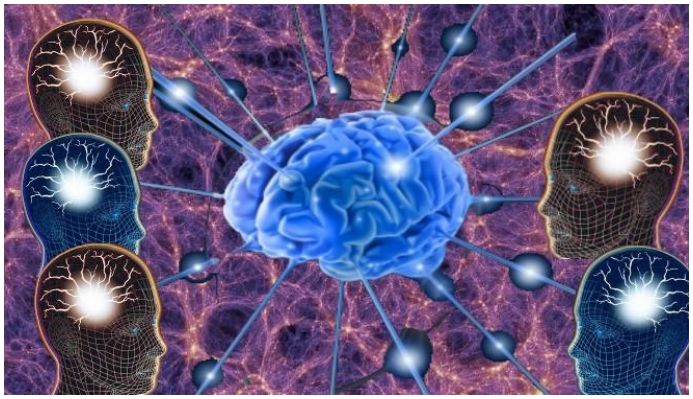
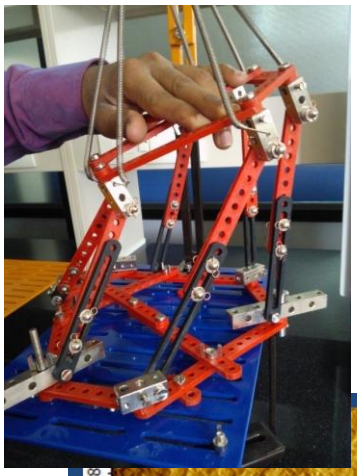
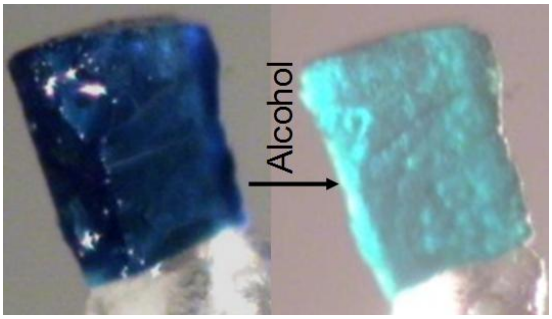
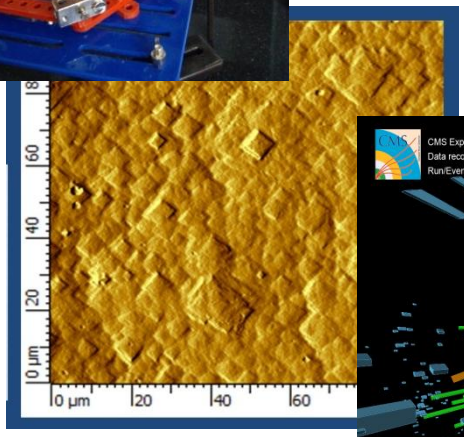
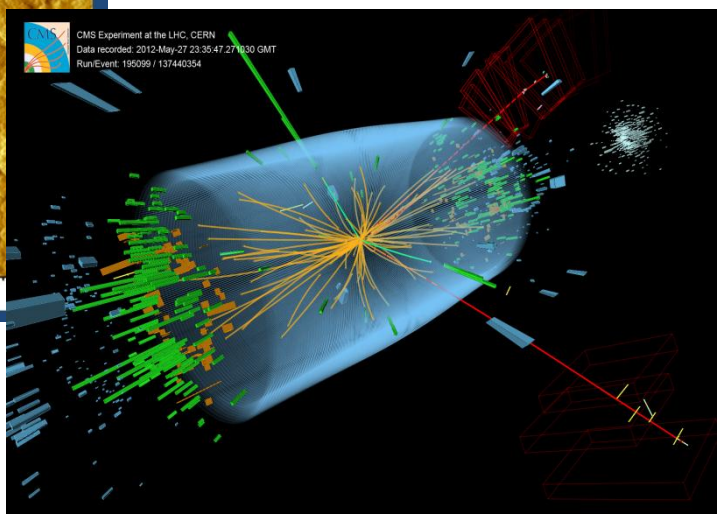


Indian Institute of Technology Indore
Annual Report - 2012-2013









Annual Report

2012-2013

Indian Institute of Technology Indore

Board of Governors:

Mr. Ajay Piramal
Chairman, Board of Governors

Prof. Pradeep Mathur
Director, IIT Indore

Mr. Som Mittal

Mr. Ashok Jaipuria

Dr. W. Selvamurthy

Mr. P. V. Deshmukh

Prof. P. N. Puntambekar

Prof. Suman Mukhopadhyay

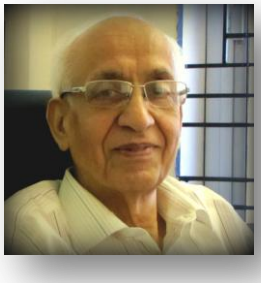
Mr. Ashok Thakur

Mrs. Ajita Bajpai Pande

CA. Vasundhara Laad
Registrar in-Charge, Secretary

Prof. Pradeep Mathur

Director, IIT Indore



Dean of Faculty Affairs

Prof. P. N. Puntambekar

Dean of Academic Affairs

Dr. N. K. Jain

Dean Research & Development

Dr. N. S. Chaudhari

Dean of Student Affairs

Dr. A. Vijesh

Dean of Planning

Dr. S. Mukhopadhyay

CONTENTS

Indian Institute of Technology Indore began its academic program in July 2009 with the first batch of 120 students. Today we have total student strength of nearly 670 which includes 170 PhD students.

IIT Indore places a heavy emphasis on its research programme and would like to be recognized by the label of a research cum teaching institute. The institute has introduced a curriculum which requires students to spend six to nine months of their final year working on projects and internships with academic or industrial exposure. The students are exposed to research projects within the institute and with collaborators abroad. With eighty faculty members and numerous sponsored research programmes, several state of the art research facilities have been created. Some of these facilities are being used extensively by external users, both from the academia and industry, within India and abroad. The 'Sophisticated Instrument Centre' at IIT Indore is such a landmark user facility which has gained reputation on characterization of materials. Recently, a radio telescope, first of its kind in India, working at 10 GHz frequency, has been 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.

With experience of observing, over several decades, the evolution of various teaching and research growth pathways in the older established IITs, the path set out in IIT Indore's vision is clear. There is tremendous excitement amongst all faculty and staff members that, indeed IIT Indore can be "different". The campus design has been adapted to an approach of bringing in revolutionary ethos, by Indian standards, in the living and working styles at the IIT Indore permanent campus. This would be reflected not only in the physical sense of integrating traditional departments into one large academic environment where students and faculty members from different specializations interact and exchange ideas and thoughts freely, but also in the research and teaching methodologies. Strong grasp of fundamentals coupled with approach leading to interdisciplinary research is recognized at IIT Indore to be an essential requirement for the fulfillment of the country's needs in the coming years. Biology as a core subject to be linked with other science and engineering disciplines has led to the formation of a Bio group at IIT Indore. There is tremendous scope in this rich area for growth and IIT Indore endeavors to expand in biosciences and biomedical engineering in developing a full-fledged Centre of Biomedical and Bioengineering Research, in collaboration with interested partners. IIT Indore also envisions a strong centre of materials

science and surface engineering and in the area of microelectronics and electrical engineering. A Bioscience and Bio-medical Engineering group, a Surface Science and Engineering group and an Astrophysics group have already been established and are functional at this moment.

IIT Indore joined the ALICE collaboration, a CERN experiment, in May 2013. The European Centre for Nuclear Research (CERN) is running the largest experiments in the world – the recently-discovered Higgs Boson is a testament to the continued success of CERN programs. Faculty members at IIT Indore are contributing a major role in the ALICE Experiment and also in the PANDA experiments, another fundamental particle probe, which aims to understand the nature of Quantum Chromodynamics – the theory of Strong Interactions.

It is no doubt that in the future several new areas of frontline research will gain attention of researchers. While IIT Indore recognizes to be a leader in all such developments, its overall vision to actively participate with leading industries in forming a, first of its kind in India, industry-academia linkage cannot be overestimated, because the institute recognizes that without a strong partnership with frontline industry, India would not be able to compete in a highly competitive international arena in the coming years.

The academic responsibility is being shared by three schools with faculty members from different disciplines within the institute:

School of (1) Engineering; (2) Sciences; (3) Humanities & Social Sciences

The School of Engineering is supported by three disciplines:

Discipline of (a) Electrical Engineering; (b) Mechanical Engineering; (c) Computer Science and Engineering

The School of Sciences is being nourished by three disciplines:

Discipline of (a) Physics; (b) Chemistry; (c) Mathematics

The School of Humanities and Social Sciences has four disciplines:

Discipline of (a) Economics, (b) English, (c) Sociology, (d) Philosophy, Psychological Sciences

IIT Indore is spreading its existence in the social sphere through its outreach programme led entirely by a students' group named AVANA which includes education and social welfare packages offered free of cost to local schools and villagers.

Prof. Pradeep Mathur,

Director, IIT Indore

To explore, search and select gems from the sea of intellectuals is an extremely difficult and strenuous task. In our quest for excellence we have taken this arduous task and the responsibility and have been successful in discovering and collecting around ninety such gems as faculty members for our institute.

Their successful performances and achievements in terms of their publications, projects and project funding and other academic and administrative activities have vindicated our efforts and is an encouragement to us. During the last year we have recruited twelve new faculty members in various disciplines and hope to have similar performances and outputs from them.

Prof. P.N. Puntambekar

Dean, Faculty Affairs

The Academic Year 2012-13 is very significant in terms of IIT Indore achieving academic milestones. 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 and 97 out of 101 graduating students received their degrees in person. Another achievement was the 90% of the pioneering batch students received placement in academia or industries. Some students have joined reputed universities, institutes for their higher studies such as University of Illinois, Purdue University, IIM Kolkata, IIM Kozhikode and IIM Indore. Three students have joined IIT Indore for pursuing their PhD. Another significant achievement was to start PG program from July 2013. These PG programs included (a) 2 year MSc program and M.Sc + PhD dual degree program in Chemistry and Physics, (b) M.Tech and M.Tech + PhD dual degree program with specialization in Communications and Signal Processing in the Electrical Engineering Discipline and (c) M.Tech and M.Tech + PhD dual degree program with specialization in Production and Industrial Engineering in the discipline of Mechanical Engineering. It was also decided to open PhD admission for the Military Service Personnel from July 2013 to increase academic collaboration between IIT Indore and the other research organizations. The academic year 2012-13 also witnessed the number of PhD students registered at IIT Indore reaching 170. Another milestone achieved towards the end of AY 2012-13 was the submission of three PhD theses in the engineering discipline. I hope that we continue the academic progress to increase exponentially in the coming years.

Dr. Neelesh Kumar Jain

Dean, Academic Affairs

IIT Indore aims to play an active role in propelling India in its growth trajectory through innovative inter–disciplinary research and educational programs at undergraduate and postgraduate levels. In line with the above ethos, 30 externally funded sponsored research projects have been sanctioned in the last year. These projects form the basis of research work of our post-graduate students.

At IIT Indore, research infrastructure forms a core component of the under graduate student project. This is reflected in several inter-disciplinary student projects taken up by the students. These include in-house development of an all purpose terrain climbing vehicle by a group of under-graduate students and processing of line emissions, obtained through the first Radio Telescope installed at IIT Indore, from variety of astronomical sources: radio galaxy clusters and accretion disc around super masses of black holes. Keeping the multi-disciplinary spirit of work and integrated approach to problem solving, the Central Workshop at IIT Indore played a key role in the fabricating several key parts of Radio Telescope installed at the institute. The Sophisticated Instrumentation Centre at IIT Indore is serving several academic and industrial organizations within Indian and abroad. The state-of-the-art research infrastructure at IIT Indore has contributed to over 200 research papers in reputed international journals/conferences. IIT Indore is also actively involved in major international projects: A Large Ion Collider Experiment (ALICE) at CERN, Geneva, Switzerland, and Anti Proton Annihilation at Darmstadt (PANDA) at Darmstadt, Germany. IIT Indore has organized several workshops, conferences and short courses for the local industry and academic institutes. I am sure that in the coming years IIT Indore will develop into a world class centre for research and innovation.

Dr. Narendra S. Chaudhari

Dean, Research and

Development

The new campus development of IIT Indore at Simrol has been given the foremost priority along with the various academic and research activities of the institute. There is much good news to share on this front as several important developments have taken place in the recent past to actualize a campus which will provide a suitable environment to carry out the highest standard of academics and cutting-age research. Some of the important milestones which have been achieved in the last one year are the completion of the first phase of boundary wall construction, freezing of master plans and conceptual drawing and design of several academic and residential buildings, obtaining the phase II environmental clearance from Ministry of Environment and Forest, commissioning 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 at the main campus and conducting the 1st convocation of the institute at Simrol where the President of India graced the occasion as the Chief Guest.

I am also happy to inform that estate section is committed and dedicated to give full support to students, faculty and staff members of the institute by facilitating the development of infrastructures in the temporary campuses as per requirement.

I hope the project team and estate section will continue to contribute immensely in future for setting up an institute with the required world class infrastructure for it to be able to play a major role at national and international level in high quality academics and cutting-edge research.

Wishing you all the best,

Dr. Suman Mukhopadhyay

Dean, Planning

As Dean, Student Affairs, I would like to acclaim the efforts taken by the students of IIT Indore. They, under the umbrella of Student Gymkhana, have conducted many functions and events. One of them is the annual cultural fest, Fluxus which was a national success this year. It is a joint cultural and technological event, which includes marathon, robo soccer, UNO debate etc. Moreover, cultural events organized throughout the year such as crescendo, dandiya night, quizooka, code carnage have offered variegated colours, vibrancy and distinct identity to IIT community's culture. Our students have also participated and won laurels in many important competitions including technological ones like Baja car competition, ICPTC competition in Russia.

In a short span of time, tireless and disciplined efforts of our students are getting recognized in field of sports too and our performance and medal tally in Inter IIT sports and aquatics meet are getting better every year. These achievements, however modest, clearly show that our students with our Director's support are gaining a wholesome improvement in various skills honing their talents not only in academics but also in cultural, social, technological and sports arena. It is heartening to see that students working under the club AVANA have taken up various social causes like helping underprivileged and disadvantaged children and people. Such humane efforts bring us closer to local society and inculcate our sense of duty towards our social responsibilities.

I wish the students all the very best in their ensuing activities and the Institute would continue to extend its support.

Dr. Anthony Vijesh

Dean, Student Affairs

Discipline of Computer Science and Engineering:

The members of the Discipline of Computer Science & Engineering working on their respective projects published approximately 100 papers since 2011. There are at present two sanctioned running projects. We congratulate B.Tech students Anant Palliwal, Archit Karandhikar, Piyush Lahoti, Sanjeev Shenoy, Ashok Pancily, and Ph.D student Neetesh Saxena and Jaya Thomas for their achievements in various international and national events. We congratulate Dr. Monalisa Sarma for receiving the prestigious IBM SUR award. We congratulate Prof. N. S. Chaudhary for being appointed as the Director of VNIT Nagpur recently. We also congratulate him on becoming a fellow and being conferred the title of "Distinguished Engineer" by the Institute of Engineers (India).

The Discipline of Computer Science and Engineering is in the process of setting up a 'Cloud Computing' lab which would be a microcosm of a large cloud infrastructure. This would facilitate its effective usage for research purposes with minimal maintenance.

The Discipline was instrumental in the induction of IIT Indore as a partner in the Garuda Grid Computing Initiative (which connects high performance computing clusters around the country) of C-DAC. This enables a user at the institute to run computationally, data, and/or memory intensive applications with ease over the Garuda infrastructure.

The discipline of Computer Science and Engineering at IIT Indore is rapidly progressing towards becoming a world class set up catering to the huge demand around the world for quality education in computer science. The discipline currently offers a degree program in Bachelor of Technology, the first batch of which is slated to graduate in 2013; and a Ph.D. program that has a current enrolment of 20 students.

- Neetesh Saxena, Ph.D. student received the Tata Consultancy Services (TCS) Fellowship Award for his research at IIT Indore (March, 2012)
- Anant Paliwal (CSE, final year) designed a low cost teaching aid as part of his final year B.Tech project which can be used to represent three dimensional structures on a two dimensional plane. His project went on to win the 'Best B.Tech Project' award of the graduating class of 2013
- Archit Karandhikar, Piyush Lahoti, and Sanjeev Shenoy (all CSE 3rd year students) represented IIT Indore at the ACM ICPC (International Collegiate Programming Contest) World Finals. IIT Indore was one of only five teams from India to qualify for the world finals. The team stood second amongst teams from India
- Ashok Pancily (CSE, 3rd year) represented IIT Indore in the 2nd Indian Student Parliament in January 2012 at MIT, Pune and was one among the 18 Student Leader Speakers selected from about 8000 student leaders of 6000 colleges all over India
- Ashok Pancily was selected as Google Student Ambassador (GSA) for Year 2012-2013: one among 1000 GSAs from 65 countries
- Jaya Thomas, Ph.D. student received an award by the Indo-U.S. Symposium on Women in Engineering. The award includes: *Travel Grant, hospitality, and complimentary Registration* for the event: Indo-U.S. Symposium on Women in Engineering entitled '*Women Engineers Leading Global Innovation*' (29-31 Aug. 2012)
- There is a strong thrust towards imparting practical knowledge to students in addition to sound theoretical concepts. To this end, several novel initiatives are being taken in the discipline. To name a few:
- As part of one of the courses in the discipline, students are made to work on very simple 'real' projects. These projects are usually from within the institute. While working on these projects students are made to go through protocols that are identical to those in the industry. This makes the students appreciate the finer points of the process and the institute benefits from the good quality software developed.
- The discipline is contemplating an 'integrated theory and lab system' for the programming courses. In such a system, the instructor would teach a programming concept and immediately follow it up with a practical problem that the student would work on his/her computer. This would help to properly cement the concept in the students' mind.

FACULTY MEMBERS

Dr. Abhishek Srivastava
Assistant Professor
Computer Science & Engineering
HOD CSE
asrivastava@iiti.ac.in

(PhD: University of Alberta, Canada; Assistant Professor, Rose-Hulman Institute of Technology, USA)

Abhishek is the Head of the Discipline of Computer Science and Engineering.

Abhishek's research is in the area of service-oriented systems. More specifically his group is working towards developing novel techniques of service composition in dynamic environments. They are also exploring means to effectively host web services using mobile devices in a purely peer-to-peer manner.

Research Interest:

- Service-Oriented Systems
- Agile Methodologies
- Mobile Web-Services
- Geographically Distributed Development Environments

Achievements:
Invited Talks: 1
Presentation in conferences: 2
Publication: 1

Dr. Kapil Ahuja
Assistant Professor
Computer Science & Engineering
kahuja@iiti.ac.in

(PhD: Virginia Tech, USA; Postdoctoral Research Fellow: Max Planck Institute, Germany)

Dr Kapil Ahuja works on applying mathematics and computation to solve science and engineering problems. Specifically, his research focuses on efficiently solving linear as well as nonlinear systems of equations. Examples where such systems arise include: the study of crack propagation in an airplane wing; finding optimal material distribution in a domain using topology optimization; predicting the path of a hurricane using model reduction; and the study of electronic structure and properties of materials using quantum Monte Carlo (QMC), etc.

Research Interest:

- Advanced linear solvers.
- Krylov subspace methods with recycling.
- Preconditioning methods.
- Model reduction.
- Uncertainty quantification.
- Quantum Monte Carlo methods.
- Homotopy methods.
- Information retrieval.

Achievements:
Technical Report Submitted: 1 (Max Planck Institute)
Funding Proposals Submitted: 1 (CSIR)
Presentation in Conferences: 2
Reviewer for Journal Paper: 2 (SIAM and Springer)

Dr. Narendra Chaudhari
Professor
Computer Science and Technology
nsc@iiti.ac.in

(PhD: Indian Institute of Technology, Bombay (IITB), India; M.Tech. (CSE), B.Tech. (EE) (Distinction) IIT Bombay; Associate Professor: Nanyang Technological University (NTU), Singapore; Visiting Professor: Freie Universitat, Berlin, Germany; Visiting Researcher: Nagoya Institute of Technology, Nagoya, Japan)

Dr. N. S. Chaudhari has done significant research work in game AI, novel neural network models like binary neural nets and bidirectional nets, context free grammar parsing, and graph isomorphism problem. He has industry experience in the areas of Electronic Controls in Larson and Toubro (L&T) Ltd, Powai, Mumbai as well as Tata Consultancy Services (TCS), Mumbai. Since 1988 to 1998, he has coordinated graduate level training for Defense Scientists in Defense Research and Development Organization (DRDO), Govt. of India. He has supervised more than 20 doctoral students and more than 80 Master's students. He has delivered invited talks and presented his research results in several countries like America, Australia, Canada, Germany, Hungary, Japan, United Kingdom, etc. He has more than 260 publications in top quality international conferences and journals. Research Interests: Algorithms, Game AI, Computational Learning and Soft Computing

Achievements:
Fellow – Institution of Engineers (IE) India (Kolkata)
Fellow - Institution of Electronics and Telecom Engineers (IETE) India (Delhi)
Presentation in conferences: 120
Publications: 80
Funding: DST, AICTE, UGC (India), A-STAR (Singapore), ST-Eng. (Singapore)

Dr. Somnath Dey
Assistant Professor
Computer Science and Engineering
somnathd@iiti.ac.in

(PhD: Indian Institute of Technology Kharagpur)

Dr. Somnath Dey works on biometric security. He investigates biometric data indexing techniques for different biometric traits. He proposes novel techniques for iris, fingerprint, face and multimodal traits.

