-proton transfer to form dehydroascorbic acid. Comparative analysis revealed the redox order: C > D > E > A > K > B12. The results confirm that electrochemical oxidation of vitamins is strongly influenced by molecular structure and functional groups, with rapid redox kinetics favoring higher sensitivity. This study confirms that cyclic voltammetry is a rapid and sensitive method for detecting vitamins, with potential applications in future biosensing.

Paper id: SM25.1.6

# Multiferroic Behaviour in Aliovalent Atom Doped Sodium Bismuth Titanate Ceramic

[1]Priyanka Sharma, [2]Rahul Goel, [2]Rajat Syal, [2]Mukul Kumar, [2]Sanjeev Kumar
[1]Department of Applied Sciences, Chandigarh Group of Colleges, Landran
[2]Dept. of Physics, Punjab Engineering College, Chandigarh
*sanjeev04101977@gmail.com*

The current study shows how aliovalent atom doped Sodium bismuth titanate ceramic exhibits multiferroic behaviour at ambient temperature. The ceramics have been studied for structural, morphological, ferroelectric, magnetic and magneto-dielectric coupling. The lossy behaviour in polarization vs electric field hysteresis curve along with high order of leakage current density has been observed by introduction of magnetic ion at B site in ABO3 perovskite structure. The occurrence of short-range ferromagnetic ordering is observed by Magnetization-applied magnetic field hysteresis curve. The present study is useful for development of lead-free single phase multiferroic materials for multistate memory devices.

*Key words: Multiferroic behaviour, Polarization, Magnetization, Multistate memory devices*

**Paper id: SM25.1.7**

# Green one-pot hydrothermal synthesis of lemon juice-derived carbon dots: UV sensor

[1]Srijan Pushkarnaa, Shivani Dhalla, [2]Kapil Sood
[1]Dept. of Physics, D.A.V. College, Jalandhar, Punjab
[2]Department of Physics, Government College Dhaliara, HP, India
*shivani.dhall24@gmail.com*

Carbon dots (CDs) were synthesized using a simple one-pot hydrothermal method, utilizing fresh lemon juice as an environmentally friendly and cost-effective precursor. The as- synthesized CDs were thoroughly characterized by various techniques, including photoluminescence (PL) spectroscopy, UV-Vis spectroscopy (with qualitative evaluation in a UV analyzer chamber), Fourier-transform infrared (FT-IR) spectrometry, X-ray diffraction (XRD), and field emission scanning electron microscopy (FE-SEM). It was found that, under UV illumination, the CDs exhibited strong blue-green fluorescence. PL measurements across different excitation wavelengths revealed a maximum emission at 460 nm. FT-IR analysis confirmed the presence of various surface functional groups, which likely contribute to the CDs' impressive optical properties. Furthermore, investigations into the effect of varying precursor concentrations showed that both the optical and structural properties of the CDs remained consistent, demonstrating the method's reproducibility, reliability, and cost-effectiveness. Notably, the CDs also exhibit promising potential for UV sensing applications due to their strong UV absorption and responsive photoluminescent behavior.

*Keywords: Carbon dots; hydrothermal synthesis; lemon juice; photoluminescence; UV sensing.*

Paper id: SM25.1.8

# Theoretical Study on Self-Focusing Dynamics of cosh-Gaussian Laser Beams in Kerr Nonlinear Media

[1]Ranju Mahajan, [2]Ravinder Kaur
[1]Dept. of Physics, Lyallpur Khalsa College, Jalandhar, [2]Dept. of Physics, DAV College, Jalandhar
*ranjumahajan@lkc.ac.in*

The theoretical and experimental exploration of the propagation dynamics of high-power laser beams in plasmas continues to be a vibrant field of research, owing to its wide-ranging applications in plasma-based particle accelerators, inertial confinement fusion, ionospheric modification, and the generation of novel radiation sources. Among the various nonlinear laser–plasma-interaction processes, self-focusing of laser beams has attracted particular attention because of its direct impact on beam stability, energy transport, and subsequent nonlinear phenomena such as filamentation, self-phase modulation, and higher harmonic generation. Self-focusing arises from effective increase in the on-axis refractive index compared to beam edges, thereby guiding and compressing the laser pulse during propagation. In this study, we present a detailed investigation of the self-focusing characteristics of a cosh-Gaussian laser beam propagating through a Kerr medium with linear absorption, while simultaneously incorporating the effect of relativistic and nonlinearity. The beam dynamics are modelled under slowly varying envelope approximation, leading to a nonlinear parabolic partial differential equation for beam's complex envelope. We employ variational method, which provides approximate yet physically meaningful solutions. The analysis focuses on decentering parameters (b) and different linear absorption coefficients (ki) in modifying the conditions for self-focusing, beam narrowing, and self-phase modulation of the cosh-Gaussian beam. Numerical simulations complement the analytical treatment, showing that variations in these parameters critically influence the beam width, phase evolution, and stability during propagation. This study not only provides deeper understanding of cosh-Gaussian beam behavior in nonlinear Kerr-type media but also offers insights useful for optimizing experimental configurations in high-intensity laser–plasma-interactions. Results may be useful in designing next-gen plasma-based accelerators, high-energy laser systems, and compact radiation sources, where controlled beam propagation is essential for achieving desired performance.

*Keywords: cosh-Gaussian beam, self-focusing, self-phase modulation, relativistic nonlinearity, beam dynamics, kerr medium.*

Paper id: SM25.1.9

# Quantum Sensors: Principles, Challenges and Emerging Technologies

Preety Aneja[1], and Pranshu Bhateja[2]
[1]DAV College Jalandhar
[2]Bharat Heavy Electricals Limited, IVP, Goindwal Sahib, Punjab
*anejapreety2009@gmail.com*

Quantum sensors are devices capable of measuring physical quantities with exceptional precision and often surpassing the performance of conventional sensing technologies. Unlike classical sensors, which rely on macroscopic physical properties, quantum sensors exploit peculiar features of quantum mechanics such as superposition, entanglement, interference, and squeezing. These phenomena enable detection of extremely small variations in parameters like time, magnetic and electric fields, acceleration, rotation, and temperature. As a result, quantum sensing has emerged as a transformative tool in both scientific and technological domains. Superposition allows a quantum system to exist in several states simultaneously until a measurement collapses it, while entanglement establishes correlations between particles that enhance measurement sensitivity beyond classical limits. Further, accuracy can be refined by quantum interference and squeezing, thus, forming the conceptual basis for advanced measurement methods. We highlight the operational mechanisms of several categories of quantum sensors, including, atomic clocks, atom interferometers, optical magnetometers, nitrogen-vacancy (NV) centers in diamond and superconducting quantum interference devices (SQUIDs. The chapter will also cover the wide range of practical applications of quantum sensors in various fields including navigation or positioning systems, microscopy, communication, medical imaging, environmental monitoring, seismology etc. Despite these advancements in quantum sensing technologies, technical and practical challenges persist such as decoherence, environmental noise, and scalability limit widespread deployment. Recent advances in high performance robust quantum materials and integration with smart technologies like artificial intelligence (AI) and Internet of things (IoT) aim to overcome these limitations, paving the way for next-generation sensors that are portable, versatile, and interconnected. Thus, quantum sensors serve to bridge the gap between quantum theory and practical application, offering measurement capabilities previously thought impossible. The combination of foundational theoretical knowledge with cutting-edge engineering is set to revolutionize precision measurement across science, industry, and everyday life, and thus making quantum sensors a cornerstone of the emerging quantum era.

Paper id: SM25.1.10

# An Efficient Hybrid Fixed-Point Method for Nonlinear Systems

Ranjita Kapur
Dept. of Mathematics, DAV College Jalandhar
*ranjitakapur@gmail.com*

Nonlinear equations are fundamental to modelling complex phenomena across science, engineering, and economics. Efficiently solving these equations is critical for practical applications. Classical approaches such as Picard iteration often converge slowly, particularly for large-scale or highly nonlinear systems. To address this, several fixed-point iterative methods have been developed, including schemes by Mann, Ishikawa, and Kanwar et al. Motivated by the need for faster and computationally efficient algorithms, we propose a novel hybrid fixed-point iteration method that combines the strengths of the Mann iteration and the Kanwar iteration process. Methodology The proposed method, referred to as GM, is a two-step second-order fixed-point iteration approach. By effectively integrating the Mann iteration with Kanwar's scheme, the method enhances convergence speed while maintaining numerical stability. Importantly, it does not require derivative computations, reducing computational cost for nonlinear systems with complex structures. The iterative process can be expressed in a generalized form, and theoretical analysis using Taylor series ensures the existence and uniqueness of solutions under suitable conditions. The GM method is flexible and reduces to the standard two-step Picard iteration for specific parameter choices, illustrating its general applicability and adaptability. The effectiveness of the GM method is evaluated through several numerical examples, including both single nonlinear equations and systems of equations. Comparative studies are conducted against the Picard Method, Mann Method, and Kanwar Method. The results show that GM consistently outperforms the existing schemes by achieving faster convergence with fewer iterations and lower error values. Graphical comparisons further highlight the method's stability and efficiency. In particular, the GM method maintains reliable convergence even for highly nonlinear or stiff systems, demonstrating its robustness for diverse problem types. The proposed hybrid fixed-point iteration method provides a simple, efficient, and reliable tool for solving nonlinear systems commonly encountered in scientific, engineering, and industrial applications. By combining Mann and Kanwar iterations, it achieves second-order convergence without derivatives and surpasses traditional methods in both speed and accuracy. Its simplicity, flexibility, and computational efficiency make it highly practical. Future work will explore extensions to constrained systems, adaptive iteration strategies, and potential integration into larger computational frameworks for real-world applications.

Paper id: SM25.1.11

# Structural, Electronic, Mechanical and Optical properties of AuAg and AuCu Alloyed Monolayers: First Principle Investigations

Yachana Sharmaa
Maharaja Agrasen University, Baddi, H.P.
*yachu30@gmail.com*

Two dimensional (2D) nanostructures have elicited tremendous interest in the research field due to their unique structures and exceptional properties. Noble metal alloyed monolayers exhibit distinct properties compared to bulk materials composed of the same atoms. By designing 2- or 3D architectures with these nanolayers, researchers can create novel materials with tailored properties, such as enhanced electronic, mechanical, optical, and sensing capabilities. The noble metals copper, silver, and gold exhibit strong plasmon resonance, which is shifted into the visible spectrum, making them ideal for various applications. In this work, structural, electronic, mechanical, and optical properties of Au-Ag and Au-Cu alloyed monolayers with its pristine counterparts (Au, Ag, & Cu monolayer) are studied by the first-principle computational method within framework of density functional theory (DFT) using SIESTA code. The value of lattice constant, binding energy and bond length of Au-Ag and Au-Cu alloyed monolayer are comparable to the values for pristine Au, Ag and Cu monolayer. Au-Ag and Au-Cu alloyed monolayer have been found to be metallic in nature like its pristine counterparts. Band structure, PDOS, real and imaginary parts of dielectric function, reflectance and absorbance are calculated. Results of band structures and density of states calculations show metallic electronic properties. Monolayers are mechanically stable and tensile strength falls within range of their pristine counterparts. Optical properties are anisotropic and sensitive to their electronic band structure. Their absorption edge corresponds closely to their calculated band gaps. The unique properties of noble metal alloyed monolayers have elicited a lot of interest for various advanced technologies because of their ease of synthesis, surface functionalization, and characterization. Due to their electronic properties and tunable characteristics, AuAg and AuCu monolayers are being studied for applications in sensing, bio sensing and nano-enhanced catalysis. Au-Ag alloyed monolayers are used in biosensing and Au-Cu nanostructures are explored for plasmon-enhanced spectroscopy. Noble metal alloyed monolayers facilitate creation of micro structured electronic circuits on non-conductive substrates, thereby expanding opportunities for innovative material design and applications.

*Key words: Density Functional Theory, Structural properties, SIESTA, Plasmon*

Paper id: SM25.1.12

# A nickel (II) based probe for selective sensing of 2,4,6-trinitrophenol at ppb level in aqueous medium

Janak, Sadhika Khullar
Dept. of Chemistry, Dr. B.R. Ambedkar National Institute of Technology Jalandhar
*khullars@nitj.ac.in*

A nickel(II) based luminescent coordination polymer, {[Ni2(TPXN)(NDC)2] 2.5H2O}n (CP1) (where TPXN = 1,1'-(1,4-phenylene)bis(N,N-bis(pyridin-2-ylmethyl)methenamine) and NDC = naphthalene-2,6-dicarboxylate) was designed for the sensing of small molecules such as 2,4,6-trinitrophenol (TNP), 4-nitrophenol (NP) etc. It was synthesized in good yields under ambient conditions and characterized by various analytical techniques such as elemental analysis, ATR spectroscopy, thermogravimetric analysis and powder X-ray diffraction studies. It is used for the selective and ultrafast detection of explosive TNP in aqueous medium via remarkable fluorescence quenching (Ksv = 0.673 × 105 M−1) with 94.65 ppb LOD (limit of detection). The quenching mechanism (static or dynamic) was investigated by the time correlated single photon counting (TCSPC) analysis. The results supported both static and dynamic quenching for the interaction of TNP with the Ni(II) probe. In order to establish its mechanism of action, spectral overlap and density functional theory (DFT) calculations have been used which confirms that the sensing takes place through both photo-induced charge transfer (PET) and resonance energy transfer (RET) process. Its stability and recyclability were also established which showed excellent results over five cycles without losing much activity. Furthermore, for real time applications, Ni(II) probe was coated on paper strips and cotton- swab for the detection of TNP.

*Keywords: Coordination Polymer, Selective, Sensing, Nitro explosives, TNP, Recyclability*

Paper id: SM25.1.13

# An Overview of Attainment of Eco-friendly Practices to Sustainable Agri Practices

[1]Deekshant, [1]Dhirendra Kumar, [2]Sheetanshu Gupta, [3]Wajid Hasan,
[4]Vineeta Shukla, Suresh [5]Aluvihara
[1]Dept. of Botany, Chaudhary Bansi Lal University Bhiwani [2]Dept. of Plant Biochemistry, College of Food Technology, Central Agriculture University, Imphal, Manipur, [3]Deptt of Entomology, KVK Jehanabad, Bihar Agricultural University, Bihar, [4]IIMT University, Meerut, [5]Dept. of Chemical and Process Engineering, University of Peradeniya, Peradeniya, Sri Lanka
*dhirencblu@gmail.com*

Since the beginning of plant science different inter (plants with microbes) and intra groups' (plants with plants) relations of plants have been studied. Some of these studies are based on their locations of colonization of microbes residing within the tissues of root, stem or leaves are regarded as endophytes on the other hand microbes residing on the Rhizosphere and Phyllosphere are called as epiphytes. Adapting agricultural practices to leverage ecosystem dynamics represents a transformative shift toward sustainability. It aims to have a more harmonious coexistence with nature, where agricultural practices are tailored to align with the inherent strengths of ecosystems. Integrated Pest Management emerges as a cornerstone of this adaptation. By integrating biological control measures, farmers foster the presence of natural predators and parasites that regulate pest opulations. Crop diversification creates environments that discourage the proliferation of specific pests, promoting a more resilient agroecosystem. This strategy harnesses the complex interactions between plants, pests, and beneficial organisms. Agroecological principles, rooted in the understanding of ecological processes, guide the adaptation of agricultural practices. Companion planting, where mutually beneficial plant combinations are cultivated, enhances biodiversity and deters pests. Crop rotation disrupts pest life cycles and fosters soil health. Precision agriculture technologies enable farmers to make informed decisions based on real-time data, optimizing resource use and minimizing environmental impact. The adaptive capacity of farmers, facilitated by technology, becomes a crucial element in leveraging ecosystem dynamics while ensuring efficient and sustainable food production.

*Keywords: Phyllosphere, Rhizosphere, Symbiosis, microbiome, Phyllosphere, Rhizosphere, bioactive molecules, antimicrobial*

Paper id: SM25.1.14

# Statistically Optimized Mesoporous Hydrogel Derived from Nyssa Sylvatica Gum: Insights into Adsorption Behaviour, Antibacterial Properties, and Phytotoxicity Evaluation

Shikha Sharma[1], Priyanka Mankotia[1], Jatin Chadha[2], Vijay K. [3, 4], Vishal Sharma, Kashma S [5]
[1]Institute of Forensic Science & Criminology, Punjab University, Chandigarh, [2]Department of Microbiology, Panjab University, Chandigarh, [3]Dept. of Physics, NIT, Hazratbal J&K, [4]Dept. of Physics, University of the Free State, P.O. Box 339, Bloemfontein ZA9300, South Africa, [5]Dept. of Chemistry, DAV College, Sector-10, Chandigarh
*shama2788@gmail.com*

An eco-friendly hydrogel derived from Nyssa sylvatica gum has been synthesized and evaluated for its potential as an adsorbent in wastewater treatment. This study investigates efficacy of NS-g-poly(AA) hydrogel synthesized through free radical polymerization to remove MG dye. A Response Surface Methodology-based Central Composite Design model was employed to optimize key process parameters for maximum NS-g-poly(AA) swelling. A maximum swelling of 1125% was obtained after optimizing the reaction parameters. Synthesized hydrogel was characterized using FE-SEM, XRD, 1 H-NMR, BET, FTIR, and TGA techniques. Results reveals that hydrogel possesses a mesoporous structure with an average pore diameter of 6.55 nm. Optimal conditions were contact time 150 min, pH 7, 60 mg L -1 adsorbent dose, 100 mg L -1 initial dye concentration, and a temperature of 303.15K. Hydrogel achieved a maximum adsorption capacity of 512.82 mg g -1.Kinetic studies show that adsorption follows a pseudo- second-order kinetic model. Langmuir model best described the adsorption isotherms evaluated at various equilibrium dye concentrations, suggesting a chemisorption mechanism. Thermodynamic analysis confirmed the spontaneous and exothermic nature of the dye adsorption process. Regeneration studies showed that after five consecutive adsorption–desorption cycles, the hydrogel retained an adsorption efficiency of 80.60% and desorption efficiency of 15.27%. Synthesized hydrogel exhibited antibacterial activity against Gram-positive and Gram-negative bacteria, with maximum inhibition zone of 24.66 mm observed against Pseudomonas aeruginosa. Phytotoxicity tests reveal that water treated with NS-g-poly(AA) achieved 100% seed germination, comparable to that of distilled water.

*Keywords: Nyssa sylvatica; Malachite green dye; Central composite design; Mesoporous hydrogel; Adsorption; Antibacterial activity; seed germination.*

Paper id: SM25.1.15

# Silver Nanoparticles Reinforced Hing Gum-Based Hydrogel Nanocomposite for Enhanced Hexavalent Chromium Adsorption: Green Synthesis, Characterization, and Mechanistic Insight

Samiksha Gautam[1], Irfan Ayoub[1], Kashma Sharma[2], Vijay Kumar[1,3]
[1]Department of Physics, National Institute of Technology Srinagar, J&K
[2]Department of Chemistry, DAV College, Sector-10, Chandigarh [3]Department of Physics, University of the Free State, Bloemfontein ZA9300, South Africa
*vijaykumar@nitsri.ac.in*

The current study investigates the potential of silver nanoparticles (Ag NPs) on Hing-based hydrogel for enhancing the efficiency of Cr(VI) ion removal from aqueous solutions. Bare hydrogels and their nanocomposites were synthesized using radical polymerization and ex-situ methods under microwave radiation. The Ag NPs incorporated into the nanocomposite were synthesized via a green route. Crosslinking in the hydrogel and nanocomposite and reduction of Ag NPs were confirmed using PXRD analysis. Additional structural characterization and confirmations of metal ion adsorption on the prepared samples were carried out using FTIR, FESEM, EDAX, XPS, and TEM analyses. The thermal stability of the samples was evaluated using TGA. To analyze the interfacial interactions between Cr(VI) ions and the hydrogel or nanocomposite, the effect of various parameters such as solution pH, adsorbent dosage, contact time, temperature, NPs content, and stirring rate was systematically studied. The nanocomposite demonstrated better Cr(VI) removal efficiency, achieving around 20% higher performance than the bare hydrogel. Among the various adsorption models applied, the Langmuir isotherm and pseudo-second-order kinetic model showed the best fit with R 2 values approaching unity for both hydrogel and nanocomposite, suggesting monolayer adsorption and chemisorption mechanisms. The hydrogel exhibited a maximum adsorption capacity of 88.73 mg/g, whereas the nanocomposite achieved a significantly higher capacity of 3043.5 mg/g, highlighting its improved performance. Thermodynamic analysis confirmed that the adsorption process is spontaneous. Overall, the bare hydrogel and nanocomposite proved to be effective and environmentally friendly materials for Cr(VI) removal from water, offering a sustainable solution for wastewater treatment and inspiring further research in this area.

*Keywords: Hing, hydrogel, green synthesis, nanoparticles, nanocomposite, heavy metal*

Paper id: SM25.1.16

# Antibacterial and Smart Drug-Release Thin Films: Materials, Mechanisms, and Technological Advances

Pooja Sharma[1], Ruchika Sharma [1], Ashwini[1], Ajay K. [3], Thakur SKR [1, 4, 5, 6] , Vipin K.Jain[2]
[1]Dept. of Physics, Chaudhary Bansi Lal University, Bhiwani, [2]Dept. of Physics, Chaudhary Bansi Lal University, Bhiwani, [3]Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur, [4]ISD, Semi-Conductor Laboratory, SAS Nagar, [5]Dept. of Holistic Education, Vidya Bharti Institute of Training and Research Trust, Mohali, [6]Institute of Training and Research, Vidya Bharti Institute of Training and Research Trust, Mohali-160071
*vipinjain7678@gmail.com*

Antibacterial and smart drug-release thin films represent a converging research frontier in biomaterials, surface engineering, and nanomedicine. The increasing incidence of multidrug- resistant pathogens and implant-associated infections has intensified the search for novel materials capable of preventing bacterial colonization while delivering therapeutic agents in a controlled and responsive manner. Thin films engineered using metals/metal oxides (Ag, ZnO, Cu, CuO, $TiO_2$), polymers, ceramics, and emerging two-dimensional (2D) materials—provide unique advantages due to their tuneable thickness, nanoscale surface features, and integration with biomedical devices. This review highlights recent advances in antibacterial and drug-release thin films, covering the material classes, mechanisms of antimicrobial action and drug delivery, fabrication strategies, and applications. Emphasis is placed on stimulus-responsive coatings, hybrid architectures, and multifunctional systems that combine antibacterial activity with therapeutic release. The present study critically examines challenges related to biocompatibility and scalability, while delineating prospective avenues for the advancement of intelligent coatings with potential clinical applicability in next-generation healthcare solutions." Follow-up experiments would systematically evaluate the in vitro and in vivo efficacy, tunable drug-release profiles, and long-term biocompatibility of advanced thin film coatings under clinically relevant conditions.

*Keywords: Antibacterial thin films; Smart drug-release; Stimuli-responsive coatings; anomaterials; Biomedical devices; Controlled therapeutic delivery; Biomaterials; Multidrug resistance; Implant-associated infections; Biocompatibility.*

**Paper id: SM25.1.17**

# Structural, Optical and Thermal Attributes for $TiO_2$ and MWCNT dispersed Polyaniline Nanocomposites

Ajay Kumar Sharma[1], Vishal Mathur[2], Jatinder Garg[3], Dhirendra Kumar[4], Thakur Sudesh Kumar Raunija[4, 5, 6, 7], Vipin Kumar Jain[4],
[1]Swami Keshvanand Institute of Technology, Management, Jaipur, [2]School of Arts and Science, American International University, Kuwait, [3]Central University of Himachal Pradesh, [4]Dept. of Physics, CBLU, Bhiwani, [5]ISD, Semi-Conductor Laboratory, SAS Nagar, Punjab, [6]Dept. of Holistic Education, Vidya Bharti Institute of Training and Research Trust, Mohali, [7]Institute of Training and Research, Vidya Bharti Institute of Training and Research Trust, Mohali
*vipinjain7678@gmail.com*

The present work deals with the study of structural, optical, and Thermal properties of specifically prepared PANI/TiO 2 (8 wt.%) , PANI/MWCNT (8 wt.%) and PANI/TiO 2 /MWCNT (8 wt.%)/ nanocomposites through In-situ chemical oxidation polymerization of aniline in the presence of ammonium peroxide sulfate (APS) oxidant. The structural and chemical properties of nanocomposite specimens characterized by SEM, and Raman techniques. Thermogravimetric analyzer (TGA) set up used to determine the weight loss (%) of the specimens which results that property enhanced more dominantly for PANI/TiO 2 /MWCNT (8 wt.%) in comparison to other specimens. UV-Vis spectrophotometer study also reveals that the band gap of PANI/TiO 2 /MWCNT(8wt%) nanocomposite specimens reduced significantly in comparison to other specimens. Impedance Analyzer experimental set up used to determine the dielectric properties of the specimens which results that property enhanced more dominantly for PANI/TiO 2 /MWCNT (8 wt.%) in comparison to other specimens. The study reveals that PANI/TiO 2 /MWCNT as potential applicant specimen for research and development of energy storage devices and applications.

*Keywords: Nanocomposites, In-situ chemical oxidation polymerization, Thermogravimetric analysis, Raman Spectra, Optical properties, dielectric properties.*

Paper id: SM25.1.18

# Eco-Friendly Carbothermal Processing of Silicon Carbide Using Waste-Derived Precursors: A Review

Ashwini[1], Pooja Sharma[1], Ruchika Sharma[1], Dhirendra Kumar[1], Jatinder Garg[3], Thakur Sudesh Kumar Raunija[1, 4, 5, 6], Vipin Kumar Jain[2]
[1]Dept. of Physics, Chaudhary Bansi Lal University, Bhiwani, [2]Dept. of Physics, Chaudhary Bansi Lal University, Bhiwani, [3]Central University of Himachal Pradesh, [4]ISD, Semi-Conductor Laboratory, SAS Nagar, Punjab, [5]Dept. of Holistic Education, Vidya Bharti Institute of Training and Research Trust, Mohali-160071,Punjab, India, [6]Institute of Training and Research, Vidya Bharti Institute of Training and Research Trust, Mohali-160071,Punjab, India
*vipinjain7678@gmail.com*

Silicon carbide is a high-performance ceramic material valued for its excellent thermal conductivity, hardness, chemical stability, and resistance to wear and corrosion. While industrial SiC is typically produced through energy-intensive processes using synthetic silica and fossil-based carbon sources, these methods raise environmental and economic concerns. In response, recent research has explored sustainable synthesis routes that utilize naturally available materials such as sea beach sand as a silica source and biomass-derived activated carbon as a reducing agent. This review summarizes the current developments in SiC synthesis, focusing on eco-friendly methods involving carbothermal reduction. Special attention is given to the properties, processing and reactivity of natural silica and activated carbon from plant waste. The review also highlights advancements in green precursor treatment, processing conditions and the resulting SiC phases and morphologies. These approaches not only reduce production costs and emissions but also contribute to resource circularity and waste valorization. Finally, the discusses the potential challenges and opportunities in scaling up sustainable SiC synthesis for industrial applications. Keywords: Silicon Carbide, Carbothermal Reduction, Activated Carbon, Beach Sand, Biomass Waste, Natural Silica, Green Materials, Sustainable Ceramics, Eco-friendly Synthesis.

Paper id: SM25.1.19

# Development and Characterization of Nanocomposite film based on Ba 0.9 X 0.1 Fe 12 O 19 in PVA (X=La, Dy) matrix

Bhawna Dev[1], Pooja Attri[1], Ajay Kumar Sharma[3],
Thakur Sudesh Kumar Raunija[1, 4, 5, 6], Rashi Nathawat[7], Vipin Kumar Jain[2]
[1]Dept. of Physics, CBLU, Bhiwani, [2]Dept. of Physics, CBLU, Bhiwani, [3]Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur, [4]ISD, Semi-Conductor Laboratory, SAS Nagar
[5]Dept. of Holistic Education, Vidya Bharti Institute of Training and Research Trust, Mohali, [6]Institute of Training and Research, Vidya Bharti Institute of Training and Research Trust, Mohali, [7]Dept. of Physics, Manipal University, Jaipur
*vipinjain7678@gmail.com*

Electromagnetic Interference is a key factor of modern electronic devices. While EMI consists of many unwanted radiated signals which can cause unacceptable degradation of system and their performance. These unwanted radiations can cause damages to communication system and safety operations of many electronic devices. In this work, BaFe 12 O 19 is formed by solid state method; and a conducting polymer PVA is used to form a film of rare earth doped Ferrite. The XRD pattern of rare earth doped M ferrite and PVA film shows the successful formation of the samples. The surface morphology of the samples was analyzed by SEM. Vector network analyzer of prepared samples shows significantly changes in magnetic property of the M type hexaferrites that alter the frequency of EMI shielding in X-band. Further, the effect of Ba 0.9 X 0.1 Fe 12 O 19 (X=La, Dy) in PVA matrix on dielectric properties has been studied which shows high dielectric loss in comparison to Dy doping.

*Keywords: Electromagnetic interference shielding, M-Ferrite, Solid state method, conducting polymer*.

Paper id: SM25.1.20

# Chemically and eco-friendly synthesis of Ferrite based Nanocomposites and its utilization in wastewater treatment: A brief review

[1]Ruchika Sharma, [1]Pooja Sharma, [1]Ashwini, [3]Ashwani Sharma,
[1, 4, 5, 6]Thakur SKR, Dhirendra Kumar[1], [7]Jatinder Garg, [2]Vipin Kumar Jain
[1]Dept. of Physics, CBLU, Bhiwani, [2]Dept. of Physics, CBLU, Bhiwani, [3]Dept. of Environmental Studies, Shivaji College, Delhi, [4]ISD, SCL SAS Nagar, [5]DHE, Vidya Bharti Institute of Training and Research Trust, Mohali, [6]Institute of Training and Research, Vidya Bharti Institute of Training and Research Trust, Mohali, [7]CU of Himachal Pradesh,
*vipinjain7678@gmail.com*

In the era of scarcity of drinkable water, there is need of immediate attention for sustainable treatment of wastewater. Now a days, Ferrite based Nanocomposites has brought great attention in wastewater treatment due to their unique physicochemical properties i.e. high surface area, magnetic separability, and catalytic activity, etc. Chemically and eco-friendly synthesis methods of ferrite nanomaterials/nanocomposites accentuate on methods utilizing plant extracts, bio- templates, and low-energy co-precipitation techniques, etc. which bring great advantages of avoiding toxic reagents, low energy consumption, and improving biocompatibility. A review study has been done to showcase how these nanocomposites may be utilized in treatment of wastewater through adsorption, photocatalysis, and antimicrobial activity, focusing on the removal of dyes, heavy metals, and organic pollutants. The magnetic properties of ferrites facilitate easy recovery and reuse, enhancing their practical applicability. Environmentally conscious design of these nanocomposites extends their utility beyond pollutant removal—contributing to broader environmental remediation and sustainability goals, such as soil rejuvenation, industrial effluent recycling, and circular water management. Their multifunctional behavior enables effective degradation of organic dyes (e.g., Methylene Blue, Rhodamine B, Rose Bengal), phenolic compounds, and pharmaceutical residues through adsorption and photocatalytic pathways, influenced by catalyst dosage, light intensity, pH, and pollutant concentration. Moreover, magnetic separability allows facile recovery and reusability, greatly reducing secondary pollution and operational costs. By Photocatalysis or adsorbent, the removal efficiency of different dyes Methylene Blue, Rhodamine B, Phenol, Rose Bengal, and pharmaceuticals can be determined by emphasizing on the parameter of catalyst dosage, light intensity, initial dye concentration, and pH. To enhance their properties, ferrites have been combined with advanced material such as MXene, metal oxide, BiOX and are doped to form binary, ternary, and quaternary nanocomposite, which shows superior photocatalytic performance due to enhanced properties such as increasing the capacity for light utilization, slowing electron hole recombination, and reducing agglomeration. For a long time, ferrite nanoparticles were seen as adsorbents suitable for physically removing pollutants, but recent studies shows that nanostructures could be suitable for UV and Visible light-induced photocatalytic decomposition of contaminants. By integrating current research, this review highlights the role of nanoparticle/ nanocomposites in addressing water-related issues and suggests directions for future research and technology development.

