2014 ANNUAL REPORT

MEMORIES OF IIT INDORE'S 1ST CONVOCATION

Research and Laboratories: IIT Indore's strength

INDIAN INSTITUTE OF TECHNOLOGY INDORE

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AR RnD -*Neeraj Kumar [July 2013- March 2014]*

Security Officer –*Ajit Kumar Bhagat [April 2013 – Sept 2013]*

Officer on special duty -*Pargat Singh*

Officer on special duty -*J.N. Kayarkar [April 2013 – Aug 2013]*

Chief Engineer -*S.P. Raghunath [July 2013 onwards]*

Superintendent Engineer -*N. Varma [Sept 2013 onwards]*

Executive Engineer (Electrical) –*Saroj Mallick*

Executive Engineer (Project) -*Atul Kumar Pandey*

Asst. Workshop Manager –*Anand Petare*

Sports Officer –*Ritesh Guchhait*

System Manager -*Koushik Mondal*

Dy. Librarian -*Anjali Bandiwadekar*

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Counsellor - *Monika Gupta*

CONTENTS

Prof. Pradeep Mathur

DIRECTOR'S MESSAGE

The fifth year since the IIT Indore began its academic programmes has been one of the most eventful. Firstly, the last bit of land pending for transfer was finally handed over to the institute. With all of the campus land in hand, the institute could begin its construction work. Director's office, the entire Estate Section, the Sophisticated Centre and some other research laboratories have shifted into the permanent campus in a building constructed within four months.

New site office and Sophisticated Instrumentation Centreat Simrol

Our second batch of students received their degree in the Convocation held on June 5, 2014 with the Former President of India, Bharat RatnaDr. A.P.J. Abdul Kalam as the Chief Guest. Six PhD students, the first batch from IIT Indore, also received their doctorate degrees in the same convocation.

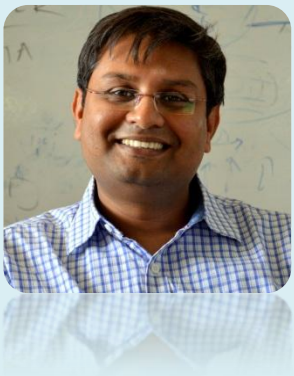
Heavy focus on developing state of the art facilities to augment the institute's research and development programmes has borne fruit as according to Scopus, IIT Indore now stands at the first position amongst all eight new IITs. High quality output also was seen in the award of several national and international recognitions such as those from the Indian National Academy of Sciences, the National Academy of Sciences, India, the Korea Robotics Society and an international honoriscausa doctor of science. Students have excelled in undergraduate and PhD level research projects and once again this year saw IBM recognising our students with the IBM PhD fellowship. Our student placement record has been excellent.

The institute's social obligations through the Outreach Programme have now expanded from the student voluntary programme, Avana, to encompass schools and villages in and around Simrol. To uplift the rural sections of society, all sections of the institute are engaged in voluntary programmes in schools and villages of the area. Government Higher Secondary School, Simrol and the village of Simrol have now been formally adopted by the institute.

AVANA: at children's home

While the first four years of the institute saw a steady growth in its academic and research programmes, the fifth year has been of immense satisfaction in seeing IIT Indore bearing fruit and climb up the ranking tables. The phase-wise shift into its own campus gives a tremendous boost to our morale and we now look forward to fulfilling our dreams of making IIT Indore truly world class.

COMPUTER SCIENCE AND ENGINEERING



Dr. Abhishek Srivastava
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Dr. Abhishek Srivastava *(PhD: University of Alberta, Canada; Assistant Professor, Rose-Hulman Institute of Technology, USA)* is the Head of the Discipline of Computer Science and Engineering. His research comprises development of novel techniques of web-service composition in dynamic environments. Further, his research explores the possibilities of using mobile devices for effectively hosting web-services.

Mobile devices are ubiquitous,but these devices collectively have tremendous untapped computing capability. The research group of Dr Srivastava is looking into this by way of utilizing these devices for web-service provisioning. Working on the concept of Service-Oriented Crowdsourcing over mobile devices the group is looking to eliminate the need for centralized infrastructure computing support for hosting web-services.Further, the group is working towards utilizing fundamental properties of nature such as the behavior of raindrops, friction, the properties of cellular membranes and others to come up with novel techniques for web-service composition. The group has been able to demonstrate increased efficiency in forming composite web applications 'on the fly' using such techniques.

Dr.Kapil Ahuja
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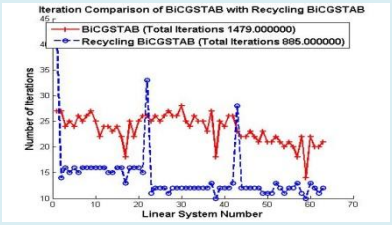
Dr. Kapil Ahuja (PhD: Virginia Tech, USA; Postdoctoral Research Fellow: Max Planck Institute, Germany) has a varied background, including degrees in Computer Science, Mathematics, and Mechanical Engineering. He has recently received the prestigious DAAD (German Academic Exchange Service) award for summer visit to TU Braunschweig.



Dr. Kapil Ahuja works on applying mathematics and computation to solve science and engineering problems. Specifically, his research focuses on efficiently solving linear and nonlinear systems of equations as well as optimization.

Application areas include: study of crack propagation in an airplane wing; finding optimal material distribution in a domain using topology optimization; micro-electro-mechanical systems (MEMS) design using model reduction; and study of electronic structure and properties of materials using quantum Monte Carlo (QMC), etc.

Dr. Gourinath Banda
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Dr. Gourinath Banda*(PhD: Roskilde University, Denmark; MSEngg: University of Southern Denmark, Denmark; Chief Engineer: Samsung Software Engineering Labs, Noida, India; Scientist Fellow: National Aerospace Laboratory, Bangalore, India)* works on: (i) formal verification technologies such as model checking, abstract interpretation and static analysis; (ii) Real-time systems' (such as kernels, RTOSs, applications, avionics, etc.) design and their formal analysis; (iii) Enhancing user-experience of devices; (iv) Embedded interventions for zeroing power wastage and (v) Energy aware computing tech.

Research Interests:
Formal analysis of safety critical systems;
Real-time systems design and analysis;
Software engineering and Rigorous analysis techniques for Cyber-physical systems, Embedded systems, Mechatronics Systems and Green devices and technologies.

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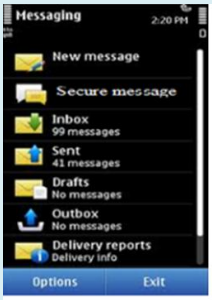
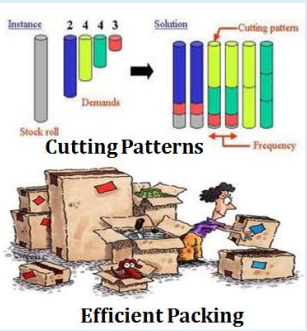
Dr. Narendra S. Chaudhari *(PhD: IIT Bombay; Associate Professor: School of Computer Engineering, Nanyang Technological University (NTU), Singapore; Professor/Reader of Computer Science in M.Sc. (DRDO) program of Ministry of Defense, Government of India)*He has done significant research on game AI, novel neural network models like binary neural nets and bidirectional nets, context free grammar parsing, and graph isomorphism problem.



End-to-end Secure SMS

Secure Value Added Services for Mobile Users



Efficient Packing

Prof. Choudhari together with his team of research scholars has developedefficient and secure authentication and key agreement (AKA) protocols for security of cellular networks. These AKA protocols are extended to provide secure delivery of value added services using SMS and end-to-end SMS security to multiple recipients simultaneously where authentication server is able to handle multiple requests in a batch.

Prof. Choudhari's recent interests in optimization algorithms have resulted in the design of methods for generating high quality solutions for the cutting and packing challenges. The problem of one dimensional cutting stock problem deals with generating patterns for cutting the available raw stock that results in minimum trim loss. The strip packing problem involves packing of small items into a large container (called as strip) such that the resulting height of packing layout is minimized.

Prof. Choudhari, together with his research students, has recently investigated minimum-sum diameter clustering algorithms. While 2-Cluster minimum-sum diameter clustering problem has polynomial complexity, 3-Cluster minimum-sum diameter clustering is NP-Complete. The research efforts have resulted in developing a new technique, based on bit-wise representation, for clusters. Computational experiments have demonstrated the savings in time when this technique was used.

Dr. Somnath Dey
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Dr. Somnath Dey (*PhD: IIT Kharagpur*). Works primary research highlights the indexing of the different biometric traits. Apart from this, his research area includes image processing, computer vision and human computer interaction.

Nowadays, there has been a significant improvement in the use of biometrics for user authentication applications. However, the different sources of attacks on the system are a growing concern when employed in security-critical applications.

Dr. Dey's group is working to provide a mechanism to generate a new biometric template which can replace the stolen template. Further, Dr. Dey's group is also looking for a security model which can protect the stored template in the database.

Dr. Surya Prakash
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Dr. Surya Prakash *(PhD: IIT Kanpur)* is anAssistant Professor. His field of research includes Biometrics, Pattern Recognition, Computer Vision and Image Processing. He is currently working on the development of efficient techniques for human recognition using face and ear biometrics. He is also involved in developing efficient techniques for indexing of large biometric databases to make the search and identification process fast.

Sample face images of different quality

Biometrics Research @ IIT Indore

Biometrics is a technology which is expected to replace key and password based traditional authentication methods which are easy to get forged. Fingerprints, face, iris, and voiceprints are commonly used biometric features. Current research work undertaken in the field of biometrics at IIT Indore by Dr. Surya's group deals with biometric authentication using various biometric traits such as face, ear, etc. The research work of this group currently involves development of techniques for assessment of quality of biometric images, image enhancement and efficient recognition.

Image quality plays an important role in the performance of a biometric system where good quality images lead to superior performance. Use of bad quality images lead to bad training and results into poor recognition. Hence there is a need of quality assessment of images before their use in training and recognition. Dr. Surya's group is working towards development of novel technique for image quality assessment without use of reference image. Among various biometric traits, face provides more direct, friendly and convenient way of recognition and is more acceptable as compared to other ways of biometric recognition. One important challenge in face biometrics is to perform recognition in presence of facial expressions. Facial expression variations, namely facial behaviour, can be positively used for face recognition. This research group is attempting to develop multi-modal face recognition framework by positively utilizing the information obtained from facial expression variations. Facial recognition also suffers from problems arising due to the variations in pose. Research work of this group focuses on recognition of face in presence of pose variations where with the help of three face images (one frontal and two profile face images); *face mosaic* is generated. The face mosaic contains the features of all three face profile images. The mosaic also includes information from ear. Use of fusion of face and ear information from the obtained mosaic leads to improved face recognition.

Dr. Neminath Hubballi
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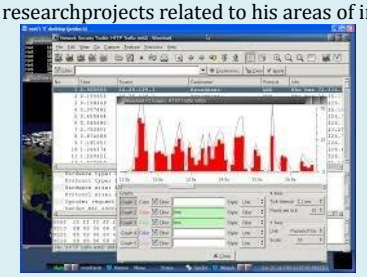
Dr. Neminath Hubballi(Ph.d from IIT Guwahati) is an assistant professor in thediscipline of computer science and engineering.His research interests are in the broad areas of system and network security,dependable computing and data mining. Previouslyhe has worked with Hewlett-Packard, Infosys Labs and Samsung R&D on the researchprojects related to his areas of interest.



Network and system security is an active research field thanks to everincreasing cyber attacks. It has a strategic importance from the defense IT infrastructure security and IT security of various financialinstitutions of nation. It involves policies and mechanismsadapted to prevent and/or monitor unauthorized access, alteration and denyingaccess to data. Monitoring of security events and data require storage and processing of network traffic, various logs from different security equipment. Given the operating speed of today's networks and diverse devices connecting to the Internet conventional storage and processing techniques are becoming inadequate. To address this, Dr. Neminath's research group is currently working on applying Big Data Analysis techniques for security monitoring. Big Data Analysis platforms have the capabilities of distributed computing and storage of data at large scale. His research group is working to leverage this to improve information security and situational awareness. Big Data Analytics can be used to analyze financial transactions, log files, and network traffic to find anomalies and suspicious activities, to correlate multiple sources of information into coherent view.

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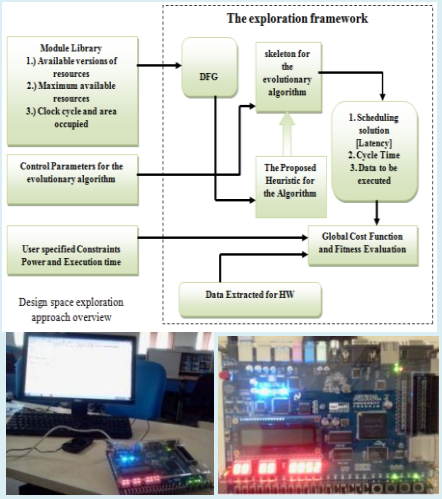
Dr. Anirban Sengupta *(PhD: Ryerson University, Canada; Visiting Research Scholar: IISc Bangalore; Researcher at OPR Lab and Member/Inventor of Technology Team with MaRS Innovation)*has expertise in design automation and high level synthesis optimization. He works on different models of optimization and synthesis of the systemswhich require extensive analysis and assessment of the design space.



The research lab of Dr. Sengupta's focuses on Architectural Synthesis using Computational Intelligence which deals with development of systems with heterogeneous optimization objective requiring extensive analysis of the design space. Selection of an optimal architecture from the design space which satisfies all the performance objectives is non-trivial for the current generation of digital processors. Based on the background mentioned above, four sub-projects have been initiated so far at IIT Indore under the title: "Development of Multi-Objective Design Space Exploration Methodologies in Architectural Synthesis of Data Intensive Applications for Application Specific Processor Design" approved under Young Scientist Scheme, DST, Govt. of India in 2013 as follows; (1) Automated Exploration of Datapath and Unrolling Factor during Power-Performance Trade-off (2) MO-PSE: Adaptive Multi Objective Particle Swarm Optimization Based Design Space Exploration (3) Automated Exploration of Datapath using Temperature Dependent Bacterial Foraging (4) Fault Secured Data Path Synthesis using EAs.

Research Achievements: (1) Based on a work done at IIT-I, a paper published in Oct 2013 from "Elsevier Journal on Advances in Engineering Software" on "MO-PSE: Adaptive Multi Objective Particle Swarm Optimization Based Design Space Exploration in Architectural Synthesis for Application Specific Processor Design" has received wide popularity in terms of being viewed/downloaded almost ~ 400 times across the world so far (2) Two book chapters written for Springer on "Design Space Exploration of Datapath (Architecture) in High Level Synthesis for Computation Intensive Applications" and "Design Flow from Algorithm To RTL using Evolutionary Exploration Approach" for a book volume "Application of Evolutionary Algorithms for Multi-Objective Optimization in VLSI and Embedded Systems" will be launched in July 2014.

Dr. Aruna Tiwari
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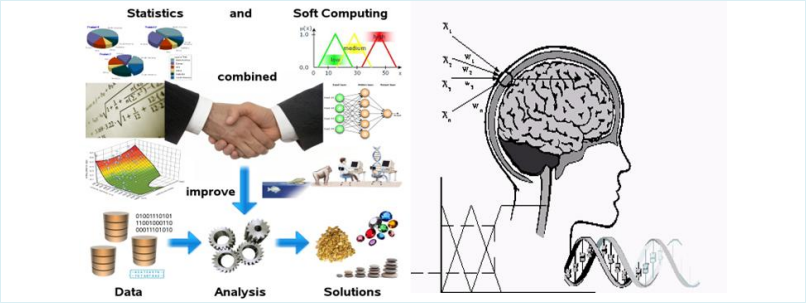
Dr. Aruna Tiwari *(PhD: RGPV Bhopal; Associate Professor: Shri Govindaram Sakseria Instt. Of Technology & Science, Indore)* works on Soft-computing Techniques, Neural Network Learning Algorithms.



To make the machine intelligent, soft-computing based learning algorithms have problems for solving classification problems due to handling large unstructured data having overlaps of data belonging to various classes, adaptation capability and unbalanced classes. Dr. Tiwari's group is working with Fuzzy based supervised and unsupervised learning algorithms with an application to Big Data Classification. The group has demonstrated the novel Genetic Programming based learning algorithm in pattern recognition domain as well. Hybrid neuro-fuzzy models are under construction to work out the cluster validation to address the problem of validity of fuzzy partitions. This can lead to better modeling of learning algorithms with efficient design of classifiers for big data handling.

ELECTRICAL ENGINEERING

Dr. Srivathsan Vasudevan
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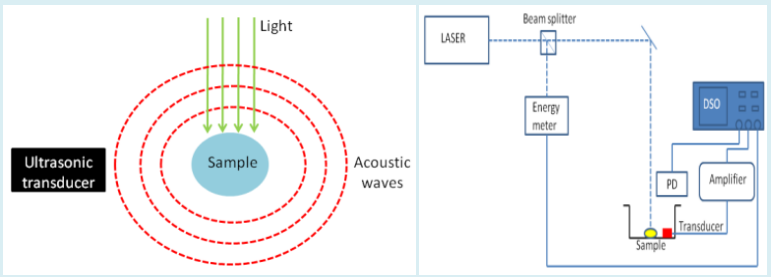
Dr. Srivathsan Vasudevan *(PhD: NTU, Singapore; Research Associate: Singapore General Hospital)* is working on photo-thermal response and photo-thermal imaging, photo-acoustic microscopy for biomedical applications, bio-photonics. He has developed a photo-thermal imaging / response system that can be used for bio-diagnostics of red blood cells.



Non-invasive characterization of tissues with abnormalities is a very important problem with respect to disease diagnostics and therapy. Dr. Srivathsan's Biophotonics Lab aims to develop photoacoustic imaging, a non-invasive multi-modal imaging technique, which can image tissues with high depth resolution and also provide additional vital information such as optical absorption contrast.
Photoacoustic imaging could find wide applications in disease diagnostics such as cancer, atherosclerosis, dermatological disorders, and peripheral microvascular complications in diabetes and also inflammatory arthritis.
Photoacoustic imaging system would be designed as a portable system with an optical fiber delivery of the laser pulses for excitation. Once the technique is perfected, this could be a portable user-friendly system suitable for a typical clinical setting.
Photoacoustic diagnostics could be utilized for diagnosis of many skin related diseases. Moreover, non-invasive monitoring would allow monitoring of the process over an extended period of time and also patient friendly. Hence successful completion of this project would aid photoacoustic diagnostics to stand as a tool for non-invasive monitoring and diagnostics.

Dr. M. Anbarasu
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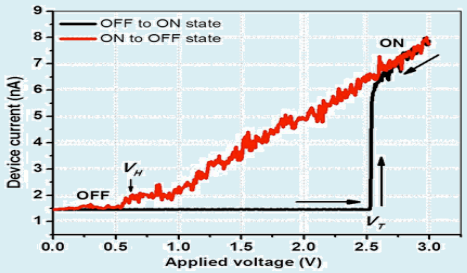
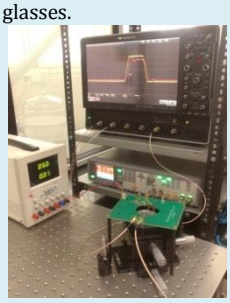
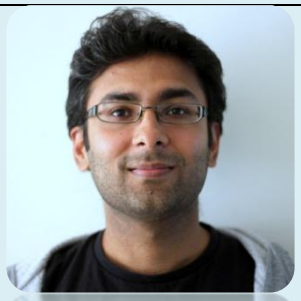
Dr. M. Anbarasu *(PhD: IISc, Bangalore;Recipient of Dr. SrinivasaRao Krishnamurthy Medal for the best Ph.D. thesis; Postdoctoral Fellow: Indian Institute of Science; Research staff: Heriot-Watt University, UK under UKIERI Project; Alexander von Humboldt Post-Doctoral Research Fellow: Institute of Physics, RWTH Aachen University, Germany)* is interested in nanoscale phase change of electronic devices, multi-bit data storage, stackable memory devices and amorphous semiconducting glasses.





Phase Change memory research Lab:
With a combination of ultrafast read-write programming characteristics, endurance, non-volatility and high-density, Phase Change Random Access Memories (PCRAM) can enable a paradigm shift for IT enterprise and data storage systems in the next few years. Dr. Anbarasu's research group mainly focuses towards development of novel high-speed, low power nanoscale PCRAM devices. His group, recently demonstrated ultra low power switching devices by means of optimization of phase change memory materials and electrode configurations. This novel configuration culminates low power threshold switching with an extremely low ON state current of ~ 8 nA as shown in the figure. The studies confirm a plausible nano-scale control over the switching behavior of GeTe based PCRAM devices.



Dr. Vimal Bhatia
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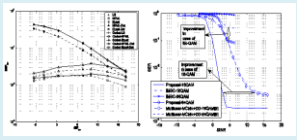
Dr. Vimal Bhatia *(PhD: The University of Edinburgh, SMIEE, SCRUM Master; Worked at various positions in Openwave, AmberFin, AudoioSoft, DTS Inc. in the UK and Hughes Software Systems, C-DOT in India)*



Dr. Vimal has mix of academic and industrial experience both in India and the UK. He completed Ph.D. from Institute for Digital Communications at The University of Edinburgh (UoE), UK in 2005 fully funded bythe UK Engineering and Physical Science Research Council (EPSRC) and The University of Edinburgh. During Ph.D. he also received IEE fellowship for collaborative research on OFDM with Prof. Falconer at Department of Systems and Computer Engineering at Carleton University, Ottawa, Canada. He heads the Signals and Software Group (SaSg) at IIT Indore, which is involved in cutting edge research and development in areas of wireless communication including communication channel estimation, equalization, and performance measurements of communication systems in high interference environment. The algorithms and techniques developed are applicable for SISO, MIMO, and various modulation techniques like OFDM, CDMA and others.

The group is also involved in general software based applications and product development. The group has interests in audio and video signal processing for improvement of QoS, Perception, Analytics, Surveillance and efficient implementations. The group is working closely with various organizations including Defence establishment like Military College of Telecommunication Engineering.Dr. Bhatia is also one of the founding faculty coordinators of Student Entrepreneurship Support Cell (www.sesciiti.in), and DST-Innovation and Entrepreneurship Development Centre at IIT Indore.

Dr. Trapti Jain
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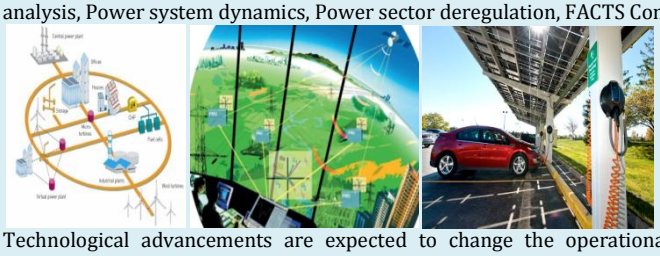
Dr. Trapti Jain *(PhD: IIT Kanpur, India; Assistant Professor at IIT Mandi until 2012)* is interested in Artificial Intelligence applications to power systems, Power system security analysis, Power system dynamics, Power sector deregulation, FACTS Controllers.



Technological advancements are expected to change the operational philosophy of tomorrow's power grid. The research group of Dr. Trapti Jain has been working towards analyzing the impact of these technologies on the operation of power systems and determining the measures needed to mitigate possible negative impact. Stable operation of microgrids, use of synchrophasor technology for security assessment of power system, optimal operation of electric vehicles and power quality monitoring are the few thrust areas of our research.

Dr. Vivek Kanhangad
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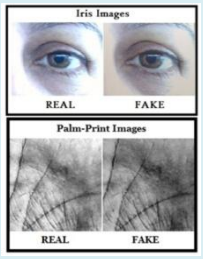
Dr. Vivek Kanhangad *(PhD: Hong Kong Polytechnic University)* works on Biometrics, Digital Signal and Image processing, Computer vision.His research interests are in the overlapping areas of digital image processing, pattern recognition and computer vision and their applications in biometrics for personal recognition.



Biometrics Research

Laboratory is currently engaged in developing techniques for spoof detection in biometric systems, especially for hand and iris based biometric systems. Sensor level attacks on biometric systems using fake image samples are a major concern. Figure on the left shows real and fake images samples for palm print and iris. It may be observed that it is extremely difficult to discriminate between a real and fake palm print image with naked eyes. We have shown experimentally that biometric systems can easily be circumvented using such fake images. We developed an approach for spoof detection based on *estimation surface reflectance* and *micro-level texture features.*

Achievement

This algorithm achieved the highest classification accuracy on an independent test dataset of 200 iris images in iris liveness detection competition (Mobilive 2014), held in conjunction with International Joint Conference on Biometrics 2014.

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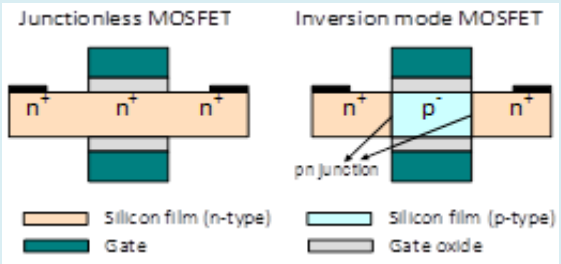
Dr. Abhinav Kranti *(PhD:University of Delhi; worked at Universitécatholique de Louvain, Belgium; Queen's University Belfast, UK; and Tyndall National Institute, Ireland)* is the Dean, Research and Devolopment. He is interested in Solid-State Devices, Circuit Design and Nanotechnology. In these areas, he has co-authored 100 research papers in journals and conferences. He is a technical reviewer for IEEE, Elsevier, IOP, Springer and Wiley journals.



Transistors are the vital building blocks of all electrical devices, from computers to mobile phones. Dr. Kranti's research group is focusing on low power operation of nanoscale devices and circuits for logic, memory, analog and RF applications. The research utilizes conventional CMOS and non-CMOS transistor architectures to address the problems at fundamental and applied level.

Dr. Shaibal Mukherjee
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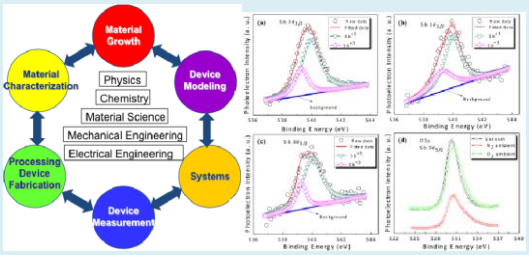
Dr. Shaibal Mukherjee*(PhD: University of Oklahoma, USA)* is working on light-emitting diodes and photo-voltaics. His research area includes design, fabrication, and characterization of semiconductor heterostructure and multiple quantum well LEDs, lasers, solar cells.



The Hybrid Nanodevice Research Group (HNRG) led by Dr. Shaibal Mukherjee in the discipline of Electrical Engineering at IIT Indore explores new physics of micro- and nano-structured materials, and to apply this knowledge to realizing advanced tools and devices for chemical, biological, optical, electronic and energy applications.
HNRG has been actively involved in the UV-visible, infrared, and terahertz semiconductor research. The researches include design of high-performance light emitting diode (LED), laser, solar cell, detectors, high mobility transistor; Dual Ion Beam Sputtering Deposition (DIBSD) of semiconductors, metals, and dielectric materials; fabrication and packaging of opto-electronic devices.

Dr. Ram Bilas Pachori
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Electrical Engineering*
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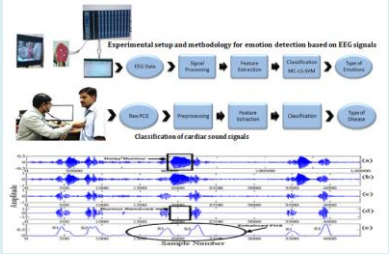
Dr. Ram BilasPachori (PhD: IIT Kanpur, India; Postdoctoral Fellow: University of Technology of Troyes (UTT), Troyes, France; Assistant Professor at International Institute of Information Technology (IIIT), Hyderabad, India) is interested in Biomedical Signal Processing, Speech Signal Processing, Time-Frequency Analysis, Signal Processing for Communications and Signal Processing Applications."



The main aim of research of Dr Pachori's group is to develop new methodologies for analysis and classification of non-stationary signals like as electroencephalogram (EEG) electrocardiogram (ECG) phonocardiograph (PCG) and speech signals.We have developed brain to computer interfacing (BCI) system for classification of human emotions.
We have also developed new methodologies for detection of epileptic seizures from EEG signals. We have proposed new methods for robust speech analysis in low-frequency region. New methods for segmentation and classification of heart sounds have been developed by our group in order to detect heart valve disorders. We have proposed cross terms free time-frequency distribution for analysis of non-stationary signals.

Dr. Vipul Singh
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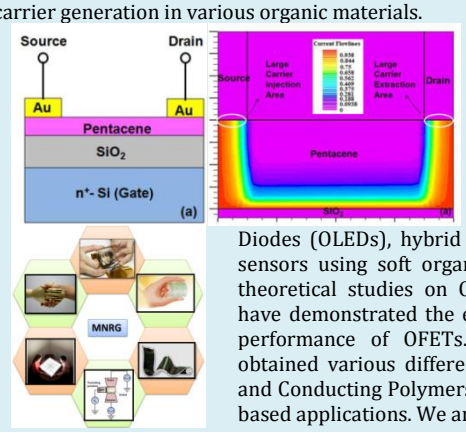
Dr. Vipul Singh*(PhD: Kyushu Institute of Technology, Japan; Scientific Researcher at Nanosystems integration laboratory, Research Institute of Electronics, Shizuoka University, Japan)* works in the area of organic electronics ranges from device applications viz. Organic Field Effect Transistors (OFETs), Organic Solar Cells (OSCs) and Organic Light Emitting Diodes (OLEDs) to the study of charge carrier transport or photo carrier generation in various organic materials.



Molecular and Nanoelectronics Research Group (MNRG) is presently focussed towards research and development of organic electronic devices viz. Organic Solar Cells (OSCs), Organic Field Effect Transistors (OFETs), Organic Light Emitting Diodes (OLEDs), hybrid electronics and chemical/ion/bio sensors using soft organic materials.We have performed theoretical studies on OFETs, through these studies we have demonstrated the effect of contact resistance on the performance of OFETs. Further, we have successfully obtained various different type of nanostructures of ZnO and Conducting Polymers for hybrid devices and biosensor based applications. We are also pursuing studies pertaining to charge transport/ dynamics of photo generated charge carriers in these materials.
Our philosophy is to develop cost effective fabrication methods towards cheap, disposable and flexible electronics, using solution processed techniques.

Dr. Amod Umarikar
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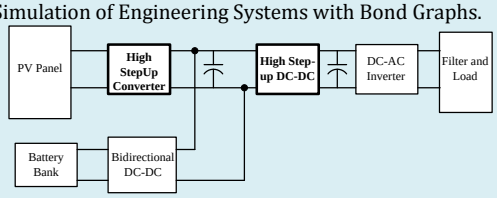
Dr. Amod Umarikar *(PhD: IISc, Bangalore, India; Postdoctoral Associate: University of Minnesota, Minneapolis, USA)* is interested in Power Electronics, Modeling and Simulation of Engineering Systems with Bond Graphs.



DC-DC converters are inherent part of most of the renewable energy electrical systems.It is used as an interface between solar PV panel, fuel cell, wind turbine etc and load or further power processing system.

Dr. Umarikar's group is currently working on High Step Up DC-DC converters which can be used as an 'efficient' interface between renewable power source and load as shown in figure. Our group has developed some DC-DC converter topologies which give excellent high step up gains.

Further, 'Power Quality' is an issue of increasing importance now a-days. It is because of increasing use of power electronic based equipments in domestic and commercial applications and nonlinear loads in industries, which affects power quality of supply system. The group is working on new algorithms for power quality signal analysis. These new algorithms will be used to detect power quality events such as voltage sag, swell, faults and other transients with better accuracy.

Dr. Prabhat K. Upadhyay
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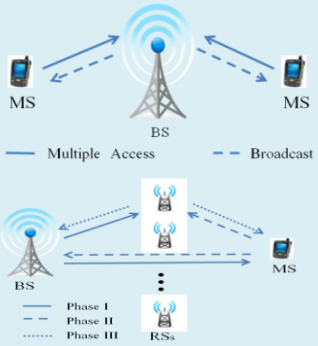
Dr. Prabhat K. Upadhyay*(PhD: IIT Delhi; Lecturer: BIT Mesra)* is interested in the areas of wireless relaying techniques, cooperative communications, and MIMO systems. He is a reviewer in journals like IEEE Transactions on Wireless Communications, IEEE Transactions on Vehicular Technology, IEEE Communication Letters.



Modern wireless communication systems are facing challenges in accommodating a large traffic volume over a limited spectrum. Dr. Prabhat K Upadhyay has established the Wireless Communications (WiCom) Research group at IIT Indore to conduct fundamental and applied research to cater to the emerging needs of the next generation wireless communication systems. The group is currently engaged in developing and analyzing spectral-efficient strategies for wireless communications by integrating cooperative and cognitive radio technologies. The recent research at WiCom has addressed the system design, performance evaluation, and resource allocation problems to increase the system capacity and spectrum agility in a more efficient and reliable manner.

It has contributed to a significant number of publications in IEEE journals and conferences over the last year.

Dr. Santosh Viswakarma
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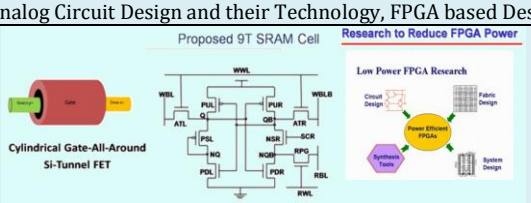
Dr. Santosh Viswakarma*(PhD: IIT Roorkee, India; Postdoctoral Fellow: University Graduate Center (UNIK), Kjeller, Norway under European Union project "COMON" (Compact Modeling Network))* is interested in Multigate and Multifin MOSFET (Square, Circular and Rectangular Gate All Around (GAA) MOSFET, Double Gate (DG) MOSFET, FinFET etc.) and their Circuit Applications in Memories, Ultra Low Power Digital & Analog Circuit Design and their Technology, FPGA based Design.



"Nanoscale Devices, VLSI Circuit and System Design Research" group arefocused on modeling and simulation of non-classical MOS Devices and their application in circuit and system design.

The research group is dedicated for design and analysis of ultra low power, high speed semiconductor memory using single and mitigates MOSFET (FinFET, Tunnel FET, GAA). The research group is closely working with System and Technology Group, IBM, Bangalore, India as industrial collaborator. At present, there are five PhD students in the group and leading the following research projects: Ultra Low Power SRAM Memory Design using CMOS and FinFET, SRAM Sub-circuit Design for Ultra Low Power Applications, Power Reduction Techniques in FPGA and FPGA based System Design, Application of Graphene in Flash Memory, Design and Analysis of SRAM memory using Cylindrical Gate-All-Around Tunnel FET for ultra low power applications.

The group has received couple of fellowships and awards.
Two students from this group have received IBM PhD Fellowship Award 2014-15 and Fulbright-Nehru Doctoral Research Fellowship 2014-2015

MECHANICAL ENGINEERING

Dr. Anil Kumar
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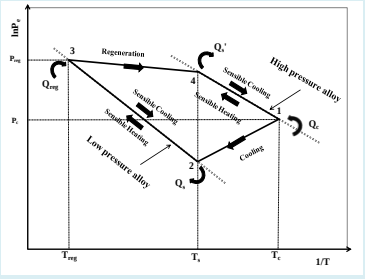
Dr. Anil Kumar *(PhD: IIT Madras; Project Officer, ICSR, IIT Madras)* is presently the convener of the Mechanical Engineering discipline. He is investigating solid state hydrogen storage options (Metal hydrides) and harnessing renewable energy.



Heat interactions during hydrogen absorption (exothermic) and desorption (endothermic) by some intermetallics/alloys can be used for building solid sorption systems. These systems operate on low grade heat energy. Thus these systems are sustainable and environmental friendly when combined with solar energy. His group at IIT Indore is investigating the suitability of the pairs of metal hydrides for the development of metal hydride-based heating and cooling, thermal energy storage and hydrogen compression systems. They have developed experimental facilities to measure the thermodynamic and thermophysical properties of metal hydrides.

Dr. Satyajit Chatterjee
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Dr. Satyajit Chatterjee *(PhD: IIT Kharagpur)* works in the field of Conventional and Non-conventional Machining, Surface Technology and Solid Lubrication. Presently he is engaged into research work related to development of hard, wear resistant tribological coatings through the application of high power laser.
Hard coating can be manufactured by combining self-propagating high-temperature synthesis (SHS) and laser surface alloying (LSA) with the action of high power laser beam on a powder mixture of Al, TiO_2 and hBN preplaced on a metal substrate. Due to high power of laser, the precursor powder mixture is melted and subsequently alloyed onto the substrate which results into in-situ formation of a hard, wear resistant coating. Manufacturing such hard composite coating can increase the potential of a metal surface in tribological applications. Mechanical properties (related to morphology, microhardness and elasticity) of the engineered surface are measured by indentation techniques. Physical characterization of the coating related to microstructure and phase related issues are performed with XRD, SEM, HRTEM etc. Tribological properties of coatings are evaluated by different types of rotary and linear tests on various tribometers. Tribological behavior of a surface is heavily dependent on various physical and mechanical properties. Innovations in hard, wear resistant coating composites along with a suitable manufacturing process and improvisations in the ways of application of the same in real life is the main target of our work.

Dr. DevendraDeshmukh
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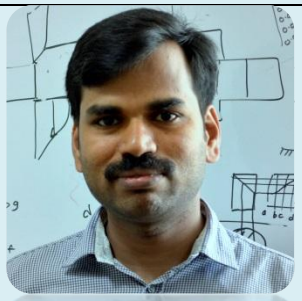
Dr. Devendra Deshmukh *(PhD: IISc, Bangalore; Research Assistant: IISc Bangalore; Engineer CAE: GM-Technical Centre India, Bangalore; R & D member: TVS Motor Company Hosur)* has his current research interests in the areas of bio-fuels, spray and combustion diagnostics, and modeling of IC engine processes.
Dr. Deshmukh is working on renewable fuels for combustion engines. Biofuels from various sources are being studied for their spray atomization characteristics. The physical properties of these biofuels control atomization and air-fuel mixing which governs the combustion and emission performance. Numerical tools are being used to understand the effect of composition on physical properties of biofuel. Optical engine and high pressure spray visualization system are being developed to study spray and combustion of renewable biofuels.