Research Interest:

- Biometric data indexing.
- Quality enhancement of biometric data.
- Cancelable biometric template generation.
- Biometric template security.
- UX design.
- HCI.

Achievements:
Awards: 1
Presentation in conferences: 7
Publications: 7

Dr. Surya Prakash
Assistant Professor
Computer Science and Engineering
surya@iiti.ac.in

(PhD: IIT Kanpur; Lecturer: Harcourt Butler Technological Institute Kanpur)

Dr. Surya Prakash is currently working on the development of efficient techniques for human recognition using face and ear biometrics. He is also involved in development of efficient techniques for indexing of large biometric databases to make search and identification process fast.

Research Interest:

- Biometric security
- Pattern Recognition
- Computer Vision
- Image Processing

Publication:1

Dr. Anirban Sengupta
Assistant Professor
Computer Science & Engineering
asengupt@iiti.ac.in

(PhD: Ryerson University, Canada; Visiting Research Scholar: IISc Bangalore; Researcher at OPR Lab and Member/Inventor of Technology Team with MaRS Innovation)

Dr. Anirban Sengupta works on design automation and architectural synthesis of digital systems. He develops stochastic and nature inspired exploration algorithms for performance-power optimization during architectural synthesis of data intensive circuits.

Research Interest:

- Architectural Synthesis of Data Paths
- High Level Synthesis/Electronic system level synthesis of Data Flow Graphs (Data crunching applications)
- Application Specific Processor Design from ESL TO RTL
- Evolutionary approaches for custom architecture design
- Heuristic and Deterministic Exploration Methodologies

Achievements:
Total Publications: 38 (Year 2012-13: 7, Before 2012-13: 31)
Patents: 4 (Granted: 1, Published: 1, Pending: 2)
Conference Papers: 24
Publications: 10 (Published: 8, Revision: 2)
Funding: DST (Applied)

Dr. Aruna Tiwari
Assistant Professor
Computer Science & Engineering
artiwari@iiti.ac.in

(PhD:RGPV Bhopal; Associate Professor:Shri Govindaram Sakseria Institute Of Technology & Science, Indore)
Her research interests softcomputing models like higher order binary neural nets, hybrid neural nets, Genetic Programming, Support vector machine and datamining with different softcomputing models specially in classification domain, pattern recognition etc. and also with databases, She guided more than 25 Master's students. She is Senior member of Computer Society of India, Member of IEEE, and many other professional societies.

Research Interest:

- Softcomputing based classifiers
- Pattern recognition in softcomputing domain
- Design of a Semi-Supervised Neuro-fuzzy systems
- Ensemble Learning of Classifiers
- Optimization of softcomputing frameworks

Achievements:
Invited Talks: 1
Reviewed papers: 6
Publications: 2
Collaboration with other institute: 1

Publications: Computer Science and Engineering (2012-2013)

Journals :

1. A. Purohit, N. S. Chaudhari, and A. Tiwari, "Code Bloat Problem in Genetic Programming", International Journal of Scientific and Research Publications (IJSRP), Vol. 3, Issue 4, April 2013, ISSN: 2250-3153, pp. 1-5.
2. A. Purohit, N. S. Chaudhari and A. Tiwari, "A New Mutation Operator in Genetic Programming", ICTACT Journal on Soft Computing (IJSC), January 2013, Vol. 3, Issue:02, ISSN: 2229-6956 (Online), pp. 467-471.
3. A. Tiwari, P. Agrawal, "On Construction of Binary Higher Order Neural Networks and Realization of Boolean Functions", International Journal of Computer Applications & Information Technology, Vol. I, Issue II, September 2012 (ISSN: 2278-7720) pp 51.
4. A. Tiwari, V. Trivedi, "Estimating Similarity of XML Schemas using Path Similarity Measure", International Journal of Computer Applications & Information Technology (IJCAIT-ISSN :2278-7720) ,Vol. 1, No.1, July 2012, pp 34-37.
5. R. Verma, S. Ruj, A. Srivastava. Virtualization Security "The Present State and Future Trends. IEEE Security and Privacy Magazine", IEEE Computer Society, 2013 (in communication)

6. A. Sengupta, “System and Methodology for Development of System Architecture”, US patent granted by United Sates Patent and Trademark Office (USPTO), Application no. 12/974,925, 2013 (co-inventor: Reza Sedaghat).
7. A. Sengupta, “Rapid Self Correction Scheme based Multi Criterion Exploration of Performance-Area Tradeoff using Fuzzy Membership Search in High Level Synthesis for Data Intensive Applications”, Elsevier Journal on Swarm and Evolutionary Computation, Minor Revision, 2013.
8. M. Sharma, S. Prakash, P. Gupta, “An Efficient Partial Occluded Face Recognition System”, Neurocomputing, 116, pp. 231-241, Elsevier, 2013.
9. J. Umarani, S. Prakash, P. Gupta, “Use of Geometric Features of Principal Components for Indexing Biometric Databases”, Mathematical and Computer Modelling, 58(1-2), pp. 147-164, Elsevier, 2013.
10. S. Prakash and P. Gupta, “A Rotation and Scale Invariant Technique for Ear Detection in 3D”, Pattern Recognition Letters, 33(14), pp. 1924-1931, Elsevier, 2012.
11. S. Prakash and P. Gupta, “An Efficient Ear Localization Technique, Image and Vision Computing”, 30(1), pp. 38-50, Elsevier, 2012.
12. J. Umarani, S. Prakash and P. Gupta, “An Efficient Color and Texture Based Iris Image Retrieval Technique”, Expert Systems With Applications, 39(5), pp. 4915-4926, Elsevier, 2012.
13. S. Dey and D. Samanta, “Iris Data Indexing Method Using Gabor Energy Features”, IEEE Transactions on Information Forensics and Security Vol-7, No-4, pp. 1192-1203, 2012.
14. A. Purohit, N. S. Chaudhari, and A. Tiwari, “Code Bload Problem in Genetic Programming”, International Journal of Scientific and Research Publications (IJSRP), Vol. 3, No. 4 (April, 2013) (ISSN: 2250-3153) pp. 1-5.
15. R. Hablani, N. S. Chaudhari and S. Tanwani, “Recognition of Facial Expressions using Local Binary Patterns of Important Facial Parts,” International Journal of Image Processing (IJIP) Volume 7, No. 2 (CSC Press, Computer Science Journals, Kuala Lumpur, Malaysia) 2013.
16. A. Purohit, N. S. Chaudhari and A. Tiwari, “A New Mutation Operator in Genetic Programming,” ICTACT Journal on soft Computing, January 2013, Volume-3, Issue-2, pp. 467-471.
17. S. Bhilare and N. S. Chaudhari, “Interference Reduction in Images from Multiple Structured Light Depth Cameras,” Journal of IMS Group, (IMS, Ghaziabad, U.P., India), Vol. 9, No. 1, (July-Dec 2012) pp. 01-05
18. R. S. Bhosle, A. R. Panhalkar, V. S. Phad, N. S. Chaudhari, “Enhanced Speech Recognition Using ADAG SVM Approach,” International Journal of Emerging Trends & Technology in Computer Science (IJETTCS) Vol. 1, Issue 4, (ISSN 2278-6856), (Nov-Dec. 2012) pp. 106-110.

19. R. K. Singh, N. S. Chaudhari, K. Saxena, “Load Balancing in IP/MPLS Networks: A Survey" Communications and Network (CN) (Scientific Research Publishing, SCIRP: http://www.scirp.org), Vol.04 No.02, (DOI: 10.4236/cn.2012.42020) pp. 151-156 (2012).
20. R. K. Sahu and N. S. Chaudhari, “Efficient Techniques to Detect the Various Attacks in Ad-Hoc Network,” International Journal of Electronics and Computer Science Engineering, available at www.ijecse.org, Sept. 2012, Vol 1, No. 1, pp 2362-2467.
21. R. K. Sahu and N. S. Chaudhari, “Analysis and Security measures of Malware in Mobile device,” International Journal of Electronics and Computer Science Engineering, available at www.ijecse.org, Sept. 2012, Vol 1, No. 1, pp 2424-2431.
22. A. Jain, and N. S. Chaudhari, “Genetic Algorithm based Concept Design to Optimize Network Load Balance,” ICTACT Journal on Soft Computing (An International Publication of ICT Academy of Tamil Nadu, India), July 2012, Volume: 02, Issue: 04, pp. 357-360.

Conference Papers:

1. A. Bhardwaj, A. Tiwari, “Performance Improvement in Genetic Programming using Modified Crossover and Node Mutation”, Genetic and Evolutionary Computation Conference 2013, Amsterdam, The Netherland, July 6-10, 2013. The conference is a recombination of the 22nd International Conference on Genetic Algorithms (ICGA) and the 18th Annual Genetic Programming Conference (GP). (Accepted)
2. A. Bhardwaj, A. Tiwari, “A Novel Genetic Programming Based Classifier Design Using a New Constructive Crossover Operator with a Local Search Technique”, in Ninth International conference on Intelligent computing (ICIC)2013,Nanning, China, July 28-31,2013, LNCS 7995, pp. 86–95. (Accepted)
3. A. Tiwari, S. Bhandari, “Design and Implementation of Binary Neural Network Learning with Fuzzy Clustering”, International Workshop on Information Technology, Control & Automation (ITCA-12), July14-15, Chennai.
4. A. Tiwari, M. Dawar, “Fast Fuzzy Feature Clustering For Text Classification”, International conference on Advanced Computer Science and Information Technology (ACSIT-12), July 14-15, Chennai.
5. T. Ahmed, A. Srivastava. “Minimizing waiting-time for service compositions: a frictional approach”. In Proceedings of the 11th IEEE International Conference on Web-Services, Santa Clara, California, June 27 -30, 2013
6. R. Verma, S. Ruj, A. Srivastava. “Security Verification using Crowd Sourcing”. In Proceedings of the Security and Privacy Symposium, IIT Kanpur, Kanpur. February 28-March 2, 2013

7. R. Rathore, S. Prakash, P. Gupta," Efficient Human Recognition System using Ear and Profile Face", IEEE International Conference on Biometrics: Theory, Applications and Systems (IEEE BTAS 2013), Washington, DC,USA.

8. S. Prakash, P. Gupta, "An Efficient Technique for Ear Detection in 3D: Invariant to Rotation and Scale", IAPR/IEEE International Conference on Biometrics (ICB 2012), New Delhi, March-April 2012.

9. D. Samanta, S. Ghosh, S. Dey, S. Sarcar, M. K. Sharma, P. K. Saha, S. Maiti, "Development of multimodal user interfaces to Internet for common people", 4th International Conference on Intelligent Human Computer Interaction (IHCI), IEEE Xplorer, pp. 1-8, Dec. 2012 , Kharagpur.

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12. N. Saxena, N. S. Chaudhari, "NPA: Protocol for Secure Communications in GSM Cellular Network," In, Proceedings, The 10th Annual IEEE Consumer Communications & Networking Conference (CCNC-2013), Wireless Communication Track, Las Vagas, Navada USA, 11th – 14th January 2013, pp. 393-398.

13. J. Thomas, N. S. Chaudhari, "Genetic Based Bounded Knapsack for Column Generation in 1-D Cutting Stock Problem," In, Proceedings, 2012 Third International Conference on Emerging Applications of Information Technology (EAIT 2012), (Proceedings included in IEEE Explorer), Indian Statistical Institute, Kolkata (November 30 - December 01, 2012).

14. A. Jain, N. S. Chaudhari, "Genetic Algorithm for Optimizing Network Load Balance in MPLS Network," In, Proceedings, IEEE International Conference on Computational Intelligence and Communication Networks (CICN-2012), GLS University, Mathura (Nov. 03-05, 2012).

15. R. K. Singh, N. S. Chaudhari, and K. Saxena, "Integrated Load Balancing Approach for Fault Tolerance in MPLS Networks," IEEE International Conference on Computational Intelligence and Communication Networks (CICN-2012), GLS University, Mathura (Nov. 03-05, 2012).

16. R. K. Sahu and N. S. Chaudhari, "Fault Tolerant Reliable Multipath Routing Protocol for Ad hoc Network," IEEE International Conference on Computational Intelligence and Communication Networks (CICN-2012), GLS University, Mathura. Proceedings pp 117-121 (Nov. 03-05, 2012).

17. P. Sharma, N. S. Chaudhari, "Phase Transition in Reduction between 3-SAT and Graph Colorability for Channel Assignment in Cellular Network," IEEE International Conference on Computational Intelligence and Communication Networks (CICN-2012), GLS University, Mathura (Nov. 03-05, 2012).

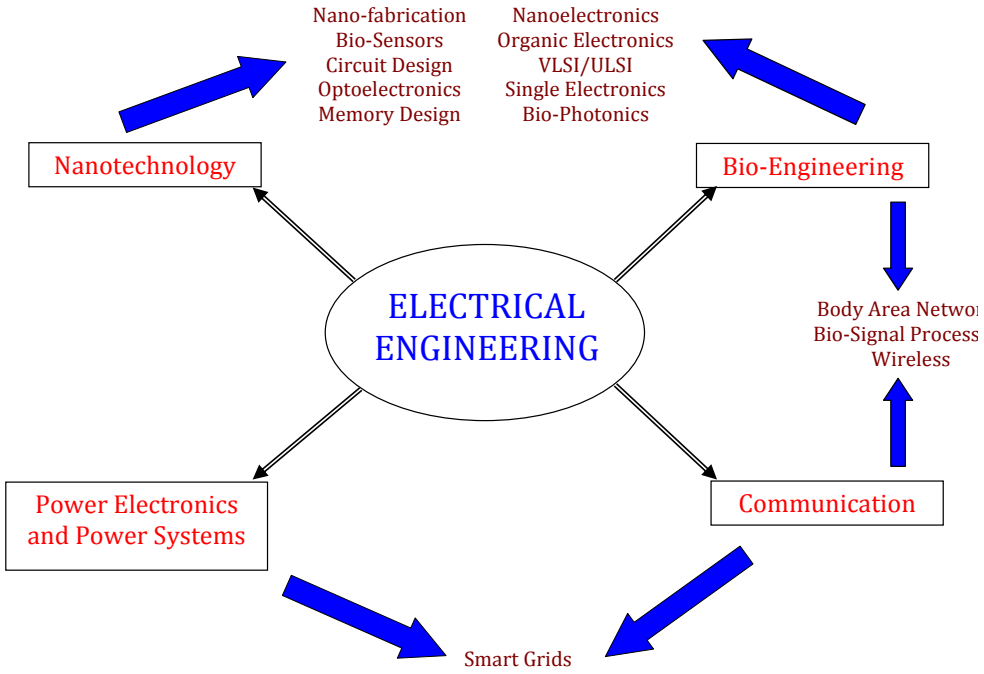
18. R. Sahu, N. S. Chaudhari, "Performance Evaluation of Ad hoc Network Under Black hole Attack," In, Proceedings, 2nd World Congress on Information and Communication Technologies, Trivendrum, Kerala, Proceedings pp 780-784 (Oct. 30-Nov. 02, 2012).
19. R. K. Singh, N. S. Chaudhari, K. Saxena, "Enhancing Fault Tolerance and Rerouting Strategies in MPLS Networks," IEEE International Conference on Wireless & Optical Communication Networks (WOCN-2012) Indore, Proceedings pp 1-3 (20th - 22nd of Sept, 2012).
20. R. K Sahu, N. S. Chaudhari, "A Performance Analysis of Network under SYN-Flooding Attack," IEEE International Conference on Wireless & Optical Communication Networks (WOCN-2012) INDORE, INDIA (20th - 22nd of Sept, 2012).
21. J. Thomas , N. S. Chaudhari, "An Analytical Approach for Column Generation for One-Dimensional Cutting Stock Problem", In, CUBE 2012: International Information Technology Conference & Exhibition: IT – Engineering – Management - Telecom : India's largest and most comprehensive Information Technology Event, Management Development Centre (MDC) at Yashwantrao Chavan Academy of Development Administration (YASHADA), Pune (3rd -5th Sep 2012).
22. N. Saxena, N. S. Chaudhari, "A Secure Approach for SMS in GSM Network", In, CUBE 2012: International Information Technology Conference & Exhibition: IT – Engineering – Management - Telecom : India's largest and most comprehensive Information Technology Event, Management Development Centre (MDC) at Yashwantrao Chavan Academy of Development Administration (YASHADA), Pune(3rd -5th Sep 2012).
23. N. Saxena, N. S. Chaudhari, G. L. Prajapati, "An Extended Approach for SMS Security using Authentication Functions", In, Proceedings of the 7th IEEE Conference on Industrial Electronics and Applications (ICIEA 2012), pp. 650-655, IEEE Catalog no. CFP1220A-CDR (published by IEEE, ISBN: 978-1-4577-2117-5) Singapore, 18th -20th July 2012.
24. N. S. Chaudhari, G. L. Prajapati, "Learning Alignment Profiles for Structural Similarity Measure," In, Proceedings of the 7th IEEE Conference on Industrial Electronics and Applications (ICIEA 2012), pp. 1316-1321, IEEE Catalog no. CFP1220A-CDR (published by IEEE, ISBN: 978-1-4577-2117-5) Singapore, 18th -20th July 2012.
25. J. Thomas, N. S. Chaudhari, "Placement Strategy for Trim Minimization in One-Dimensional Cutting Stock," In, Proceedings of the 7th IEEE Conference on Industrial Electronics and Applications (ICIEA 2012), pp. 1362-1365, IEEE Catalog no. CFP1220A-CDR (published by IEEE, ISBN: 978-1-4577-2117-5) Singapore, 18th -20th July 2012.
26. K. Pathak, N. S. Chaudhari, A. Tiwari, "Privacy Preserving Association Rule Mining by Introducing Concept of Impact Factor," In, Proceedings of the 7th IEEE Conference on Industrial Electronics and Applications (ICIEA 2012), pp. 1455-1458, IEEE Catalog no. CFP1220A-CDR (published by IEEE, ISBN: 978-1-4577-2117-5) Singapore, 18th -20th July 2012.

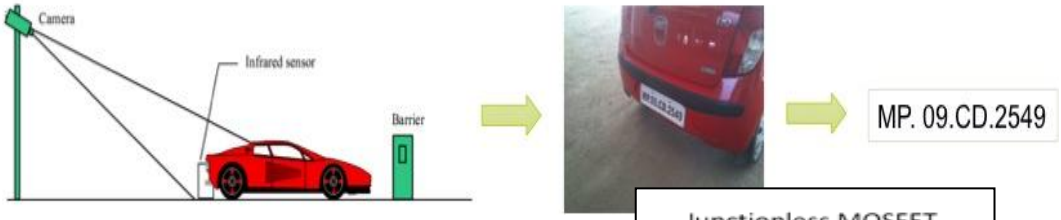
27. P. C. Sharma, N. S. Chaudhari, “Channel Assignment Problem in Cellular Network and Its Reduction to Satisfiability using Graph k-Colorability”, In, Proceedings of the 7th IEEE Conference on Industrial Electronics and Applications (ICIEA 2012), pp. 1731-1734, IEEE Catalog no. CFP1220A-CDR (published by IEEE, ISBN: 978-1-4577-2117-5) Singapore, 18th-20th July 2012.
28. R. Jain, N. S. Chaudhari, “A New 3-Clustering Algorithm For Minimum Sum Of Diameter Using Bit Representation”, In, Proceedings of the 7th IEEE Conference on Industrial Electronics and Applications (ICIEA 2012), pp. 2004-2009, IEEE Catalog no. CFP1220A-CDR (published by IEEE, ISBN: 978-1-4577-2117-5) Singapore, 18th-20th July 2012.

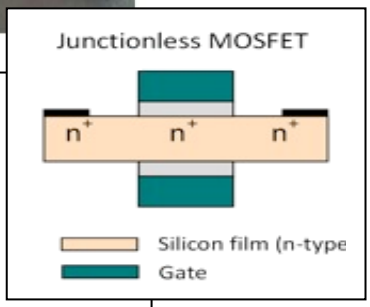
Discipline of Electrical Engineering:

Electrical Engineering at IIT Indore aims to play an active role in propelling India in its growth trajectory through innovative inter–disciplinary research and educational programs at undergraduate and postgraduate levels.