*Keywords: Ferrite based Nanocomposites, Environmental applications, wastewater treatment. Graphical representation.*

**Paper id: SM25.1.21**

# Controlled Band Gap Tuning of CdS Nanoparticles under Irradiation for Next-Generation Solar Cells

[1]Shweta Agrawal, [2]Dhirendra Kumar, [3]Jatinder Garg,
[2, 4, 5, 6]Thakur Sudesh Kumar Raunija,
[2]Vipin Kumar Jain
[1]Dept. of Physics, University of Rajasthan, Jaipur, [2]Dept. of Physics, CBLU, Bhiwani, [3]Central University of Himachal Pradesh, [4]ISD, SCL, SAS Nagar-Punjab, [5]DHE, Vidya Bharti Institute of Training and Research Trust, Mohali, [6]Institute of Training and Research, Vidya Bharti Institute of Training and Research Trust, Mohali-160071,Punjab, India
*vipinjain7678@gmail.com*

Cadmium Sulfide (CdS) nanoparticles doped in a PMMA matrix were studied to investigate the effect of irradiation on their structural and optical properties. Optical absorption analysis revealed a clear red shift in the absorption edge after irradiation, which is attributed to particle size growth and the consequent reduction in quantum confinement. Irradiation was also found to modify defect states and surface characteristics, further influencing the band structure. These results demonstrate that irradiation can act as an effective tool for controlled band gap tuning in CdS–polymer nanocomposites. Such findings are highly relevant to present-day research, where polymer-supported semiconductor films are being developed for flexible and lightweight solar cells, and where radiation stability is essential for space photovoltaics. Moreover, irradiation-induced defect engineering in CdS-based systems offers new opportunities for advancing photodetectors and optoelectronic devices. This work highlights how irradiation-driven modifications in CdS–PMMA nanocomposites can bridge fundamental optical studies with the design of next-generation energy and electronic technologies.

*Keywords: Irradiation effect, Red shift, Flexible solar cells, Optoelectronic devices*

Paper id: SM25.1.22

# Preparation of Silica Slurry and Impact Analysis on Chemical Mechanical Planarization of 180 nm Technology Node

[1, 2, 3] Thakur Sudesh Kumar Raunija, Ashwini[1], Dhirendra Kumar[1], Vipin Kumar Jain[1]
[1]Dept. of Physics, CBLU, Bhiwani, ISD, Semi-Conductor Laboratory, SAS Nagar, Punjab, [2]Dept. of Holistic Education, Vidya Bharti Institute of Training and Research Trust, Mohali, [3]Institute of Training and Research, Vidya Bharti Institute of Training and Research Trust, Mohali, Punjab
*vipinjain7678@gmail.com*

In the fabrication of IC, particularly when multilayer chips are involved, surface of silicon wafers at every level should have mirror finish. This kind of high finish is achievable through adaption of chemical-mechanical planarization (CMP). CMP is basically a combination of chemical etching and mechanical abrasion. CMP helps to achieve an ultra-flat, smooth surface on silicon wafers before deposition of a subsequent layer is contemplated. Broadly, two types of CMP processes, namely metal CMP and ceramic oxide or dielectric CMO, are widely known in the state of art. Although simple in concept, at the nano-scale, CMP is a complex process in real action. The layers that make up the wafer surface may have varying hardness, because of which they may get polished at different rates. This could lead to "dishing," where the soft parts are recessed underneath the harder materials, which is not desirable and may compromise the chip performance very critically. This malady can, to some extent, be offset using certain chemicals. Time duration for entire CMP process is about 30 seconds, that includes post-polish cleaning during which time the wafer is washed, rinsed, and dried. In overall, the CMP leads to an amazing degree of flatness. The present contemporary CMP technology is perfectly enabled to address very delicate top-down cropping uniformity and is able to cater to productivity, and cost related demands. Emerging applications, such as 3D memory structures, will demand even higher levels of cropping control. Achievement of shallow trench isolation using CMP is essential for fabrication of ULSI. During STI process, the oxide overburden is generally removed in two steps. In first step, the oxide is removed from sufficiently large active areas (AAs) through etching and in second step the oxide from STI region is polished using CMP. Removal of oxide from large AAs necessitates the usage of an extra mask which results in several hours added processing apart from chemical usage, etc. To reduce processing time and cost, it is felt to devise a methodology with indigenously developed slurry for CMP.

*Keywords: Integrated circuit (IC) chip, Chemical-mechanical planarization,* Chemical etching, Mechanical abrasion, Shallow trench isolation

Paper id: SM25.1.23

# Controlled Band Gap Tuning of CdS Nanoparticles under Irradiation for Next-Generation Solar Cells

[1]Shweta Agrawal, [2]Dhirendra Kumar, [3]Jatinder Garg, [1, 2, 4, 5, 6]Thakur SKR, [2]Vipin K. Jain
[1]Dept. of Physics, University of Rajasthan, Jaipur, [2]Dept. of Physics, CBLU, Bhiwani, [3]Central University of Himachal Pradesh, [4]ISD, SCL, SAS Nagar, Punjab, [5]DHE, Vidya Bharti Institute of Training and Research Trust, Mohali, Punjab, India, [6]Institute of Training and Research, Vidya Bharti Institute of Training and Research Trust, Mohali, Punjab, India
*vipinjain7678@gmail.com*

Cadmium Sulfide (CdS) nanoparticles doped in a PMMA matrix were studied to investigate the effect of irradiation on their structural and optical properties. Optical absorption analysis revealed a clear red shift in the absorption edge after irradiation, which is attributed to particle size growth and the consequent reduction in quantum confinement. Irradiation was also found to modify defect states and surface characteristics, further influencing the band structure. These results demonstrate that irradiation can act as an effective tool for controlled band gap tuning in CdS–polymer nanocomposites. Such findings are highly relevant to present-day research, where polymer-supported semiconductor films are being developed for flexible and lightweight solar cells, and where radiation stability is essential for space photovoltaics. Moreover, irradiation-induced defect engineering in CdS-based systems offers new opportunities for advancing photodetectors and optoelectronic devices. This work highlights how irradiation-driven modifications in CdS–PMMA nanocomposites can bridge fundamental optical studies with the design of next-generation energy and electronic technologies.

*Keywords: Irradiation effect, Red shift, Flexible solar cells, Optoelectronic devices*

Paper id: SM25.1.24

# Geometry Dependent Optical Properties of Nanostructures by FDTD Simulations using Experimental Index Parameters

[1]Harkawal Singh, [2]Isha Aroraand, [2]Praveen Kumar Sharma
[1]Dept. of Physics and Astronomical Sciences, Central University of Jammu
[2]School of Natural Sciences, GNA University, Phagwara, Punjab, India
harkawal.hkl@gmail.com, *prafiziks@gmail.com*

Computational modeling of electromagnetic field distributions and scattering cross-sections in thin-film plasmonic nanostructures is critical for the design of photonic waveguides, photosensors and wireless communications. The Finite Difference Time Domain (FDTD) method is a widely established tool for simulating such behaviours in arbitrary geometries. However, translating idealized simulations into experimental thin-film nanostructures remains challenging due to their complex multiscale nature. Exact solutions to Maxwell's equations are further constrained by computational limits, as nanoscale discretization demands extremely fine spatial grids. To overcome these challenges with optimized computational efficiency, we simulated a variety of thin-film nanostructures using identical refractive index parameter derived from experimental data, and compared their geometry-dependent optical responses. The modeled geometries included uniformly distributed nanoparticles, periodic hexagonal arrays, wavy surfaces, and FE-SEM-imported reconstructions of experimental assemblies. The refractive index was extracted using Drude–Lorentz fitting of experimental reflectance spectra under near-normal incdence. FDTD simulations were then employed to evaluate scattering cross-sections, reflectance, transmission, and electric field distributions (both cross-sectional and normal). This correlative framework bridges theoretical and experimental insights, highlighting the influence of refractive index and geometry on light convergence, propagation, and plasmon enhanced light-matter interactions.

*Keywords: Finite Difference Time Domain (FDTD); Thin-film nanostructures*;

Paper id: SM25.1.25

# Electronic and Optical properties of Zinc Oxide: A DFT+U approach

Jitender Kumar
Vallabh Govt. College, Mandi, Himachal Pradesh, India
*jitenderapd@gmail.com*

Zinc oxide (ZnO) is a multifunctional material with diverse applications in cosmetics, pharmaceuticals, ceramics, coatings, electronics, food, and textiles due to its distinct structural, electronic, and optical properties. In this work, the electronic and optical characteristics of ZnO were investigated theoretically using Density Functional Theory (DFT) within the SIESTA computational framework. Structural optimization was performed with GGA-based pseudopotentials, followed by calculations of band structure, density of states (DOS), partial DOS, and optical spectra. The results indicate an indirect band gap of 3.38 eV, which is consistent with experimental data. However, it is noted that the Generalized Gradient Approximation (GGA) tends to underestimate the band gap relative to experimental values. To address this limitation, additional effort was devoted to incorporating Hubbard-U corrections (Ud,Zn and Up,O), which helped in reproducing a more accurate band gap. DOS analysis highlights the dominance of O 2p orbitals at the valence band edge and Zn 4s states in the conduction band, explaining ZnO's natural inclination toward n-type conductivity. Optical simulations further reveal a sharp absorption onset near the band edge, significant refractive index dispersion in the UV region, low reflectance in the visible range, and dielectric responses that confirm strong electronic transitions across the gap. The close agreement between simulation and experimental observations reinforces ZnO's potential for applications in UV detectors, transparent conductors, optical coatings, and light-emitting devices. Overall, the study demonstrates the effectiveness of SIESTA in capturing ZnO's electronic and optical behavior while highlighting the importance of Hubbard-U corrections for achieving accurate band gap predictions.

*Keywords: Zinc Oxide, Density Functional Theory, SIESTA, Band Gap, Hubbard-U, Optical Properties, Electronic Structure*

Paper id: SM25.1.26

# Influence of Annealing Temperature on Magnetic and Optical Properties of Fe doped SnO2 Thin Films prepared by Sol-Gel Technique

Sarabjeet Kaur[1], Aashish Sharma[2], Prianka Sharma[3]
[1]Dept. of Applied Sciences, CGC College of Engineering, Landran, Mohali
[2]Dept. of Applied Sciences, Swami Vivekananda Institute of Engineering & Technology, Banur, Punjab, [3]Dept. of Physics, School of Basic & Applied Sciences, Maharaja Agrasen Univ., Solan
*drpriankasharma@gmail.com*

Fe doped SnO2 thin films were prepared by sol-gel dip coating technique. The deposited films on glass substrate were annealed at 300oC, 400oC and 500oC. The effect of annealing temperature on the magnetic and optical properties of the Fe doped SnO2 thin films have been studied by VSM and UV-Vis spectrophotometry. X-ray diffraction studies exhibit tetragonal rutile structure of SnO2 with no additional phases of SnO2. Various parameters like crystallite size, lattice constants, dislocation density and micro-strain have been calculated and found to vary with annealing temperature. The MH-curve at different annealing temperatures show ferromagnetic ordering at lower annealing temperature. Saturation magnetization decreases and ferromagnetic ordering shift to paramagnetic ordering with increase in annealing temperature. The optical transmission spectra show a red shift in the position of absorption edge towards higher wavelength for Fe- doped thin films but as the annealing temperature increases, the absorption edge shifts toward lower wavelengths. The optical constants and the optical parameters were determined by the spectral transmittance data.

*Keywords: Diluted Magnetic Semiconductors, Fe-SnO2 thin films, Sol-Gel Dip Coating method, Annealing Temperature, Saturation Magnetization, Band Gap, Urbach's Energy.*

## Section 2:

## Engineering and Technology

***Track Chair: Prof. Anish Sachdeva***

There has been phenomenal growth and development of disruptive technologies in all domains of engineering and technology. Cutting edge technologies including Internet of Things, Artificial Intelligence and Machine Learning, Quantum communication, Cloud Computing, Smart manufacturing and Infrastructure, Space technologies are being developed and deployed in the real-life applications. This section on Engineering and Technology focuses on innovations, research advancements, and emerging trends that drive progress across diverse engineering domains. The Engineering and Technology is also becoming increasingly crucial for sustainable growth and development. Designing renewable energy systems, devising clean water management system, developing energy efficient structures are going to have detrimental impact on the futuristic sustainable development. This section provides a collaborative and interactive platform for academicians, students, researchers, and industry professionals to share insights and practical solutions addressing modern technological challenges. The role of engineering excellence and technological innovation in shaping a sustainable and progressive future for society is also highlighted.

**Paper id: SM25.2.1**

# Machine Learning and Wireless Communication Technologies

Brahmjit Singh[1], Shalu Malik[1], Vikash Kumar Garg[2]
[1]ECE Department, National Institute of Technology, Kurukshetra
[2]CSE Department, Sant Longowal Institute of Engineering and Technology Longowal
*brahmjit.s@gmail.com, 62300015@nitkkr.ac.in*

Wireless communication is becoming backbone of the digital transformation happening across all dimensions of the society, industry, and governance. Wireless communication technology enables provisioning of ubiquitous, reliable, and fast connectivity to both human being and the machines. Considering ever increasing demand of connectivity vis-à-vis constrained resources in wireless communication, a lot of innovations are needed at all layers of design stack of the wireless networks. The design and development of wireless communication systems heavily rely on the mathematical models of the entities and phenomenon involved. In the present scenarios, we are witnessing ever increasing complexity of the wireless systems. This makes mathematical modelling a serious challenge. Machine learning, that learns from data, is making revolutionary changes in the design, development, and deployment of wireless technologies. It offers a promising tool to develop viable solutions to the complex problems of the design of next generation wireless communication systems. Feasibility of THz communication has already been demonstrated. First wireless standard 802.15.3d-2017 operating at around 300 GHz frequency has been reported by IEEE. It is expected to deliver data rates in the order of 1Tbps. In this article, we present unique strengths and capabilities of the machine learning. The strategies of machine learning that can enable enhanced performance of the wireless networks are also discussed. The potential of machine learning is highlighted to address the challenges of the radio propagation environment. Major research areas wherein machine learning could be leveraged include channel estimation and coding, synchronization, and position. Analysis is presented to draw the insights on how to utilize the machine leaning in these functionalities of next generation wireless networks. The major focus is on potential applications of machine learning in 6G wireless networks.

*Key words: Wireless communication, Machine learning, Wireless standards, Wireless networks*

**Paper id: SM25.2.2**

# A Sustainable Multi-Layered Computing Framework for Real-Time Smart Healthcare Applications

[1]Pardeep Jindal, [2]Bhaskar Pant, [2]Navneet Kumar Rajpoot, [2]Prabh Deep Singh
[1] (DICE), [2]Graphic Era Univertsy, Dehradun
*prabhsingh@geu.ac.in*

Healthcare applications based on cyber technologies need a computing infrastructure that should be responsive, handle efficiently multimodal medical data, and must be a cost-effective way of using resources. Cloud-centric schemes only employing the cloud servers as infrastructure are subject to delays, high energy consumption, and low reliability, which may not be suitable for real-time services, e.g., intensive care monitoring, emergency alert systems, and real-time diagnosing. This paper presents the Integrated Healthcare-Oriented Edge–Fog–Cloud Architecture, a three-tier architectural model put in place to address these shortcomings. The framework migrates five types of coordinated strategies: (1) a task offloading mechanism that allocates processing between nodes and (2) a bandwidth management policy for robust data transmission, (3) a scheduler which considers latency in prioritizing jobs on the edge, (4) an energy-aware workload moving mechanism to reduce the power consumption and a cost-constrained orchestration model for practical scalability in healthcare networks. The proposed system has been tested in five deployment configurations, from single local edge-only case to a full hybrid edge–fog–cloud scenario. Performance measures include latency, power consumption, the throughput, the bandwidth efficiency and the overhead in the operation. Although there is flexibility in the proposed approach, a relatively small amount model there shows 25% lower delay and about 20% less energy consumption than any approach. The proposed framework lays out the key standards for future generations of high-performance computing systems, tackling the important trade-offs between responsiveness and sustainability and affordability. The proposed system enables trustworthy, patient-focused services, with such support, it is fit for constructing robust digital healthcare ecosystems in an era where prompt decisions in medical emergencies are vital.

Paper id: SM25.2.3

# Rudraksha for Overall Wellbeing: Textual Evidence and Contemporary Applications

Shiva Sharma
Shobhit Institute of Engineering and Technology (Deemed to-be-University), Meerut
*shiva@shobhituniversity.ac.in*

The quest for finding a perfect methodology of using Rudrakshas is an age-old exercise, as is evident in Rudraksha Mahatamaya(Glorification of Rudraksha) and Rudraksha Dharan Vidhi(Method of using Rudrakshas) mentioned in Upanishads(such as Aksha Malika Upanishad, Rudraksha Jabala Upanishad, Bhasma Jabal Upanishad), Purans( such as Shiva Puran, Shrimad Devi Bhagwat Puran, Padma Puran, Skand Puran), Agam Shastras( such as ChandraGyan agam), Tantra(such as Meru Tantra, Damara Tantra) and Ayurveda texts(such as Raj Nighantu, Bhav Prakash Nighantu, Van Aushadi Chandrouday) respectively. Originating from different time periods, classical texts have elucidated Rudrakshas for its spiritual and medicinal importance. In Modern times, Astrology has emerged as a major discipline where Rudrakshas is recommended on the basis of purpose or personal problems or desires of the user. But there is high degree of ambiguity in the method of recommending Rudrakshas. If we can evolve a suitable methodology which can be tested on the touch-stone of Shastric (Textual guidelines) knowledge then Astrology can provide a base for concrete method of Rudrakshas recommendation which will be an effective measure for personal healing and an alternative way of achieving personal wellbeing. To meet this end, in this article, an effort is made to analyse important resources of information on Rudrakshas to bring out the suitable information from texts that forms the basis for astrological application of Rudrakshas in contemporary times.

*Keywords: Rudraksha, Vedic astrology, planetary afflictions, wellbeing, ancient literature*

**Paper id: SM25.2.4**

# Optical Frequency Comb Sources: Generation Methods and Applications

Jasmine Kaur, Karamdeep Singh, Brahmjit Singh
ECE Dept. National Institute of Technology, Kurukshetra
*Er.jasminn@gmail.com*

An optical frequency comb is a multi-wavelength light source that consists of a sequence of discrete, equally spaced spectral lines which acts like a 'ruler' of light. Optical Frequency Comb Sources have enabled significant applications in the field of Optical Communications, Astronomical Observations, Microwave Signal Generation, High Resolution Spectroscopy, Meteorology, etc. Such diverse set of applications have led to various researchers to develop and explore various optical frequency comb source generation techniques. Some popular optical comb source architectures are: 1) Mode Locked Laser Diode (MLLD) based comb sources. 2) Modulator based comb sources. 3) Dual Source induced Four Wave Mixing (FWM) in HNLFs/DSFs based comb sources, Stimulated Brillouin Scattering (SBS) based comb Sources etc. In this paper, we present a critical review of the recent advancements happening in the field of optical comb source generation methods. We further discuss application specific requirements of optical comb sources and suggest possible generation methods for specific use cases.

*Key words: Optical frequency combs, Four-Wave Mixing, Stimulated Brillouin Scattering, Non-Linear Optics, Wavelength Division Multiplexing*

Paper id: SM25.2.5

# Relay Selection and Intelligent Reflecting Surfaces for Physical Layer Security in Wireless Networks – A Case Study

Ranjana, Poonam Jindal, Hemant Sharma
Electronics and Communication Engineering Department
National Institute of Technology, Kurukshetra
*ranjana230@gmail.com*

Relay selection and intelligent reflecting surfaces (IRS) are two promising approaches for enhancing physical layer security (PLS) in wireless networks. The relay technology has a great capability to enhance the communication distance and system capabilities. The IRS is the device that is qualified for the dynamically altering wireless channels to enhance the communication performance. The new IRS-aided hybrid wireless system will be highly promising for achieving a sustainable capacity growth. This paper presents a comparative analysis of relay selection and IRS for physical layer security in wireless networks in different network scenarios. Results are obtained for relay-only, IRS-only, and hybrid IRS-assisted relay systems with varying geometries, artificial noise (AN), relay counts, and IRS elements. From the obtained results it is observed that hybrid IRS-assisted relay systems with AN outperform the relay-only and IRS-only systems. When located close to the transmitter and receiver, IRS offers high secrecy; nevertheless, performance deteriorates with increasing distance. While IRS in conjunction with relays and an delivers the maximum robustness and secrecy rates. This paper is aimed to maximize the secrecy rate. These results highlight how relays, IRS, and an operate cooperatively to create safe 6G wireless networks.

*Key words: Relay selection, Intelligent reflecting surfaces, Physical layer security, Artificial noise*

Paper id: SM25.2.6

# Leveraging Internet of Things in Precision Agriculture

Raman Sharma
ECE Dept. National Institute of Technology, Kurukshetra
*ramansharma05384@gmail.com*

The adoption of Internet of Things (IoT) technologies in modern agriculture has opened new avenues for smart, data-driven farming. This study focuses on the development and implementation of a Smart Agriculture IoT Kit designed to promote precision farming by continuously tracking key soil and environmental parameters. The system employs a range of sensors to measure soil nutrients, pH value, electrical conductivity (EC), temperature, humidity, and moisture content. The collected data is transmitted through IoT-enabled modules to a cloud-based monitoring platform, where it is analysed to generate useful recommendations for farmers. These insights assist in optimizing irrigation patterns, improving fertilizer application, and maintaining suitable environmental conditions for crop growth. The system's use of affordable, low-power sensors makes it both scalable and practical for farmers with varying land sizes. By reducing manual labour and enabling timely interventions, the solution contributes to higher productivity and efficient use of natural resources.

Overall, this IoT-based framework demonstrates the potential of connected technologies in transforming conventional agricultural systems into intelligent, sustainable, and resilient farming ecosystems that support long-term food security and environmental balance.

***Keywords:*** *Internet of Things, Smart Agriculture, Precision Farming, Soil and Environmental Monitoring, Smart Farming, Sustainable Agriculture.*

Paper id: SM25.2.7

# CNN-Driven Automatic Modulation Classification with Rician Fading Channel Considerations

Kumkum Lodhi, Pankaj Verma
ECE Dept. National Institute of Technology, Kurukshetra
*pankaj@nitkkr.ac.in*

Automatic modulation classification(AMC) has gained attention as a key technology in wireless communication systems, especially in cognitive and intelligent radios. Among various fading models, Rician fading represents realistic propagation environment where a strong line-of-sight component coexists with multiple scattered multipath components. In this study, we investigate AMC under Rician fading conditions and propose a deep learning method that makes direct use of raw I/Q data. We design a custom convolutional neural network (CNN) specifically suited for feature extraction from distorted signals. Because CNNs can automatically learn discriminative features from low-level I/Q patterns, they are well-suited for this task. Our architecture is optimized to ensure complexity and performance. To evaluate the proposed approach, we generated a comprehensive and reproducible dataset using MATLAB simulations. The dataset includes six widely used digital modulation schemes- BPSK, QPSK, 8PSK, 16QAM, 8QAM and 4PAM- simulated under Rician fading and realistic Doppler conditions to emulate realistic wireless environments such as urban, suburban, and mobile communications. Experimental results reveal that the suggested CNN performs well in classification across all channel impairments considered. Particularly noteworthy is the CNN's ability to distinguish between closely related modulation schemes that are typically challenging to distinguish under realistic conditions. The findings of this research demonstrate how deep learning techniques can be incorporated into intelligent wireless communication systems. The proposed CNN model is a strong contender for military applications and real-time spectrum monitoring due to its accuracy and resilience. Overall, this study emphasizes how important CNN-based AMC solutions are to achieving intelligent and robust communication in upcoming wireless technologies.

*Keywords: Automatic modulation recognition, Convolutional neural networks, Wireless communication*

Paper id: SM25.2.8

# Scalable Deep Learning Approaches for Wildlife Species Detection

[1]Sehajpreet Kaur, [2]Jaspreet Kaur, [2]Arshveer Kaur
[1]Indian Institute of Technology, Rupnagar, [2]Baba Banda Singh Bahadur Engineering College, Fatehgarh Sahib, India
*jaspreet.kaur@bbsbec.ac.in*

Effective monitoring of wildlife species remains a critical priority in conservation, particularly amidst escalating challenges of biodiversity loss and poaching. Our previous research established the usefulness of Convolutional Neural Networks (CNNs) for wildlife species identification, leveraging deep learning and computer vision techniques to achieve automated object recognition from curated image datasets. Building on these foundations, the present study conducts a detailed comparative evaluation of advanced detection architectures, namely Region-Based CNN (R-CNN) and Faster R-CNN, with the aim of improving object localization precision and detection efficiency in diverse, natural habitats. The models are systematically trained on well-labeled datasets of vulnerable animal species, incorporating real-time images as part of the training data. The system itself performs preprocessing on incoming real-time image data, as the models are trained to handle such inputs for enhanced robustness and accuracy. The recognition pipeline employs convolutional and pooling layers for hierarchical feature extraction, followed by multi-layer perceptrons for final species classification. Experimental validation will include comparative analysis using accuracy metrics and localization benchmarks, with results visualized through performance graphs and detection output samples. This work aims to demonstrate the potential of enhanced CNN-based methods for scalable deployment in conservation monitoring and anti-poaching applications.

Paper id: SM25.2.9

# Integrated Predictive Analytics and Interactive Dashboard for Multi-Disease Diagnosis in Healthcare

Harmandeep Kaur
Baba Banda Singh Bahadur Engineering College, Fatehgarh Sahib, Punjab
*kaurharmandeep625@gmail.com*

This research presents a thorough comparison of machine learning models for the prediction of heart disease, diabetes, and Parkinson's disease. Establishing a strict performance standard is the main goal in order to determine which predictive model is best for each medical condition. This will allow for precise early diagnosis and useful clinical decision support. When compared to eXtreme Gradient Boosting (XGBoost) and Light Gradient Boosting Machine (LightGBM) for diabetes and heart disease datasets, XGBoost consistently produced better prediction accuracy. A comparison of XGBoost and Deep Neural Networks (DNNs) in the context of Parkinson's illness showed that the DNN model performed better in classification. A strong preprocessing pipeline that included correlation-based feature selection, outlier reduction, and normalization was used to enhance data quality and model reliability. Precision, recall, accuracy, and F1-score were among the criteria used to systematically evaluate the suggested framework, guaranteeing a fair assessment of performance. With its user-friendly graphical representations and real-time forecasts, the finished system incorporates the best model for every scenario into an interactive dashboard. The suggested system exhibits great potential for long-term deployment in healthcare settings due to its scalable architecture and modular design, providing clinical practitioners with better diagnostic support and increased decision-making efficiency.

**Paper id: SM25.2.10**

# NLP-Driven Video Translation with IoT-Powered Interpretation

Karamveer Singh
CSE Dept. Baba Banda Singh Bahadur Engineering College
*karamveersingh3303@gmail.com*

Language barriers continue to limit access to video content for diverse audiences, affecting communication, learning, and inclusivity. This work presents an Artificial Intelligence based Video Translator System designed to translate pre-recorded videos into Punjabi, Hindi, French, and Spanish, enabling precise and efficient cross-lingual understanding. The system processes video files from local storage or online sources in formats such as MP4, AVI, and MKV, extracting and enhancing audio through noise reduction, speech activity detection, and volume normalization for improved clarity. Advanced speech recognition techniques generate accurate, time-stamped transcripts that handle background noise, varied accents, and mixed-language speech. These transcripts are translated into the target language using transformer-based models that preserve tone, grammar, and natural sentence structure. The translated text is converted back into speech, with optional voice cloning, and synchronized with the video through alignment techniques to maintain smooth lip movement. The final output preserves video quality, resolution, and frame rate. Additionally, an Internet of Things based assistive system provides language interpretation for visual content, supporting visually impaired individuals and enhancing immediate comprehension. This integrated approach demonstrates the potential of combining Artificial Intelligence and Internet of Things technologies to break language barriers, improve multimedia accessibility, and facilitate inclusive cross-lingual interaction.

Paper id: SM25.2.11

# Role of IoT Systems in Healthcare Management: A Review

Hardik Bangar
ECE Dept. National Institute of Technology Kurukshetra
*umang7973@gmail.com*

Today, the Internet of Things (IoT) helps medical institutions to monitor medical equipment. Equipment like ventilators, heart monitors, and X-ray machines is used to treat patients. By using IoT, these machines are connected to the internet, so doctors and hospital staff can track and control them easily. One major problem is losing or misplacing equipment. With IoT, small sensors are added to machines that help the staff to track its location and provide faster care to patients. IoT also helps to check the working of machines. Sensors monitor the machines and send alerts if something goes wrong. This helps in repairing it on time and keeping patients safe. IoT shows how often machines are used and when maintenance is needed. This helps hospitals plan repairs without disturbing patient care and reducing waste, saving money. In emergencies, if a machine like a heartbeat monitor detects a problem, it can alert doctors immediately so treatment is given without delay. However, IoT also brings challenges. One issue is the safety of data. Since information is sent over the internet, it can be hacked if not properly secured. Another problem is the cost, as small hospitals may not afford these systems or train staff. Despite this, IoT is becoming more popular with better internet, cloud storage, and smart software. Many hospitals now use it to keep equipment ready and safe. Governments and organizations are supporting by providing funds and training. At the end, IoT helps hospitals manage equipment better, find machines quickly, monitor them, and improve patient safety. Even with challenges like cost and data security, its benefits are much greater, making healthcare more efficient and saving lives.