Dr. ShanmugamDhinakaran
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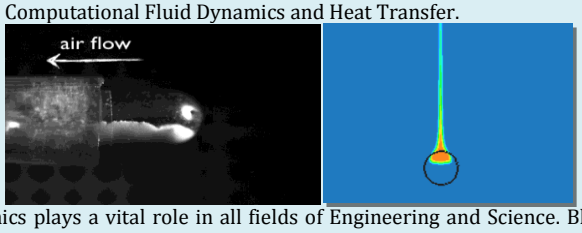
Dr. Shanmugam Dhinakaran *(PhD: IIT Kharagpur; Postdoctoral Fellow: Laboratory of Physio-Chemistry of Polymers, Université de Pau et des pays de L'Adour, Pau, France/Dept. of Biological Engineering, Universidade do Minho, Braga, Portugal/ Dept. of Chemical Engineering, Faculdade de Engenharia da Universidade do Porto, Portugal/ Dept. of Fluid Dynamics & Heat Transfer, Université de Valenciennes et de Hainaut-Cambresis, France)* is an expert on Computational Fluid Dynamics and Heat Transfer.



Fluid dynamics plays a vital role in all fields of Engineering and Science. Blood flow in diseased arteries; heat transfer enhancement from electronic components using nanofluids; thermal cooling in data centers; analysis of flow and heat transfer characteristics of porous media; flow around submarines are some of the application areas in which Dr. Dhinakaran's research group is focusing on. His research group is largely interested in the development of three-dimensional in-house computational fluid dynamics codes using high resolutions numerical schemes based on finite volume as well as finite element methods for Newtonian and non-Newtonian fluid flows. His research interests are in bluff body flows, non-Newtoninan fluid flows, flow and heat transfer from porous media, heat pipes and biofluid mechanics.

Dr. Neelesh Jain
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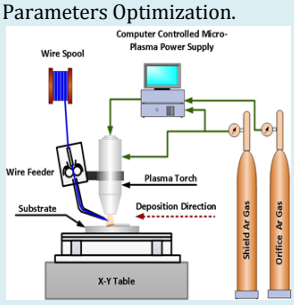
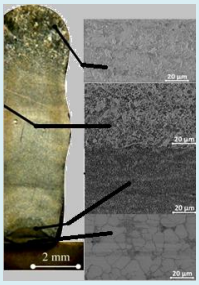
Dr. Neelesh Jain *(PhD: IIT Kanpur; Assistant Professor: IIT Roorkee/South Asia International Institute (SAII) Hyderabad; Visiting Assistant Professor: School of Mechanical and Aerospace Engineering, Oklahoma State University, Stillwater, USA; Lecturer: NSIT, New Delhi; Senior Project Associate, IIT Kanpur)* is the Dean of Academic Affairs. His work is on Advanced Machining Processes. Hybrid Machining Processes. Micro-machining and Nano-finishing Processes. Mfg Process Selectionand Parameters Optimization.





Development of Mirco-plama Transferred Arc (µ-PTA) wire deposition Process for Additive Layer Manufacturing (ALM) applications: The objective of this work was to develop µ-PTA wire deposition process as an energy and material efficient process for the ALM applications. The main focus was to repair the surface cracks developed in the automotive dies and molds. Micromachining process was used for making proper material filling space in the developed cracks. The experimental setup has been developed and range of process parameters was identified for regular deposition through extensive experimentation. The process was further optimized for multi-layer deposition.

Establishing Wire EDM process for manufacturing high-quality miniature gears: This work was aimed to establish WEDM as superior process for manufacturing miniature spur gears (i.e. outside diameter less than 10 mm) as compared to the conventional processes such as gear hobbing, gear stamping, gear forging, gear extrusion, and powder metallurgy processes. The main emphasis is to optimize the WEDM process for improving the geometric accuracy and surface integrity of the WEDMed miniature gears.

Development of Electrochemical Honing (ECH) process for Precision Finishing of Straight Bevel Gears(part of CSIR sponsored project): This work was aimed to develop ECH a viable, productive, economical alternative gear finishing process for the bevel gears overcoming the inherent limitations of conventional bevel gear finishing processes i.e. gear grinding and gear lapping. This is the first attempt on ECH being explored for finishing the bevel gears. In this project an innovative concept of using twin complementary cathode gears has been envisaged for precision finishing the bevel gears which will ensure enhancement in the geometric accuracy and surface quality of the bevel gears.

Dr. Ritunesh Kumar
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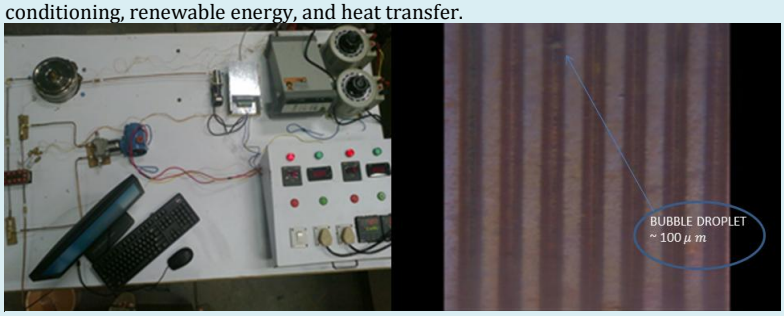
Dr. Ritunesh Kumar *(PhD: IIT Delhi; Employee: Tata Consulting Engineers Limited Mumbai)* works on desiccant cooling. His research focus is on refrigeration & air-conditioning, renewable energy, and heat transfer.



World is moving towards miniaturization. Microchannel heat sinks play an important role in this. Dr. Kumar's group (Mr. K. Sambhaji, V. Yadav and K. S. Baghel) are involved in finding methods for improving performance and removing instability problems of microchannels. Another research activities that we have recently initiated are solar cooling (Mr. D. Patil), biodiesel as transportation fuel (Mr. Y. Upadhyay). We are also working on waste water treatment using microalgae and their subsequent conversion into biofuels (Dr. K. Bala, Ms. K. Pathak)

Dr. Satish C. Koria
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Dr. Satish C. Koria*(PhD: Technical University, Germany; Professor/Coordinator QIP/HOD/Chairman SPO: IIT Kanpur; Postdoctoral Fellow: Institute for iron metallurgy, TU Aachen Germany; Lecturer: University of Roorkee)* did research in area of Energy efficiency in industrial furnaces, Steelmaking, Continuous casting, Heat and mass transfer in metallurgical reactors with more6yhu7jpui4tr5 than 80 papers. His research interest is in materials science and manufacturing.

Dr. Bhupesh K. Lad
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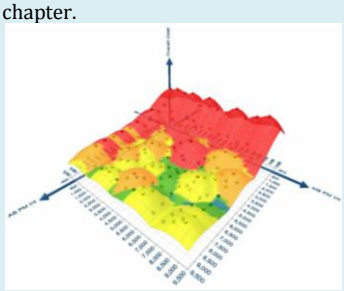
Dr. Bhupesh K. Lad (PhD: IIT Delhi; Research Engineer: General Electric (GE) Global Research Center (JFWTC) Bangalore, India) has his focus on Reliability of Mechanical Systems, Prognosis, and Operations Planning. He has several publications and one book chapter.



His group has developed a novel methodology for fleet level maintenance planning by integrating decisions pertaining to level of repairs, preventive maintenance schedules and spare parts optimization. The methodology considers time dependent failure rates for the components thereby making it more practical.
In the second work, the group has demonstrated that the joint optimization of maintenance with other shop floor level operations policies may alter the performance of a manufacturing system.

A simulation-based approach is proposed to model the performance of a generic manufacturing system considering the effect of failures and maintenance on inventory. Data from a physical security industry is used to model the system configuration. In another approach, the benefits of joint optimization of production and maintenance scheduling for multi-component machine over Earliest Due Date (EDD) policy has been demonstrated.
In the third work, Dr. Lad's group has developed efficient approaches for remaining life predictions of milling machine cutting tools.

Dr. I. A. Palani
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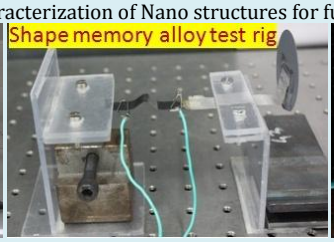
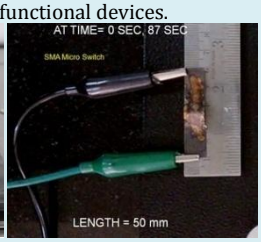
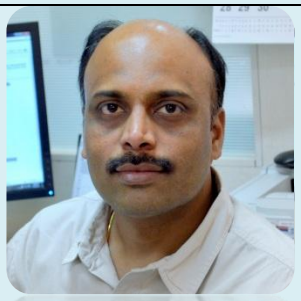
Dr. I. A. Palani*(PhD: IIT Madras; Postdoctoral Researcher: Laser Laboratory, Graduate school of Information science and Electrical Engineering, Kyushu University, Fukuoka, Japan)* studies Optical instrumentation, Mechatronics System Design, Laser assisted synthesis and characterization of Nano structures for functional devices.





Mechatronics and Instrumentation Lab

Dr.Palani's mechatronics research group focuses their research towards the development of NiTi Shape memory alloy based micro devices. An optical based NiTi micro-switch has been developed. The Switch has been designed to get actauted by applying a low laser laser fluence. These optical swicthes can be emplayed to control flow rate in harsh environment. Niti micro postioning stages are devopled by using NiTi splines. Thes Niti splines were manufatured using a novel techaniue of laser rapid manufacturing. The group has has also been in the dvelopment of Pneumatic stewart platform, with 6 DOF for mounting radio telescopes.



Dr. Anand Parey
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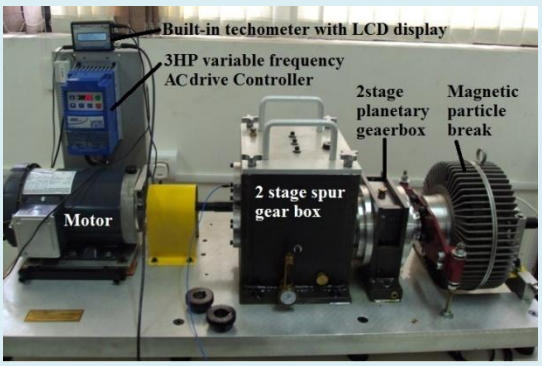
Dr. Anand Parey *(PhD: IIT Delhi; Lecturer: Department of Mechanical Engineering, BITS Pilani Goa Campus; Postdoctoral Fellow: University of Alberta, Edmonton, Canada; Assistant Manager: Heavy Engineering Division, Larsen and Toubro Ltd. Mumbai; Manager-Technology in Global R&D Centre, Crompton Greaves Ltd. Mumbai)* is an Associate Professor working on Condition monitoring, noise and vibration isolation and signal processing of mechanical systems. He is a reviewer of several international journals.



Planetary gearboxes are essential in many industries. They are widely used in heavy trucks, helicopters, and other large-scale machinery. Due to their heavy load and tough working environment, they are subject to severe wear and impact damage of key components including gears, shafts, and bearings. A failure of the gearbox may cause shutdown of the entire train and result in major economic losses. On-line condition monitoring of the gearbox for early fault detection aims to prevent gearbox breakdown and generate significant cost savings.

Dr. Kazi Sabiruddin
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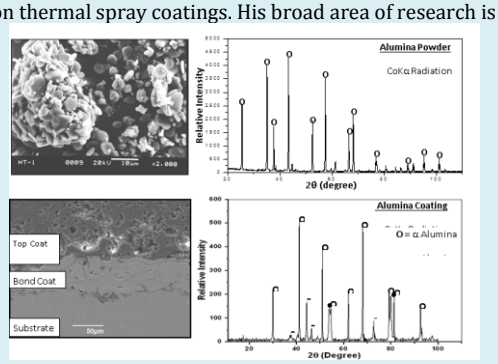
Dr. Kazi Sabiruddin *(PhD: IIT Kharagpur; Assistant professor: Jaypee University of Engineering and Technology, Guna and Birla Institute of Technology, Mesra)*has expertise on thermal spray coatings. His broad area of research is manufacturing.



During thermal spraying of ceramics on metal substrate to form thick wear resistive coating with the stable α phase in the starting powder; metastable phases tend to form in the final coating.This is attributed to the rapid quenching associated with the process. The weight fraction of metastable phases is formed, i.e., stable phase retained, and estimated using Rietveld refinement of X-ray diffraction data.This weight fraction depends on the process parameters like standoff distance, primary and secondary gas flow rate, nozzle size, etc., which in turn control particle melting. Under favorable melting conditions, the weight fraction of the metastable phases approaches 1. His group at IIT Indore fabricates plasma sprayed ceramic coatings on metal substrate and characterizes them with modern equipment to create a functional coating with suitable tribo-chemical property enhancement. As the property of a coating depends on the microstructure and phases of the coating material, the property is to be co-related with the type of phases and their quantity present within the coating.

Dr. Santosh Sahu
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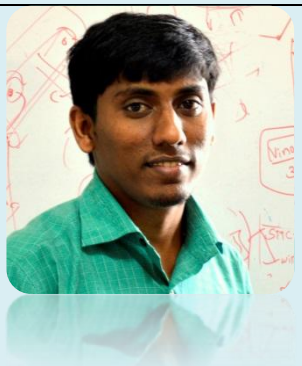
Dr. Santosh Sahu *(PhD: IIT Kharagpur; Visiting Scholar: School of Nuclear Engineering, Purdue University, West Lafayette, USA;Lecturer: Department of Mechanical Engineering, National Institute of Technology Rourkela)* is working on thermo hydraulics of nuclear reactors, multi-phase flows and heat transfer, choked flows and rarefied gas flows. He is currently on the editorial board of *ISRN Mechanical Engineering*.

His research group at IIT Indore is engaged in studying thermo-hydraulic behaviour of hot and moving surfaces by impinging jets. Impinging jets have received considerable attention in various industrial processes namely - cooling and drying of films and papers, processing of metals and glasses, cooling of gas turbine blades and most recently cooling of various components of electronic devices.

In addition, the research group is engaged in evaluating the thermal performance of various nanofluids (CNT/water, Al_2O_3, CuO/water) in thermal devices including an automobile radiator. Furthermore, investigations have been carried out to evaluate the fluid flow and heat transfer behaviour of gaseous flows in micro devices through theoretical investigation.



Dr. Mohan Santhakumar
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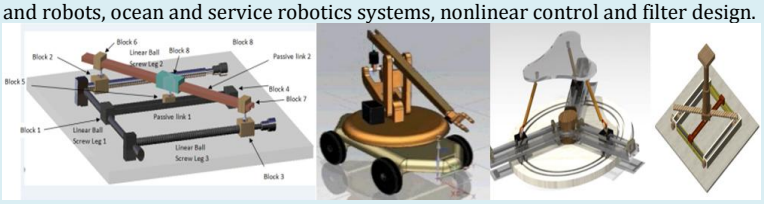
Dr. Mohan Shanthakumar *(PhD: IIT Madras; Postdoctoral Researcher: Division of Ocean Systems Engineering, School of Mechanical, Aerospace and Systems Engineering, Korean Advanced Institute of Science and Technology, Daejeon, Republic of Korea; Assistant Professor: Department of Mechanical Engineering, National Institute of Technology Calicut; Lecturer: Department of Mechanical Engineering, Bannari Amman Institute of Technology Sathy)* is working on dynamic modelling and analysis, parallel mechanisms and robots, ocean and service robotics systems, nonlinear control and filter design.



Dr. Santhakumar works on dynamic analysis and controller development of robotic manipulators and systems. He developed a novel indirect adaptive control scheme for the underwater vehicle-manipulator systems and parallel robotic motion platform. His research and interest on robotic platforms brought a new family of parallel robotic manipulators which can provide a basis to develop new technologies for precise and micro positioning applications using smart actuators. His team developed a new type of singularity free planar modular parallel robotic motion platform. His team also brought a new spatial parallel manipulator which is overcome most shortcomings of the existing manipulators. His team approaching to bring a new meso-size machining / material handling centre. This research group also proposes a new type of automatic car parking system which minimizes the space required, energy and cost.

DISCIPLINE OF CHEMISTRY

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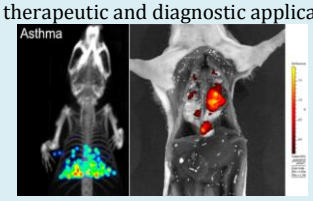
Dr. Chelvam Venkatesh*(PhD: IIT Kanpur; Alexander von Humboldt fellowship: Freie University Berlin, Germany; Postdoctoral Fellow: Purdue University, USA)* is heading the discipline of Chemistry. His research interests include synthesis of natural products, heterocycles, carbocycles and small molecule targeting ligands or inhibitors for therapeutic and diagnostic applications of pathological diseases.



Dr. Venkatesh's research group activity revolves around design, synthesis and application of new targeting ligands for diagnosis and therapy of various pathological diseases. The research group's long term goal is to establish a centre of excellence in the field of bio-science and medicinal chemistry, especially for detection and treatment of cancer and inflammatory diseases.A brief description of research projects that are currently in progress are as follows. Combination of in vivo imaging and molecular biology gave birth to a new research area of interest called molecular imaging in the field of medical diagnosis. This allows visualization of dynamic cellular process non-invasively in live cells. The unique ability of this technique carved out newer insights in the field of diagnosis especially in cancer, inflammatory, neurological and cardiovascular diseases. Conventional techniques such as X-ray, ultrasound, computed tomography (CT), and magnetic resonance imaging (MRI) can detect only morphological and anatomical changes in organs and tissues and often fail to distinguish abnormalities arising due to inflammation and pathological diseased state. In molecular imaging, targeted or non-targeted 'radio or fluorescent labeled tracers are systemically introduced into the biological system and monitored for their ready uptake by abnormal or hyperactive tissues. Many of those abnormal cells express or over-express special cellular proteins known as biochemical markers that have high affinity for their natural ligand. Therefore, the binding of radio or fluorescent labeled tracers or ligands to the over-expressed biomarkers identifies diseased cells and distinguishes them from normal and healthy tissues. Based on this principle several new methods were discovered for molecular imaging applications.

Most commonly described modalities include magnetic resonance spectroscopic imaging (MRSI), positron emission tomography (PET), single photon emission computed tomography (SPECT), optical and radionuclear imaging. Separate or in combination with conventional tools, these techniques could be employed to understand the cellular processes responsible for onset and progression of diseases and also for the evaluation of new imaging agents and drug candidates for pathological diseases.

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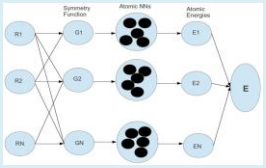
Dr. Satya S. Bulusu *(PhD: University of Nebraska, USA; Assistant Professor: Shobhit University, India; Postdoctoral Fellow: York University, University of New Brunswick, University of Nebraska)* works on Computational Chemistry, Structural evolution of Nanoclusters and Nanoalloys, Global Optimization Methods, Algorithms for predicting Transition State and DFT Guided Simulations.



Potential Functions for metal clusters and nanoalloys:

We study potential energy surfaces of metal clusters and nanoalloys. Numerous empirical potentials were developed earlier to study metals but none weretransferable to study small sized metals clusters (less that few 100 atoms).

This is because of quantum effects that dominate this size regime.To accurately model interactions in metals clusters including quantum effects, we built an on-the-fly fitting approach based on Artificial Neural Networks (ANN). ANN is basically a softcomputing technique that is widely used in many non-linear problems. For this, we require to train our ANN using variety of structures of Na previously evaluated using DFT. Once trained we can directly use this network to generate PES using molecular simulations.

Potential Functions for small organic molecules: Our aim is to generate potentials functions that are relatively cheap and reliable for small organic molecules. We are particularly interested in AMOEBA (atomic multipole based force field for biomolecular applications). AMOEBA uses charges, dipoles and quadrapoles to study long range interactions. We are trying to develop a standalone code that can generate AMOEBA force field parameters for any organic molecules. At present we generated parameters for all nucleobases. To test the reliability of the potential parameters, we performed global optimizations for small clusters of all nucleobases. Global optimizations were carried out using montecarlo minimization technique using different levels of theory. We used OPLSAA potentials, AMOEBA potentials and DFT methods to generate PES. For these small clusters, in gas phase, we found that AMOEBA predicts identical global minimums identical to that of DFT. It requires a few hours of computing time for a DFT optimization while AMOEBA is computationally very cheap (just takesa few seconds).

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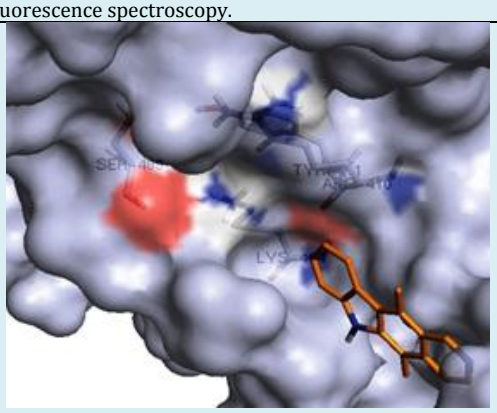
Dr. Anjan Chakraborty *(PhD: IIT Kharagpur; Postdoctoral Fellow: Pennsylvania State University, Florida State University USA, Kobe University, Japan)* works on anticancer drug molecule,ellipticine in different biological media. His research interest is in photophysics of drug molecules and study of different biological systems by fluorescence spectroscopy.



Reactants confined in molecular assemblies such as micelles, reverse micelles, microemulsion and vesicles, etc., offer a greater degree of organization compared to their geometries in homogeneous solution. They are able to mimic reactions in biosystems and also have great potential to encapsulate important drug molecules.Since the local properties e.g. polarity, viscosity, and pH in such a nano-environment are vastly different from those in a bulk medium,the structure, dynamics, and reactivity of biomolecules at an interface differ markedly from those observed in the bulk. Interestingly, most natural and biological processes occur at such interfaces or in confined systems, e.g., proteins, biomembranes, and vesicles. Therefore, chemistry in organized assemblies mimics the extremely efficient chemical processes occurring in the natural systems. We have undertaken entrapment of various drug in different biomimetic systems and the dynamical and photophysical behavior of those complexes. Various biomimetic systems studied by us are bile salt aggregates, reverse micelles, liposome-bile salt aggregates, proteins and liposomes-proteins complex. We used anticancer drug molecules namely ellipticine and doxorubicin and exploited their photophysical properties to understand their interaction with biological systems.

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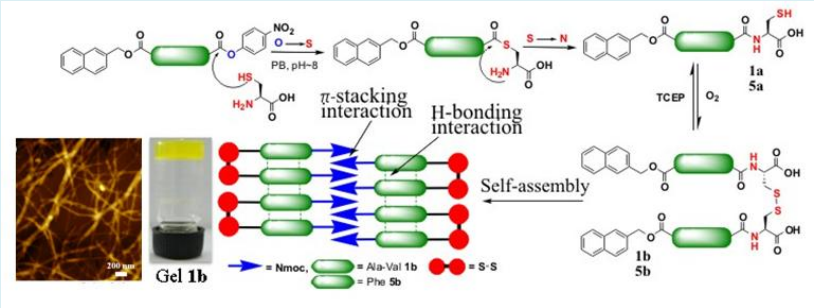
Dr. Apurba K. Das *(PhD: Indian Association for the Cultivation of Science; Postdoctoral Research Associate: Manchester Interdisciplinary Biocentre and School of Materials, University of Manchester, Manchester, UK, Department of Pure and Applied Chemistry, University of Strathclyde, Glasgow, UK)* is working on directed self-assembly of peptides and DNA-based molecules for potential applications in Biology and Nanosciences. His group is focused on multidisciplinary (Chemistry, Biology and Nanosciences) research.



This group'sresearch focuses on the molecular design of dynamic peptide based materials for the applications in biology and nanosciences. Several chemical reactions are used to generate dynamic peptide libraries. By exploiting non-covalent interactions and introducing different functionality, we can change the chemical nature of the materials that can be used for several applications.

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Dr. Pradeep Mathur *(PhD:Keele University, UK; Research Associate: Yale University, USA; J.C.Bose Fellow; Recipient of the Shanti SwarupBhatnagar Prize in Chemical Sciences; Professor: IIT Bombay; Visiting Professor: University of Cambridge, University of Freiburg; DAAD Distinguished Guest Professor: University of Karlsruhe; Fellow of the Indian Academy of Sciences, Bangalore; Editorial Board Member - Organometallics, Journal of Organometallic Chemistry and Journal of Cluster Science; and Chair of Inorganic Ring Systems 2009)*

Research Interest:Synthesis and molecular structures of organometallic clusters, design and facile synthesis of mixed metal clusters, reactivity, activation of organic molecules on them and use of metal carbonyls in catalytic processes.

Metal mediated transformations of acetylenes

Using simple mononuclear metal carbonyls, some unusual transformation have been observed, including the first example of a structurally characterized pentahapto-coordinated cyclopentadienone ligand system. Ferrocenyl-substituted thiophene and selenophene derivatives and ferrocenylchalcogenopropargyl complexes can now be obtained under facile conditions. These have served as precursors to unusual ferrocenyl-containing metal clusters with novel five-membered FeSCH:CCH_2 ring ligand systems. Intermediates in the formation of ferrocenyl-substituted quinones have been isolated and structurally characterized.

Metal-acetylide chemistry:

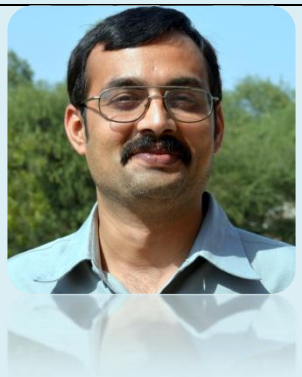
New types of acetylide coupling on mixed-metal clusters, including the first example of tail-to-tail coupling, and influence of secondary bridging ligands on acetylide reactivity have been investigated. Several other new ligand systems have been generated on mixed-metal clusters, featuring, C-S and C-Se formation and acetylide flip. Reactivity of metal acetylide with CS_2 has resulted in isolation of thiones and an unusual h^3-coordinated S_2CCCPh ligand. Electrochemistry and non-linear activity of some of the new systems have been investigated.

Synthesis of mixed-metal clusters:

Methodology of using the lone pairs of some single atom ligands for addition of coordinatively unsaturated metal carbonyl fragments has been successful for designed construction of metal cluster compounds. The most significant feature of this strategy is that variation in the transition metal as well as main group element ligands can now be controlled. Identical cluster core geometries but with variable compositions has enabled systematic studies to be made on variation of properties such as non linear optical activity on composition of clusters.

Ferrocenyl-incorporated metal carbonyl complexes:

Extension of reactivity of new cluster compounds is the reactivity of ferrocenyl and related acetylenes to form organics arising from unusual oligomerisation and co-oligomerisation reactions. This forms the present thrust of the main research projects. Work involves synthesis, spectroscopic and structural characterisation by single crystal X-ray diffraction methods



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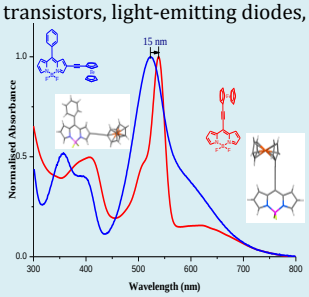
Dr. Rajneesh Misra*(PhD: IIT Kanpur; Postdoctoral Fellow: GATECH, Atlanta, USA, University of Kyoto, Japan)* focuses on design and synthesis of conjugated organic molecules for organic electronics, and photonics such as solar cells, field-effect transistors, light-emitting diodes, and multi-photon absorption.



Electronic absorption spectra of ferrocenyl substituted BODIPYs

Increasing the Electronic Communication in the BODIPYs

Superior electronic communication was achieved by introducing the ethynyl spacer at the *meso*-position of the BODIPY as compared to the *β*-position. Previous reports show that the substituents on the *meso*-phenyl ring of the BODIPY hampers the conjugation with BODIPY core due to the orthogonal orientation of the *meso*-phenyl ring. This problem was eradicated by introducing the 'ethynyl' spacer at the *meso*-position.

The *meso*-ethynyl spacer facilitates the superior electronic communication, and induces stronger interaction between the substituent and the BODIPY core. The ethynyl ferrocene substituent at the *meso*-position shows 15 nm red shifted absorption as compared to the same substituent at *β*-pyrrolic position, indicating higher degree of conjugation.

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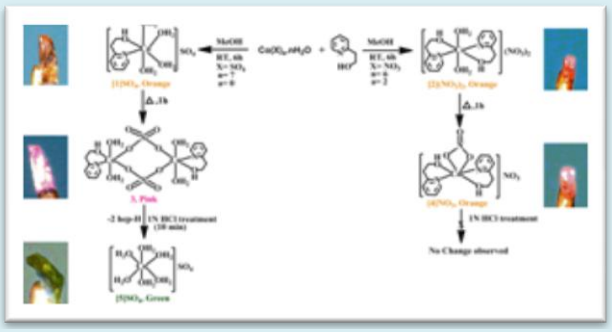
Dr. Shaikh M. Mobin*(PhD:University of Bombay, India; Research Scientist: IIT Bombay)* is in-charge of the Sophisticated Instrument Centre at IITI. He studies Single-Crystal to Single-Crystal (SCSC) Transformation and works on Synthesis and Structural Characterization of Some Novel Organo-metallic Clusters and Inorganic MOFs.



Solid-state Structural Transformations:

Transformation from one type of structure to another is not common in supramolecular chemistry. Solid-state supramolecular reactions involving transformation of different structures are very rare since they involve breaking and forming of *bonds* in more than one direction. The Single-crystal to single crystal (SCSC) transformation is upcoming fields, particularly due to solvent-free reaction conditions in SCSC processes are an added advantage particularly from the point of view of environmentally benign green chemistry. Our group is focus on SCSC transformations at discrete and polymeric level by applying heat, light or vapor techniques. We are further exploring the possibilities of SCSC by using laser or photocrystallographic techniques.

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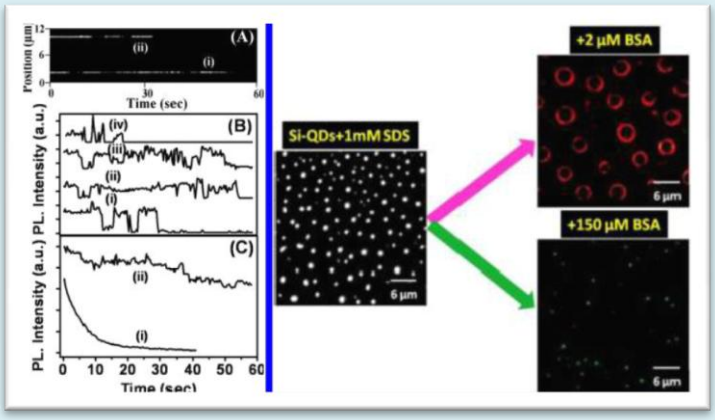
Dr. Tushar K. Mukherjee*(PhD IIT Bombay; Postdoctoral Scientist, Columbia University Medical Center, New York, USA)* works on Single molecule fluorescence imaging using TIRFM, Single molecule spectroscopy in heterogeneous media, developing high resolution optical microscope and Ultrafast fluorescence spectroscopy.



Dr. Mukherjee's research group at IIT Indore is presently involved in studying photoluminescence properties of bio-compatible water soluble quantum dots by photoluminescence spectroscopy and imaging techniques. Quantum dots show unique and characteristic PL that distinguishes them from organic dyes. In the past few decades core-shell QDs, namely CdSe/ZnS, CdTe/ZnS, CdSe/ZnTe and InAs/CdSe have emerged as a far better candidate for light emitting device than conventional organic dyes due to their higher brightness, photostability and broad excitation spectrum with narrow emission band. As a consequence of these advantages, QDs have replaced conventional organic dyes in optical imaging application. However, these core-shell QDs do have significant drawback in biomedical application due to their bigger size and cytotoxicity.

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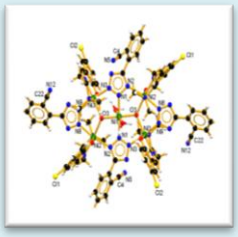
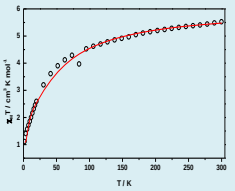
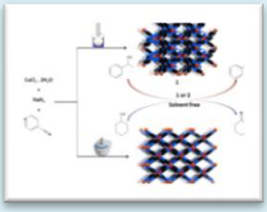
Dr. Suman Mukhopadhyay *(PhD: Indian Association for the Cultivation of Science; Postdoctoral Fellow: National University of Singapore; FCT post-doctoral fellow: Instituto Superior Técnico in Portugal;Marie-Curie International Incoming Fellow: EPFL in Lausanne (Switzerland))* is the Dean of Planning at IITI. He works on application of metal mediated cycloaddition to develop dynamic porous metal organic frameworks with material applications, chiral metal-organic frameworks, activation of small molecules/metal-mediated organic synthesis, Inorganic/organometallic pharmaceuticals.







Tetraozole ligands are showing great promise to generate multidimensional metal-organic frameworks with interesting catalytic, magnetic and spectroscopic properties. However generation of tetrazoles involves *in-situ* cycloaddition reactions between organonitriles and azide mainly by hydrothermal process having not much control over it. Dr. Mukhopadhyay's group is currently working upon use of microwave techniques to generate multidimensional polymers as well as getting a control over cycloadditions by limiting nuclearity of the desired systems. Generated compounds have shown interesting catalytic properties for organic transformation reactions. Apart from that this group is also working on studies on targeted oragometallic anticancer drugs and their mode of action.

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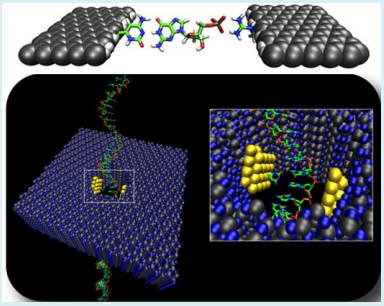
Dr. Biswarup Pathak (PhD: Hyderabad Central University, Hyderabad; Postdoctoral Fellow: Jackson State University, USA & Uppsala University Sweden) uses advanced computational methods to work on various solid state materials for clean energy (Hydrogen storage, Photocatalysis, Fuel Cell, Li-ion Batteries and Solar Cell) applications. He also studied the mechanism of (i) CO-releasing molecules in human body (ii) QM/MM study for biological agents (nerve agent) and (iii) Hg reacting with several atmospheric gases.



Dr. Pathak is involved in designing nano-materials for the renewable energy and bio-applications. He is actively working on the semiconductor based photo-catalytic water splitting. He has shown how the anionic, cationic mono-doping and cationic-anionic co-doping could improve the visible light photocatalytic activities. Moreover, the photo-catalytic activities of any materials can be tuned on the basis of their anionic/cationic p/d-orbital's energy respectively.
His other interest is to design nano-pore based electrodes for rapid DNA sequencing. He has shown how the fictionalization of the nano-pores embedded gold/graphene electrodes could be very effective in rapid DNA sequencing.

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Dr. Sampak Samanta *(PhD: Indian Association for the Cultivation of Science, India; Postdoctoral Fellow: University of Missouri Rolla, USA, University of Texas at San Antonio, USA; JSPS Post-doctoral Fellow: Tokyo University of Science, Japan; Senior Research Scientist,New Drug Discovery Research Centre, Medicinal Chemistry, Ranbaxy Laboratories Limited and Daiichi Sankyo Research Centre in India, Medicinal Chemistry Gurgaon)* is interested in organo-catalytic mediated asymmetric synthesis, total synthesis of highly biologically active compounds, metal mediated synthetic transformations and green chemistry.

The research in Sampak's group spans methodology and complex molecule synthesis. In this context, the development of novel one-pot multi-component reactions will be followed by their implementation in the total synthesis of biologically active natural products and analogs, with a special emphasis on compounds relevant for anti-cancer drugs.In this direction, we have developed a highly efficient, organocatalytic, practical protocol for the preparation of biologically significant pyrimido fused carbazole scaffold also known as topoisomerase II inhibitors. In total synthesis, we emphasize shortness, efficiency and flexibility in generation of molecular complexity. In our search for new reactions, we utilize the readily available metal-free catalysts efficiently and pursue organic reactions in a green manner, aiming at achieving high selectivities (chemo-, regio-, diastereo- and enantioselectivity) during the course of reaction. Moreover, the design of high-performance catalysts is primary focus in my research group in consideration of the following keywords, "synthetic power", "environmental harmony", "atom economy", and "sequential transformations.

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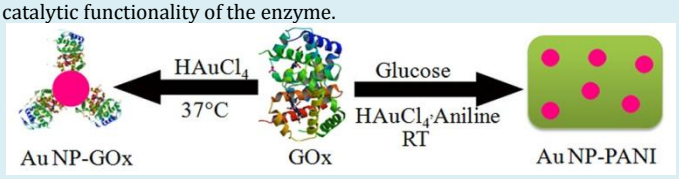
Dr. Tridib K. Sarma *(PhD IIT Guwahati, India; JSPS Post-Doctoral Research Fellow: University of Tokyo, Japan; Alexander-von-Humboldt Post-Doctoral Fellow: University of Heidelberg, Germany)* works on nanosciences, catalysis and coordination polymers with an intention of developing functional materials with potential multidisciplinary applications. He is also studying metal-biomolecule interactions and subsequent development of functional materials.

A few projects that have been currently pursued in this endeavor are:

1. Development of magnetic nanoparticle based MRI contrast agents
2.Development of inorganic nanoparticle-carbon nanostructure hybrids for various applications
3. Functional supramolecular nanostructures assembled from bioactive building blocks
4. Enzymes as nanobioreactors for synthesis of functional nanostructures

One of the major focus areas of this research group is to use the biomacromolecules such as enzymes as reactors for the synthesis of inorganic nanostructures. These studies are important as the nanoparticles bound to the enzymes can activate or inhibit the catalytic functionality of the enzyme.



Self-assembled supramolecular systems from functional building blocks are synthesized where the bioactive function and the self-assembling segment are conjugated. The group has recently found new supramolecular hydrogels based on assembly of amino acids and nucleic bases with metal salts.

The group also works on the application of graphene oxides as supports for inorganic nanoparticles (Au, Pt, Pd, metal oxides and alloys) to be used as heterogeneous catalysts for important organic transformations such as C-H oxidations. Synthesis of carbon dots, studying their physio-chemical properties, synthesis of metal-C-dot composites and their applications as catalysts and nanobeacons for sensing biomolecules is being done. This group develops easy synthetic routes towards metal oxide-graphene oxide composite materials for photocatalysis, dye-sensitized solar cells and LED.

This research group also intents to develop multimodal imaging probes involving nanomaterials that could be used efficiently for simultaneous cancer cell imaging and photo-thermal therapy.