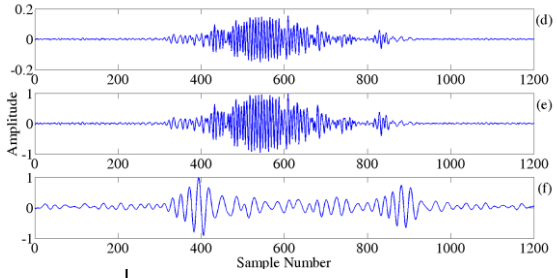
The Discipline currently has 12 faculty members with expertise in diverse areas including Nanotechnology and Nanoelectronics, Communications and Networking, Signal Processing, Bio-photonics, Power Systems and Renewable Energy. In tune with the inter–disciplinary research philosophy of IIT Indore, an effort is made to promote internal and external collaborations. This has resulted in getting substantial external funding for research activities and also more interaction of the different groups of the discipline. A clear picture of how the different areas of Electrical Engineering work together is shown below.





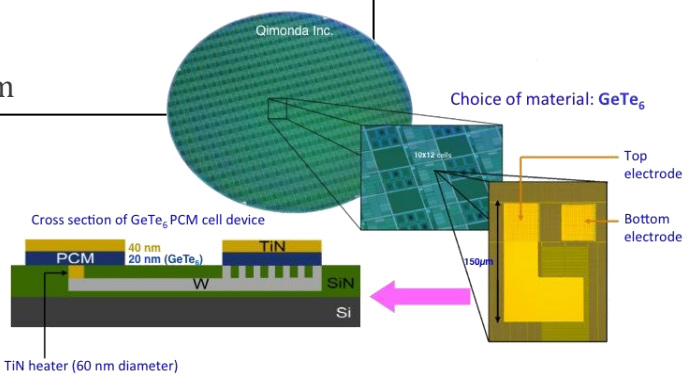


Projects:
Sponsored Grants:
9 (approved), Cost: Rs. 2.4 Crore
6 (submitted), Cost: Rs. 2.5 Crore
Research Publications: 62 (2010—2012)
Patents filed (Indian): 1
Several International /National Collaborations



Research Areas:
Nanoelectronics
Signal Processing
Communication
Organic Electronics
Power
Bio-photonics

Facilities and Equipments:
Dual Ion Beam Sputtering System
High Temperature Annealing Furnace
Four probe Hall Measurement System
1 GHz Digital Storage Oscilloscope
Spectroscopic Ellipsometer
Metal Evaporator
EEG-ECG Recording and Analysis Facility
Advanced TCAD tools for Device/Circuit Design
Helium – Neon Laser and CCD camera
Labview based Control Systems
Potentiostat – Galvanostat
PLECS Simulator
Photo Luminescence System



FACULTY MEMBERS

Dr. Srivathsan Vasudevan
Assistant Professor
Electrical Engineering
HOD BSBE
svasudevan@iiti.ac.in

(PhD: Nanyang Technological University, Singapore; Research Associate: Singapore General Hospital)

Dr Srivathsan Vasudevan is the Head of Discipline of Electrical Engineering.
He works on the development of photothermal imaging / response system which is a microscopy technique that can be used for bio-diagnostics. He also develops photoacoustic imaging system which would be used as a diagnostic tool for cancer diagnosis. His main interest lies in disease diagnostics using optical non-invasive techniques.

Research Interest:

- Development of non-invasive optical techniques for biological diagnosis
- Building the electronics and instrumentation to make the system compact and can be used for clinical trials.
- Application of the developed techniques on different biological problems like skin cancer.

Achievements:
Invited Talks: 3
Presentation in conferences: 6
Publications: 7
Funding: Department of Biotechnology (DBT)

Dr. M. Anbarasu
Assistant Professor
Electrical Engineering
Surface Science & Engineering
anbarasu@iiti.ac.in

(PhD: Indian Institute of Science, Bangalore, received Dr. SrinivasaRao Krishnamurthy Medal for the best Ph.D. thesis; Post-doctoral fellow: Indian Institute of Science; Research staff: Heriot-Watt University, UK under UKIERI Project; Alexander von Humboldt Post-Doctoral research fellow at Institute of Physics, RWTH Aachen University Germany)

Dr. M. Anbarasu has been working towards development of universal memory that combines DRAM-like speed with non-volatile capability for future Random access memory devices. He investigates time-resolved electrical switching and programming characteristics of novel phase change memory devices, local structure and physical properties, electronic transport properties of phase change memory materials, design and development of novel materials for high-density random access memories.

Research Interest:

- Phase Change Random Access Memories
- Multi-bit data storage Technology
- Vertically stackable cross-point memory devices
- OTS Selector for high-density non-volatile PCM devices
- Photo induced effects in disordered solids.

Achievements:
Funding: DST– Rs 23.3 Lakhs, SERB/F/0894/2013-14
DST-SERB – Rs 53.5 Lakhs; SERB/F/1493/2013-14

Dr. Trapti Jain
Assistant Professor
Electrical Engineering
traptij@iiti.ac.in

(PhD: IIT Kanpur, India; Asst. Prof. at IIT Mandi until 2012)

Dr. Trapti Jain works on security assessment and control of power systems. She works on developing methods which are fast enough to assess the secure or insecure status of the power systems. She also works on developing the control techniques for maintaining the stable operation of power systems under different operating conditions.

Research Interest:

- Power System security analysis
- Power sector deregulation
- FACTS controllers
- Artificial intelligence applications to power system
- Synchrophasor applications to power system
- Renewable energy source integration into the power grids
- Impact analysis of electric vehicles on the power system

Achievements:
Invited Talks: 2
Funding: DST

Dr. Vivek Kanhangad
Assistant Professor
Electrical Engineering
kvivek@iiti.ac.in

(PhD: Hong Kong Polytechnic University)
MTech: Indian Institute of Technology Delhi)

His research interests are in the overlapping areas of digital image processing, pattern recognition and computer vision and their applications in Biometrics based personal recognition. He regularly reviews papers for IEEE Transactions on Information Forensics and Security (TIFS), IEEE Transactions on Systems, Man, and Cybernetics - Part C, Elsevier journal - Pattern Recognition and EURASIP journal on Image and Video processing.

Research Interests:

- Hand biometrics: Design of efficient algorithms for matching 3D hand scans in realistic scenarios.
- Anti-spoofing measures: Development of spoof detection techniques for unconstrained and contact-free hand biometric systems.
- Object tracking in videos: Development of efficient tracking algorithms for reducing the sensitivity of performance to the initial template selection.

Achievements:
Presentations in conferences: 6
Publications: 5

Dr. Abhinav Kranti
Associate Professor
Electrical Engineering
HOD - Electrical Engineering
akranti@iiti.ac.in

(PhD: University of Delhi; worked at Université catholique de Louvain, Belgium; Queen's University Belfast, UK; and Tyndall National Institute, Ireland)

Dr Abhinav Kranti works on the design, simulation and modeling of advanced scalable Metal-Oxide-Semiconductor (MOS) transistors and circuits for the More-than-Moore era. He has been working on energy efficient devices and circuits for ultra low power logic, analog and RF applications.

Research Interests:

- Performance evaluation of Junctionless transistor in Silicon-on-Insulator (SOI) Technology as a possible replacement of conventional MOSFET. Design and optimization of low power analog/RF devices and circuits. Transistors with steep subthreshold slope for ultra low power applications. Capacitorless Dynamic Random Access Memory cell. MgZnO/ZnO based heterostructure field effect transistors. Circuit design with novel transistors.

Reviewer of research proposal (regular) for DST. Reviewer for several international journals.
Achievements:
Presentations in conferences: 4
Publications: 7
Funding: DST
Professional Work:
Session Co-chair: Advanced CMOS Devices-II at the 2013 IEEE International Nanoelectronics Conference (INEC), Singapore, January 2-4, 2013.

Dr. Shaibal Mukherjee
Assistant Professor
Discipline of Electrical Engineering
shaibal@iiti.ac.in

(PhD: University of Oklahoma, USA, Post Doctoral Researcher in Electrical and Computer Engineering, 2009-2010, Northwestern University, Illinois, USA)

The Hybrid Nanodevice Research Group (HNRG) led by Dr. Shaibal Mukherjee explores new physics of micro/nano-structured materials. His interests are in advanced tools and devices for chemical, biological, optical, electronic and energy applications. The group actively uses UV-visible, infrared, and terahertz spectroscopy and designs 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 optoelectronics

Research Interest:

- Nano-scale Multiple Quantum Well Lasers, hybrid LEDs, Photodetectors, Solar Cells.
- Nanophotonics, photonic LED and solar cell, Photonic bandgap defect microcavity devices
- High electron mobility transistor (HEMT) based on ZnO, GaN, AlGaN

Achievements (2012-2013):
Invited Talks: 2
Conference proceedings: 10
Publications: 5
Funding: DST (3), CSIR (1)

Dr. Ram Bilas Pachori
Associate Professor
Electrical Engineering*
Bio-Sciences and Bio-Engineering†
pachori@iiti.ac.in

(PhD: IIT Kanpur; Postdoctoral Fellow: University of Technology of Troyes (UTT), Troyes, France; Assistant Professor at International Institute of Information Technology (IIIT), Hyderabad, India until 2008)

Dr. Ram Bilas Pachori works on the development of new methodologies for analysis and classification of bio-signals like electroencephalogram (EEG), electrocardiogram (ECG), phonocardiograph (PCG), centre of pressure (COP). He also works on time-frequency decomposition based methodologies for speech signal analysis. He is also interested in the applications of signal processing.

Research Interest:

- Bio-medical Signal Processing.
- Time-Frequency Analysis.
- Speech Signal Processing.
- Signal Processing Applications

Achievements:
Invited Talks: 4
Presentation in conferences: 4
Publications: 6
Funding: DST

Dr. Vipul Singh
Assistant Professor
Electrical Engineering
vipul@iiti.ac.in

(PhD: Kyushu Institute of Technology, Japan; Scientific Researcher at Nanosystems integration laboratory, Research Institute of Electronics, Shizuoka University, Japan)

Dr Vipul Singh works in the area of organic electronics. His research interest ranges from organic material based device applications viz., Organic Field Effect Transistors (OFETs), Organic Solar Cells (OSCs), Organic Light Emitting Diodes (OLEDs) and Organic based Memory Devices. His interest also lies in understanding the charge carrier transport in this class of materials. He is also working towards theoretical investigation of Silicon based Nano devices, Single electron transistors, RF-SET and Low frequency noise in Silicon MOSFETs. Lately he is also focusing towards development of hybrid electronic devices and biosensors.

Research Interest:

- Organic electronic/photonic devices and their applications, Photoluminescence spectroscopy, thin film fabrication/ characterization.
- Si nano devices, Single electron devices, Bulk and SOI MOSFETs, Low frequency noise in MOSFETs, MOSFET based sensors, Low power information processing circuits and RF-SET.
- Study of hybrid electronic devices consisting of inorganic and organic materials.
- Research and development of Biosensors utilizing Conducting Polymer based nanostructures.

Achievements:
Invited Talk: 1
Presentation in conferences: 7
Funding: DST Fast Track

Dr. Amod Umarikar
Assistant Professor
Electrical Engineering
HOD School of Eng
amodu@iiti.ac.in

(PhD: Indian Institute of Science, Bangalore; Postdoctoral Associate: University of Minnesota, Minneapolis, USA)

Dr Amod Umarikar is the Head of the School of Engineering.

He works on applications of power electronics to renewable energy systems. Currently he is working on applications of Z source converter family in renewable energy systems.

Research Interest:

- Applications of power electronics in renewable energy systems.
- Modeling and simulation of engineering systems using bond graphs.

Achievements:
Presentations in conferences: 2

Dr. Prabhat K. Upadhyay
Assistant Professor
Electrical Engineering
pkupadhyay@iiti.ac.in

(PhD: IIT Delhi; Lecturer: BIT Mesra)

Dr. Prabhat Kumar Upadhyay has a PhD in Electrical Engineering from the Indian Institute of Technology Delhi. He has carried out his doctoral research in the area of wireless two-way relay communications over fading channels. He is currently focusing on the analysis and design of spectrally-efficient cooperative systems, MIMO and diversity techniques, and cognitive radio. He has numerous publications in peer-reviewed journals and conferences, and has authored a book and a book chapter. He is serving as a reviewer for a number of international journals which includes IEEE Transactions on Wireless Communications, IEEE Transactions on Vehicular Technology, and IEEE Communications Letters. Dr Upadhyay is a Member of the IEEE and the IEEE Communications Society.

Research Interest:

- Cooperative communications.
- Relaying and diversity techniques.
- MIMO systems.
- Cognitive radio.

Achievements:
Invited Talks: 2
Presentation in conferences: 2
Publications: 2
Funding: DST (SERC Fast-Track)

Dr. Santosh Viswakarma
Assistant Professor
Electrical Engineering
skvishvakarma@iiti.ac.in

(PhD: IIT Roorkee; Post Doctoral Fellow: University Graduate Centre (UNIK), Kjeller, Norway under European Union project "COMON" (Compact Modeling Network))

Dr. S. K. Vishvakarma works on Non-Classical MOS Devices and their application in Circuit and System Design. His research group is focused on the development of MOS devices model for Double Gate, Gate-All-Around, Tunnel FET, FinFET, TriGate etc. Further, the entire group is developing Cache memory for low power applications. The group is also working on FPGA based system design and is in the process of developing techniques which may consume less power by the system designed on FPGA.
Dr. Vishvakarma's research group is working with industries like IBM. At present, two of his PhD scholars are working in the area of Design and Development of Subthreshold SRAM and It's Sub Circuit Design, with Dr. Devesh, Manager, SRAM Development, System and Technology Group, IBM, Bangalore.

Research Interest:

- Device Modeling: MOS Devices Modeling (Double Gate, FinFETs, Tunnel FET, Gate-All-Around structure etc.).
- Circuit Design: Ultra Low Power SRAM Memory Design using CMOS and Advanced CMOS Devices (FinFETs, Tunnel FET etc.).
- FPGA based Design: Power Reduction Techniques in FPGA and FPGA based System Design.

Achievements:
Presentation in conferences: 6
Publications: 5
Funding: DST, India

Publications: Electrical Engineering (2012-2013)

Journals:

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. V. Bajaj, R. B. Pachori, "Epileptic seizure detection based on the instantaneous area of analytic intrinsic mode functions of EEG signals", Biomedical Engineering Letters, vol. 3, issue 1, pp. 17-21, March 2013.
3. V. Bajaj, R. B. Pachori, "Classification of seizure and non-seizure EEG signals using empirical mode decomposition", IEEE Transactions on Information Technology in Biomedicine, vol. 16, no. 6, pp. 1135-1142, November 2012.
4. D. Sharma, S. K. Vishvakarma, "Precise Analytical Model for Short Channel Quadruple Gate-All-Around MOSFET," IEEE Transaction on Nanotechnology, vol. 12, no. 3, pp. 378-385, 2013.
5. B. Reniwal, S. K. Vishvakarma, "A Reliable, Process-Sensitive-Tolerant

Hybrid Sense Amplifier for Ultra Low power SRAM", International Journal of Electronics and Electrical Engineering, Canada, vol. 1, no. 1, March 2013.

6. P. Singh, S. K. Vishvakarma, "Device/Circuit/Architectural Techniques for Ultra Low power FPGA Design," Journal of Microelectronics and Solid State Electronics, Scientific and Academic Publishing, USA, vol. 2, pp. 1-15, 2013.
7. D. Sharma, S. K. Vishvakarma, "Precise analytical model for short channel Cylindrical Gate (CylG) Gate-ALL-Around (GAA) MOSFET" Solid State Electronics, Elsevier, vol. 86, pp. 68-74, August 2013.
8. P. 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.
9. S. K. Pandey, Sushil Kumar Pandey, U.P. Deshpande, V. Awasthi, A. Kumar, M. Gupta, S. 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.
10. S. K. Pandey, Saurabh Kumar Pandey, C. Mukherjee, P. Mishra, M. Gupta, S. R. Barman, S. W. D'Souza, S. Mukherjee, "Effect of growth temperature on structural, electrical and optical properties of dual ion beam sputtered ZnO thin films", Journal of Materials Science: Materials in Electronics, vol. 24, pp. 2541-2547, 2013.
11. M. S. Parihar, D. Ghosh, A. Kranti, "Occurrence of Zero Gate Oxide Thickness Coefficient in Junctionless Transistors", Applied Physics Letters, vol. 102, article 203509, 2013.
12. M. S. Parihar, D. Ghosh, A. Kranti, "Single transistor latch phenomenon in junctionless transistors", Journal of Applied Physics, vol. 113, article 184503, 2013.
13. 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.
14. M. S. Parihar, D. Ghosh, G. A. Armstrong, A. Kranti, "Bipolar snapback in junctionless transistors for capacitorless dynamic random access memory", Applied Physics Letters, vol. 101, article no. 263503, 2012.
15. D. Ghosh, M. S. Parihar, G. A. Armstrong, A. Kranti, "Optimally designed moderately inverted double gate SOI MOSFETs for low power RFICs", Semiconductor Science and Technology, vol. 27, article no. 125004, 2012.
16. D. Ghosh, M. S. Parihar, G. A. Armstrong, A. Kranti, "High performance junctionless MOSFETs for ultra low power analog/RF applications", IEEE Electron Device Letters, vol. 33, no. 10, pp. 1477-1479, 2012.
17. M. S. Parihar, D. Ghosh, G. A. Armstrong, R. Yu, P. Razavi, A. Kranti, "Bipolar effects in unipolar junctionless transistors", Applied Physics Letters, vol. 101, article no. 093507, 2012.
18. S. Yadav, P. K. Upadhyay, "Performance of Three-Phase Analog Network Coding with Relay Selection in Nakagami-m Fading," IEEE Communication Letters, accepted for publication.

19. P. K. Upadhyay, S. Yadav, “On the Performance of Cellular Two-Way Relay Systems with Analog Network Coding and Multiuser Diversity,” Wireless Personal Communications, Springer, Apr. 2013.

Conference Papers:

1. K. Patidar, A. C. Umarikar, “A space vector PWM signal generation for Z-source inverter using only sampled amplitudes of reference phase voltages with a unified method to implement different shoot through strategies”, 2012 IEEE International Conference on Power Electronics, Drives and Energy Systems (PEDES), 2012.
2. P. S. Rathore, R. B. Pachori, "Determination of instantaneous fundamental frequency of speech signals based on the FB expansion and AM-FM signal model", Proceedings Second International Conference on Signal, Image Processing and Pattern Recognitions, New Delhi, India, May 24-26, 2013.
3. S. Patidar, R. B. Pachori, "Constrained tunable-Q wavelet transform based analysis of cardiac sound signals", Proceedings 2013 AASRI Conference on Intelligent Systems and Control, Vancouver, Canada, April 17-18, 2013.
4. V. Bajaj, R. B. Pachori, "Classification of human emotions based on multiwavelet transform of EEG signals", Proceedings 2013 AASRI Conference on Intelligent Systems and Control, Vancouver, Canada, April 17-18, 2013.
5. P. Kanani, A. Gupta, D. Yadav, R. Bodade, and R. B. Pachori, "Vehicle license plate localization using wavelets", Proceedings IEEE Conference on Information and Communication Technologies, Thuckalay, India, April 11-12, 2013.
6. S. Patidar, R. B. Pachori, "A continuous wavelet transform based method for detecting heart valve disorders using phonocardiograph signals", Proceedings International Conference on Convergence and Hybrid Information Technology, 23-25 August, 2012, Daejeon, South Korea.
7. V. Bajaj, R. B. Pachori, "Separation of rhythms of EEG signals based on Hilbert-Huang transformation with application to seizure detection", Proceedings International Conference on Convergence and Hybrid Information Technology, 23-25 August, 2012, Daejeon, South Korea. (Best paper award).
8. C. Kushwah, S. K. Vishvakarma, "Sub-Threshold 8T SRAM Cell Immune to Process Variations at ULV Supply” IEEE International Conference on Electron Devices and Solid-State Circuits, June 2nd-5th 2013, Hong Kong.
9. P. Singh, S. K. Vishvakarma, "RTL Level Implementation of High Speed Low Power Viterbi encoder and decoder" IEEE 3rd International Conference on Information Science and Technology (ICIST-2013), March 23rd-25th, 2013 pp. 345-349, Yangzhou, Jiangsu, China.