*Keywords: Internet of Things, Healthcare, Security, Medical equipment*

Paper id: SM25.2.12

# High Power Consumption by AI Models

Rahul Kumar
ECE Dept. National Institute of Technology Kurukshetra
*bkrkumar250119@gmail.com*

.Artificial intelligence (AI) is becoming more a part of our daily lives. From chatbots that answer our questions to creating AI based images, AI is helping people in daily life, defense, health care, education and businesses in many ways. However, this growing reliance on AI comes with a major environmental concern—its high energy consumption. Large AI models, including those used for text generation and image creation, require immense computing power during both training and usage phases. Training involves continuous operation of thousands of GPUs or TPUs over extended periods, consuming vast amounts of electricity. Even after deployment, AI models demand ongoing computational resources, further elevating power use. Currently, data centers housing AI systems consume around 1–2% of global electricity, contributing significantly to carbon emissions when powered by fossil fuels. This escalating energy demand not only impacts the environment but also strains energy infrastructures. As AI systems become more advanced, their energy requirements are expected to surge, intensifying concerns about sustainability. To address this, researchers and technology companies are focusing on enhancing energy efficiency through optimized hardware, smart model design, and improved cooling technologies. Additionally, many organizations are transitioning to renewable energy sources such as wind and solar to reduce the carbon footprint of AI operations. While advancements in energy-efficient AI chips promise improvements, the overall consumption may continue rising alongside the growing scale of AI applications. Therefore, achieving sustainable AI development demands continuous innovation in both computational efficiency and renewable energy integration.

*Keywords: Artificial intelligence, Data centers, Sustainable development, Power consumption*

**Paper id: SM25.2.13**

# Smart Gas Detection & Weight Monitoring System with Alert Message using IoT

Radha Kaulwar
*yashwant.kwaraul24@vit.edu*

LPG Gas is a widely used fuel for cooking. People are not knowing the status of the gas cylinder, and not being able to predict its working days and if gas will leakage it will harmful to all living organisms. By using “Smart Gas Detection & Weight Monitoring System with Alert Message using IoT” will detects LPG leakage and sends an alert message to the user with the help of buzzer. When the weight will be displayed on the LCD then it helps customers know if they are being cheated by the gas agency and it will help to notifies the user of the cur- rent status and booking notifications. For designing this system we will need components like NODE MCU, load cell sensor with amplifier HX711, Buzzer, Gas sensor and LCD. This system is helpful for elderly people who live alone and are dependent on others, making them independent and secure from any kitchen hazards.

Paper id: SM25.2.14

# A Compact Fractal Patch Antenna for Efficient Biotelemetry in Cardiac Implants

Sukhpreet Kaur, Jaswinder Kaur, Rajesh Khanna
Thapar Institute of Engineering and Technology Patiala, Punjab
*skaur60_phd20@thapar.edu*

This study introduces an innovative fractal patch antenna (FPA) designed for an implantable leadless cardiac pacemaker (LCP) system, functioning within the Industrial, Scientific, and Medical (ISM) band (2.4–2.48 GHz). The antenna has a compact design of 9 × 9 × 0.13 $mm^3$.The proposed FPA is coated with a biocompatible polymer material to prevent the human tissue from being metallized. Innovative fractal design in the radiating patch facilitates its compact dimensions, superior impedance matching, and improved bandwidth performance within the ISM band. The antenna is designed by examining two different body tissue environments: homogeneous four-layer cubic (FLC) tissue phantom and a heterogeneous Human Hugo voxel (HHV) model. In both scenarios, the proposed antenna is positioned at the center of the heart tissue. The antenna attains a maximum gain of -23.7 dBi at 2.46 GHz and provides an improved bandwidth of 539 MHz, ranging from 2.15 – 2.69 GHz. Furthermore, specific absorption rate (SAR) assessments were conducted within a heterogeneous bodily context to guarantee patient safety. Finally, a link budget analysis has been conducted to ascertain the telemetry range for four distinct data rates.

*Key words: Implantable antenna, fractal, voxel model, leadless cardiac pacemakers, wireless link margin*

Paper id: SM25.2.15

# Design of Bus Stands Machine Translation System of Indian Sign Language for Deaf

Rakesh Kumar
University College Miranpur, Patiala
*rakesh1404@gmail.com*

Deaf people face so many difficulties in their communication need when they travel or visit bus stands if not accompanied by a human sign interpreter. Deaf people are unable to hear or understand any instructions being announced at bus stands, for example, which bus is going to which destination city, which bus is running late etc. Even they are unable to choose the right counter number to board into the desired bus without the assistance of an interpreter or helper. In addition, they fail to find whether bus is on time, running late or cancelled. A prototype of the proposed Bus Stand Announcement System for Deaf based on a hybrid machine translation approach is developed. It is the foremost hybrid machine translation system developed in the public domain of bus stands for easier and smooth translation of all the instructions being announced at bus stands into Indian Sign Language (ISL) synthetic animations. The proposed system prototype is developed using Python and Flask Framework. This proposed machine translation system prototype takes input as all the announcements in the English textual form and generates corresponding Indian Sign Language synthetic animations as output with the help of a developed bilingual English-ISL dictionary.

Paper id: SM25.2.16

# Empowering Farmers with AI: Retrieval Augmented Generation for Improved Agricultural Information Access

Navjot Kaur Cheema, Jaspreet Kaur
Baba Banda Singh Bahadur Engineering College
*navjotkaurcheema4@gmail.com*

The advancements in Natural Language Processing (NLP) and Retrieval-Augmented Generation (RAG) is paving the way for specialized, domain-oriented conversational agents. This work introduces a RAG-based chatbot designed as a digital agricultural assistant to address the knowledge gap between farmers and reliable agronomic information sources. Unlike conventional rule-based chatbots with limited, static response capabilities, this solution integrates Large Language Models (LLM) with domain-specific document retrieval techniques, delivering context-sensitive, accurate, and adaptive guidance on crucial agricultural topics such as crop cultivation, soil health management, pest and disease control, and climate resilience. The architecture employs a hybrid pipeline combining dense passage retrieval and semantic ranking with fine-tuned generative models, ensuring that responses are both factually grounded and linguistically well-aligned. At the core of the system lies a carefully curated agricultural knowledge base, which includes government advisories, scientific research publications, and validated research reports, thereby enhancing the credibility and reliability of the retrieved information. This work highlights improvements in reliability, response efficiency, and user engagement when compared to traditional FAQ-based solutions. This RAG-based digital assistant shows significant potential as a scalable and effective tool for precision agriculture, enabling farmers with timely, data-driven decision support, promoting inclusivity in digital agricultural services, and fostering sustainable farming practices. Future developments will focus on incorporating multilingual support to broaden accessibility across diverse farming communities.

Paper id: SM25.2.17

# Heavy Metal Detection Using Biosensors Based on Nanoparticles: A Precision-Based Approach

[1]Nitasha Tayal, [1]Kuldeep Kumar, [2]Namarta Tanwar
[1]College of Engineering and Technology, Galgotias, [2]Chandigarh University
*nitasha309@gmail.com*

This study investigates the advanced application of nanomaterial-enhanced biosensors for the precise detection of heavy metals in environmental samples. Conventional techniques, such as atomic absorption spectroscopy, often face significant limitations in sensitivity, selectivity, and suitability for real-time, on-site monitoring. To address these challenges, this research explores the integration of functionalized nanoparticles, specifically gold (AuNPs) and silver (AgNPs), as core transducers in biosensing platforms. The investigation focuses on both electrochemical and optical methods, which leverage the unique electronic and plasmonic properties of these nanomaterials to achieve high-precision detection. Experimental analyses confirm that biosensors utilizing AuNPs and AgNPs demonstrate exceptional performance, with detection limits for metals like lead ($Pb^{2+}$) and mercury ($Hg^{2+}$) reaching the parts per billion (ppb) level. A thorough comparative review highlights the distinct advantages of these nano-biosensors over traditional methods, including a rapid response time often under ten minutes, significantly lower cost due to minimal reagent use, and excellent portability for field-deployable detection kits. The results conclusively validate that biosensors based on nanoparticles present a robust and highly promising alternative for environmental heavy metal monitoring. Their implementation holds the potential to revolutionize screening protocols, thereby effectively enhancing environmental safety and safeguarding public health through more accessible and frequent water and soil quality testing.

***Keywords:*** Heavy Metal Detection, Biosensors, Nanoparticles, Electrochemical Sensors, Optical Sensors, Environmental Monitoring, Nanotechnology, Detection Sensitivity.

Paper id: SM25.2.18

# Blockchain-Based Defense Mechanisms against DDoS attacks in Distributed Systems

[1]Nitasha Tayal, [1]Kuldeep Kumar, [2]Namarta Tanwar
[1]College of Engineering and Technology, Galgotias, [2]Chandigarh University
*nitasha309@gmail.com*

Distributed Denial-of-Service (DDoS) attacks are an inherent threat to distributed system stability via network resource exhaustion and interference with valid service. Traditional mitigation approaches based on centralized control introduce single points of failure and subvert resilience against large-scale, advanced attacks. To address these limitations, this paper proposes a decentralized blockchain-based defense framework with anomaly-driven detection, trust-aware Practical Byzantine Fault Tolerance (PBFT) consensus, and adaptive feedback mechanisms. Blockchain's immutable ledger enables tamper-proof attack logging and decentralized traffic validation, and smart contracts enforce policy automatically. Suspect traffic is assigned Confidence Scores and validated on-chain, and validator nodes are dynamically analyzed based on Reputation Scores to neutralize insider attacks. Experimental evaluation on benchmark IoT-based datasets over 5,000 nodes demonstrated over 97% detection accuracy, false positives under 2.8%, and throughput preservation of 93.5% under 1 Tbps multi-vector attacks. Compared to centralized defenses, the framework demonstrated 35% higher accuracy and 42% better mitigation time, demonstrating its scalability, transparency, and robustness for next-generation distributed systems.

Paper id: SM25.2.19

# Fabrication of Carbon Dots-Based Hydrogen Sulfide Gas Sensor

Shivani Dhall*[1], Srijan Pushkarna[1], Kapil Sood[2]
[1]Department of Physics, DAV College, Jalandhar, Punjab, India
[2]Department of Physics, Government college Dhaliara, H.P., India
*shivani.dhall24@gmail.com*

The growing demand for sustainable materials has encouraged researchers to explore eco-friendly synthesis methods for carbon dots (CDs), which hold great potential in applications such as energy storage, bioscience, water purification, and gas sensing. In the present work, we report a chemiresistive hydrogen sulfide ($H_2S$) gas sensor based on CDs. It was found that CDs/ZnO-based $H_2S$ sensor shows good sensitivity at room temperature with complete resistance recovery, fast response/recovery time, and excellent stability without needing any lithography technique for a 5ppm concentration of gas. Furthermore, the incorporation of ZnO nanoparticles was found to enhance the structural and sensing properties of CDs synthesized via a one-step hydrothermal method. The structural and optical characteristics of the CDs and their nanocomposites were examined using X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FTIR), and photoluminescence (PL) spectroscopy. Notably, the CDs demonstrated promising gas-sensing performance toward low concentrations of $H_2S$, exhibiting good sensitivity, rapid resistance recovery, and excellent repeatability under ambient conditions. The reported results confirm that CDs have potential applications in gas sensor industry and the optoelectronics areas.

Keywords: CDs, Hydrothermal route, Gas sensor, Raman study, FTIR

Paper id: SM25.2.20

# A Hybrid Attention-Based Deep Learning Framework for Detecting Fake News Using DistilBERT and Auxiliary Features

Upasna Sharma
Punjabi University, Patiala
*erupasna401@gmail.com*

The rapid spread of fake news on digital platforms jeopardizes information accuracy and public trust. Existing techniques frequently rely primarily on deep contextual embeddings or handmade linguistic features, but their performance and interpretability are limited. This paper provides a hybrid deep learning approach for detecting fake news that combines semantic, statistical, and affective information in a unified architecture. DistilBERT was used to extract contextual embeddings, which captured intricate semantic relationships within the news text. To add to this, n-gram features (unigrams, bigrams, and trigrams) and sentiment-based features (polarity and subjectivity scores) were used to simulate stylistic inconsistencies and emotional bias, both of which are common in misleading writing. To efficiently capture both contextual meaning and language anomalies, the proposed model uses a Bidirectional Long Short-Term Memory (BiLSTM) network with an attention mechanism, which is supplemented with auxiliary features. Experimental testing on the ISOT Dataset of Fake News shows that the proposed model achieves a classification accuracy of 99.86%, greatly exceeding many state-of-the-art baselines that normally range between 92-97% accuracy. Furthermore, the use of attention-based heatmaps improves model interpretability by highlighting critical sentences that influence the classification outcome—a factor that was frequently neglected in previous studies. This study's originality is established by its twin contribution of high predictive accuracy and transparent decision-making, proving that combining deep contextual embeddings with supplementary handmade features results in a robust and interpretable approach for false news identification.

Paper id: SM25.2.21

# Analysis of Siphon Effect in Integrated Sensing and Communication Wireless Sensor Networks

Saurabh Yadav, Sachin Kumar, Manish Kumar, Sandeep Bharati, Anamika Kumari, Prateek
Madan Mohan Malaviya University of Technology, Gorakhpur
*2022041067@mmmut.ac.in*

Sensor Networks can combine the task of sensing their surroundings as well as communicating with the gateway nodes for successful estimation of events in the area of deployment. However, sensor networks suffer from information leakage due to various intrusion attacks. In the present work, the issue of "Siphon Effect" has been defined. The effect of sensor network is quantified. Subsequently, a Siphon Effect Compensation (SEC) algorithm is proposed to mitigate the negative effects and to improve event estimation accuracy. Numerical results verify the utility of proposed method. The proposed algorithm shall prove to be an indispensable tool in developing sustainable sensor networks which satisfy the various sustainable development goals (SDGs).

Keywords— Wireless Sensor Networks (WSNs), Integrated Sensing and Communication (ISAC), Siphon Effect, Information Leakage, Intrusion Attacks.

Paper id: SM25.2.22

# Federated Learning-Based Age of Information Minimization for D2D-Enabled Social Internet of Healthcare Things Networks

Saurabh Chandra, Rajeev Arya
National Institute of Technology Patna
*saurabhc.phd22.ec@nitp.ac.in*

The integration of Device-to-Device (D2D) communication within Social Internet of Healthcare Things (SIoHT) networks imposes stringent requirements for minimizing Age of Information (AoI), ensuring prompt data availability, and enhancing energy efficiency, while addressing perturbation issues arising from dynamic network conditions. This paper proposes a Federated Learning-based AoI Minimization Algorithm for SIoHT networks, tackling the dynamic dissemination of healthcare data across distributed devices amidst perturbations such as signal interference and node mobility. The optimization problem is formulated to reduce AoI while preserving reliability and optimizing energy usage, leveraging federated learning for improved resource allocation and timely information delivery, with adaptive mechanisms to mitigate perturbation effects. Energy efficiency is carefully modeled, incorporating communication overhead, device power limitations, and perturbation-induced energy fluctuations. Extensive simulations have been performed to validate the effectiveness of the proposed approach and compared with the benchmark schemes. The proposed work may provide a resilient solution for real-time health monitoring, emergency interventions, and patient-focused services in evolving SIoHT ecosystems.

*Key words: Federated learning, Information freshness, Perturbation effect, Social Internet of Healthcare things*

Paper id: SM25.2.23

# An Identity based Authentication and Quantum Cryptography

Vinod Kumar, Neha
Department of Mathematics, Shyam Lal College, University of Delhi
*vkmaths@shyamlal.du.ac.in*

The identity-based authentication (IBA) helps parties in communication to verify each other without relying on the traditional certificate parties. It makes the process easier and reduces the chances of identity theft. Quantum Cryptography (QC) provides very high security using the quantum mechanisms, such as entanglement and the no cloning theorem which states it is impossible to create an exact copy of unknown quantum state, that makes it impossible for an eavesdropper to copy or intercept the information without being detected. In this study, we explore how IBC is utilized in QC to maintain security and privacy. This combination reduces the system overhead and eliminates the need of certificate authorities. Further, IBC can be utilized for unconditional security, authentication, and identification in quantum networks. The IBA ensures that the parties are genuine, while the information is kept secret by QC. This prevents man- in-the-middle attacks, reply attacks, etc., to improve the security of quantum communications. In the future, IBA may play a more secure role for QC compared to classical communications. This fusion of IBA and QC is expected to become a foundation for next generation secure communication models like opening new pathways for secure data transmission across global quantum networks.

**Keywords:** Identity-based authentication, Classical cryptography, Secure communication, Quantum Cryptography and Cyber-Attacks.

**Paper id: SM25.2.24**

# Some Identity based Authentication Protocols for Quantum Communications

Vinod Kumar, Rohit
Department of Mathematics, Shyam Lal College, University of Delhi, India
*vkmaths@shyamlal.du.ac.in*

Quantum communication, particularly through Quantum Key Distribution (QKD), provides unconditional security superior to classical cryptography. However, vulnerabilities in identity authentication can compromise the entire system, such as through man-in-the-middle attacks. This paper examines Quantum Identity Authentication (QIA) protocols, which leverage quantum resources for secure verification. We trace their chronological evolution over the past three decades and classify them based on required quantum resources (e.g., entanglement, single qubits) and inherent computational tasks like symmetries or group-based designs. Key protocols are analyzed for merits, including resistance to impersonation, and limitations like scalability and noise tolerance. Future directions include hybrid classical-quantum frameworks to address computational burdens and improve practicality in evolving quantum networks.

*Keywords: Quantum Communication, Quantum Key Distribution (QKD), Quantum Identity Authentication, Security and Privacy.*

Paper id: SM25.2.25

# Development and qualification of packaging process for charge coupled devices

Thakur SKR[1, 2, 3]
[1]Semi-Conductor Laboratory, Ministry of Electronics and Information Technology, SAS Nagar, Punjab-160071, [2]Dept. of Holistic Education, Vidya Bharti Institute of Training and Research Trust, SAS Nagar, Punjab-16007, [3]Dept. Physics, Chaudhary Bansi Lal University, Bhiwani, Haryana
*thakurskr@gmail.com, thakursk@scl.gov.in*

Semiconductors are employed in the manufacture of various kinds of electronic devices, including diodes, transistors, and integrated circuits. Such devices have found wide application because of their compactness, reliability, power efficiency, and low cost. One of the semiconductor devices is charge-coupled device (CCD) which is basically an array of closely-spaced metal-oxide-semiconductor (MOS) diodes that can store and transfer information using packets of electric charge. The charge packets are generated when light excites electrons in the valence band into the conduction band. The light-generated charge packets that carry the image information are stored and by applying the proper sequence of voltage pulses (clock signals), stored charge is transferred from one potential well to another until it is eventually shifted out of an output register.

SCL has packaged various Charged Coupled Imaging Devices viz. 4 K Linear Imager, FTI Area Imager, SWIR diode array detector, FT CCD for OCM and 12 K TDI device. This paper presents the details of successful development and qualification of the packaging processes, resulting in the realization of Flight Model Devices.

Paper id: SM25.2.26

# Semiconductor gases – An important Constituent of Semiconductor Eco-System

Thakur SKR[1, 2, 3]
[1]Semi-Conductor Laboratory, Ministry of Electronics and Information Technology, SAS Nagar, Punjab, [2]Department of Holistic Education, Vidya Bharti Institute of Training and Research Trust, SAS Nagar,Punjab-160071, India, [3]Department of Physics, CBL Univ. Bhiwani
*thakurskr@gmail.com, thakursk@scl.gov.in, www.drthakurskr.com*

In my previous work, I presented the 'Semiconductor Industry in Indian Perspective' covering the need of the semiconductor industry in India and efforts taken by India in this direction. My previous paper was published before the announcement of Semiconductor Policy by Government of India. Post announcement of Semiconductor Policy, allocation of ₹76k Cr for semiconductor eco-system, annexation of SCL Mohali by Ministry of Electronics and Information Technology (MEITY) and announcement of several proposals by semiconductor giants like Micron, Foxxcon, Vedanta, etc., to establish semiconductor packaging and fabrication facilities in India, it becomes necessary to bring the real picture of semiconductor infrastructure in terms of raw materials, chemicals, gases, wafers, laser sources, sputtering targets, etc., in front of researchers, industrialists, decision makers and the investors to avoid any hindrance in the establishment of semiconductor eco-system in India. Therefore, in my present work I have tried to put forward the real picture of most sought material of semiconductor manufacturing after silicon wafer i.e. semiconductor gases. Semiconductor gases are class of gases utilized in the semiconductor industry to realize various semiconductor products. These gases are used in semiconductor processing like deposition, etching, cleaning, lithography laser source, heating and purging. These semiconductor gases are classifieds into two categories i.e. Bulk gases and Specialty gases. Few of these gases include industrial gases such as argon, carbon dioxide, helium; hydrogen, nitrogen, and oxygen in their purest form, while others include gases such as arshine, phosphine, etc., that are exclusively produced for the semiconductor industry. This article presents the overview of semiconductor gases industry in Indian perspective.

Paper id: SM25.2.27

# Test and Burn-in Socket – A Preliminary Study on Its Indigenization

Thakur SKR [1, 2, 3]
[1]Semi-Conductor Laboratory, Ministry of Electronics and Information Technology, SAS Nagar, Punjab, [2]Department of Holistic Education, Vidya Bharti Institute of Training and Research Trust, SAS Nagar, Punjab, [3]Department of Physics, CBL Univ. Bhiwani
*thakurskr@gmail.com, thakursk@scl.gov.in*

Test and Burn-in sockets are specialized connectors and essential components in the semiconductor industry, specifically used for evaluating the reliability and quality of electronic devices. The term is used to describe test sockets, which are mechanical electronic interfaces customized to test the functionality of the chip associated with the integrated circuit. Test sockets are made up of three primary components i.e. Body/Cartridge; Spring Probes and Pins and Mechanical Parts, while others are added depending on the device they intend to test. Key Types of Test and Burn-in Sockets are Test Sockets; Burn-in Sockets; Based on IC Package and Other Types. The global test and burn-in socket market was valued at approximately $1.8 billion in 2024 and is projected to reach $2.5 billion by 2030, according to a strategic research report. The Indian test and burn-in socket market is meagre as of now however, its growing, driven by increasing demand for electronics and semiconductors, and is expected to reach a significant size in the coming years.

In the context of test sockets, indigenization of them is need of the hour and requirement to encourage local companies to design, develop, and produce test sockets for the Indian market and specifically for SCL Mohali is in demand. Considering above factors, Semi-Conductor Laboratory took a call to indigenize the test and burn-in sockets with the support of user, academia and industry. This study presents the real scenario of test and burn-in sockets' market and possibilities of indigenization.

Paper id: SM25.2.28

# UAV-Assisted Wireless Communication: Applications and Challenges in Dynamic Environments

[1]Dilip Mandloi, [2]Rajeev Arya
[1]Department of EEE, Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore, MP (452001), India,
[2]Department of ECE, National Institute of Technology Patna, Patna, Bihar (800005), India
*mandloidilip@gmail.com, rajeev.arya@nitp.ac.in*

The utilization of Unmanned Aerial Vehicles (UAVs) to assist wireless networks is steadily increasing due to their ability to provide fast, flexible, and cost-effective connectivity. UAVs can operate as flying base stations or as relays for restoration of connectivity in disaster affected areas or provide connectivity solutions for remote areas or large public events. The mobility of UAVs allows them to reposition and provide services to users where it is most needed, instead of adhering to static infrastructure. However, UAV-assisted communications face challenges by factors such as limited flight time, interference, secured and safe use, and deployments in dynamic environments. This paper reviews the literature to highlight aspects such as important application scenarios, technical and operational challenges. The aim is to summarize recent advances, highlight important challenges and discuss open research areas and opportunities for reliable and secure UAV-assisted communication systems.

*Keywords: UAV-Assisted Communication, Dore base stations, Connectivity restoration, Disaster recovery, Base station offloading*

Paper id: SM25.2.29

# An overview on Green Energy Technologies as Renewable and Alternative Energy

Sachin Kumar[1], Nishi[1], Dhirendra Kumar[1], Manoj K. Teotia[2], Vipin K.Jain[3,4,5], Thakur Sudesh Kumar Raunija, [6]Suresh Aluvihara
[1]Dept. of Botany, CBLU. Bhiwani [2] Centre for Research in Rural and Industrial Development, Chandigarh, [3] Dept. of Physics, CBLU Bhiwani, Semi-Conductor Laboratory, SAS Nagar, Punjab, [5] Dept. of Holistic Education, Vidya Bharti Institute of Training and Research Trust, Mohali, Punjab, India, [6] Dept. of Chemical and Process Engineering, University of Peradeniya, Sri Lanka
*dhirencblu@gmail.com*

Energy green technologies, renewable energy, and alternative energy are all terms that refer to methods of generating energy in ways that are environmentally friendly and sustainable. Renewable energy comes from natural sources that are replenished constantly. These are considered sustainable because they are not depleted over time. Together, renewable energy, alternative energy, and green technologies play a significant role in mitigating climate change, reducing reliance on fossil fuels, and promoting sustainable development for the future. Few key forms include: Solar Energy: Harnessing sunlight through photovoltaic cells or solar thermal systems to generate electricity or heat. Wind Energy: Using wind turbines to convert the kinetic energy of wind into electricity. Hydropower: Capturing the energy of flowing or falling water, often through dams, to generate electricity. Geothermal Energy: Utilizing heat from the Earth's core to generate electricity or heat buildings and Biomass: Converting organic materials like wood, agricultural waste, or even algae into energy. While many alternative energy sources are renewable, some are non-renewable but still considered cleaner than fossil fuels. Examples of alternative energies include: Nuclear Energy. While it is not renewable, it produces large amounts of energy with relatively low carbon emissions. Hydrogen: A fuel that can be used in fuel cells to generate electricity, with water as it is only by product. Hydrogen is considered an alternative energy source if produced from renewable methods like electrolysis of water. Now a days green technology, or "clean tech," are innovations aimed at reducing environmental impacts and promoting sustainability. These technologies use less energy to perform the same tasks. Smart grids: Advanced electrical grids that optimize the distribution and use of electricity. Electric Vehicles: Vehicles powered by electricity rather than gasoline or diesel, reducing greenhouse gas emissions. Carbon capture and storage: Technology designed to capture carbon dioxide emissions from power plants or industrial sources and store them underground to prevent them from entering the atmosphere.

Paper id: SM25.2.30

# Information and Communication Technology and Artificial Intelligence: Boon for Education

[1]Hina Gupta, [2]Neena Aneja
[1]Dept. of Computer Science & Applications, S.D. College for Women, Moga
[2]S.D. College for Women, Moga
*hina14041987@gmail.com*

The rapid advancement of Information and Communication Technology (ICT) and Artificial Intelligence (AI) has significantly reshaped the education system. ICT provides the digital foundation for teaching and learning environments through tools such as computers, smartboards, online platforms, and multimedia resources. These technologies promote interactive teaching, improve access to information, and support collaboration among teachers and students, both in traditional classrooms and online learning spaces. While AI introduces intelligent solutions that personalize learning experiences, analyze student data, and automate administrative and assessment systems, virtual tutors, and analytics, enable educators to identify learners' strengths and weaknesses, thus improving teaching effectiveness. Together, ICT and AI contribute to making education more inclusive, engaging, and efficient. However, challenges such as unequal access to technology, data privacy concerns, and the need for digital literacy and ethical frameworks etc. are there .The integration of ICT and AI holds enormous potential to transform education into a more dynamic, data-driven, and learner-centered system, preparing students for the demands of the Google age.

Paper id: SM25.2.31

# Experimental Investigation of Interfacial Bonding and Mechanical Performance of Fibre Metal Laminates

Amritpal Singh Sandhu , Ravinder Singh Joshi, Rohit Kumar Singla, Kishor Khanna
Mechanical Engineering Department, Thapar Institute of Engineering and Technology, Patiala
asandhu_phd25@thapar.edu, rsjoshi@thapar.edu, rohit.kumar@thapar.edu,
*kishore.khanna@thapar.edu*

Fibre Metal Laminates (FMLs) have gained major attention in automotive and aerospace sectors due to their better fatigue resistance, corrosion protection, and weight reduction as compared to the conventional metallic structures. However, achieving a strong interfacial bond between the metallic and composite layers is one of the major challenges in the fabrication and performance of FMLs. Poor adhesion at this interface can lead to delamination and a reduction in the overall mechanical efficiency of the laminate. In the present study, FMLs were fabricated using aluminium alloy 2024 sheets of 0.4 mm thickness as the metallic component and E-glass woven fibre fabric of 200 GSM as the reinforcement, combined with an LY556 epoxy resin system and HY951 hardener as the polymer matrix. Two different stacking sequences, namely 3/2 [Al/G/Al/G/Al] and 3/4 [Al/GG/Al/GG/Al], were prepared by hand lay-up technique followed by hot compression moulding. The mechanical behaviour of the fabricated laminates was evaluated through tensile and flexural tests. The experimental data revealed that the 3/2 stacking sequence demonstrated a much higher tensile and flexural strength than the 3/4 configuration. Higher tensile and flexural strength in 3/2 stacking sequence was due to better interfacial adhesion between aluminium and glass fibre layers. Failure analysis demonstrates that interfacial delamination was the main failure mode under increasing tensile and flexural loads. During tensile loading, no fracture occurred in the aluminium layers. As the load was increased, fibre delamination led to specimen failure. The overall mechanical performance of fibre metal laminates was changed by changing the stacking sequence of fibre in laminates. The study demonstrates that stacking sequence plays an important role in defining the interfacial adhesion between fibre and metal. These findings support the potential plication of optimized FML configurations in lightweight, high-strength structural components for aerospace and other advanced engineering applications.

Paper id: SM25.2.32

# Climate Data Visualization and Analysis of Seasonal Pattern Identification tools - GUI based

Parul Khurana, Alkali Mohammed Grema, Ismail Aliyu Bunza
Lovely Professional University, Jalandhar
*parul11183@gmail.com*

Farmers and agricultural planners rely heavily on understanding seasonal weather patterns to make critical decisions about crop selection, planting and harvesting times, irrigation, and resource management. Nowadays, the concern about the climate data is being increasing and historical climate data available is not easily accessible or interpret-able for them. There is a lack of simple, dedicated desktop tools that translate this data into actionable, agriculture-specific insights without requiring an internet connection. In the present study, an attempt is being made for developing an AI based software system for Climate data Visualizations and prediction analysis. The main objective is to development a user-friendly AI tool for climate data analysis as well as pattern visualization of multi-source and multi-scale weather and climate data build with Python, and the findings of this project would be used for the efficient and real time analysis by farmer and scientist or policy makers to understand the various changes in the weather and climate parameters like Temperature, rainfall, humidity and to predict the best practice of agriculture for better output.