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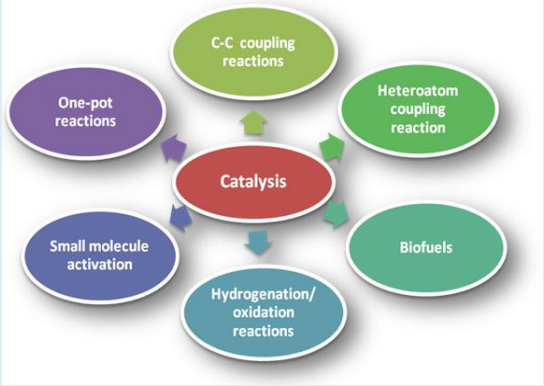
Dr. Sanjay K. Singh *(PhD:A.P.S. University, India; JSPS Postdoctoral Fellow and AIST Postdoctoral Scientist at AIST, Osaka, Japan; Alexander von Humboldt (AvH) Postdoctoral Fellow: Karlsruhe Institute of Technology (KIT), Germany)*focuses on synthetic organo-metallic and coordination chemistry of transition metals and nano-materials for catalysis.



Dr. Singh's research group has undertaken the task of developing homo- and heterogeneous catalytic systems for various important organic transformations, including C-C coupling reactions, C-heteroatom coupling reactions, one-pot hydrogenation/oxidation reactions, and so on. Recently, they have developed a purely aqueous-phase methodology for chemoselective reduction of a wide range of aromatic and aliphatic nitro- substrates in the presence of inexpensive Ni and Co metal nanocatalysts, with high tolerance to other highly reducible groups present in close proximity to the targeted nitro groups, to respective amines using hydrous hydrazine as a reducing agent at room temperature (Inorg. Chem., **2014**, *53*, 2904–2909).

DISCIPLINE OF MATHEMATICS

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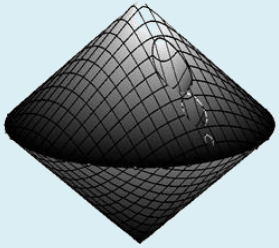
Dr. Swadesh Kumar Sahoo(*PhD: IIT Madras, India; Postdoctoral Fellow: IIT Madras, Visiting Researcher: University of Turku, Finland) works on Geometric Function Theory. His current research interests include* Univalent Function Theory, Hyperbolic-type Metrics, and Quasi-conformal Mappings. He received his doctoral degree on "Inequalitiesand Geometry of Hyperbolic-type Metrics, Radius Problems, and Norm Estimates". TheNational Board for Higher Mathematics, Department of Atomic Energy, awarded him theNBHM Post-doctoral Fellowship in 2008.



A domain having geometric properties

His work at IIT Indore focuses mostly in international collaborative research work with active researchers from India and other countries such as Japan, China, Finland, and U.S.A.
In particular, some of the important problems investigated are the following:

- to extend the theory of hyperbolic-type geometry associated with quasiconformal mappings and domains having geometric characterizations;
- to investigate properties of conformal mappings associated with metrics bilipschitz equivalent to the hyperbolic metric

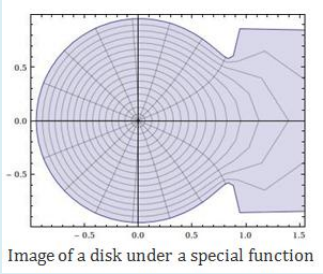


Image of a disk under a special function

- to find necessary and sufficient conditions for certain analytic functions in terms of coefficient estimates, pre-Schwarzian and Schwarzian derivatives;
- to study analytic and geometric properties of partial sums, arc length, area, and radius problems for univalent functions; and
- to visualize mapping properties of basic hypergeometric functions using techniques from geometric function theory.

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Dr. Md. Aquil Khan*(PhD: IIT Kanpur, India; Visiting Researcher: University of Amsterdam, The Netherlands; Postdoctoral Fellow: The Institute of Mathematical Sciences (IMSc), Chennai; Marie-Curie Fellow:Fraunhofer SIT, Darmstadt, Germany)*works on Modal Logic, Rough Set Theory and its applications.
Since the inception of the Rough Set Theory (RST), it has seen applications in many areas viz. medicine, finance, information science, decision analysis, social science, pharmacy, etc. To increase the applicability of the Rough Set Theory, it is important to extend the theory to relate it with some important issues in artificial intelligence such as multiple-source (agent) knowledge-bases, temporal evolution of knowledge-bases, information updates. This line of research comes under Dr. Khan's expertise. Moreover, he also focuses on the logical systems which can be used for reasoning with the rough sets.

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Dr. Sk. Safique Ahmad*(PhD: IIT Guwahati, India; Research Associate: SERC, IISc. Bangalore; Postdoctoral Fellow: InstitutfürMathematik, Universität Berlin, Germany)* is interested in Numerical Linear Algebra and the study of logarithmic norm for matrix pencils which are associated with Differential Algebraic Equations (DAE), Differential Equations (DEs), and Stochastic Differential Equations (SDEs).His doctoral thesis was concerned with "The Eigenvalue and Eigendecomposion of Matrix Pencils and Their Applications on Pseudosepectra of Matrix pencils". He received NBHM Post Doctoral fellowship funded by DAE and German Post Doctoral Fellowship BAT IIa. He accepted the German fellowship.

Perturbation analysis for the eigenvalues and eigenvectors of structured multiparameter eigenvalue problems are useful for the stability analysis of various differential equations and delay differential equations arise to model the vibrations on linear mechanical systems. The dynamical modelling of a disk brake with respect to squeal and its discretization via the finite element method, usually results in a large-scale quadratic eigenvalue problem. Physical effects such as gyroscopic, damping and friction results in quadratic eigenvalue problems with parameter dependent with non-symmetric matrix coefficients. So, we analyse the perturbation on the parameter eigenvalue problems which are useful to study the backward errors of perturbed systems.

In the present research, minimal structured perturbations are constructed such that an approximate eigenpair of a nonlinear eigenvalue problem in homogeneous form becomes an exact eigenpair of an appropriately perturbed nonlinear matrix function. These results extend previous results for matrix polynomials to more general functions. Structured and unstructured pseudospectra for nonlinear eigenvalue problems are also discussed. Farther, the construction of minimal structured perturbation for the specified number of approximate eigenpairs has been discussed, that is to show, the approximate eigenpairs become the exact of some nearby multiparameter eigenvalue problem.

The right eigenvalues of quaternionic matrices play an important character in control theory, particularly, the analysis of the stability of linear dynamical systems with quaternionic matrix coefficients. We developed the Gerschgorin and Bauer-Fike type theorems similar to complex eigenvalue problems which are useful to study the stability analysis on quaternionic systems. A general framework for the Gerschgorin type theorems based on right and left eigenvalues of quaternionic matrices are investigated and further, we propose the Bauer-Fike type theorem for the non-diagonalisable quaternionic matrix and later we present the relation between them with the existing literatures. We also talk on a minimal Gerschgorin ball in 4D spaces which contain all Gerschgorin balls of quaternionic matrix. We introduce the estimation for the right eigenvalues of quaternionic matrices in a minimal ball in 4D spaces.

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Dr. Ashisha Kumar (PhD: IIT Kanpur; Research Associate: IISc, Bangalore; Dr. DS Kothari Postdoctoral Fellow: IISc, Bangalore) has joined the Analysis Research Group of the Discipline of Mathematics in November 2013. His main interest of research is to study analytical properties of the d-plane transform, which is a generalization of X-ray and Radon transform (highly used in tomography such as medical imaging and CT scan). His research interest also includes harmonic analysis on certain 2-step nilpotent Lie groups. Dr. Kumar is an enthusiastic collaborative researcher with significant collaboration with researchers from eminent institute like Indian Statistical Institute Kolkata.Dr. Kumar is an enthusiastic collaborative researcher with significant collaboration with researchers from eminent institute like Indian Statistical Institute Kolkata.

Dr. Anand Parkash
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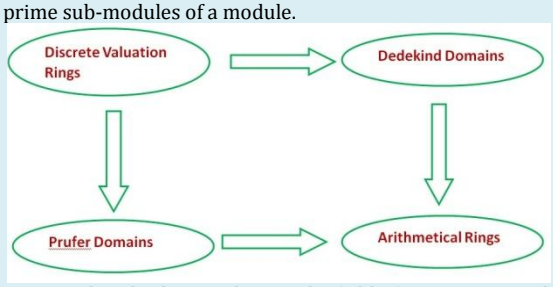
Dr. AnandParkash*(PhD: IIT Kanpur, India; Lecturer: LNMIIT, Jaipur; Visiting faculty member: IISER, Bhopal)*works on Radical formula, Multiplication Modules and Distributive Modules. Currently, He is working on Radical Formula which is based on prime sub-modules of a module.



Dr. Anand Parkash is working in the field of Commutative Algebra and Modules. Presently, he is working on Prime Submodules, Radical Formulae and Arithmetical Rings. It is not known when an Integral Domain satisfies the radical formula. He has found a necessary and sufficient condition for a Local Domain of dimension one to satisfy the radical formula. The result is first obtained for Finitely Generated Free Modules and then it is generalized for general Modules.

Dr. Niraj K. Shukla
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Dr. Niraj K. Shukla*(PhD: Allahabad University; Guest Faculty Member: University of Allahabad, R.K.G.I.T. Ghaziabad, Galgotias University, U.C.E.R. Allahabad, and Central University of Bihar, Patna)*is interested in Wavelets and Time-Frequency Analysis. His doctoral work was in the area of wavelets, particular multi-resolution analysis, scaling sets, wavelet sets, non-MSF wavelets and their topological behavior.

Dr. Antony Vijesh
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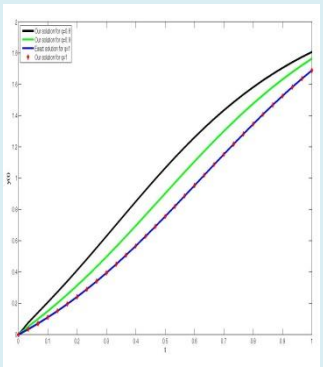
Dr. Antony Vijesh (PhD: IIT Madras; Reader: Indian Institute of Space Science and Technology (IIST), ISRO, Thiruvananthapuram; Assistant Professor: Centre for Mathematical Sciences Pala) is the Dean of Student Affairs. He works on applied functional analysis. His main research area is iterative methods for solving operator equations.

Many mathematical problems arising in modeling involve the solution of non-linear equations of the form F (x) = 0 in finite or infinite dimensional spaces. Dr. Antony Vijesh is working on iterative methods for solving nonlinear problem. Presently he is working with his research scholars on quasilinearization method for fractional differential equations. In this direction, they derived a modified quasilinearization method, which is more robust with less computational complexity compared to existing quasilinearization approaches. More classes of fractional order initial value problems can be solved using the proposed work as the conditions have been relaxed for the problem.



DISCIPLINE OF PHYSICS

Dr. Subhendu Rakshit
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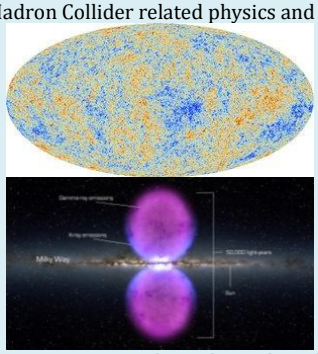
Dr. Shubhendu Rakshit*(PhD: Calcutta University; Visiting Scientist: TIFR, India; Postdoctoral Fellow: University of Dortmund, Germany, Saha Institute of Nuclear Physics, India; Technion University, Israel; Harish-Chandra Research Institute, Allahabad)*works on phenomenological aspects of particle physics. His interests include probing beyond the standard model particle physics, especially neutrino physics, super-symmetry, Large Hadron Collider related physics and neutrino astronomy.



Several astrophysical evidences suggest the presence of dark matter in our Universe. However the standard model of particle physics offers no such candidate, which fits the description of a dark matter "particle". Hence it is a challenge to extend the standard model to include such a particle.
Subhendu Rakshit and his collaborators have proposed a solution to this problem by extending the standard model by introducing two real scalar particles.
This model can explain the observations made by the earth-based direct detection experiments, produce the right relic abundance of dark matter,as indicated by the observed cosmic microwave background radiation by satellite-based experiments like WMAP or Planck, and can also provide an explanation of the excess gamma ray emission from our galactic center as observed by Fermi gamma ray space telescope.

Dr. Preeti Bhobe
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Dr. Preeti Bhobe *(PhD: Goa University; JSPS Postdoctoral Fellow: Institute for Solid State Physics (ISSP), University of Tokyo and RIKEN, SPring8 synchrotron source, Japan; Postdoctoral Fellow: Tata Institute of Fundamental Research, Mumbai)* has extensive experience on X-ray Absorption Fine Structure (XAFS) and Photoemission Spectroscopy (PES). Her expertise is on Experimental Condensed Matter Physics: Study of crystal and electronic structure, and magnetic properties of functional materials.

Dr. Preeti Bhobe has set up a highly sophisticated experimental facility to carry out "X-ray Absorption Spectroscopy". This versatile facility enables in-house performance of advanced experiments like XAS, XANES, and EXAFS which were hitherto, performed using a synchrotron source.

It is a distinctive interdisciplinary technique and works equally well in amorphous materials, liquids, (poly)-crystalline solids, and molecular gases. It is worth mentioning that such a facility has very little foot-print within India.

Dr. Sudeshna Chattopadhyay
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Dr. Sudeshna Chattopadhyay *(PhD: Saha Institute of Nuclear Physics; Research Associate: Northwestern University, USA; Postdoctoral Appointee of Center for Electrical Energy Storage (CEES); Guest Researcher: Chemical Sciences and Engineering Division, Argonne National Laboratory, USA) is working in the field of atomic scale characterization of surface and interfaces of materials. She has recently received DAAD award.*
Her group has expertise on preparation of the template mediated selfassembled tunable nanoparticle array using a generalized route to study the advanced photonic and plasmonic properties of these tailor-made nano-scale arrays.

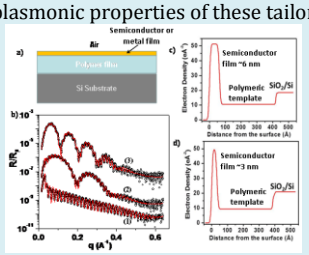

Fig. (a) Schematic representation of controlled deposition of thin semiconductors or metal film (~3-6 nm) on confined polymeric film (or template). (b) Specular reflectivity data for (1) polymer film, (2) ~3nm ITO/ polymer film, (3) ~6nm ITO/polymer film. Lines are best fits from which the electron density profiles (Fig. (c) and (d)) are determined.

Her research Interests:
(i) Study of Surfaces and interfaces – Solids, liquids, soft matter and nanomaterials (metal-polymer nanocomposites, nanostructured organic / inorganic ultra-thin films etc.).
(ii) Improvement of the capacity of Electrical Energy Storage Materials: Study of Electrode electrolyte interface, structure, mechanism:
(iii) Structure-property relationship of high pressure thermo electric materials.
(iv) Specialization in techniques: X-ray scattering, Spectroscopy (vUV, UV-vis, IR, EELS, XPS, NEXAFS, SIMS), Atomic force microscopy, Magnetron sputtering, spin coating, electrochemistry.

Dr. Sarika Jalan
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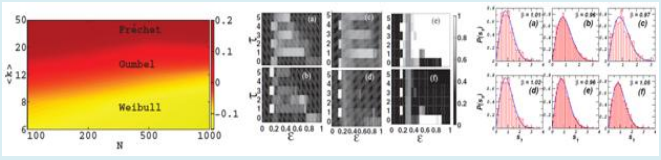
Dr. Sarika Jalan *(PhD: Non-Linear Dynamics from Physics Research Laboratory; Senior Research Fellow: National University of Singapore, Singapore; Guest Scientist, Postdoctorate Fellow: Max-Planck-Institute for the Physics of Complex Systems, Dresden, Germany*) works on nonlinear dynamics and complex systems emphasizing on complex biological networks, Spectral graph theory, Random matrix theory, Synchronization, Coupled chaotic dynamics on large networks, Adaptation and Evolution.



Research in Complex Systems Lab at IIT Indore involves nonlinear dynamics and complex systems. Synchronization and coupled chaotic dynamics on large networks, random matrix analysis of complex biological networks, social networks, extreme value statistics are the prime domains of focus. In 2013, there have been three major publications from Complex Systems Lab in peer-reviewed journals apart from one in press.

The group studies the role of delay in phase synchronization and phenomena responsible for cluster formation in delayed coupled maps on various networks, revealing that delay may lead to a completely different relation, between dynamical and structural clusters.They also study the effects of delay in diffusively coupled logistic maps on the Cayley tree networks, importance of which is reflected in understanding conflicts and cooperation observed in family business.The group inspired by the importance of inhibitory and excitatory couplings in the brain, analyzed the largest eigenvalue statistics of random networks incorporating such features, deriving that systems having more interactions among its constituents are likely to be more unstable. They deal with the analysis of protein–protein interaction networks for six different species under the framework of random matrix theory, depicting universality in nearest neighbour correlations, indicating randomness in underlying systems. Two of the species deviating from randomness at next to next neighbour correlations can be construed as a supportive evidence of non-random mutations prevalent in biological systems.

Dr. Rajesh Kumar
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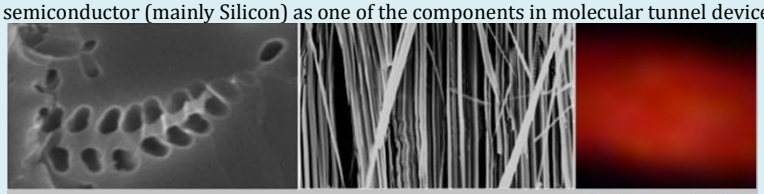
Dr. Rajesh Kumar(*PhD: IIT Delhi; Postdoctoral Fellow: National Institute for Nanotechnology (NINT),University of Alberta, Canada*)works in the field of experimental solid state Physics. His field of specialization is Raman and Photoluminescence spectroscopy. He also specializes in junction fabrication and is involved in a variety of electronic and spectroscopic diagnostics of junction structure and performance, with the long-term goal of understanding electron transfer in organic nanostructure junctions. Conducting polymer- based memory devices is a part of his research along with using semiconductor (mainly Silicon) as one of the components in molecular tunnel devices.



The "Materials Research Laboratory", Discipline of Physics, IIT Indore has prepared silicon nanowires contained inside porous silicon membrane which emits red light as a result of quantum confinement effect in low dimensional silicon. This is done by simple metal assisted chemical etching method. These results can be used for application in SILICON PHOTONICS.

Dr. Manavendra Mahato
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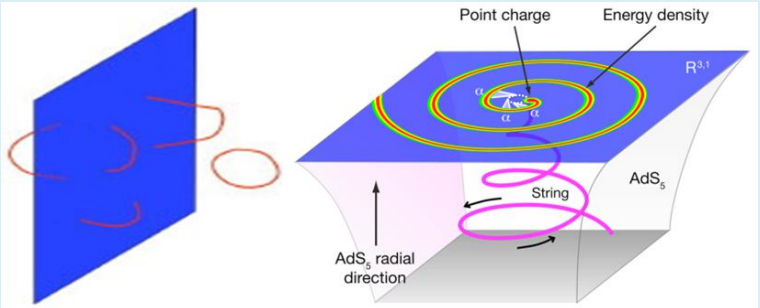
Dr. Manavendra Mahato *(PhD: University of Michigan, Ann Arbor, USA; Visiting Fellow: TIFR, Mumbai)* is working in the area of holography. He deals with those theories of gravity which contain a lot of information about its boundary encoded in its geometry.



Properties of D branes and strings are crucial for AdS/CFT.

Dr. Mahato's group works in the area of holography, a specialized topic in theoretical high energy physics. Here, those theories of gravity are investigated which contain a lot of information about its boundary encoded in its geometry. The information about the boundary may correspond to some quantum field theory such as non-Abelian Yang Mills theory, conformal field theory, or a condensed matter theory or fluid dynamics. This area is also known as gauge/gravity correspondence or AdS/CFT correspondence. Recently, these techniques were used to investigate dynamical properties of quenched field theories. Also, some anisotropic solutions of general relativity were constructed and were studied by the group.

Dr. Siddharth Savyasachi Malu
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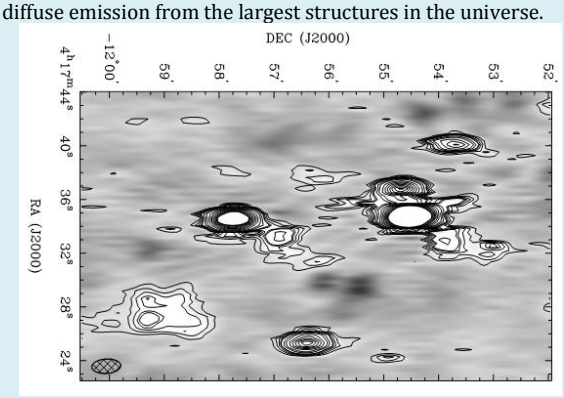
Dr. Siddharth Savyasachi Malu*(PhD: University of Wisconsin-Madison, USA, Jansky Fellow; Postdoctoral Fellow: IUCAA, Raman Research Institute, India; Meera Memorial Fellow, Radhakrishnan Fellow at Oxford)* is designing and planning a radio telescope at IIT Indore. This will be a research and teaching instrument, and will be used primarily for detecting diffuse emission from the largest structures in the universe.



This figure is a 1.0x0.5 million light year 5 GHz radio image of a part of the galaxy cluster MACS J0417.5-1154 in the southern sky, observed from the Australia Telescope Compact Array. The image shows four distinct galaxies, with two galaxies very close to each other, and barely resolved. The most interesting parts of the image are the three positions with a significant amount of diffuse emission, not attributable to any galaxy. It is possible – though not certain – that two of these galaxies have "fallen in" to the cluster and caused this diffuse emission; if proved, this would be the first such instance recorded in radio astronomy.The proposed radio telescope at IIT Indore would observe this and other clusters like it in greater detail and with more sensitivity.

Dr. Krushna Mavani
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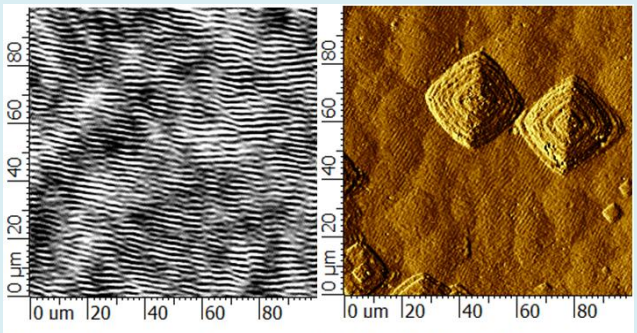
Dr. Krushna Mavani*(PhD: Saurashtra University; WPI Postdoctoral Researcher: Kyoto University, Japan; Postdoctoral Researcher: Osaka University, Japan; Postdoctoral Researcher: Tata Institute of Fundamental Research, Mumbai)* is working onthin films and multilayers of Functional Oxides, Exploring Phenomena at Terahertz Frequencies using different Terahertz Spectroscopic techniques.



Magnetic domains on the surface of thin films where black and white parts show opposite orientations of magnetic spins.

Surface of a thin film showing a growth with pyramid shape structures of micrometer thickness.

Dr. Mavani works on structurally oriented thin films (in nanometer thickness) and multilayer of oxides. She synthesizes the thin films and multilayer using Pulsed Laser Deposition method. She studies the electronic, magnetic and structural properties of different oxide materials using techniques like X-ray diffraction, magnetization measurements, resistivity measurement, Hall coefficient measurements and terahertz spectroscopy. She studies the surface morphology and magnetic domains using Atomic Force Microscopy and Magnetic Force Microscopy. She investigates the structural, magnetic and electronic correlations in functional oxides for device-based applications. The strongly correlated properties of oxides can give rise to applications in fast memroy-devices, scanning devices, electronics and as various sesors.
During last year Dr. Mavani had delivered two invited talks and attended conferences in India and abroad. She has published four research papers from IIT Indore, in international journals during the year 2013-14.

Dr. P. N. Puntambekar
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Dr. P.N. Puntambekar *(PhD: Delhi University; Visiting Professor: Rose Hulman Institute of Technology Terre Haute, Indiana State, USA; Professor of Physics, and HoD: IIT, Bombay; Adjunct Professor: San Diego State University San Diego CA; Sr. Scientist at NPL, New Delh; Postdoctoral Fellow: Imperial College of Science Technology, London, UK and National Physical Laboratory, Teddington, UK; Scientist: NPL, New Delhi)*is the Dean of Faculty Affairs. His field of research is laser and its applications.

Dr. Ankhi Roy
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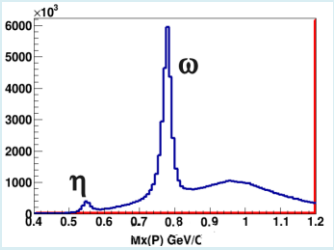
Dr. Ankhi Roy *(PhD: IIT Bombay; DST Young Scientist IIT Bombay)* works on Hadron Physics, Physics beyond Standard Model and Multivariate Analysis Techniques to analyze rare decay modes. She is collaborating with institutes like WASA-at-COSY, Germany, PANDA, Germany and LMD-CAA, Jefferson Laboratory, USA on different projects. She is one of the main faculties involved in the IIT Indore- ALICE collaboration.



One of the fascinating goals of hadron physics is the quantitative understanding of low energy QCD (Quantum Chromodynamics) which is the theory of strong interaction. A unique way of doing this is through studying different decay modes of mesons. Currently, Dr. Roy is involved with WASA-at-COSY, LMD-CAA, and PANDA collaboration. Her present physics interests are: Dalitz plot analysis through hadronic decays of eta, omega and etaprime mesons, calculation of transition form factor through Dalitz decay of eta meson, etc. She is also involved in the development of a detector, named as Lambda Disks detector, of the PANDA experiment.

Dr. Pankaj R. Sagdeo
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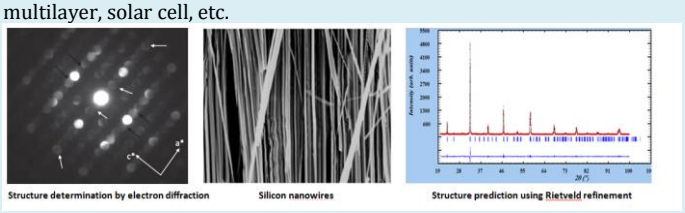
Dr. Pankaj R. Sagdeo *(PhD: UGC-DAE CSR Indore; Scientific Officer/Coordinator: Bhabha Atomic Research Centre, Visakhapatnam, India; Research Associate/Postdoctoral Researcher: UGC-DAE-CSR Beamlines on Indus-I AND Indus-II, Indian Synchrotron source)* is interested in surface interface physics, surface modifications/treatments by high power lasers and plasma, material characterization using synchrotron radiation, synthesis of composite materials for industrial applications, optical/magnetic multilayer, solar cell, etc.



Dr Sagdeo works in the field of experimental solid state Physics. His field of interest is structure property correlation in highly correlated electron system such as manganites and multiferroic materials. Dr. Sagdeo has mastered various characterization techniques which include transmission electron microscopy, x-ray photoelectron spectroscopy, grazing incidence x-ray diffraction, x-ray reflectivity, atomic force microscopy, energy dispersive analysis of x-ray, x-ray florescence, raman spectroscopy, etc. and extensively used the thin film deposition techniques such as pulsed laser deposition, magnetron sputtering, electron beam deposition, spin coater etc. for sample preparation.
On going projects:
1)Quantitative Substrate-Strain Induced Effect on Optical, Electrical and Magnetic Properties of Manganites: Funding agency CSIR, amount 20 lakhs.
2) Characterizations of pure and doped AB_7O_{12} type multiferroic oxides using Indus synchrotron radiation source. Funding agency DAE-BRNS, amount 25 lakhs.

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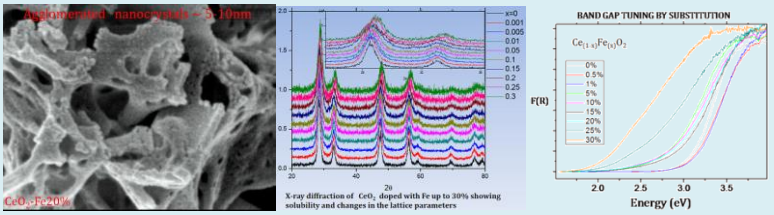
Dr. Raghunath Sahoo (PhD: Institute of Physics, Bhubaneswar; CNRS Postdoctoral Fellow: Subatech, France and INFN Fellow in INFN Padova, Italy; Visiting Scientist, University of Cape Town, South Africa.)
Dr. Sahoo has almost 14-years of experience working in large-scale experiments starting from detector R&D, operation and data analysis, since his Ph.D. in STAR experiment at Brookhaven National Laboratory USA and later at LHC (Large Hadron Collider), CERN, Geneva, Switzerland, the world's largest particle accelerator. He is presently the Principal Investigator and Team Leader of ALICE group from IIT Indore and a member in ALICE Council. He has also taken up the responsibility of the Convenership of PWG-CF: ALICE-India Physics Working Group for particle Correlations and Fluctuations.

As an experimentalist in high energy physics, his research interest aims at studying of

Dr. Raghunath Sahoo *(Continued)*	matter created in relativistic heavy-ion collisions at the extreme conditions of temperature and energy density, namely a million times the core of the Sun temperature and around 100 times the normal nuclear matter density: a process called "Big Bang Experiment" to produce Quark Gluon-Plasma (QGP): a plasma of fundamental constituents of matter, in the laboratory. He has the expertise of handing large scale data for the study of global properties like transverse energy, charged particle production and freeze out properties. His group is involved in the Photon multiplicity measurement at the forward rapidities in ALICE experiment at LHC and also in the neutral pion spectra using PHOS detector. He also works in the phenomenology of QGP, where he has substantial scientific contributions. Dr. Sahoo is the Principal Investigator of the future Compressed Baryonic Matter(CBM) Experiment at FAIR facility at GSI, Germany. He is also the member of Collaboration Board, CBM Experiment. This is a forthcoming experiment to studythe QCD phase diagram and search for critical point in the domain of high baryondensity.
 **Dr. Somaditya Sen** **Associate Professor** **Physics,** **Astrophysics** **Materials Science and Eng.** **In-charge Central Workshop** **sens@iiti.ac.in**	**Dr. Somaditya Sen** *(PhD: Indian Association for the Cultivation of Science; Research Associate and Scientist: University of Wisconsin, Milwaukee; Postdoctoral Fellow: National Taiwan University, Taipei, Taiwan, University of Electro-communications, Tokyo, Japan, University of Wisconsin Milwaukee)* works primarily on magnetic/electronic materials with multiferroic properties. His expertise spreads on synthesis/engineering/characterization (structure/physical) of nano-structured/thin film/single crystal/glassy forms of complex oxides/chalcogenides with semiconducting, superconducting, magneticand optical properties.  Structural complexities can be easily introduced by substitution of elements in functional materials which may provide scope of redefining newer functionalities. These redefined new functionalities can be generated or enhanced by altering the size and shape of the particles in the nano-regime associated with structural changes. One of the foremost importance in nano-material science is the process and details of the synthesis which may determine structure, size and shape and hence the nature of the functionality leading to generation of newer devices. The consistency in the inter-dependence of these properties is a matter of extreme importance in future devices. Devices in operation are subjected to different physical and chemical changes and sometimes these alter the properties of the materials temporarily or permanently until otherwise retreated. Hence the vulnerability of a device will be dependent on these studies. As thermal processes may lead to growth of nano-crystals it is also important to compare how the properties change when we grow these materials from nanostructures to single crystals. All these studies of functional materials such as multiferroics, DMS, ferroelectrics, dielectrics and semiconductors which hold the ground of modern and next generation technology will definitely enrich material research. The current projects which he is working on are: 1) Single phase solubility limits of TM-doped CeO_2 and TiO_2 systems 2) Double phase co-existence of semiconducting simple oxides by introduction of doping or substitution 3) Morphotropic Phase boundary studies on $Pb(Ti,Fe)O_3$, $Pb(Ti,Ni)O_3$, $Pb(Ti,Mn)O_3$, $Pb(Ti,Co)O_3$ systems. 4) Similar projects on $BaTiO_3$ and other Titanites and Manganites.

SCHOOL OF HUMANITIES AND SOCIAL SCIENCES

Dr. Bharath Kumar
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Dr. Bharath Kumar*(PhD: University of Hyderabad; Indian Council of Philosophical Research (ICPR) General Fellow)*is heading the School of Humanities and Social Sciences. He works on Moral and Political Philosophy as the focus areas. He is interested in the issues of Nationalism, Multiculturalism, Citizenship, etc. in the Indian context.

Dr. Sujata Kar
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Dr. Sujata Kar *(PhD: IIT Roorkee)*focuses on estimating models of headline and core inflation and tried to understand the statistical and economic properties of inflationary movements in India. She further works on the nexus between financial development and innovation and inflation along with the growth inflation nexus.

She works in the area of monetary and financial economics. Taking cue from her doctoral work on core and headline inflation, she developed interest in the area of monetary policy transmission mechanism. The persistent inflationary tendencies in the last couple of years despite RBI's relentless tightening efforts, made it apparent that the fiscal condition and supply situations rendered monetary policies ineffective. Other channels affecting the effectiveness of RBI's policies are the globalization of financial market. The stock indices closely follow movements and decisions made in the international financial markets and affect the monetary policy transmission mechanism through various channels including foreign exchange market. India also had to borne the impact of Global Financial Crisis (GFC) of 2007-09, though with a lag. In the aftermath of the GFC of 2007-09 Hyman P. Minsky's financial instability hypothesis (FIH) has received renewed interest from post-Keynesians as well as behaviouralists. Essentially, the theory suggests that "in a capitalist economy with finance, an endemic tendency towards euphoric expectations will generate both cycles and a secular trend of rising debt, leading ultimately to a debt-induced crash." However, this inevitability of recessions is not apparent in the Indian context. India has not experienced financial crisis of the order and depth as the Great Depression of the 1930s or the GFC of 2007-09. The obvious reason is that India was not only a closed economy for most part but also the financial development and globalization both are relatively at a nascent stage. Nevertheless, given that Minsky's original hypothesis also assumed a closed economy, and the Indian economy has been liberalised now for more than two decades it might be of some interest to examine the applicability of Minskian hypothesis in explaining turbulent periods in the Indian economy. Currently, Dr. Kar is working on the validity of Minsky's Financial Hypothesis in the Indian context.

Dr. Nirmala Menon
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Dr. Nirmala Menon *(PhD: George Washington University, USA) works* primarilyon Postcolonial Literature and Theory. Her focus is on comparative study of twentieth century postcolonial literatures in English, Hindi and other languages. Gender studies, Globalization and Translation studies are additional areas of research. Her research interests are multilingual and interdisciplinary; she investigates cultural, gender and historical representations in colonial and postcolonial works. Her work examines the ways in which literatures from different non-Western languages influence and redefine/reframe understanding of postcolonial theoretical concepts.

Her primary area of research is Postcolonial Literature and Theory. Her focus is on comparative study of twentieth century postcolonial literatures in English, Hindi and other languages. Gender studies, Globalization and Translation studies are additional areas of research. Her interests are multilingual but also interdisciplinary; she looks at cultural, gender and historical representations in colonial and postcolonial works. Her research examines the ways in which literatures from different non-Western languages influence and can redefine and reframe or understanding of the postcolonial theoretical concepts.

Her publications include examining questions that try to understand the impact and influence of language literatures on postcolonial theoretical vocabulary and discourse. Her concurrent research converges the above interests in two book projects. Creole Cosmopolitanisms: Narratives of Migrant Postcoloniality with Marika Preziuso will be released in the next few weeks. She is also working on a monograph Re-Mapping the Postcolonial Canon: Re-Imagine, Re-Map and Re-Translate that elaborates on the question of multiple language literatures in postcolonial theoretical studies. Her publications and conference papers in the past include questions of language, translation and canon building.

Out of this research in multilingual postcolonial studies, Dr Menon has developed an engaging interest in the merging field of Digital Humanities particularly the role of Humanities in critiquing, archiving and using various forms of Digitization and Publishing, especially academic Humanities publishing. Her proposal and paper on the imperative of multilingual open access publishing recently won an award at the GO:DH, Global Outlook: Digital Humanities peer reviewed journal. She intends to develop a Digital Humanities project based off of the award winning paper. Her interest in Gender issues translates in her work in this area; currently she is the Chairperson of the Western Region of the Internal Complaints Committees set up in the various offices of Hindustan Lever Ltd, Mumbai as per the Vishaka guidelines of the Supreme Court of India. She is involved in directing the drafting a policy for HUL Ltd in accordance with the law.

Dr. Sanjram Premjit Khanganba
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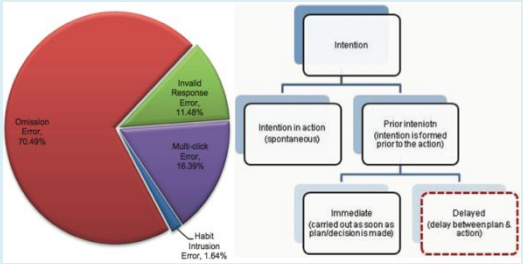
sanjrampk@iiti.ac.in

Dr. Sanjram Premjit Khanganba (PhD: IIT Bombay) performs Human Factors Research employing both experimental and non-experimental techniques.



Having extensive research experience in his area of expertise, he performs applied research with scientific rigor and is passionate about research projects and consultancy that will have social implications. His research at 'Human Factors & Applied Cognition Lab' concentrates on broad domains of: Interaction, Transport, Performance, Innovation, and Social Design. He is a founding member of HCI Professional Association of India. He has recently published his scientific papers entitled "Task difficulty and time constraints in programmer multitasking: An analysis of prospective memory performance and cognitive workload" and "Attention and intended action in multitasking: An understanding of cognitive workload" in *International Journal of Green Computing* and *Displays* respectively. His specific topic of research interest include- Human Error, Human Multitasking, Human Factors in, Computer and Information Systems, Interactive System Design & Evaluation, Psychology of Programming/Empirical Study of Programming, User Cognition, and Community System.

Dr. Neeraj Mishra
Assistant Professor
HSS
nmishra@iiti.ac.in

Dr. Neeraj Mishra (PhD:The Center of Development Research, University of Bonn, Germany) research interests are: 'political sociology of water governance', river basin management and development, usage of spatial tools and GIS in natural resource management, anthropological research on developmental issues etc.

His current research focuses on urban and rural water resource governance, river basin management, inter-basin water politics and climate change adaptability research in the water sector.

At IIT Indore he is also part of "Indian consortium on Indo-UK Collaboration on River Health" and will be undertaking research on the gaps existing in the present institutions and governance of Ganga river basin that has led to its poor health status. The study also documents the traditional and tacit community knowledge for river basin management that exists among the local people and suggests how such knowledge can be documented and included to support the Decision Support Systems (DSS). Towards a more nuanced understanding of river basin management, this study would also collect qualitative data to show how local people construct the river in their own 'world-views' and how does the historical, linguistic, and political situated-ness of different riverfront communities affect the health of the river?