10. V. Vijaywargiya, S. K. Vishvakarma, "Effect of Doping Profile on Tunneling Field Effect Transistor". 9th IEEE Spanish Conference on Electron Devices, February, 12th-14th, pp. 195-198, Feb. 2013, Valladolid, Spain.
11. D. 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.
12. D. Sharma, S. K. Vishvakarma, "Isomorphic Polynomial based Precise Analytical Modeling of 3D Potential Distribution for Surrounding Gate Gate-All-Around MOSFET", IEEE International Conference on Emerging Electronics (ICEE), Dec. 15th-17th, 2012, IIT Bombay, India.
13. C. Kushwah, S. K. Vishvakarma, "Ultra low power Sub-Threshold SRAM Cell Design to Improve Read Static Noise Margin" 16th International Symposium of VLSI Design and Test (VDAT)-2012, July 1st-4th, 2012, Bengal Engineering and Science University, Shibpur, India. (Available on Springer Lecture note on Computer Science (LNCS), 7373, pp. 139–146, 2012).
14. S. K. Pandey, Sushil Kumar Pandey, M. Gupta, V. Sathe, S. Mukherjee, "Influence of substrate temperature variation on dual ion beam sputtered Ga-doped ZnO thin films", accepted, 3rd Nano Today Conference, Singapore, December 8-11, 2013.
15. S. K. Pandey, Saurabh Kumar Pandey, V. Awasthi, M. Gupta, and S. 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.
16. S. Verma, S. K. Pandey, S. Mukherjee, "Design and Growth Optimization of Hybrid Green Light Emitting Diode by Dual Ion Beam Sputtering, Discussion Meeting on Recent Developments in Magnetic Materials and Thin Films (RDMMTF-2013)", UGC-DAE Consortium for Scientific Research, Indore, May 24-25, 2013.
17. R. Anthony, S. K. Pandey, Saurabh Kumar Pandey, S. Mukherjee, "Influence of in-situ annealing temperature on structural, electrical properties of dual ion beam sputtering grown ZnO thin films", 6th India Singapore Joint Physics Symposium on Physics and Advanced Materials, ISJPS-2013, IIT-Kharagpur, February 25-27, 2013.
18. Saurabh Kumar Pandey, S. Mukherjee, "Device modeling and optimization of high-performance thin film CIGS solar cell with MgxZn1-xO buffer layer", 5th IEEE International Nanoelectronics Conference, IEEE INEC 2013, Singapore, January 2-4, 2013.
19. S. K. Pandey, Saurabh Kumar Pandey, S. Mukherjee, "Design and growth optimization by dual ion beam sputtering of ZnO-based high-efficiency multiple quantum well green lights emitting diode", 5th IEEE International Nanoelectronics Conference, IEEE INEC 2013, Singapore, January 02-04, 2013.

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21. S.i Verma, S. K. Pandey, Saurabh Kumar Pandey, S. Mukherjee, “High Efficiency Hybrid Green Light-Emitting Diode”, in proceedings of 4th International Conference on Advanced Nano Materials, IIT Madras, India, October 17-19, 2012.
22. S. K. Pandey, Saurabh Kumar Pandey, S. Verma, S. Mukherjee, “High Performance from ZnO Multiple Quantum-Well Green Light Emitting Diode with Li-doped CdZnO Active Region”, in proceedings of IEEE NANO 2012-12th International Conference on Nanotechnology, International Convention Centre, Birmingham, United Kingdom (UK), August 20-23, 2012.
23. V. Singh, S. S. Pandey, W. Takashima, K. Kaneto, “Influence of Metal Coating and Aggregation Effects on Intrachain Excitons in Poly (3-Hexylthiophene)” [10th International Conference on Nano-Molecular Electronics], PT-45, Awaji Hyogo, Japan, (12-14 December 2012).
24. K. Bhargava, P. A. Palod, A. Bilgaiyan, V. Singh, “Comparative Analysis of Top and Bottom Contact Organic Thin Film Transistors and Contact Resistance Estimation by 2-D simulations” [25th International Microprocesses and Nanotechnology Conference], 1P-7-39, Kobe, Japan, (30 October- 2 November 2012).
25. P. A. Palod, K. Bhargava, A. Bilgaiyan, V. Singh, “Simulation based study of device parameters related to Organic Field Effect Transistors for Possible Applications as Ion Sensitive Field Effect Transistors” [4th International Conference on Advanced Nanomaterials], PP-80, Indian Institute of Technology Madras, India, (17-19 October 2012).
26. 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.
27. D. Ghosh, M. S. Parihar, G. A. Armstrong and A. Kranti, “Low Power Nanoscale RF/Analog MOSFETs”, In Proc. IEEE International Conference on Nanotechnology, Birmingham, UK, Digital Object Identifier: 10.1109/NANO.2012.6322028, 2012.
28. M. S. Parihar, D. Ghosh, G. A. Armstrong, R. Yu, P. Razavi, S. Das, I. Ferain, and A. Kranti, “Sensitivity Analysis of steep Subthreshold Slope (S–slope) in Junctionless Nanotransistors”, In Proc. IEEE International Conference on Nanotechnology, Birmingham, UK, Digital Object Identifier: 10.1109/NANO.2012.6321973, 2012.
29. P. K. Upadhyay, S. Prakriya, “Joint Power and Location Optimization for Analog Network Coding with Multi-Antenna Sources,” in Proc. IEEE Wireless Communications and Networking Conference (WCNC), Shanghai,

China, Apr. 2013.
30. S. Yadav , P. K. Upadhyay, “Performance Analysis of Two-Way AF Relaying Systems over Cascaded Generalized-K Fading Channels,” in Proc. National Conference on Communications (NCC), IIT Delhi, New Delhi, Feb. 2013.

Books:

1. P. K. Upadhyay, “Spatial Diversity for Analog Network Coding,” Lambert Academic Publishing, Germany, 2012.

Discipline of Mechanical Engineering:

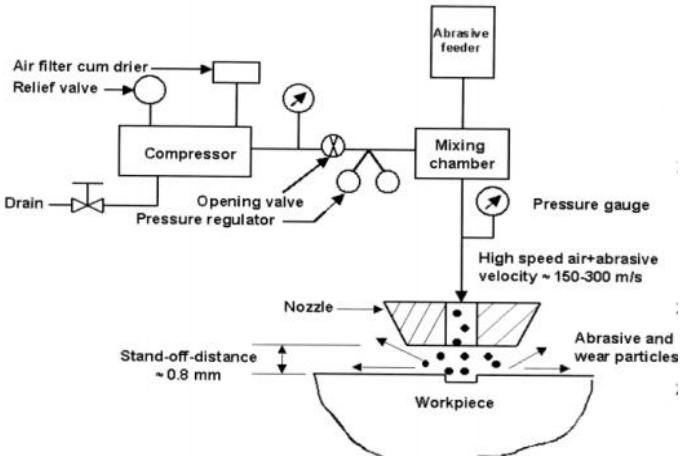
Short term course on Mechatronics and Robotics: A short-term course on Mechatronics and Robotics was conducted during 15th-19th July 2013, in PACL-campus. Around 52 participants, comprising of students from various colleges, faculty members from different universities and research scientist from industries, participated in this short term program. Lectures on sensors, actuators, PLC programming, control technique and process controller, Pneumatic system design, Opto-mechatronics system design, Kinematics and serial robotics, dynamics of serial robotics, modeling and control of serial robots and control of mobile robotic platforms were delivered by the mechanical and electrical engineering faculty members of IIT Indore. Laboratory training on pneumatic system design and kinematic and systematic modeling was given to the participants. The participants were highly excited and the course was very well appreciated.

CEP Course on Advances in Gear Engineering: A five day continuing education program (CEP) on ADVANCES in GEAR ENGINEERING was organized during 19-23rd Nov. 2012. It was attended by 21 participants. The course covered various aspects of gears in details such as types and applications, gear materials, gear manufacturing, gear finishing by conventional and ECH, gear metrology, gear failures, noise, vibration, condition monitoring and fault diagnosis of gears, issues of reliability and warranty in the gears and gearboxes, performance enhancement through surface modifications and thermal aspects of the gears. The course also included intensive training and hands-on sessions on the topics such as CNC gear metrology, precision finishing of gears by ECH, condition monitoring and fault detection in gearboxes, testing and estimation of reliability of gears and gear boxes, gear surface evaluation using laser interferometry using the state-of-art facilities of the Mechanical Engineering Labs. The course was very successful as reflected by the participant's feedback.

Short term course on Introduction to Research: Students who are motivated to join a Ph.D. program are welcome to take this course which provides training on choosing a particular research topic, collecting bibliography from various sources; planning and working on new research problems. Therefore, taught the essentials of research work involving publishing, dissemination of results in conferences and workshops, writing reports, thesis etc. With this objective, the two day course 'Introduction to Research' was held during 6th-7th July, 2013, which was attended by 26 participants.

Significant facilities developed through B. Tech Projects:

Design, Fabrication and Testing Abrasive Jet Machining Apparatus



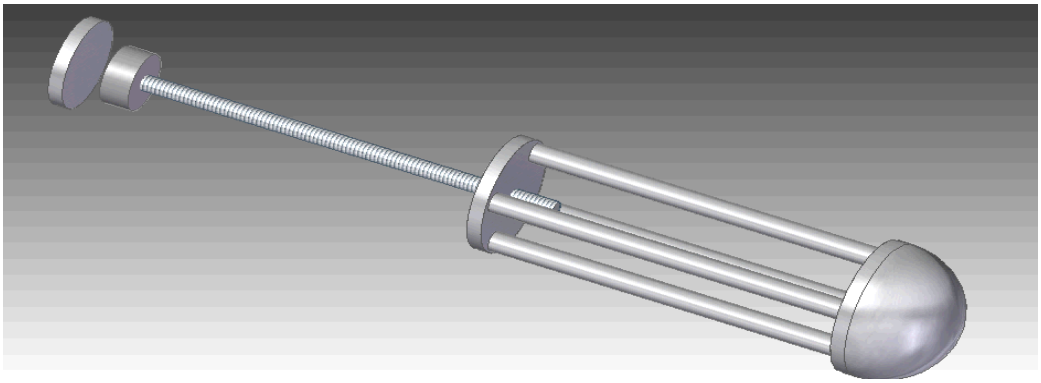
Abrasive jet machining, one of the advanced manufacturing processes, is used to cut and drill brittle and fragile materials like glass and ceramics. This process specifically is used to cut intricate shapes or form specific edge shapes. The project is aimed to fabricate an abrasive jet machining apparatus, at a much lesser cost than the one that is available in the market. Students fabricated this instrument with a motive to provide an experimental apparatus at a low cost.

Design and fabrication of noise and vibration Test rig for bevel gear box

In a commercial vehicle the deferential used have some particular level of vibration and noise which can alter due to defects in the gears like surface wear, crack tooth, chipped tooth and missing tooth. This can be demonstrated on bevel gears. Rolling element bearing faults like inner race, outer race, and ball damage can also be incorporated. To detect the particular defect this test rig can be used and preventive and corrective maintenance can be performed. Even gears which are finished by Electro-chemical honing process can be tested. In addition to noise testing, the rig can also be used for gear life testing and measurement of efficiency. This test rig has been designed for testing gears under controlled conditions. Finite elemental analysis has been used to predict the dynamical properties of the gear test rig. Experimental model analysis has to be carried out on the gearbox housing to verify the theoretical predictions of natural frequencies.

Design and development of underwater glider

An underwater glider is a type of autonomous underwater vehicle (AUV) that uses small changes in its buoyancy in conjunction with wings to convert vertical motion to horizontal, and thereby propel itself forward with very low power consumption. Students designed and fabricated a novel mechanism that qualifies as a glider and can be used for various applications without any structural change.



BAJA-2013 Competition

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. 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 the 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 completed 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. The 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 students to handle the projects on their own right from concept, analysis, development and budget management.

Team Captain: Brahm Pratap
Team convener: Dr. Devendra Deshmukh

FACULTY MEMBERS

Dr. Anil Kumar
Assistant Professor
Mechanical Eng.
HOD ME
anil@iiti.ac.in

(PhD: IIT Madras; Project Officer, ICSR, IIT Madras)

Dr. Anil Kumar is presently the Head of the discipline of Mechanical Engineering.

He works on hydrogen storage for mobile applications. He developed experimental setups for characterization of thermodynamic and thermo physical properties of a variety of solid state hydrogen storage materials. He is also working on carbon dioxide sequestration and development of clean energy technologies.

Research Interests:

- Solid state hydrogen storage for mobile applications.
- Metal Hydride based engineering devices.
- CO_2 Sequestration.
- Vapor absorption refrigeration and Air-conditioning systems.
- Solar assisted water desalination.

Achievements:
Invited Talks: 2
Presentation in conferences: 2
Funding: DST

Dr. Satyajit Chatterjee
Assistant Professor
Mechanical Eng.
satyajit@iiti.ac.in

(PhD: IIT Kharagpur)

Dr. Satyajit Chatterjee has joined Mechanical Engineering Department as Assistant Professor. His Research interests include Conventional and Non-conventional Machining, Surface Technology and Solid Lubrication. Having the background of Production Engineering with Tool Engineering specialization, he is involved in teaching Production and Manufacturing Technologies since he joined IIT Indore. Apart from this, he works for the development of hard, wear resistant tribological coatings through the application of high power laser. He has published his research work in reputed journals like Surface and Coatings Technology and The International Journal of Advanced Manufacturing Technology.

Research Interest:

- Surface technology
- Solid lubrication
- Tribological coatings

Achievements:
Presentation in conferences: 1
Publications: 2 (1 journal, 1 Int. Conference)
Funding: DST (₹23.2 Lakhs)

Dr. Devendra Deshmukh
Assistant Professor
Mechanical Eng.
dldeshmukh@iiti.ac.in

(PhD: IISc, Bangalore; Research Assistant: IISc Bangalore; Engineer CAE: GM-Technical Centre India, Bangalore; R & D member: TVS Motor Company Hosur)

Dr. Devendra Deshmukh has research interest in the area of renewable fuels for Internal combustion engine, Bio-fuel sprays, combustion diagnostics, and modelling of IC engine processes. He is investigating effect of physical properties of bio-fuels on spray atomization and combustion.

Research Interest:

- Renewable fuels of combustion engine
- Optimizing engine for bio-fuel
- Investigations on spray atomization
- Development of optical engine for I.C. Engine research

Achievements :
Invited Talk: 1
Publication: 1

Dr. Shanmugam Dhinakaran
Assistant Professor
Mechanical Eng.
sdhina@iiti.ac.in

(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)

Dr. Shanmugam Dhinakaran is an expert on Computational Fluid Dynamics and Heat Transfer, Heat and Mass Transfer in Porous Media, Non-Newtonian Fluid Mechanics, Heat Pipes, Biofluid Mechanics.

Research Interest:
Bluff body flows, heat transfer enhancement using nanofluids, Heat transfer in porous media, Non-Newtonian fluid mechanics, Biofluid Mechanics, Biodiesel, Optical engine.

Publications: 5
Reviewer, Course Development: Biofluid Mechanics (PG, UG Elective); Introduction to Research (PG Course)
Funding: DST ₹27.5 Lakhs

Dr. Neelesh Jain
Associate Professor
Mechanical Engg.
Dean Academic Affairs
nkjain@iiti.ac.in

(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)
Dr. Neelesh Jain is the Dean of Academic Affairs.

Dr Neelesh Kumar Jain works on various aspects of advanced and hybrid machining processes, micro-machining and nano-finishing processes through experimental investigations. He has extensively worked on establishing electrochemical honing (ECH) process as a precision gear finishing process. Presently, he is also working on establishing WEDM as accurate, productive and economic process for manufacturing the miniature gears and the repair of molds and dies using micro-manufacturing processes. His work also includes modeling and process parameters optimization of machining processes and process selection of manufacturing processes.

Research Interest:

- Advanced and Hybrid Machining Processes,
- Finishing of Gears by Electrochemical Honing (ECH) Process
- Repair of Molds and Dies using Micro-manufacturing Processes
- Manufacturing the Miniature Gears Using Wire-EDM Process
- Micromachining and Nano-finishing Processes
- Process Selection, Modeling and Optimization of the Manufacturing Processes

Achievements:
Publications: 8; Conferences: 5
PhD Supervision: 2, B.Tech. Project Supervision: 2
Research Project: 1; Consultancy Projects: 2
Organizing International Conference: 1 (IRAM 2013)
CEP Course: 1; Invited Lecture: 2
PhD thesis examiner; (NIT Hamirpur, Government College of Engineering, Aurangabad); MTech /ME thesis examiner: IIITDM Jabalpur, SGSITS Indore.
Reviewer: Int. J. of Ad. Mfg. Technology, J. of Materials Processing Technology, Int. J. of Mfg. Tech. and Management, and some other reputed journals.
Funding: CSIR

Dr. Ritunesh Kumar
Assistant Professor
Mechanical Engg.
ritunesh.kumar@iiti.ac.in

(PhD: IIT Delhi; Employee: Tata Consulting Engineers Limited Mumbai)

Dr. Ritunesh Kumar works on desiccant cooling. His focus is on refrigeration & air-conditioning, renewable energy, and heat transfer.

Prof. Satish C Koria
Visiting Professor
Mechanical Engg.
sckoria@iiti.ac.in

(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)

Prof. Satish C Koria did research in area of Energy efficiency in industrial furnaces, steelmaking, continuous casting, heat and mass transfer in metallurgical reactors with more than 80 papers.

Dr. Anand Parey
Associate Professor
Mechanical Engg.
anand.parey@iiti.ac.in

(PhD: IIT Delhi; Lecturer: Department of Mechanical Engineering, BITS Pilani Goa Campus; Post Doctoral Fellow in University of Alberta, Edmonton, Canada; Asst. Manager in Heavy Engineering Division, Larsen and Toubro Ltd. Mumbai; Manager-Technology in Global R&D Centre, Crompton Greaves Ltd. Mumbai)

Dr. Anand Parey works on condition monitoring, noise and vibration isolation and in signal processing of mechanical systems. He is a reviewer of several international journals.

Research Interest:

- Condition monitoring
- Noise and vibration isolation
- Signal Processing of Mechanical Systems

Achievements in 2012-2013:
Presentations in conferences: 1
Publications: 3
Funding: Shree Cement consultancy project

Dr. Bhupesh K Lad
Assistant Professor
Mechanical Engg.
bklad@iiti.ac.in

(PhD: IIT Delhi; Research Engineer: General Electric (GE) Global Research Centre (JFWTC) Bangalore, Karnataka; Lecturer: IEC College of Engineering and Technology, Uttar Pradesh; Junior Research Fellow, Defence Research Development Organization (ADRDE Lab) Agra, Uttar Pradesh)

Dr. Bhupesh Kumar Lad works in the area of reliability and maintenance engineering. He develops methodologies for reliability improvement, fleet level maintenance planning, remaining life prediction and Condition Based Maintenance (CBM). He explores and models the interaction of reliability and maintenance issues with shop floor level operations planning.

Research Interest:

- Develop methodologies for fleet level maintenance planning
- Reliability prediction using experts' judgment
- Development of decision support system (DSS) for manufacturing planning
- Joint consideration of shop floor level operations planning
- Develop hybrid methods for remaining life predictions
- Develop Condition-Based-Maintenance (CBM) planning

Achievements in 2012-2013:
Publications: 2
Presentation in conferences: 1
Funding: DST

Dr. I A Palani
Assistant Professor
Mechanical Engg.
palaniia@iiti.ac.in

(PhD: IIT Madras; Postdoctoral Researcher: Laser Laboratory, Graduate school of Information science and Electrical Engineering, Kyushu University, Fukuoka, Japan)

Dr I.A. Palani works on the development of Smart materials, shape memory alloy based micro positioning stages, micro actuators and micro-pumps using laser assisted micro-fabrication. He is involved in the development of ZnO nano structures for functional device, currently he is focusing on the development of opto-mechatronics based systems for calibration of MEMS device.

Research Interest:

- Mechatronics based System design
- Smart materials
- Laser assisted micro-fabrication
- Synthesis and characterization of nanostructures

Achievements in 2012-2013:
Invited Talks: 3
Presentation in conferences: 7
Publications: 3
Funding: DST

Dr. Kazi Sabiruddin
Assistant Professor
Mechanical Engg.
skazi@iiti.ac.in

(PhD: IIT Kharagpur; Assistant professor: Jaypee University of Engineering and Technology, Guna and Birla Iinstitute of Technology, Mesra)

Dr Kazi Sabiruddin works on tribological and chemical properties of thermally sprayed thick coatings on metal substrates. He also studies on thermally sprayed coatings for hard chrome replacement and bio-active ceramic coatings for medical implants.

Research Interest:

- Thermally Sprayed Coatings for Mechanical, Chemical and Biological applications
- Surface Roughness Characteristics of Machined Product
- Surface Modification by Plasma-Nitriding Techniques
- Conventional and non conventional Machining
- MIG/MAG Welding of Dissimilar metals

Achievements in 2012-2013:
Presentation in conferences: 1
Publications: 7
Project: 1
Funding: DST

Dr. Santosh Sahu
Assistant Professor
Mechanical Engg.
sksahu@iiti.ac.in

(PhD: IIT Kharagpur; Visiting Scholar: School of Nuclear Engineering, Purdue University, West Lafayette, USA; Lecturer: Department of Mechanical Engineering, National Institute of Technology Rourkela)

Dr. Santosh Kumar Sahu works on the measurement of heat transfer on thermal devices by using various liquids such as: nanofluids and water. Dr. Sahu investigates the heat transfer characteristics of impinging jets. In addition, he analyzes the heat transfer characteristics in micro devices and for rarefied flow conditions.