Paper id: SM25.2.33

# Deep Learning–Based Analysis of Cognitive Workload

Gorika
ECE Dept. National Institute of Technology Kurukshetra
*gaurgorika13@gmail.com*

In the complex environment of today's world, it is difficult to understand the human cognitive workload due to the demands of multitasking and technology in everyday tasks. The mental effort and energy needed to complete cognitive activities are referred to as cognitive workload, which includes the link between task demands and a person's cognitive capacity. Its basic definition is the amount of mental processing power used to complete a task. It reflects interplay between performance results, personal capabilities, and environmental pressures. Maximizing the performance of humans in different domains like healthcare, education and more requires the precise measurement of cognitive workload. .An excessive cognitive workload can result in fatigue, mistakes, and diminished efficiency, whereas an inadequate workload may lead to disengagement and subpar performance. CLAS is one data set for such analysis. This dataset comprises multimodal physiological recordings from 62 healthy volunteers, gathers various biological signals. Electroencephalography signals observe neural activity performance associated with cognitive effort, electrocardiography signal reflects the cardiovascular responses to mental stress, and photoplethysmography signals indicate blood volume variations. In this study, we aim to study the effect of different deep learning algorithms on the available dataset for measuring the cognitive workload. DL algorithms offer novel capabilities for evaluating the complex, nonlinear relationships over a multimodal physiological data. Convolutional neural networks can effectively process the spectral patterns in EEG signals. Recurrent neural networks particularly long short-term memory networks, excel at modeling temporal dependencies in physiological signals. Transformer-based architectures can also be used to improve the efficiency which provides the attention mechanism which can help in identifying the relevant signal components for cognitive workload assessment. Furthermore, multimodal fusion methods enable the combination of data from various physiological modalities, which could enhance the accuracy of assessments compared to single-modality methods.

Paper id: SM25.2.34

# Synergistic Integration of Zinc Ferrite and MXene Nanosheets for Efficient Removal of Plastic Contaminants from Wastewater

Nahid Tyagi[1], Gaurav Sharma[2], Sreedevi Upadhyayula[1], Manika Khanuja[3]
[1]Dept. of Chemical Engineering, Indian Institute of Technology Delhi
[2]Centre for Rural Development and Technology, Indian Institute of Technology Delhi
[3]Centre for Nanoscience and Nanotechnology, Jamia Millia Islamia, New Delhi
*nahid191286@cuh.ac.in, gks107@gmail.com*

The rational design of multifunctional nanocomposites offers a promising pathway for sustainable wastewater remediation. Here, the synthesis of MXene-zinc ferrite (Ti3C2Tx-ZnFe2O4) nanocomposites via a sol-gel auto-combustion–assisted hydrothermal route has been carried out. The two-dimensional MXene substrate provides a high-surface-area porous scaffold, while uniformly anchored ZnFe2O4 nanoparticles impart magnetic recoverability and enhanced catalytic functionality. Among the series, the optimized catalysts MZF-3 achieved rapid terephthalic acid (TPA) removal efficiencies of 97.4%, 82.5%, 76.0%, and 69.4% at pollutant concentrations of 20-100 mg $L^{-1}$ within 20 min nearly ninefold higher than pristine ZnFe2O4. Mechanistic investigations revealed pH-dependent adsorption governed by the point of zero charge, radical-mediated degradation under dark conditions, and mineralization validated by high-performance liquid chromatography and chemical oxygen demand reduction (~86%). The catalyst retained stability and recyclability over multiple cycles. This study establishes MXene-ferrite composites as robust platforms for non-toxic, rapid, and reusable removal of recalcitrant plastic pollutants, advancing wastewater treatment technologies aligned with global sustainability goals.

***Keywords:*** *MXene nanosheets; ZnFe2O4; Sol-Gel, Auto Combustion & Hydrothermal Method; Catalytic properties; Degradation of Terephthalic acid*

## Section 3

## Management, Business and Entrepreneurship

***Track Chair: Prof. Sanjeev Bansal***

In an era defined by rapid globalization, digital transformation, and market volatility, the convergence of management, business, and entrepreneurship has become a critical determinant of organizational success. Effective management provides the strategic framework for optimizing resources, guiding innovation, and sustaining competitive advantage. Business development, in turn, focuses on creating value through customer-centric models, sustainable operations, and technological integration. Entrepreneurship acts as the catalyst that drives creativity, opportunity recognition, and resilience in uncertain environments. Together, these three pillars form a dynamic triad that enables organizations to adapt, innovate, and grow in a constantly evolving global economy. The different papers submitted by various authors explore the interconnected roles of management practices, entrepreneurial orientation, and business innovation in achieving sustainable growth. The different papers received touch upon the various areas of management, including Training and Development, the impact of family business on women entrepreneurs, role of women in promoting entrepreurship, Socio-Economic Analysis of Innovative Startup Ventures, as also Corporate Governance mechanisms. Through a variety of contemporary research and real-world case studies, touched by the authors, including strategic analysis, in disruptive innovation and start up ecosystem. Some papers also throw some light on integrating entrepreneurial thinking into managerial and business strategies for thriving in the modern global marketplace.

Paper id: SM25.3.1

# The Impact of Family Support on Women Entrepreneurs: Insights from Family-Owned Enterprises in India

Vaishali Singh, Pawan Dhiman, Sanjeev Garg
Sant Longowal Institute of Engineering and Technology, Longowal
*singh.vaishali1212@gmail.com*

Familial support makes a huge difference to the aspirations and outcomes of women entrepreneurs in family-run businesses in India. This article examines the influence of emotional support, financial support, mentoring and decision-making autonomy from family members on women's entrepreneurial empowerment. There is evidence to suggest that support from families can enhance confidence, bestow legitimacy and make leadership available as a possibility while constraining norms and patriarchal beliefs act as obstacles. Roshni Nadar Malhotra is now the chairperson of HCL Technologies and a prominent testimony to how trust and mentorship in familial businesses can help women breach gender walls. This research explores cultural and institutional influences that give explanation to dual aspects of family influence as a catalyst for, as well as the impediment in forming women's entrepreneurial paths. The research has important implications for policymakers, educators and family business members to create practices that promote gender inclusion as well as build the next generation of women leaders in the family enterprise.

Paper id: SM25.3.2

# Innovation-Driven Entrepreneurship: Challenges and Opportunities for Startups in India

Sanjeev Bansal, Sanjay Gupta
Sant Longowal Institute of Engineering and Technology, Longowal
*sbansal.sliet@gmail.com*

In recent years, India has witnessed a surge in innovation-driven entrepreneurship, fueled by rapid technological advancements, increased access to funding, and supportive government initiatives such as Startup India. Startups, especially in sectors like fintech, edtech, agritech, and health tech, are playing a transformative role in reshaping the economy. This study examines the dual landscape of opportunities and challenges faced by innovation-driven startups in India. Using a qualitative and quantitative research methodology, the paper explores factors such as access to capital, market entry barriers, talent acquisition, regulatory compliance, and scalability. Case studies of successful and failed startups are analyzed to understand the critical success factors and common pitfalls. The role of incubation centers, government policies, venture capital, and digital infrastructure in promoting innovation is also discussed.<br/><br/>The findings reveal that while India presents a fertile ground for entrepreneurial innovation, startups must navigate complex challenges related to infrastructure, policy clarity, and customer adoption. The study concludes with strategic recommendations for entrepreneurs, investors, and policymakers to foster a sustainable innovation ecosystem in India.

*Keywords: Innovation-Driven Entrepreneurship, Startups in India, Challenges and Opportunities, Entrepreneurial Ecosystem. Startup Policy.*

Paper id: SM25.3.3

# Digital Transformation as a Driver of Innovation Performance in Startup Ecosystems: A Mixed-Methods Analysis

Shubham Jayant, Sanjeev Bansal, Rakesh Kumar
Sant Longowal Institute of Engineering and Technology
*sbansal.sliet@gmail.com*

Digital transformation has emerged as a critical catalyst for innovation performance in startup ecosystems globally. This study investigates how digital technologies influence innovation outcomes in startups through a comprehensive mixed-methods analysis. The research examines few technology startups across various industries, utilizing both quantitative performance metrics and qualitative insights from Semi-structured interviews with founders and key stakeholders. Key findings reveal that startups implementing comprehensive digital transformation strategies demonstrate 65% higher innovation performance compared to traditional approaches. The study identifies four primary digital enablers: artificial intelligence integration, cloud-based platforms, automated processes, and data-driven decision-making. Results indicate that 77% of digitally transformed startups show measurable growth in business performance, with significant improvements in time-to-market (40% reduction), customer acquisition efficiency (30% increase), and product development cycles (50% acceleration). The research contributes a novel framework linking digital transformation maturity to innovation performance metrics, providing actionable insights for entrepreneurs, investors, and policymakers. These findings underscore the strategic importance of digital capabilities in driving competitive advantage and sustainable growth in contemporary startup ecosystems.

*Keywords: Innovation, startups, digital transformation, performance measurement, entrepreneurial ecosystems.*

Paper id: SM25.3.4

# Empowering India's Journey to the World's Third Largest Economy through Entrepreneurship

Pankaj Kumar
Akal Group of Technical and Management Institutions, Mastuana Sahib
*Pankajgoyal.sliet@gmail.com*

India's trajectory toward becoming the world's third-largest economy by 2028, with a nominal GDP projected to reach $5.2 trillion, hinges on multifaceted drivers, among which entrepreneurship emerges as a cornerstone of innovation, employment, and inclusive growth. This paper explores how entrepreneurial activities, particularly through startups and micro, small, and medium enterprises (MSMEs), are reshaping India's economic landscape. As of September 2025, India hosts over 120,000 recognized startups, contributing approximately 12% to GDP and generating more than 1.2 million direct jobs, while MSMEs account for 30% of GDP and 45% of exports. Drawing from Schumpeterian theories of creative destruction and empirical evidence from post-1991 liberalization, the analysis demonstrates entrepreneurship's role in amplifying growth rates from 6.5% to potentially 8% annually. Key sectors like fintech, agritech, and edtech exemplify this, with unicorns such as Byju's and Zomato driving digital inclusion and rural empowerment.<br/>Utilizing a mixed-methods approach—integrating quantitative data from the World Bank and RBI with qualitative insights from case studies—the study highlights policy enablers like the Startup India initiative, which has disbursed over ₹10,000 crore in funding since 2016. However, persistent challenges, including access to capital (with only 20% of startups securing venture funding) and gender disparities (women-led ventures at 14%), underscore the need for targeted interventions. Projections suggest that scaling entrepreneurial ecosystems could add $1 trillion to India's economy by 2030, aligning with the Viksit Bharat vision. This research advocates for reforms in skilling, regulatory simplification, and regional equity to harness entrepreneurship is democratizing potential, ensuring sustainable ascent to global economic preeminence.

Paper id: SM25.3.5

# Training and Development in Banking: Linking Skill Enhancement with Career Growth through Motivation and Clear Objectives

Manuja Garg, Sanjeev Bansal
Sant Longowal Institute of Engineering and Technology Longowal
*manujagarg88@gmail.com*

Training initiatives affect employees' skills and career growth in both public and private banks in Punjab. Based on the previous studies, that employs multiple regression and structural equation modelling to test hypotheses on skill enhancement and career development. It can be observed that while training programmes significantly improve employees' technical and professional skills, skill enhancement alone does not directly translate into career development, as other factors like qualifications, experience, and recruitment processes also play a role. However, internal motivation and clarity of training objectives significantly influence career growth, with training objectives having a stronger effect than motivation. The study will conclude that training programmes are crucial for skill development, but their impact on career advancement depends on how well they are structured and aligned with employees' goals, offering practical insights for designing more effective training policies in the banking sector.

Paper id: SM25.3.6

# An Empirical Study on the Socio-Economic Analysis of Innovative Startup Ventures in Himachal Pradesh

[1]Ishani Dogra, [2]Dr. Sukhjinder Singh, [2]Nitika Parmar
[1]Panjab University, Chandigarh, [2]CSIR-IHBT, Palampur, H.P.
*bdmu.ihbt@csir.res.in*

This study examines the socio-economic impact of innovative startup ventures in Himachal Pradesh, aiming to understand the economic impact, regional development and what factors enable their growth. This study adopted a mixed-methods approach, integrating both quantitative and qualitative data. Primary data was collected from 12 startups by survey and semi-structured interviews with startup founders to gather insights on business performance, growth and challenges. Percentage analysis and statistical techniques were used to analyse employment data, cost components and returns. The findings highlighted the contribution of startups in job creation, raising household income in rural and semi-urban areas and most importantly, that startups are profitable ventures. However, it was found that growth is hampered due to scarcity of skilled labour, availability of raw material, market linkage and complex regulatory environment. The paper concludes that startups units are profitable ventures having higher net return, and benefit cost ratio more than one. Innovative startups are generating employment with approximately 49% is for skilled manpower. The paper concluded with policy recommendations to enhance the socio-economic contribution of innovative startups in Himachal Pradesh by expanding funding avenues for facility upgrade, prioritizing women and youth and teaching financial and marketing skills. These measures are important for harnessing the full potential of startups ventures for sustainable development in Himachal Pradesh.

Paper id: SM25.3.7

# Corporate Governance Mechanisms and Their Impact on the Performance of Indian Publicly Listed Firms

Amit Chawla
Sant Longowal Institute of Engineering and Technology Longowal
*ped2465_amit@sliet.ac.in*

Corporate governance has emerged as the most important issue in the modern business world, especially in the emerging economies such as India when the market is growing at a fast rate and attracting international investors. Corporate governance, broadly defined as the framework of policies, practices, and structures that ensure accountability, fairness, and transparency in corporate dealings, is analysed through the lens of agency theory and stakeholder theory. In this dynamic era, corporate governance has emerged as a critical determinant of firm performance, especially in nations like India where institutional structures are rapidly evolving. This study investigates the relationship between corporate governance mechanisms and the financial performance of Indian publicly listed firms.<br/>The paper investigates how corporate governance influences firm performance in India by analysing a panel dataset of 300 non-financial NSE-listed companies over the period 2013–2023. The research focuses on how governance practices such as board independence, board size, CEO duality, audit committee effectiveness, ownership concentration, and institutional ownership affect the performance of publicly listed Indian firms. Firm performance is assessed using both accounting-based measures (RoA, RoE) and market-based indicators (Tobin's Q) to reflect operational efficiency, firm value, and investor confidence in institutional framework. This study contributes to the literature by providing empirical evidence from an emerging market context, where regulatory frameworks, cultural factors, and ownership structures differ significantly from developed economies. The results have important implications for policymakers, investors, and corporate managers. Firms are advised to reconsider board compositions and avoid excessive power centralization, while investors should critically evaluate governance practices as part of their investment decision-making process.

Paper id: SM25.3.8

# Consumer Confusion and Negative eWOM in Mobile Sector; The Moderating Role of Gender and Self-efficacy

Anuradha Sharma
Dr. B R Ambedkar National Institute of Technology, Jalandhar
*anuradhasharma1291@gmail.com*

The aim of this paper is to effectively apply the S-O-R paradigm in analyzing the consequences of insufficient marketplace stimuli on mobile purchasing perceptions. The potential outcomes of this may result in confusion which could significantly impact consumer behavior, leading to the spread of negative eWOM. Furthermore, this study delves into the potential moderating effects of gender and self-efficacy on these outcomes. Design/methodology/approach – By examining survey data gathered from 337 respondents using AMOS structural equation modelling, the established associations were put to the test. Results indicate that the marketplace environment considerably influences different types of confusion, further affecting negative eWOM. Findings also suggest that self-efficacy moderates the relationship between different types of confusion and negative eWOM. In addition, according to a multigroup study, gender moderates the associations between the marketplace, confusion, bad eWOM, and self-efficacy. Practical implications – This study offers recommendations to mobile companies on how to handle inefficient market stimulation in order to decrease confusion and minimize negative electronic word-of-mouth (eWOM). Additionally, the research emphasizes the importance of self-efficacy and gender from the perspective of mobile companies. This study unequivocally presents a practical model that effectively explains the undeniable correlation between ineffective marketplace promotion and the insidious spread of negative electronic word-of-mouth (eWOM) from disgruntled consumers. Furthermore, it illuminates critical insights on the impact of gender and self-efficacy, which have been overlooked in previous research.

Paper id: SM25.3.9

# Role of Artificial Intelligence in Business

[1]Kirna Rani, [2]Anshul Garg
[1]Shaheed Bhai Daila Ji Senior Secondary School, Longowal, [2]Akal Degree College, Mastuana
*kirangoyal2906@gmail.com*

Artificial Intelligence (AI) in business is transforming how companies operate, compete, and grow. It has an great impact on people, society, and economy. Artificial Intelligence (AI) transforms businesses by automating tasks, enhancing data-driven decision-making, improving customer experiences through personalization, and boosting operational efficiency. The last few years have been remarkable for artificial intelligence, and today almost every company is reshaping their strategies and business models to incorporate AI into all business processes. However, companies are not yet aware of the consequences of this AI adoption, so its impact needs attention. Ongoing development of business and the most recent advances in artificial intelligence (AI) allow for the many business practices to be improved by the capacity to establish new forms of collaboration, which is a significant competitive advantage. The aim of this paper focuses on the application of AI techniques in business and different industries.

Paper id: SM25.3.10

# Women as Nation Builders: Entrepreneurship, Empowerment, and Economic Development in India

Mandeep Kaur
Sant Longowal Institute of Engineering and Technology Longowal
*mandeepdroach@gmail.com*

The role of women entrepreneurs in the Indian economic development, social change, and inclusive development is becoming increasingly significant. Women-led businesses have been growing due to increased access to education, professional training programs, and government support programs. This paper examines four key aspects: (i) reasons why women start up in business; (ii) their contribution to the growth of the Indian economy; (iii) the institutions and government programs to support them; and (iv) challenges encountered by women in sustaining business. Despite these great improvements, women entrepreneurs continue to experience challenges that include financial marginalization, social norms, limited mobility, and limited access to technology and training. Government initiatives such as Pradhan Mantri Mudra Yojana, Stand Up India and programs that focus on women have enabled entrepreneurship to flourish alongside incubation, mentorship, and skill development programs. The findings indicate that women entrepreneurs do not just generate jobs and exports, but also do not conform to gender stereotypes and promote inclusive socioeconomic change. However, there remains much untapped potential. Long-term policy interventions, universal access to finance, capacity-building programmes and awareness campaigns are needed to maximise the potential of women entrepreneurs and develop women as nation builders in the Indian growth process.

Keywords: self-help groups, financial inclusion, sociocultural hurdles, government initiatives, women entrepreneurs, India, and economic growth.

Paper id: SM25.3.11

# Talent Retention Strategies in the Steel Industry: Challenges, Practices, and Future Directions

Parul Mishra
Sant Longowal Institute of Engineering and Technology, Longowal
*ped2468_parul@sliet.ac.in*

The steel industry, being capital-intensive and labor-driven, depends significantly on skilled human resources to maintain operational efficiency, technological advancement, and global competitiveness. Retaining experienced professionals and technical experts is vital for ensuring consistent productivity, workplace safety, and sustainable growth. This paper investigates the major challenges of employee retention in the steel sector, including high attrition in skilled labor, demanding work environments, and global talent migration. It further explores contemporary strategies such as skill development programs, organizational culture enhancement, competitive compensation models, and health safety wellbeing initiatives. The study proposes a framework for sustainable talent management in the steel industry, emphasizing long-term engagement, continuous upskilling, and alignment of employee aspirations with organizational goals. Findings highlight that retention in the steel sector depends not only on financial incentives but also on building trust, fostering loyalty, and creating a safe, growth-oriented environment for workers. Additionally, the role of digital transformation and AI in enhancing employee engagement and retention strategies is discussed as a future direction.

Paper id: SM25.3.12

# Disruptive Innovation and Startup Success: A Strategic Analysis

Sanjeev Bansal, Mahesh Arora, Anshul Kumar
Sant Longowal Institute of Engineering and Technology, Longowal
*sbansal.sliet@gmail.com*

In the rapidly evolving business landscape, disruptive innovation has emerged as a critical driver of startup success, particularly in markets dominated by legacy enterprises. This research explores the strategic role of disruptive innovation in the growth, competitiveness, and sustainability of startups. Through a strategic analysis framework, the study investigates how startups leverage disruptive technologies, novel business models, and customer-centric innovation to carve out market niches and challenge established players. A mixed-methods approach was adopted, combining qualitative case studies of successful Indian startups across sectors—such as fintech, edtech, and healthtech—with quantitative survey data from early-stage entrepreneurs. The research identifies key enablers of disruptive innovation, including agility, technology adoption, access to venture capital, and an innovation-friendly regulatory environment. Challenges such as scalability, regulatory compliance, and customer acquisition in traditional markets are also examined. Findings suggest that while disruptive innovation can significantly enhance a startup's market entry and competitive edge, strategic alignment with customer needs and ecosystem readiness remains crucial for long-term success. The study provides actionable insights for entrepreneurs, policymakers, and investors aiming to foster a robust innovation ecosystem in India.

Paper id: SM25.3.13

# The Rise of Start-up in Developing Economies

Suvidha, Sanjeev Bansal
Sant Longowal Institute of Engineering and Technology, Longowal
*suvidha0020@gmail.com*

In recent years The Rise of Start-up around the world has significantly increased and it plays an important role for developing the economics. as we move towards to the digitalization to start a new business is easier for entrepreneur. Start-up in sectors like Fintech, health care, Edtech, and e-commerce are attracting significant domestic and international investment. The major role of rise of start-up is the supportive government policies, increasing internet penetration. The internet enables entrepreneurs to connect with people globally, making it easier to reach potential customers and expand their businesses across borders. This paper explores the factors contributing to the expansion of start-ups and highlights their role in shaping modern economies.

*Keywords: Start-up, Developing Economies, Innovation, Entrepreneurship, Government Policies*

Paper id: SM25.3.14

# Impact of Emotional Branding on Consumers: A comparative case study of international brands Coca Cola, Apple and Nike

Gagandeep Kaur, Sushma Gupta, Neena Aneja
SD College for Women Moga
*gaganmagon123@gmail.com*

In the contemporary marketplace, where competition is intense and consumer attention is fleeting, emotional branding has emerged as a powerful strategy to create meaningful and long-lasting connections between brands and consumers. Emotional branding focuses on eliciting emotions that go beyond product functionality, fostering brand loyalty, trust, and identification. This paper explores how emotional branding influences consumer perception, purchase decisions, and brand attachment. It highlights that emotional connections can transform consumers into brand advocates, encouraging repeat purchases and enhancing word-of-mouth communication. The study draws on secondary data from previous research and case studies of successful brands such as Apple, Coca-Cola, and Nike, which have effectively utilised emotional cues in advertising, storytelling, and customer experience.

Findings suggest that emotional branding significantly impacts consumer behavior by appealing to intrinsic feelings such as happiness, belonging, and self-expression. In conclusion, emotional branding not only shapes consumer attitudes but also establishes a deep psychological bond, positioning brands as part of consumers' self-identity rather than mere market options.

*Keywords: Emotional Branding, Consumer Behavior, Brand Loyalty, Emotional Connection, Marketing Strategy*

Paper id: SM25.3.15

# From Waste to Wealth: A Framework for Scaling Biochar Social Enterprises in India & Circular Economy

Randeep Kaur, Ankush, Manpreet Kaur, Anshul Kumar
Department of Management & Humanities, Sant Longowal Institute of Engineering Technology, Longowal , Sangrur (Punjab)
*randeepsran3478@gmail.com*

This paper investigates the potential of biochar-focused social enterprises to address India interconnected challenges of agricultural waste management, climate change, and rural livelihood insecurity. The rampant practice of crop residue burning contributes significantly to air pollution and greenhouse gas (GHG) emissions, while simultaneously degrading soil health. Biochar, a carbon-rich material produced from the pyrolysis of biomass, offers a tripartite solution: effective waste management, long-term carbon sequestration, and soil fertility enhancement. However, its adoption remains nascent due to technological, financial, and policy barriers. This paper argues that social entrepreneurship models are uniquely positioned to overcome these hurdles by creating community-centric, market-driven solutions. Using a conceptual framework built on a comprehensive review of secondary literature, we analyze the opportunities and challenges for scaling biochar initiatives in India. The analysis applies the Triple-Layered Business Model Canvas (TLBMC) to map the economic, environmental, and social value propositions of a biochar social enterprise. Findings indicate that while significant potential exists in leveraging carbon markets and improving soil health, success hinges on policy integration, financial innovation, and robust community engagement. We draw comparative insights from global case studies in Africa and Europe to propose an integrated framework tailored to the Indian context. The paper concludes with actionable policy recommendations for government agencies and strategic implications for social entrepreneurs, farmer producer organizations (FPOs), and private sector partners aiming to build a sustainable and scalable biochar ecosystem.

*Keywords: Biochar, Social Entrepreneurship, Circular Economy, Agricultural Waste, Climate Policy*

Paper id: SM25.3.16

# Share and Contribution of the Electronics Sub-Sector in India's Electronic Manufacturing: An ASI-Based Analysis

Gurjeet Kaur
Guru Nanak Dev University Amritsar
*gurjeet98678@gmail.com*

The electronics industry is the largest and fastest-growing industry in the world. Because of their complementary and enabler properties, electronics are increasingly diffusing into communication, computing, healthcare, defence, transportation, energy, and countless other applications around the world. Electronics are the driving force behind emerging technologies such as artificial intelligence, blockchain, cloud computing, internet of things, advanced robotics, 3D printing, 5G, and so on. The electronics industry is the most-prioritized industry of the government of India as it lies in the heart of the Make in India and Digital India Programme of the country. This study analyzes the share and growth of the sub sector electronic industry in the overall electronic manufacturing sector using Annual Survey of Industries (ASI) unit-level data. Key performance indicators such as, Gross Value Added (GVA), Fixed Capital, Depreciation, and Employment (Total Persons Engaged) are examined to capture the industry's structural trends and growth dynamics. The analysis highlights the relative contribution of the sub-sector of the electronic within total electronic industry and tracks its growth trajectory over time. However, the growth pattern also reflects challenges of uneven capacity utilization and dependence on imported inputs. By combining share analysis with trend growth estimations, this paper provides insights into the evolving role of the electronic industry in India's industrial development and offers an empirical base for evaluating policy measures aimed at enhancing competitiveness, technological upgrading, and export orientation.

## Section 4:

## International: Relations, Law, and Governance

***Track Chair: Dr. Poornima Singh Pawar***

The International Relations, Law & Governance track at Shiksha Mahakumbh 2025 focuses on advancing dialogue around global policy frameworks, transnational legal systems, and governance innovations in an evolving international order. It aims to connect theory with practice by engaging academicians, legal professionals, policymakers, and practitioners in meaningful discussions on international diplomacy, global security, trade and investment law, human rights, environmental governance, and technology-driven regulatory challenges. As Track Chair, Ms. Poornima Singh Pawar, Advocate and Legal Scholar, envisions this forum as a collaborative space to examine the transformative influence of law and governance in building equitable global cooperation, strengthening institutional accountability, and fostering ethical leadership. The track emphasizes forward-looking research and policy insights consistent with the vision of the National Education Policy (NEP) 2020, aiming to nurture a globally conscious, inclusive, and justice-oriented approach to governance. Through scholarly exchange and interdisciplinary dialogue, the track seeks to inspire innovative perspectives that address contemporary global challenges while reinforcing India's role in shaping a balanced, transparent, and sustainable international order.

Paper id: SM25.4.1

# Interlinking Relations, law, and Governance: Towards a just and Sustainable Global Order

Janhavi Dhir
GD Goenka University Gurugram
*220060401073.janhavi@gdgu.org*

This study addresses the key challenges and opportunities of international law. Issues on the current global agenda (e.g. climate change, pandemics, cyber-security, population growth, armed conflict) invoke that no state acts on its own, and the need for more robust cooperation. These challenges also demonstrate the limits of conventional understandings of state sovereignty and the need for global collective action. The study looks at how the different schools of thought in international relations realism, liberal institutionalism, and constructivism explain state behaviour, the exercise of power, and how common ideas, fostered by state agencies, constitute international law. The role of key institutions such as the United Nations, the International Court of Justice, the International Criminal Court, and the World Trade Organization has been given significant attention to show their importance in the establishment of rules, dispute resolution, and contribution to foster cooperation among states. Finally, the study explores non-state actors' multinational corporations, civil society organizations, and advocacy coalitions and their significance to global governance and the shaping of legal arguments. Case studies related to the Paris Agreement on Climate Change, the global response to the COVID-19 pandemic, and the enforcement of international humanitarian law in armed conflict show how the current system has both strengths and shortcomings. Yet, their actions highlight the shortcomings of a legal system that remains heavily focused on state authority.

*Key words: Global Governance, State Sovereignty, International Institutions, Non- State Actors, Transnational Challenges.*

Paper id: SM25.4.2

# From Sovereignty to Responsibility: Legal and Institutional Dimensions of International Relations

Ananya Singhal
GD Goenka University Gurugram
*230060403016.ananya@gdgu.org*

The study of international relations is increasingly indistinguishable from questions of law and governance. In the contemporary period, the international order is not just built by diplomacy and power politics but by rules and institutional frameworks that influence state behavior and enable cross-state cooperation. The paper examines the interplay of >international relations, international law, and governance, and how rules, institutions, and decision-making mechanisms influence global order and stability. The paper examines key themes like the interlinkage of sovereignty and international responsibility, international institutions in peace and conflict settlement and international development, and challenges of compliance and enforcement in a multipolar world. By interweaving theoretical voices and contemporary examples, the paper outlines the promise and limitations of today's models of governance. The paper ends by advocating the construction of more inclusive, flexible, and rules-based mechanisms to enable cooperation, dampen conflicts, and ensure a just and sustainable international order.