Dr. Neeraj Mishra is also a co-Investigator for proposal submitted to JICA on "Centre for Excellence in Sustainability Studies." He is undertaking PhD students' supervision in the areas urban water governance, watershed management, and inter-regional and national water politics.

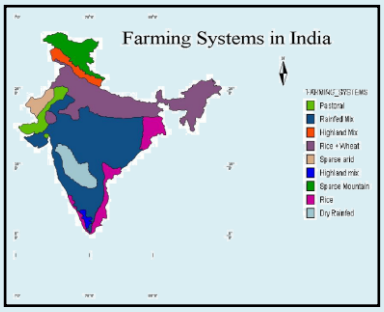
Dr. Amarjeet Nayak
Assistant Professor
HSS
amarjeet@iiti.ac.in

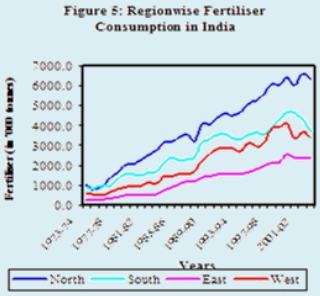
Dr. AmarjeetNayak(PhD: IIT Kanpur) major areas of interests are Indian Writing in English, Postcolonial Theory and Translation Studies. He has published academic papers in international and national refereed journals such as SKASE journal of Literary Studies, Jura Gentium, Parnassus, Journal of Drama Studies, Pegasus, Apperception, etc.

Dr. Nayak's research work in the fields of postcolonial literature, disability studies, politics of literary marginalization, etc. has been published in many international journals of repute such as *New Writing: The International Journal for the Practice and Theory of Creative Writing*, *Disability and the Global South*, *Short Fiction in Theory and Practice*, etc. Dr. Nayak's doctoral students have also published their works in reputed international and national journals such as *Notes on Contemporary Literature*, *Wizcraft Journal of Language and Literature*. Some of the major achievements of Dr. Nayak's doctoral students include presenting research papers in prestigious international conferences at MIT, University of Osnabruck, Germany, as well as participating in the Summer School at Harvard and at Institute of Economic Growth, Delhi University.

Dr. Pritee Sharma
Assistant Professor
HSS
psharma@iiti.ac.in

Dr. Pritee Sharma *(PhD: IIT Bombay; Project Associate: Gujarat Institute of Development Research, Ahmedabad; Academic Associate: Indian Institute of Management, Ahmedabad)* is interested in Agricultural Economics (Economics of Land, Water and Forests) and Development Economics (Rural Poverty and Trade Concerns of Developing Countries).

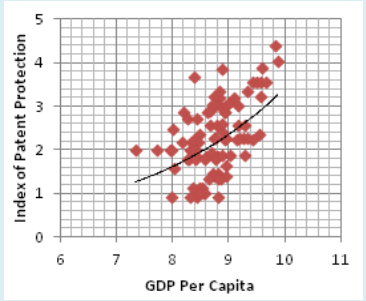




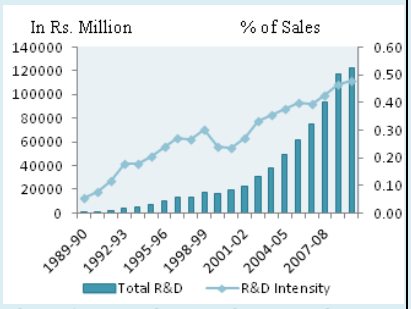
Prior to her doctorate she has worked on research assignments from the Ministry of Agriculture, Ministry of Environment and Forests, GOI, and the World Bank. Her current research focuses on water resource economics, energy economics, and climate change adaptation in Indian agriculture.
At IIT Indore she is also a part of "Indian consortium on Indo-UK Collaboration on River Health" and will be undertaking research on Ecosystem Services Valuation and Implications of Ganga Health on Agriculture and Food Security. She is also a Principle Investigator for proposal submitted to JICA on "Centre for Excellence in Sustainability Studies." She is the lead for research group working on "Rural Technologies and Development Studies." She is undertaking PhD students' supervision in the areas of Climate Change and Food Security, Renewable Energy Policy and Labour Market Rigidities and Industrial Regulations in India.

Dr. Ruchi Sharma
Assistant Professor
HSS
ruchi@iiti.ac.in

Dr. Ruchi Sharma(PhD: IIT Kanpur; M.Phil. and M.A. (Economics) Panjab University, Chandigarh; U.G.C Doctoral Research Fellow) has worked as Economist with Tata Services Limited. She has also worked at IIT Delhi and holds visiting position at IIM Indore.



This figure shows that countries tend to formulate patent policy per the domestic economic and technological requirements.



This figure shows that total R&D expenditure and intensity of Indian industries has increased in the last two decades.

Her research areas are Economics of Innovation, Patent Policy and Technology Transfer (FDI and Licensing). Currently, her research group is working on R&D and patenting by Indian firms, patenting by Indian universities and academic institutions and the impact of FDI on innovation by Indian firms. She has completed sponsored research project funded by Indian Council of Social Sciences Research. She has published research papers in international journals of repute like Journal of Intellectual Property Rights and World Patent Information. Dr. Ruchi Sharma has presented her research work in international conferences held at University of Illinois and Oxford University. She was awarded Kusuma Young Faculty Incentive Fellowship at IIT Delhi.

Dr. C. Upendra
Associate Professor
HSS
cupendra@iiti.ac.in

Dr. C. Upendra[PhD: IIT Bombay; Research Fellow at Forum on Contemporary Theory, Baroda (funded by Ford Foundation)]

He is deeply interested in the areas of Moral Philosophy, Moral Epistemology, Evolutionary Theories and Philosophy of Cinema. He also takes great interest in teaching and discussions.. The common line of argument he is committed to is that knowledge, reasoning and judgment are `pluralistic' in nature. He has been working on a few fundamental questions of philosophy like "What is the nature of morality? Is morality a science? All things being equal, what is the possibility of moral knowledge?" Dr. Upendra has worked on pertinent questions in philosophy – "as science is naturalistic, so too is morality; thus, collapsing the fact/value dichotomy. Arguing against such stance, he has been linking this issue with the very recent resurgence of 'evolutionary biology' and 'Darwinism' in moral cognition. How do human beings become moral beings? There are evolutionists, who locate these moral cognitive traits in the natural evolutionary process [intrinsic to organisms, to some extent arguing that human cognition is dependent on animal cognition], and on the other hand, anthropomorphic approach [humans are superior to animals in nature] talks about the discovery of moral cognates that transforms savages to moral beings [veneer theory]. Currently, he is working on these issues linking to cognitive psychology – questioning the 'certainty' aspect of behavioral approach.

The above is the fundamental concern. But how do we understand the human condition when we claim that societies and cultures, through logical-rational knowledge systems, have reached their zenith of sophistication? Dr. Upendra is concerned with the reality of ideological and political interplay throughout history. The recorded history provides us enough insights into the interminable conflicts over the nature of social formations. As part of the research, his works are centered on the ideological and philosophical rivalry of two major ideas of history – liberalism and communism. Particularly, his research sympathizes with the Marxist philosophy and centers on the claim that "History repeats itself first as fallacy, second as farce". The major emphasis is on 'the political' dimension of the individual – the focus being laid here on the Aristotelian proposition that 'man is a political animal'. His research focuses on the far reaching implications of this statement in political philosophy, which took a psychoanalytic turn after the holocaust and later on till the present.

The third issue Dr. Upendra is working on is the long-standing confrontation between science and philosophy, on `Awe and Wonder' – "whether something comes out of something" or 'something comes out of nothing." Though much of the philosophical debate inclines with Science [something like 'nature' is taken for granted, owing to the principle of infinite regress], Dr. Upendra is concerned about the 'ethical' stance of the world. He is working on the question – "Why it is the case that x if x?" This work focuses on the cognitive flaws of human beings – that measures sanity and insanity from the psychoanalytic point of view.

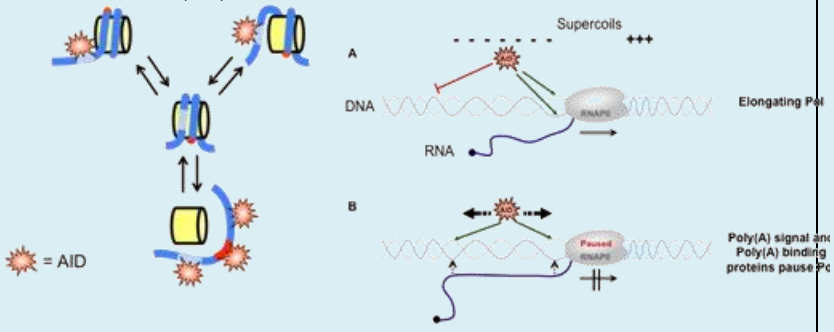
Through these three research concerns, Dr. Upendra's focus is that despite a law-like mechanism intrinsic to both organic evolution and cognitive growth, our pursuits will not be productive unless we reach the next level – understanding the life-forms confronted between metaphysical concerns and concrete existential patterns. The judgmental nature of human beings, thus, has to realize the 'variety' intrinsic to these various life forms.

Besides these primary interests, Dr. Upendra is interested in the history of ideas [great ideas and ideologues acting as the footprints of human civilization], philosophy of cinema [the manner in which philosophical ideas are brought onto the moving image, and the critical relationship between film, fiction and reality], and perspectives of human progress [there is progress recorded ever without conflict and violence].

INTER DISCIPLINARY CENTER:BIOSCIENCES AND BIOMEDICAL ENGINEERING CORE FACULTY MEMBERS

Dr. Prashant Kodgire
Assistant Professor, BSBE
HOD, BSBE
pkodgire@iiti.ac.in

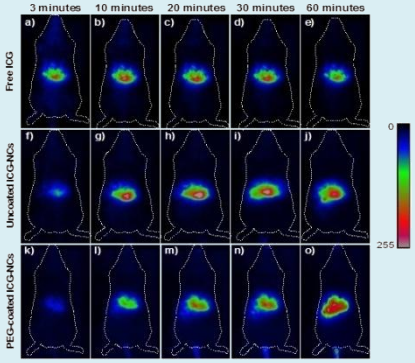
Dr. Prashant Kodgire *(PhD: IIT Bombay; Postdoctoral Fellow: University of Chicago, USA; Research Associate: Wockhardt Research Centre, Aurangabad, India)*works on Molecular Immunology, Somatic hyper-mutation of immunoglobulin genes, Chromatin structure and gene regulation. He got the prestigious Ramanujan fellowship from Govt. of India.He also received Irvington Institutes postdoctoral fellowship from the Cancer Research Institute, USA, for work in Immunology and Cancer Immunology.He received another very prestigious International postdoctoral fellowship award from the Lady Tata Memorial Trust, UK, for research in Leukemia.



His group's current efforts are on identifying the molecular mechanisms of action and targeting of activation-induced cytidine deaminase (AID) on the Ig genes.
These studies are important for determining how the varied repertoire of antibody genes is created with the potential to react against any foreign antigenic substance, including tumor cell antigens. Besides aiding the defense against tumors by creating potent anti-cancer antibodies, SHM can have a negative effect as a promoter of cancer by giving rise to B cell lymphomas and leukemias. Understanding somatic mutation will aid in the investigation of the cellular, genetic and environmental causes of B lymphocyte malignancies as well as in learning how to influence the production of high affinity antibodies against infectious agents and tumor antigens.

Dr. Sharad Gupta
Assistant Professor
BSBE
shgupta@iiti.ac.in

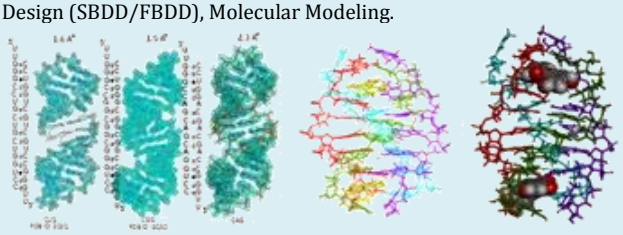
Dr. Sharad Gupta *(PhD: IIT Kanpur, India;Postdoctoral Fellow: Tufts University, MA, USA; Visiting Research Associate: Biosystems, KAIST, S.Korea; Assistant Project Scientist, Academic Coordinator and Lecturer: University of California, Riverside)* focuses on the development of biocompatible nano-carriers for *in-vivo* molecular imaging. He plans to use these nano-carriers for cancer diagnosis and therapy. He also develops new biomaterials for the development of biologic wound dressings.



The main focus of Dr. Gupta's research is on development of optical techniques for biomedical applications, bio-nanotechnology and biomaterials. Currently he is focusing on a project that studies the mechanism of small peptide interaction with plasma membrane. In this work, the effect of cholesterol on interaction of small peptide with plasma membrane is also studied. To understand these mechanism he is using optical interferometric techniques, it has been found that inclusion of cholesterol in plasma membrane makes membranes more resilient towards the cytolytic action of this small peptide. In addition to this he is developing a nanotechnology based approach for near infrared (NIR) biomedical imaging for disease diagnosis. In this project, he is developing biocompatible and biodegradable nanoparticles that will bring the NIR chromophore such as Indocyanine green (ICG) to a target location to diagnose the abnormality inside the tissues.

Dr. Amit Kumar
Assistant Professor
BSBE
amitk@iiti.ac.in

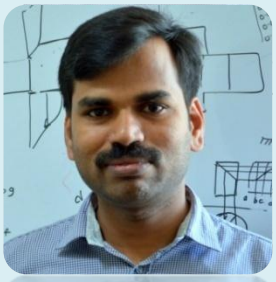
Dr. Amit Kumar *(PhD: IIT Roorkee, India; Postdoctoral Research Associate: The Scripps Research Institute, U.S.A.; Postdoctoral Fellow: Research Foundation, SUNY Buffalo, U.S.A; CSIR Research Fellow: IIT, Roorkee)* works on Structure Biology, NMR Spectroscopy, Target Identification and Drug discovery for different diseases, Proteomics, Computer Based Drug Design (SBDD/FBDD), Molecular Modeling.



(Left) Crystal structure that have been refined of a model duplex of r(CUG)exp in Myotoni dystrophy Type I, r(CGG)exp in Fragile X-associated tremor ataxia/ Fragile X syndrome an r(CAG)exp in Huntington's Disease (HD) and Spino Cerebellar Ataxia (SCAs) (Right)Minimized structure showing the G-quadruplex DNA complexed with the lead sma molecule.

Dr. Kumar's group members are involved in developing libraries of bioactive sma molecule ligands that can target a variety of toxic DNA/RNAs that are present in severa untreatable neurological and orphan diseases. Such toxic RNA based diseases include Myotonic dystrophies, Kennedy's disease, the Spinocerebellar ataxias, Huntington' disease, Fragile X syndrome and many others. In many of these cases, not only do we us directly the information contained in the RNA motif-ligand database but also we utilize similarity searching and virtual screening to rationally optimize the initial leads int potently bioactive small molecules. Further, rational design of small molecules an structural studies of these small molecules in complex with their RNA targets, thes studies will not only allow us to understand the molecular and atomic level interaction that drive association of complexes but will also allow us to rationally design improve small molecules that target RNA.

MEMBERS IN BSBE FROM OTHER DISCIPLINES:



Dr. Shanmugam Dhinakaran
Assistant Professor, ME

Dr. Chelvam Venkatesh
Assistant Professor, Chem

Dr. Srivathsan Vasudevan
Assistant Professor, EE

Dr. Premjit K. Sanjram
Assistant Professor, HSS

Dr. Ram Bilas Pachori
Associate Professor, EE

Dr. Shaikh M. Mobin
Assistant Professor, Chem

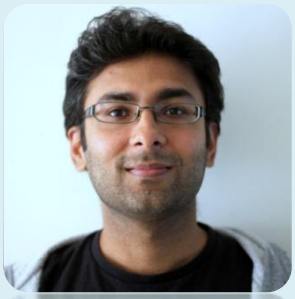
Dr. Rajesh Kumar
Assistant Professor, Physics

Dr. Sarika Jalan
Associate Professor, Physics

INTERDISCIPLINARY CENTERS: ASTROPHYSICS

Dr. Siddharth Malu
Assistant Professor, Physics
HOD Astrophysics

Dr. M. Anbarasu
Assistant Professor, EE



Dr. Vimal Bhatia
Associate Professor, EE

Dr. I. A. Palani
Assistant Professor,ME

Dr. Pankaj Sagdeo
Assistant Professor, Physics

Dr. Somaditya Sen
Associate Professor, Physics

Dr. Abhishek Shrivastav
Assistant Professor, CSE

INTERDISCIPLINARY CENTER: MATERIAL SCIENCE AND ENGINEERING

Dr. I. A. Palani
Assistant Professor, ME
Shape Memory Alloys, Surface modifications

Dr. M. Anbarasu
Assistant Professor, EE
Shape Memory Alloys

Dr. Preeti Bhobe
Assistant Professor, Physics
X-ray absorption spectroscopy

Dr. Satya Bulusu
Assistant Professor, Physics
Computational Chemistry

Dr. Satyajit Chatterjee
Assistant Professor, Physics
Surface Science and Technology

Dr. Sudeshna Chattopadhyay
Assistant Professor, Physics
Battery materials, Energy

Dr. Rajesh Kumar
Assistant Professor, Physics
Optics, Semiconductors

Dr. Abhinav Kranti
Associate Professor, EE
Device engineering, Simulations

Dr. Krushna Mavani
Associate Professor, Physics
Thin Films, Magnetism, Terahertz spectroscopy

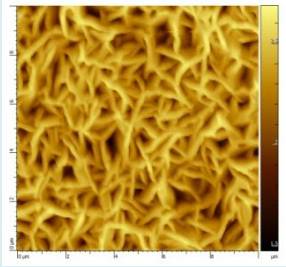
 **Dr. Shaikh M. Mobin** **Assistant Professor, Chemistry** **Xray Diffraction, Organometallic synthesis**	 **Dr. Shaibal Mukherjee** **Assistant Professor, EE** **Thin films, Semiconductors**	 **Dr. Biswarup Pathak** **Assistant Professor, Chemistry** **Computational Chemistry**
 **Dr. Kazi Sabiruddin** **Assistant Professor, ME** **Surface Science and Technology**	 **Dr. Pankaj Sagdeo** **Assistant Professor, Physics** **Experimental Instrumentation**	 **Dr. Somaditya Sen** **Associate Professor, Physics** **Magnetism, Multiferroics, Semiconductors**
 **Dr. Parasharam Shirage** **Ramanujan Fellow, Physics** **Nanotechnology, Superconductors**	 **Dr. Sanjay Singh** **Assistant Professor, Chemistry** **Metal Nanoparticles for Catalysis**	 **Dr. Vipul Singh** **Assistant Professor, EE** **Nanocomposites, Organic thin films**

SCIENTISTS:

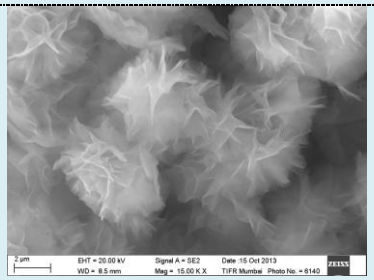
PHYSICS
MATERIALS SCIENCE ENGINEERING

Dr. Parasharam M. Shirage
Ramanujan Fellow
Physics
Materials Science and Eng.
pmshirage@iiti.ac.in

Dr. Parasharam Shirage *(PhD: Shivaji University, India; Postdoc Scientist: Tata Institute of Fundamental Research, India (2012-13); Institute Postdoctoral Fellow: AIST, Tsukuba, Japan (2008-2012); JSPS Postdoc. Fellow: AIST, Tsukuba, Japan (2006-2008); Visiting Scientist: KERI, Changwon, South Korea (2004-2006); Lecturer: Rajaram College, Kolhapur (Maharashtra Govt.) (2003-2004))* works on Superconductors, Oxides,Topological Insulators, Nano-materials and Multiferroics: Synthesis and Single Crystal Growth. He studies structural, magnetic and electrical properties of polycrystalline and single crystalline advanced functional samples, superconducting wires, thin films and multilayers. His fundamental contribution to science is the inverse isotope effect on the transition temperature of $(Ba,K)Fe_2As_2$ superconductor, which is a historic achievement in high-T_c superconductivity.He has investigated into the energy applications.



AFM image of nickel oxide



SEM image of nickel oxide

Advanced functional materials are the materials whose physical and chemical properties are sensitive to a change in the environment such as temperature, pressure, electric field, magnetic field, optical wavelength, adsorbed gas molecules and the pH value. The functional materials utilize the native properties and functions of their own to achieve an intelligent action. Few materials belong to magnetism, energy storage functions, ferroelectricity, piezoelectricity, *etc*..
Dr. Shirage developed a facile technique for growing nano-materials by avoiding toxic and sophisticated instrumentationincluding single layer graphene and their applications in energy generation and storage. He demonstrated that porous carbon can be utilized as superior materials for supercapacitors. He is also an expert in high pressure high temperature synthesis of novel advanced functional materials and basic properties studies, he contributed fundamental finding of inverse isotope effect on T_c of $(Ba,K)Fe_2As_2$ superconductor and also invented few new materials. He is one of the leaders in growing large single crystals of varieties of functional materials.

MECHANICAL ENGINEERING
BIOSCIENCE & BIOENGINEERING

Dr. Kiran Bala
Inspire Faculty Fellow
Mechanical Eng.
Bioscience and Bio-Engg.

Bioenergy is projected as alternate of fossil fuels because of environmental sustainability. Dr. Bala's group is exploring biofuels production potential of microalgae, which can act as a potential source of renewable energy. Group has isolated number of microalgal strains from different wastewater samples collected from Indore. Presently identifying and screening suitable strains of microalgae which will perform uniformly in wastewater with consistently good biomass and lipid productivity.

CHEMISTRY

Dr. Deepa Dey
DST Woman Scientist (A)
Chemistry

Dr. Deepa Dey works on nanomaterials synthesis and their applications in photocatalytic behaviours, metal oxides, carbonaceous composites and their use in catalysis, electronic devices,*etc.*

Non-Stoichiometric Metal Oxides Synthesis (M= Ti, Nb, Zr, Ta, V) for photocatalytic activities:

We have developed a solution based method for preparingnon-stoichiometric metal oxides based on core-shell method where the reduced titanium oxide is in the core and the shell is Au, Ag, Cu or graphene oxide. The Au-Titanium and Ag-titanium composites are applied for the catalytic conversion of p-nitrophenol to p-aminophenol and due to the presence of Au and Ag the catalytic activity of titanium oxide has increased immensely as compared to bare TiO_2.

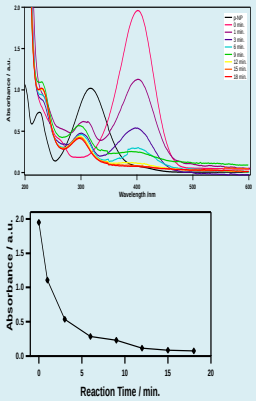
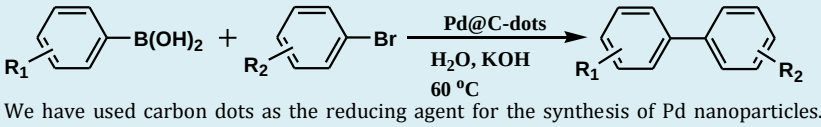


Figure: Catalytic reduction of 4-nitrophenol into 4-aminophenol by sodium borohydride using Au-TiO_2 composite

Carbon dot reduced palladium nanoparticles as active catalysts for carbon-carbon bond formation[Dalton Transaction 2013, 42, 13821-13825]:

We have developed a new thermal carbonization method towards the synthesis of C-dots using clotted cream as theprecursor.

This method has been in use for centuries for producing butter oil (*ghee* in India), however, we reported for the first time that the caramelized byproducts in this process, which are produced in gram quantities, are carbon dots and they show interesting optical properties comparable to other synthesized carbon dots.



We have used carbon dots as the reducing agent for the synthesis of Pd nanoparticles. The Pd@C-dot composite were then used to catalyse Suzuki and Heck coupling reactions.

Work based on carboneous nanoparticles and graphene oxide is also underway.

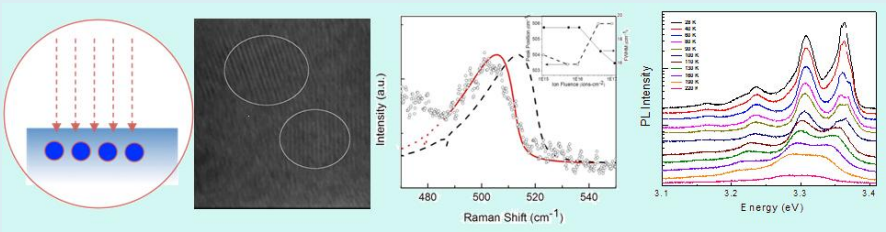
PHYSICS

Dr. Gayatri Sahu
DST Fast Track Young Scientist
Physics
gayatri@iiti.ac.in

Dr Gayatri Sahu*(Ph.D: Institute of Physics Bhubaneswar, Visiting Scientist: Institute of Physics Bhubaneswar, DST Young Scientist : IIT Indore)*is working on a project: "Systematic study of optical properties of semiconductor nanocrystals synthesized using ion implantation technique"

Her research is concentrated on the following aspects:

- Semiconductor nano-clusters formation using ion implantation and study of its optical properties using PL, Raman scattering, XRD techniques. The observed optical characteristics show that these luminescent centers may be very useful for the opto-electronic device applications.
- Synthesis of porous silicon using metal assisted chemical etching process.



Her collaborations are with RRCAT Indore, IIT Bhubaneswar and NISER Bhubaneswar, University of North Texas, Denton, USA. Her 3 year DST project of Rupees 19.2 lacs started in 2012 and has presently yielded 4 journal publications and one conference proceedings.

STATEMENT OF ACCOUNTS

INDIAN INSTITUTE OF TECHNOLOGY INDORE

BALANCE-SHEET AS ON 31st MARCH 2014

(Amount in ₹)

Sr. No.		LIABILITIES	Current Year 2013-14
1		**Corpus / Capital Fund**	
	i)	Capital Fund	72,85,49,357
	ii)	Unutilized Grant in Aid Plan	41,02,13,597
	iii)	Other Funds	1,35,55,882
		Total of Sr. No. 1	**115,23,18,836**
2		**Current Liabilities & Provisions**	
	i)	Sundry Creditors	1,65,18,956
	ii)	Student Funds	30,24,761
	iii)	Refundable Deposit	2,88,20,769
	iv)	Statutory liabilities	16,02,688
	v)	Other Current Liabilities	4,15,99,640
	vi)	Provisions	12,88,05,563
		Total of Sr. No. 2	**22,03,72,377**
		GRAND TOTAL (1+2)	**137,26,91,213**
Sr. No.		**ASSETS**	**Current Year 2013-14**
1		**Fixed Assets**	
	i)	Land	1
	ii)	Equipments	41,28,95,405
	iii)	Furniture & Fixtures	8,60,34,962
	iv)	Library Books & Journals	1,32,02,473
	v)	Motor Vehicle	1,66,78,642
	vi)	Cycles	23,000
	vii)	Computers	1,71,62,230
	viii)	Capital Work in Progress	18,23,73,507
		Total of Sr. No. 1	**72,83,70,220**
2		**Current Assets, Loans and Advances, etc.**	
	i)	Inventories	71,771
	ii)	Sundry Debtors	2,24,493
	iii)	Receivables	1,42,87,205
	iv)	Fixed Deposit in Scheduled Banks	54,57,87,212
	v)	Savings/Current Account in Scheduled Banks	1,06,99,025
	vi)	Advances to Staff	36,12,264
	vii)	Advances to Others	3,47,70,556
	viii)	Deposits	86,91,216
	ix)	Prepaid Expenses	1,28,31,111
	x)	Accrued Interest	1,33,46,140
		Total of Sr. No. 2	**64,43,20,993**
		GRAND TOTAL (1+2)	**137,26,91,213**

INDIAN INSTITUTE OF TECHNOLOGY INDORE

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st MARCH 2014

Sr. No.		PARTICULARS	Current Year Up to 31.03.2014
		INCOME	
1		Fee from Students	5,34,85,324
2		Other Receipt from Students	19,89,567
3		Other Income & Miscellaneous Receipt	20,89,733
4		Interest on Short Term Deposit	3,34,76,268
5		Transfer from Grant-in-aid (Plan)	43,97,72,103
		GRAND TOTAL	**53,08,12,995**
		EXPENDITURE	
1		**Establishment Expenses**	**18,01,14,911**
2		**Administrative Expenses**	
	i)	Consumables-Departmental & Others	1,50,47,828
	ii)	Rent, Rates & Taxes	4,39,69,185
	iii)	Electricity & Water charges	82,92,634
	iv)	Insurance for Students	10,50,570
	v)	Freight Charges & Wages for Staff & Students Shifting	1,15,430
	vi)	Repairs & Maintenance	32,42,795
	vii)	Vehicle Running and Maintenance	75,69,405
	viii)	Postage, Telephone and Communication Charges	63,63,509
	ix)	Printing and Stationery	21,21,945
	x)	Travelling and Conveyance Expenses	66,29,378
	xi)	Hospitality and Guest House Expenses	16,45,699
	xii)	Legal and Professional Charges	12,12,764
	xiii)	Advertisement and Publicity	22,20,483
	xiv)	Merit Cum Means Scholarship	73,31,572
	xv)	Subscription/ E Journals - Library Books & Journal	2,58,12,767
	xvi)	House-keeping & Security Charges	3,44,53,853
	xvii)	Mess Charges	1,36,24,511
	xviii)	Stipend of Ph. D. Students	2,82,61,949
	xix)	Students Gymkhana & Support Expenditure	54,45,037
	xx)	Contribution to IIT Council Secretariat	1,00,000
	xxi)	Expenses on Events & Programs	2,19,60,807
	xxii)	Students Medical Expenditure	7,03,308
	xxiii)	Renewal of Software License	8,60,015
	xxiv)	Seminar & Conference	11,02,993
	xxv)	Other Revenue Expenses	22,39,826
		Total of Sr. No. 2	**24,13,78,263**
3		**Depreciation**	**10,93,19,822**
		GRAND TOTAL (1+2+3)	**53,08,12,995**

CENTRAL LIBRARY

The Central Library started with a small number of books in 2009. The Collection Development activity gathered momentum in the year 2010. At present, the Library has a collection of 27600+ books and new books are being added to the collection continuously. These include books on all relevant subjects for teaching and for reference. The Library also boasts of a select collection of fiction, literature, and general interest books such as sports, films, etc, to take care of the leisure and recreation reading needs of the users. The Library has also developed a special Collection of books on Gandhian Studies.

Library at a Glance:

Collection:

Books	E Journals	E Books	Print Journals	Magazines	Newspapers
27600+	4000+	7600 approx.	21	74	22

Library Usage in IET and PACL Campus: **(April 2013 to March 2014)**

Books Issued	Reading Room Usage per month (Average)
17847	4000 users p.m. approx

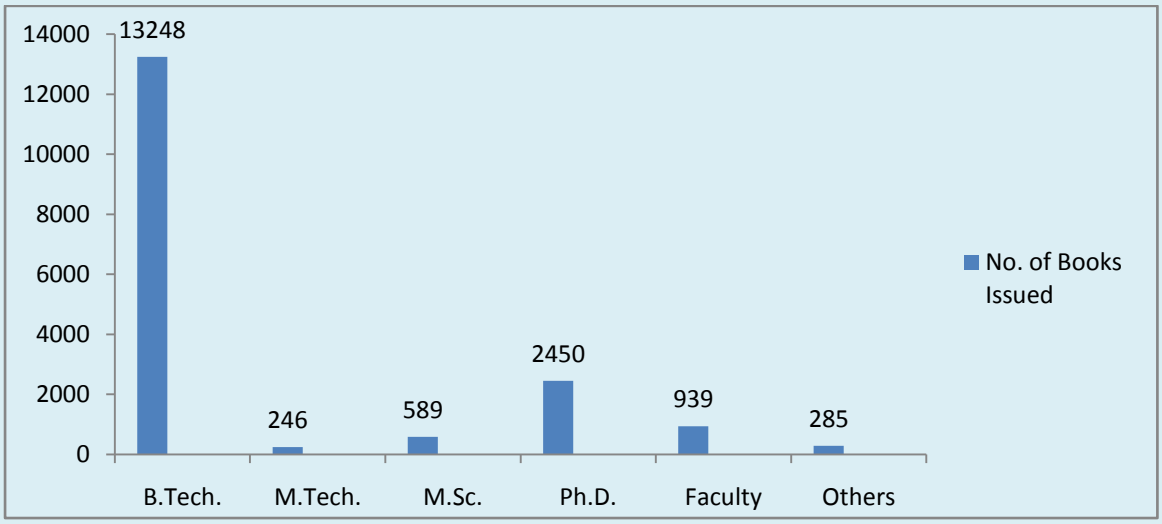


Figure 1. Book Issue Statistics-Category wise (Apr.2013 to Mar.2014)

Periodicals and Newspapers (Print Format): At present, the Library subscribes to 21 Print Journals, 74 Magazines and 22 newspapers.

Electronic Resources: In today's world of Information explosion, access to electronic information resources is essential, particularly in an academic environment. The library has developed a collection of Electronic Resources which includes thousands of journal articles, research papers, books, and other resources. The E Resource collection of the library includes electronic journals in various disciplines published by reputed societies such as American Mathematical Society, American Chemical Society, American Institute of Physics, American Physical Society, Royal Society of Chemistry, SIAM, IEEE, and so on. In addition to this, journals published by publishers such as Elsevier and Springer are also available to users of the Library. The E Resource collection also includes 7600 E-Books from various publishers. The complete list of e-resources with hyperlinks is available on the Library web page at the Institute website for users' convenience, so that users can access the resources from the library webpage itself.

Library Services:

At present, the Library offers services as described below:

- **Lending facility**: Undergraduate students can borrow 08 books for the period of 15 days, whereas Ph.D. students can borrow up to 08 books for the period of 1 month. Faculty members can borrow up to 30 books for a semester + 10 books for 15 days.
- **Overnight Lending**: Overnight lending facility is provided to students who wish to borrow a book from the reserved section, or have crossed their entitlement limit. Books on overnight issue have to be returned by 9.30 a.m. the next day.
- **Claims/ Reservations**: Users can claim/ reserve books which are issued out. Claimed/ reserved books are kept in the Library for the user for 3 days from the date of return by the previous borrower, before they can be issued to the next claimant.
- **Renewals:** Books can be renewed only if there are no claims.
- **Reading Room**: The Library provides air conditioned and wi-fi enabled Reading Room with a seating capacity of 50 students in each of the three campuses. In addition to this, 40 PCs are kept in the reading room for the use of research scholars and faculty members for the purpose of accessing e-resources, checking Web OPAC, etc.
- **Inter Library Loan & Document Delivery Services**: The Library has informal Inter Library Loan arrangements and Document Delivery Services with institutes such as IIM Indore, RRCAT Indore, IIT Bombay, GSITS Indore, etc. Under this facility, access is provided to books or electronic materials which may be needed by users but is not available in our library.
- **Book Bank**: Under the Book Bank scheme, text books are provided to SC/ST students for the period of a semester.
- **Library Portal**: Detailed information about the Library can be accessed through the Library portal. It can be accessed at : http://library.iiti.ac.in/
- **Reprography Services**: Users are provided Photocopies or Printouts of library resources subject to the provisions of the Copyright Act.

- **Orientation Program**: Library conducts orientation programs for new students to make them aware of the library facilities and services and to help them utilize the library resources optimally.

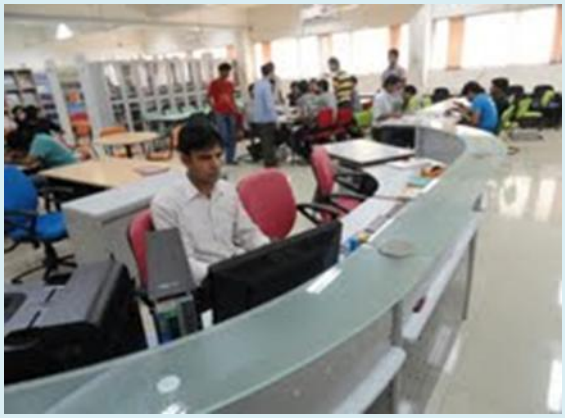
Library Automation:
ILMS: The Library uses Libsys7, an Integrated Library Management System (ILMS), for the automation of all its activities and services. Users can check the Library collection by using the Web OPAC (Online Public Access Catalog).

CCTV Surveillance: The Library has installed high tech cameras for the surveillance of all its 3 campuses to ensure the safety and security of its users and collections.

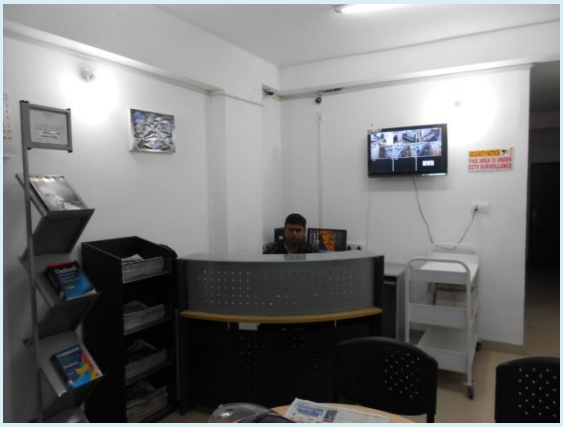
Bar Coding : Bar Code Technology is being used for issue/ return of books at the Circulation Counter.

Other Activities: The Library organizes various Training Programs/ Informative Sessions for E Resources and also for Print Resources. In addition to this, the Library organizes Book Exhibitions under the name "IITI Booksville" every year.

IET Campus Library: The IET campus library has an area of 1800 sq.ft. approximately. The Basic Sciences and Humanities collection is housed in this library, though copies are available in PACL campus Library, too. Also, books are sent to PACL campus library in case of demand by users.



Library at PACL Campus: The Library at PACL Campus has an area of 1781 sq.ft. It caters to the teaching and research needs of Engineering Faculty members, students, and research scholars. All the above mentioned facilities and services are provided to the users at both IET campus and PACL Campus Library.



Silver Springs Campus Library: At Silver Springs Campus a library has been set up in April 2013 to cater to the Faculty members, students, and research scholars staying on the campus. It has an area of approximately 1500 sq.ft. It has a collection of Text books and Reference books that students can refer to. It also has a select collection of Literature and Fiction titles. In addition to this, magazines and newspapers are also provided here.

IIT-I Central Workshop

The IITI Central Workshop is equipped with modern state-of-the-art instruments. Currently, the workshop is having eight sections: Machining, Welding, Forming, Foundry, Injection Molding, Fitting, Carpentry and Glass-blowing. Apart from industrial manufacturing work it also provides hands-on-training to students/operators involved in research and development of industry or academics in production and fabrication of mechanical components.