Research Interest:

- Thermal Hydraulics of nuclear reactors
- Metallurgical quenching and heat transfer measurement
- Fluid flow and heat transfer in micro devices
- Heat transfer augmentation of thermal devices by nanofluids
- Choking flows

Achievements in 2012-2013:
Invited Talks: 2
Publications: 5
Conferences: 5
Member, American Society of Mechanical Engineering (ASME)
Selected for Inclusion in Marquis's Who's Who for the year 2012, 2013 and 2014
Invitation to contribute an article on the special issue for international Journal Comptes Rendus Mecanique (Elsevier, London), 2012
International journal papers reviewed: 4
Member, Editorial Board, ISRN Mechanical Engineering, Hindawai Publishing Corporation, USA.

Dr. Mohan Shanthakumar
Assistant Professor
Mechanical Engg.
santhakumar@iiti.ac.in

(PhD: IIT Madras; Post Doctoral 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)

Dr M Santhakumar works on Dynamic analysis and Controller development of Robotic manipulators and systems. He investigates the performance behaviors of underwater robot (specifically, autonomous underwater vehicle and underwater vehicle-manipulator systems). He developed a novel indirect adaptive control scheme for the underwater vehicle-manipulator systems. He also developed a energy efficient task space control scheme for underwater robots.

Research Interest:

- Research on new family of parallel robotic manipulators will provide a basis to new technologies for precise and micro positioning applications using smart actuators.
- Research on underwater robotic technology will contribute to develop autonomous robots for deep sea applications namely underwater inspection, observation and manipulation tasks.

Achievements in 2012-2013:
Invited Talks: 2; Conferences: 8; Publications: 4
Funding: DST, NRB, NSF (Korea)

Publications: Mechanical Engineering (2012-2013)

Journals :

1. K. Sambhaji, R. Kumar, K. Baghel "Simplified Model for prediction of bubble growth in microchannels", Journal of Heat transfer.(Communicated).
2. Y. Pandya and A. Parey, "Failure Path Based Modified Gear Mesh Stiffness for Spur Gear pair with Tooth Root Crack", Engineering Failure Analysis, 27 (2013), 286-296.
3. Y. Pandya and A. Parey, "Simulation of Crack Propagation in Spur Gear Tooth for Different Gear Parameters and its Influence on Mesh Stiffness", Engineering Failure Analysis, 30 (2013), 124-137.
4. S. K. Sahu, P. Behera, "An improved lumped model for transient heat conduction in different geometries 2012", Computational Thermal Science,439-48
5. S. K. Sahu, P. Behera, "An improved lumped analysis for transient conduction in different geometries with heat generation 2012", ComptesRendusMecanique, 340, 477–484(Invited article)
6. N. D. Patil, P. K. Das, S. Bhattacharya, S. K. Sahu, "An experimental assessment of cooling of a 54-rod bundle by in-bundle injection 2012", Nuclear Engineering and Design 250, 500-511
7. M. K. Agrawal and S. K. Sahu, "Analysis of conduction-controlled rewetting of a hot surface by variation method 2012", Heat and Mass Transfer 49,963-971.
8. S. Pragya, P. K. Jain, N. K. Jain, "Study on wire electric discharge machining Based on response surface methodology and genetic algorithm", Advanced Material Research, Vol. 622-623, 1280-1284. (DOI:10.4028/www.scientific.net/AMR.622-623.1280)
9. J. P. Misra, P. K. Jain, N. K. Jain, H. Singh, "Effects of Electrolyte Composition and Temperature on Precision Finishing of Spur Gears by Pulse Electrochemical Honing (PECH)" Int. J. Precision Technology, 3(1), 37-50. (DOI: 10.1504/IJPTECH.2012.045987)
10. P. Shandilya, P. K. Jain , N. K. Jain , "On Wire Breakage and Microstructure in WEDC of SiCp/6061 Aluminum Metal Matrix Composites", Int J. of Advanced Manufacturing Technology, 61(9-12) (Aug. 2012), 1199–1207 (DOI: 10.1007/s00170-012-4095-2)
11. P. Shandilya, P. K. Jain, N. K. Jain , "Prediction of Surface Roughness During Wire Electrical Discharge Machining of SiCp/6061 Al MMC", Int. J. of Industrial and Systems Engineering, 12(3), 301-315.
12. P. Shandilya, P. K. Jain, N. K. Jain, "Neural Network based Modelling in Wire Electric Discharge Machining of SiCp/6061 Aluminium Metal Matrix Composite", Advanced Materials Research, Vol. 383-390, 6679-6683. (DOI:10.4028/www.scientific.net/AMR.383-390.6679)

13. P. Shandilya, P. K. Jain , N. K. Jain, “Parametric optimization during wire electrical discharge machining of SiCP/6061 Al MMC using response surface methodology”, Procedia Engineering, 38: 2371–2377. (DOI: 10.1016/j.proeng.2012.06.283).
14. E. A. Kumar, M. P. Maiya, S. S. Murthy, "Measurement and Analysis of Effective Thermal Conductivity of $MmNi_{4.5}Al_{0.5}$ Hydride Bed", Ind. Eng. Chem. Res., 2011, 50, 12990–12999. (ACS Publication)
15. B. K. Lad, M. S. Kulkarni, “Reliability and Maintenance Based Design of Machine Tools”, International Journal of Perform ability Engineering, Volume 9, Number 3, May 2013, pp. 321-332.
16. B. K. Lad, and M. S. Kulkarni, “Optimal maintenance schedule decisions for machine tools considering the user's cost structure”. International Journal of Production Research. Volume 50, Issue 20, 2012, pp. 5859-5871.
17. G. Amutha, I. A. Palani, N. J. Vasa, M. Singaperumal, T. Okada, “Investigations on Nano- and Pico-Second Laser Based Annealing Combined Texturing of Amorphous Silicon Thin Films for Photovoltaic Applications”, Journal of solid mechanics and materials engineering, Vol 7, 2013, 206-218.
18. M. Santhakumar, T. Asokan, “Power efficient dynamic station keeping control of an underactuated flat-fish type autonomous underwater vehicle through design modifications of thruster configuration”, Ocean Engineering 58, 11-21, January 2013.
19. M. Santhakumar, J. Kim, “Indirect adaptive control of an autonomous underwater vehicle-manipulator system for underwater manipulation tasks”, Ocean Engineering 54, 233-243, November 2012.
20. Dhinakaran et al., “Steady flow of power-law fluids in a 1:3 sudden expansion”. Journal of Non-Newtonian Fluid Mechanics, 198, 48-58.
21. A. Parey and R. B. Pachori, "Variable cosine windowing of intrinsic mode functions: Application to gear fault diagnosis", Measurement, Vol. 45, Issue 3, pp. 415-426, 2012.

Conference Papers:

1. K. Baghel, K. Sambhaji, & R. Kumar, 2013, “Three dimensional numerical analysis of single phase flow in microchannels”, International conference on Mechanical and Industrial Engineering.
2. K. Sambhaji, R. Kumar, “Bubble growth in mini channel”, IEEE International Conference on research and development prospects on engineering & technology, 29-30 March 2013.
3. K. Gupta, N. K. Jain, "Deviations in geometry of miniature gears fabricated by wire electrical discharge machining(IMECE2013-66560)", Proc, of the ASME 2013 International Mechanical Engineering Congress & Exposition (IMECE 2013) Nov. 13-21, 2013, San Diego, California, USA.
4. P. Shandilya, P. K. Jain, N. K. Jain. “A comparative study of ANN and RSM

models for predicting process parameters during WEDC of SiCp/6061 Al MMC", Proc. 37th International MATADOR Conference 2012 (Eds: S. Hinduja and L. Li), 67-70, Springer-Verlag London 2013. (DOI: 10.1007/978-1-4471-4480-9_3)

5. P. Shandilya, P. K. Jain, N. K. Jain "Artificial neural network kerf model in Wire Electric Discharge Machining of SiCp/6061 Al MMC". 4th International and 25th All India Manufacturing Technology Design and Research Conference-2012, Jadavpur University, 14-16 December, 2012, Kolkata.
6. P. Shandilya, P. K. Jain, N. K. Jain "Parametric optimization during wire electric discharge machining of SiCp/6061 Al metal matrix composite using response surface methodology, International conference on modeling, optimization and computing" 10-11 April, 2012, Tamil Nadu.
7. P. Shandilya, P. K. Jain, N. K. Jain "Study on wire electric discharge machining Based on response surface methodology and genetic algorithm, 3rd International Conference on Manufacturing Science And Technology, 18-19 August, 2012, New Delhi.
8. M. Rawat and B. K. Lad, "Condition Based Optimal Maintenance Strategy for Multi-Component System", IEEE-2013 International conference on industrial engineering and engineering management(IEEM), 10-13 Dec, Bankok, communicated
9. S. P. Maghade, Y. K. Meena, Y. Singh, M. Santhakumar, I.A. Palani, "Design, Fabrication & Characteristic Analysis of Actuator build on Shape Memory Alloy Spring" ICAMS2013, Faridabad (accepted)
10. S. Agarwal, I. A.Palani, "SMA(Shape Memory Alloy) deflection study using Michelson Interferometer" ICAMS2013, Faridabad, India (accepted)
11. Y. Singh, S. P. Maghade, S. Agarwal, M. Santhakumar, I. A. Palani., "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, March, 2013.
12. Y. Singh, S. P. Maghade, S. Agarwal, M. Santhakumar, I. A. Palani., "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, March, 2013.
13. S. P. Maghade, Y. K. Meena, Y. Singh, I. A. Palani, M. Santhakumar, " Design and Simulation of Shape Memory Alloy Spring and its implementation in an Actuator", International Conference on Automation and Mechanical Systems, Faridabad, March, 2013.
14. K. Aditya, J. Gulsagar, K. Abhyudaya, M. Santhakumar, "Low-Cost Navigation system for Computationally Constrained MAVs", International Conference on Recent Advances in Design, Development and Operation of Micro Air Vehicles, Hyderabad, Dec, 2012.

15. M. Santhakumar, “A Nonlinear Disturbance Observer based Adaptive Control Scheme for an Underwater Manipulator”, International Conference on Intelligent Robotics, Automation and Manufacturing (IRAM 2012), Malaysia, Nov, 2012.
16. M. Santhakumar, Y. Kim and J. Kim, “A Nonlinear Task space Tracking Control of an Underactuated Underwater Vehicle”, IEEE The 9th International Conference on Ubiquitous Robots and Ambient Intelligence (URAI 2012), Daejeon, ROK, Nov 2012.
17. M. Santhakumar and J. Kim, “Power efficient trajectory tracking control of underactuated autonomous underwater vehicle-manipulator systems”, IEEE / MTS OCEANS 2012, Yeosu, ROK, May, 2012.
18. S. Dhinakaran, A. Vicente, “Heat transfer from a circular cylinder to a fluid stream. International Congress on Computational Mechanics and Simulations”, ICCMS 2012, Dec 9-12, IIT Hyderabad. (Extended abstract in proceedings)
19. S. Dhinakaran, “Heat transfer from a porous sphere to a flowing fluid. International Congress on Computational Mechanics and Simulations”, ICCMS 2012, Dec 9-12, IIT Hyderabad. (Extended abstract in proceedings)
20. A. Verma, S. Dhinakaran, “Flow structure around tandem square cylinder near a moving wall. International Congress on Computational Mechanics and Simulations”, ICCMS 2012, Dec 9-12, IIT Hyderabad. (Extended abstract in proceedings)
21. K. Sharma, S. Dhinakaran, “Mixed convection heat transfer from a square cylinder near a moving wall”. International Congress on Computational Mechanics and Simulations, ICCMS 2012, Dec 9-12, IIT Hyderabad. (Extended abstract in proceedings)
22. S. Dhinakaran, “Heat transport from a sphere a flowing nanofluid.” IV National Conference on Mechanics of Fluid’s, Thermodynamics and Energy”, Bragança, Portugal, May 28- 29. (Full paper)
23. Y. Pandya , A. Parey, “Finite element analysis and numerical simulation of spur gear pair with tooth root crack to calculate mesh stiffness,” ASME 2012 International Mechanical Engineering Congress and Exposition, IMECE 2012, November 9-12, Houston, Texas, USA.
24. Y. Pandya , A. Parey, “Experimental Investigation of modulation sidebands of a planetary gear train for tooth fault diagnosis”,10th International Conference on Vibration in Rotating Machines, 25-27 Feb. 2013, TU Berlin, Germany.
25. S.K. Sahu, C. Kumar, “Assessment of Capability of Theoretical Correlations for Prediction of Pressure Drop of Fuel Pins with Grid Spacer”, 9th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, Malta, (HEFAT2012), Malta, July 22-26, 2012.
26. S. K. Sahu, P. K. Das, S. Bhattacharyya, “Counter current flow limit for air and water in cold and heated condition”, International Conference on Multiphase flow (ICMF2013), Korea, May 26-May 31, 2013.

27. S. Chougule, S. K. Sahu, “Model of Heat Conduction in Hybrid Nanofluid”, International conference on emerging trends in computing, communication and nano Technology (ICE-CCN 2013), India, March 25-26, 2013.

28. E. A. Kumar, "Solid state hydrogen storage for mobile applications". INDO-SWISS Symposium on Renewable Energies End-Use, October 22-25, 2012, Lausanne, Switzerland.

29. E. A. Kumar, V. K. Sharma, “Carbon Nanomaterials for Hydrogen Storage”, Proceeding of 1st Winter Workshop on Engineering at Nanoscale: From Materials to Bio-Sensors, December 10-12, 2012, Indore.

30. E. A. Kumar, V. K. Sharma, “Estimation of Enthalpy of formation of Metal Hydrides - Influence of various parameters”, Proceedings of International conference on Advances in Biological Hydrogen Production and Application”, December 14-15, 2012, JNTU Hyderabad.

31. E. A. Kumar, "Hydrogen as a future energy carrier", Proceedings of International Symposium on Recent Advances in Integrated Energy and Energy Conservation, December 19-20, 2012, JNTU Hyderabad.

Discipline of Chemistry:

Discipline of Chemistry at the Indian Institute of Technology Indore was started in 2009 with a vision of establishing a centre of excellence and state of the art facility in chemical sciences research, education and scientific leadership in technology transfer to industry. The department is home to 13 faculty members who are eminent in probing fundamental, molecular level of chemical reactions and properties of matter and apply the intellectual understanding in ways that will impact the world we live in.

The discipline has 40 PhD students, 3 postdoctoral research scholars, 3 project students and a scientist who carries out cutting edge research in various frontier areas of nanotechnology, organic light harvesting materials, organo-metallic pharmaceuticals and catalysts, asymmetric synthesis, biosensor metal clusters, molecular fluorescence spectroscopy, computational aspects of materials/alloys and molecular inhibitors for disease targets. Research in these areas is acknowledged by the scientific world in the form of 50 research publications in 2013 and several lectures in national and international conferences. The main focus of the department is to translate the fundamental research done in the laboratory to innovative applications for the welfare of society. The members of our research family grow continuously with an inflow of 10-12 research aspirants every semester thereby conveying to the onlookers the presence of a rapidly growing scientific community at Indore. Our research is supported by generous funding from private and public agencies, especially DST and CSIR to an amount equal to Rupees 3.5 crores that shows a model of self-sustaining system.

The discipline has pledged to train and develop next generation scientific leaders by providing an opportunity for independent and meticulous thinking in research problems. The graduate students are exposed to learn in an environment of modern facilities at par with international standards to fulfill their scientific passion of creativity. Chemistry department also provides introductory chemistry knowledge to a large number of students other than science disciplines. The chemistry department at IIT Indore has opened the avenue for full fledged two year masters program in chemistry discipline, in the academic year 2013-14 with 8-students. The attention is focused on real research problems in laboratory rather than a traditional two year theoretical

programme with meagre space for research exercise. This will slow down the wheel of intellectual drain in India and absorb our creative master students for pursuing their research interests, in full satisfaction, within our country.

Faculty members of chemistry department were actively involved in conducting workshops to serve the society under the scheme 'Continuing Educational Programme' (CEP). Recently two such successful workshops, "Modern Spectroscopic Techniques-I & II", has been conducted in partnership with Sophisticated Instrumentation Centre (SIC) during which faculty members, scientists, researchers, postgraduate and under graduate students from various institutes across the country has participated in large numbers. These workshops familiarize researchers and teachers with modern techniques that have been practiced in facilitating the discoveries of chemistry department.

Toxic and hazardous substances generated in the chemistry laboratories during day to-day research activities are being disposed off in an environmental friendly manner by following world class research practice teaching our students and workers about environmental safety and consciousness. This ensures the chemistry department's seriousness and attention towards our surroundings where we live in, without neglecting issues like environmental pollution.

The department of chemistry also offers interdisciplinary collaboration with institutes of national (Banaras Hindu University, India) and international (Uppsala University, Sweden, Kalshrue Institute of Technology, Germany, National Institute of Advanced Industrial Science and Technology, Japan, Purdue University, USA) repute to expedite scientific discoveries in various disciplines of research ranging from sciences to engineering. Public-private partnership in the form of intellectual advice to industries and technology transfer from in-house discovery is another aspect of the chemistry department, to install trust with common people that the public fund is used for societal cause.

Faculty members:

Dr. Rajneesh Mishra
Associate Professor
Chemistry
HOD School of Sciences
rajneeshmisra@iiti.ac.in

(PhD: IIT Kanpur; Postdoctoral fellow: GATECH, Atlanta, USA, University of Kyoto, Japan)

Dr. Rajneesh Mishra is the Head of the School of Sciences. He works on organic electronics and photonics.
He 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.

Research Interest:

- Organic synthesis/ Synthetic methodology
- Organic solar cell
- Electron and Energy transfer in molecular systems
- Multi-photon absorption
- Photo-sensitizers for photodynamic cancer therapy.
- Supra-molecular systems for molecular devices.

Achievements in 2012-2013:
Publications: 13
Funding: DST, CSIR

Dr. Chelvam Venkatesh
Assistant Professor
Chemistry*,
Bio Sc. & Bio Eng.#,
HOD Chemistry
cvenkat@iiti.ac.in

(PhD: IIT Kanpur; Alexander von Humboldt fellowship: Freie University Berlin, Germany; Postdoctoral Fellow: Purdue University, USA)
Dr. Chelvam Venkatesh is heading the discipline of Chemistry.
He works on total synthesis of biologically active molecule, new methodologies for small molecule heterocycles and ligands that can act as lead or targeting ligand for drug research programme. The new targeting ligands can be utilized to deliver drugs selectively to pathological cells of cancer and inflammatory diseases. Further his research involves developing near infrared imaging agents that can in future aid intra-operative guided surgery in oncology.

Research Interest:

- Synthesis of natural products, heterocycles and carbocycles
- Construction of C-C and C-X (X =N,O,S,P) bonds,
- Diagnostic applications of new targeting ligands for cancers and inflammatory diseases,
- Synthesis of Inhibitors for drug targets, drug delivery systems, near-infra red fluorescence, nuclear Imaging and bio-conjugate chemistry

Achievements in 2012-2013**:**
Workshops: Modern Spectroscopic Methods-I & II in SIC
Publications: 4
Funding: CSIR (submitted)

Dr. Satya S. Bulusu
Assistant Professor
Chemistry*,
Bio Sc. & Bio Eng.#,
sbulusu@iiti.ac.in

(PhD: University of Nebraska, USA; Assistant Professor: Shobhit University, India; Postdoctoral Fellow: York University, University of New Brunswick, University of Nebraska)

Dr. Satya S. Bulusu works on Computational Chemistry, Structural evolution of Nano-clusters and Nano-alloys, Global Optimization Methods, Algorithms for predicting Transition State and DFT Guided Simulations.

Research Interests:
Computational Chemistry, Chemical Physics, Nano-clusters, Nanoalloys, Global optimization methods and Soft computing techniques.

Projects:
"Interaction of Noble metal ions with Nucleo-base".
"Modeling size selected Nano-alloys".
Achievements in 2012-2013:
Workshop: 1; Publications/Book Chapters: 2
Funding: CSIR

Dr. Anjan Chakraborty
Assistant Professor
Chemistry
anjanc@iiti.ac.in

(PhD: IIT Kharagpur; Postdoctoral Fellow: Pennsylvania State University, Florida State University USA, Kobe University, Japan)

Dr. Anjan Chakraborty works on anticancer drug molecule ellipticine in different biological media. His interest is in photo-physics of drug molecules and study of different biological systems by fluorescence spectroscopy. Funding: DST

Research Interest:

- Preparation and characterization of different biological system which can be important for drug delivery.
- Understanding of drug delivery by different spectroscopic technique.
- Interaction of drug molecules with proteins and membranes.
- Dynamical aspect of drug molecules in bio-mimic system.

Dr. Apurba K. Das
Assistant Professor
Chemistry
apurba.das@iiti.ac.in

(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)

Dr. Apurba K. Das is working on directed self-assembly of peptides and DNA based molecules for potential applications in Biology and Nano-sciences. His group is focused on multidisciplinary (Chemistry, Biology and Nano-sciences) research.

Research Interest:
Peptide and DNA based nano-structured materials; Systems Chemistry; Supra-molecular electronics; Nano-catalysis.