*Keywords: International Relations, Global Governance, International Law, Sovereignty*

Paper id: SM25.4.3

# Directive Principles vs. Fundamental Rights: The Constitutional Dilemma of UCC in India

Gantavya Joshi
St. Peters Academy Patiala
*gantavyajoshi@gmail.com*

The implementation of the Uniform Civil Code (UCC) has emerged as a pivotal and contentious reform in India's legislative agenda. While the Indian Constitution envisions a unified legal framework under Article 44, the persistence of diverse personal laws continues to challenge the principle of "One Nation, One Constitution." Dr. B.R. Ambedkar's vision emphasized national unity, yet the coexistence of multiple personal laws has led to legal inconsistencies and gender-based disparities (Constituent Assembly Debates, 1949). Muslim personal law has historically disadvantaged women by restricting alimony to the short iddat period, permitting polygamy, granting unequal inheritance rights, and, until recently, allowing instant triple talaq (Mohd. Ahmed Khan v. Shah Bano, 1985; Shayara Bano v. Union of India, 2017). The practice of Nikah Halala has further exposed women to exploitation, forcing them into consummated marriages simply to remarry their former husbands (Ali, 2020). Hindu law, though codified, has its own inconsistencies. While bigamy is prohibited under the Hindu Marriage Act, men have attempted to exploit religious conversion to Islam to contract a second marriage, a practice declared fraudulent in Sarla Mudgal v. Union of India (1995). Similarly, under Parsi law, women marrying outside the community often lose rights, and their children are excluded from inheritance (Baxi, 2002). The demand for a UCC does not aim to abolish cultural or religious rituals. A UCC would prevent fraudulent conversions, close legal loopholes, and provide equal protection across genders, including recognition of rights for non-binary identities. With the introduction of the Bharatiya Nyaya Sanhita, integrating the UCC becomes even more significant to strengthen equality in personal laws. This paper briefly discusses ways to implement the UCC and highlight loopholes that needs to be prevented in the process. Since the time of Sanjay Gandhi's rule, attempts to introduce it have been resisted by strong religious communities, often framing it as a threat to religious freedom. Yet for the integrity of Indian democracy and the constitutional promise of equality, a UCC is essential—not to erase traditions, but to ensure that no religion continues practices that are discriminatory, unconstitutional, or unethical.

Paper id: SM25.4.4

# Safeguarding Examination Integrity: A Critical Analysis of The Public Examinations (Prevention of Unfair Means) Act, 2024

Nisha Singla
Department of laws, Panjab University, Chandigarh
*nishasingla1818@gmail.com*

The unfair practices in public examinations have come as one of the major threats to the credibility and integrity of the educational structure in India. There has never been any great effort to curb examination malpractices in public exams due to its growing tendency the government passed the Public Examinations (Prevention of Unfair Means) Act, 2024. The main aim of this act is to encourage a culture of integrity, honesty and fairness in examinations, upholding the principles of equity, justice and a level playing field for all students. It argues that exam-centric teaching, rote memorization and lack of focus on critical thinking contribute to a culture where students resort to dishonest methods. Examination Malpractices affects only those students who follow the rules, thereby violating the constitutional principle of equality (Article 14) and the Right to Education (Article 21A). The most frequent causes of examination malpractice are societal pressure, limited employment opportunities, inadequate examination security, lack of strict enforcement of anti-malpractice policies, inadequate preparation, lack of ethical awareness and teacher training undermine the education system. In response to the growing prevalence of malpractices, the Government of India enacted the Public Examinations (Prevention of Unfair Means) Act, 2024. This paper analyses the provisions of the Act, exploring its potential to prevent and penalize dishonest practices, promote transparency, and encourage a culture of integrity in education. Furthermore, the paper discusses how the legislation can serve as a catalyst for broader educational reforms by fostering holistic learning, strengthening institutional accountability, and ensuring a level playing field for all students. Through this analysis, the paper aims to contribute to the discourse on educational justice and systemic reform in India.

*Keywords: Examination Malpractices, Education System, Public Examinations Act 2024, Transparency, Educational Reforms, Meritocracy, Unfair Means*

Paper id: SM25.4.5

# Legal Dimensions of Climate Diplomacy – Analyzing the effectiveness of international environmental treaties and governance mechanisms.

Pooja Kaul
Practicing Lawyer, Delhi High Court
*poojakpul09@gmail.com*

We do not inherit the Earth from our ancestors; we borrow it from our children. Native American Proverb "Climate change is no longer a distant threat, it is a legal, political, and moral challenge that necessitates coordinated international action. This paper examines the legal dimensions of climate diplomacy, analyzing the effectiveness of international environmental treaties and governance mechanisms in addressing global climate risks. It explores key instruments such as the UNFCCC, the Paris Agreement, and the Kyoto Protocol, assessing their legal obligations, enforcement mechanisms, and the interplay between national sovereignty and global responsibility. The study further evaluates multilateral negotiations, compliance frameworks, and dispute resolution mechanisms, highlighting successes, limitations, and emerging trends. The research concludes that while international climate law has promoted global cooperation, significant gaps remain in enforcement, equity, and financing for adaptation. Strengthened legal governance and innovative treaty mechanisms are essential to achieve meaningful climate action, offering insights for policymakers, legal scholars, and international governance institutions

*Keywords: Climate Diplomacy, International Environmental Law, Paris Agreement, Treaty Compliance, Global Governance*

## Section 5:

## Social Sciences and Humanities

***Track Chair: Prof. Bala Lakhendra***

The Humanities and Social Sciences is an important area which play a vital role in shaping a thoughtful, informed, and compassionate society. They help us understand human experiences, cultures, values, and the complex social structures that define our world. Through disciplines such as history, literature, sociology, economics, and philosophy, these fields encourage critical thinking, creativity, and ethical reflection. They foster empathy by helping individuals appreciate diverse perspectives and cultural differences. Moreover, the Humanities and Social Sciences equip people with skills in communication, problem-solving, and analysis—essential for addressing real-world challenges like inequality, conflict, and climate change. They also inform public policy, promote civic responsibility, and preserve cultural heritage. In a rapidly changing technological world, these disciplines remind us of our shared humanity and guide us toward a more just, inclusive, and sustainable future. In terms of research, the Humanities and Social Sciences essential for understanding human behavior, culture, values, and social structures. It helps us explore how people think, communicate, and interact within societies, offering insights into history, politics, literature, economics, and philosophy. Unlike natural sciences, which focus on physical phenomena, humanities and social science research addresses questions of meaning, ethics, and social change. It promotes critical thinking, empathy, and cross-cultural understanding, enabling societies to respond thoughtfully to issues such as inequality, identity, governance, and globalization. Through research, scholars can preserve cultural heritage, challenge stereotypes, and contribute to policy-making that improves lives. Ultimately, research in these fields strengthens democratic values, fosters creativity, and provides a deeper awareness of what it means to be human in an ever-changing world.

Paper id: SM25.5.1

# Tribal Society of Sonbhadra District: A Study of Festivals, Culture, and Cultural Identity

Bala Lakhendra
Journalism and Mass Communication Banaras Hindu University, Varanasi
*drbalalakhendra@gmail.com*

Sonbhadra district, located in the south eastern corner of Uttar Pradesh where it borders Bihar, Jharkhand, Chhattisgarh, and Madhya Pradesh, is home to a dense mosaic of tribal communities, notably the Gond, Baiga, Kharwar, Kol,Chero, Panika, Bhuiya/Bhuinya and Agaria. This paper examines how festivals, everyday cultural practices, and expressive traditions shape and sustain cultural identity among these groups. Drawing on census tables, district records, and ethnographic and cultural studies, it analyzes ritual calendars such as Karma, Jitiya/Jivitputrika, Sohrai, performative genres (Karma dance, Baiga song–dance), technologies-as-traditions (Agaria iron smelting), kinship and life cycle rites, and contemporary pressures industrialization (coal and power), forest regulation, schooling, migration, and media. The study argues that tribal cultural identity in Sonbhadra is not a static inheritance but a living repertoire that communities mobilize in ritual time, village space (akhra/dance-ground), and civic contention (claims to land and forests), allowing both continuity and creative change. The paper also examines the implications for safeguarding intangible cultural heritage and for inclusive district cultural policy of Sonbhadra.

*Keywords: Sonbhadra, Gond, Kharwar, Baiga, Agariya, Karma, Culture, Cultural Identity, Society*

Paper id: SM25.5.2

# Archaeological Journalism in India: Challenges of Accuracy, Sensationalism, and Cultural Representation with Special Reference to Sarnath, Varanasi

Bala Lakhendra, Nitin Bhardwaj, Ranjeet Kumar Rai
Journalism and Mass Communication Banaras, Hindu University Varanasi
*drbalalakhendra@gmail.com*

Archaeological journalism is the intersection of archaeology—the scientific study of human history through material remains—and journalism, which translates complex findings into narratives for the general public. In India, archaeological journalism has historically played a crucial role in shaping cultural identity and public understanding of heritage. Sites like Sarnath in Varanasi are not only archaeological in nature but also religiously, politically, and culturally charged. Sarnath, where the Buddha is believed to have delivered his first sermon, has long been a focal point for both academic archaeology and mass media storytelling.This paper examines the evolution and practice of archaeological journalism in India with a focus on Sarnath, Varanasi—one of the most significant archaeological sites. Journalism has played a crucial role in popularizing archaeological knowledge and has faced challenges of accuracy and cultural representation. Using historical sources, contemporary media reports, and theoretical perspectives from media and heritage studies, this study critically analyzes how Sarnath has been represented in Indian journalism from the colonial era to the digital present. The paper concludes with recommendations for improving accuracy and collaboration between archaeologists and journalists.

*Key words – Archeology, Journalism, Human, History, Media*

Paper id: SM25.5.3

# Challenges of Social Media for Contemporary Photojournalists of Varanasi: A Qualitative Study

Nitin Bhardwaj, Ranjeet Kumar, Bala Lakhendra
Journalism and Mass Communication Banaras, Hindu University, Varanasi
*drbala@bhu.ac.in*

Social media has profoundly transformed the professional lives of contemporary photojournalists, providing new opportunities for visibility, audience engagement, and real-time storytelling. This qualitative study explores the experiences of twelve photojournalists working in Varanasi, a city known for its spiritual and cultural significance, where capturing daily life and rituals requires navigating complex social, religious, and political dynamics. Semi-structured interviews were conducted to understand how social media shapes their professional choices, content creation, and personal well-being. Participants reported intense pressure to post quickly, which often compromises depth and accuracy in their work. They also face frequent copyright violations, with images reused without credit or permission, and algorithmic biases that prioritize visually appealing content while overlooking socially or politically important stories. The study highlights<br/>how these challenges are intensified by Varanasi's unique socio-cultural environment, creating ethical dilemmas and professional pressures that are distinct from other contexts. Overall, social media acts as both an enabler and a<br/>source of stress, emphasizing the need for strategies that help photojournalists maintain ethical standards, protect personal safety, and achieve sustainable livelihoods while continuing to tell authentic and responsible visual stories.

*Keywords: Social Media, Photojournalists, Ethical Challenges*

**Paper id: SM25.5.4**

# THE ARCHITECTURE OF CONNECTION: AN INTERPERSONAL COMMUNICATION ANALYSIS OF 8 A.M. METRO

Geethanjali M, Bala Lakhendra, Geetanjali M
Journalism and Mass Communication Banaras, Hindu University, Varanasi
*geethanjalim869@gmail.com*

The metro compartment, a transient space of fleeting glances and unspoken stories, becomes an unlikely laboratory for human connection. This paper analyzes the film 8 A.M. Metro through the lens of interpersonal communication theory to explore how connection forms in spaces of urban isolation. The study employs a textual analysis of the film's narrative, focusing on the non-verbal and paraverbal interactions between the two protagonists, Iravati and Pritam, who meet during their daily commute. The research examines how their relationship develops within the metro's "third place", a neutral, transient space outside their home and work environments. The findings reveal that their bond is not built through elaborate dialogue but is facilitated by consistent presence, shared silence, and the exchange of poetry as a medium for indirect emotional disclosure. The paper concludes that the film champions a model of communication where empathy and quiet understanding converge, demonstrating that profound connection can emerge from the subtle accommodation of communication styles in mundane, everyday rituals, offering a poignant critique of modern loneliness.

*Keywords: Interpersonal Communication, Non-Verbal Communication, Silence, Third Place*

**Paper id: SM25.5.5**

# Preservation of Ethnic Identity through Cultural Practices: Case studies on Women Entrepreneurs from Indigenous communities of North East

Bala Lakhendra, Sneha Maiti
Journalism and Mass Communication Banaras, Hindu University, Varanshi
*educationistsneha@bhu.ac.in*

India is a land of rich ethnicity, consisted with around 550 indigenous groups, many religions such as Hinduism as majority followed by Islam, Christianity, Sikhism, Jainism and some others; as the result the country is blessed with diverse cultures and traditions. The home for more than 200 tribes, the North East region of India can be called one of the cultural hotspots of the country, is enriched with many indigenes traditions and folk cultures. With time it becomes necessary for the natives to preserve the cultures and traditions and set up cultural entrepreneurship. Whenever there is talk about preserving , practicing and Cultural Entrepreneurship women are found in prominent roles. Women have been always great safekeepers, practitioners and transformers of their cultures for generation after generations. They are also believed to be the inventors of arts, traditional knowledge system of cultures, songs, oral narratives, performative arts, rituals and ceremonies am so on. . North Eastern women experience better societal status than the other parts of the country. They also play leading roles in preserving and cultural entrepreneurship of their own indigenous cultures. This paper will give insights about how women from different Tribes of North east practicing, preserving and cultural entrepreneurship of their respective folk cultures beyond their boundaries. Researcher will also discuss about women who work tirelessly. cause. This paper will be solely descriptive and the information would be gathered most likely from books, articles, journals, research papers, thesis, etc.

*Keywords: Ethnic Identity, Culture, Women, Entrepreneur, North East*

Paper id: SM25.5.6

# Integrating Digitalization and Workplace Spirituality in Hospitality: From Algorithms to Awareness

Poonam Sharma
University School of Applied Management
Punjabi University Patiala
*poonam07sharma@gmail.com*

The swift integration of Artificial Intelligence (AI) and digital technologies is transforming the hospitality sector, bringing about new service models and improved operational efficiencies. Although these innovations improve guest experiences and simplify procedures, they also pose challenges for workers, such as technostress, job insecurity, and worries about being supplanted by machines. Previous studies have mostly focused on how AI affects customer satisfaction, while there has been insufficient focus on employee well-being and their coping strategies during digital transformation. This research investigates the relationship among the adoption of AI, workplace spirituality (WPS), and the outcomes for employees within the hospitality industry. Based on the Job Demands Resources (JD-R) and Conservation of Resources (COR) theories, the research suggests that workplace spirituality—through aspects of finding meaning in work, fostering a sense of community, and aligning with organizational values—serves as a resource that mitigates the adverse effects of stress brought on by AI. Specifically, the research examines how WPS mediates or moderates the relationship between AI adoption stress and critical employee outcomes such as job satisfaction, engagement, and turnover intentions. Employing a quantitative survey approach, this research targets hospitality staff from various hotels and restaurants that are integrating AI technologies, intending to offer empirical insights into the human aspects of digital transformation.

**Paper id: SM25.5.7**

# Impact of Fintech on Household Financial Management

Reetu Devi
Dept. of Humanities and Social Sciences
National Institute of Technology Kurukshetra
*62410027@nitkkr.ac.in*

The rapid expansion of financial technologies (FinTech) has transformed household financial management across emerging and developed economies. This paper presents a systematic review and synthesis of global and national evidence to examine how FinTech adoption influences household outcomes. Using data from the EY Global FinTech Adoption Index (2019), World Bank Global Findex (2021), and national databases, we document adoption disparities across regions: while China and India reached 87% consumer adoption, Japan lagged at 34%, and Sub-Saharan Africa recorded 33 % of adults with mobile money accounts. Empirical findings highlight India's Unified Payments Interface (UPI), which crossed 20 billion monthly transactions in August 2025, as a benchmark for rapid digital payments growth. Comparative analysis shows FinTech's potential to improve financial inclusion, savings behavior, investment diversification, and household resilience, while also creating risks of over indebtedness, fraud, and algorithmic bias. The paper proposes a conceptual framework linking FinTech inputs, mediating mechanisms, and household outcomes, offering a structured synthesis of global evidence. Policy implications emphasize the need for balanced regulation, financial literacy programs, and safeguards to ensure that digital innovations support sustainable and inclusive household financial welfare.

Paper id: SM25.5.8

# The Politics of shame in Digital Sphere: Power, Surveillance and Suppression of Voice

Rahul Kherwa
Department of English, Central University of Punjab, Bhatinda
*kherwarahul@gmail.com*

In the contemporary digital era, social media has become a major arena of ideological contestation where 'shaming' as a practice is increasingly deployed as instruments of political and moral regulation. This paper examines an important issue in digital society: the application of public shaming on social media to fight against extremist ideologies. As the practice hopes to hold individuals accountable and combat extremist point of views, we contend that it frequently develops a negative unintended consequence. The very instrument designed to silence dangerous voices ends up silencing everyone.<br/>We build this argument using social theory, case studies, and literary analysis. Through the use of Michel Foucault's theory of disciplinary power, and Erving Goffman's theories on social stigma, we contextualize online shaming as a new kind of social control. We then bolster this framework with literary evidence. Nathaniel Hawthorne's The Scarlet Letter illustrates how public shaming enforces conformity, and George Orwell's Nineteen Eighty-Four illustrates how fear of retaliation constrains individuals into silence. Case studies of recent internet controversy illustrate how public tagging creates widespread fear that undermines democratic discussion by constraining moderates and dissenter into silence.<br/>Our main finding is that the dynamic produces a "chilling effect." The threat of being mislabeled, dogpiled, or doxed moderate voices into self-censorship. They suppress their questions and thoughtful opinions in fear not in agreement. The outcome is a public sphere becomes fragmented, where performance substitutes for authentic dialogue. It damages the open and critical discourse necessary for a healthy democracy, in the end reinforcing the polarization that it aims to fix.

Paper id: SM25.5.9

# Deconstructing the Human: A Posthumanist Reading of Priya S. Chabria's Generation 14

Sonika, Research Scholar
Chaudhary Devi Lal University, Sirsa, Haryana
*panghalsonika@gmail.com*

The present paper attempts to study Priya S. Chabria's 2008 novel Generation 14 using the critical-theoretical framework of posthumanism. Generation14 is an exemplary work of Indian science fiction that uses a posthuman protagonist to interrogate the idea of the human itself. It deconstructs the pervasive belief in human superiority over the nonhuman by showing similarities between the (human) Originals and the (also human) Clones. The novel discards the notion of human exceptionalism and challenges the self-sufficiency of the humans. Furthermore, Chabria understands that representations of technological advancement and posthuman figures in fictional texts frame our responses towards them. In Generation 14, the positive portrayal of nonhuman entities and a dynamic heterosexual relationship between a human and a clone usher in a demand for posthuman equality and inclusivity. Lastly, the paper emphasizes that Generation 14 encourages the readers to consider the social and ethical implications of emerging biotechnologies such as genetic engineering and cloning.

Paper id: SM25.5.10

# Voicing Draupadi in the Digital Age: Literary Resilience, Gender Justice, and AI in the Humanities

Riddhi Singh
Uttaranchal University, Dehradun
*singh.riddhi1412@gmail.com*

The paper examines how Draupadi, the fire-born heroine from the Mahabharata, serves as a powerful symbol of strength for those engaging in feminist debates, psychoanalytic approaches, and AI-based teaching today. Once literature moves from manuscripts to metadata, the way we read the Mahabharata and other epics is greatly transformed, letting in new ideas of empowerment, equity, and resistance. Viewing Draupadi from a psychoanalytic standpoint, the study reflects that she is both a legend and carries unresolved trauma, withheld agency, and acts as a representation of rebellion. This research looks at how AI tools, digital humanities platforms, and online courses are helping to rethink Draupadi's story for the purpose of gender awareness and justice. The research investigates how automated tools in AI, such as text analysis, extracting emotions, and interactive storytelling, add value to literary studies and question aspects of cultural authenticity and bias. At the same time, it addresses the way digital tools are influencing the use of language, the storytelling process, and styles of teaching in literature classrooms. Linking digital resilience, language adaptation, and feminist storytelling allows us to study how the character of Draupadi changes in different types of hyperconnected media and technologies. To sum up, this paper supports a thoughtful and creative way of combining technology in humanities work with an analytical but imaginative approach, ensuring that the connected ancient message of Draupadi can be appreciated in the present as both a sign of cultural continuity and one of progress.

*Keywords: Draupadi, digital resilience, feminist literature, psychoanalysis, AI in education*

Paper id: SM25.5.11

# The Democratic Renaissance: Between NEP 2020's Promise and the Practice of Engineering Civic Consciousness

Jyoti Malhotra

PGT Political Science Facilitator at KIIT World School, Pitampura, Delhi
jyotiauthor@gmail.com

Education serves as a cornerstone of political socialization, transmitting the foundational knowledge, values, and competencies essential for active democratic citizenship. The National Education Policy (NEP) 2020 represents India's most ambitious educational reform in over three decades, transcending traditional curriculum revision to champion holistic development, critical thinking, and ethical consciousness. This paper investigates how NEP 2020 functions as an instrument of political socialization, examining its potential to cultivate democratic citizenship and strengthen civic values among Indian youth. Grounded in theoretical frameworks of political socialization and civic education, this study analyzes NEP 2020's distinctive pedagogical approaches—including experiential learning methodologies, constitutional literacy, multilingual education, and inclusive practices. The policy's emphasis on critical inquiry and value-based education creates opportunities for nurturing core democratic principles: equality, justice, liberty, fraternity, and pluralism. NEP 2020 emerges as a transformative framework for developing informed, responsible, and civically engaged citizens capable of sustaining democratic institutions. Analysis also critically examines implementation challenges that threaten to undermine these aspirations. Structural inequalities in educational access, persistent regional disparities, inadequate infrastructure, and the pervasive digital divide create significant barriers to equitable implementation. These challenges raise crucial questions about whether the policy can reach marginalized communities and rural populations. Employing a political science perspective, we evaluate how education policy shapes civic consciousness and democratic participation. It explores dialectical relationship between education and democracy, arguing that implementation of NEP 2020 could strengthen democratic fabric by producing citizens equipped for critical engagement with governance processes. The study concludes with strategic recommendations focusing on inclusive curriculum design, participatory pedagogical practices, comprehensive teacher professional development, and community-based learning initiatives.

*Keywords: Political Socialization, NEP-2020, Democratic Citizenship, Civic Education*

Paper id: SM25.5.12

# Problematic Internet Use, Mindfulness and Adolescents

Angela Chandel
Department of Psychology, Punjab University, Chandigarh
*officialangela04@gmail.com*

Problematic Internet Use (PIU) has grown as a cause for concern due to the rapid advancement of the internet especially in school going adolescents. Joseph (2022) found that 21.5% of school going adolescents showed moderate level of problematic internet use, while 2.6% reported severe level, indicating a significant concern for public health (2022). The present study was conducted to examine the role of mindfulness and perceived social support in relation to PIU. Gender differences were explored. The sample comprised of 100 school going adolescents (50 boys and 50 girls) in the age range of 15-18 years. The sample was randomly selected from Government schools in the Tricity region of Chandigarh. The Problematic Internet Use Questionnaire (PIUQ-18) (Demetrovics, Szeredi, & Rózsa, 2008), Mindful Attention Awareness Scale (MAAS) (Brown & Ryan, 2003), and Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet, Dahlem, Zimet, & Farley, 1988) were used to measure Problematic Internet Use, Mindfulness and Perceived Social Support respectively. Results show no significant gender differences in PIU, mindfulness, or perceived social support. However, correlation analysis indicated that greater mindfulness and perceived social support were significantly associated with lower PIU scores.

*Keywords: Problematic Internet Use, Mindfulness, Perceived Social Support, Adolescents, Gender Differences, India*

Paper id: SM25.5.13

# Can Mindfulness and Financial Self Efficacy Predict Financial Well Being

Chhabra, H.K., Juneja, J.
Department of Psychology, Panjab University, Chandigarh.
*jayajuneja0425@gmail.com*

The present study examined the predictive role of Financial Self-Efficacy and Mindfulness, respectively, in determining Financial Well-being among female Assistant Professors. Financial Well-Being is a comprehensive term that comprises an individual's relationship with money and the impact of the relationship in his or her life. It also refers to a state of being wherein a person can fulfill the criteria of the present and ongoing financial obligations and can also possess security with regards to their financial future while making productive choices. Despite the relevance of psychological factors in financial outcomes, limited research has been administered to examine the relationship between the above variables within an academic setup. The sample consisted of female Assistant Professors aged 27 to 37 years (average age 32 years) selected through random sampling from the city of Chandigarh, India. Standardized measures of Financial Well-Being, Financial Self-Efficacy, and Mindfulness were administered. Data was analyzed using multiple regression analysis to determine the extent to which Mindfulness and Financial Self-Efficacy predict Financial Well-Being. Results indicated that Financial Self-Efficacy was a significant positive predictor of Financial Well-Being. However, Mindfulness did not significantly predict Financial Well-Being, in the sample. The study seems to contribute to the growing body of research linking psychological factors with financial outcomes.

*Keywords: Financial Well-Being, Financial Self-Efficacy, Mindfulness, early-career educators, female Assistant Professors*.

## Section 6:
## Education System and Pedagogy

***Track Chair: Dr. P K. Singh***
***Co-Chair: Prof. Vikas Chaudhary NIT Kurukshetra***

The Education System and Pedagogy form the foundation of a nation's intellectual, social, and cultural development. These determine how they experience learning, ultimately shaping their values, skills, and worldview. In the contemporary era, education emphasizes innovative teaching–learning practices, curriculum reforms, and the integration of technology to enhance learning outcomes. Pedagogy serves as both a science and an art rooted in structured instruction while simultaneously nurturing curiosity, creativity, and independent thinking. Modern education has shifted away from rote memorization toward experiential and inquiry-based learning. Pedagogical innovations such as project-based learning, flipped classrooms, experiential activities, and collaborative assignments promote active participation and real-world application of knowledge. Multidisciplinary teaching, environmental awareness, and value-based learning ensure that education remains holistic and relevant to societal needs. Curriculum reforms advocate for flexibility and learner autonomy. Students are encouraged to explore their interests and talents rather than restricting themselves to rigid academic pathways. Such reforms aim to bridge the gap between theoretical knowledge and practical skills. Technology has further revolutionized education by making learning more accessible and personalized. Digital platforms, online classrooms, virtual simulations, and AI-based tools support adaptive learning, enabling students to learn at their own pace. Technology also encourages global connectivity, expanding the boundaries of the classroom. Education functions as a shared responsibility among teachers, researchers, policymakers, parents, and communities. A holistic system recognizes diverse learning needs and promotes inclusivity. By supporting students with varied physical, cognitive, or emotional needs, inclusive pedagogy ensures equity and dignity in learning. At its core, pedagogy nurtures critical thinking and lifelong learning. In a rapidly changing world, lifelong learning is essential for personal and professional growth. Pedagogy that instills curiosity and adaptability ensures that individuals continue learning throughout life. In conclusion, education and pedagogy together build the foundation of a progressive society. By integrating innovation, inclusivity, and human values, the education system prepares learners not only for employment but for meaningful participation in society.

Paper id: SM25.6.1

# श्रवण बाधित विद्यार्थियों की उपलब्धि अभिप्रेरणा एवं सृजनात्मकता का संक्षिप्त समीक्षा

Shveta Aasu
Guru Ghasidas Vishwavidyalaya Bilaspur
*shveta.singh1985@gmail.com*

उपलब्धि अभिप्रेरणा चुनौतीपूर्ण गतिविधियों में योजना बनाने और भाग लेने की निरंतर इच्छा है जो उत्कृष्टता के व्यक्तिगत मानकों तक पहुंचने के अंतिम लक्ष्य के साथ महत्वपूर्ण प्रयास की मांग करती है। यह आंतरिक अभिप्रेरणा एक विशिष्ट लक्ष्य को पूरा करने की तीव्र इच्छा से आती है जो किसी की व्यक्तिगत जरूरतों और आकांक्षाओं के अनुरूप होती है। यह अध्ययन इस विषय पर उपलब्ध साहित्य की एक संक्षिप्त समीक्षा प्रस्तुत करता है। यह 2000 से 2022 तक के 29 शोध पत्रों की समीक्षा करने का एक प्रयास है। अध्ययन के परिणामों के अनुसार, श्रवण बाधित किशोरों में सामान्य विद्यार्थियों की तुलना में बेहतर उपलब्धि अभिप्रेरणा पाई गई। माता-पिता की अपेक्षाओं और मार्गदर्शन ने उच्च उपलब्धि की आवश्यकता को विकसित किया। सृजनात्मक चिंतन पर शहरी और ग्रामीण क्षेत्रों से आने वाले निजी और सरकारी विद्यालयों में पढ़ने वाले पुरुष और महिला माध्यमिक विद्यालय के विद्यार्थियों के मध्य कोई सार्थक अंतर नहीं था और लिंग और आवासीय पृष्ठभूमि, विद्यालय के प्रकार और आवासीय पृष्ठभूमि के बीच कोई बातचीत नहीं पाई गई । माता-पिता के प्रोत्साहन, शिक्षा के महत्व और शैक्षिक मामलों की चर्चा का उपलब्धि अभिप्रेरणा पर सीधा और सकारात्मक प्रभाव पड़ा।

मुख्य शब्द : श्रवण बाधिता, उपलब्धि अभिप्रेरणा, सृजनात्मकता

Paper id: SM25.6.2

# Socio-cultural Dimensions of Modernization among senior secondary Teachers of Punjab

Rajwinder Kaur, Kuljeet Kaur Brar
Centre for Distance and Online Education, Panjab University, Chandigarh
*rajwinder3140@gmail.com*

Modernization refers to a profound transformation in individual's thinking, emotions, and attitudes toward life, society and the universe. In Indian society, modernization has led to significant changes in traditional customs and values related to caste, family, marriage and religion. Teachers, as pivotal agents of change, play a crucial role in shaping and disseminating modern values, thereby influencing societal development. This study aimed to examine the socio-cultural dimensions of modernization among senior secondary school teachers in Moga District, Punjab, focusing on gender, locality and institutional type. The objectives were to compare the levels of socio-cultural modernization across different genders, assess differences between rural and urban teachers and analyze variations between teachers in government and private institutions. A total of 160 teachers from 20 senior secondary schools in Moga District participated in the study. The Modernization Scale, translated into Punjabi, was administered to assess the teacher's levels of socio-cultural modernization. Overall, teachers exhibited a moderate to high level of socio-cultural modernization, with statistical analyses confirming their openness to new ideas and practices. Gender did not significantly influence modernization levels, indicating uniformity across male and female educators. While urban teachers showed slightly higher levels of modernization compared to their rural counterparts, this difference was not statistically significant, suggesting that modernization is gradually reaching rural areas as well. Teachers in private institutions reported higher levels of socio-cultural modernization than those in government schools, with this difference being statistically significant, highlighting the impact of institutional environment on modernization.