It is supported by a team of extremely skilled operators.

The projects and manufacturing divisions satisfy industrial standards and requirements and also bridge the gap between industry and academia. Completion of a project in a time-bound, cost-effective framework maintaining high quality of products is the main aim.

The workshop provides excellence and problem specific solutions to industries and research organization, apart from teaching students on handling the facilities.

At present the following experimental classes are regularly being held in the Central Workshop:

- Basic Manufacturing Technique Lab (ME 154),
- Manufacturing Processes Lab (ME 258),
- Machining Science Lab (ME 355) laboratory

The central workshop initiated its role of transforming students to engineers capable of thinking, designing and executing new ideas and has already achieved considerable success. It has provided infrastructure and services to faculty members/research scholars to fabricate experimental setup for research/consultancy purposes and to help UG/PG students in designing their B.Tech./M.Tech.projects. Research scholars are now capable of custom designing their experimental setup to produce their desired results.

Recently **Glass Blowing section** has been added to the workshop equipped with glass and quartz blowing equipments, such as double check glass blowing lathe, glass cutting machines, glass annealing furnace, surface grinding machine, glass blowing bench burner, etc. The shop is designed to fabricate specialty laboratory quartz/glass apparatus and repair used/broken parts.

The type of jobs done by the glass blowing section can be listed as fabrication of custom designed glass apparatus, modification of an existing glassware or apparatus, vacuum sealing of quartz tubes, glass to metal sealing (tungsten/platinum to borosilicate glass), repairing of various glass apparatus. It has already provided support to B.Tech./P.G./Ph.D. research students and faculty members and is looking forward to provide support for external users.

ACHIEVEMENTS of the CENTRAL WORKSHOP

Fabrication of BAJA SAE ATV

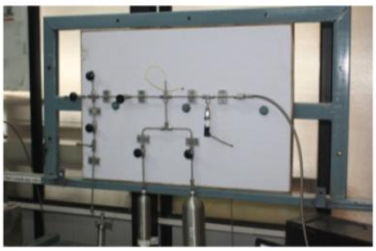
A group of Mechanical Engineering students has fabricated ATV for SAE-BAJA2014 for the second time after the SAE-BAJA2013 competition. The complete fabrication activities including welding, assembly, machining takes place inside by active participation of students and staff. IIT-Indore team was placed 35th position for innovative concepts and design among 260 participant institutes in 2013. The concept vehicle was then analyzed using various analysis software and specially developed program to optimize the vehicle design. The final vehicle was manufactured and assembled in IIT-Indore workshop. The vehicle was 5th cheapest vehicle in the BAJA-2013 competition and was appreciated by the jury for safety and the ergonomics. The vehicle competed till the last lap in the final endurance race through rough terrain. Our team of 25 students, "Engines and Demons", was placed 8th in the Computer Aided Engineering (Design & Analysis) round. Team stood 32nd in the acceleration test among 260 institutes all over the country. Participation in the BAJA competition had given invaluable experience to the student to handle the projects on their own right from concept, analysis, development and budget management.

Fabrication of Radio-telescope Antenna

The astrophysics project started at the central workshop in last week July-2013 under guidance of Dr. Somaditya Sen and Dr. Siddharth Malu. Initially the job was to understand the construction of a purchased 4.5m antenna and to assemble it for data collection. Subsequently, drawings were made with AutoCAD and all fabrication work of base mount completed in first week of August 2013. The assembly work was started and completed by the end of September 2013. Parallel to this the plan of fabrication of an in-house construction of a similar antenna started late August 2013. Currently design and fabrication of 4.5 m Radio Telescope Dish antenna is in process. This antenna will be having facilities to move 360 degrees azimuth movement as well as 90 degrees elevation movement. During inauguration of the 4.5m Radio-telescope antenna, Dr. Shashi Tharoor, Minister of State for Human Resource Development, Government of India visited the fabrication unit of the central workshop, IIT Indore. Dr. Tharoor praised the workshop's stand on manufacturing India's first 4.5m radio-telescope antenna.

GALLERY

Research projects



Some visitors

Some equipment fabricated at the Central Workshop

Central Workshop report 2013-2014

For year Apr-13 to Mar-14 total 107 Nos. of Work request received for various purposes which include PG Research, UG Teaching, BTP, other work. The details of estimated market cost (Raw material and Labor) and estimated cost at workshop (Raw material and Labor) are shown in Table .1

Purpose	Estimated Cost at Workshop (Materials & Labour)	Estimated Market Cost (Materials & Labour)	Net Gain /Saving
BTP	10645	19000	8355
PG Research	638819	1608150	969331
UG Teaching	49965	100650	50685
Other	271272	886500	615228
	970701	**2614300**	**1643599**

The total estimated cost of work at workshop is Rs.970701/- and estimated cost at market Rs.2614300/-. Further, the net saving achieved by fabrication at workshop is Rs.1643599/- The distribution of various Work request categories are PG Research (61%), other (28%) UG Teaching (5%) BTP (1%) as shown in Fig.1

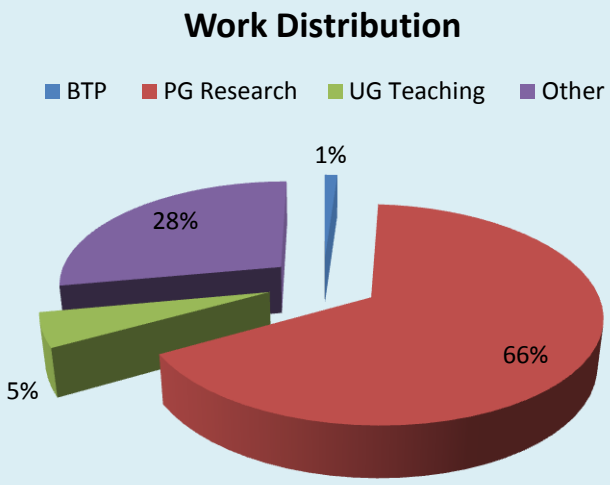


Fig.1

Distribution of Work request categories are PG Research, Other, UG Teaching, BTP and Estimated market cost , Estimated cost at workshop and net profit achieved is shown in graphical distribution at Fig.2 & Fig.3

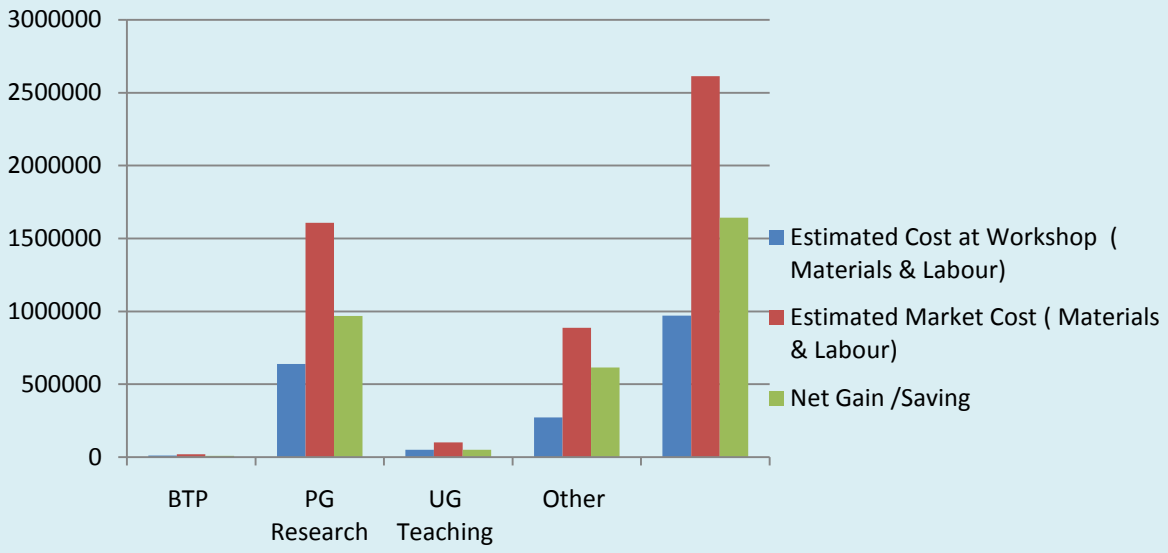

3000000
2500000
2000000
1500000
1000000
500000
0
BTP
PG Research
UG Teaching
Other
Estimated Cost at Workshop (Materials & Labour)
Estimated Market Cost (Materials & Labour)
Net Gain /Saving

Fig-2

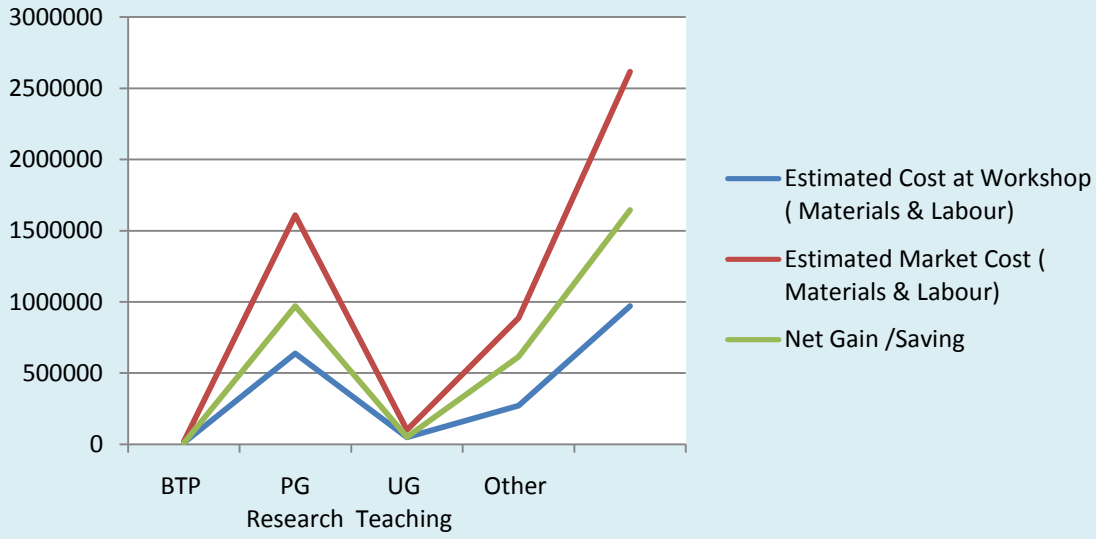

3000000
2500000
2000000
1500000
1000000
500000
0
BTP
PG Research
UG Teaching
Other
Estimated Cost at Workshop (Materials & Labour)
Estimated Market Cost (Materials & Labour)
Net Gain /Saving

Fig -3

Sophisticated Instrumentation Centre (SIC), IIT Indore: A National Facility

Sophisticated instrumentation centre (SIC) was established in September 2011 with institute funding to expedite the research program at IIT Indore. The SIC mission is to support and foster the research enterprise in the School of Basic Science, at the Indian Institute of Technology (IIT) Indore, as opportunities exist, by providing state-of-the-art instrumentation and ancillary equipment, and expertise in its use and application. The SIC in the School of Basic Science at IIT Indore is equipped with Single Crystal X-ray Diffraction, Nuclear Magnetic Resonance, Mass Spectrometry, Elemental Analysis, Single Molecule Imaging and Spectroscopy and other Spectroscopic facilities all together under one roof to provide the very highest quality of data analysis to academics and students in both research and teaching. With our excellent facilities and high level of expertise, we can offer our analytical services to other schools within the Institute sector and external commercial organizations.

SIC has now emerged as one of the first such centres in the country providing extensive support to the users across the country. It has become a self sustained centre by generating funds from service provided to external users from academia and industry.
A major advantage of SIC is its accessibility to the students within the institute, a very healthy ratio of students to the time availability on instruments.

The SIC instruments strenthens the following research areas: Fundamental Research in Inorganic Chemistry, Organic Chemistry, Organometallic Chemistry, Various aspects of Material Science, Bio Science and Engineering, including work on biosensors, Materials Science and Engineering, and Condensed Matter Physics

Our mission is to support and foster the research enterprise in the School of Basic Science at IIT Indore, as opportunities exist, by providing state-of-the-art instrumentation and ancillary equipment, and expertise in its use and application. The SIC in the School of Basic Science at IIT Indore is equipped with Single Crystal X-ray Diffraction, Nuclear Magnetic Resonance, Mass Spectrometry, Elemental Analysis and Single Molecule Imaging and Spectroscopy all together under one section to provide the very highest quality of data analysis to academics and students in both research and teaching. With our excellent facilities and high level of expertise, we can offer our analytical services to other Schools within the Institute sector and external commercial organisations.

Some important facilities:

Atomic Force Microscopy (AFM)

Atomic Force Microscopy (AFM) or Scanning Probe Microscopy (SPM) AIST-NT Smart SPM 1000, is one of the first 100% automated systems that offers its cutting-edge technology of ultra-fast, metrological and high resolution measurements for the most advanced materials research at the nano scale in all AFM and STM modes. Various Measuring modes, Contact AFM in air/liquid; Semicontact AFM in air/liquid; Non-contact AFM; Phase Imaging; Magnetic Force Microscopy (MFM); Kelvin Probe (Surface Potential Microscopy); Electric Force Microscopy (EFM); Piezo Response Force Microscopy; Force curve measurements; Nanolithography; Conductive AFM; Scanning Tunneling Microscopy STM (optional); Photocurrent Mapping; Volt-ampere characteristic measurements.

Single Crystal X-ray Diffraction

Single Crystal X-ray Diffraction Facility at SIC is equipped with state- of –the- art dual core Agilent Technologies (Oxford Diffraction) Super Nova CCD System. It gives access to micro-focus Cu and Mo sources which allows even small size crystals data collection and fairly good structure solutions. It is also equipped with Oxford cryo systems which enable temperature range from 90 to 400 K. There are also high definition microscopes for separations and mounting of crystals.

Services provided include:
Crystal screening and mounting, including air-sensitive samples.
Diffraction data collection under various conditions, including temperatures as low as 90 K .
Structure solution, refinement, and interpretation upto publication level.
Cambridge Structure Database searching.
Single Crystal X-ray Diffraction Facility is an independent National Facility. Currently, it is offering service to School of Basic Science within the Institute, other academic institutes and Industries throughout India for X-ray Crystallographic studies.

Powder XRD (PXRD)

Rigaku SmartLab, Automated Multipurpose x-ray Diffractometer, is an x-ray diffraction system (including thin film analysis system) equipped with a high-accuracy theta-theta goniometer featuring a horizontal sample mount.
Features: High-accuracy theta-theta goniometer: A theta-theta goniometer enables omega scans, 2-theta/omega scans, and 2-theta scans with the sample oriented horizontally. Additionally, the two axes are equipped with encoders to enable control of each axis with a resolution of 0.0001.
Attachments: Standard Powder XRD attachment, RxRy attachment (for sample tilt alignment, for thin film and rocking curve measurement), Phi-Chi attachment (for thin film, reflectivity).
X-ray generator: A 3 kW sealed tube x-ray generator (Max. voltage 60kV, Max. current 50mA, with Cu target) is attached with this system.
Cross beam optics (CBO): Changing the selection slits allows easy switching between the direct beam for para-focusing (Bragg-Brentano or BB) optics and a monochromatic parallel using a multilayer mirror. Para-focusing optics is applied to the measurement of phase ID analysis and quantitative analysis of powder samples. Parallel beam (PB) optics is applied to the measurement of profile analysis of powder samples, measurement of preferred orientation, measurement of thin film samples, and rocking curve measurement.

Detectors: (i) 0D Scintillation Counter (point detector), (ii)1D Semiconductor DetectorD/tex Ultra (linear detector)

Dual Ion Beam Sputtering Deposition (DIBSD)

The goal is to encourage and foster the research initiative in the School of Engineering, at Indian Institute of Technology Indore, by providing state-of-the-art research facility, and expertise in its use and application. The diverse novel researches performed by this unique facility will be a platform to attract top-seeded researchers and experimentalists in key semiconductor opto-electronic and nanotechnology industries, research laboratories, and academic institutions across the entire globe to establish a strong collaborative research programme with IIT Indore. Research activities, boosted by the DIBSD facility, are mainly focused on growth of novel nanostructures and high-quality thin films having enormous applications in semiconductor opto-electronics, sensors, solar photovoltaics, detectors, biotechnology, microelectro-mechanical systems (MEMS), nanoelectromechanical systems (NEMS) etc.
Diverse novel research activities would have major impact on following industries:

- Automobile
- Nanotechnology
- Pharmaceutical (Nano-Bioelectronics)
- Electronics
- Chemical
- Renewable Energy

In a broad sense, the research work accomplished by this facility would be extremely beneficial to showcase our expertise in the emerging areas of current research and development.

Nuclear Magnetic Resonance 400 MHz (NMR)

NMR spectrometer: Fourier transform Nuclear Magnetic Resonance spectrometer, Model AVANCE III 400 Ascend Bruker BioSpin International AG, Switzerland. Magnet: 8.96 Tesla (Superconducting), 50 mm bore Probes Available: For Solution State NMR 5 mm Broad Band Fluorine Observe Probe with gradient along Z-axis and Automated Tuning & Matching (ATM) accessory. 5 mm Broad Band Inverse Probe with gradient along Z-axis and Automated Tuning & Matching (ATM) accessory. Console: The state of the art Avance III 400 NMR console with digital lock and 2 independent RF channels providing 60 W 1H/19F transmitter and 150 W transmitters and broad band Preamplifier. In addition 5 W 2H transmitter for deuterium observe and decoupling.

Field-Emission Scanning Electron Microscope (FE-SEM)

Supra55 Zeiss, provides excellent imaging properties combined with analytical capabilities makes this high end FE-SEM suitable for a wide range of applications in materials science, life science and semiconductor technology. The large specimen chamber for the integration of optional detectors and accessories enables the user to configure the SUPRA for specific applications without sacrificing productivity or efficiency.

- GEMINI Technology with high efficiency in-lens detector and no magnetic field at specimen level
- Superb resolution and image quality at high and low operating voltages
- Extremely wide operating voltage range from 0.02-30kV
- Designed-in ease of use with minimal adjustments required when changing operating conditions
- Short analytical working distance of 8.5 mm for simultaneous high resolution imaging and X-ray analysis
- High probe current (up to 100 nA) with high stability (better than 0.2%/h) for precise analytical results
- Variable Pressure (VP) mode up to 133Pa for superb imaging of non conductive samples
- Multi-User friendly with Windows® based SmartSEM control software

Apart from these the SIC has several other instruments enlisted at http://www.iiti.ac.in/sic/index.php

Collaborators --- The Institutes and Industries for which service is being provided are:

Academic Institutions:
BARC, Mumbai
Banaras Hindu University
Delhi University
Guru Nanak Dev University Punjab
IIT Bombay
IIT Madras
IIT Mandi
IIT Patna
IIT Gandhinagar
GITAM University
Jammu University
MS University Baroda
NIPER Mohali
NIT Rourkela and others
Institute of Himalayan Bioresource Technology (IHBT)
Pune University
Pinnacle Biomedical Research Institute (PBRI)
Devi Ahilya Vishwavidyalaya
Shri Govindram Seksaria Institute of Technology and Science
NMU Jalgaon
RD University Jabalpur
Central University Sagar
Guru Ghasidas Vishwavidyalaya Central University, Bilaspur
SRM University
University College Trivandrum

Industries:
Gharda Chemicals
Glenmark Pharmaceuticals
Piramal Healthcare Mumbai
Lupin Pharmaceutical Pvt. Ltd.
Mimani Wires Pvt. Ltd.
Choksi Labs Ltd.
UV Resins Pvt. Ltd.
Impress Chemicals Pvt. Ltd.

International Academic Institutes:
Universität Stuttgart, Germany
Jehangirnagar University, Bangladesh
Dhaka University, Bangladesh

PEOPLE at SIC

Dr MOBIN SHAIKH
Incharge
Email: xray@iiti.ac.in
Tel: +91-731-2438 762

SARITA BATRA
Instrument: CHNS-O

KINNY PANDEY
Instruments: NMR, AFM, PXRD, SEM/EDAX/WDX, FT-IR, TCSPC, UV- Vis, Polarimeter, Fluorimeter, LB-Film, CD

GHANASHYAM A. BHAYSAR
Instrument: LC-MS, HPLC, HRMS, TGA, FT-IR

MANISH KUSHWAHA
Instrument: CD

FARHAN BABU
Instrument: FE-SEM /EDAX/WDS

Achievements: 2014-2015

<table>
<tr>
<td>Published Papers</td>
<td>Journal:
Computer Science and Engineering :- 10
Mechanical Engineering :- 13
Electrical Engineering :- 14
Chemistry:- 87
Physics:- 41
Mathematics :- 1
Humanities& Social Sciences :- 15
BSBE :- 8</td>
<td>Conferences:
Computer Science and Engineering :- 17
Mechanical Engineering :- 37
Electrical Engineering :- 19
Chemistry :- 6
Physics:
Mathematics
Humanities& Social Sciences :- 8</td>
</tr>
<tr>
<td colspan="2">Conferences / Workshops Arranged
ME:-
1. IRAM (Dr. N.K.Jain)
2. Short Term Course on Introduction to Research (Dr. Dhinakaran, ME)
3. Short Term Course on Mechatronics & Robotics (Dr. I.A. Palani, ME)
4. Bearing & Gear Fault Diagnosis (Dr. Anand Parey, ME)

Chemistry :-
1. Workshop on Modern Spectroscopic Techniques (Dr. Rajneesh Misra, Chemistry)
2. Nanoscience and Nanotechnology: From concepts to applications (Dr. Tushar Kranti Mukherjee, Chemistry)
3. Molecular Charecterization Techniques (Dr. Mobin Shaikh, Chemistry)

BSBE :- 17
Mathematics :- ISCACG 2013 (Dr. Swadesh Sahoo)
Physics :- CNSD 2013 (Dr. Sarika Jalan)
HSS :- Beyond Borders (Dr. Nirmala Menon)</td>
<td colspan="2">Book/ Chapter
Computer Science and Engineering :-
Mechanical Engineering :-
Electrical Engineering:-
Chemistry
Physics:
Mathematics
Humanities& Social Sciences :- 1</td>
</tr>
<tr>
<td>Achievements</td>
<td>Awards:
1. Dr. E. Anil Kumar: DST-Indo Switzerland Fellowship “To Develop collaboration in energy utilization and storage”.
2. Dr. Santosh Kumar Sahu: Indo-US Research Fellowship on Nano Fluidics.
3. Mr.Dheeraj Sharma, PhD Scholar with Dr. S.K.Vishvakarma, was awarded the IBM Ph.D. Fellowship award-2013.
4. Dr. N. S. Chaudhari was conferred the title of ‘Distinguished Engineer’ by</td>
<td>Placement :-
Computer Science and Engineering :- 36
Mechanical Engineering :- 22
Electrical Engineering :- 29
Max. Package received (in LPA INR)
1. 20. 46 (Amazon)
2. 11.22 (CISCO)
3. 10.7 (UHG)</td>
</tr>
</table>

	the Institution of Engineers (India) in February 2013	
	Progress: 1. A radio telescope, first of its kind in India, working at 10 GHz frequency, was constructed and installed at IIT Indore campus, and is now gathering data on diffuse emission from our own galaxy and later on from galaxy cluster mergers. 2. IIT Indore with the endeavor to expand in biosciences and biomedical engineering developed a full-fledged Centre of Biomedical and Bioengineering Research, in collaboration with interested partners. To develop a strong centre of materials and in the area of microelectronics and electrical engineering a Material Science and Engineering group and an Astrophysics group was established. 3. IIT Indore to actively participate with leading industries in forming a, first of its kind in India, industry-academia linkage, Industry Academia Conclave was organized. 4. The first B.Tech batch, consisting of 101 students, graduated in June 2013 and were conferred upon the degree in the 1st Convocation of the Institute held on 8th June 2013 at its permanent campus site in Simrol. The Hon'ble President of India, Shri Pranab Mukherjee was the chief guest of the convocation. 5. IIT Indore for spreading its existence in the social sphere through its outreach programme was initiated by a students' group named AVANA which includes education and social welfare packages offered free of cost to local schools and villagers. 6. Received complete handover of 501.42 acres of land. 7. First phase of boundary wall construction was completed. 8. Received phase II environmental clearance from Ministry of Environment and Forest.	**MoU:** 1. Deakin University, Australia:- Research activities, possible short-course programs and Joint Research Degress. 2. INSTITUT Mines - Télécom, France:- Academic and Scientific Collaboration. 3. Kurnakov Institute of General and Inorganic Chemistry of the Russian Academy of Sciences (IGIC RAS), Russia:-Academic.

	9. Commissioning of the first temporary electrical line in the main campus, obtaining permission for water supply to the main campus through Narmada-Kshipra-Simhasta link project, conduction of hydro-geological survey and soil and CBR testing, beginning of construction of temporary project office are some important activities were undertaken. 10. IIT-Indore participated in the SAE-BAJA competition for the first time. The all terrain vehicle was designed and developed in-house. In the first virtual round of this competition, concept design was presented with detailed project. IIT-Indore team was placed 35th position for innovative concepts and design among 260 participant institutes.	

PUBLICATION LIST:

Discipline of Computer Science and Engineering

Publications in 2013

Dr. Abhishek Srivastava,
Assistant Professor

1. Tanveer Ahmed, **Abhishek Srivastava**. "Minimizing Waiting-Time for Service Compositions: a Frictional Approach", ***Proceedings of the 20th IEEE International Conference on Web-Services (ICWS)***, Santa Clara, California, June 27 -30, 2013.
2. Rohit Verma, Sushmita Ruj, **Abhishek Srivastava**. Security Verification using Crowd Sourcing. ***Proceedings of the Security and Privacy Symposium***, IIT Kanpur, Kanpur, India, February 28- March 2, 2013.

Dr. Anirban Sengupta,
Assistant Professor

1. **Anirban Sengupta**, Vipul Kumar Mishra, Pallabi Sarkar, "Rapid Search of Pareto Fronts using Dlogic Exploration during Multi-Objective Tradeoff of Computation Intensive Applications", ***Proceedings of the IEEE 5th Asian Symposium on Quality Electronic Design (ASQED), Malaysia***, August 2013, pp. 113-122.
2. Vipul Mishra, **Anirban Sengupta** "Swarm Intelligence Driven Design Space Exploration: An Integrated Framework for Power-Performance Trade-off in Architectural Synthesis', ***Proceedings of the 25th IEEE International Conference on Microelectronics (ICM 2013),*** Dec 2013, pp. 1 - 4.
3. **Anirban Sengupta**, Vipul Mishra "D-logic Exploration: Rapid Search of Pareto Fronts during Architectural Synthesis of Custom Processors", ***Proceedings of the IEEE International Conference on Advances in Computing, Communications and Informatics (ICACCI-2013),*** August 2013, Mysore, pp. 586 - 593.
4. **Anirban Sengupta** "A Methodology for Self Correction Scheme Based Fast Multi Criterion Exploration and Architectural Synthesis of Data Dominated Applications", ***Proceedings of the IEEE International Conference on Advances in Computing, Communications and Informatics (ICACCI-2013),*** August 2013, Mysore, pp.430 - 436.
5. **Anirban Sengupta "**An Architecture Synthesis Tool for Rapid Multi-Objective Exploration and RTL Circuit Generation", ***ACM International Conference on Advances in Computing & Artificial Intelligence***, 2013.

Dr. Aruna Tiwari,
Assistant Professor

1. Arpit Bhardwaj, **Aruna Tiwari**, "A Novel Genetic Programming Based Classifier Design Using a New Constructive Crossover Operator with a Local Search Technique", ***Proceedings of the Ninth International conference on Intelligent computing (ICIC)***, Nanning, China, July 28-31, 2013, pp. 86–95.
2. Arpit Bhardwaj, **Aruna Tiwari**, "Performance improvement in genetic programming using modified crossover and node mutation", ***Proceedings of the 15th Annual Conference on Genetic and Evolutionary Computing***, Amsterdam, Netherland, ACM, 2013, pp. 1721-1722., pp. 86–95.

Dr. Kapil Ahuja,
Assistant Professor

1. **Kapil Ahuja**, Eric de Sturler, Lihong Feng, and Peter Benner. *Recycling BiCGSTAB with an Application to Parametric Model Order Reduction*. In ***Preprints of Max Planck Institute forDynamics of Complex Technical Systems***, Magdeburg, Germany, MPIMD/13-21, November 2013.

Publications in 2014

Dr. Abhishek Srivastava,
Assistant Professor

1. Tanveer Ahmed, **Abhishek Srivastava**. "A data-centric and machine based approach towards fixing the cold start problem in web service recommendation", ***Proceedings of the IEEE Students Conference on Electrical, Electronics, and Computer Science (SCEECS)***, 2014.
2. Tanveer Ahmed, Michael Mrissa, **Abhishek Srivastava**. MagEl: A Magneto-Electric Effect-Inspired Approach for Web Service Composition. Accepted at the ***21th IEEE International Conference on Web-Services (ICWS)***, Anchorage, Alaska, June, 2014.
3. Rohit Verma, **Abhishek Srivastava**. A Novel Web Service Directory Framework for Mobile Environments. Accepted at the ***21th IEEE International Conference on Web-Services (ICWS)***, Anchorage, Alaska, June, 2014.
4. Tanveer Ahmed, Abhinav Tripathi, **Abhishek Srivastava**. Rain4Service: An approach towards decentralized web service composition. Accepted at the ***11th IEEE International Services Computing Conference (SCC),*** Anchorage, Alaska, June, 2014.
5. Tanveer Ahmed, **Abhishek Srivastava**. Service Choreography: Present and Future. Accepted at the ***11th IEEE International Services Computing Conference (SCC)***, Work In Progress Track, Anchorage, Alaska, June, 2014.

Dr. Anirban Sengupta,
Assistant Professor

1. **Anirban Sengupta** and Vipul Kumar Mishra "Automated Exploration of Datapath and Unrolling Factor during Power-Performance Tradeoff in Architectural Synthesis Using Multi-Dimensional PSO Algorithm", ***Elsevier Journal on Expert Systems With Applications***, **Accepted**, January 2014 ***(5yr Thompson ISI Impact Factor = 2.339)***.
2. Vipul Kumar Mishra, **Anirban Sengupta** "MO-PSE: Adaptive Multi Objective Particle Swarm Optimization Based Design Space Exploration in Architectural Synthesis for Application Specific Processor Design", ***Elsevier Journal on Advances in Engineering Software***, Volume 67, pp. 111–124, January 2014 ***(5yr Thompson ISI Impact Factor = 1.391)***.
3. **Anirban Sengupta**, Reza Sedaghat, Vipul Kumar Mishra, "Execution Time – Area Tradeoff in GA using Residual Load Decoder: Integrated Exploration of Chaining Based Schedule and Allocation in HLS for Hardware Accelerators, ***Journal of Electronics and Energetics: Facta Universitatis,*** **Accepted**, February 2014 ***(INVITED PAPER)***
4. **Anirban Sengupta**, Vipul Kumar Mishra , "Integrated Particle Swarm Optimization (i-PSO): An Adaptive Design Space Exploration Framework for Power-Performance Tradeoff in Architectural Synthesis", ***Proceedings of the IEEE 15th International***

Symposium on Quality Electronic Design (ISQED 2014), Santa Clara, California, USA, **Accepted**, March 2014 (BLIND REVIEW). (Amongst top 5 conferences in EDA area).

5. Vipul Mishra, **Anirban Sengupta** "Swarm Intelligence Driven Design Space Exploration: AnIntegrated Framework for Power-Performance Trade-off in Architectural Synthesis', ***Proceedings of the 25th IEEE International Conference on Microelectronics (ICM 2013),*** Dec 2013, pp. 1 - 4.
6. **Anirban Sengupta**, Vipul Mishra "Automated Parallel Exploration of Datapath and UnrollingFactor in High-Level Synthesis using Hyper Dimensional Particle Swarm Encoding", Accepted for publication in the ***Proceedings of the 27th IEEE Canadian Conference on Electrical andComputer Engineering (CCECE),*** May 2014.
7. **Anirban Sengupta,** Saumya Bhadauriya "Automated Exploration of Datapath in High Level Synthesis using Temperature Dependent Bacterial Foraging Optimization Algorithm", Accepted for publication in the ***Proceedings of the 27th IEEE Canadian Conference on Electrical andComputer Engineering (CCECE),*** May 2014.

Dr. Aruna Tiwari,
Assistant Professor

1. Neha Bharill, **Aruna Tiwari**, "Handling Big Data with Fuzzy Based Classification Approach", Proceeding of 3rd Annual World Conference on Soft Computing-WCSC, ***Advance Trends in SoftComputing***, ***Springer***, Texas USA, Dec 16-18 2014, pp. 219-227. Published in Studies in Fuzziness and Soft Computing, Springer Cham Heidelberg New York Dordrecht London, Volume 312, 2014, ISSN 1860-0808, ISBN 978-3-319-0374-8, DOI 10.1007/978-3-319-03674-8.
2. Neha Bharill, **Aruna Tiwari**, "Enhanced cluster validity index for the evaluation of optimal number of clusters for fuzzy c-means algorithm", ***IEEE World Congress on Computational Intelligence Society***, Beijing, 2014.

Dr. Somnath Dey,
Assistant Professor

1. Rajat Saxena, **Somnath Dey**, "Collaborative Approach for Data Integrity Verification in Cloud Computing", ***Proceedings of the the Second International Conference on Security in Computer Networks and Distributed Systems (SNDS-14)***, 13-14 March 2014 at Thiruvananthapuram, India.(CCIS, Springer). [Accepted].

Dr. Surya Prakash,
Assistant Professor

1. **Surya Prakash**, Phalguni Gupta "Human recognition using 3D ear images", ***Neurocomputing Journal, Elsevier,*** 2014.
2. Piyush Joshi, **Surya Prakash**, "Image Quality Assessment based on Noise Detection", ***Proceedings of the International Conference on Signal Processing and Integrated Networks (SPIN 2014)***, NOIDA-Delhi, 2014.

Discipline of Electrical Engineering

Publications in 2013

Faculty Name: Dr. Shaibal Mukherjee
Designation: Assistant Professor

Conference

1. Saurabh Kumar Pandey, Sushil Kumar Pandey, M. Gupta, V. Sathe, Shaibal Mukherjee, Influence of substrate temperature variation on dual ion beam sputtered Ga-doped ZnO thinfilms, accepted, 3rd Nano Today Conference, Singapore, December 08-11, 2013.
2. Sushil Kumar Pandey, Saurabh Kumar Pandey, Vishnu Awasthi, Mukul Gupta, and Shaibal Mukherjee, Growth of Sb-doped p-type ZnO thin films by dual ion beam sputtering, accepted,3rd Nano Today Conference, Singapore, December 08-11, 2013.
3. Shruti Verma, Sushil Kumar Pandey, Shaibal Mukherjee, Design and Growth Optimization ofHybrid Green Light Emitting Diode by Dual Ion Beam Sputtering, Discussion Meeting on
   Recent Developments in Magnetic Materials and Thin Films (RDMMTF-2013), UGC-DAEConsortium for Scientific Research, Indore, May 24-25, 2013.
4. Ricky Anthony, Sushil Kumar Pandey, Saurabh Kumar Pandey, Shaibal Mukherjee, Influence of in-situ annealing temperature on structural, electrical properties of dual ion beam sputtering grown ZnO thin films, 6h India Singapore Joint Physics Symposium on Physics and Advanced Materials, ISJPS-2013, IIT-Kharagpur, February 25-27, 2013.
5. Saurabh Kumar Pandey, Shaibal Mukherjee, Device modeling and optimization of highperformance thin film CIGS solar cell with MgxZn1-xO buffer layer, 5th IEEE InternationalNanoelectronics Conference, IEEE INEC 2013, Singapore, January 02-04, 2013.
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1. Saurabh Kumar Pandey, Sushil Kumar Pandey, Uday P. Deshpande, Vishnu Awasthi, Ashish Kumar, Mukul Gupta, Shaibal Mukherjee, " Effect of oxygen partial pressure on the behavior of dual ion beam sputtered ZnO thin films", Semiconductor Science and Technology, vol. 28, pp. 085014(1-7), 2013.
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Faculty Name: Dr. Abhinav Kranti,
Designation: Associate Professor

Conference

1. M.S. Parihar, D. Ghosh, G.A. Armstrong, A. Kranti, "Single transistor latch phenomena in junctionless nanotransistors," IEEE International Nanoelectronics Conference (INEC),Singapore, pp. 72-73, 2013.

2. D. Ghosh, M.S. Parihar , A. Kranti, “Optimizing nanoscale MOSFET architecture for low power analog/RF applications,” DIEEE International Nanoelectronics Conference (INEC), Singapore,pp. 22-23, 2013.

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1. M.S. Parihar, D. Ghosh, A. Kranti, "Single transistor latch phenomenon in junctionlesstransistors", Journal of Applied Physics, vol. 113, article 184503, 2013.
2. M.S. Parihar, D. Ghosh, A. Kranti, "Ultra low power junctionless MOSFETs for subthreshold logic applications", IEEE Trans. Electron Devices, vol. 60, no. 5, pp. 1540-1546, 2013.
3. M.S. Parihar, D. Ghosh, A. Kranti, "Occurrence of Zero Gate Oxide Thickness Coefficient inJunctionless Transistors", Applied Physics Letters, vol. 102, article 203509, 2013.

Faculty Name: Dr.Ram Bilas Pachori,
Designation: Associate Professor:

Conference

1. P.S. Rathore, R.B. Pachori, "Determination of instantaneous fundamental frequency of speechsignals based on the FB expansion and AM-FM signal model", Proceedings Second InternationalConference on Signal, Image Processing and Pattern Recognitions, New Delhi, India, May 24-26, 2013.
2. S. Patidar, R.B. Pachori, "Constrained tunable-Q wavelet transform based analysis of cardiacsound signals", Proceedings 2013 AASRI Conference on Intelligent Systems and Control,Vancouver, Canada, April 17-18, 2013.
3. Bajaj , R.B. Pachori, "Classification of human emotions based on multiwavelet transform ofEEG signals", Proceedings 2013 AASRI Conference on Intelligent Systems and Control,Vancouver, Canada, April 17-18, 2013.
4. P. Kanani, A. Gupta, D. Yadav, R. Bodade, and R.B. Pachori, "Vehicle license plate localizationusing wavelets", Proceedings IEEE Conference on Information and CommunicationTechnologies, Thuckalay, India, April 11-12, 2013.

Journal

1. P. Jain, R.B. Pachori, "Marginal energy density over the low frequency range as a feature for voiced/non-voiced detection in noisy speech signals", Journal of the Franklin Institute, vol. 350, issue 4, pp. 698-716, May 2013.
2. Bajaj , R.B. Pachori, "Epileptic seizure detection based on the instantaneous area of analyticintrinsic mode functions of EEG signals", Biomedical Engineering Letters, vol. 3, issue 1, pp.17-21, March 2013.