Achievements in 2012-2013:
Invited Talks: 1;
Presentation in conferences: 1
Publications: 4
External Funding: DST, CSIR

Dr. Pradeep Mathur
Director
Professor
Chemistry
director@iiti.ac.in

(PhD: Keele University, UK; Research Associate: Yale University, USA; J.C.Bose Fellow; recipient of the Shanti Swarup Bhatnagar 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; has been on Editorial Boards of Organometallics, Journal of Organometallic Chemsitry and Journal of Cluster Science and has been Chair of Inorganic Ring Systems 2009)

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

Dr. Shaikh M. Mobin
Assistant Professor
Chemistry*,
Bio Sc. & Bio Eng.#,
Surface Sc. & Eng.†
Incharge SIC
xray@iiti.ac.in

(PhD IIT Bombay, India; Postdoctoral Fellow: IIT Bombay)

Dr. Shaikh M. Mobin is In-charge of the Sophisticated Instrument Centre at IITI.
Research Interest:
Synthesis and structural characterization of (a) metal chalcogenized clusters. (b) Coordination polymers. (c) Inorganic co-crystals; Solid-State Studies by employing SCSC techniques to the metal complexes; Time-Resolved X-ray Crystallography; Designing of newer class of MOF's and studying their solid-state properties; Development of organometallic clusters to explore their catalytic properties; Construction of bio-mimetic sensor through electrochemical methods.

Invited Talks: ; 5 Publications: 23 (2013); Funding: CSIR
Convener for 1st User Meet on Agilent Technologies X-ray Diffractometer at IIT Indore, which results in two summer fellowship sponsored by Agilent Technologies.

Dr. Tushar K Mukherjee
Assistant Professor
Chemistry
tusharm@iiti.ac.in

(PhD IIT Bombay; Postdoctoral Scientist, Columbia University Medical Centre, New York, USA)

Dr Tushar Mukherjee works on fluorescence imaging and spectroscopy. His group involve in studying the details spectroscopic properties of bio-compatible quantum dots by combining ensemble and single molecule fluorescence techniques.

Research Interest:

- Single molecule fluorescence imaging.
- Single molecule spectroscopy in heterogeneous media.
- Developing high resolution optical microscope.
- Ultrafast fluorescence spectroscopy.

Achievements in 2012-2013:
Invited Talks: 1
Presentation in conferences: 1
Publications: 1
Funding: CSIR

Dr. Suman Mukhopadhyay
Associate Professor
Chemistry
Dean of Planning
suman@iiti.ac.in

(PhD: Indian Association for the Cultivation of Science; Post-doctoral Fellow: National University of Singapore; FCT post-doctoral fellow: Instituto Superior Técnico in Portugal;Marie-Curie International Incoming Fellow: EPFL in Lausanne (Switzerland))

Dr. Suman Mukhopadhyay works on synthetic coordination and organometallic chemistry. His interest is on study of catalytic, absorption and medicinal properties of Metal-organic Frameworks generated by cycloaddition and organoruthenium compounds.

Research Interest:

- Synthesis of metal-organic frameworks and studies on catalytic, absorption and magnetic properties.
- Metal-mediated organic synthesis and small molecule activation
- Organo-ruthenium compound and the application in medicinal chemistry

Achievements in 2012-2013:
Presentation in conferences: 3
Publications: 4
Funding: DST, CSIR

Dr. Biswarup Pathak
Assistant Professor
Chemistry
biswarup@iiti.ac.in

(PhD: Indian Institute of Science, Bangalore; Postdoctoral Fellow: Jackson State University, USA)

Dr. Biswarup Pathak 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. The underlying reaction mechanism for each of these processes is very important for their understanding and improvement. He is working on such materials which can be potentially applicable for renewable energy and bio-applications.

Research Interest:

- Computational Material Science
- Atomistic Modeling on Clean Energy Materials
- Hydrogen Storage and Production (Photo catalysis)
- Li-ion Batteries
- Fuel Cell
- Surface Catalysis
- Molecular Electronics

Achievements in 2012-2013:
Invited Talks: 3;
Publications: 13
Funding: CSIR

Dr. Sampak Samanta
Assistant Professor
Chemistry
sampaks@iiti.ac.in

(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)

Dr. Sampak Samanta works on organocatalytic synthesis of various N-heterocycles. He develops one-pot metal-free based catalytic system for the synthesis of both asymmetric and non-asymmetric versions of a variety of biologically significant indole based heterocycles namely tetrhydrothiopyrano [2,3-*b*]indole, tetrahydrocarbazole and carbazole derivatives.

Research Interest:

- Organocatalytic synthetic transformations.
- Total synthesis of biologically significant molecule.
- Green chemistry.

Achievements in 2012-2013:
Publications: 6
Funding: CSIR (ongoing), DST (submitted)

Dr. Tridib K. Sarma
Assistant Professor
Chemistry
tridib@iiti.ac.in

(PhD: IIT Guwahati, India; JSPS Post-Doctoral Research Fellow: University of Tokyo, Japan; Alexander-von-Humboldt Post-Doctoral Fellow: University of Heidelberg, Germany)

Dr. Tridib K. Sarma works on materials Chemistry at the nanometer dimension. His research group involves in research works towards the development of new functional materials with potential applications in organic catalysis, nano-diagnostics and therapeutics, nano-bio integration and nano-electronics.

Research Interest:

- Synthesis of metallic, metal oxide and magnetic nanoparticles through biogenic routes with improved biocompatibility and functionality.
- Nanoparticles as effective heterogeneous catalysts for important organic transformations.
- Development of nanoparticle based systems for applications such as contrast agents for biomedical applications and electronics applications such as transistors, solar cells and LED devices.
- Development of co-ordination polymer materials and hydrogels and their applications.

Achievements in 2012-2013:
Presentation in conferences: 2
Publications: 3
Funding: DST

Dr. Sanjay K. Singh
Assistant Professor
Chemistry
sksingh@iiti.ac.in

(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)

Dr. Sanjay Singh works on synthetic organo-metallic and nano-particle catalysts for organic transformations. He works on the development of metallo-ligands based on metal-arene complexes are of prime importance owing to their application as building blocks in the development of architecturally complex metal-organic supra-molecular systems. He also works on the development of inexpensive metal nanoparticles as efficient catalysts for various industrially and biologically important organic transformations.

Research Interest:

- Synthetic organo-metallic and coordination chemistry of transition metals; Nano-particle catalysis for organic transformations.

Achievement in 2012-2013:
Conference: 1
Publications: 2
Funding: CSIR

Publications: Chemistry (2012-2013)

Journals :

1. J. B. Sanghavi, M. M. Shaikh, P. Mathur, K. G. Lahiri, K. A. Srivastava, "Biomimetic sensor for certain catecholamines employing copper(II) complex and silver nanoparticle modified glassy carbon paste electrode", Biosensors & Bioelectronics. 2013, 39(1), 124-132.
2. Y. Torubaev, P. Mathur, B. Jha, M. M. Shaikh, I. V. J. Skabitsky, "Cyclodimerization of phenyliodoacetylene with elemental tellurium: New pathway to 1.3-ditellurofulvenes" Organomet. Chem, 2012, 696(2), 496-503.
3. B. Jha, P. Mathur, K. R. Joshi, M. M. Shaikh, "Distinguished role of iron pentacarbonyl toward the reaction of acetylenes and isocyanates under photochemical and thermal reaction conditions" Abstracts of Papers, 243rd ACS National Meeting & Exposition. 2012, INOR-1195.
4. V. Dhayal, A. Chaudhary, B. L. Choudhary, M. Nagar, R. Bohra, M. M. Shaikh, P. Mathur, "Molecular precursors for the preparation of homogenous zirconia–silica materials by hydrolytic sol–gel process in organic media" Dalton Trans. 2012, 41(31), 9439-9450, .
5. P. Mathur, R. K. Joshi, D. K. Rai, B. Jha, M. M. Shaikh, "One pot synthesis of maleimide and hydantoin by Fe(CO)5 catalyzed [2 + 2 + 1] co-cyclization of acetylene, isocyanate and CO" Dalton Trans. 2012, 41(16), 5045-5054.
6. Y. Torubaev, A. Pasynskii, P. Mathur, "Organotellurium halides: New

ligands for transition metal complexes", Coordination Chemistry Reviews. 2012, 256(5-8), 709-721.

7. P. Mathur, B. Jha, A. Raghuvanshi, R. K. Joshi, M. M. Shaikh, "Photolytic reaction of substituted (ethynyl) benzaldehyde and Fe(CO)5: Formation of indenone and chelated iron complexes" J. Organomet. Chem. 2012, 712, 7-14.

8. D. K. Rai, M. Tauqeer, M. M. Shaikh, P. Mathur, "Reaction of 3-ferrocenylpropynal with iron carbonyl and chalcogenised iron carbonyl clusters: Formation of new ligands"Abstracts of Papers, 243rd ACS National Meeting & Exposition, 2012. INOR-994.

9. P. Mathur, R. Shyam Ji, D.a K. Rai, A. Raghuvanshi, M. M. Shaikh, "Role of Sulfur in Influencing Contrasting Reactivity of Acetylene Bonds in 1-Ferrocenyl-4-phenyl-1,3-butadiyne in Cluster Forming Reaction" J. Cluster Sci. 2012, 23(3), 615-625.

10. P. Mathur, R. Shyam Ji, M. Tauqeer, G. K. Lahiri, M. M. Shaikh, "Synthesis and characterization of a novel unfused 1, 4-diselenine" J. Organomet. Chem. 2012, 721-722, 186-189.

11. P. Mathur, D. K. Rai, M. Tauqeer, R. K. Joshi, G. K. Lahiri, M. M. Shaikh, "Synthesis, structure and redox property of first 1, 2, 3-triselenole, J. Organomet. Chem. 2012, 721-722, 144-147.

12. T. Bhattacharya, T. K. Sarma, S. Samanta, "Self-assembled monolayer coated gold-nanoparticle catalyzed aerobic oxidation of α-hydroxy ketones in water: an efficient one-pot synthesis of quinoxaline derivatives" Catal. Sci. Technol., 2012, 2, 2216-2220.

13. R. Sharma, R. Margani, M. M. Shaikh, R. Misra, "Ferrocenyl substituted calixarenes: synthesis, structure and properties", RSC Adv., 2013, 3, 5785-5788.

14. T. Jadhav, R. Maragani, R. Misra, V. Sreeramulu, D. N. Rao, M. M. Shaikh, "Design and synthesis of donor–acceptor pyrazabole derivatives for multiphoton absorption", Dalton Trans., 2013, 42, 4340-4342.

15. R. Maragani, T. Jadhav, M. M. Shaikh, R. Misra, "C3 symmetric ferrocenyl triazines: synthesis, structure, and properties", RSC Adv., 2013, 3, 2889-2892.

16. R. Sharma, P. Gautam, M. M. Shaikh, R. Misra, "β-Substituted ferrocenyl porphyrins: synthesis, structure, and properties", Dalton Trans., 2013, 42, 5539-5545.

17. B. Dhokale, P. Gautam, M. M. Shaikh, R. Misra, "Donor–acceptor, ferrocenyl substituted BODIPYs with marvelous supramolecular interactions", Dalton Trans., 2013, 42, 1512-1518.

18. R. Misra, P. Gautam, T. Jadhav, M. M. Shaikh, “Donor-Acceptor Ferrocenyl Substituted Benzothiadiazoles: Synthesis, Structure and Properties”, J. Org. Chem., 2013, DOI: 10.1021/jo4005734.

19. P. Gautam, B. Dhokale, M. M. Shaikh, R. Misra, “Ferrocenyl BODIPYs: synthesis, structure and properties” RSC Advances, 2012, 2, 12105-12107.

20. R. Maragani, T. Jadhav, M. M. Shaikh, R. Misra, “Synthesis, structure, photophysical, and electrochemical properties of donor acceptor ferrocenyl derivatives”, Tetrahedron 2012, 68, 7302-7308

21. P. Gautam, B. Dhokale, V. Shukla, C. P. Singh, K. S. Bindra and R. Misra, “ Optical limiting performance of meso-tetraferrocenyl porphyrin and its metal derivatives”, J Photochem and Photobio A, 2012, 239, 24.

22. B. Dhokale, P. Gautam, and R. Misra, “Donor-Acceptor Perylenediimide-Ferrocene conjugates: synthesis, photophysical, and electrochemical properties”. Tetrahedron Lett. 53, 2012, 2352-2354.

23. D. B. Rasale, I. Maity, M. Konda, A. K. Das , “Peptide Self-assembly Driven by Oxo-ester Mediated Native Chemical Ligation”, Chemical Communications, 2013, In press

24. I. Maity, D. B. Rasale, A. K. Das, “Exploiting a Self-assembly Driven Dynamic Nanostructured Library, RSC Advances, 2013, In press.

25. D. B. Rasale, I. Maity, A. K. Das, “Emerging pi-stacked Dynamic Nanostructured Library”, RSC Advances, 2012, 2, 9791-9794.

26. I. Maity, D. B. Rasale, A. K. Das, “Sonication Induced Peptide-appended Bolaamphiphile Hydrogels for in situ Generation and Catalytic Activity of Pt Nanoparticles”, Soft Matter, 2012, 8, 5301-5308.

27. R. Thakur, A. Das and A. Chakraborty, “Fate of Anticancer Drug Ellipticine in Reverse Micelles in Aqueous and Methanolic Environment: A Photophysical Approach”, Chem. Phys. Lett., 2013, 563, 37.

28. R. Thakur, A. Das and A. Chakraborty, “Photophysical and Photodynamical Study of Ellipticine: An Anticancer Drug Molecule in Bile Salt Modulated in Vitro Created Liposome Phys”. Chem. Phys. 2012, 14, 15369.

29. R. Thakur, A. Mallick and A. Chakraborty, “Photophysical and Photodynamical Study of Fluoroquinolone Drug Molecule in Bile Salt Aggregates” Photochem. Photobiol. 2012, 88, 1248.

30. P. K. Jaiswal, S. Biswas, S. Singh, B. Pathak, M. M. Shaikh, S. Samanta, “Stereoselective synthesis of highly functionalized tetrahydrocarbazoles through a domino Michael-Henry reaction: an easy access of four

contiguous chiral centers", RSC Advances 2013, in press.

31. D. Majee, A. Srivastava, M. M. Shaikh, S. Samanta, "L-Proline catalyzed highly efficient synthesis of Z-5-alkylidene cyclic sulfamidate imines: An easy access of 5-alkyl-substituted-4-aryl-cyclic sulfamidate imines", RSC Advances 2013, in press.
32. A. Srivastava, S. Singh, S. Samanta, "(±)-CSA catalyzed Friedel-Crafts alkylation of indoles with 3-ethoxycarbonyl-3-hydoxyisoindolin-1-one: An easy access of 3-ethoxycarbonyl-3-indolylisoindolin-1-ones bearing a quaternary α-amino acid moiety", Tetrahedron Letters 2013, 54, 1448.
33. S. Singh, A. Srivastava, S. Samanta, "Rapid access of 2,3,4-trisubstituted-2,3,4,9-tetrahydrothiopyrano[2,3-b]indole derivatives via one-pot three component reaction using organocatalysis", Tetrahedron Letters, 2012, 53, 6087.
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39. M. M. Shaikh, V. Mishra, P. Ram, A. Birla, "Bis [(2-(2-hydroxymethyl) pyridine-\k^2^N, O] (pivalate-\k O^1^) Copper (II)", Acta Cryst. Sec. E., 2012, E68, m1055.
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41. S. K. Singh, "Nanocatalysts for Hydrogen Generation from Hydrazine, Qiang Xu, Catal.Sci.Techol.,DOI:10.1039/C3CY00101F, 2013", Advance Article

(Perspective).

42. J. Prasongkit, A. Grigoriev, B. Pathak, R. Ahuja, and R. H. Scheicher, "Transverse Electronic Transport through DNA Nucleotides with Functionalized Graphene Electrodes", Arkivoc:1202.3040 2013, (in press).

43. P. Liu, J. Nisar, Ba. Sa, B. Pathak, R. Ahuja, "Anion-Anion Mediated Coupling in Layered Perosvkite La2Ti2O7 for Visible Light Photocatalysis", Journal of Physical Chemistry C, 2013, (in press).

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45. P. K. Jaiswal, S. Biswas, S. Singh, B. Pathak, M. M. Shaikh and S. Samanta "Stereoselective Synthesis of Highly Functionalized Tetrahydrocarbazoles through a Domino Michael-Henry Reaction: an Easy Access of Four Contiguous Chiral Centers", RSC Advances, 2013 (in Press).

46. P. Mathur, R. Shyam Ji, B. Pathak, M. M. Shaikh , "Formation of (E)-$[FcC(PS_2(OR)_2)=CH(PS_2(OR)_2)]$ (R = Me, Et, iPr) in Photolytic Reactions of Ferrocenylacetylene and $[(RO)_2PS_2H]$ in Hexane/Alcohols: Experimental and DFT study", Journal of Organometallic Chemistry, 2013 (in Press).

47. M. Saha, R. Nasani, M. M. Shaikh, 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", Inorganic Chemistry Communications 34, 62-67, 2013.

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51. X. Jiang, J.d Nisar, B. Pathak, J. Zha, R. Ahuja, "Graphene oxide as a chemically tunable 2-D material for visible-light photocatalyst applications", Journal of Catalysis, 299, 204-213, 2013.

52. Z. Qian, S. Li, B. Pathak, C. M. Araujo, R. Ahuja, P. Jena, "C_{60}-Mediated Hydrogen Desorption in Li-N-H Systems", Nanotechnology, 23, 485406, 2012.

53. J. Nisar, X. Jiang, B. Pathak, J. Zhao, R. Ahuja, "Semiconducting allotrope of grapheme", Nanotechnology , 23, 385704, 2012.

54. T. Hussain, B. Pathak, T. A. Maark, M. Ramzan, R. Ahuja, “Functionalization of graphene with alkali and alkaline-earth metals: An insulator to metallic transition”, Euro Physics Letter, 99, 47004, 2012.

55. J. Shen, V. Chelvam, G. Cresswell, P. S. Low, “Use of Folate-conjugated Imaging Agents to Target Alternatively Activated Macrophages in a Murine Model of Asthma”, Molecular Pharmaceutics, 2013, *10*, 1918–1927.

56. K. Lindsay, V. Chelvam, W. Charity, M. Sakkarapalayam, P. Scott, “Development of Tumor-Targeted Near Infrared Probes for Fluorescence Guided Surgery” , Kularatne Sumith, Low Philip Bioconjugate Chemistry, 2013, 24, 1075-1080.

57. V. Gaind, H. R. Tsai, K. J. Webb, V. Chelvam, P. S. Low, “Small animal optical diffusion tomography with targeted fluorescence”, J. Opt. Soc. Am. A. 2013, 30, 1146-1154.

58. H. R. Tsai, B. Z. Bentz, V. Chelvam, V. Gaind, K. J. Webb, P. S. Low, “ In vivo optical imaging of kinetics in a small animal for folate-targeted drug development”, Optics in the Life Science, 2013.

Conference Papers:

1. Distinguished role of iron pentacarbonyl toward the reaction of acetylenes and isocyanates under photochemical and thermal reaction conditions, Jha, Badrinath; Mathur, Pradeep; Joshi, Raj K.; Mobin, Shaikh M. Abstracts of Papers, 243rd ACS National Meeting & Exposition, San Diego, CA, United States, March 25-March 29, 2012
2. Reaction of 3-Ferrocenylpropynal with iron carbonyl and chalcogenised iron carbonyl clusters: Formation of new ligands; $[Fe(CO)_3\text{-}\eta^4\text{-}(FcC_2CHO)_2]$, $[Fe(CO)_2\{\eta^2\text{:}\eta^2\text{-}(FcC_2CHO)_2Fe(CO)_3\text{-}\mu\text{-}CO\}]$ and 1,2,3-triselenole, Rai, Dhirendra K.; Tauqeer, Mohd.; Shaikh, Mobin M.; Mathur, Pradeep Abstracts of Papers, 243rd ACS National Meeting & Exposition, San Diego, CA, United States, March 25-29, 2012
3. Enzyme Sensing and Enzyme-driven Dynamic Peptide Nanostructures, Dnyaneshwar B. Rasale Indrajit Maity, Apurba K. Das, presented in 1st National Conference on "Challenges and Prospective in Engineering, Management & Pharmacy", B. M. College, Indore, April 27-28, 2012.

Discipline of Mathematics:

The Discipline of Mathematics, IIT Indore took an initiative to conduct the Madhava Mathematics Competition 2013 on January 06, 2013 for the Indore region. The objective of this competition is to generate interest in mathematics and inculcate the spirit of problem solving especially for second year B.Sc. Students in India. The discipline has started collaborative work with Tohoku University and Yamaguchi University, Japan. Research in this project involves new development and aspects of geometric function theory which were not investigated earlier, and developing applications based on these developments.