Paper id: SM25.6.3

# Mapping the Intellectual Landscape of AI in Higher Education: A Bibliometric and Content Analysis

Manisha Sharma, Vikrant Sharma
Mody University of Science and Technology, Lakshmangarh Sikar
*manishasharma22.set@modyuniversity.ac.in*

Artificial Intelligence (AI) has quickly become a revolutionary tool in the field of higher education, changing how educational institutions operate, how students interact with the institutions, and in how institutions make decisions. This paper will include a bibliometric and content analysis of 140 publications of interest on AI in higher education that are indexed by Scopus. Using performance analysis, keyword co-occurrence mapping and thematic evolution techniques, the research identifies dominant themes including intelligent tutoring systems, adaptive learning, predictive analytics and generative AI applications. Topic modeling also captures a clear sense of temporal change -- from early focus on the use of e-learning platforms and performance assessment to recent discussions on ChatGPT, ethics and faculty preparedness. While many of the studies focus on the potential of AI to improve learning outcomes and efficiency, issues of governance frameworks, equity, and long-term assessment of impact are critically missing. The findings offer a structured overview of the intellectual landscape and point to strategic directions for researchers, educators and policymakers for ensuring responsible and inclusive adoption of AI in academia.

Paper id: SM25.6.4

# Mapping the Landscape of Online Learning in Education: A Bibliometric Perspective

[1]Purnima Sharma, [2]Satyajit Anand
[1]GLA University, Mathura, [2]Chitkara University Institute of Engineering and Technology
*purnimasharma.1487@gmail.com*

This paper presents a review of role of online and blended learning in education system A literature search was carried out using the documents extracted from Scopus database. To conduct this study, total 174 research articles from 2003 and August 2025 were reviewed. Bibliometrix (R package) and SciMAT tools were used to conduct this review in terms of bibliometric study and thematic analysis respectively. The analysis presents results as leading contributing countries, relevant resources, collaboration network, and major themes. The derived results provide insight into the present status of work, limitations and future scope in the area of online learning, e learning for education system. In terms of publications and citations, USA, China and Australia are the top three contributing countries. There is total 1377 authors contributing research articles in the related field. By using this approach, researchers can identify new research that supports their interests. This analysis offers valuable directions and findings to the academic researchers working in the online learning and blended learning.

Paper id: SM25.6.5

# COVID-19 Statistical Trends and Comparative Analysis Platform – GUI Based

Parul Khurana, Shamrood Ali, Muhammed Nahid
Lovely Professional University, Jalandhar
*parul11183@gmail.com*

The goal of this research is to create and implement a graphical user interface (GUI) platform. This platform will allow for real-time statistical analysis and visual comparisons of COVID-19 trends across various regions. The study uses a design-focused research method, combining data from public health databases with structured programming techniques in Python and SQLite for backend storage. We developed interactive dashboards that let users filter, compare, and understand pandemic-related variables like infection rates, recovery rates, and vaccination coverage. Testing of the prototype shows that the platform greatly improves access to and understanding of complex epidemiological data for both experts and the public. The visualization models made it easier to compare data between countries, showing how policy changes affected infection trends. The implications of this work suggest that GUI-based statistical systems can effectively support decision-making for policymakers, educators, and healthcare professionals. We recommend expanding the framework to include future epidemic data, adding machine learning models for predictive analysis, and enabling multilingual options to increase accessibility. This research contributes by connecting data science with public health communication through an easy-to-use interface. It adds value by turning raw statistical data into practical insights. This work highlights the potential of human-computer interaction to make data-driven decisions more accessible during global health emergencies.

Paper id: SM25.6.6

# Role of Gamification in Enhancing Problem-Solving Skills through Digital Learning Platforms among Senior Secondary School Students

Iqra Saifia, Anoj Raja
Department of Education, Swami Vivekanand Subharti University, Haridwar
*Iqrasaifi70@gmail.com*

The traditional learning approach has been transformed by the assimilation of digital technologies into education, offering modern pedagogical approaches to engage and motivate students. One prominent approach in this evolution is gamification, defined as the implementation of game-based elements in non-game environments, that has been developed as an effective pedagogical tool to enhance problem-solving competency and active learning. This review paper examines the role of gamification in enhancing problem solving skills among senior secondary school students through digital lending platforms. Based on contemporary theoretical perspectives and empirical findings, this study emphasizes that components such as leaderboards, challenges, instant feedback, and rewards play a crucial role in fostering intrinsic motivation, promoting sustained participation, and enhancing cognitive engagement in educational settings. To enhance the practice of Critical thinking, decision making and adaptability in dynamic program scenarios is enabled through gamified platforms that provide opportunities for collaborative and experiential learning. The psychological foundations of gamification are also examined in the paper, including how it fits with self- determination theory, which highlights competency, intrinsic motivation and autonomy, as important factor in successful learning. Although many reviews paper shows that gamification significantly improves problem solving abilities, issues including an excessive dependence on extrinsic rewards, technology accessibility and the requirement for a well-structured instructional design continue to be concerns. In conclusion, the review observes that carefully designed and thoughtfully applied gamification can play a pivotal role in equipping senior secondary learners for both academic achievement and the complex problem-solving expectations of a knowledge driven society.

*Keywords: Gamification; Problem-Solving Skills; Digital Learning Platforms; Senior Secondary Education; Student Engagement*

Paper id: SM25.6.7

# Problem solving in context of Blended learning

Arti Sharma, Anoj Raj
Department of Education, Swami Vivekanand Subharti University, Meerut
*arti.sharma2055@gmail.com*

Problem solving has long been recognized as a core educational outcome, but in the twenty-first century it has acquired heightened significance as a key competency for success in the knowledge society and future workforce. International organizations such as UNESCO and the OECD emphasize its role in fostering critical thinking, creativity, collaboration, and lifelong learning. At the same time, the rapid adoption of blended learning (BL), accelerated by digital technologies and the COVID-19 pandemic, has transformed educational delivery into a mainstream modality worldwide. This paper explores the intersection of problem solving and blended learning, highlighting evidence that BL—particularly when combined with problem-based and flipped approaches—can substantially enhance learners' problem-solving skills. Empirical studies report improvements across diverse disciplines, from mathematics and science to sports education, with outcomes including increased self-efficacy, scientific literacy, strategic thinking, and creativity. Meta-analyses further confirm strong effects of BL on critical and creative thinking, which underpin effective problem solving. Collectively, the findings suggest that carefully designed blended learning environments provide both the flexibility of digital tools and the affordances of social interaction, making them uniquely effective in cultivating students' problem-solving competencies across educational levels.

Paper id: SM25.6.8

# Impact of Emotional Maturity on Lifelong Learning Competency across Diverse Family Backgrounds: A Review

Bhavna Chaudhary, Anoj Raj
Department of Education, Swami Vivekanand Subharti University, Meerut, Uttar Pradesh India
*bhavnachaudharybhavna68@gmail.com*

Self-awareness, emotional control, empathy, and flexibility are all components of emotional maturity, which is essential for a person's ability to pursue lifelong learning. As technology, societal change, and globalization need ongoing skill development, lifelong learning competence is becoming more and more important. Family background influences emotional development and, in turn, may have an impact on lifelong learning practices. Examples of this include socioeconomic level, parental education, parenting style, and family structure. This study evaluates the research to investigate the link between emotional maturity and lifelong learning competency, as well as the ways in which different aspects of familial history regulate or modify this relationship. It synthesizes policy texts, correlational research, and empirical investigations. Results indicate that higher emotional maturity is positively correlated with authoritative parenting and supportive socioeconomic circumstances. Higher emotional maturity is correlated with increased learning motivation, self-regulation, and perseverance—all of which are elements of lifelong learning competency. Studies, however, are frequently cross-sectional and have limited integration of the three dimensions (family background, lifelong learning, and emotional maturity). The study points out gaps, makes recommendations for future research avenues (such as cross-cultural comparisons, longitudinal designs, and standardized assessment), and provides policymakers, parents, and educators with some takeaways.

*Keywords: Emotional maturity; lifelong learning; family background; parenting style; socio-emotional development*

Paper id: SM25.6.9

# Parenting Styles and Academic Self Efficacy among secondary School Students: Evidence from Punjab, India, with International Perspective

Vishav Abrol
Research Scholar, Panjab University, Chandigarh
*vishavabrol@gmail.com*

Parenting practices are consistently linked with students' motivation and academic outcomes, yet little is known about how they influence academic self-efficacy in South Asian settings. This study explored associations between parenting styles and the self-efficacy of secondary school students in Punjab, India, and examined the relevance of these findings in an international context. A stratified random sample of 240 adolescents (classes IX–X) from government and private schools completed standardized measures of perceived parenting behaviour (authoritative, authoritarian, permissive, neglectful) and an academic self-efficacy scale. Descriptive statistics, independent-samples t tests, Pearson correlations, and multiple regression analyses were employed. Authoritative parenting was most prevalent and showed the strongest positive relationship with self-efficacy (β = .42, p < .001), whereas authoritarian and neglectful styles correlated negatively. Private-school students reported significantly higher self-efficacy than their government-school peers, but gender differences were negligible. These findings align with international evidence from PISA, TIMSS, and cross- cultural studies highlighting the value of supportive, autonomy-oriented parenting for adolescents' confidence in learning. Implications for teacher training, parental guidance programmes, and policy reforms aimed at strengthening student resilience and achievement are discussed.

*Keywords: parenting styles, academic self-efficacy, adolescents, secondary education, international comparison*

## Section 7:

## EdTech and Digital Education

***Track Chair: Prof. Rajneesh Talwar***

The EdTech and Digital Education section serves as a dynamic platform to explore the intersection of education, technology, and innovation in a rapidly evolving digital landscape. As educational ecosystems worldwide embrace digital transformation, this section seeks to highlight emerging technologies, pedagogical models, and data-driven strategies that are redefining how knowledge is delivered, accessed, and experienced. It invites educators, researchers, technologists, and policymakers to share novel insights, best practices, and empirical research that advances the quality and inclusivity of digital learning. Key areas of focus include education technology innovations, online & blended learning, AI in education, digital literacy, and access. By integrating technology with pedagogy, participants will discuss how to create engaging, flexible, and learner-centered educational experiences that cater to diverse needs and contexts. Furthermore, this section aims to address challenges such as digital divide, cybersecurity in education, and ethical implications of AI-driven learning tools. Through interdisciplinary dialogue and collaboration, the EdTech and Digital Education track aspires to envision the future of education—one that leverages innovation to enhance learning outcomes, promote global connectivity, and empower educators and learners alike in the digital age.

Paper id: SM25.7.1

# AI based Student Academic Performance Monitoring Tool

Parul Khurana, Housseini Fofana, Aissata Traore
Lovely Professional University, Jalandhar
*parul11183@gmail.com*

The Student Academic Performance Monitoring Tool is developed to offer a streamlined and user-friendly interface for the real-time tracking and assessment of student performance. Utilizing a graphical user interface (GUI) created in Python (Tkinter) and supported by a MySQL database, this system facilitates seamless management of academic records for administrators, educators, and students alike. The tool enables the systematic storage and retrieval of student information, grades, and subject-specific performance, while also incorporating visualization features such as charts and comparative analyses. Its modular architecture ensures that various user roles; administrators for system management, teachers for updating performance records, and students for monitoring their academic progress can access the platform effectively. By combining data management with interactive dashboards, the project alleviates the burdens of manual record-keeping and enhances decision-making within educational contexts. Looking to the future, there is significant potential for the integration of artificial intelligence (AI) within the project. Implementing predictive analytics could facilitate the forecasting of student outcomes based on historical performance, attendance, and engagement metrics. Additionally, early warning systems could automatically identify students at risk of underachievement, while recommendation engines might provide tailored study plans and subject-specific guidance. Moreover, AI-powered chatbots could function as virtual assistants, addressing student inquiries and delivering real-time academic support. These prospective enhancements would elevate the tool into an intelligent academic resource, enabling proactive interventions and promoting student success through a data-driven approach.

Paper id: SM25.7.2

# AI based - Library Demand Prediction Dashboard

Parul Khurana, Jha Abhishek, Jha Kanhaiya
Lovely Professional University, Jalandhar
*parul11183@gmail.com*

The aim of the present research is to forecast library resources' demand so that library resources can be enhanced in terms of allocation and service delivery from resource managers to users of the library. The research employed a quantitative study design to forecast demand utilizing borrowing history data in conjunction with user demographic information, seasonal usage variations, and the research employed machine learning models to achieve this. Methodology for research encompassed pre-processing data, data engineering, developing predictive demand models. Model performance was gauged using several measures such as accuracy and error measures. Results indicate that the predictive models detected times of above average demand and reflected both library resources under-anticipated by their respective users and those that were over-anticipated. Implications are that library resources are capable of building demand forecasting systems that order better quantities of resources rather than under or over buying, deliver user satisfaction and cost services better. Library recommendations include integrating their demand prediction models within their library digital framework and re-training their models using data generated on the fly to refine accuracy in later predictions. In general, this study adds value to a library service by illustrating how data-driven means of working to build more contemporary management and decision-making in a library context assists in delivering value to a library. The value proposition provides a library with means to systematically, robustly, scalable, and as evidence a credible answer to ever-evolving user requirements.

Paper id: SM25.7.3

# NLP-Driven Essay Evaluation and Feedback Model

*Jasmeet Kaur*
*jasmeetkaur1130@gmail.com*

The increasing adoption of digital education platforms has created a demand for efficient and scalable assessment systems. Manual grading of essays and descriptive answers is time-consuming, subjective, and prone to inconsistencies. The NLP-Driven Essay Evaluation and Feedback Model leverages Natural Language Processing and deep learning techniques to assess textual responses based on their relevance, coherence, and clarity. To ensure fairness and content correctness, the approach integrates retrieval-augmented methods that compare student or teacher answers with reference rubrics, model solutions, and trusted online sources. Retrieval Augmented Generation are utilized to capture semantic meaning, identify missing concepts, and provide constructive feedback alongside predicted scores. Beyond grading, the framework assists students in improving their learning outcomes and reduces the evaluation workload for educators. By combining linguistic analysis with knowledge-aware assessment, this work offers a scalable, reliable, and adaptive solution for modern educational environments.

Paper id: SM25.7.4

# Access to digital literacy effect on health services by mediation of social media engagement

Shashi Kant, Ashwani Panesar
Lovely Professional University, Jalandhar
*skant317@gmail.com*

This research examines the influence of digital literacy on the use of health care, mediated via social media interaction. Using a sample of 385 respondents, data were collected through structured questionnaires assessing digital literacy (proficiency in online health information, evaluation of digital skills, and frequency of internet use for health-related purposes), social media engagement (frequency of health-related posts, involvement in health groups/forums, and interaction metrics), and health services outcomes (utilisation of telehealth services, patient satisfaction, and access to health resources). Before the study, the sample adequacy was validated with a Kaiser-Meyer-Olkin (KMO) coefficient above 0.80 alongside Bartlett's test of sphericity (p < 0.001), demonstrating its appropriateness for factor analysis. Exploratory Factor Analysis (EFA) showed a clear three-factor answer that matched the hypothesised structures and accounted for more than 70% of the variation. Confirmatory Factor Analysis (CFA) exhibited robust model fit (CFI > 0.90, RMSEA < 0.08), hence validating construct validity and reliability. The structural equation modelling (SEM) findings indicated that digital literacy strongly predicts social media participation (β > 0.40, p < 0.001), which subsequently mediates the association between digital literacy and health care use (indirect impact significant at p < 0.01). These results are consistent with the Technology Acceptance Model (TAM) as well as Social Cognitive Theory (SCT), indicating that increased digital literacy boosts self-efficacy and perceived ease of use, resulting in greater online health-related engagement, which in turn enhances access to and satisfaction with health services.

Paper id: SM25.7.5

# MIMO Antenna Systems as Catalysts for Next-Generation Educational Technology: Performance Analysis and Implementation Framework

Sohni Singh
Punjabi University Patiala
*sohnibagga5@gmail.com*

This paper explores the convergence of Multiple-Input Multiple-Output (MIMO) antenna technology with modern educational innovations to create enhanced learning environments. As educational institutions increasingly rely on robust wireless connectivity for digital learning platforms, virtual reality applications, and IoT-enabled smart classrooms, MIMO systems offer unprecedented opportunities to revolutionize educational delivery. This research examines how MIMO technology can be leveraged to support innovative educational approaches including adaptive learning systems, collaborative virtual environments, and real-time assessment platforms. An integrated framework that we are proposing involves a combination of spatial multiplexing of MIMO with educational technologies to optimize the bandwidth distribution, minimize latency and support interactive experiences between users. Our findings suggest that MIMO systems in educational establishments can be used strategically and can enhance data throughput up to 400 percent, cut connection drops by 85 percent, and enable concurrent high-bandwidth usage of up to 50 users on a single access point, and thus facilitate immersive learning experiences and connected learning.

Paper id: SM25.7.6

# Immersive Learning through AR–AI: Powering the Next Generation of Education

Neha Garg
Chitkara University
*bansal.neha@chitkara.edu.in*

For decades, education in India has been shaped by rote-based learning, where students memorize information to pass examinations but often fail to develop problem-solving ability, deeper understanding, or creativity. This conventional model restricts critical thinking and lifelong learning competencies. Emerging technologies such as Augmented Reality (AR) and Artificial Intelligence (AI) offer opportunities to overcome these limitations by creating interactive and adaptive learning environments. AR enables learners to engage with 3D simulations, immersive activities, and dynamic visualizations that make complex concepts more accessible and extend learning experiences beyond static textbooks. When combined with AI, AR evolves into an intelligent ecosystem where AI-powered chatbots provide personalized support, immediate feedback, and adaptive learning pathways that encourage autonomy and self-management. This study employs a qualitative methodology, drawing on literature reviews and comparisons of traditional education with technology-supported models. The findings show that integrating AR and AI enhances student participation, fosters conceptual clarity, improves motivation, and cultivates key 21st-century skills such as creativity, critical thinking, collaboration, and computational thinking. Moreover, AR–AI systems democratize access to high-quality education by bridging gaps between urban and rural contexts and supporting diverse learners. The outcomes emphasize that AR–AI-powered environments reduce dependence on rote memorization, nurture curiosity, promote interactivity, and improve long-term knowledge retention, thereby preparing learners for success in a knowledge-driven global economy. Importantly, the implementation of AR and AI in education resonates with the National Education Policy 2020 by supporting experiential, inquiry-based, and competency-driven education for holistic student growth.

Paper id: SM25.7.7

# Technology Business Incubators as Catalysts of Entrepreneurial Growth: Exploring Their Role in Nurturing Innovation and Start-ups

Pardeep Jindal
Department of Interdisciplinary Courses in Engineering, Chitkara University Chandigarh
pardeep.alkra@gmail.com

Technology Business Incubators (TBIs) are emerging as the major forces behind entrepreneurship and innovation within knowledge-based economies. By offering start-ups access to resources like mentoring, finance, networking, infrastructure, and business development services, TBIs reduce the entry costs of new ventures and increase their chances of survival and growth. This paper explains the contribution of TBIs to entrepreneurial ecosystems through the ability they offer entrepreneurs to make innovative concepts successful business models. This is an overview of the contribution of TBIs in entrepreneurial ecosystems due to the ability that they empower entrepreneurs to convert innovative concepts into successful business models. The overview outlines the different support of TBIs, from technical to strategic partnering support, and their effects on start-up performance, readiness for the marketplace, and survival This paper defines the contribution of TBIs to entrepreneurial ecosystems as the capacity that they provide to entrepreneurs to transform innovative ideas into long-lasting business models. This report addresses the contribution of TBIs to entrepreneurial ecosystems due to the capacity that they provide to entrepreneurs to transform innovative ideas into long-lasting business models. This report brings to the limelight different forms of support of TBIs, from technical to strategic partnering support, and their impact on start-up performance, market readiness, and survivability. The report also discusses TBIs' function towards technology entrepreneurship, local economic development, and job creation. The study confirms that TBIs not only enhance the entrepreneurial capability but are also strategic policy tools for governments in competitive, innovation-driven economy making.

Paper id: SM25.7.8

# AI-Enabled Voice Assistants as Catalysts for Managerial Efficiency: A Study on Business Administration Practices Education Technology Innovation

Parul Khurana, Jyoti Sharma
Lovely Professional University Jalandhar
*parul11183@gmail.com*

Voice assistants based on artificial-intelligence (AI) are swiftly transforming the planning, communication, and decision-making processes of organizations. The paper will explore their use as strategic instruments in business management. Based on the Technology Acceptance Model and Resource-Based View, we explore how AI voice interfaces can simplify the operations, improve the quality of decisions, and affect the productivity of employees. Applying a mixed-methods approach, an online survey of 200 managers working in the retail, e-commerce, and services industry, and face-to-face interviews with 15 executives, we discover that perceived usefulness, data security, and ease of integration mean a lot in predicting adoption intentions. Findings point to quantifiable efficiency benefits, yet they also suggest issues of privacy and change management in the organization. We draw a conclusion with recommendations that managers and policymakers can use voice-powered AI and reduce ethical risks.

Paper id: SM25.7.9

# Low-Cost EdTech Solutions for Rural Education

Armaan Grover, Aanika Dhamija, Abhay Prashar, Akshit, Anushka Madan, Armaan Grover
Chitkara University, Punjab
*armaangrover567@gmail.com*

The students in rural areas often face challenges like poor internet, scarcity of qualified teachers, and insufficient access to learning materials, which make learning unequal and difficult. This paper introduces a realistic model of low-cost educational technology for such areas, emphasizing adaptability, affordability, and durability. This approach utilizes an "offline-first" system, allowing students in rural areas to access and update digital content even without a constant internet connection. The model's primary features include inexpensive Android tablets and basic phones with lightweight applications, as well as solar-powered community learning kiosks. These small, self-contained units use solar energy to power technology for education and information access in remote areas. Lessons are broken down into small segments for low-bandwidth use, and materials can be created from open resources and translated into local languages. A simple, secure, and privacy-friendly analytics tool that helps educators identify students in need of additional assistance. Training for teachers and community facilitators ensures the technology is used effectively. Learning assessments and feedback will check its impact on attendance, engagement, and basic literacy. Early results show that well-designed, low-cost EdTech can improve student participation, digital skills, and learning outcomes while remaining practical and budget-friendly. The paper recommends policy changes that include securing funding and aligning with the objectives of inclusive and multilingual education outlined in NEP 2020.

*Keywords: Low-cost EdTech; Rural education; Offline-first; Digital literacy; NEP 2020*

Paper id: SM25.7.10

# AI–Driven Innovations in Higher Education: Trends, Barriers, and Futuristic Perspectives

Neelima Gupta, Shamshir Singh Dhillon
Dept. of Education, Central University of Punjab, Bathinda
*neelimag0501@gmail.com*

The traditional education administration mode and student training approach appear ineffective in the light of modern technologies and require urgent innovation and reform. As society continues to develop and progress, artificial intelligence (AI) technology is being rapidly adopted in higher education, drawing increasing attention. The current use of AI in higher education has an impact on both teachers' instructional approaches and students' learning experiences. AI is more than a technological achievement; it symbolizes a paradigm shift that is transforming how knowledge is transmitted, received, and managed. Adaptive learning platforms, virtual tutors, and automated grading systems enable personalized information in the educational experience, which is enhanced by delivering more information tailored to the student's needs. The importance of avatars and virtual teachers in the educational process is revealed. AI technologies are being used to promote equitable and inclusive access to education. It gives access to marginalized people and communities, people with disabilities, refugees, those who are not in school, and those who live in remote communities, providing appropriate learning opportunities. While acknowledging that AI advancements provide numerous benefits and contribute significantly to societal progress, over-reliance on AI in education may lead to a variety of issues, including a lack of transparency, bias, job displacement, lack of creativity, privacy and security concerns, and a lack of human interaction. There is a need to invest in collaborative efforts that prioritise a socio-conscious educational system that accommodates all stakeholders while maximising the benefits of AI. Institutions must develop strategic guidelines to provide equal access to AI resources. A standardised AI system might be built by fully implementing policies and suggestions within the institution. The increasing prevalence of Artificial Intelligence (AI) in higher education underscores the need to examine its trends, challenges, and future prospects. Future research must guarantee that we understand what practices work and how to apply them effectively.

***Keywords:*** *Artificial Intelligence, Edutainment, ChatGPT, Personalized learning, Higher education, Augmented reality, and Virtual reality*

Paper Id: SM25.7.11

# Artificial Intelligence: An Enabler for Education 4.0

Shalu, Brahmjit Singh
Dept. of Electronics and Communication Engineering
National Institute of Technology Kurukshetra -136119
*62300015@nitkkr.ac.in*

In the current times, we are witnessing phenomenal advancements in technology space. These technological developments are making impactful interventions in the education system also. This has led to immense transformations in all dimensions of the eco-system of education. The intervention of technology has given the birth to Education 4.0. Further, the Education 4.0 is envisaged to be in synergy with Industry 4.0. The goal of this synergy is to equip our students with necessary capabilities to successfully face the challenges of future world. The right education prepares an individual on both personal and professional life and hence the Education 4.0 aims at producing the graduating students equipped with 21$^{st}$ century skills and sense of responsibility towards the self-, society, nation, and the planet. The education system is required to produce the youth with problem solving abilities along with collaborative and adaptable mindset. In the wake of imperatives of the education, Artificial Intelligence (AI) is set to play an immensely significant role in preparing the youth ready for future world. It is regarded as the most powerful technological force of 21$^{st}$ century. In this paper, we present a critical review of the enabling power of artificial intelligence to address the prominent challenges of quality education.

## Section 8

## Health Sciences and Traditional Medicine

***Track Chair: Dr. Nitin Bansal***

Health Sciences and Traditional Medicine aim to integrate modern medical research with the wisdom of traditional healing systems. It provides a forum for healthcare professionals, researchers, and academicians to share insights on preventive healthcare, wellness, and evidence-based traditional practices. This section underscores the importance of a holistic approach to health, combining science and tradition for building healthier world.

**Paper id: SM25.8.1**

# Artificial Intelligence Transforming Healthcare: Innovations, Applications, and Future Directions

[1]Sonia Suneja, [2]Rajneesh Talwar, [2]Manvinder Sharma
[1]Chandigarh University, [2]Chitkara University, Chandigarh
*dca.soniasuneja@gmail.com*

Artificial Intelligence (AI) is rapidly reshaping healthcare, offering transformative improvements across diagnostics, therapeutics, and patient management. This paper reviews key AI innovations in medical imaging, precision medicine, drug discovery, robotic assistance, and ambient assisted living, synthesizing insights and evidence from leading research. By integrating AI technologies, healthcare systems can enhance clinical workflows, enable individualized treatment, reduce costs, improve surgical outcomes, and expand care accessibility. This paper explores how Artificial Intelligence (AI) is rapidly reshaping healthcare across multiple domains, including diagnostics, therapeutics, and patient management. It examines key AI innovations such as machine learning and deep learning, focusing on their applications in medical imaging, precision medicine, drug discovery, robotic-assisted surgery, and ambient assisted living. The paper highlights how AI integration enhances clinical workflows, supports personalized treatment plans, reduces healthcare costs, and improves patient outcomes. Additionally, it discusses the role of AI in transforming electronic medical records through natural language processing and the challenges associated with data privacy, interoperability, and ethical concerns.

Paper id: SM25.8.2

# Charaka AI: A Retrieval-Augmented Generative Assistant for Ayurveda and Indian Healthcare

Ipsha Singh, Shivangi Mamgain, Khushi Mittal, Ashish Bagwari
Women Institute of Technology, Dehradun
*ipsha.singh28@gmail.com*

Healthcare AI systems face significant cultural calibration gaps, where models trained on Western biomedical data fail to represent diverse traditional medicine systems and culturally grounded health practices. This limitation is particularly pronounced in Ayurveda, where diagnostic approaches differ fundamentally from conventional Western medical paradigms. Existing AI healthcare assistants lack domain-specific knowledge and cultural sensitivity required for trustworthy guidance within traditional Indian healthcare frameworks. We present Charaka AI, a novel retrieval-augmented generation (RAG) system designed for Ayurvedic and Indian healthcare applications. The system integrates large language models (GPT/Gemini) with a culturally curated knowledge base encompassing classical Ayurvedic texts (Charaka Samhita, Sushruta Samhita), structured medicinal herb databases, validated home remedies, and expert-reviewed community contributions. Our approach employs FAISS vector database technology for efficient semantic retrieval, enabling real-time response generation grounded in authoritative traditional medicine sources.The key innovation lies in integrating multiple complementary components addressing critical limitations in existing healthcare AI systems. The system features a multilingual, culturally aware interface supporting regional Indian languages with personalization based on geographical and constitutional factors. A human-in-the-loop validation mechanism incorporates expert Ayurvedic practitioners to ensure clinical safety and cultural appropriateness, while a community contribution framework enables scalable knowledge expansion through expert oversight. This architecture provides contextually grounded, culturally sensitive responses aligned with traditional healthcare practices. Charaka AI establishes a paradigm for bridging traditional medical wisdom with AI technology, offering a scalable framework for culturally grounded healthcare assistants.

**Paper id: SM25.8.3**

# Impact of sunlight exposure and outdoor activities on the development of Myopia

Hemant Pal
Indira Gandhi University Meerpur, Haryana
*hemant.dops@igu.ac.in*

Recent scientific literature highlights a strong correlation between increased outdoor activity, sunlight exposure, and the reduction in risk of myopia (near-sightedness) in children and adolescents. With myopia rapidly emerging as a global public health concern—projected to affect nearly 50% of the world's population by 2050—there is an urgent need for scalable, low-cost preventive strategies. This work presents the development of an innovative device designed to accurately measure sunlight exposure in children, enabling the assessment of time spent outdoors in relation to myopia prevention and progression. The integration of such technology can support data-driven approaches to promote healthier vision among school-aged children. These findings hold significant implications for public health and educational policy. Encouraging outdoor activities through curriculum design, school infrastructures planning, and awareness programs can play a pivotal role in safeguarding the vision of future generations. In line with the vision of building a vibrant Bharat by 2047, this initiative underscores the importance of preventive eye health as a foundational element of national development.

Paper id: SM25.8.4

# Breastfeeding for a Healthier Planet: Linking Maternal Care, Immunity, and Sustainability

*Meenakshi Choudhary[1], Gaurav Sharma[1], Ajay Kumar[2]*
*[1] Centre for Rural Development and Technology, Indian Institute of Technology Delhi, New Delhi*
*[2] Department of Environmental Science and Technology, Central University of Punjab, Bathinda*
*cmeenakshi1111@gmail.com; ajay.evst@cup.edu.in*

Breastfeeding serves as the cornerstone of infant and maternal health while contributing to a healthier planet. It provides complete nourishment to newborns during the first six months and continues to meet significant nutritional needs up to two years. Colostrum, the first milk or "yellow gold," is rich in immune-protective components such as immunoglobulins (IgA, IgM, IgG), white blood cells, and human milk oligosaccharides that collectively safeguard infants against a wide range of bacterial, viral, and parasitic infections. Beyond infant health, breastfeeding benefits mothers by promoting uterine recovery, reducing postpartum depression, aiding weight regulation, and lowering risks of breast and ovarian cancers, hypertension, and diabetes. Environmentally, it offers a sustainable, cost-effective, and waste-free alternative to formula feeding. Despite challenges faced by working mothers, proper milk expression and storage practices can help sustain breastfeeding. Furthermore, during the COVID-19 pandemic, studies indicate that breast milk is not a vector for viral transmission, while offering critical immune protection through antibodies. Encouraging breastfeeding practices at community, institutional, and policy levels can thus enhance public health, support sustainable development, and foster stronger human-nature connections for a healthier planet.