Faculty Name: Dr. Santosh Kumar Vishvakarma,
Designation: Assistant Professor

Conference

1. Bhupendra Reniwal , S.K. Vishvakarma, " Process Aware Ultra-High Speed Hybrid SensingTechnique for Low power Near-Threshold SRAM ", 17th International Symposium of VLSI Design and Test (VDAT)-2013, July 27th-30th, Jaipur, India, 2013. (Will be available online onSpringer, Communication in Computer and Information Science).
2. Chandrabhan Kushwah , S.K. Vishvakarma, "Sub-Threshold 8T SRAM Cell Immune to ProcessVariations at ULV Supply" IEEE International Conference on Electron Devices and Solid-StateCircuits, June 2nd-5th 2013, Hong Kong.

3. Pooran Singh, S.K. Vishvakarma, " RTL Level Implementation of High Speed Low PowerViterbi encoder and decoder " IEEE 3rd International Conference on Information Science andTechnology (ICIST-2013), March 23rd-25th, 2013 pp. 345-349, Yangzhou, Jiangsu, China.
4. Vikas Vijaywargiya, S.K. Vishvakarma, " Effect of Doping Profile on Tunneling Field EffectTransistor " 9th IEEE Spanish Conference on Electron Devices, February, 12th-14th, pp. 195-198, Feb. 2013, Valladolid, Spain.
5. Dheeraj Sharma, S.K. Vishvakarma, " Analysis of Crossover Point and Threshold Voltage for Triple Gate MOSFET", 9th IEEE Spanish Conference on Electron Devices, February, 12th-14th Feb. pp. 99-102, 2013, Valladolid, Spain.

Journal

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2. Bhupendra Reniwal , S. K. Vishvakarma, "A Reliable, Process-Sensitive-Tolerant Hybrid Sense Amplifier for Ultra Low power SRAM", International Journal of Electronics and ElectricalEngineering, Canada, vol. 1, no. 1, March 2013.
3. Pooran Singh, S. K. Vishvakarma, "Device/Circuit/Architectural Techniques for Ultra Lowpower FPGA Design," Journal of Microelectronics and Solid State Electronics, Scientific andAcademic Publishing, USA, vol. 2, pp. 1-15, 2013.
4. Dheeraj Sharma, S. K. Vishvakarma, "Precise analytical model for short channel CylindricalGate (CylG) Gate-ALL-Around (GAA) MOSFET" Solid State Electronics, Elsevier, vol. 86, pp.68-74, August 2013.
5. Pooran Singh, S. K. Vishvakarma, "FPGA Implementation of 413.121 MHz and 11.34 mW High Speed Low Power Viterbi Decoder", IET International Journal of Modeling and Optimization, vol. 3, no. 1, February 2013.

Faculty Name: Dr. Prabhat Kumar Upadhyay,
Designation: Assistant Professor

Conference

1. P. K. Upadhyay , S. Prakriya, "Joint Power and Location Optimization for Analog NetworkCoding with Multi-Antenna Sources," in Proc. IEEE Wireless Communications and NetworkingConference (WCNC), Shanghai, China, Apr. 2013.
2. S. Yadav , P. K. Upadhyay, "Performance Analysis of Two-Way AF Relaying Systems overCascaded Generalized-K Fading Channels," in Proc. National Conference on Communications(NCC), IIT Delhi, New Delhi, Feb. 2013.

Journal

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2. P. K. Upadhyay, S. Yadav, "On the Performance of Cellular Two-Way Relay Systems withAnalog Network Coding and Multiuser Diversity," Wireless Personal Communications,Springer, Apr. 2013.

2014

Faculty Name: Dr. Srivathsan Vasudevan
Designation: Assistant Professor

Conference

1. D. Biswas, S.S. Sundar , S. Raja, S. Vasudevan, “Preliminary Studies on Photoacoustic Imaging”, In Proc. DAE-BRNS National Laser Symposium (NLS-22), Manipal University, India, January 2014

Discipline of Mechanical Engineering

Year 2013

Prof. N. K. Jain

Journal Publications

1. J.H. Shaikh, **N.K. Jain** and V.C. Venkatesh **(2013)**, "Precision Finishing of Bevel Gears by Electrochemical Honing" ***Materials and Manufacturing Processes,*** 28(10), 1117-1123. (DOI: 10.1080/10426914.2013.811737).
2. Kapil Gupta and **N.K. Jain (2013),** "On deviations in micro-geometry of miniaturegears manufactured by WEDM"***, Materials and Manufacturing Processes***, 28(10),1153-1159. (DOI:10.1080/10426914.2013.792422).
3. Suyog Jhavar, C.P. Paul and **N.K. Jain (2013),** "Causes of Failure and Repairing Options for Dies and Molds: A Review", ***Engineering Failure Analysis***, 34, 519-535. (DOI: 10.1016/j.engfailanal.2013.09.006).
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5. Abhishek Das and **N.K. Jain (2013)**, "Investigations on Tool Wear and MaterialDeposition Aspects of TiC Coating on Aluminum by Electro Discharge Coating (EDC)Process", ***Int. J. of Manufacturing Technology and Management,*** 27(4/5/6), 251-262.

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2. Kapil Gupta and **N.K. Jain (2013)**, "On productivity of wire electric discharge machining for manufacturing of miniature gears" ***Proceedings of 2nd International Conference on Intelligent Robotics, Automation and Manufacturing 2013 (IRAM 2013)***, 428-439, IIT Indore (Eds. N K Jain, I A Palani, B K Lad, M S Kumar and A Parey) (16th -18th December , 2013).

Dr. E. Anil Kumar

Conference Proceedings

1. Y. Madaria, **E. Anil Kumar**, M.P. Maiya and S. Srinivasa Murthy **(2013)**, "Simulation of effective thermal conductivity of metal hydride beds", ***International Symposium on Innovative Materials for Processes in Energy Systems 2013 (IMPRES 2013)***, pp 31- 35, Fukuoka, Japan (4th -6th September, 2013).
2. S. Srinivasa Murthy and **E. Anil Kumar (2013)**, "Advanced materials for solid state hydrogen storage: Thermal Engineering Issues", Key Note Lecture, ***International Symposium on Innovative Materials for Processes in Energy Systems 2013 (IMPRES 2013)***, pp. K9-33, Fukuoka, Japan (4th -6th September, 2013).
3. S. Reema, S. Vinod Kumar and **E. Anil Kumar (2013)**, "Carbon Dioxide Capture and Sequestration by Adsorption on Activated Carbon", in ***4th International Conference on***

Advances in Energy Research (ICAER 2013), IIT Bombay, pp. 785-793, Mumbai(10th - 12th December 2013). (ISBN: 978-81-928795-0-5)

Dr. B. K. Lad

Journal Publications

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Dr. I. A. Palani

Conference Proceedings

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2. Sunil Pathak, N.K. Jain and **I.A. Palani (2013),** "A methodology for precision finishing of conical gears using automated field controlled electrochemical honing processes", ***2nd International Conference on Intelligent Robotics, Automation and Manufacturing***, at IIT Indore (16th -18th December, 2013).
3. Tejendra Dixit**, I.A. Palani and** Vipul Singh **(2013)**, "Influence of Substrate Annealing Temperature on Growth of ZnO Nanodumbbells and Nanorods Using Hydrothermal Process for LED Applications**"**, ***17th International Workshop on the Physics of Semiconductor Devices***, Amity University, Noida (10th -13th December, 2013).
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5. S.P. Maghade, Y.K. Meena, Y. Singh, **I.A. Palani** and M. Santhakumar **(2013)**, "Design and Simulation of Shape Memory Alloy Spring and its implementation in an Actuator", ***International Conference on Automation and Mechanical Systems***, Faridabad, India.
6. Yogesh Singh, S.P. Maghade, Sahil Agarwal, M. Santhakumar and **I.A. Palani (2013),** "Experimental Investigation on Deflection, Characteristics and suitability of SMA (shape

memory alloy) based Actuators for Parallel manipulators (3-Degree of Freedom)", ***International Conference on Advanced manufacturing and Automation***, Tamil Nadu, India.

Dr. Devendra Deshmukh

Conference Proceedings

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Dr. Ritunesh Kumar

Conference Proceedings

1. Sambahji T. Kadam, **Ritunesh Kumar** and Kuldeep Baghel (**2013**), "Bubble Growth at Nucleation Cavity in Microchannels", ***ASME 2013 4th Micro/Nanoscale Heat and Mass Transfer International Conference (MNHMT2013)***, Hong Kong, China (11th-14th December, 2013).
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Dr. S. Dhinakaran

Journal Publications

1. **S. Dhinakaran**, M.S.N. Oliveira, F.T. Pinho and M.A. Alves **(2013)**, "Steady flow of power-law fluids in a 1:3 sudden expansion", ***Journal of Non-Newtonian Fluid Mechanics***, 198, 48-58.

Dr. S. K. Sahu

Journal Publications

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4. Hari Mohan and **Sahu S.K. (2013**), "Analysis of gaseous flow between parallel plates by second order velocity slip and temperature jump boundary conditions", ***Heat Transfer-Asian Research.***

Conference Proceedings

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2. Sandesh Chougule and **Sahu S.K. (2013)**, "Model of Heat Conduction in Hybrid Nanofluid", ***International conference on emerging trends in computing, communication and nano Technology (ICE-CCN 2013)***, India (25th-26th March, 2013).
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12. Patil N.D., **Sahu S. K.**, Das P. K., Bhattacharyya **(2013)** , "Rewetting of a single heater rod with and without counter current flow", ***22nd National and 11th ISHMT-ASME Heat and Mass Transfer Conference*** (28th -31st December, 2013).
13. Satish Chandra, Palash Gupta, Manish. K. Agrawal and **Sahu S.K. (2013)**, "Heat Transfer Characteristics of an Obliquely Impinging Liquid Jet", ***31st National Conference on Fluid Mechanics and Fluid Power***, NIT Hamirpur, India, 2013.
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Dr. M. Santhakumar

Journal Publications

1. **M. Santhakumar (2013),** "Investigation into the Dynamics and Control of an Underwater Vehicle-Manipulator System", ***Modelling and Simulation in Engineering***, 1-13.
2. **M. Santhakumar (2013)**, "Task space trajectory tracking control of an underwater vehicle-manipulator system under ocean currents", ***Indian Journal of Geo-Marine Sciences***, 42(6), 675-683.

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1. Mayur Hole, Nitin Tyagi and **M. Santhakumar (2013)**, "Dynamic modelling, Simulation and Performance analysis of 3 DOF novel planar Parallel robot", ***International Conference on Intelligent Robotics, Automation and Manufacturing (IRAM 2013)***, at IIT Indore (December 2013).
2. Gaurav Parchani, Akshat Kumar, Shanmukh Santosh and **M. Santhakumar (2013)**, "Design and Analysis of an Underwater Glider without a Conventional Buoyancy Engine", ***International Conference on Intelligent Robotics, Automation and Manufacturing (IRAM 2013)***, at IIT Indore (December 2013).
3. Parth Padwal, **M. Santhakumar** and Uday Cherekar **(2013)**, "Design of Speed Test System for coupling parts", ***International Conference on Intelligent Robotics, Automation and Manufacturing (IRAM 2013)***, at IIT Indore (December 2013).
4. **M. Santhakumar**, Ramavatar Meena, Jayant Kr. Mohanta and Sandip Patidar **(2013),** "Modelling and trajectory tracking control of a planar parallel robotic platform (x-ytheta motion platform)", ***International Conference on Developments in Robotics, Applied Mechatronics, Manufacturing and Automation***, Bhopal (September 2013).
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Dr. Anand Parey

Journal Publications:

1. Nizar Ahamed, Yogesh Pandya and **Anand Parey (2014), "**Spur Gear Tooth Root Crack Detection using Time Synchronous Averaging under Fluctuating Speed", ***Measurement,*** **Article in Press, Accepted Manuscript. (doi.org**/10.1016/j.measurement.2014.02.029).

Dr. E. Anil Kumar

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1. Vinod Kumar Sharma and **E. Anil Kumar (2014**), "Effect of Measurement Parameters on Thermodynamic Properties of La based Metal Hydrides", ***International Journal of Hydrogen Energy***, 39(11), 5888-5898. (DOI:10.1016/j.ijhydene.2014.01.174) (**Impact factor: 4.086**).

Dr. S.K. Sahu

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2. Chougule S. Sandesh and **Sahu S.K. (2014**), " Comparative study of cooling performance of Automobile Radiator using Al2O3-water and carbon nanotubewater Nanofluid", ***Journal of Nanotechnology in Engineering and Medicine***, Vol. 5/011001-5.

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1. Chougule S. Sandesh and **Sahu S.K. (2014**), " An integrated effect of PCM and Nanofluid charged heat pipe for electronics cooling", ***Proceedings of the ASME 2014 4th Joint US-European FEDSM2014 and 12th International Conference on Nanochannels, Microchannels, and Minichannels***, Chicago, Illinois, USA, August 3-7, 2014.
2. Agrawal, Manish Kumar, Garg, Karti, Singh, Aditya and **Sahu S.K. (2014)**, "An analysis of a three-region conduction controlled rewetting of hot surface by variational method", ***Proceedings of the 22nd International Conference on Nuclear Engineering (ICONE22)***, Prague, Czech Republic, July 7-11, 2014.
3. Kushwaha, H.M., **Sahu, S.K.** and Verma, Ankit K. **(2014)**, "Analysis of slip f;low heat transfer between asymmetrically heated parallel plates", ***4th Micro and Nano Flows Conference***, UCL, London, UK, 7-10 September 2014.
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Year 2014

Dr. M. Santhakumar

Journal Pubications:

1. Yogesh Singh, V. Vinoth and **M. Santhakumar (2014),**"Dynamic Modelling and Control of a 3-DOF Planar Parallel Robotic (X-Y-THETA Motion) Platform", ***Procedia Materials Science***, 2014.
2. **Mohan Santhakumar** and Jinwahn Kim **(2014),**"Robust Adaptive Tracking Control of Autonomous Underwater Vehicle-Manipulator Systems", ***Journal of Dynamic Systems, Measurements, and Control***, 2014.
3. V.Vinoth**,** Yogesh Singh, and **M. Santhakumar (2014),**"Indirect disturbance compensation control of a planar parallel (2-PRP and 1-PPR) robotic manipulator", ***Robotics and Computer-Integrated Manufacturing***, 2014. (Article in Press)
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2. V. Vinoth, Yogesh Singh and **M. Santhakumar (2014)** "Robust Disturbance Observer based Sliding Mode Control of a Planar Parallel (3-PPR) Manipulator", ***SCES***, 2014. (Abstract accepted)

Discipline of Chemistry

2013

Name: Pradeep Mathur
Designation: Director, IIT Indore

List of Publications:

1. P. Mathur, D. K. Rai, R. S. Ji, B. Pathak, S. Boodida, and S. M. Mobin, Structural and electrochemical aspects of tris(ferrocenyl/phenyl-ethynyl)phosphine ligated chalcogen bridged iron carbonyl clusters, *RSC. Adv., 3,* 26025-26034, 2013.
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1. A. Raghuvanshi, P. Mathur, Distinguished role of iron pentacarbonyl towards complex formation and organic transformations, 246th ACS National Meeting & Exposition, Indianapolis, United States, 2013.

Name: Dr. Rajneesh Misra
Designation: Assistant Professor

1. R. Misra, P. Gautam, S. M. Mobin, Aryl-Substituted Unsymmetrical Benzothiadiazoles: Synthesis, Structure, and Properties, *J. Org. Chem., 78,* 12440−12452, **2013**.
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Faculty: Dr. Apurba K. Das
Designation: Assistant Professor

Journal:
1) D. B. Rasale, I. Maity, M. Konda, A. K. Das*, Peptide Self-assembly Driven by Oxo-esterMediated Native Chemical Ligation, Chemical Communications, 49, 4815-4817, 2013.
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Suman Mukhopadhyay
Assistant Professor

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1. R. Nasani, M. Saha, A. Kirillov, S. Mukhopadhyay, New coordination complexes based on 4-aminobenzonitrile with different dimensionality, J. Coord Chem, 1602-1615, 2013.
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Dr. Anjan Chakraborty
Assistant Professor

1. R. Thakur, A. Das, A. Chakraborty, Fate of anticancer drug ellipticine in reverse micelles in aqueous and methanolic environment: A photophysical approach Original Research Article *Chem. Phys. Lett. 563, 37-42,* **2013**.

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Name: Sampak Samanta
Designation: Assistant Professor

Publications:

1) P. K. Jaiswal, S. Biswas, S. Singh, S. Samanta, Highly Efficient Practical Approach to the Direct Synthesis of Substituted Carbazoles in Water Medium via One-pot Domino Michael Henry/Aromatization Using Organocatalysis, Org. Biomol. Chem., 11, 8410-8418, 2013.
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Dr. Tushar Kanti Mukherjee
Assistant Professor,
Department of Chemistry.

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Name: Dr. Mobin M Shaikh
Designation: Assistant Professor

1. **M. M. Shaikh**, V. Mishra, P. Ram, A. Birla, P. Mathur, Formation of a 1D-Polymeric Chain of Hg Building Blocks Through C-C Coupling Under Ambient Conditions, *Dalton Trans. 42*, 10687-10689, **2013**.
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IIT Indore

Journal

1. S. Kazachenko, **S. Bulusu**, A. J. Thakkar, Methanol clusters (CH3OH) n: Putative global minimum-energy structures from model potentials and dispersion-corrected density functional theory, *J. Chem. Phys., 138*, 224303, **2013**
2. R. Fournier, **S. Bulusu**, Closed Shell Metal Clusters, *Metal Clusters and Nanoalloys*, *Springer .N.Y.*, 81-103, **2013**

Conference

1. **S. Bulusu**, *Soft-Computing Techniques Workshop*, IIIT Gwalior, 2013.

Dr. Sanjay Kumar Singh,
Assistant Professor (Chemistry)

Journals:

1) S. K. Singh, Q. Xu, Nanocatalyst-for Hydrogen Generation from Hydrazine, *Catal. Sci. Technol., 3*, 1889-1900, **2013**.
2) S. K. Singh, M. Yadav, S. Behrens, P. W. Roesky, Au-based Bimetallic Nanoparticles for the Intramolecular Aminoalkene Hydroamination, *Dalton Trans., 42*, 10404-10408, **2013**.

Conferences/proceedings:

1) R. K. Rai, S. K. Singh, Nano-sized non-noble metal catalysts for room temperature nitroarenes reduction, 15th Asian Chemical Congress, Singapore, 2013.
2) S. K. Singh, Nanoparticle catalysts for hydrogen generation from hydrazine, 15th RSINational Symposium in Chemistry, Banaras Hindu University (BHU), Varanasi, India, 2013.

Dr. Biswarup Pathak
Assistant Professor (Chemistry)

Publications:

1. P. Mathur, D. Kumar Rai, R. Shyam Ji, B. Pathak, S. Boodida, S. M. Mobin, Structural and Electrochemical Aspects of Tris(ferrocenyl/phenyl-ethynyl)phosphine Ligated Chalcogen Bridged Iron-carbonyl Clusters, *RSC Advances, 3*, 26025-26034, **2013**.
2. T. Hussain, T. A Maark, B. Pathak, R. Ahuja, Improvement in the hydrogen desorption from MgH_2 upon transition metals doping: A hybrid density functional calculations, *AIP Advances, 3,* 102117-102124, **2013.**
3. B. Wang, P. D. Kanhere, J. Nisar, B. Pathak, R. Ahuja, Anion doped NaTaO3 for Visible Light Photocatalysis, *J. Phy. Chem. C, 117*, 22518-22524, **2013**.
4. P. Liu, J. Nisar, B. Pathak, R. Ahuja, Cationic-Anionic Mediated Charge Compensation on La2Ti2O7 for Visible Light Photocatalysis, *Phys. Chem. Chem.Phys.*, *15*, 17150-17157, **2013**.
5. J. Prasongkit, A. Grigoriev, B. Pathak, R. Ahuja, R.H. Scheicher, Theoretical Study of Electronic Transport through DNA Nucleotides in a Double-Functionalized Graphene Nanogap, *J. Phy. Chem. C, 117*, 15421-15428, **2013**.
6. Y. Li, B. Pathak, J. Nisar, Z. Qian, R. Ahuja, Metal-Decorated Graphene Oxide for Ammonia Adsorptions, *E. Phy. Lett., 103*, 28007-28012, **2013.**
7. P. liu, J. Nisar, B- Sa, B. Pathak, R. Ahuja, Anion-Anion Mediated Coupling in Layered Perovskite La2Ti2O7 for Visible Light Photocatalysis, *J. Phy. Chem. C, 117*, 13845-13852, **2013**.
8. P. Liu, J. Nisar, R. Ahuja, B. Pathak, Layered Perovskite $Sr_2Ta_2O_7$ for Visible Light Photocatalysis: A First Principles Study, *J. Phy. Chem. C, 117*, 5043-5050, **2013**.
9. Z. Qian, B. Pathak, R. Ahuja, Energetic and Structural Analysis of $N_2H_4BH_3$ Inorganic Solid and its Modified Material for Hydrogen Storage, *Int. J. Hyd. Energy,38*, 6718-6725, **2013.**
10. P. Mathur, R. Shyam Ji, B. Pathak, S. M. Mobin, Formation of (E)[FcC($PS_2(OR)_2$)=CH($PS_2(OR)_2$)] (R = Me, Et, *i*Pr) in Photolytic Reactions of Ferrocenylacetylene and $[(RO)_2PS_2H]/P_4S_{10}$ in Hexane/Alcohols: Experimental and DFT Study, *J. .Org. Chem., 748*, 46-50, **2013**.
11. P. K. Jaiswal, S. Biswas, S. Singh, B. Pathak, S. M. Mobin, S. Samanta, Stereoselective Synthesis of Highly Functionalized Tetrahydrocarbazoles through a Domino Michael-

Henry Reaction: An Easy Access of Four Contiguous Chiral Centers, *RSC Advances, 3*, 10644-10649, **2013.**

12. M. Saha, R. Nasani, S. M Mobin, B. Pathak, S. Mukhopadhyay, The Effect of Remote Substitution on Formation of Preferential Geometrical Isomer of cobalt(III)-tetrazolato Complexes Formed via [2 + 3] Cycloaddition, *Inorg. Chem. Comm., 34*,62-67, **2013**.
13. Y. Li, A. D. Sarkar, B. Pathak, R. Ahuja, Strain-induced Stabilization of Al Functionalization in Graphene Oxide Nanosheet for Enhanced NH3 Storage, *App.Phys. Lett., 102*, 243905-243909, **2013.**
14. X. Jiang, J. Nisar, B. Pathak, J. J. Zhao, R. Ahuja, Graphene Oxide as a Chemically Tunable 2-D Material for Visible-light Photocatalyst Applications, *J. Catal., 299*, 204-209, **2013.**

Conference/Proceedings:

15. B. Pathak, Functionalized Electrodes for Rapid DNA Sequencing for DNA Sequencing, 3rd Indo-German Conference on Modeling Chemical and Biological (Re)activities, NIPER-IISER Mohali, India, 2013.

Name: Dr. Chelvam Venkatesh
Designation: Assistant Professor

1. Small Animal Optical Diffusion Tomography with Targeted Fluorescence, V. Gaind, H.-R. Tsai, K. J. Webb, **C. Venkatesh**, P. S. Low, *J. Opt. Soc. Am. A. 30*, 1146-1154, **2013**.
2. Development of Tumor-Targeted Near Infrared Probes for Fluorescence Guided Surgery, K. Lindsay, **C. Venkatesh**, W. Charity S. Mahalingam, P. Scott, K. Sumith, P. S. Low, *Bioconjug. Chem., 24*, 1075-1080, **2013**.
3. Use of Folate-Conjugated Imaging Agents to Target Alternatively Activated Macrophages in a Murine Model of Asthma, J. Shen, C. **Venkatesh**, G. Cresswell, P. S. Low, *Mol. Pharm., 10*, 1918–1927, **2013**.
4. In vivo Optical Imaging of Kinetics in a Small Animal for Folate-Targeted Drug Development, H.-R. Tsai, B. Z. Bentz, **C. Venkatesh**, V. Gaind, K. J. Webb, P. S. Low, *Opt. Life Sci.*, **2013**.

2014

Name: Pradeep Mathur
Designation: Director, IIT Indore

List of Publications:

1. A. Chaudhary, N. Sharma, M. Nagar, S. M. Mobin, P. Mathur, R. Bohra, Syntheses and characterization of a new class of vanadia precursors of oxime-modified oxovanadium(V) isopropoxide, crystal and molecular structure of [VO{ONC$_{10}$ H$_{16}$}$_3$], *J. Sol-Gel Sci Technol,DOI 10.1007/s10971-014-3306-8*.
2. P. Mathur, M. Tauqeer, Y. Torubaev, S. M. Mobin, G. K. Lahiri, A. Pasynskii, and A. Pavlova, Step-by-step transformations of ferrocenyltellurium complexes of Group VIB metal carbonyls, *J. Organomet. Chem., 758*, 55-59, 2014.
3. P. Mathur, M. Tauqeer, R. S. Ji, G. K. Lahiri, and S. M. Mobin, Some unusual reactions of metal carbonyls with (*Z*)-1-ferrocenyltelluro-1-ferrocenyl-4-ferrocenyl-1-buten-3-yne, *RSC Adv., 4*, 6878-6885, 2014.

4. Y. Torubaev, P. Mathur, M. Tauqeer, S. M. Mobin, G. K. Lahiri, A. Pasynskii, A. Pavlova and V. Grinberg, Mixed-valent ferrocenyltellurenyl halides. Synthesis, electrochemistry and unusual molecular structure, *J. Organomet. Chem*., *749*, 115-119, 2014.

Conferences/Proceedings: NIL

Dr. Tridib Kumar Sarma
Assistant Professor in Chemistry

Journal Publication:

1. B. Sharma, S. Mandani, T. K. Sarma, Enzymes as Bionanoreactors: Glucose Oxidase for the Synthesis of Catalytic Au Nanoparticles and Au Nanoparticle-Polyaniline Nanocomposite, *J. Mater. Chem. B*, 2, **2014** (accepted article).

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1. B. Sharma, S. Mandani, T. K. Sarma, Green Synthesis of Au Nanoparticles Using Pepsin as a Bionanoreactor and their Application Towards the Reduction of Resazurin to Resorufin, International Conference On Nano Science and Technology, Chandigarh, India, 2014.
2. B. Majumdar, T. Bhattacharya, T. K. Sarma, Au-Graphene Oxide Nanocomposite, An effective heterogeneous catalyst for Aerobic sp3 C-H bond Oxidation, International Conference On Nano Science and Technology, Chandigarh, India, 2014.

Name: Dr. Rajneesh Misra
Designation: Associate Professor

1. R. Misra, B. Dhokale, T. Jadhav, S. M. Mobin, Heteroatom connected ferrocenyl BODIPYs: synthesis, structure and properties, *Organometallics*, *33*, 1867–1877, **2014**.
2. R. Misra, R. Sharma, S. M. Mobin, Star shaped ferrocenyl truxenes: synthesis, structure and properties, *Dalton Trans.*, *43*, 6891-6896, **2014**.
3. R. Misra, R. Maragani, T. Jadhav, S. M. Mobin, Ferrocenyl end capped molecular rods: synthesis, structure, and properties, *New J. Chem.*, *38*, 1446-1457, **2014**.
4. R. Misra, B. Dhokale, T. Jadhav, S. M. Mobin The quenching of fluorescence as an indicator of donor-strength in meso arylethynyl BODIPYs, *Dalton Trans.*, *43*, 4854–4861, **2014**.
5. R. Misra, T. Jadhav, S. M. Mobin, Ferrocenyl pyrazaboles: design, synthesis, structure, and properties, *Dalton Trans.*, *43*, 2013–2022, **2014**.

Faculty: Dr. Apurba K. Das
Designation: Assistant Professor

Journal:

1. I. Maity, M. K. Manna, D. B. Rasale, A. K. Das*, Peptide-nanofiber-supported Palladium Nnaoparticles as an Efficient Catalyst for the Removal of N-terminus Protecting Groups,ChemPlusChem, 79, 413-420, 2014.
2. I. Maity, T. K. Mukherjee, A. K. Das*, Photophysical Study of a □-stacked □-sheetNanofibril Forming Peptide Bolaamphiphile Hydrogel, New Journal of Chemistry, 38, 376-385, 2014.

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Suman Mukhopadhyay
Associate Professor

Publication
Journal

1. M. Saha, R. Nasani, M. Das, A. Mahata, B. Pathak, S. M. Mobin, L. M. Carella, E.Rentscheler, S. Mukhopadhyay, Limiting nuclearity in formation of polynuclear metalcomplexes through [2 + 3] cycloaddition: synthesis and magnetic properties of tri- andpentanuclear metal complexes, Dalton Trans., 10.1039/C4DT00378K, 2014.

Conference

1. M. Das, S. Mukhopadhyay, Mono and polynuclear schiff base complexes of zinc and cadmium : synthesis and structural studies with variety of co-ligands, ACBIR, Rourkella, India, 2014.

Dr. Anjan Chakraborty
Assistant Professor

1. The fate of anticancer drug, ellipticine in DPPC and DMPC liposomes upon interaction with HSA: A photophysical approach, R. Thakur, A. Das, A. Chakraborty J. Photochem. and Photobiol B: Biology, 130, 122-131, 2014.
2. A Das, R. Thakur, A. Chakraborty, Interaction of human serum albumin with liposomes of saturated and unsaturated lipids with different phase transition temperatures: a spectroscopic investigation by membrane probe PRODAN, RSC Adv.4, 14335-14347, 2014.
3. A Das, R. Thakur, A. Dagar and A. Chakraborty, A spectroscopic investigation and molecular docking study on the interaction of hen egg white lysozyme with liposomes of saturated and unsaturated phosphocholines probed by an anticancer drug ellipticine, Phys. Chem. Chem. Phys.16,5368-5381, 2014.

Name: Sampak Samanta
Designation: Assistant Professor

1) A. Srivastava, S. M. Mobin, S. Samanta, (±)-CSA Catalyzed One-Pot Synthesis of 6,7 Dihydrospiro[indole-3,1′-isoindoline]-2,3′,4(1H,5H)-trione Derivatives: Easy Access of Spirooxindoles and Ibophyllidine-Like Alkaloids, Tetrahedron Lett., 55, 1863-1867, 2014

Dr. Tushar Kanti Mukherjee
Assistant Professor,

1. I. Maity, T. K. Mukherjee, A. K. Das, Photophysical Study of a Pi-Stacked Beta-SheetNanofibril Forming Peptide Bolaamphiphile Hydrogel, *New J. Chem.*, *38*, 376-385, **2014**.

2. S. Chatterjee, T. K. Mukherjee, Spectroscopic Investigation of Interaction Between Bovine Serum Albumin and Amine-Functionalized Silicon Quantum Dots, *Phys. Chem. Chem. Phys.*,*16*, 8400-8408, **2014**.

Name: Dr. Mobin M Shaikh
Designation: Assistant Professor

1. A. Kumar, R. Pandey, R. K. Gupta, V. Mishra, M. M. Shaikh, D. S. Pandey, Swift Photoswitching in a Binuclear Zn(II) Metallacycle Relative to a Salen-type Ligand, Dalton Trans., 43, 6365-6376, 2014.
2. R. Misra, B. Dhokale, T. Jadhav, M. M. Shaikh, Heteroatom-Connected FerrocenylBODIPYs: Synthesis, Structure, and Properties, Organometallics, 2014, (in press)
3. R. Misra, R. Maragani, T. Jadhav, M. M. Shaikh, Ferrocenyl End Capped Molecular Rods:Synthesis, Structure, and Properties, New J. Chem., 38, 1446-1457, 2014.
4. H. S. Das, D. Schweinfurth, J. Fiedler, M. M. Khusniyarov, M. M. Shaikh, B. Sarkar, Tuningthe Electronic Properties in Ruthenium-Quinone Complexes through Metal Coordination andSubstitution at the Bridge, Chem. A Eur. J., 20, 4334-4346, 2014.
5. Chaudhary, N. Sharma, M. Nagar, M. M. Shaikh, P. Mathur, R. Bohra, Syntheses and Characterization of A New Class of Vanadia Precursors of Oxime-modified Oxovanadium(V) isopropoxide, Crystal and Molecular Structure of [VO{ONC10H16}3] , AJ. Sol-Gel Sci. andTech. 2014, DOI:10.1007/s10971-014-3306-8
6. A. Srivastava, M. M. Shaikh, S. Samanta, (±)-CSA Catalyzed One-pot Synthesis of 6,7-Dihydrospiro[indole-3,1'-isoindoline]-2,3',4(1H,5H)-trione Derivatives: Easy Access ofSpirooxindoles and Ibophyllidine-like Alkaloids, Tet. Lett. 55, 1863-1867, 2014.
7. R. Misra, B. Dhokale, T. Jadhav, M. M. Shaikh, The Quenching of Fluorescence as anIndicator of Donor-strength in meso Arylethynyl BODIPYs, Dalton Trans., 43, 4854-4861,2014.
8. D. Gupta, B. Shankar, P. Elumalai, R. Shanmugam, M. M. Shaikh, F. Weisser, B. Sarkar, M.Sathiyendiran,Synthesis and Characterization of a Tetrametallic Coordination Complex ofTetrahydroxy-pbenzoquinone, J. Organomet. Chem., 754, 59-62, 2014.
9. H. Agarwala, T. M. Scherer, M. M. Shaikh, W. Kaim, G. K. Lahiri, Bidirectional Noninnocence of the β-Diketonato Ligand 9-Oxidophenalenone (L-) in [Ru([9]aneS3)(L)(dmso)]n,[9]aneS3 = 1,4,7-trithiacyclononane, Dalton Trans., 43, 3939-3948, 2014.
10. Some Unusual Reactions of Metal Carbonyls with (Z)-1-Ferrocenyltelluro-1-ferrocenyl-4-ferrocenyl-1-buten-3-yne, RSC Adv., 4, 6878-6885, 2014. A. Mandal, T. Kundu, F. Ehret, M. Bubrin, M. M. Shaikh, W. Kaim, G. K. Lahiri, Varying Electronic Structural forms of Ruthenium Complexes of Non-innocent 9,10-Phenanthrenequinonoid Ligands, Dalton Trans., 43, 2473-2487, 2014.
11. B. Manimaran, A. Vanitha, M. Karthikeyan, B. Ramakrishna, M. M. Shaikh, Self-Assemblyof Selenium-Bridged Rhenium(I)-Based Metalla Rectangles: Synthesis, Characterization, andMolecular Recognition Studies, Organometallics, 33, 465-472, 2014.
12. R. Misra, T. Jadhav, M. M. Shaikh, Ferrocenyl Pyrazaboles: Design, Synthesis, Structure,and Properties, Dalton Trans., 43, 2013-2022, 2014.
13. S. K. Patel, V. Tirkey, S. Mishra, H. R. Dash, S. Das, M. Shukla, S. Saha, M. M. Shaikh, S.Chatterjee, Synthesis of Mono- and Bi-metallic Dithiocarboxylate-alkyne Complexes fromSunlight Driven Insertion Reaction and their Antibacterial Activity, J. Organomet. Chem., 749,75-82, 2014.

14. B. Chaubey, M. M. Shaikh, M. S. Balakrishna, P-Cl Bond-Induced Lactamization of 2(2'-hydroxyl)phenyloxazoline to form a Cyclic Phosphinite, 3-(2-chloroethyl)-2-phenyl-2Hbenzo[e][1,3,2]oxaza-phosphinin-4(3H) one: Synthesis, Structural Studies and Transition metal complexes, Dalton Trans., 43, 584-591, 2014.
15. R. Misra, R.Sharma M. M. Shaikh, Star Shaped Ferrocenyl Truxenes: Synthesis, Structureand Properties, Dalton trans., 43, 6891, 2014.

Dr. Biswarup Pathak
Assistant Professor (Chemistry)
Publications:

1. M.Saha, R. Nasani, M. Das, A. Mahata, B. Pathak, S. M Mobin, L. M. Carrella, E.Rentschler, S. Mukhopadhyay, Limiting Nuclearity in Formation of Polynuclear Metal-complexes through [2+3] Cycloaddition: Synthesis and Magnetic Properties of tri- and Pentanuclear Metal Complexes generated through Bridging Tetrazolate Moiety, *Dalton Trans, DOI: 10.1039/C4DT00378K* (in press)**, 2014**
2. R. Rai, A. Mahata, S. Mukhopadhyay, S. Gupta, Li Pei-Zhou, K. T. Nguyen, Y. Zhao, B. Pathak, S. Singh, Room-temperature Chemoselective Reduction of Nitro groups using Non-noble Metal Nanocatalysts in water, *Inorg. Chem., 53*, 2904-2909, **2014**.
3. Z. Guo, B. Sa, B. Pathak, J., Zhou, R. Ahuja, Z. Sun, Band Gap Engineering in Hugegap Semiconductor SrZrO3 for Visible-light Photocatalysis, *Int. J. Hyd. Energy*, 39, 2042-2048**, 2014**.

Conference/Proceedings:

1. B. Pathak, Ab initio Study on Materials for Visible Light Photocatalysis, 16th Chemical Research Society of Chemistry (NSC-16), IIT Bombay, India, 2014.
2. B. Pathak, Computational Modeling of Materials for Visible Light Photocatalysis, Light in Chemistry, Materials and Biology, IIT Kharagpur, India, 2014

Discipline of Mathematics

Year 2013

Dr. Swadesh Kumar Sahoo,
Assistant Professor

1. R. Klen, Y. Li, **S. K. Sahoo**, and M. Vuorinen: On the stability of phi-uniform domains, *Monatshefte für Mathematik*, Published online on 10 September 2013. DOI: 10.1007/s00605-013-0576-0.

Year 2014

Dr. Antony Vijesh,
Assistant Professor

1. Varun Joshi, R.B. Pachori, and **Antony Vijesh**: Classification of ictal and seizure-free EEG signals using fractional linear prediction, *Biomedical Signal Processing and Control*, Vol. 9, pp.1-5, Year 2014.

Dr. Niraj Kumar Shukla,
Assistant Professor

1. **Niraj K. Shukla** and G.C.S. Yadav: Contractibility of simple scaling sets, *Communications in Mathematical Analysis (Project Euclid)*, Vol. 16, Issue 1, pp. 31−46, Year 2014.
2. **Niraj K. Shukla** and S. Mittal: Wavelets on the spectrum, *Numerical Functional Analysis and Optimization*, Vol. 35, Issue 4, pp. 461–486, Year 2014.

Dr. Md. Aquil Khan,
Assistant Professor

1. **Md. Aquil Khan**, Mohua Banerjee and Roland Rieke: An update logic for information systems, *International Journal of Approximate Reasoning*, Vol. 55, Issue 1, pp. 436−456, Year 2014.