Faculty members:

Dr. Swadesh Kumar Sahoo
Assistant Professor
Mathematics
HOD Mathematics
swadesh@iiti.ac.in

(PhD IIT Madras; Postdoctoral fellow: IIT Madras, Visiting Researcher: University of Turku, Finland)

Dr Sahoo is the Head of the Discipline of Mathematics.
He 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 "Inequalities and Geometry of Hyperbolic-type Metrics, Radius Problems, and Norm Estimates". The National Board for Higher Mathematics, Department of Atomic Energy, awarded him the NBHM Post-doctoral Fellowship in 2008. His main research area is Geometric Function Theory and the current research interests include Univalent Function Theory, Hyperbolic-type Metrics, and Quasi-conformal Mappings.

Achievements in 2012-2013:
Invited Talks: 4; Presentations in conferences: 3, Publication: 1 (accepted) and 2 (submitted) Recently started research collaboration work with Tohoku University and Yamaguchi University, Japan.

Dr. Sk. Safique Ahmad
Assistant Professor
Mathematics
safique@iiti.ac.in

(PhD IIT Guwahati; Research Associate: SERC, IISc. Bangalore; Postdoctoral Fellow: Institutfür Mathematik, Universität Berlin, Germany)

Dr. Ahmad 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 Eigen-value & Eigen-decomposion of Matrix Pencils and their Applications on Pseudospectra of Matrix pencils". He received NBHM Post Doctoral fellowship funded by DAE and German Post Doctoral Fellowship BAT IIa.

Achievements in 2012-2013:
Invited Talks: 2;
Presentation in conferences: 1;
Publication: 3 (published) and 2 submitted;
Funding: DST

Dr. Md. Aquil Khan
Assistant Professor
Mathematics
aquilk@iiti.ac.in

(PhD IIT Kanpur; Visiting researcher: University of Amsterdam, The Netherlands; Postdoctoral Fellow: The Institute of Mathematical Sciences (IMSc), Chennai; Marie-Curie Fellow: Fraunhofer SIT, Darmstadt, Germany)

Dr. Khan works on Modal Logic, Rough Set Theory and its Applications.

Achievements in 2012-2013:
Publication: 1 (accepted) and 3 Submitted.

Dr. Anand Parkash
Assistant Professor
Mathematics
anandparkash@iiti.ac.in

(PhD IIT Kanpur; Lecturer: LNMIIT, Jaipur; Visiting faculty member: IISER, Bhopal)

Dr. Prakash 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. Niraj K. Shukla
Assistant Professor
Mathematics
nirajshukla@iiti.ac.in

(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)

Dr Shukla 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 it's some topological behavior.

Achievements in 2012-2013:
Publications: 2 (submitted).

Dr. Antony Vijesh
Assistant Professor
Mathematics
Dean Student Affairs
antony@iiti.ac.in

(PhD: IIT Madras; Reader: Indian Institute of Space Science and Technology (IIST), ISRO, Thiruvananthapuram; Assistant Professor: Centre for Mathematical Sciences Pala)

Dr Vijesh is the Dean of Student Affairs.

He works on Applied Functional Analysis. His main research area is Iterative Methods for solving operator equations.

Achievements in 2012-2013:
Publications: 1 accepted and 2 submitted

Publications: Mathematics (2012-2013)

Journals:

1. Safique Ahmad, "Backward errors for eigenvalues and eigenvectors of Harmitian, skew-Hermitian, H-even, and H-odd matrix polynomials" accepted in Linear and Multi-linear Algebra, pp. 1-23, Volume 1, Year 2012. (with V. Mehrmann).

2. Swadesh K. Sahoo, "On the stability of phi-uniform domains (with R. Klen, Y. Li and M. Vuorinen)", Accepted in Monatshefte für Mathematik, published by Springer.

Discipline of Physics

The discipline of Physics at IIT Indore with 12 faculty members, from diverse streams and specializations, provides a wonderful spectrum of fundamental and applied physics. These unmatchable understanding of basic concepts help them grow as engineers and scientists. Theoretical groups work in diverse research areas like chaos, complex systems, high energy physics, gravitational theory, Quantum electrodynamics. The experimentalists in discipline of physics work in experimental condensed matter physics, device physics, materials science, experimental astrophysics and experimental high energy physics. Major research related to experimental high energy physics is the development of detectors for PANDA experiment in Germany and understanding global properties of quark-gluon plasma. IIT Indore is a partner in Large Hadron Collider (LHC). The experimental condensed matter physics (ECMP) group is involved in various activities of research and development. This vibrant group has wide range of expertise in different synthesis and characterization techniques. Research activities of this group include the study of intermetallics, manganites, superconductors, multiferroics, elemental & oxide semiconductors etc. Also, research work of soft condensed matter physics includes organic polymers, metal polymer nanocomposites and its polymeric blends with organic insulators, conducting polymers and organic semiconductors for direct applications in memory devices, electrochromic devices, batteries etc. Surfaces and interfaces (solid and liquid surfaces, liquid-solid, liquid-liquid interface etc.) of systems, which are potentially important in terms of basic science and technology, are also studied due to the importance of these materials in energy storage materials. With a research team consisting of 12 faculty members, 25 research students and one post doctoral research scientist, discipline of Physics has produced more than 50 publications in last one year. Among faculty members, we now have a DAAD Fellow, 3 DST and 1 CSIR projects with a total budget of ₹ 2.5 crores.

Faculty members

Dr. Siddharth Savyasachi Malu
Assistant Professor
Physics*
HOD Physics[!]
siddharth@iiti.ac.in

(PhD: University of Wisconsin-Madison, USA, Jansky Fellow; Postdoctoral Fellow: IUCAA, Raman Research Institute, India; Meera Memorial Fellow, Radhakrishnan Fellow at Oxford)

Dr. Siddharth Savyasachi Malu is the Head of the Astrophysics group.
Dr. Malu 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. He has recently installed India's first 10 GHz radio telescope at IITI and is working for fabricating in-house an array of antennas to build an observatory at IITI's new campus at Simrol.

Dr. Shubhendu Rakshit
Associate Professor
Physics
rakshit@]iiti.ac.in

(PhD: Calcutta University; Visiting Scientist: TIFR; Postdoctoral Fellow: University of Dortmund, Germany, Saha Institute of Nuclear Physics; Technion University, Israel; Harish-Chandra Research Institute, Allahabad)

Dr. Shubhendu Rakshit 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. His main aim is to look for signals of new physics beyond the standard model of particle physics. He aims at building models falsifiable at colliders and other high energy physics experiments.
Research Interests:

- Dark matter model building
- Higgs physics at Large Hadron Collider
- Origin of neutrino masses

Achievements in 2012-2013:
Presentation in conferences: 2
Member of India-based Neutrino Observatory

Dr. Preeti Bhobe
Assistant Professor
Physics*
Surface Sc. & Eng.[†]
pbhobe@iiti.ac.in

(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)

Dr. Preeti Bhobe specializes in X-ray Absorption Fine Structure (XAFS), Photoemission Spectroscopy (PES), and Thermoelectric power measurement.
Research Interest: Study of Crystal and Electronic Structure of Materials forms the underlying theme of her research activity. She employs advanced experimental probes like XAFS, XMCD and PES to investigate and understand a variety of properties and phenomena in solids - broadly classified into following areas: Strongly Correlated Electronic Systems ; Magnetic Shape memory Alloys ; Half metals and Semiconducting Materials; Unusual Magnetism across Metal-Insulator transitions etc.
She is setting up a facility to carry out "X-ray Absorption Spectroscopy". This will enable XAS, XANES, and EXAFS to be performed in-house which not many posses in India.

Achievements in 2012-2013:
Invited Talks: 2
Publication: 1
Funding: DST, India; CSIR, India; Institute funding.

Dr. Sudeshna Chattopadhyay
Assistant Professor
Physics*
Surface Sc. & Eng.†
sudeshna@iiti.ac.in

(PhD: Saha Institute of Nuclear Physics; Research Associate: Northwestern University, USA; Postdoctoral appointee of Centre for Electrical Energy Storage (CEES); Guest researcher appointment: Chemical Sciences and Engineering Division, Argonne National Laboratory, USA)

Dr. Sudeshna Chattopadhyay has been working in the field of atomic scale characterization of surface and interfaces of liquid-solid, soft materials, nanocomposites, and high pressure thermo electric materials. Her specialization is in: X-ray scattering, Spectroscopy (vuv, uv-vis, IR, EELS, XPS, NEXAFS, SIMS), Atomic force microscopy, Magnetron sputtering, spin coating, electrochemistry.

Research Interest:
- Surfaces and interfaces – Solids, liquids, soft matter and nanomaterials (metal-polymer nanocomposites, nanostructured organic/inorganic ultra-thin films etc.).
- Improvement of the capacity of Electrical Energy Storage Materials: Study of solid electrolyte interface, structure, mechanism
- Structure-property relationship of high pressure thermo electric materials
- The interface of water and hydrophobic surfaces: protein folding in aqueous environments, interaction of membrane with water, the physics of interfaces within colloids etc.

Achievements in 2012-2013:
Invited Talks: 4
Conferences: 3
Publications: 3
Patent: 1
Award: Deutscher Akademischer Austausch Dienst award, 2013.

Dr. Sarika Jalan
Associate Professor
Physics*
Biosciences & Bioengineering#
sarika@iiti.ac.in

(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)

Dr. Sarika Jalan works on complex networks and emergent behavior in spatially extended systems. Combining tools from random matrix theory and graph theory, her complex systems lab investigates complex systems ranging from biology to climate science.

Research Interest:
Complex biological and social networks, Extreme events, Spectral graph theory, Random matrix theory, Synchronization, Coupled chaotic dynamics on large networks, Adaptation and Evolution.

Achievements in 2012-2013:
Reviewer of : Physical Review Letters, EPL, Physical Review E, Chaos
Invited talks: 5
Publication: 4
Book Chapter: 1
Funding: DST, CSIR
Master/B.Tech. Thesis supervised: 4

Dr. Rajesh Kumar
Assistant Professor
Physics*,
Bio Sc. & Bio Eng.#,
Surface Sc. & Eng.†
rajeshkumar@iiti.ac.in

(PhD: IIT Delhi; Post Doctoral Fellow: National Institute for Nanotechnology (NINT),University of Alberta, Canada)

Dr. Rajesh Kumar works in the field of experimental Solid State Physics. His field of specialization is Raman and Photoluminescence spectroscopy of materials. He studies various microscopic properties (like electron-phonon interaction) of semiconductor nanostructures using Raman Spectroscopy.

Research Activities:

- Fabrication and characterization of molecular electronic devices
- Fabrication of Electro-chromic devices using organic materials.
- Fabrication and characterization of memory devices based on conducting polymer and/or various metal oxides.
- Spectroscopic investigation of organic/inorganic semiconductors
- Investigation of porous/nano-structured semiconductors

Achievements in 2012-2013:
Recipient of "best teacher award" in 2013
Publication: 3
Outreach activity: Article published in *Science Reporter (CSIR)*

Dr. Manavendra Mahato
Associate Professor
Physics
manav@iiti.ac.in

(PhD: University of Michigan, Ann Arbor, USA; Visiting Fellow: TIFR, Mumbai)

Dr. Manavendra Mahato's research involves theories of gravity which contain a lot of information about its boundary encoded in its geometry such as some quantum field theory such as non-Abelian Yang Mills theory, conformal field theory, or a condensed matter theory or fluid dynamics present there. This relation is known as Holographic correspondence or gauge/gravity correspondence. Most concrete and well studied version is known as AdS/CFT (anti de Sitter/ conformal field theory) correspondence. It is a specialized topic under broader framework of String theory and theoretical high energy physics.

Research Interest(s):

- Constructing topological solutions and their implications of relativistic hydrodynamical systems with anomalies and their interpretations for quantum field theories and gravity theories.
- Constructing anisotropic gravity solutions with asymptotic AdS spacetime and using them to study properties of spatially modulated condensed matter systems.
- Thermalization of higher spin fields in AdS spacetime and the corresponding quantum field theory.
- Behavior of quasi-normal modes during thermalization in AdS space.

Achievements in 2012-2013**:**
Invited Talks: 1
Presentation in Conference:1
Publications: 1 (under peer review)
Funding: DST

Dr. Krushna Mavani
Associate Professor
Physics*,
Surface Sc. & Eng.†
krushna@iiti.ac.in

(PhD: Saurashtra University; WPI postdoctoral Researcher: Kyoto University, Japan; Postdoctoral Researcher: Osaka University, Japan; Postdoctoral Researcher: Tata Institute of Fundamental Research, Mumbai)

Dr. Krushna Mavani works on structural magnetic and electrical properties of surface/interfaces of thin films and multilayers. She investigates the magnetic exchange at the interfaces in multilayered structures. She characterizes the surface properties with Atomic/Magnetic Force Microscopy.

Research Interest:

- Improve the efficiency and functions of memory-storage and devices.
- Research on functional materials will pave a road to new technologies for much lesser power-consumption and heat-generation in electronic devices.
- Research on Terahertz technology will contribute to develop the techniques for detecting RDX, Quality Control/Check of drinks, food, medicines and chemicals/compounds.
- The Terahertz spectroscopy will be used to understand optical functions of new materials.

Achievements in 2012-2013:
Invited Talks: 1
Conferences: 6
Publications: 5
Funding: DST, CSIR

Dr. P.N.Puntambekar
Visiting Professor
Physics
Dean Faculty Affairs
puntambekar@iiti.ac.in

(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; Post Doctoral Fellow: Imperial College of Science Technology, London, UK and National Physical Laboratory, Teddington, UK; Scientist: NPL, New Delhi)

Professor P N Puntambekar is the Dean of Faculty Affairs. His field of research is laser and its applications.

Dr. Ankhi Roy
Associate Professor
Physics
ankhi@iiti.ac.in

(PhD: IIT Bombay; DST Young Scientist IIT Bombay) Dr. Ankhi Roy 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 faculty members involved in the IIT Indore-ALICE collaboration.

Research Interest:

- Transition form factor of different light mesons
- Dalitz plot analysis of different mesons
- Detector development of the PANDA experiment.

Achievements in 2012-2013 :
Publications – 5 (2012-3, 2013-2)
Conference paper - 1
Awards – IUSSTF fellowship to pursue research in Old Dominion University, USA
Fund - COSY-FFE , Germany and DST-DAE

Dr. Pankaj R Sagdeo
Assistant Professor
Physics*
Surface Sc. & Eng.†
prs@iiti.ac.in

(PhD: UGC-DAE CSR Indore; Scientific officer/coordinator: Bhabha Atomic Research Centre, Visakhapatnam; Research Associate/Post Doctoral Research: UGC-DAE-CSR Beamlines on Indus-I AND Indus-II, Indian Synchrotron source)

Dr P. R. Sagdeo is the Head of the department of Surface Science and Enginering.
He explores magnetic, dielectric and electrical properties of various oxides, intermetallic and complex multilayer system. He is an expert for various characterizations techniques which includes electron diffraction and imaging using transmission electron microscopy, x-ray diffraction, electrical, dielectric, magnetic measurements, x-ray photoelectron spectroscopy, valence band spectroscopy, Raman spectroscopy and synchrotron based characterization techniques. He serves as a reviewer for journals published by AIP, IOP, Taylor and Francis, MRS, etc.

Research Interest:

- Search for innovative methods for sample preparation and characterization.
- Physics of highly correlated electron systems.
- Hybrid solar/memory devices for space application.
- In house design and development of scientific instruments.

Achievements:
Funding: CSIR
Organized international workshop on surface science and engineering, during 4th-5th March 2012 at IIT Indore.
Invited Talks/Lectures:

1. Structural Studies and Criticality in Ca Doped $LaMnO_3$; Seoul National University Korea, (April 2007).
2. Transmission Electron Microscopy: A tool for material Characterizations, National Chemical Laboratory, Pune, India. (2008).
3. TEM Investigations of Phase Coexistence in Manganites. Department of Physics, University of Pune, India. (2008).

Dr. Raghunath Sahoo
Associate Professor
Physics
raghunath@iiti.ac.in

(PhD Institute of Physics; CNRS postdoctoral fellow: Subatech, France and INFN Fellow in INFN Padova, Italy; Associated with LHC experiment at CERN Geneva through active participation in the ALICE Experiment)

Dr. Raghunath works in the area of high energy heavy-ion collision experiment aiming to produce a deconfined phase of quark gluon plasma in the laboratory (popularly known as the ***Big Bang Experiment***). He is the team leader and principal investigator of the ALICE project from IIT Indore and a council member of ALICE experiment. He is also the convener of Physics analysis Working Group (PWG) on Correlations and Fluctuations in India.
He is involved in the PANDA experimental initiatives from IIT Indore for the detector development for the FAIR facility at GSI, Germany.

Research Interest:

- Study of bulk properties of matter created in heavy-ion collisions; Particle Correlations and Fluctuations as a measure to study the QCD phase; diagram and signal of deconfinement; Phenomenology of Quark-Gluon Plasma; Quark-Hadron Phase transition, Hadron Physics.

Publications: Physics (2012-2013)

Journals :

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 Vol: 87, 144412 (2013).
2. A. Uysal, M. Chu, B. Stripe, A. Timalsina, S. Chattopadhyay, C. M. Schlepütz, T. J. Marks, and P. Dutta, "What X-rays can tell us about the interfacial profile of water near hydrophobic surfaces"; Phys. Rev. B 88, 035431 (2013).
3. S. Chattopadhyay, A. L. Lipson, H. J. Karmel, J. D. Emery; T. T. Fister, P. A. Fenter, M. C. Hersam, M. J. Bedzyk, "In Situ X-ray Study of the Solid Electrolyte Interphase (SEI) Formation on Graphene as a Model Li-ion Battery Anode"; Chemistry of Materials 24 (15), 3038 (2012). [§Equal contribution and co-first authors] {Selected by Advanced Photon Source, Argonne National Lab, USA as Outstanding Research Work}
4. A. L. Lipson §, S. Chattopadhyay §, H. J. Karmel, T. T. Fister, J. D. Emery, V. P. Dravid, M. M. Thackeray, P. A. Fenter, M. J. Bedzyk, M. C.Hersam, "Enhanced Lithiation of Doped 6H-SiC (0001) via High Temperature Vacuum Growth of Epitaxial Graphene"; J. Phys. Chem. C 116 (39), 20949 (2012). [§Equal contribution and co- first authors]
5. R. Kumar, R. G. Pillai, N. Pekas, Y. Wu, R. L. McCreery (2012) "Spatially Resolved Raman Spectroelectrochemistry of Solid-State Polythiophene/Viologen Memory Devices." J Am Chem Soc 134:14869–14876. doi: 10.1021/ja304458s
6. R. Kumar (2013) "Asymmetry to symmetry transition of Fano line-shape: analytical description." Indian J Phys 87:49–52. doi: 10.1007/s12648-012-0183-2
7. G. Sahu, R. Kumar, D. P. Mahapatra "Raman Scattering and Backscattering Studies of Silicon Nanocrystals Formed Using Sequential Ion Implantation." Silicon 1–7. doi: 10.1007/s12633-013-9157-z
8. M. Manavendra "Chiral vortices in relativistic hydrodynamics", arXiv:1207.0461 (currently under peer review),
9. M. Chandra, R. Rana, F. Aziz, A. Khare, D. S. Rana and K. R. Mavani "Competing Effects of Mn-Doping and Strain on Electrical Transport of NdNi1-xMnxO3 ($0 \leq x \leq 0.10$) Thin Films" ., J. Phys. D: Appl. Phys. 46, 415305 (2013)
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12. R. Rana, D. S. Rana , K. R. Mavani, I. Kawayama, H. Murakami, M. Tonouchi "Charge density wave excitations in stripe-type charge ordered Pr0.5Sr0.5MnO3 manganite", Applied Physics Letters 101(2012) 252401
13. M. Chandra, F. Aziz, K. R. Mavani "Charge Transport in NdNiO3 Thin Films: Effects of Mn-doping versus Tensile Strain", AIP Conference Proceedings (ACCEPTED)

14. M. Chandra, A. Khare, F. Aziz, R. Rana, D. S. Rana, and K. R. Mavani “Contrasting effects of compressive and tensile strain and doping-induced opening of charge-transfer gap in NdNi0.90Mn0.10O3 thin films”, AIP Conf. Proc. 1512, (2012) pp. 986-987

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16. S. M. Haque, P. R. Sagdeo, D. Bhattacharya, D. D. Shinde, J. S. Misal, N. Prasad, and N. K. Sahoo Comparison of spectral performance of HfO2/SiO2 and TiO2/SiO2 based high reflecting mirrors; AIP Conf. Proc. 1512, pp. 480-481 (2013).

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23. B. Abelev,....., R. Sahoo et al. ``Coherent J/Ψ photoproduction in ultra-peripheral Pb-Pb collisions at √sNN =2.76 TeV.'', ALICE Collaboration, Phys. Letts. B 718 (2013) 1273 [Impact Factor: 3.955].

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49. A. Roy “Symmetry Breaking and Transition Form Factor from eta and omega Decays.” for 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).