***Keywords:*** *Breastfeeding; Maternal and child health; Sustainable nutrition; Environmental sustainability; Innate immunity*

## Section 9

## Sports, Physical Education and Well Being

***Track Chair: Dr. Lakha Singh***

Sports and physical education make an integral part of education system. These activities nurture physical health and mental well-being. They are also important in improving mental health by alleviating and preventing the conditions like anxiety, depression, and restlessness. Regular physical activities provide immense physical and mental health benefits. This section aims to derive insights on developing physical fitness, health awareness, and better social interaction. It also highlights the impact of physical activities on the social skills and team spirit.

Paper id: SM25.9.1

# Comparative Effects of Plyometric and Resistance Training on Agility Among Male Athletes

Manpreet Kaur, Dalvinder Singh, Sonia Saini
Dept. of Physical Education, Punjab University Chandigarh
*kourm679@gmail.com*

The present study was designed to determine the comparative effects of a twelve weeks Plyometric Training and Resistance Training on the development of agility among male athletes. Methodology: Total forty-five (N=45) athletes who were undergoing training at Sports Council Sports Complex, Sector-42 were selected by using random sampling technique. The age of the subjects was ranged between 13-16 years. Further, the subjects were randomly assigned into two Experimental Groups i.e. Plyometrics Training Group, Resistance Training Group and One Control Group. Each group consists of 15 subjects. Tools Used: Agility of the subjects was measured by administering T-Test developed by Donald S. Semenic (1990). Statistical Application: Normality of data was verified by using the Kolmogorov–Smirnov Test and Shapiro-Wilk. Since the data follows a normal distribution, therefore, Analysis of Co-Variance (ANCOVA) was applied to see the effects (Pre, Mid and Post) of different training methods. Scheffe's post-hoc test was applied to find out the degree and direction of differences, where 'F' ratio was found significant. The level of significance was set at 0.05. Results: Results of Analysis of Co-Variance (ANCOVA) regarding the variable Agility (T-test) revealed significant differences among the Pre, Mid and Post test scores in respect of plyometric training group, resistance training group while comparing with the control group. The results of post-hoc test revealed that the plyometric training group performed significantly better than the control group. Similarly, resistance training group had also demonstrated better on the variable agility as compared to the control group. However, while comparing the comparative effects of both the experimental groups i.e. plyometrics training group and resistance training group, statistically insignificant differences were observed between both the groups.

Paper id: SM25.9.2

# The Validation of Scientific Tools in officiating During Sports

Mansi Kaushik, Manjeet Singh, Paramvir Singh
Punjabi University, Patiala, Punjab
smanjitt@gmail.com

Sports organization, administration, and officiating is a broad area in the management skills of the competitive world of sports. More specifically officiating, the sports events, have been very important role during the tournament. In recent time, there are so many techniques and technologies used for the assistance in officiating. This paper "The validation of Scientific Tools in officiating during Sports" evaluated the validity of the different tools to identify the impact of officiating. To establish the validation of the questionnaire, 'two validity methods are used': face and content validity. For assessing the face and content validity a panel of 10 experts has been engaged. The experts were selected from different area related to sports and based on academic qualifications, professional experience, coaching and research contribution. The questionnaire was sent to experts in the form of soft copy and hard copy. In face validity, the experts were sent the suggestions for the improvement in the questionnaire. Based on expert's suggestions, modifications were made to correct the structure and content of the items in the questionnaire further sent to experts for content validity to assessed the relevancy of the questionnaire. To assess content validity, the I-CVI (Item-Content Validity Index) and S-CVI (Scale-Content Validity Index) was calculated. The items that did not fulfill the minimum values were revised or eliminated from the questionnaire. For the each item, the calculated values were, I-CVI Score is (0.92) and S-CVI Score is (0.92) and was quite satisfying for the statistical consideration for the sake of research and evaluations.

## Section 10:
## Agriculture, Food and Vet Sciences

***Track Chair: Dr. Neelesh Sharma***

Animals have been an integral part of human civilization, contributing not only to agriculture, transportation, and food security but also to ecosystems and biodiversity. However, challenges in animal health—ranging from zoonotic diseases to emerging infections and nutritional deficiencies—threaten to disrupt these contributions. It is here that technology can serve as our greatest ally. Globally, we lose over 20% of livestock productivity annually due to diseases, translating into losses of more than $300 billion, according to the Food and Agriculture Organization (FAO, 2021). Diseases such as African Swine Fever, Foot and Mouth Disease, Avian Influenza, and emerging zoonotic diseases like COVID-19 have highlighted the interconnectedness of human and animal health. The **World Health Organization (WHO, 2022)** and the **World Organisation for Animal Health (WOAH)** report that approximately **75% of emerging infectious diseases** in humans have their origins in animals. This underscores the critical role of veterinary health in safeguarding public health. The FAO also estimates that **livestock emissions contribute about 14.5% of global greenhouse gas emissions**, urging the need for sustainable livestock practices to mitigate climate change. In India, with its vast livestock population—the largest in the world—**animal health directly impacts the livelihoods of over 150 million rural households** (Department of Animal Husbandry & Dairying, Government of India, 2022). Despite being the world's largest producer of milk, India faces an annual economic loss of over **₹50,000 crore due to livestock diseases** (National Centre for Disease Control, NCDC, 2021). With the global population projected to reach **10 billion by 2050**, sustainable livestock production is critical. According to the FAO (2022), advances in animal health can improve food availability and affordability. Strengthening India's animal health system will reduce the risk of pandemics, as 60% of emerging zoonotic diseases originate in Asia (WOAH, 2022). Healthier livestock emit fewer greenhouse gases per unit of production, contributing to the **Paris Agreement targets** (FAO, 2021). Veterinary innovations can boost India's **₹13 lakh crore livestock economy**, uplift marginalized farmers, and expand export potential (Economic Survey of India, 2023). Let us resolve today to harness the power of technology to create a future where animal health is no longer a challenge but an opportunity—a future where science and policy synergize to ensure the well-being of all living beings. By embracing cutting-edge technologies, we have the power to not only transform animal health in India but also influence global health, sustainability, and economic growth.

Paper id: SM25.10.1

# Role of Shifting Weather Patterns on Apple Production in Shimla, Himachal Pradesh, India: Correlation and Trend Analysis of Environmental Factors

[1]Arundhati Balouria, [1]Manmeet Kaur, [2]Jasvir Kaur
[1]Chandigarh University, Mohali, [2]Punjabi University Patiala
*arundhati8992@gmail.com*

Agricultural yields in terms of quality and quantity significantly depend upon the weather of the area. The current study reports the change in area, production, and productivity of apple crop in Shimla District of Himachal Pradesh, India. The yield of apple crop in the study area has been observed over the last four decades to witness any apparent change in the production of the crop in the area. In the last decade, a significant increase in the area under apple crop production has been recorded from the area of 13558.67 ha to 26114.4 ha. Overall, around 51.9% change has been observed in the area under apple crop production. Since last thirty years there has been observed an increasing trend in apple crop production. This paper would aid in identifying the fundamental causes of such change in the area under apple crop production and, its broad assessment to ensure future output potential. The impact of different weather conditions, such as, temperature and rainfall has been quantified to develops a correlation matrix between average maximum temperature, average minimum temperature, average rainfall and average productivity of apple within the chosen time. Based on the correlation it can be concluded that warmer temperatures may increase crop production however, unusually high minimum temperatures might surpass a certain threshold. The relationship between climatic conditions and productivity has been highlighted by the fact that heavy precipitation corresponds with decreased yield, whereas average rainfall and lowest temperatures show very weak positive relationships. Mann-Kendall test has been used for analyzing the trend of apple production based on Kendall's tau, s-value and p-value. The Mann-Kendall test results highlight the need for improved production process efficiency as it shows a large increase in apple yield and cultivated area.

Paper id: SM25.10.2

# Phytochemical profile of methanol and chloroform extracts of Skimmia anquetilia N.P. Taylor & Airy Shaw using GC-MS and FTIR spectroscopy

Lenesha Manhas, Nrip Kishore, Pankaj, Pawan Kumar Verma, Neelesh Sharma
Division of Veterinary Pharmacology and Toxicology, F.V.Sc. A.H, SKUAST R.S. Pura, Jammu
*leneshamanhas2096@gmail.com*

To explore novel anti-diabetic phytochemicals based on traditional uses, the leaves of the plant Skimmia anquetilia N.P. Taylor & Airy Shaw were collected from Chattergala Pass, Bhaderwah, Jammu. The leaves were shade-dried, ground to a fine powder, subjected to maceration, and extracts were prepared using chloroform and methanol. The phytochemical characterization of the chloroform and methanol extracts of leaves was carried out using GC-MS and FTIR spectroscopy. FTIR spectral analysis exhibited characteristic absorption bands confirming the presence of hydroxyl, alkyl, carbonyl, aromatic, and sulfonic functionalities. In the chloroform extract, broad absorption around 3313 cm -1 indicated – OH stretching, while peaks at 2924-2856 cm -1 corresponded to aliphatic C-H stretching. A strong band at 1710 cm -1 suggested C=O stretching, and bands near 1373-1233 cm -1 were associated with C-O and S=O stretching vibrations. The methanolic extract revealed absorption peaks at 2920-2852 cm -1 for C-H stretching, 1722-1718 cm -1 for C=O stretching, and prominent signals between 1373-1155 cm -1 corresponding to C-O, S=O, and aromatic vibrations. These findings have been corroborated by the GC-MS analytical st udy. The chloroform extract revealed the presence of major bioactive phytoconstituents such as Methoxsalen, 3,7 Octadiene-2,6-diol,2,6-dimethyl (linalool isomers), n-Hexadecanoic acid, Naphtho [1,2-b] furan-2-one, and Furo [2,3-b] quinolone derivatives. The GC-MS analysis of methanolic extract revealed major constituents such as phenol, 2H-1-Benzopyran-2-one, Methoxsalen, linalyl acetate, 1-Ethynylcyclododecanol, and Furo [2,3-b] quinolone derivatives. It has been indicated as antidiabetic in available literature and used by local folks in diabetes control. Following the FTIR and GC-MS analysis, the extracts are subject to screening for their anti-diabetic properties.

*Keywords: Skimmia anquetilia, GCMS, FTIR, Methoxsalen, Furo [2,3-b] quinolone*

Paper id: SM25.10.3

# Soil Health in Agriculture and Significance of Sustainable Sil Practices for Crop Protection

Anushka Sharma[1], Sugandha Mishra[2], Dhirendra Kumar[1],
Wajid Hasan[3], Sheetanshu Gupta[4], Dilip Kumar Jha[5]
[1] Dept. of Botany, CBLU, Bhiwani, [2] Dept. of Environmental Science, Govt. (PG) College for Women, Rohtak, [3] Dept. of Entomology, KVK Jehanabad, Bihar Agricultural University, Bihar, 4 Dept. of Plant, Biochemistry, College of Food Technology, Central Agriculture University, Imphal, Manipur, 5 Dept. of Aquaculture, Agriculture and Forestry University, Rampur, Chitwan, Nepal
*dhirencblu@gmail.com*

The concept of soil health extends beyond a mere assessment of soil fertility; it encapsulates the intricate web of relationships between physical, chemical, and biological properties that collectively determine a soil's capacity to support plant life. In agriculture, where the demand for food is ever-increasing, comprehending soil health is tantamount to unlocking the full potential of agricultural productivity. The nexus between soil health and crop protection is at the heart of sustainable agriculture. This section underscores the critical importance of adopting sustainable soil practices as a proactive approach to safeguarding crops against a myriad of challenges, ranging from pests and diseases to the impacts of climate change. As global agriculture confronts the consequences of environmental degradation and climate variability, embracing sustainable soil management practices becomes imperative. Sustainable practices such as organic farming, cover cropping, reduced tillage, and integrated nutrient management are not mere alternatives; they are essential components of a resilient agricultural system. By nurturing soil health, these practices create an environment that naturally fortifies crops against diseases and pests. Organic farming, for instance, emphasizes the use of natural inputs and eschews synthetic chemicals, fostering a balanced ecosystem where beneficial organisms can thrive. Cover cropping helps prevent soil erosion, enhances biodiversity, and contributes organic matter, bolstering the soil capacity to support plant life. Reduced tillage minimizes soil disturbance, preserving the structure and microbial communities crucial for soil health. Integrated nutrient management involves optimizing the use of organic and inorganic fertilizers, ensuring a judicious balance that benefits both crops and the soil.

*Keywords: Soil Health, Crop Rotation, Nutrients, soil compositions, soil types*

Paper id: SM25.10.4

# A Quick Impression of Soil Pollution and its Consequences on Today's Society

Aarti[1], Neeraj Kumar[2], Dhirendra Kumar[3], Manoj K. Teotia [4], Vineeta Shukla [4], Suresh Aluvihara [5]
[1] Dept. of Botany, CBLU, Bhiwani [2] Dept. of Botany and Plant Physiology, CCS HAU, Hisar, [3] Centre for Research in Rural and Industrial Development, Chandigarh [4] IIMT University, Meerut,
[5] Dept. of Chemical and Process Engineering, University of Peradeniya, Sri Lanka
*dhirencblu@gmail.com*

Degradation of the soil is a serious problem that impacts every part of the nation and is a key building weakness. These pollutants, which are mostly produced by microbial activity and the breakdown of organisms in the soil, include metals, inorganic ions, salts, and organic chemicals. Furthermore, a variety of compounds can be introduced into the soil via atmospheric substances such precipitation water, wind, soil disturbances, surface water bodies, and shallow groundwater. Soil pollution happens when the concentrations of these pollutants are higher than they should be. Loss of vegetation, impeded plant growth, and development, and ultimately soil degradation resulting in erosion and desertification are all effect of soil pollution. Anthropogenic and natural causes are two primary sources of soil pollution. The use of herbicides, pesticides, and fungicides to protect the crops from pests, fungi etc, alter the basic composition of soils and make it toxic for plant growth. The construction process and human health are both impacted by soil, which is essential to sustainable economic and social growth. To promote ecological advancement and guarantee ecological safety at home, soil protection is essential. Pollutants in soil at levels endanger both human health and the environment. Organic insecticides-DDT, aldrin, benzene hexachloride etc. are used against soil borne pests. They accumulate in the soil as they degrade very slowly by soil and water bacteria causing deleterious effect on plant growth and reducing the yield and size of fruit. Their degradation products may be absorbed by the plants further it reaches to the animals and human through the food chains. Intensification of agricultural production by practices of irrigation (causes salination), excessive fertilizers, pesticides, insecticides etc. have created the problems of soil pollution. It can be checked by restricting the use of soil pollutants, resorting to organic farming, adopting better agriculture practices etc. Soil pollution comprises the pollution of soils with materials, mostly chemicals that are out of place or are present at concentrations higher than normal which may have adverse effects on humans or other organisms.

*Keywords: Anthropogenic Contaminants, Pollutants, Insecticides, DDT, Toxic residues*

Paper id: SM25.10.5

# Determination of the efficacy of bacteriocin produced by LAB against pathogenic strains and use of bacteriocin as bio preservative in fruit juices

Kaur Rajveer, Neena Aneja
S.D. College for Women, Moga
*rajrajveerkaur1991@gmail.com*

Lactic acid bacteria are the components of dairy products and are considered as the perfect carriers of *Lactobacilli* (Mohan *et al*. 2013). As fruits are rich in saccharides, they also provide a suitable medium for the growth of *Lactobacilli*. The bacteriocin isolated from lactic acid bacteria can be used as biopreservative in fruit juices and nutritional value of juices can be enhanced (Soomro *et al*. 2002). *This study aims at identifying* the antibacterial activity of *Lactobacillus acidophilus* NCDC 343 against various strains of pathogenic bacteria *like Staphylococcus aureus, Pseudomonas fluoroscens, Acinetobacter, Bacillus subtilis* and *E.Coli.* The strain of *Lactobacillus acidophilus* NCDC 343 was procured from NDRI, Karnal. Culture was revived in MRS broth and incubated at 37˚C for 24 hours. Bacteriocin was isolated from the culture after 24 hours of incubation because protein is maximum at 24 hours of incubation. The juice sample was inoculated with test strain @8.14 log CFU/ml to induce contamination. Antibacterial activity of *Lactobacillus acidophilus* NCDC 343 was determined by agar well diffusion assay (Sumathi and Reetha, 2012) against test strains procured from IMTECH, Chandigarh. 100 µl of cell free supernatant (bacteriocin) was added in the wells dug on agar plates spreaded with 50 µl of test strain . Then the plates were incubated at 37˚C for 24 hours and zone of inhibition was observed around the wells Antibacterial property of *Lactobacillus acidophilus* NCDC 343 (bacteriocin) was observed against *Staphylococcus aureus, Pseudomonas fluoroscens, Acinetobacter, E.coli* and *Bacillus subtilis* by well diffusion assay. Clear zones of inhibition (Z.I.) of *Lactobacillus acidophilus* NCDC 343 cell-free supernatant (bacteriocin) were observed against 4 strains i.e. *Staphylococcus aureus* (Z.I. 2 cm), *Pseudomonas fluorescens* (Z.I. 1.5 cm) ,*Acinetobacter* (Z.I. 1.5 cm) and *E.coli* (Z.I. 1 cm).No zone formation was observed against *Bacillus subtilis.* Bacteriocin isolated from LAB showed a high antimicrobial activity thus can be successfully used as bio preservative in fruit juices.

***Keywords:*** *Bacteriocin, bio preservation, fruit juice, Lactobacillus acidophilus NCDC 34*

## Section 11:

## Environment, Sustainability and Water Resources

***Track Chair: Dr. Ashwani Sharma***

This section on Environment, Sustainability, and Water Resources focuses on addressing global environmental challenges through innovative and sustainable practices. It brings together researchers, environmentalists, and policymakers to share insights on climate resilience, biodiversity conservation, and efficient water resource management. This section underscores the collective responsibility of safeguarding natural resources to ensure a sustainable and harmonious future for generations to come.

Paper id: SM25.11.1

# Environmental Learning: Cultivating Eco-Consciousness for Sustainable World

Upinder[1], Shamshir Singh Dhillon[2]
[1]Dept. of Education, Central University of Punjab, Bathinda.
[2]School of Education, Central University of Punjab, Bathinda.
*shamshir.dhillon@cup.edu.in*

Environmental education, emphasizes the value of sustainable living, encourages individuals to actively participate in environmental preservation, and installs a respect and knowledge of the environment that is an essential part of contemporary education. It seeks to create environmentally aware individuals who are informed, concerned, and motivated to take action for the preservation and enhancement of the environment. A healthy cohabitation of humans and the natural world is promoted by environmental education, which tackles topics like biodiversity, sustainability, and ecological stewardship. Environmental education is an interdisciplinary strategy that combines environmental knowledge with the development of the skills and attitudes necessary for responsible environmental management. It aims to raise people's understanding of ecological principles and how humans impact the environment, enabling them to make informed decisions and adopt sustainable practices. It must be introduced in Curriculum and Teaching Methodologies, for planning strategies to integrate environmental topics throughout a range of courses, such as science, geography, and social studies, to improve understanding and involvement. Additionally, environmental education employs experiential learning strategies like field trips, volunteer work, and practical exercises. The roles of educators, institutions, Teachers and educational institutions have a big impact on environmental consciousness. This means not only imparting knowledge but also fostering an environmentally conscious culture in the community and school by modeling sustainable conduct. Advocacy and Engagement play one of the major roles to impart important aspects of environmental education. Environmental education is encouraging active participation in environmental conservation projects, participating in community initiatives, endorsing sustainable legislation, and promoting eco-friendly practices like recycling, energy conservation, and biodiversity preservation are all part of this. Challenges of environmental education include innovation, interdisciplinary collaboration, and the development of novel teaching strategies. Lastly by watching different aspects of environmental education around the world reflects cultural, geographic, and economic conditions. It is necessary to address global environmental problems like pollution, deforestation, and climate change. Environmental education is essential for producing a generation of informed, responsible citizens capable of managing environmental concerns. Keywords: Environmental education, recycling, energy conservation, and biodiversity, deforestation, endorsing sustainable legislation, and climate change.

Paper id: SM25.11.2

# An Outlook on Water Management and Plant Protection as Keys to Sustainable Development

Sugandha Mishra[1], Neeraj Kumar[2], Dhirendra Kumar[3], Manoj Kumar Teotia[4], Jatinder Garg[5], Ashutosh Nigam[6]
[1]Dept. of Environmental Science, Govt. (PG) College for Women, Rohtak,
[2]Dept. of Botany and Plant Physiology, CCS HAU, Hisar,
[3]Dept. of Botany, CBLU, Bhiwani, [4]Centre for Research in Rural and Industrial Development, Chandigarh, [5]Central University of Himachal Pradesh, Dharamshala, [6]Dept. of Management Studies, JC Bose Univ. of Science & Technology, Faridabad
*dm41008research@gmail.com*

Water scarcity is a growing concern globally, and agriculture is a major consumer of freshwater resources. Precision water management addresses this concern by optimizing water usage, thereby contributing to sustainable agricultural practices. By minimizing over-irrigation, it reduces the risk of water logging, soil erosion, and nutrient leaching, all of which can have detrimental effects on plant health. The water management represents a pattern shift in agricultural practices, utilizing advanced technologies to optimize the use of water resources. At its core, precision water management involves the precise application of water, considering variability in soil, weather conditions, and crop water requirements. This departure from traditional irrigation practices is made possible through the integration of sensor technologies, data analytics, and automated systems. The objective is to move away from uniform water application across entire fields and towards targeted, site-specific water delivery. In the context of precision water management, soil moisture monitoring plays a pivotal role.

Various sensor technologies, such as soil moisture sensors and densitometers, are employed to assess the moisture content at different depths in the soil. This real-time data provides valuable insights into the soil's water-holding capacity, allowing farmers to tailor irrigation schedules based on the specific needs of the crops. Automated irrigation systems further enhance precision by enabling the timely and accurate delivery of water, often incorporating weather forecasts and plant water stress indicators. The significance of precision water management extends beyond mere water conservation; it intersects with the broader goal of plant protection.

Paper id: SM25.11.3

# An Outline on Current Perception of Noise and Light Pollution

Sakshi[1], Neeraj Kumar[2], Dhirendra Kumar[1], Manoj Kumar Teotia[3], Vineeta Shukla[4], Sugandha Mishra[5], Suresh Aluvihara[6]

[1]Dept. of Botany, CBLU, Bhiwani, [2]Dept. of Botany and Plant Physiology, CCS HAU, Hisar, [3]Centre for Research in Rural and Industrial Development, Chandigarh, [4]IIMT UNIVERSITY, Meerut, [5]Dept. of Environmental Science, Govt. (PG) College for Women, Rohtak, [6]Dept. of Chemical and Process Engineering, University of Peradeniya, 20400, Sri Lanka,

*medhirendra01@cblu.edu.in , dhirencblu@gmail.com*

Noise and light pollution, both forms of anthropogenic environmental disturbances significantly disrupt natural ecosystems by interfering with organisms sensory perception, particularly affecting nocturnal behaviour and circadian rhythms, with detrimental impacts on wildlife ranging from altered migration patterns to disrupted breeding cycles, while also impacting human health through sleep disturbances and stress, high lighting the need for mitigation strategies to reduce excessive artificial light and noise levels in urban environments. Noise and Light pollution are pollutants out of seven environmental pollutions that take place in the world. These two pollutants are two that are often not talked about as much they should be. Noise pollution is any harsh loud noises or sounds that affects human. Also, light pollution is when human made objects or any source of light is turned on during the day causing the sky or places to be too lit up to where the stars cannot view very well .Fireworks are a good example to use when talking about light pollution because it covers up the sky when the explosions are set up causing stars to be hidden. The primary objective of addressing noise and light pollution is to minimize negative impacts on human health, wildlife, and ecosystems by reducing excessive noise and artificial light levels, thereby preserving natural night time environments and promoting overall well-being. In commercial areas, the permitted noise level is 65 dB during the

day and 55 dB at night. In residential areas, the permissible noise levels is 55 dB during the day and 45 dB at night. Car horns are 90 dB and Bus horns are 100 dB. Precisely, noise becomes harmful when it exceeds 75 dB and is painful above 120 dB. So .we all should we aware about these pollutions and take immediate steps to reduce pollution. Noise and light pollution are affecting our societies and animal environments .These pollutants do negative damage that should not be ignored, but brought up and made awareness. There is factual evidence and experiments on how bad it is and damaging to people and animals. So, there should be awareness that how we reduce noise and light pollution.

Paper id: SM25.11.4

# Environmental Cost of Tourism Reinforcing Urban Gentrification

Gaurika Singh, Sunita Meena
Miranda House, University of Delhi
*gaurika2421*@gmail.com

There has been a rapid transition from simple classifications of professional and leisure tourism influenced by temperature variations, to emerging concepts of religious tourism and e-tourism after the first decade of 2000s. This study examines dynamic relation and causation of how tourism brings urban gentrification and cause an impact on climate of the host state. Sustained footfall growth, when weakly regulated, leads to mounting stress on landforms, changing land-use pattern around sacred precincts, degrading water quality, air quality and increasing pressure on municipal services. North India has witnessed an upsurge in religious Tourism in the last decade. Uttarakhand, with increasing high-altitude pilgrim-traffic, has faced severe impact on forest cover, water resources, and slope stability; while Uttar Pradesh illustrates the strain that crowd-intensive religious events such as Maha Kumbh place on rivers and urban waste systems. Religious tourism will escape the scrutiny of being examined for having detrimental effects on climate, however, it is essential to consider carrying capacity of a state and the sustainable management of activities to ensure they do not harm the environment. This is evident via Tourism Board(s) inflow data, accommodation capacity, increase in solid waste per day, fluctuating AQI and water indices and River Cleansing programs. The growing appeal and attraction of North-East India raise further concern. in states like Assam, which is facing same fate as hilly cities of Uttarakhand following expansion of its urban borders and rising pollution as one enters from Meghalaya (South). Nature tourism in Meghalaya and Sikkim, though well-managed by local population participating in economic activities at tourist destinations, face imminent danger to their ecology, natural resources and even culture if confronted with unregulated mass tourism & vehicle inflow. The North-Eastern frontier calls for attentive policy windows of prevention rather than remediation and cost of damage control at later stages. Sustainable governance of religious tourism must move beyond tokenized environmental measures and must integrate stricter assessments of carrying capacity, green infrastructure investment, and community-centered policies. Carbon Footprint tracking procedures, environmental police, and compliance charges on individuals, and not only manufacturers, and systems such as Pfand will provide incentives for the state to uphold environmental regulations and prioritize ecological considerations over economic interests.

***Keywords:*** *Ecology, Symbiosis, microbiome, Phyllosphere, Rhizosphere, Antimicrobia*

## Section 12:

## Culture, Arts and Heritage

***Track Chair: Dr Ravi Prakash***

Culture, arts, and heritage form the timeless foundation upon which societies stand. They bind communities with shared memories, values, and creative expressions that transcend generations. Each tradition, craft, and artistic endeavor carries the imprint of human imagination and resilience, narrating stories of who we are and where we come from.

Art, in all its forms—music, dance, painting, theater, literature, and craftsmanship—is the language of the human spirit. It bridges differences and opens doors to empathy and understanding. Whether through the rhythmic beat of traditional drums, the intricate strokes of folk paintings, or the melody of classical compositions, art captures the essence of cultural identity.

Heritage, both tangible and intangible, reminds us of our ancestry and the collective wisdom preserved through monuments, rituals, architecture, and oral traditions. Preserving heritage is not merely about restoring artifacts or protecting monuments—it is about nurturing a living legacy that continues to inspire the future. Today, as globalization brings the world closer, preserving and promoting our cultural diversity becomes ever more vital. Through cultural celebrations, artistic exchanges, and education, we sow the seeds of respect and pride in our heritage.

Culture, the arts, and heritage are not relics of the past; they are living forces that shape modern identity and community harmony. Let us continue to honor them, for in their preservation lies the enduring beauty and spirit of humanity, and inspire future generations to honor diversity while fostering a shared global identity.

Paper id: SM25.12.1

# Bhartiya Culture for Sustainability

Thakur Sudesh Kumar Raunija[1,2,3,4]
[1]Dept. of Physics, CBLU, Bhiwani, Haryana, Bharat
[2]FSD, Semi-Conductor Laboratory, SAS Nagar, Punjab
[3]Dept. of Holistic Education, Vidya Bharti Institute of Training and Research Trust, Mohali
[4]Institute of Training and Research, Vidya Bharti Institute of Training and Research Trust, Mohali

Bhartiya culture stands as one of humanity's most ancient and multifaceted living heritages, exemplifying a seamless confluence of spirituality, philosophy, art, science, engineering, technology, architecture, and ethical values. Grounded in the eternal tenet of Vasudhaiva Kutumbakam — "the world is one family" — it embodies a profound commitment to coexistence, tolerance, universal harmony, and sustainable coexistence with nature. From the timeless wisdom enshrined in the Vedas and Upanishads to the expressive realms of classical dance, music, literature, and crafts, Bhartiya culture manifests as a dynamic continuum of tradition and transformation.

Its intrinsic strength lies in its pluralistic character — a vibrant synthesis where diverse religions, languages, and philosophical schools interact fruitfully, enriching the collective cultural consciousness while preserving their individuality. The Bhartiya worldview, guided by the principles of Dharma (righteous duty), Karma (conscious action), and Ahimsa (non-violence), also emphasizes ecological balance and stewardship of natural resources as an essential moral duty. This holistic integration of spirituality and sustainability offers enduring lessons for harmonious human progress.

In the contemporary context, as Bharat emerges as a key global contributor, its civilizational ethos continues to inspire models of innovation, resilience, and sustainable living. The vitality of Bhartiya culture rests not merely in its antiquity but in its adaptability — its enduring capacity to integrate modern aspirations with a deeply rooted spiritual, ethical, and ecological consciousness. This work will detail the rich Bhartiya culture from the Vedic and Upanishadic foundations to the modern-day pursuit of sustainable development.