Dr. Swadesh Kumar Sahoo,
Assistant Professor

1. S. Ponnusamy, **S. K. Sahoo**, and H. Yanagihara: Radius of convexity of partial sums of functions in the close-to-convex family, *Nonlinear Analysis Series A: Theory, Methods & Applications*, Elsevier, Vol. 95, pp. 219 – 228, Year 2014.

Dr. Ashisha Kumar,
Assistant Professor

1. **Ashisha Kumar** and Swagato K. Ray: End point estimates for Radon transform of radial functions on non-Euclidean spaces, *Monatsh. Math.*, Vol. 174, pp. 41-75, Year 2014.

Discipline of Physics

2013

Name: **Dr. A. Roy**
Designation: **Associate Professor**
List of Publications:

1. "Search for a dark photon in the π0→e+e−γdecay" P. Adlarson, …..**A. Roy**,.....etal (WASA-at-COSY collaboration) *Physics Letters B* 726 (2013) 187–193.
2. "Measurement of the pn→ppπ0π− reaction in search for the recently observed resonance structure in dπ0π0 and dπ+π− systems" P. Adlarson, ….., **A. Roy**,.....et al (WASA-at-COSY collaboration)*Phys. Rev. C 88, 055208 (2013).*
3. "Isospin Decomposition of the Basic Double-Pionic Fusion in the region of the ABC effect." P. Adlarson, ……..,**A. Roy,…**et al. (WASA-at-COSY collaboration),*Phys. Lett. B 721 (2013) 229.*
4. "Search for eta-mesic 4He with the WASA-at –COSY detector." P. Adlarson, ……,**A. Roy**, …et al.(WASA-at- COSY collaboration), ***Phys. Rev. C 87 (2013) 035204.***
5. "Investigation of the dd->3Henpi0 reaction with the FZ Julich WASA-at-COSY facility " P. Adlarson, ……, **A. Roy,** …et al.(WASA-at- COSY collaboration) Phy. Rev. C 88 (2013) 014004

Conferences/Proceedings:

1. Sudeep Ghosh, Ankhi Roy, Dalitz plot of the hadronic decay\ eta^\ prime\rightarrow\ eta\ pi^+\pi^, Proceedings of the International Symposium on Nuclear Physics, Plenary Talks and Contributed Papers Volume 58 (2013), page 642-643
2. Ajay Kumar, Ankhi Roy, Development of the Lambda Disk Detector for the PANDA Experiment, Proceedings of the International Symposium on Nuclear Physics, Plenary Talks and Contributed Papers Volume 58 (2013), page -652-653
3. Ankhi Roy, Symmetry Breaking and Transition Form Factor from eta and omega Decays, WASA-at-COSY collaboration, Hyperfine Interactions, 0304-3843, doi: 10.1007/s10751-013-0802-0 (2013) (Presented in 5th International Symposium on Symmetries in Subatomic Physics (SSP2012) KVI, Groningen, Netherlands, 18-22 June, 2012).

Designation: **Associate Professor**
List of Publications:

1. "Anisotropy-induced crossover from Drude conductivity to charge-density-wave excitations in a stripe-type charge-ordered manganite" R. Rana, P. Pandey, D. S. Rana, **K. R. Mavani**, I. Kawayama, H. Murakami, M. Tonouchi, Phy. Rev. B 87, 224421 (2013)
2. "Competing Effects of Mn-Doping and Strain on Electrical Transport of NdNi1-xMnxO3 ($0 \leq x \leq 0.10$) Thin Films" Mahesh Chandra, Rakesh Rana, Fozia Aziz, Amit Khare, D. S. Rana and **K. R. Mavani,** J. Phys. D: Appl. Phys. 46, 415305 (2013)
3. "Contrasting effects of compressive and tensile strain and doping-induced opening of charge-transfer gap in NdNi0.90Mn0.10O3 thin films" Mahesh Chandra, Amit Khare, Fozia Aziz, Rakesh Rana, D. S. Rana, and **K. R. Mavani,** AIP Conf. Proc. 1512, 986, (2013)

Conferences/Proceedings:

1. K. R. Mavani, "Temperature Dependent Effects of Mn-doping on Charge-Transport of NdNiO3 Thin Films", Pulsed Laser Deposition-2013, Indian Institute of Technology Kharagpur, India, (2013).
2. K. R. Mavani, "Ultrafast Photo-induced Effect and Corresponding Magnetization of Pr0.5Sr0.5MnO3 Thin Film as Investigated by Visible Pump Terahertz Probe Spectroscopy", Optical Terahertz Science and Technology-2013, Kyoto University, Japan, (2013)

Name: **Dr. Preeti Bhobe**
Designation: **Assistant Professor**
List of Publications:

1. K. R. Priolkar, **P. A. Bhobe**, D. N. Lobo, S. W. D'Souza, S. R. Barman, Aparna Chakrabarti, and S. Emura , Antiferromagnetic exchange interactions in the Ni2Mn1.4In0.6 ferromagnetic Heusler alloy, *Phys. Rev. B 87*, 144412 **2013.**

Conferences/Proceedings:

1. Preeti Bhobe, "Electronic structure of some strongly correlated Antiferromagnetic Metals using Photoemission Spectroscopy", Conference on Condensed Matter and Biological Systems (CCMB13), Department of Physics, Banaras Hindu University, Varanasi, India (2013)

Name: **Dr. Raghunath Sahoo**
Designation: **Associate Professor**
List of Publications:

1. Long-range angular correlations of π, K and p in p–Pb collisions at √sNN = 5.02 TeV. *Raghunath Sahoo (ALICE Collaboration), Phys. Lett. B 719 (2013), 29-41*
2. Coherent J/Psi photoproduction in ultra-peripheral Pb-Pb collisions at √sNN = 2.76 TeV. *Raghunath Sahoo (ALICE Collaboration), Phys. Lett. B 718, (2013) 1273–1283*
3. Centrality Dependence of Charged Particle Production at Large Transverse Momentum in Pb$-$Pb Collisions at √sNN = 2.76 TeV. *Raghunath Sahoo (ALICE Collaboration), Phys. Lett. B 720 (2013), 52-62*
4. Measurement of electrons from beauty hadron decays in pp collisions at √s = 7 TeV. *Raghunath Sahoo (ALICE Collaboration), Phys. Lett. B 721 (2013) 13–23*
5. Measurement of the inclusive differential jet cross-section for pp collisions at √s=2.76 TeV. *Raghunath Sahoo (ALICE Collaboration), Phys. Lett. B, 722, 262-272*
6. Charge correlations using the balance function in Pb–Pb collisions at √sNN = 2.76 TeV. *Raghunath Sahoo (ALICE Collaboration), Phys. Lett. B 723, 267–279*
7. Long-range angular correlations on the near and away side in p--Pb collisions at √sNN = 5.02 TeV.
   Raghunath Sahoo (ALICE Collaboration), Phys. Lett. B 719 (2013), 29-41
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   Raghunath Sahoo (ALICE Collaboration), Phys. Rev. Lett. 110, 082302 (2013)
9. Multiplicity dependence of the average transverse momentum in pp, p-Pb, and Pb-Pb collisions at the LHC.
   Raghunath Sahoo (ALICE Collaboration), Phys. Lett. B 727 (2013) 371–380
10. Performance of the ALICE VZERO system.
    Raghunath Sahoo (ALICE Collaboration), JINST 8 P10016 (2013)

11. Constituent quark scaling of strangeness enhancement in heavy-ion collisions.
    Raghunath Sahoo (ALICE Collaboration), Advances in High Energy PhysicsVolume 2013 (2013), Article ID 273248, 11 pages
12. Multiplicity dependence of two-particle azimuthal correlations in pp collisions at the LHC.
    Raghunath Sahoo (ALICE Collaboration), JHEP09 (2013) 049
13. Measurement of inelastic, single and double diffraction cross- sections in proton-protoncollisions at LHC with ALICE.
    Raghunath Sahoo (ALICE Collaboration), Eur. Phys. J. C (2013) 73:2456
14. Mid-rapidity anti-baryon to baryon ratios in pp collisions at √s = 0.9, 2.76 and 7 TeV measuredby ALICE.
    Raghunath Sahoo (ALICE Collaboration), Eur. Phys. J. C (2013) 73: 2496
15. Charmonium and e+e- pair photoproduction at mid-rapidity in ultra-peripheral Pb-Pb collisions at √sNN = 2.76 TeV.
    Raghunath Sahoo (ALICE Collaboration), Eur. Phys. J. C (2013) 73:2617
16. Energy Dependence of the Transverse Momentum Distributions of Charged Particles in ppCollisions with ALICE.
    Raghunath Sahoo (ALICE Collaboration), Eur. Phys. J. C (2013) 73:2662
17. Centrality determination of Pb-Pb collisions at √sNN = 2.76 TeV in the ALICE experiment.
    Raghunath Sahoo (ALICE Collaboration), Phys. Rev. C 88, 044909 (2013)
18. Centrality dependence of Pion, Kaon, and Proton Production in Pb-Pb Collisions at √sNN = 2.76 TeV.
    Raghunath Sahoo (ALICE Collaboration), Phys. Rev. C 88, 044910 (2013)
19. D meson elliptic flow in non-central PbPb collisions at √sNN = 2.76 TeV.
    Raghunath Sahoo (ALICE Collaboration), PRL 111, 102301 (2013)
20. J/psi Elliptic Flow in Pb-Pb Collisions at √sNN = 2.76 TeV.
    Raghunath Sahoo (ALICE Collaboration), Phys. Rev. Lett. 111 (2013) 162301
21. K0s and Lambda production in Pb–Pb collisions at √sNN = 2.76 TeV.
    Raghunath Sahoo (ALICE Collaboration), Phys. Rev. Lett. 111 (2013) 222301 (2013)
22. Directed flow of charged particles at mid-rapidity relative to the spectator plane in Pb-Pbcollisions at √sNN = 2.76 TeV.
    Raghunath Sahoo (ALICE Collaboration), Phys. Rev. Lett. 111 (2013) 232302 (2013)
23. Net-Charge Fluctuations in Pb-Pb collisions at √sNN = 2.76 TeV.
    Raghunath Sahoo (ALICE Collaboration), Phys. Rev. Lett. 110 (2013) 152301 (2013)
24. Charged kaon femtoscopic correlations in pp collisions at √s =7 TeV.
    Raghunath Sahoo (ALICE Collaboration), Phys. Rev. D 87, 052016 (2013)
25. Transverse Momentum Distribution and Nuclear Modification Factor of Charged Particles in p-Pb Collisions at √sNN = 5.02 TeV.
    Raghunath Sahoo (ALICE Collaboration), Phys. Rev. Lett. 110(2013) 082302 (2013)
26. Anisotropic flow of charged hadrons, pions and (anti-) protons measured at high transversemomentum in Pb-Pb collisions at √sNN = 2.76 TeV.
    Raghunath Sahoo (ALICE Collaboration), Physics Letters B 719 (2013) 18–28
27. Pseudorapidity density of charged particles in p-Pb collisions at √sNN = 5.02 TeV.
    Raghunath Sahoo (ALICE Collaboration), Phys. Rev. Lett. 110 (2013) 032301 (2013)
28. Charge separation relative to the reaction plane in Pb--Pb collisions at √sNN = 2.76 TeV.
    Raghunath Sahoo (ALICE Collaboration), Phys. Rev. Lett. 110 (2013) 012301

Name: **Dr. Rajesh Kumar**
Designation: **Assistant Professor**

List of Publications:
1. “Asymmetry to symmetry transition of Fano line-shape: Analytical description" Rajesh Kumar, Ind. J. Phys. 87, 49 (2013)

Name: **Dr. P.R. Sagdeo**
Designation: **Assistant Professor**

List of Publications:
1. Readdressing the issue of low-temperature resistivity minimum in La0.7Ca0.3MnO3 thin films, P. R. Sagdeo and A. Sagdeo, Applied Physics A 113, 793 (2013)
2. Comparison of spectral performance of HfO2/SiO2 and TiO2/SiO2 based high reflecting mirrors, S. Maidul Haque, P. R. Sagdeo, D. Bhattacharya, D. D. Shinde, J. S. Misal, Nisha Prasad, and N. K. Sahoo, AIP Conf. Proc. 1512, 480 (2013).

Name: **Dr. Sudeshna Chattopadhyay**
Designation: **Assistant Professor**

List of Publications:
1. "What X-rays can tell us about the interfacial profile of water near hydrophobic surfaces" Ahmet Uysal, Miaoqi Chu, Benjamin Stripe, Amod Timalsina, Sudeshna Chattopadhyay, Christian M. Schlepütz, Tobin J. Marks and Pulak Dutta, ***Phys. Rev. B*** **88**, 035431 (2013).

Conferences/Proceedings:
1. Sudeshna Chattopadhyay, Albert L. Lipson, Hunter J. Karmel, Jonathan D. Emery, Timothy T. Fister, Vinayak P. Dravid, Michael M. Thackeray, Paul A. Fenter, Mark C. Hersam, Michael J. Bedzyk, Enhanced Lithiation of Graphitized SiC: In Situ X-ray Scattering Study at Electrolyte / Graphene / SiC(0001) Interface, American Physical Society March Meeting 2013, Baltimore, Maryland, USA, 2013.
2. Sudeshna Chattopadhyay, The free surface of liquids, International Workshop on Surface Science and Engineering, Indian Institute of Technology Indore, Hotel Red Maple Mashal, Indore, India, 2013.

2014

Name: **Dr. Krushna R. Mavani**
Designation: **Associate Professor**

List of Publications:
1. “Surface morphology, ferromagnetic domains and magnetic anisotropy in BaFeO3−δ thin films: Correlated structure and magnetism” Fozia Aziz, Parul Pandey, Mahesh Chandra, Amit Khare, D. S. Rana and **K. R. Mavani,** J. Magn. Magn. Mater. 356, 98 (2014)
2. “Contrasting effects of doping on insulating and metallic states of NdNi1-xMnxO3 thin films” Mahesh Chandra, Fozia Aziz, Shivendra Tripathi, Rakesh Rana, D. S. Rana, and **K. R. Mavani** , J. Appl. Phys. 115, 093701 (2014)

Name: **Dr. Raghunath Sahoo**
Designation: **Associate Professor**

List of Publications:

1. Measurement of charged jet suppression in Pb-Pb collisions at √sNN=2.76.
   Raghunath Sahoo (ALICE Collaboration), JHEP03 (2014) 013.
2. J/Psi production and nuclear effects in p-Pb collisions at √sNN = 5.02 TeV.
   Raghunath Sahoo (ALICE Collaboration), JHEP02 (2014) 073.
3. Two and Three-Pion Quantum Statistics Correlations in Pb-Pb Collisions at √sNN = 2.76 TeV at the LHC.
   Raghunath Sahoo (ALICE Collaboration), Phys. Rev. C 89(2), 024911 (2014)
4. Multi-strange baryon production at mid-rapidity in Pb-Pb collisions at √sNN = 2.76 TeV.
   Raghunath Sahoo (ALICE Collaboration), Physics Letters B 728 (2014) 216–227
5. Multiplicity Dependence of π □, K□, K0S, p(pbar) and Lambda(Lambdabar) in pPb Collisions at √sNN = 5.02 TeV.
   Raghunath Sahoo (ALICE Collaboration), Phys. Lett. B 728 (2014) 25–38

Name: **Dr. Rajesh Kumar**
Designation: **Assistant Professor**

List of Publications:

1. "Qualitative evolution of asymmetric Raman line-shape for nano-structures" **Rajesh Kumar, Gayatri Sahu**, Shailendra K. Saxena, Hari M. Rai and **Pankaj R. Sagdeo**, ***Silicon (Springer), 06, 117 (2014)***
2. "Raman Scattering and Backscattering Studies of Silicon Nanocrystals Formed Using Sequential Ion Implantation" **Gayatri Sahu, Rajesh Kumar,** Durga Prasad Mahapatra, ***Silicon 06, 65 (2014)***

Name: **Dr. P.R. Sagdeo**
Designation: **Assistant Professor**

List of Publications:

1. Symmetry of the charge-ordered phases in Pr0.5Ca0.5MnO3, **P. R. Sagdeo** and N.P. Lalla, Philosophical Magazine **94**, 117 (2014).
2. Effect of substrate bias and oxygen partial pressure on properties of RF magnetron sputtered HfO2 thin films, S.K. Maidul Haque, **P. R. Sagdeo** Shanmugam Balaji, Kalavathi Sridhar, Sanjiv Kumar, Debarati Bhattacharyya, Dibyendu Bhattacharyya and Naba K. Sahoo. J. Vac. Sci. Technol. B **32**, 03D104 (2014).

Name: **Dr. Sarika Jalan**
Designation: **Associate Professor**

List of Publications:

1. Uncovering randomness and success in society, **Sarika Jalan**, Camellia Sarkar, Anagha Madhusudan and Sanjiv K. Dwivedi, PLoS ONE 9(2) e88249 (2014.

School of Humanities and Social Sciences

2013

Dr. Amarjeet Nayak (Assistant Professor, English)

Journal Publications:

1. Sethi, Bijay Kumar and Amarjeet Nayak. **"**Redefining Dalit: Identity Politics, Issues and Debates in Contemporary Dalit Literature", ***Wizcraft Journal of Language and Literature,*** Vol. II, No. II, 2013. pp. 137-142.
2. Shukla, Shanu and Amarjeet Nayak. "Splitting of Identity in Time and Place: An Exploration of North-East Indian Writings through their use of Flashbacks and Reminiscences", ***Galaxy: an Open Access Online International Multidisciplinary Research Journal***, Issue VII, 2013 (http://www.galaxyimrj.com/V2/n3/Shanu.pdf)
3. Yeldho, Joe Varghese and Amarjeet Nayak. "*Inception*: Voyeurism and Urban Representations", ***Ravenshaw Journal of Literary and Cultural Studies***, Vol. III, 2013. pp. 95-107.

Book Chapter:

1. Nayak, Amarjeet. "Debunking the Stereotypes: A Close Reading of Selected Short Fiction in English from the Northeast India" in ***Discourse on Marginality: Identity, Diaspora and Other Issues,*** Eds. Borah, Manash Pratim and Deepak Nanaware (Central Institute of Himalayan Culture Studies), 2013. pp. 71-78.

Conference Papers

1. "*Ice-Candy Man* to *1947 Earth*: Folklores and Legends Lost in Translation" in the International Conference "Literature to Cinema: Adaptation, Appropriation and Adulteration" at NIT Durgapur, June 1 – 3, 2013.

Dr. Joe Varghese Yeldho (Assistant Professor, English)

Publications:

1. Shrivastava, Jaya and Joe Varghese. "The city knows you": Spatial Consciousness in Colson Whitehead's The Colossus of New York (2003)". *Notes on Contemporary Literature*, 43.5 (2013) 4-6.

Dr. Nirmala Menon (Assistant Professor, English)

Conference Proceedings:

1. Menon, Nirmala. "Market Translations, World Literature, and the Global Publishing Industry" American Comparative Literary Association (ACLA) Annual Conference April 7-11, Toronto, Canada http://www.acla.org/acla_2013/
2. Menon, Nirmala. "Representing the Postcolonial Subaltern: A Comparative Reading of Subaltern Narratives by Arundhati Roy and Mahashweta Devi" North Eastern Modern Language Association (NeMLA), Boston, March 22-25, 2013. http://nemla.org/convention/2013/index.html

Conferences:

1. Menon, Nirmala. "Translating Mahashweta Devi for the Academic Market" as part of a seminar on "Market Translations, World Literature, and Global Publishing Industry", American Comparative Literature Association (ACLA) Conference, University of Toronto, Canada April 4-7, 2013.
2. Menon, Nirmala. "Conceptualizing Translation Theory for Postcolonial Translation", North-East Modern Language Association (NeMLA) 44thConvention, Tufts University, MA, USA March 21-24 2013.

Dr. Pritee Sharma (Assistant Professor, Economics)

Publications:

1. Kumar, Ajay and Pritee Sharma. "Impact of Climate Variation on Agricultural Productivity and Food Security in Rural India", *Economics: The Open Access, Open Assessment E-journal*, 2013.

Dr. Ruchi Sharma (Assistant Professor, Economics)

Conferences:

1. Kumar, Sunil and Ruchi Sharma. "Foreign licensing by Indian Industry: The role of patent policy" at 49th Annual Conference of The Indian Econometric Society (TIES) at Patna University Patna (India), 09-11 January, 2013.
2. Kumar Sunil and Ruchi Sharma. "Innovation in High Medium High Technology Industries: An Indian Experiences," during 6th Annual Conference of the Academy of Innovation and Entrepreneurship, held at TMD, Oxford International Development Centre, Oxford University, U.K., 29-30 August 2013.

Dr. Sanjram, Premjit K. (Assistant Professor, Psychology)

Publications:

1. Sanjram, P. K. & Gupta M. Task difficulty and time constraints in programmer multitasking: An analysis of prospective memory performance and cognitive workload. *International Journal of Green Computing. 04*(1), 2013. 35-57. doi: 10.4018/jgc.2013010103
2. Sanjram, P. K. "Attention and Human Errors in Multitask Performance". *APCHI'13*, ACM, 2013.

Dr. Sujata Kar (Assistant Professor, Economics)

Publications:

1. Mishra, Anindya J and Sujata Kar. "Broader Social Implication of the Strategies of Business Corporations", *International Journal of Indian Culture and Business Management*, Vol. 7, No.2, 2013.
2. Kar, Sujata. "Exploring the Causal Link Between FDI and Human Capital Development in India", *Decision*: *Indian Institute of Management*, Kolkata, Vol. 40, Nos. 1-2, 2013.

Dr. C. Upendra (Associate Professor, Philosophy)

Publications:

1. Review of Paul Blackledge and Kelvin Knight (eds.) *Virtue and Politics: Alasdair Macintyre's Revolutionary Aristotelianism,* 11.2(May 2013), p. 229.
2. Review of Joshua L. Cherniss's *A Mind and Its Time: The Development of Isaiah Berlin's Political Thought* (Oxford: OUP, 2013), published in *Political Studies Review*. forthcoming
3. Review Article of Mathew Kramer's *Moral Realism as Moral Doctrine* (Oxford: Wiley-Blackwell, 2009), published in the Journal of *PUBLIC REASON*, from Universitatea Din Bucuresti, 5.1(2013).
4. Review Article of Terry Eagleton's *Why Marx Was Right* (New Haven: Yale University Press, 2011), forthcoming in the journal of *REASON PAPERS.*
5. Review of Jacques Ranciere's *Althusser's Lesson* (London: Bloomsbury Academic, 2011), published in the *Journal of Baudrillard Studies*, 10.2(2013)
6. Review of Sara Arson Vaux's *The Ethical Vision of Clint Eastwood* (Win B. Eerdmans Publishing Company, 2011), published in the *Journal of religion and Film,* 17.2(2013).

Conferences:

1. "Moral and Normative Cognition: Certain Reflections", presented at an International Conference on *Cognition, Emotion and Action,* organized by the School of Humanities & Social Sciences, IIT Gandhinagar, held during 6-8 December, 2013.

Year: 2014

Dr. C. Bharath Kumar (Assistant Professor, Philosophy)

Publications

1. Kumar, Bharath, Sreelekha Mishra and D. Balaganapathy. "Transition from Cultural Diversity to Multiculturalism: Perspectives from Off-shore Industry in India" in *AI & SOCIETY: Journal of Knowledge, Culture and Communication,*Volume 30, Issue 2, Springer 2014.

Dr. Amarjeet Nayak (Assistant Professor, English)

Journal Publications:

1. Chattopadhyay, Sagarika and Amarjeet Nayak. "Performing the Stare in Indra Sinha's *Animal's People*", ***Disability and the Global South***, Vol. 1, Issue 1, 2014. pp. 29-43.
2. Nayak, Amarjeet. "Witches are Bitches", ***New Writing: The International Journal for the Practice and Theory of Creative Writing***, Vol. 11, Issue 1, 2014. pp. 62-66.
3. Shrivastava, Jaya and Amarjeet Nayak."Reading a Culturally Different Text: Meaning Signification Process in Chinua Achebe's Short Stories", ***Short Fictionin Theory and Practice*** (Accepted)

Book Chapter:

1. Sethi, Bijay Kumar and Nayak, Amarjeet. "Departure from Speciesism to New Humanities in select Stories of Thongchi, Barua and Changkija".(Accepted as a book chapter in ***Perspectives on New Literatures: Postcolonial Responses***)

Dr. Nirmala Menon (Assistant Professor, English)

Publications:

1. Menon, Nirmala. "Introduction*" Creole Cosmopolitanism: Narratives of Migrant Postcoloniality*, Peter Lang Publishing, New York 3-22, 2014.
2. Menon, Nirmala. *"*Multilingual Digital Publishing: A Postcolonial Digital Humanities Imperative*" Digital Studies/Le champ numérique. Société canadienne des humanités numériques* (CSDH/SCHN) February, 2014
   Accepted/ Final Revision: Accepted and Won a joint Prize for best article on GO:DH (Global Outlook: Digital Humanities, an Alliance of Digital Humanities Organisations).
3. Menon, Nirmala. *"*Muslim Identity and Representation in Deepa Mehta's Earth and Abhishek Kapur's Kai Po Che*"* Accepted in Ed Esra Santesso and James K Islam and Postcolonial Literature. Forthcoming, 2014.
4. Menon, Nirmala. *"*Peripheral Identities and Hybridity in Arun Joshi's The City and the River", *Journal of English and American Studies*: A Quarterly Journal of Language, Literature and Culture, ZAA Germany, April 2014.
5. Menon, Nirmala. "The Hullabaloo about Hybridity: Kiran Desai's Inheritance of Loss*", Cultures of Migration: Local Cosmopolitanisms*. Peter Lang Publishing, New York 2014 .
6. Menon, Nirmala. "Translating Silences in Mahashweta Devi's Imaginary Maps*"*. Accepted and Forthcoming in Romantic Circles Pedagogies Journal, 2014.

Books:

1. Menon, Nirmala. Co-Author, Collection of Essays. Creole Cosmopolitanism: Narratives of Migrant postcoloniality, Peter Lang Publishing Feb 2014 Under the series,http://www.peterlang.com/index.cfm?event=cmp.ccc.seitenstruktur.detailseiten&seitentyp=series&pk=1588&cid=367&concordeid=PCS

Conference Proceedings:

1. Menon, Nirmala. THATCamp DC, April 26-28, 2014. " Digital Academic Publishing: A Postcolonial Imperative"

Conference Presentations:

1. Menon, Nirmala. THATCamp DC, April 26-28, 2014. " Digital Academic Publishing: A Postcolonial Imperative"
2. Menon, Nirmala "Use of Omeka for Digital narratives" The George Washington University, USA April 18-19, 2014.

Dr. Ruchi Sharma (Assistant Professor, Economics)

Publications

1. Ambrammal K.S. and R. Sharma. 2014. Innovations by Firms in High and Medium-High Technology Industries: An Indian Experience. *Journal of Chinese Economics and Business Studies, Special Issue: Harnessing Internal and External Resources for Innovation in Emerging Economies*. Volume 12, Issue 2, 2014. 181-207.
2. Sharma, Ruchi and A. Jain. 2014. Research and Patenting in Indian Universities and Technical Institutes: An Exploratory Study. *World Patent Information*. [In Press]
3. Sharma, Ruchi. 2014. Influence of the Patent Policy of South on the Research and Development of North: Exploration of the Foreign Direct Investment Channel. *Journal of World Intellectual Property*. [Accepted for Publication]

Dr. C. Upendra (Associate Professor, Philosophy)

Book:

1. The reprint of the first edition of earlier book *In Defense of Liberal Pluralism* (CambridgeScholars Publishing, 2009), is due in 2014 with substantial modifications and change in the title.

Conferences:

1. "The Ethical in the Social". presented at an International Conference on *Bounds of Ethics in a Globalized World*, jointly organized by the Christ University, Bangalore, and University of KU Leuven, Nederlands, held during 6-9 January, 2014.
2. "The Ethical in the Cosmic!! Huxley's Buddha", presented at a Conference on *Applied Buddhist Philosophy,* organized by Acharya Nagarjuna University, Andhra Pradesh, from 30-31 January, 2014, Sponsored by University Grants Commission.
3. "Experimental Moral Philosophy", presented at the National Conference on New Avenues in Philosophy, held during 28-29 March, 2014, SM Vaishnav Devi University, Jammu, J&K.

Center of Biosciences and Biomedical Engineering

2013

Dr. Chelvam Venkatesh
Assistant Professor,
Department of Chemistry,
Biosciences and Biomedical Engineering (Adjunct Faculty)

1. J. Shen, C. Venkatesh, G. Cresswell, P.S. Low, Use of folate-conjugated imaging agents to target alternatively activated macrophages in a murine model of asthma, *Mol. Pharm.*, *10*, 1918–1927, **2013**.
2. K. Lindsay, C. Venkatesh, W. Charity, S. Mahalingam, P. Scott, K. Sumith, P. S. Low,Development of tumor-targeted near infrared probes for fluorescence guided surgery, *Bioconjug. Chem.*, *24*, 1075-1080, **2013**.
3. V. Gaind, H. R. Tsai, K. J. Webb, C. Venkatesh, P. S. Low, Small animal opticaldiffusion tomography with targeted fluorescence, *J. Opt. Soc. Am. A. 30*, 1146-1154, **2013**.
4. H. R. Tsai, B. Z. Bentz, C. Venkatesh, V. Gaind, K. J. Webb, P. S. Low, In vivo optical imaging of kinetics in a small animal for folate-targeted drug development, *Opt. Life Sci.*, **2013**.

Dr. Prashant Kodgire
Assistant Professor, Ramanujan Fellow and Head
Discipline of Biosciences and Biomedical Engineering

1. P. Kodgire, P. Mukkawar, S. Ratnam, T. E. Martin, U. Storb, Changes in RNA polymerase II progression influence somatic hypermutation of Ig-related genes by AID, *J. Exp.Med.*, *210*, 1481-1492, **2013**.

Dr. Sanjram Premjit Khanganba
Assistant Professor,
Discipline of Psychology,
Biosciences and Biomedical Engineering (Adjunct Faculty)

1. P. K. Sanjram, M. Gupta, Task Difficulty and Time Constraint in Programmer Multitasking: An Analysis of Prospective Memory Performance and Cognitive Workload, *International Journal of Green Computing 4*, 35-57, **2013.**

Dr. Sarika Jalan
Associate Professor,
Discipline of Physics,
Biosciences and Biomedical Engineering (Adjunct Faculty)

1. S. Dwivedi and S. Jalan, Extreme value statistics in networks with excitatory and inhibitory connections, *Phys. Rev. E 87*, 042714, **2013**.

Dr. Shanmugam Dhinakaran
Assistant Professor,
Discipline of Mechanical Engineering,
Biosciences and Biomedical Engineering (Adjunct Faculty)

1. S. Dhinakaran, M.S.N. Oliveira, F.T. Pinho and M.A. Alves, Steady flow of power-law fluids in a 1:3 sudden expansion, *J. Non-Newtonian Fluid Mech*, *198*, 48-58, **2013**.

Year – 2014

Dr. Sarika Jalan
Associate Professor,
Discipline of Physics,
Biosciences and Biomedical Engineering (Adjunct Faculty)

1. A. Agarwal, C. Sarkar, S. K. Dwivedi, S. Jalan, Quantifying randomness in proteinprotein interaction networks of different species: A random matrix approach, *Physica A 404*, 359, **2014**.

Dr. Sharad Gupta
Assistant Professor,
Discipline of Biosciences and Biomedical Engineering

1. S. Gupta, D. Gui, R. Zandi, S. Gill, U. Mohideen, Fluorescence interference contrast based approach to study real time interaction of melittin with plasma membrane, Imaging, Maniulation, and Analysis of Biomolecules, Cells and Tissues XII, *Proc. of SPIE*, *Vol. 8947*, 894723, **2014**.

Students' Achievements

Ronshee Chawla *was selected for DAAD-WISE (Working Internships in Science and Engineering) Scholarship 2014 for pursuing a research internship in Germany. He will be going to RWTH Aachen University in Aachen, Germany which is among top 150 universities of the world (according to QS World University rankings 2013).*

[Left]

Mr. M Ramesh Krishna*, selected as a Google Student Ambassador for IIT Indore, stood out impressively amidst 1750 strong candidates from more than 100 cities across India vying for the coveted GSA title. [Right]*

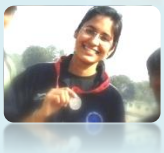
Ashok Pancily Poothiyot *of the 2010 CSE batch represented IIT Indore at the 2nd Indian Student Parliament held in Jan 2012 at MIT, Pune and was among the 18 student leader speakers selected from about 8000 student leaders from over 4000 colleges all over India on the basis of speech auditions. He thus got the opportunity to address an 8000+ strong audience including eminent personalities of the likes of Mr.* ***Kapil Dev, Mr. Shashi Tharur, H.H. the Dalai Lama, Mr. Narayana Murthy, Dr. Vijay Bhatkar and cartoonist R.K. Lakshman.*** *Ashok shared the dais with Mr. Kapil Dev and was felicitated with shawl and memento by him. Ashok is an excellent speaker and has been the official anchor for many important events. He has qualified for higher studies at the* ***Yale School of Management****.*

Awarded the 'Top Performer - ***Google Student Ambassador'*** *award in recognition of quality of events organized (14 city-wide events centered on coding and technology) and exceptional work done in areas of web-literacy, up-skilling fellow students and increasing community access to information.*

*Bagged 2 awards: '****Audience's Most Popular Choic****e' &****'Jury's Most Innovative Solution****' at Siemens Technical Challenge 2013 for an innovative, green, free-flow, high-speed (100 km/h) tolling solution.*

One among 45 students world-wide selected for the ***Young Leaders Program,*** *Indian School of Business (Hyderabad)*

Mr. Eshaan Yash Sharma: *Research work on ECG signal processing, prepared a research paper titled 'A Novel Approach for ECG beat detection using an Improved Envelope based on Hilbert Transform and Proximity Mean' and presented it at the national level tech symposium 'Technosummit-13' organised by Sathyabama University, Chennai. Their paper was adjudged the third best paper of the summit.*



IIT Indore participated in 47th Inter IIT Sports Meet at IIT Kharagpur. Students of IIT Indore actively participated in various sports such as football, cricket, badminton, table tennis, weightlifting, athletics etc. ***Suhani Chaudhary****, a student of B.Tech. Electrical Engineering (2010 Batch) won a bronze medal in Shot-put event and brought glory to the institute.*

IIT Indore participated in the 46th Inter IIT Sports Meet held in December 2010 at IIT Delhi. IIT Indore's Athletics, Badminton, Basketball, Chess, Cricket, Football teams took active participation. ***Ms. Kanika Sankle*** *(EE-2009 batch) won Gold Medal in 100m Sprint in women's category*

IIT Indore participated in Inter IIT Aquatics as a part of 47th Inter IIT Sport Meet Kharagpur. Being a new IIT and for first time in Inter IIT Aquatics Competition, it is a matter of pride that our student ***Sanidhya Naikawad*** *(ME-2010 batch) won bronze medal in 200m Individual Medley.*

Archit Vikrant Karandikar *represented India at International Olympiad in Informatics 2010 (IOI-2010) and won Bronz Medal. IOI-2010 was held in University of Waterloo, Ontario, Canada in August 2010. IOI is one of the seven prominent Science Olympiads held annually. The other Science Olympiads are held in the fields: Mathematics, Physics, Chemistry, Biology, Astronomy and Astrophysics. Archit is the first representative of Maharashtra in the Indian Team.*

IIT Indore participated in 45th Inter IIT Sport Meet (2009) held at Kanpur. Being a new IIT, as IIT Indore established in 2009 itself, it was a big challenge to the students. IIT Indore won Two silver medals. ***Kanika Sankle*** *(EE-2009 Batch) won silver medal in 200m race and* ***Devika Devika Prabhu*** *(EE-2009 batch) won silver medal in shot-put.*

STUDENT ACTIVITIES

Team Paradigm Shift of IIT Indore *reached the World Finals stage of the prestigious ACM ICPC Competition twice (2013, 2014).*

Fluxus - *The annual techno-cultural festival of IIT Indore, held in February is just 4 years old and is already the largest college*

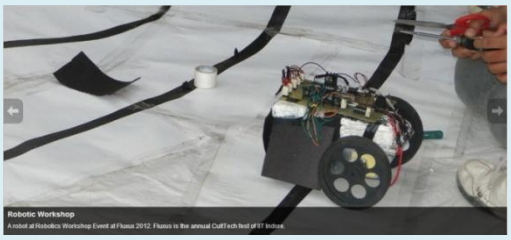
festival in Central India. It hosts ingenious technical competitions and exciting cultural events that pull a footfall of over 10,000 visitors each year.

The Literary Club of IIT Indore *that comes under the Student Gymkhana publishes its annual magazine Inscription every year. The theme of Inscription 2013 was 'Changing Future'. Inscription 2014 would be published in the coming November. Apart from the magazine, the Club also crafts the Yearbook for the passing out back each year and keeps the students busy by holding campus events such as Creative Writing, Spelling Bee, Model UN, Debates, Talks etc. It is aided by the Quiz Club and the Programming Club that organize events in their respective domain.*

Team Engines and Demons *competes in the SAE India's BAJA Competition to design, build, test and race a single-seated off-road vehicle that will survive the severe test/punishment of rough terrain.*

Musical night Crescendo *is organized every year in the even semester. UG students, PG students, PhD students, faculty members*

EVENTS arranged by the STUDENTS' GYMKHANA



IIT Indore provides free web-space for students. Using this facility one can create his/her own personal website on IIT Indore's server.

AVANA

a student social forum

AVANA is a social service organization which took birth in IIT Indore, meant for spreading joy to all, preserving our values and our mother nature, protecting (guarding) our society from the aliments of corruption, discrimination of rights, satisfaction of fulfilling our responsibility towards our society and our people.

This organization is at a nascent stage which emerged from a vision of the heart, the thoughts and discussions of a few students. A group of students with immense moral strength to fight the odds and with belief that their efforts would attract help from others and who believed that a great moral revolution would start a single step founded AVANA.

So we step ahead to face the cruelty of the truth. Moreover we believe "Success not always means to achieve something. It also means to sacrifice something for the good of others." AVANA through the vision of similar hearts is strongly determined to serve the needy, abandoned, diseased and sick, and SPREAD THE JOY.

RULES and REGULATIONS:

Volunteers giving ideas about projects will be the head project coordinator for corresponding projects.
Main co-coordinators will co-ordinate everything from taking permissions to scheduling events, maintaining reports, etc.
Treasurer will be maintaining the finance of the organization. He takes help from one or two volunteers if necessary.
Conflict resolution using bilateral debate.
All volunteer should abide by the rules and regulations of the Organization. Rules briefly formulated are:

- No internal politics.
- Projects should derive maximum benefits for the deserving and also for ecology.
- Code of conduct while working on projects related to AVANA.