***Keywords:*** *Vedas, Dharma, Karma, Ahimsa, Vasudhaiva Kutumbakam*

## Section 13:

## Language and Linguistics

***Track Chair: Dr. Anshu Sailpar***

Language and linguistics play a vital role on the global platform, facilitating international communication, cultural exchange, and economic cooperation. As the world becomes increasingly interconnected, language serves as a bridge between nations, enabling the sharing of ideas, knowledge, and innovations. Linguistics, the scientific study of language, contributes to this process by providing insights into language structure, language acquisition, and language use, informing language teaching, language policy, and language technology. The importance of language and linguistics is evident in various domains, including global business, diplomacy, education, and cultural exchange, where effective communication is crucial for success. Moreover, language and linguistics help promote cultural understanding, tolerance, and peace, highlighting the need for language preservation, language documentation, and language revitalization efforts to support linguistic diversity and multilingualism in the global community. Furthermore, language and linguistics are essential for addressing global challenges such as language-based discrimination, language barriers in healthcare and education, and language-related inequalities in access to information and opportunities. As the world continues to evolve, the role of language and linguistics will only continue to grow, making it imperative to prioritize language-related initiatives and promote linguistic diversity and inclusivity in global discourse.

**Paper id: SM25.13.1**

# Negotiating Identities through Language: A Sociolinguistic Perspective

Anshu Sailpar
Chaudhary Bansi Lal University, Bhiwani
*anshu.english@cblu.ac.in*

Identity is multidimensional and dynamic. Sociolinguistics provides frameworks to understand how language reflects and shapes social identities. Language serves as a crucial medium for negotiating and expressing identities. The present paper will examine how individuals employ linguistic strategies to construct, perform, and navigate multiple identities through a sociolinguistic lens. Focusing on contexts like multilingual urban settings, it explores mechanisms of code-switching, language choice, and stylistic variation in identity negotiation. It will highlight the dynamic interplay of language, context, and identity. Furthermore, it recognizes that identity is not a fixed attribute but a fluid construct that individuals continuously reshape in response to social interactions and power relations. Linguistic practices often signal group membership, cultural affiliation, or resistance to dominant norms. By analyzing everyday communicative practices, this study seeks to uncover how speakers actively position themselves and others in social hierarchies. It also considers how language ideologies influence identity formation, reinforcing or challenging existing social boundaries. Ultimately, this exploration underscores the role of language as both a product and a driver of identity construction in diverse sociocultural landscapes.

*Keywords: Identity, language, sociolinguistics, multilingual, code-switching.*

Paper id: SM25.13.2

# The Cage of Hypocrisy: A Counter-discourse against Oppressive Patriarchal and Religious Institutions in Banu Mushtaq's Heart Lamp

Sarita Yadav
Department of English, Central University of Punjab
*sanasarita09@gmail.com*

The paper argues that the collection systematically unveils how institutional religious life, represented by hypocritical male guardians, functions as a "cage of hypocrisy" to secure social control, particularly over women. Through close readings of a few of the most significant such tales as "Black Cobras," "Fire Rain," and "Heart Lamp," an attempt will be made to demonstrate that how figures such as the mutawalli (mosque trustee) purposely invoke Islamic teachings—such as polygyny, law of inheritance, and ritual purity—in ways that allow them to consolidate their own power while preventing women from asserting their simple fundamental right to justice, equality and assistance. But Mushtaq's writing is not merely documenting oppression. This reading also explores the resourceful counter-narratives of women's piety and resilience that emerge when the doors of the mosque, both real and symbolic, are closed to women. Against institutional breakdown, female characters develop alternative sites of moral power and spiritual strength. From Aashraf's frantic watch in the mosque itself ("Black Cobras") and Zulekha Begum's intellectual defiance of patriarchal readings of Sharia, to the women's community-wide, wordless condemnation and Salma's life-preserving action in "Heart Lamp," the tales map a geography of women's resistance off-stage from the official religious arena. The core objective of the paper will be to argue that Heart Lamp richly depicts the inability of an ill-advised religious system to offer comfort or fairness, but also commemorates a steadfast, frequently interior, female belief that emerges as the authentic location of ethical conflict and survival.

Paper id: SM25.13.3

# भारतीय भाषिक विविधता में हिंदी की केंद्रीय भूमिका

Girdhari Lal
Assistant Professor
Shri Sanwaliyaji Government College Mandaphia Chittorgarh, Rajasthan
*girdhareelal31@gmail.com*

भारत अपनी विशिष्ट भाषिक विविधता के लिए विश्वभर में प्रसिद्ध है। यहाँ अनेक भाषाएं और बोलियाँ हैं जो भारतीय संस्कृति की बहुलता और समृद्धि को दर्शाती हैं। इन विविध भाषाओं के बीच हिंदी एक ऐसी भाषा है जो संपर्क, एकता और समझ का सांस्कृतिक सूत्र बनकर उभरती है। हिंदी की संवैधानिक पहचान अनुच्छेद 343 से 351 तक भारत के भाषाई ढाँचे को सुदृढ़ करती है, जिससे यह राजभाषा के रूप में न केवल प्रशासनिक बल्कि भावनात्मक एकता का प्रतीक बनती है ।हिंदी का स्वरूप अनेक भारतीय भाषाओं जैसे संस्कृत, प्राकृत, उर्दू, मराठी, बंगला, पंजाबी, गुजराती, तेलुगु, तमिल आदि की भाषिक संपदाओं को आत्मसात कर विकसित हुआ है। इस प्रकार हिंदी भारतीय समाज की साझा सांस्कृतिक चेतना का प्रतिनिधित्व करती है और भाषाई सह-अस्तित्व को नई दिशा देती है। हिंदी ने साहित्य, मीडिया, शिक्षा और प्रशासन के माध्यम से क्षेत्रीय भाषाओं के बीच संवाद स्थापित किया है और विविधता में एकता का जीवंत उदाहरण प्रस्तुत किया है।यह अध्ययन हिंदी की उस केंद्रीय स्थिति का विवेचन करता है जो भारत की बहुभाषिक संरचना में समन्वय का कार्य करती है। निष्कर्षतः कहा जा सकता है कि हिंदी केवल राजभाषा नहीं, बल्कि भारतीय भाषिक विरासत का केंद्रबिंदु है, जो देश की सांस्कृतिक विविधता को एक सूत्र में बाँधती है।

**कीवर्ड्स:-** भाषा, बोली, विविधता, सांस्कृतिक, संचार

Paper id: SM25.13.4

# Decoding Illness Discourses: Analyzing Thomas Mann's *The Magic Mountain*

Ayush Rathore
Department of English Literature
Central University of Punjab

In this paper, we attempt to address illness in the novel *The Magic Mountain* by Thomas Mann and its multiple discourses in the narrative. It will bring out latent aspects of illness by analysing social, cultural, and psychological dimensions. It will also analyse how illness becomes a personal identity and social construct, narrative techniques and subjective interpretation related to illness in the text, love as an illness, illness as a metaphor and illness as a medical and administrative instrument. This research will contribute to a deeper understanding of the illness and how it is constructed, represented, and interpreted in literary studies.

*Keywords: Illness, Corporeality, Loss of agency, Collective experience, Cultural pattern practices, Romanticizing illness*

## Section 14:

## Vocational and Skill based Education

***Track Chair: Prof. Kamlesh Prasad***

This thematic section on Vocational and Skill-Based Education emphasizes the importance of practical learning and hands-on training in preparing youth for employability and entrepreneurship. It provides a platform for educators, industry experts, and policymakers to discuss innovative models that bridge the gap between education and workforce needs. It also highlights the role of skill development in empowering individuals, promoting self-reliance, and driving economic growth.

Paper id: SM25.14.1

# Role of Private Sector in Enhancing Skill Development among Punjab's Youth

Amrish Dhawan, Varinder Mohan Singh, Yadwinder Singh
Universal College Patran
*amrishdhawan@gmail.com*

Skill development has emerged as a critical policy focus in India to tackle youth unemployment and bridge the gap between education and employability. In Punjab, where youth migration and joblessness are pressing issues, the involvement of the private sector in skill development holds significant potential. This study explores the role of private enterprises—both through direct training initiatives and public-private partnerships—in equipping Punjab's youth with industry-relevant skills. The research employs a mixed-methods approach, combining primary data collected through surveys and interviews with trainees, corporate representatives, and government officials, along with secondary data from reports of the National Skill Development Corporation (NSDC), Punjab Skill Development Mission (PSDM), and private CSR disclosures. It examines the effectiveness, reach, and challenges of private sector-led skill development programs across various sectors such as manufacturing, IT, and textiles Findings indicate that while the private sector contributes meaningfully to skill training—especially through CSR initiatives and partnerships with government schemes—challenges remain in scalability, quality control, rural outreach, and post-training employment. The study concludes with policy recommendations aimed at strengthening private sector involvement through improved coordination, incentives, and regulatory support. This research highlights the untapped potential of private sector engagement in making skill development more responsive, inclusive, and employment-oriented in the state of Punjab.

*Key words : Skill Development, Private Sector, Youth Employability, Public-Private Partnership*

Paper id: SM25.14.2

# Assessing the Effectiveness of Vocational Training in Enhancing Employment Opportunities in Punjab

Sanjay Gupta, Sanjeev Bansal
Sant Longowal Institute of Engineering and Technology, Longowal
*sanjgupta41@gmail.com*

Vocational training plays a pivotal role in equipping the workforce with industry-relevant skills that enhance employability and support economic growth. This study evaluates the effectiveness of vocational training programs in Punjab, focusing on their impact on employment opportunities among youth. Utilizing a mixed-methods approach, the research analyzes data collected from program participants, training institutions, and employers to assess skill acquisition, job placement rates, and income improvement. The study identifies key factors influencing the success of vocational training, including curriculum relevance, quality of instruction, and industry collaboration. Findings indicate that well-structured vocational programs significantly improve employment prospects and contribute to bridging the skill gap in Punjab's labor market. The paper concludes with policy recommendations aimed at optimizing vocational training frameworks to ensure sustainable employment and socioeconomic development in the region.

*Keywords: Vocational Training, Employability, Skill Development, Youth Employment, Punjab*

Paper id: SM25.14.3

# The Role of Women Professors in Promoting Entrepreneurship: Insights from Punjab and Chandigarh Universities

Shivani Nagpal, Sanjeev Bansal

Saint Longowal Institute of Engineering and Technology, Longowal
*ped2513_shivani@sliet.ac.in*

Entrepreneurship is increasingly recognized as a driving force of India's growth and self-reliance, inspired by the vision of Atmanirbhar Bharat. Recent national initiatives such as the 'chips to ships' mission and policies to strengthen startups highlight the country's commitment to fostering innovation and entrepreneurship. This momentum is also evident in Punjab and Chandigarh, where programs like the Punjab Startup and Innovation Policy, the SHE (Startup Handholding & Empowerment) initiative, and efforts such as Panjab University's BioNEST seed fund, Campus Tank Punjab, and entrepreneurship-focused courses in universities are cultivating creativity, risk-taking, and entrepreneurial learning among students. Within this evolving ecosystem, women professors hold a pivotal yet often very less recognized role. They act not only as educators but also as mentors and role models who inspire students to translate ideas into ventures. However, systemic challenges such as gender bias, limited leadership representation, and weak institutional support restrict their visibility and impact.<br/>This study explores the role of women professors in entrepreneurship academia and critically examines the barriers that limit their contributions. Through a review of policies, institutional practices, and existing literature, it underscores the need for gender-sensitive policies, structured mentorship frameworks, and supportive environments. The findings reaffirm that empowering women professors is not merely an issue of equity but a strategic imperative to inspire future entrepreneurs, strengthen regional ecosystems, and accelerate India's transition toward a knowledge-driven, innovation-led economy.

*Keywords: Entrepreneurship, Women Professors, Innovation, Mentorship, Higher Education*

Paper id: SM25.14.4

# From Learning to Earning: Strengthening Skill Development in Punjab

Harshit Singla
Sant Longowal Institute of Engineering and Technology
*1913002@sliet.ac.in*

Punjab has a large and energetic youth population, but many lack the practical skills needed for modern jobs and entrepreneurship. This paper focuses on how effective skill development can transform education into employability — truly taking youth "from learning to earning." It examines the gap between classroom learning and industry needs, reviews existing government and private training schemes, and identifies the sectors with the highest potential for skilled employment in Punjab. The study highlights strategies such as industry-linked apprenticeships, hands-on training, digital skills, and entrepreneurship mentoring. By strengthening skill development at the grassroots level, Punjab can not only reduce unemployment but also create a workforce that drives innovation and local economic growth. The paper concludes with actionable recommendations for policymakers, training institutes, and employers to collaborate and build a stronger ecosystem that turns young learners into confident earners. The paper emphasizes the importance of inclusivity, future-ready skills, and sustained mentorship to ensure long-term impact. It argues that skill development should go beyond short-term courses and be integrated with digital learning, soft skills, and entrepreneurial training to meet emerging industry demands. By focusing on local training hubs, public–private partnerships, and innovative funding models, Punjab can empower not just urban youth but also rural and marginalized groups. This expanded approach will help transform the state's demographic potential into a resilient, innovative, and self-reliant workforce prepared for the challenges of a rapidly changing economy. Ultimately, Punjab's youthful energy into a powerful growth. It stresses that coordinated action among all stakeholders can close the gap between education and employment. With the right strategies, Punjab emerge as national model for skill development, entrepreneurship, and sustainable economic progress.

Paper id: SM25.14.5

# Assessing the Impact of Skill Development Programs on Employment Outcomes in the field of Plastics technology: A Longitudinal Study

Amit Chawla
Sant Longowal Institute of Engineering and Technology
ped2465_amit@sliet.ac.in

The employment-oriented Skill Development Training Programmes are gradually increasing the livelihood of the underprivileged & unemployed youth of the country. These programmes are not only empowering individuals but are also effectively addressing industry requirements by providing skilled manpower capable of operating high-cost machinery and ensuring the production of good quality products. In the past, the plastics industry often struggled to find skilled machine operators in various states and had to rely on talent from a few specific regions. However, this scenario is gradually changing. Today, industries across different states are increasingly able to find domain experts and trained operators locally. As the daily consumption of plastic products continues to rise, the demand for raw materials is also increasing. This surge is driving increased production levels in the plastics industry and significantly boosting the need for skilled manpower to operate advanced machinery and maintain quality standards. With the growing daily consumption of plastic products, the demand for plastic raw materials is also rising. This surge leads to an increase in the production of plastic goods, thereby further boosting the demand for skilled manpower. The socio eco statuses of these underprivileged youths are drastically improving. Even, the Middle-East countries, Viz., Dubai, Oman, Abu Dhabi are accepting the Indian Institutes Trained Operators. The plastics industry plays a pivotal role in modern manufacturing and industrial development, contributing significantly to economic growth and job creation. However, the sector faces persistent challenges, including skill shortages, obsolete technology, and the demand-supply gap in skilled manpower. In response, various public and private initiatives have implemented skill development programs aimed at bridging these gaps. This paper presents a longitudinal study assessing the effectiveness of these skill development initiatives.

Paper id: SM25.14.6

# GST 2.0—A Stress Test to Create a Boost in the Economy

[1]Kirna Rani, [2]Pankaj Kumar, [3]Sanjeev Bansal
[1]Shaheed Bhai Daila Ji Senior Secondary School, Longowal, [2]Akal Group of Technical and Management Institutions, Mastuana Sahib, [3]Sant Longowal Institute of Engg. and Technology Longowal, Sangrur (Punjab)
*kirangoyal2906@gmail.com*

The introduction of Goods and Services Tax (GST) in India in 2017 marked a pivotal shift in the nation's indirect taxation framework, aiming to unify a fragmented system into a single, destination-based levy. However, as the economy evolved amid global disruptions like the COVID-19 pandemic and geopolitical tensions, the original GST structure revealed limitations in compliance, rate complexity, and revenue buoyancy. Enter GST 2.0, a comprehensive reform package announced in September 2025 following the 56th GST Council meeting. This paper conceptualizes GST 2.0 as a "stress test" for India's fiscal architecture—one that imposes short-term revenue pressures but catalyzes long-term economic vitality. Drawing on empirical analyses and theoretical frameworks from taxation economics, we examine the reform's structural simplifications, rate rationalizations, and procedural enhancements. Through a review of scholarly literature, including meta-analyses of GST's macroeconomic impacts, we argue that GST 2.0's reduction of tax slabs to primarily 5% and 18%, alongside nil rates for essentials, could unleash a consumption surge equivalent to 1.6% of GDP, offsetting initial fiscal strains with accelerated growth, reduced inflation, and enhanced formalization. Utilizing secondary data from academic journals and books on Indian taxation, this study employs a qualitative synthesis augmented by econometric insights to project a 0.8% GDP uplift. The findings underscore the reform's potential to fortify federal fiscal relations while positioning India as a resilient $5 trillion economy. Policymakers must prioritize implementation efficacy to mitigate transition risks, ensuring this stress test evolves into a sustained economic booster.

Paper id: SM25.14.7

# Vocational and Skill based education in the Digital Age: Integrating Industrial Training, Craft Traditions, Workforce Readiness and Digital Humanities for Sustainable Futures

Manisha Berwal, Sonpreet, Kamlesh Prasad, Mahesh Arora
Sant Longowal Institute of Engineering and Technology Longowal
*mberwal1007@gmail.com*

Vocational and skill-based education plays a very important role in bridging the gap between traditional academic learning and the practical needs of the job market which equips the learners with practical knowledge and job ready competencies. Unlike the conventional education which often emphasizes theoretical knowledge vocational training focuses on hands-on skills, industry specific competencies and real-world applications. This form of education empowers individuals with employable skills , enhance productivity and supports economic development by addressing labor market demands . With the growing emphasis on entrepreneurship , self- reliance , fashion design , digital transformation, and many more vocational educations have become increasingly relevant in both developed and developing nations. Through short term course certificates learners gain direct access to employment opportunities in sectors such as health care, information technology , construction, hospitality, and manufacturing. As government and industries collaborate to modernize and expand vocational training programs, this educational approach is emerging as a key driver of inclusive growth and sustainable development.

*Key words: Skill, traditional , competencies , employability, inclusive , sustainable , productivity, manufacturing .*

Paper id: SM25.14.8

# Equipping Youth for the Future: A Study on Vocational Training and Employability

Devangini Bhardwaj, Dr. Mani Kant Paswan
Sant Longowal Institute of Engineering and Technology
*devangini5922@gmail.com*

Vocational education is pivotal in bridging the gap between education and employment, particularly for youth entering a dynamic labor market. This paper examines the role of vocational diploma programs, with a focus on the Sant Longowal Institute of Engineering and Technology (SLIET), in enhancing employability. Through analysis of curriculum structure, industry partnerships, and placement outcomes, the study identifies key strengths and challenges within vocational training frameworks. The findings suggest that vocational education institutions, through practical training and strong industry linkages, significantly contribute to workforce readiness. However, continuous curriculum updates and emphasis on soft skills development remain necessary for future-proofing youth employability.

Paper id: SM25.14.9

# Vocational and Skill based Education

Mona Sharma
Blue Bells Model School, Gurugram
*mona0549@yahoo.com*

Vocational and skill-based education plays a very important role in bridging the gap between traditional academic learning and the practical needs of the job market which equips the learners with practical knowledge and job ready competencies. Unlike the conventional education which often emphasises theoretical knowledge vocational training focuses on hands-on skills, industry specific competencies and real-world applications. This form of education empowers individuals with employable skills , enhance productivity and supports economic development by addressing labour market demands . With the growing emphasis on entrepreneurship , self-reliance , fashion design , digital transformation, and many more vocational educations has become increasingly relevant in both developed and developing nations. Through short term course certificates learners gain direct access to employment opportunities in sectors such as health care, information technology , construction, hospitality, and manufacturing. As government and industries collaborate to modernise and expand vocational training programs, this educational approach is emerging as a key driver of inclusive growth and sustainable development.

*Key words: Skill, traditional, competencies, employability, inclusive, sustainable, productivity, manufacturing .*

# Section 15

## Section 15: Bhartiya Knowledge System

***Track Chair: Dr. V K Singh***

This section of the conference delves into the profound legacy of India's intellectual and philosophical heritage, emphasizing its critical role in shaping education, science, and culture across the centuries. As we look back on this rich tradition, it becomes evident how deeply the Bhartiya Knowledge System has influenced the global intellectual landscape. The section aims to provide a platform where ancient wisdom, traditional learning methods, and their application in contemporary education are explored. By doing so, it serves as a bridge between the past and present, helping to integrate valuable knowledge that continues to hold relevance today. Particularly, this segment highlights the potential of Bhartiya values and ethics to nurture holistic development. In a world where societal harmony is essential for collective progress, the ancient teachings of India offer valuable lessons. This session emphasizes how these traditional principles can significantly contribute to character building, ensuring that individuals not only excel academically but also develop a strong sense of ethics and responsibility toward society. Through this integration of time-honored values with modern educational frameworks, we can pave the way for sustainable development. This approach fosters not just intellectual growth, but also personal development and social well-being, creating an environment that nurtures balanced, compassionate, and innovative minds for the future.

Paper id: SM25.15.1

# Understanding of the Indian Youth on the Indian Knowledge System (IKS) and Its Importance

Dr. Bala Lakhendra
Department of Journalism and Mass Communication
Banaras Hindu University, Varanasi
*drbalalakhendra@gmail.com*

The broad term "Indian Knowledge Systems" (IKS) refers to the extensive and varied knowledge traditions that have grown up on the Indian subcontinent. These include traditional sciences (such as Ayurveda and Classical Astronomy), mathematics (including Vedic mathematics traditions), classical and folk literatures, philosophical ideas, the arts, and socio-institutional practices. IKS has emerged from the periphery of educational policy discourse in recent years. The National Education Policy (NEP) 2020 calls for the systematic reconstruction and incorporation of elements of IKS in education, both in higher education and in schools, and expressly acknowledges IKS as a significant component that should be incorporated into research agendas and curriculum.

This study explores the perspectives of modern Indian youth regarding the Indian Knowledge System (IKS) and assesses its significance for education, culture, and addressing current challenges. This study also looks at how Indian youth now perceive the Indian Knowledge System (IKS) and trying to understand its significance for education, culture, and modern problem-solving. The paper synthesizes existing findings, identifies factors shaping youth perception, highlights the potential benefits and risks of mainstreaming IKS, and makes recommendations for policy, pedagogy, and further research. It does this by drawing on policy documents (particularly the National Education Policy 2020), government IKS initiatives, recent institutional developments, and empirical studies on student awareness. While IKS has increasing institutional support, the argument goes that youth awareness and meaningful engagement are uneven. Integration of IKS must be evidence-based, pedagogically sound, and mindful of academic rigor and pluralism to fulfil its educational and societal potential.

**Keywords:** *Indian Knowledge System (IKS), Indian Youth, youth perceptions, National Education Policy (NEP) 2020, curriculum, pedagogy, cultural knowledge, India*

Paper id: SM25.15.2

# The Contributions of the Indian Knowledge System in Wireless Communication: Role of Sir Jagdish Chandra Bose

Brahmjit Singh, Shalu
ECE Deptt. National Institute of Technology Kurukshetra
*brahmjit.s@gmail.com, 62300015@nitkkr.ac.in*

Wireless communication is one of the most transformative technologies in today's era. In the late 19th century, experiments of Sir Jagadish Chandra Bose laid foundational principles for modern radio communication and microwave engineering. However, more often the contributions of the Indian knowledge system (IKS) in this technology domain get overlooked. Sir J.C. Bose is popularly known for his research in plant sciences, but indeed he was a man of many talents — a physicist, botanist, biologist, technologist, and even a science fiction writer. This paper examines his contributions in the field of wireless communication, including his early demonstrations of electromagnetic wave generation, transmission, and detection, use of dielectric lenses, horn antennas, and crystal detectors. These pioneer innovative developments predated many later developments in the field of radio communication. Acknowledging other pioneering contributions from ancient India, this article offers a broader perspective on its scientific importance. Overall, this study emphasizes the need to recognize and integrate the knowledge and innovations of the Indian Knowledge System in advancing modern science and technology.

*Key words: Sir J.C. Bose, Wireless communication, Indian Knowledge System, Microwave engineering*

Paper id: SM25.15.3

# Artificial Intelligence Tools and Frameworks for the Indian Knowledge System: A Comprehensive Review of Methods and Applications

[1]Jatin Gupta, [2]Vishal Goyal, [3]Jahnavi
[1]Chitkara University, [2]Punjabi University, [3]TIET Patiala
*jatin.gupta.1988@ieee.org*

The Indian Knowledge System (IKS) represents a vast collection of traditional sciences, philosophies, and cultural practices that have evolved over thousands of years. With the rise of digital technologies, the preservation and interpretation of this heritage have become both possible and necessary. Artificial Intelligence (AI) offers new ways to document, translate, and analyze ancient Indian knowledge in languages, medicine, art, and education. This paper presents a comprehensive review of AI tools that are currently being used or developed for the Indian Knowledge System. It discusses natural language processing models for Sanskrit and regional languages, computer vision methods for manuscript and artifact digitization, and knowledge graph tools for organizing philosophical and scientific ideas. The review highlights government and academic initiatives such as Bhashini, AI4Bharat, and the AICTE-IKS program that promote AI-driven cultural preservation. Key challenges, including data scarcity, script complexity, and ethical interpretation, are analyzed. The paper concludes with recommendations for creating culturally sensitive, explainable, and integrated AI frameworks that align with the holistic values of IKS. The study emphasizes that AI should not only serve as a technical aid but also as a medium for reawakening indigenous ways of knowing and learning in the digital era.

Paper id: SM25.15.4

# समग्र विकास की अवधारणा

Nidhi Kansal, Coordinator,
Eskuares Fisiovirtual Institute, Delhi
*nidhimtech@gmail.com*

ज्ञान सदैव से ही भारतीय जीवन शैली और संस्कृति की मूल अवधारणा में अंतर निहित रहा है, और ज्ञान प्राप्ति ही सर्वदा जीवन का श्रेष्ठतम लक्ष्य निर्धारित किया गया है। भारतीय संस्कृति के सभी आधार बिंदुओं को स्वंय में समेटे हुए यह समय चक्र प्रदर्शित करता है, समग्र विकास का एक सम्पूर्ण दृष्टिकोण।



भारतीय दर्शन सदा ही संवाद पर आधारित्य रहा है कि विवाद पर। समग्र विकास का मूल आधार व्यवहार ज्ञान है। यानी किस प्रकार का व्यवहार हमें परिवार में, समाज में, या स्वंय से भी करते हैं, यहीं निर्धारित होता है कि हमारा विकास कितना हुआ या हममें कितने विकसित होने की संभावनाएं हैं। व्यवहार ज्ञान का आधार बनता है अपना स्वंय का समग्रस्वास्थ्य  प्राणी के समग्र स्वास्थ्य के निम्नलिखित आयाम हैं :

शारीरिक क्षमता यानी तत्वज्ञान i मानसिक क्षमता यानी आत्मज्ञान i सही आजीविका चुनना यानी ज्योतिज्ञान

यदि अपना समग्र स्वास्थ्य ठीक रख पायें तो ही अपना अपना विकास संभव है। भारतीय संस्कृति के तकनीकी आधार बिन्दु कहते हैं: कर्म वो चुनो जो समाज के किसी भी वर्ग को किसी भी तरह का नुक़सान न पहुँचाय कर्म वो चुनो जिसकी मदनी प्रदूषित ना हो कर्म वो चुनो जो आपके प्रति किसी और को ईर्ष्या करने के लिए मजबूर ना करे ऐसा पैसा नहीं कमाना जो लोभ को बढ़ाये अपने को अनुकूल और प्रतिकूल स्थियों के लिए सदा तैयार रखना और अपनी सीखने की क्षमताओं का निरंतर विकास स्वर्ग और नर्क की vibrations की पहचान होना अति आवश्यक है। कर्म को execute करने हेतु पूर्ण ज्ञान सीखना अति आवश्यक है और इसमें dedication जरूरी है, इसी को भक्ति कहा गया है। कोई कर्म बिना शक्ति के execute हो नहीं सकता। जितनी शक्ति चाहिए वो पहले हम अर्जित करें कोई भी काम समय से पूर्ण करना ही अपेक्षित परिणाम दे सकता है कार्य शुरू करने के लिए सही I

Paper id: SM25.15.5

# From Oral Lore to Digital Discourse: Mass Communication through the Lens of Indian Knowledge Systems

Ravi Prakash
Department of History, Chaudhary Bansi Lal University, Bhiwani, Haryana
*profraviprakash74@gmail.com*

The communication traditions of India represent one of the most sophisticated and enduring systems of knowledge transmission in human history. From the oral recitation of the Vedas to the algorithmic structuring of digital discourse, Indian communication has continuously evolved while retaining its moral, philosophical, and dialogic foundations. This paper examines the transformation of Indian knowledge systems across historical epochs — from oral, written, and performative cultures to print and digital media — and analyses their relevance for modern mass communication. Drawing on classical epistemological frameworks such as pramāṇa (valid means of knowledge), śabda (verbal testimony), and rasa (aesthetic emotion), the study explores how ethical and cognitive principles rooted in ancient philosophy inform the structure, style, and intent of contemporary communication. Through an interdisciplinary lens combining cultural studies, communication theory, and Indian philosophy, the paper investigates the adaptation of traditional communication ethics within journalism, advertising, digital storytelling, and artificial intelligence. The study concludes that Indian epistemology provides a unique foundation for developing media systems that are not only technologically advanced but also ethically grounded and culturally resonant.

*Keywords: Indian knowledge systems, mass communication, oral tradition, epistemology, dharma, digital media, rasa theory, communication ethics*

Paper id: SM25.15.6

# Indigenous Metallurgical Wisdom of Ancient India: A Blueprint for Sustainable Industrial Practices

Gaurav Sharma[1], Shamsher Singh[2], Sujeet Kumar Thakur[3]
[1]Centre for Rural Development and Technology, Indian Institute of Technology Delhi
[2]Dept. of Computer Science, AB College Pathankot, Punjab
[3]FITT, Indian Institute of Technology Delhi
*gks107@gmail.com*

Ancient India possessed one of the most advanced metallurgical traditions in the world, characterized by technical excellence, environmental consciousness, and sustainable material utilization. This review explores key metallurgical innovations including wootz steel, the corrosion-resistant Delhi Iron Pillar, and zinc distillation at Zawar that illustrate India's early mastery of alloy design, smelting, and refining. These technologies, developed through empirical experimentation and guided by indigenous knowledge systems, demonstrated remarkable efficiency with minimal environmental impact. Renewable biomass served as fuel, closed crucible systems ensured emission control, and waste materials were often reused, embodying modern principles of circular economy and green manufacturing. Analytical studies of ancient artifacts reveal sophisticated control over microstructure, composition, and processing conditions that parallel current metallurgical engineering objectives. By integrating ancient Indian metallurgical wisdom with modern sustainability frameworks, industries can achieve energy-efficient production, waste minimization, and ethical material design. This review underscores the scientific significance of traditional Indian metallurgy as a model for contemporary eco-friendly manufacturing, advocating the revival and reinterpretation of indigenous technologies to meet present-day sustainability goals.

***Keywords:*** *Ancient Indian Metallurgy, Wootz Steel, Sustainable Manufacturing, Indian Knowledge Systems, Green Metallurgy.*