Long Term Projects:

1. Voluntary Teaching in Ashrawath Govt. School, Indore
2. Audio-documenting Project
3. One Rupee Miracle

Short Term Projects:

1. No Plastic campaign– Jute Bag Distribution

Voluntary Teaching:

MODEL SCHOOL:
ASHRAWATH KURG GOVT SCHOOL, near Tejaji Nagar, Indore

Presently we are trying to analyse the effectiveness of this initiative. We are going to the school every Saturday in the morning session and on either in Thursday or Monday in the afternoon session. We are teaching English, Sciences, Maths.

Outcome: The student's English basics gradually increased and knowledge of Maths are improved.

Proposed work: Structuralizing the syllabus volunteer will be teaching. Trying to implement and promote experimental teaching at the lowest level with help of other NGOs. And to spread this work to other Govt. Schools nearby.

LIBRARY establishment:

Other small events of student encouragement:

Blood Donation Camp:

Other Organizations involved: MY Hospital Indore, Sat-Dus

Outcome: More than 100 students showed up for the donation camp out of them 83-86people donated blood from our Institute and 5-10 people from outside also donated blood.

Strategy: In association with medical team IIT Indore and MY hospital the camp wasorganized. Dr.Matkar contacted the hospitals on our behalf. The institute medical committee reviewed the safety measures. The refreshments were sponsored by Sat-Dus convenient shopping facility in Silver Springs Indore. Monetary support was given by our institute which is used in pre-donation meeting and publicity of the meeting.

Proposed Work: To organize blood donation camp every year on a wider scale.

Children home Visit:

Other NGOs involved: Abundant Life Children home in Indore

Outcome: Collected three cartons of clothes and one small bag of books and ten pairs of shoes and other accessories.

Strategy: A donation box was set up at the Silver Springs mess. In some cases donations were collected from individual donors personally. And the collected donations were given to Abundant Life Children home.
Our students visited the home spent a day with them and distributed some stationery items to the children there.

Observed situation: Many of the children there are either from the Leprosy families in (or around) Indore with no contamination or the victims of the Orissa massacre or orphans. Abundant Life Children home is very good and providing good facilities to the children.

Proposed work: To establish collaboration between our AVANA and Abundant Life so that our students can teach and interact with them.

Donations to economically retarded people:

Quilt Distribution for old and poor people sleeping on platforms:

Outcome: 40 quilts have been distributed to poor people.

Strategy: Students contributed money for buying quilts. Three representatives bought quilts. The distribution team started at 9:30 p.m. in the hostel. We took a Magic van. We divided ourselves into two teams. One team for areas surrounding railway stations and another team for areas around Rajwada. The teams went around the areas looked for the possible people to whom we can donate and gave them quilts without disturbing their sleep.

Cloth Donation:

Outcome: Four cartons of clothes were distributed Phase II workers at Silver Springs.

Strategy: Cartons were setup at Silver Springs dining hall. Residents of Silver Springs were also involved. We went to many places in Indore in search of ideal set of people to whom we should donate these collected donations. We found the nearest best match in Silver Springs itself.

COME JOIN US …… WITH ALL OUR EFFORT

"WE NEED TO CHANGE THE WORLD"

Indo-UK Collaboration on River Health

IIT Indore's contribution

Indian river eco-systems are highly vulnerable because of the sheer number of people that are directly or indirectly dependent on the water bodies and the unplanned development that not only introduces but also increases the systemic risk to the eco-system. Unplanned development on mountain slopes leads to soil erosion which manifests in faster landslides, increased sediment load in the rivers, lower capacity to withhold flash floods. There is much hue and cry from various pressure groups that dams are the main cause of these floods. The jury still are not out on whether that is really the case. Although no one can refute the fact that dams are crucial for development for they provide much needed electricity, but the unchecked construction of dams also disturbs the river ecosystem.

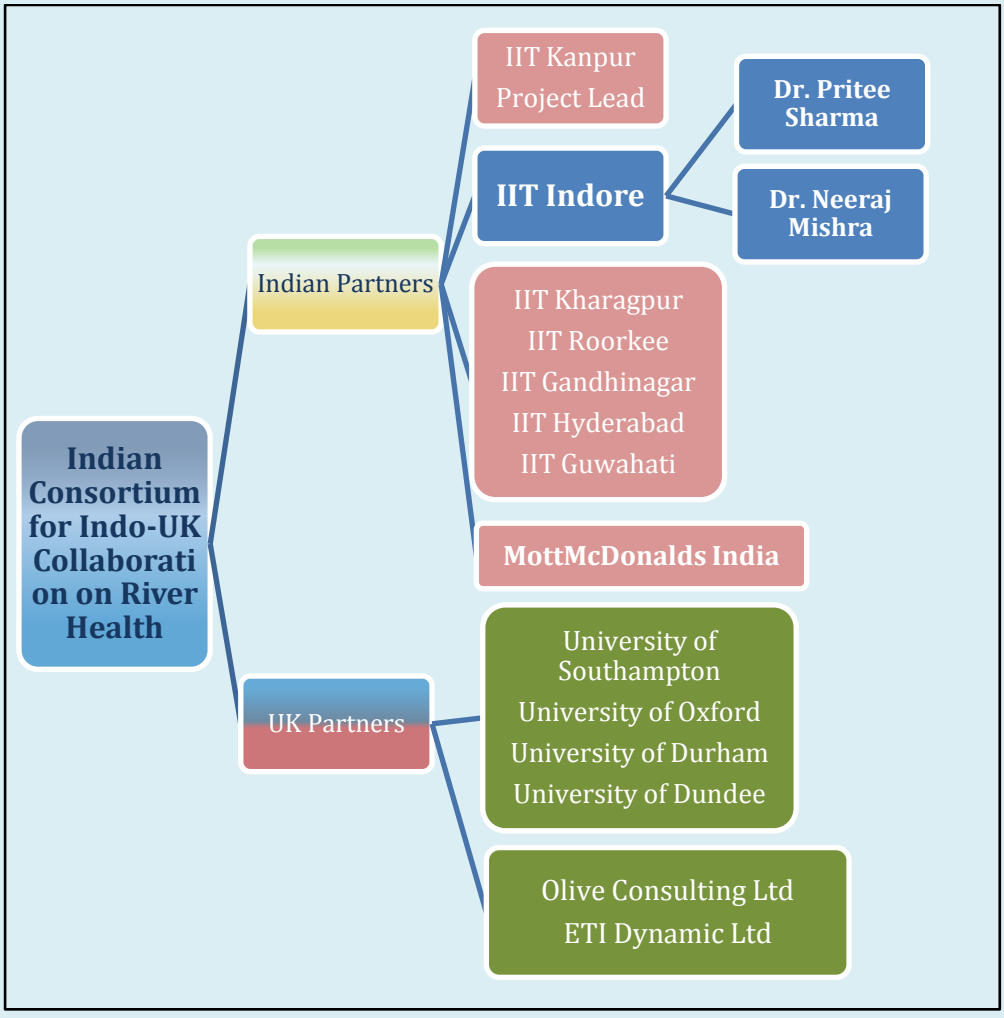
In the complex environment of the River Ganga, declared the National River, any institutional response needs to be **welfare/economically -driven but ecology-centric, multi-sectoral, integrative and evidencebased**. As such, the private sector, stakeholders across civil society, and national river managers responsible for the Ganga across the basin need to have access to a comprehensive evidence base, as well as have the opportunity to engage with, debate and discuss the implications of this information both nationally and trans-nationally. Through **such stakeholder engagement, information support, and public wider debate**, appropriate applied research will provide the opportunity to allow the people of the region through which this socio-environmentally significant river flows to consider the possible consequences of interventions to improve the health of the river Ganga and enhance the potential for cooperation in the management of the vital economic and ecological services the river provides (Ganga Health Consortium document, 2013).

In view of this an Indian Consortium for Indo-UK Collaboration on River Health is constituted with 7 IITs as Indian partner institutions and four Universities from UK and two private research firm. IIT Kanpur is the Project Lead for the consortium. IIT Indore being a part of the consortium is represented by two principal investigators Dr. Pritee Sharma and Dr. Neeraj Mishra. Dr. Sharma's contribution in the project are in the areas of (i) "Economic Valuation of Ecosystem Services" including livelihood concerns, climate change adaptation and change in agricultural practices; and (ii) "Impacts of River Health on Agriculture and food security" including agricultural productivity and change in land use pattern. Dr. Neeraj Mishra is working on (i) "Governance and Institutions" based on anthropological approach to identify socio-ecological and socio-political issues in river health management, and (ii) "Community Knowledge and Participation" based analysis to create decision support systems for rural, urban, industrial and agricultural needs.

ECONOMIC ESTIMATION OF TRANSITIONING TO SUSTAINABLE RIVER HEALTH: MIDDLE GANGA BASIN

Dr. Pritee Sharma

To promote sustainable health plan for Ganga river basin we need to incorporate economic criteria in developing investment decision making for Ganga river basin development. A macroeconomic view for the basin would be developed and will then be extended to sector-wise analysis. This analysis would aim at finding a balance between economic growth and demand for water by different sectors which exhibits a dualistic and interdependent nature between river and the economic sectors, especially in Ganga basin which might have relatively smaller economic base but huge population concentration dependent on the basin's good health. The analysis at large would include estimation of Gross Geographic Product to indicate the desired capital investment for water resource development in the area.



Most of the studies and networks until now observe, collect and report socio-economic and biophysical data separately. We would incorporate the approach of overcoming spatial incompatibilities between these based on meta-modelling using Geographical Information Systems. Utilising GIS based geo-referenced data for agricultural census and land use, industrial points and domestic sectors will provide a data at finer scale enabling modelling for efficient water allocation and

economic efficiency. A model for optimal bulk allocations of limited water can be based on economic and demographic criterion for competing use sectors like agriculture, domestic, and industry. A model based on utilising Reservoir Operation Module (ROM) and Water Allocation Module (WAM) for all the six different zones identified as six high priority regions in the Ganga Basin will be estimated. The ROM will determine the amount of water available for allocation which will be used as an input to WAM with an objective to maximize net economic benefits of bulk allocations to different use sectors.

In addition to preparing the basic models for efficient allocation of water to different sectors keeping in view the vulnerability of populations dependent on this critical resource for their livelihood and welfare, further, it is proposed to undertake estimation of direct and indirect impacts of water quality improvement policy scenarios, focusing on sector-wise (domestic, agricultural and industrial) reduction of emission levels and other eco-toxicological substances. For this purpose Applied General Equilibrium (AGE) model consisting of different production sectors is extended to water through the inclusion of substitution elasticities between labour, capital and emissions to water in each sector's production function. The study also proposes to bring the analysis from national and state levels to river basin level and subsequently estimate shadow prices for water-polluting substances through introduction of a possible emission permits market.

The proposed estimation will be based on national, sectarian and regional databases from secondary data sources of economic, institutional and social variables. Subsequently these would be co-integrated with the GIS based geographic parameters to arrive at allocation efficiency models. These estimations at finer scales would be enriched with primary data collected at sub-regional levels. Direct and indirect impacts of water quality improvements for each sector would be based on general equilibrium models and case studies focusing on high priority regions.

ANTHROPOLOGICAL METHODS IN RIVER BASIN RESEARCH

Dr. Neeraj Mishra

Setting the Scene/Overview

The Ganga river basin is a dynamic system in the process of continuous change and reformation. These changes are caused due to human interventions in the river system, and also the changes that the river system brings about in human socio-economic and political life. This interactive relationship with the river has both biophysical and socio-economic outcomes. In the river based ecosystems, river and the people create each other both in meaning and understanding, which is reflected in their manifest behavior with each other in the daily life of the community, built around the river. This part of the project proposes to study the subjective relationship between river system and local communities and the interactive behavior between humans and the river. It would develop a narrative account of the lives of the people living on Ganga basin to understand the coexistence of human life and river basin health. In the middle Ganga segment we propose an in-depth anthropological study of individual basins of the tributaries of Ganga and Yamuna rivers.

Main tributaries like Chambal can be further seen as an assemblage of many rivulets, rivers and streams that join the main stem of the river at different places. This study proposes to conduct an anthropological research among the people living on the banks of Chambal river from its origin near Indore to Etawah/Bhind the place where it meets Yamuna, covering a distance of 960 kilometers. More than twenty large and small tributaries join river Chambal on this journey. The tributaries of the Chambal include *Shipra, Choti Kalisindh, Sivanna, Retam, Ansar, Kalisindh, Banas, Parbati, Seep, Kuwari, Kuno, Alnia, Mej, Chakan, Parwati, Chamla, Gambhir, Lakhunder, Khan, Bangeri, Kedel and Teelar.*The study would begin with one such tributary of Chambal, called the Khan river, which flows through the city of Indore. Khan river meets Shipra river in Ujjain, and Shipra meets Chambal river, which finally merges into Yamuna. Many such tributaries could be identified for studying the life and livelihoods of the people living on the Ganga basin.

There would be two sections of the study:
a) Rural phase of the river (irrigational usage): in a study conducted recently, MP and Odisha were identified as highly vulnerable to climate change. MP has a widespread dependence on agriculture: 75 percent of its rural population relies on farming with a majority of farmers small-scale or marginal.
b) Urban phase of the river (pollution, drinking water supply system, communities living on the river banks, seasonal floods, drought, water quality, health standards of water).

Data Collection

Fieldwork-based data collection from relevant stakeholders, their profiles, needs assessment, water usage behavior, attitude towards river system etc. to develop socio-economic and political theoretical tools of analysis. It strives for the inclusion of needs, perceptions and preferences of common people and local stakeholders by using participatory methods of knowledge creation. The data collection would involve recording the socio-ecological functions of river, livelihoods built around the river system, poverty alleviation options in the Ganga basin development, demographic changes and urbanization of areas on the Ganga basin; governance processes, actors, policies and institutions involved in the management of Ganga system. It would also collect quantitative data on socio-political issues linked to the Ganga health project; biophysical data and its linkages with political action-historical review; integrating/recording community knowledge, alternative forms of basin development plans in the local discourse, what are the requirements for a people-friendly/ pro-poor adaptation of the research focus; based on community survey and anthropological methods of data collection.

Outcomes

• Integration with DSS: Critical Analysis of the project in its embeddedness in the organizational, political and economic contexts at the local, national and regional levels would be useful to visualize the local dynamics of policy in its implementation phase, and its ground level unfolding. • Recommendations on institutional and governance setup; focus areas for policy action; space for people's knowledge- tacit and explicit, that can be considered in plans for the future; • Space for local knowledge in DSS: downward mobility of DSS en route to the masses living on the Ganga basin- what data can be quantified and what socio-political theories are applicable; upward focus and mobility of the DSS to the policy makers, international funding agencies, scientific experts and politicians; lack of documentation of local knowledge in water management as the missing link.

Our main contribution is to provide socio-economic data, enumerate the discursive regimes of basin development, and provide qualitative data on the river system and its dependent population. Politics is now actively discussed in the mainstream global water resource debate (HDR, 2006) implying stronger mobilization of political science approaches to water resource research.

ASTROPHYSICS at IIT INDORE

The Astronomy and Astrophysics Group was set up at IIT Indore on the advice of distinguished Astro/physicists, in 2013. the institute took the bold initiative of providing major seed grant to set up a Radio Astronomy Laboratory and the first radio dish. A total sum of Rupees fifty million was provided to the Astrophysics Group so far towards the setting up of a Radio Astronomy Laboratory and the construction of a single-dish radio telescope. The programme provides a foundation for self-sustaining research activity and facilitates future expansion of construction / experimental activity.

We are very pleased to announce that this initiative taken by the institute has now borne fruit, as evidenced by the commissioning of our first single-dish radio telescope in September 2013, after merely three months of work.

Work Completed by the Astrophysics Centre

With the initial seed grant, the following progress has been made to date in a short time span of 1 year:

(i) A single-dish Alt-Az motion radio telescope, capable of 90 degree motion in altitude and 100 degree motion in azimuth, has been constructed. Except the aluminium dish, the entire structure was designed and constructed at the IIT Indore workshop.

(ii) The dish has a 10 GHz receiver system, with a spectrometer that was made by undergraduates working in this project. The team is in the process of acquiring a PLL at 10 GHz in order to operate the receiver system at 10 GHz continually.

(iii) A separate and simple receiver chain with no downconversion has also been assembled by this team, which recently detected neutral hydrogen in the galaxy as a first step towards calibrating the telescope.

(iv) A radio astronomy laboratory, with test and measurement capability from 10 MHz to 8.4 GHz, and eight advanced digital receivers was commissioned in 2013.

(v) A second dish is now being constructed by IIT Indore Workshop.

(vi) A large project, with the aim of building a large high-frequency array of radio dishes at IIT Indore, and a total estimated cost of Rupees 920 million is currently under way with Dr. Siddharth Savyasachi Malu as PI and Drs. M. Anbarasu, I.A. Palani and Pankaj R. Sagdeo as Co-Is.

Interdisciplinary Aspects

Design, construction and commissioning of the single-dish radio telescope is truly interdisciplinary, as it has involved expertise in mechanical engineering, signal detection and processing and astronomy. The institute's Central Workshop has constructed most of the structure of the radio telescope, and has paved a way for the development of novel dishes for an entire radio array. Additionally, faculty members from the disciplines Mechanical and Electrical Engineering and Physics have contributed to the setting up of this telescope. This is one of the most successful examples of this institute's emphasis on and promotion of interdisciplinary research.

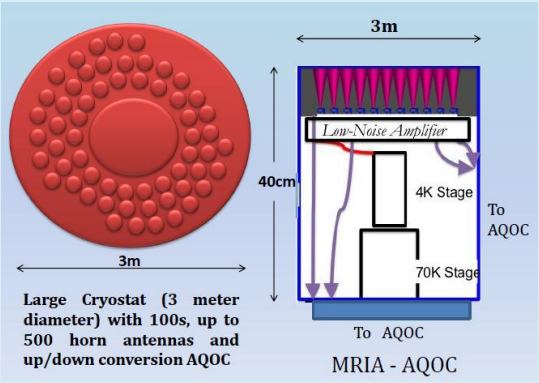
Undergraduate student involvement

The Astrophysics Group initiated the practice of involving undergraduates in forefront research – the single-dish radio telescope was assembled and commissioned by five B.Tech. project students working in the Group. In addition, five undergraduate students characterized radio frequency interference in the summer 2013.

A cm-wave radio interferometer at IIT Indore

Radio telescopes have been in use for the last 6 decades in astronomy, and have yielded a huge amount of information about the universe. However, radio telescopes – whether single dishes (like Arecibo, Green Bank and Parkes), or arrays (like the Very Large Array (VLA), the Australia Telescope Compact Array (ATCA) in Narrabri, Australia, the Giant Metrewave Radio Telescope (GMRT) in India and the Westerbork in the Netherlands) were designed primarily with galaxies in mind. The basic advantage that radio arrays have over single dishes is that they provide a way to probe very small angular scales on the sky.

However, these radio arrays are not well-suited for studying large-scale structures like galaxy clusters and superclusters. Additionally, none of the planned radio arrays, like the Square Kilometre Array (SKA) or the Murchison Widefield Array (MWA), even plan to address this issue.



Scheme 1

With this background, all efforts in Astrophysics are now focused on the construction of an interferometer with 3 dishes, to be upgraded to 5, 8, 16, 32 and finally, 64 dishes. We have been able to construct our own digital spectrometer, and are on our way towards designing a digital correlator to enable interferometry. Furthermore, an innovative design made by Dr. Malu is also ready for implementation; this is shown in Scheme1. This novel design would be tested using the interferometer.

When constructed, this radio interferometer array, working at 20 GHz, would be the only facility dedicated to the study of the largest structures in the universe, with the ability to study magnetohydrodynamic turbulence using high-frequency emission, as also the ability to cover regions of super/clusters at high frequencies.

Recent Progress

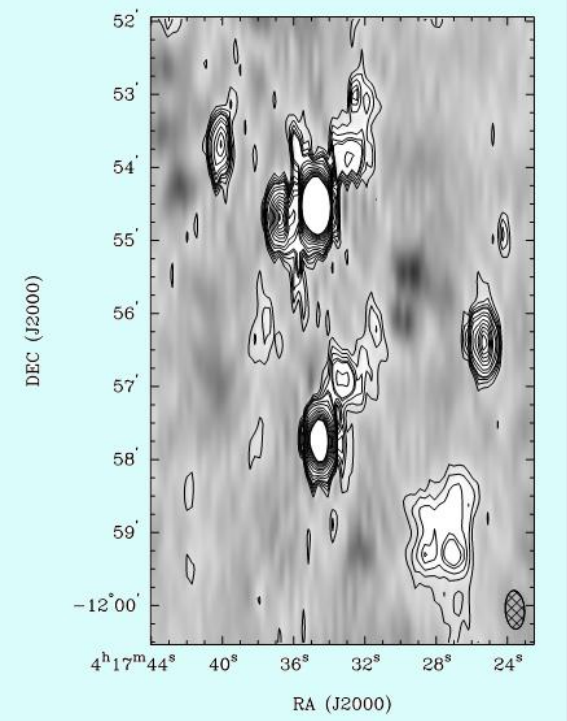


Figure 1

Figure 1 is a 1.0x0.5 million light year 5 GHz radio image of a part of the galaxy cluster MACS J0417.5-1154 in the southern sky, observed from the Australia Telescope Compact Array.

The image shows four distinct galaxies, with two galaxies very close to each other, and barely resolved.

The most interesting parts of the image are the three positions with a significant amount of diffuse emission, not attributable to any galaxy. It is possible – though not certain – that two of these galaxies have "fallen in" to the cluster and caused this diffuse emission; **if proved, this would be the first such instance recorded in radio astronomy**.

The proposed radio telescope at IIT Indore would observe this and other clusters like it in greater detail and with more sensitivity.

Analysis and imaging by P.K. Sandhu and S.S. Malu; observations by S.S. Malu. This cluster was first observed in the Radio by S.S. Malu and R. Kale.

Figure 2 is a 3x3 million light year 18 GHz radio image of a part of the galaxy cluster Abell 521 in the southern sky, observed from the Australia Telescope Compact Array. The image shows diffuse emission in the cluster, as a result of a known collision between two clusters. It has been claimed in literature that a sharp cutoff should be present at frequencies below 10 GHz for diffuse emission, meaning that no diffuse emission should be visible above 10 GHz – implying that MHD turbulence in this and other cluster collisions is poorly understood.

Observations, analysis and imaging by S.S. Malu.

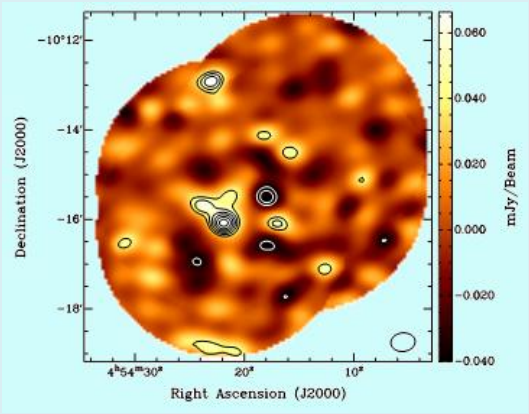


Figure 2

HEALTH CENTRE-IIT INDORE

Health is an important human resource. It is the very foundation of success in any sphere of life. Health centre –IIT Indore is established not just to treat patients but to provide preventive health care to IIT Indore community.

The centre provides dedicated health services to the institute community comprising of students and staff. All the students and a large number of the employees and their families are residing in Silver Springs campus.

Health Centre is located in E block, Student's hostel, Silver Springs campus.

Though small in relative terms, the centre is well equipped to offer outpatient care as well as day care in-patient treatment.

The centre provies primary health care to IIT students, staff members and their dependents, project assistants, research associates, temporary staff and Institute guests as and when required. It offers round the clock out patient, day care facility and the emergency care.

The main aim of the staff of health centre is to have state- of-the- art health facilities and provide excellent services to patients. For this, upgradation of clinical facilities is done on regular basis. Health Centre is open 24 X 7 to provide better out Patient and day care services. OPD Hours have been increased to provide better facility to patients in last one year. Specialist OPD Consultation facility is started for certain departments.
Health centre has provided OPD services to 7312 patients and managed 1825 trauma andemergency cases and 640 cases were admitted and kept under observation during the year 2013-2014.

The centre helps institute community to deal with stress and other related ailments. Institute has a dedicated counselling centre to help and support students for wide variety of concerns.

It providessample collection facility for investigation and aims at providing investigation facility in health centre itself in near future.

Ambulance services are available 24X7 and staff on duty accompanies critical Patients to empanelled Hospitals.

Screening and Health awareness camps: Lifestyle diseases are increasing globally. Diabetes Mellitus, Dyslipidaemia, Hypertension can be prevented or controlled in early stage. The disease if diagnosed in early stage will help the patient for future management and long term outcome. Hence, awareness of such diseases plays a significant role for long and healthy life. The centre organizes activities for screening of such diseases and carries out further evaluation and management. It also creates awareness about infective disease like Hepatitis A, Cholera, Typhoid, and Malaria etc. and provides guidelines for lifestyle modification for prevention and control of these diseases.

Health Centre organizes lecture sessions to increase awareness about healthy lifestyle. It also organizes blood donation camp with Avana Group every year.

ACHIEVEMENTS (2013-2014)

1. Registration of Health Centre done with State Medical Council.
2. Upgradation of clinical facilities
   a) Health Centre is open 24 X 7 to provide better Out Patient and day care services.
   b) OPD Hours have been increased to provide better facility to the Patients.
   c) Started Specialist OPD Consultation for Obs-Gynaecology cases.
   d) Provide OPD services to 7312 Patients and managed 1825 Trauma & Emergency cases and 640 cases were admitted and kept under observation during this period.
   e) Started Sample collection facility for Investigation.
   f) Electronic Medicine Record.
3. Ambulance services are available 24X7 and staff on duty accompanies critical Patients to empanelled Hospitals.
4. Arranged two successful Screening camps :-
   a) Diabetes Screening Camp.
   b) Screening camp for Hypertension and Dyslipidaemia.
5. Organized Lecture sessions to increase awareness about Healthy lifestyle.
6. Organized Blood Donation Camp with Avana Group.

Health Centre IIT Indore provides dedicated service to students and employees of IIT Indore.
It is located at 301, E-Block, Silver Springs Hostel.
The Health Centre is open 24 X 7. For Year 2013-2014, the data of patients is as follows:-

S.No	Out Patient Cases	Trauma and Emergency Cases	Under Observation Cases
1.	7312	1825	640

Research and Development

IIT Indore envisages the process of convergence of disciplines as the key to accomplish the previously unimaginable. With this vision, IIT Indore has been promoting multi-disciplinary research to solve fundamental and applied research problems.

Despite the absence of a permanent campus and facing the challenge of operating from three different campuses which are at a distance of 20 km from each other, IIT Indore has performed exceptionally well in maintaining a very active intra and inter-disciplinary research program, focusing on basic as well as applied research, technology development and innovation. Salient achievements of the institute's research and development work are outlined below.

(i) Sponsored Research Projects:

Over the last academic year, IIT Indore has secured 14 externally funded sponsored research projects, focusing on pure and applied research problems, from various government agencies. The research funding from these projects is projected to be around Rs. 3.8 Crore.

(ii) Publications:

The high level of research output from the institute is clearly evident in terms of quality journal and conference publications in core and interdisciplinary research areas. In the academic year 2013-14, research output from the institute in terms of the number of publications in International Journals, and Conferences were 135 and 120, respectively.

(iii) International Projects:

IIT Indore is actively engaged in research at international platform. Apart from the ongoing international research projects such as A Large Ion Collider Experiment (ALICE) at CERN, Gevena, Switzerland, and AntiProton ANnihilation at DArmstadt (PANDA) Project, Germany, IIT Indore is involved in the Indo-Russian project dedicated to crystal engineering and controlled self assembly of multicomponent crystals of element and metal organic compounds by using secondary interactions as a tool for preparation of materials with desired structure and useful physical properties. Successful solution of crystal engineering tasks mostly dependent on identifying appropriate intermolecular interactions which are optimal in direction and energy. The task becomes even more complicated as instead of simply building a crystal packing picture, the target is to fabricate a desired supramolecular arrangement which influences the actual physical properties at the micro level.

(iv) Entrepreneurship Cell:

Since inception in 2013, the Student Entrepreneurship Support Cell (SESC) at IIT Indore has been involved in several activities and workshops to promote innovation and entrepreneurial spirit amongst students. SESC has been proactive in organising awareness, events and encouraging students towards entrepreneurship. The Cell has conducted over 50+ events and workshops in six months since inception, and have achieved 2nd position at National Entrepreneurship Challenge organised by IIT-Bombay in Feb, 2014 and Best Debutant Award in E-Week in March 2014, organised by National Entrepreneurship Network. First campus-company has also been formed under this Cell in February 2014, and the Cell's achievements and activities has been covered in various national, local newspapers and online media. IIT Indore has recently been awarded funding from DST to setup Innovation and Entrepreneurship Development Centre at IIT Indore.

(v) Interaction with Military at MCTE, Mhow:

After setting up of a special programme for the officers from Military College of Telecommunication Engineering (MCTE), Mhow, to pursue research leading to PhD in project of mutual interest, IIT Indore has further consolidated its interaction and engagement with MCTE by signing a Memorandum of Understanding (MoU) with MCTE, Mhow, for providing a tactical radio on local area network (LAN) using

Software Defined Radio (SDR) for future network of the Army under the aegis of Army Technology Board (ATB). The features of the project include:

- Physical establishment of prototype facility in terms of servers, transceiver, antenna and DSP boards
- Demonstration of prototype to the Army
- Archiving and analysis of all parts of prototype to act as a knowledge base for future reference in the Army
- Functionality of future expansion in terms of supporting new equipment/ technologies/ protocols that come up in the future to be provided

(v) Promotion of Research / Innovation for Undergraduate Students (PRIUS):

To promote and support research and innovation for undergraduate students the new scheme entitled "Promotion of Research/Innovation for Undergraduate Students (PRIUS)" has been started at IIT Indore. This scheme is introduced for supporting undergraduate students in the research laboratories at IIT Indore, for international collaborative research projects and encouraging projects leading to innovation by undergraduate students. The undergraduate projects, of minimum 6 months duration, are expected not to come in the way of the students regular academic obligations. Initial grants from PRIUS scheme has been given to the undergraduate students.

(vi) Engagement with Research Institutes/Organizations in France:

In line with the vision of fostering long term strategic research partnerships with organizations abroad, IIT Indore actively participated in the Indo-French Technology Summit 2013 which took place on October 23-24, 2013 in New Delhi, at the invitation of the CII and the Department of Science and Technology, which chose France as their partner country for the 2013 edition of the Summit.

The Summit showcased the best in state-of-the-art French and Indian technology from all sectors. By bringing together the expertise and know-how under one banner at this Summit, an opportunity was created to forge close collaborations on key technologies. MoUs were signed between IIT Indore and French Universities/Organizations. The most noticeable being the engagement with INSTITUT Mines -Télécom (IMT), France, which has been fruitful in terms of student exchanges and collaborative research work. Four of undergraduate students from IIT Indore were successful in securing admission in the Diplome d'Ingenieur (equivalent to M.Tech.) programme at IMT France after going through a rigorous selection process.

As a process of consolidating the relationship with French institutes, IIT Indore will be hosting students from Institut Français de Mécanique Avancée, Clermont, France, as part of student exchange programme.

IIT Indore delegation interacting with Shri S. Jaipal Reddy, Hon'ble Minister for Science and Technology and Earth Sciences, and H.E. Mr. François Richier, Ambassador of France to India.

IIT Indore student delegation at the Indo-French Technology Summit.

(vii) IIT Indore Radio Telescope Inauguration:

Astronomical research, contrary to popular belief, has wide-ranging applications – in telecommunications, remote sensing, medical imaging as well as national security. These are reasons enough to pursue astronomical research in our country, which is in need of technological development in all of these areas. The Astrophysics Centre, an interdisciplinary research group involving Physicists, Electrical, Mechanical and Instrumentation Engineers at IIT Indore proposes to fill this huge gap in Indian technology – one that is widening in the absence of a significant experimental program by forming a Centre of Excellence that aims to lead major experimental projects in astrophysics through technological innovation.

On September 6, 2013, Dr. Shashi Tharoor, Minister of State for Human Resource Development, Government of India, inaugurated the first radio telescope of IIT Indore. Among those present were the Guest of Honour, Prof. Avinash Deshpande, a Bhatnagar awardee in Astrophysics, Lt. Gen. Rajesh Pant from Military College of Telecommunication Engineering (MCTE), Mhow, Indore. This radio telescope receives signals in the 10-13 GHz range and is operated entirely by students.

The Astrophysics Centre aims to work towards establishing a millimeter-wave observatory in the Himalayas – at Han Le, the site of a current small experimental setup for radio and optical astronomy. The observatory will start out as a test–bed and then a Pathfinder at 100 GHz for the CMBPol satellite mission, and will then expand to a mm-wave observatory in its last phase, intended for
(i) Interferomtric observations of the Sunyaev–Zel'dovich Effect at 100, 150, 330 and 450 GHz,
(ii) Probing the "Dark Ages", i.e. emission from the first structures in the universe, and
(iii) Probing the interstellar and intergalactic media (ISM & IGM) mm–wave technology has a wide range of possible applications, from defence to short–range communications.

Most of the work towards the Astrophysics facility, has been done by undergraduate B.Tech. students of IIT Indore. As a result of their perseverance and hard work, the planned inauguration was moved ahead from July 2014 to September 2013. This radio telescope receives signals in the 10-13 GHz range and is operated entirely by students.

Inauguration of Radio Telescope facility at IIT Indore.

(viii) Sophisticated Instrumentation Centre:

The Sophisticated Instrumentation Centre (SIC) at IIT Indore established in September 2011 and equipped with advanced facilities such as: Single Crystal X-ray Diffraction, Nuclear Magnetic Resonance, Mass Spectrometry, Atomic Force Microscopy (AFM), Field Emission Scanning Electron Microscopy (FESEM), Elemental Analysis, Single Molecule Imaging and other characterization facilities, has been providing the very highest quality of characterization facilities to academic and industrial organizations. SIC is being developed as a Centre of Excellence in central India that caters to specific technical requirements of several academic and industrial organizations across Madhya Pradesh and neighbouring states.

(ix) Awards and Recognition:

Following faculty members and students of IIT Indore have been recognized for their exceptional work in their respective discipline.

(i) Dr. M. Anbarasu, Electrical Engineering Discipline, received DAE Young Scientist Research Award.
(ii) Dr. Ankhi Roy, Physics Discipline, was awarded Indo-US Research Fellowship for the year 2013 for conducting advanced research in the area of Physical Sciences for the duration of three months at Old Dominion University, USA.
(iii) Dr. Kapil Ahuja, Computer Science and Engineering Discipline, was awarded DAAD Scholarship under the IIT-TU9 Faculty Exchange Program.
(iv)Dr. Rajneesh Misra, Chemistry Discipline, was awarded INSA Young Scientist Medal in recognition of his outstanding contributions in Chemistry.
(v) Team of Electrical Engineering undergraduate students consisting of Mr. Pragalbh Garg and Mr. Pranjalya Singh won the 1st Mobile Iris Liveness Detection Competition, MoblLive 2014 held during 29 September - 2 October 2014, Clearwater, Florida, USA.
(vi) Mr. Chandrabhan Kushwah, PhD student in Electrical Engineering, received 2014 IBM Ph.D. Fellowship Award.
(vii) Mr. Pooran Singh, PhD student in Electrical Engineering, received Fulbright-Nehru Doctoral Research Fellowship.

(x) Workshops and Conferences Organized at IIT Indore:

To facilitate greater interaction amongst scientists and researchers, and encourage inter-disciplinary research, IIT Indore has organized several national/international workshops and conferences. The conferences organized by IIT Indore are:

(i) 8th Conference on Non-linear Systems and Dynamics (CNSD), December 11-14, 2013.

(ii) 2nd International Conference on Intelligent Robotics, Automation and Manufacturing (IRAM), December 16-18, 2013.
(iii) 1st Multidisciplinary International Conference on Humanities and Social Sciences, December 20-21, 2013.
(iv) International Symposium on Complex Analysis and Conformal Geometry (ISCACG), December 28-30, 2013.

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(v) Laboratory Health and Safety Workshop, April 04, 2014

(xii) Courses Organized at IIT Indore:

IIT Indore has organized several Continuing Education Programmes and Short Courses for working professionals to enable them to update their knowledge and skills, and also to train them in state-of-the-art technologies. Some of these courses organized at IIT Indore are:

(i) Modern Spectroscopic Techniques, July 6-7, 2013
(ii) Introduction to Research, July 6-7, 2013
(iii) Introduction to Mechatronics and Robotics, July 15-19, 2013
(iv) Nanoscience and Nanotechnology: From Concepts to applications, October 17-19, 2013
(v) SERB School on Combustion Modelling and Diagnostics, October 7-11, 2013
(vi) Molecular Characterization Techniques, March 7-8, 2014
(vii) Bearing and Gear Fault Diagnosis, March 21-23, 2014
(viii) Applied Econometrics, May 12-14, 2014
(ix) Measurement Techniques in Thermal Engineering, May 30-31, 2014

(xiii) Foreign Delegations:

Delegations from several institutes/universities visited IIT Indore for discussions to forge and further strengthen student exchange and research collaboration.

(i) Prof. Vimal Chaitanya, Prof. Jeffery Arterburn, Prof. Charles Bradley Shuster, Prof. Satyajayant Misra and Prof. Stefan Zollner from New Mexico State University, USA
(ii) Prof. Dr. James Ritma, Dr. ElisabettaPrencipe, Dr. Frank Goldenbaum from Forschungszentrum,Juelich Germany
(iii) Prof. Peter Lindstedt from Imperial College London, UK
(iv) Prof. Professor Dr. Uwe Klemradt from RWTH Aachen Germany

MOU signed during 2013-2014

	Deakin University, Australia	Research activities, possible short-course programs and Joint Research Degress	06.03.2013	5 years
	INSTITUT Mines -Télécom, France	Academic and Scientific Collaboration	25.10.2013	5 years
	Kurnakov Institute of General and Inorganic Chemistry of the Russian Academy of Sciences (IGIC RAS), Russia	Academic		3 years (with automatic prolongation for the next one year)

IIT INDORE, SIMROL – A GLIMPSE INTO THE NEAR FUTURE


Professor C. N. R. Rao's visit to IIT Indore during Frontier Lecture Series in Chemistry


Central Workshop: Students in action with skilled supervision


Sophisticated Instrumentation Centre: Material Characterization in your grip


IIT Indore's vehicle and student team at BAJA2014



Important events at IIT Indore