School of Humanities and Social Sciences:

The discipline of HSS has published 75 journal papers since 2009. There are 4 research projects running, Ganga Health Project, Department for International Development (DFID), UK; The Impact of Patent Policy on India's Innovativeness and Technology transfer, Indian Council of Social Science Research; Expanding Moral Compass, Indian Council of Philosophical Research; Eikhoi: A Design Initiative for a Transformative Community System, Indian Council of Social Science Research.

One faculty and three students have achieved scholarships in research projects. Dr. Joe Varghese secured Mellon Grant to visit School of Criticism and Theory, Cornell University (June- July, 2013). Mr. Ajay got selected for 'South–South PhD Sandwich Scholarship Programme 2013' at Asian Institute of Technology Bangkok, Thailand, sponsored by Food Security Center, University of Hohenheim, Germany. Ms. Sagarika Chattopadhyay is selected for Summer School 2013, organised by Institute for World Literature, Harvard University. Ms. Sreelekha Mishra is a visiting researcher, Council for Research in Values and Philosophy (RVP), Washington, D.C.,(September -October 2013). The department has established International collaborators: Massachusetts Institute of Art and Design and Shanghai International Studies University. The total funding achieved is 40 lakhs.

The HSS in its current structure includes various disciplines namely, Economics, English Literature, Sociology, Philosophy and Psychological Science. The school currently offers Doctoral Program in all these disciplines while expanding its interdisciplinary coverage to anthropology, history, political science, music, and design.

Faculty members:

Dr. Bharat Kumar;
Assistant Professor, HSS,
HOD HSS
bharathk@iiti.ac.in

(PhD: University of Hyderabad; Indian Council of Philosophical Research (ICPR) General Fellow)

Dr. Kumar 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.

Research Interest:

- Nationalism, Multiculturalism, Citizenship,
- Contemporary Indian Philosophy

Recent Publications: 2

Dr. Sujata Kar;
Assistant Professor
HSS
sujata@iiti.ac.in

(PhD IIT Roorkee)

Dr. Kar 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.

Research Interest:

- Unconventional Monetary policy
- Finance, Growth and Development

Recent Publications: 2

Dr. Nirmala Menon;
Assistant Professor, HSS
nmenon@]iiti.ac.in

(PhD George Washington University, USA)

Dr. Menon's 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 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.

Research Interest:

Postcolonial literature and translations; Literary theory; Gender studies; Digital Humanities, Role of Humanities in critiquing, archiving and using various forms of Digitization; Publishing, especially academic Humanities publishing

Recent Publications: 5

Dr. Premjit K Sanjram
Assistant Professor, HSS
sanjrampk@iiti.ac.in

(PhD IIT Bombay)

Dr. Sanjram performs research in Human Errors, Human Multitasking, Human Factors in Computer and Information Systems, Interactive System Design & Evaluation, Psychology of Programming/Empirical Study of Programming, and User Cognition by performing Human Factors research.

Research Interest:

- Cognitive Ergonomics; Human-System Interaction, Transport Human Performance, Usability, and Social Design.

Recent Publication: 1

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

(PhD from the Centre of Development Research, University of Bonn, Germany)

Dr. Mishra's 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.

Research Interests:

- Urban and rural water governance in India; River basin management in India; International water sharing between India, China, Pakistan and Bangladesh; Privatization of water.

Recent Publications: 2

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

(PhD IIT Kanpur)

Dr. Nayak's 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.

Research Interest:

- Marginalized Literatures and Postcolonial Studies
- Indian Writing in English, Postcolonial Theory,
- Translation Studies and Comparative Literature

Recent Publications: 8

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

(PhD IIT Bombay; Project Associate: Gujarat Institute of Development Research, Ahmedabad; Academic Associate: Indian Institute of Management, Ahmedabad)

Dr. Sharma is interested in Agricultural Economics (Economics of Land, Water and Forests) and Development Economics (Rural Poverty and Trade Concerns of Developing Countries).

Research Interest:

- Climate change and agriculture; Food security; Subsidies in energy sector and other aspect of resource Economics

List of Publication: 4

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

(PhD IIT Bombay; Academic Fellow/Program Manager: Centre for Contemporary Theory, Baroda)

Dr. Upendra works on Moral Philosophy (Epistemology), History of Philosophy and, Philosophical Foundations of Social Sciences. He is currently working on a project sponsored by the Indian Council of Philosophical Research titled, "Explaining the Moral compass".

Research Interest:

- Philosophy and History of Ideas;
- Philosophical Foundations of Social Sciences

Recent Publication: 1

Publications: Humanities and Social Sciences (2012-2013)

Journals :

1. S. Kar, "Exploring the Causal Link between FDI and Human Capital Development in India", Decision (IIM Calcutta).
2. A. J. Mishra, S. Kar, "Broader Social Implications of the Strategies of Business Corporations", International Journal of Indian Culture and Business Management (Inderscience), Vol. 7, No. 2, 2013, pp. 213 – 225
3. B. Kumar, S. Mishra D. Balaganapathy," Transition from Cultural Diversity to Multiculturalism: Perspectives from Off-shore Industry in India", AI & SOCIETY: Journal of Knowledge, Culture and Communication, Springer 2013. (Forthcoming)
4. B. Kumar "Reviewed the book Speaking of Gandhi's Death by Tridip Suhrud and Peter Ronald de Souza", Indore Management Journal, Volume 3, Issue 4, 75-76, 2012.
5. A. Nayak, "What does it mean to be an Untouchable? A Study of the Many Contours of Subjugation and "independence" in Mulk Raj Anand's Untouchable" in Social Exclusion Inclusion Continuum: A Paradigm Shift, eds. V. Rama Krishna, R. Shashidhar, M. Muniraju. Neruta Publishing

House, Bangalore, 2012. pp. 01 – 13.
6. A. Nayak, “An Exploration of Moral Conflicts in Macbeth”, The Literati: Journal of Language and Literature, Vol. 4, 2012. pp. 148 – 153.
7. A. Nayak , “Debunking the Stereotypes: A Close Reading of Selected Short Fiction in English from the Northeast India" in an edited volume titled Rethinking Marginality: Identity, Diaspora and Other Issues, Ed. Manash Pratim Borah (Central Institute of Himalayan Culture Studies), 2013 (Accepted)
8. B. K. Sethi, Amarjeet Nayak. “Redefining Dalit: Identity Politics, Issues and Debates in Contemporary Dalit Literature”, Wizcraft Journal of Art and Culture, Vol. I, No. II, 2013 (Accepted)
9. S. Shukla, A. 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)
10. A. Nayak, “Oscillating between Propaganda and High Art: Dealing with Conflicts in Indian English Poetry”, Lapis Lazuli – An International Literary Journal, Vol. II, Issue I, Spring 2012.
11. A. Nayak, “Sweeping Generalizations and False Dichotomies: An Examination of the Insider-Outsider Dichotomy in Anjum Hasan’s Lunatic in My Head”, ed. Indu Swami. Exploring North-East Indian Writings in English, Vol. 2, New Delhi: Sarup Book Publishers, 2012, pp. 44 – 55.
12. N. Menon, “The Hullabaloo about Hybridity”: Kiran Desai’s “Inheritance of Loss” in Creole Cosmopolitansims: Narratives of Migrant Postcoloniality. Peter Lang Publishing, New York (June-July 2013).
13. N. Menon, “Cracked Earth, Shattered Identities: Bapsi Sidhwa’s Cracking India and Deepa Mehta’s Earth”. In Esra Santesso and James McClung Edited Islam and Postcolonial Culture University of Georgia. (Accepted for publication, 2013).
14. N. Menon, “Translating Silences in Mahashweta Devi’s Imaginary Maps” Forthcoming in Romantic Circles Pedagogies Journal, August-Sept 2013
15. P. K. Sanjram, M. Gupta, “Task difficulty and time constraints in programmer multitasking: An analysis of prospective memory performance and cognitive workload”. International Journal of Green Computing. 4 (1) (forthcoming)
16. C. Upendra, “The Dynamics of Minority Redemption” for an Anthology on Becoming MInority: Perspectives on Europe and India, Jyotirmay Tripathy & S. Padmanabhan (Routledge India).
17. J. V. Yeldho, A. Nayak. “Inception: Voyeurism and Urban Representations”, Ravenshaw Journal of Literary and Cultural Studies, Vol. III, 2013. pp. 95-107.
18. J. V. Yeldho, “Out of Bounds: The letter and Amitav Ghosh’s In an Antique Land.” Pegasus. 6 (2012):70-76.
19. S. Chattopadhyay, J. Shrivastava. "Transitional Identities and the Unhomed Space in Monica Ali's Brick Lane and Tishani Doshi's The Pleasure Seekers". Asiatic, 6.1 (2012) 113-125.
20. S. Mishra, “Review of the book [Multiculturalism: A Very Short Introduction (2011)” by Ali Rattansi, Oxford University Press]. Indore

Management Journal, 4(1), 68-69.

21. R. Sharma, S. Kumar, "The role of patent policy in technology transfer to India: An empirical investigation on Indian manufacturing industry". The Journal of Technology Transfer. 2013 (Forthcoming).
22. S. Shukla, A. Nayak, "Splitting of Identity in Time and Place: An Exploration of North-East Indian Writings through their Use of Flashbacks and Reminiscences". Galaxy: International Multidisciplinary Research Journal, 2(iii), 1-5

Conference Papers:

1. A. K. Jha. "Developing Emotional Intelligence through Reading" in Proceedings of International Conference on Empowering the English Language classroom. The Department of Humanities and Social Sciences, MNIT Jaipur. ISBN 978-93-81583-84-5
2. P. K. Sanjram, "Attention and Human Errors in Multitask Performance". Proceedings of the 11th Asia Pacific Conference on Computer Human Interaction. Bangalore, India: ACM.
3. J. V. Yeldho, "Harlem: Black Manhattan and the practices of the city." Presented at the conference on Space and Place, Mansfield College, Oxford.

Books:

1. N. Menon, Ed. Marika Preziuso "Perspectives on Migrant Cosmopolitans": Narratives of Contemporary Postcoloniality, Peter Lang Publishing, (forthcoming 2013)
2. N. Menon, "Co-Editor, Collection of Essays. Creole Cosmopolitanism: Narratives of Migrant postcoloniality", Peter Lang Publishing (Forthcoming in 2013)
3. R. Sharma, "Patent Policy and Research and Development Expenditure: Evidence from Indian Industry" Knowledge Globalization Conference, held at Pune from January 5-7 2012, 193-200. ISBN 978-0-979-7593-3-8.

Interdisciplinary Research

Astrophysics Group:

IIT Indore's unique vision for research has led to the revival of instrumentation in Experimental Astrophysics - dormant for 20 years in India after GMRT came up - the last frontline experimental project in Radio Astronomy. Radio Telescopes are Passive Radar Systems, and require the expertise of Electrical Engineers in order to receive and characterize the extremely faint signals from the cosmos. This institute has broken from the tradition of focusing only on low-frequency radio astronomy and accordingly, our first radio telescope - to be installed in July 2013 - will have 5 GHz as the lowest frequency - 100 times more than the lowest frequency at other Indian Radio Telescopes. The fact that these signals - arriving at earth from billions of light years away in the case of clusters of galaxies - require extremely sensitive equipment for their detection was well appreciated right from the start. Another critical aspect of such research is the involvement of enterprising youngsters with the zeal to work at the forefront of research. Astrophysics at IIT Indore has led the way by encouraging B.Tech. students to apply their engineering skills to Experimental Astrophysics problems and as a result has been able to admit the most enterprising engineering undergraduate student, with one patent and two more on the way, as a Ph.D. scholar. Multi-frequency wideband Radio Telescopes usually require 3-4 years to build, with 12-15 dedicated members of a group working solely towards the goal of constructing a novel instrument. We have managed to do this in one year with one undergraduate and two Ph.D. students, and only a single faculty member devoted to the construction of the telescope. This single-dish telescope will receive signals at 5, 10 and 14 GHz with a bandwidth of 2 GHz, and will study the diffuse emission in galaxy cluster mergers that has its origins in complex Magneto-hydrodynamic turbulence effects. Since its inception in July 2012, the Astrophysics Group has now grown to four faculty members, with three of them joining in for detector, mechanical structure and modulator design and construction. IIT Indore is therefore poised to be the only institute in India that has a dedicated laboratory for material design and fabrication for astrophysics - on the lines of NASA centers. The Astrophysics Group has established collaborations with senior NASA scientists and a major MoU with UW-Madison has also been signed. UW-Madison, Brown University and the University of Manchester have already supplied sophisticated equipment and software to IIT Indore free of charge; most importantly, they have provided their expertise and experience in the design and construction of our first telescope. We acknowledge the major contributions from Prof. Lucio Piccirillo, Prof. Peter Timbie and Prof. Gregory Tucker.

siddharth@iiti.ac.in

Dr. Siddharth Savyasachi Malu
Head, Astrophysics Group
(PhD: University of Wisconsin-Madison, USA, Jansky Fellow; Postdoctoral Fellow: IUCAA, Raman Research Institute, India; Meera Memorial Fellow, Radhakrishnan Fellow at Oxford) heads the Astrophysics Group at IITI. He has led the design, construction, installation and commissioning of IIT Indore's first Radio Telescope and is now working towards fabricating in-house an array of antennas to build an observatory at IITI's new campus at Simrol.

Other Members:
M Anbarasu
Vimal Bhatia
I A Palani
Pankaj Sagdeo
Somaditya Sen
Abhishek Srivastava

Bio-sciences & Bio-medical Engineering Group (BSBE)

Rural India contains over 68% of India's total population with half of it living below poverty line, struggling for better and easy access to health care and services. Health issues confronted by the rural poor as well as those in urban slums are diverse and numerous, ranging from severe malaria to uncontrolled diabetes, from a badly infected wound to cancer, and frequent epidemics and pandemics of dengue fever, flu, cholera, hepatitis, tuberculosis, plague and pneumonia. These illnesses not only result in deaths, but also have an enormous impact on the patients and society as a whole.

BSBE group of faculty members and research scientists aspires to create an ambience for the smooth pursuit of scholarly activities in research as well as training, leading to fundamental study of life and living organisms, ranging from the simple bacteriophage to a complex multi-cellular organism like humans, about their structure, function, growth, origin, evolution, distribution, and taxonomy. In addition to basic biology research, the BSBE group seeks to contribute towards applied research on practical problems in the country.

With application of engineering principles, design concepts of biology, medicine and other sciences, the BSBE group desires to devote its energy and expertise towards translational technology innovations in the areas of Bioengineering and Biomedical Engineering, to achieve improved longevity, health and well-being for humans. The BSBE group seeks to pursue research and development activities resulting in new discoveries in imaging techniques, diagnostics kits, and novel therapies. Additionally, the BSBE group intends to carry out patient-based research in collaboration with physicians and clinicians at the renowned hospitals around India and abroad. Our aim is not only to perform the fundamental biology research and novel technological innovations, but to take these discoveries up to the clinical trials, in true sense "bedside to bench and back".

FACULTY MEMBERS:

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

(PhD IIT Bombay; Postdoctoral Fellow: University of Chicago, USA; Research Associate: Wockhardt Research Centre, Aurangabad)

Dr. Kodgire 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 recieved Irvington Institutes postdoctoral fellowship from the Cancer Research Institute, USA and International postdoctoral fellowship award from the Lady Tata Memorial Trust, UK, for research in Leukemia.

Research Interest:

- Molecular Biology.
- Molecular Immunology.
- Somatic hypermutation of immunoglobulin genes.
- Chromatin structure and gene regulation.

Ramanujan fellowship from the Department of Science and Technology, Govt. of India.
Irvington Institutes postdoctoral fellowship from the Cancer Research Institute, USA.
International postdoctoral fellowship award from the Lady Tata Memorial Trust, UK, for research in Leukaemia.

Dr. Kiran Bala
Inspire Fellow, BSBE
kiranb@iiti.ac.in

(PhD: Guru Jambheshwar University of Science & Technology, Hisar; DBT- BioCARe scientist: Devi Ahilya University, Indore; UGC- Post Doctoral Fellow: Centre for Environmental Studies, Anna University, Chennai; Research Associate: Centre for Environmental Studies, The Energy & Resources Institute (TERI), Delhi)

Dr Bala is an INSPIRE faculty. She studies different micro-algal strains capable of growing in wastewater would be studied for maximum biodiesel production. Main goal of this study is combining the process of algal bio-fuels development with waste-water treatment.

Research Interest:

- Biodiesel Production using cyanobacterial species
- Carbon Sequestration from flue gas of thermal power plants
- Bioremediation of wastewater

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

(PhD IIT Kanpur; Postdoctoral fellow: Postdoctoral Fellow: Tufts University, MA, USA; Visiting Research Associate: Biosystems, KAIST, S.Korea; Assistant Project Scientist, Academic Coordinator and Lecturer: University of California, Riverside)

Dr Gupta 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.

Research Interest:

- Near infrared medical imaging.
- Targeted drug delivery
- Regenerative medicine and tissue engineering

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

(PhD IIT Roorkee; Postdoctoral Research Associate: The Scripps Research Institute, U.S.A.; Postdoctoral Fellow: Research Foundation, SUNY Buffalo, U.S.A; CSIR Research Fellow: IIT, Roorkee)

Dr Kumar works on Structure Biology, NMR Spectroscopy, Target Identification and Drug discovery for different diseases, Proteomics, Computer Based Drug Design (SBDD/FBDD), Molecular Modeling.

Other Members:
S Dhinakaran
Rajesh Kumar
Shaikh Mobin
Ram Bilas Pachori
Srivasthan Vasudevan
Chelvam Venkatesh

Publications: Bio-sciences & Bio-medical Engineering Group (2012-2013)

Journals :

1. P. Kodgire, P. Mukkawar, S. Ratnam , TE Martin , U. Storb, "Changes in RNA polymerase II progression influence somatic hypermutation of Ig-related genes by AID" Journal of Experimental Medicine, 2013, **210** (7): 1481-1492.

2. P. Kodgire, P. Mukkawar, T. Martin, U. Storb, "Transcriptional pausing facilitates, whereas termination obstructs AID access to Ig variable regions during somatic hypermutation", Autumn Immunology Conference (AIC) 2012, scheduled at the Chicago Marriott Downtown from 16-19 November 2012.

Surface Sciences & Engineering Group (SSEG)

The discipline of surface science and engineering at Indian Institute of Technology Indore was started in Jan 2013. The discipline is involved in interdisciplinary research activities of the Institute with a common goal of achieving further knowledge and techniques in various areas related to surface science and engineering. The activities of this discipline are spread in areas such as material science, surface characterization, surface modification using lasers plasma etc. The aim of this group is to provide a robust platform to the students and researchers interested in cutting-edge education and research and to provide the R&D based solutions to industrial clients. The faculty members have already been able to establish important collaborations nationally and internationally. Collaborators like Fraunhofer, Germany, University of Nante, France, etc. are joining hands with IITI for long term research projects.

The discipline started by organizing an "International Workshop on Surface Science and Engineering" on March 4th - 5th 2013. The workshop introduced the discipline to a handful of potential national and international collaborators.

Dr. Pankaj R Sagdeo,
Assistant Professor,
HOD SSEG
prs@iiti.ac.in

(PhD: UGC-DAE CSR Indore; Scientific officer/coordinator: Bhabha Atomic Research Centre, Visakhapatnam, India; Research Associate/Post Doctoral Research: UGC-DAE-CSR Beamlines on Indus-I AND Indus-II, Indian Synchrotron source)

Dr Pankaj Sagdeo is heading the SSEG. He 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. Somaditya Sen
Associate Professor
Physics, Astrophysics
Surface Science & Eng
In-charge ME Workshop
sens@iiti.ac.in

(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)

Dr Sen works primarily on magnetic/electronic materials with multiferroic properties. His expertise is on synthesis /engineering/characterization (structure / physical) of nano-structured/thin film/single crystal/glassy forms of complex oxides/chalcogenides with semiconducting, superconducting, magnetic and optical properties. His recent works include multiferroics belonging to the rare earth manganite and lead based titanate families. His present research areas are on room-temperature Multiferroicity and dilute-magnetic semiconductors. He has several collaborators spread in US and Japan. He is presently building up his links with countries like France, China and Australia.

Other Members:
M Anbarasu
Preeti Bhobe
Satyajit Chatterjee
Sudeshna Chattopadhyay
Sabiruddin Kazi
Rajesh Kumar
Krushna Mavani
Shaikh Mobin
I A Palani

STATEMENT OF ACCOUNTS

INDIAN INSTITUTE OF TECHNOLOGY INDORE

BALANCE-SHEET AS ON 31st MARCH 2013

(Amount in ₹)

Sr. No.		LIABILITIES	Current Year 2012-13
1		**Corpus / Capital Fund**	
	i)	Capital Fund	614,979,444
	ii)	Unutilised Grant in Aid Plan	343,376,475
	iii)	Other Funds	5,717,132
		Total of Sr. No. 1	**964,073,051**
2		**Current Liabilities & Provisions**	
	i)	Sundry Creditors	20,252,550
	ii)	Student Funds	1,628,228
	iii)	Refundable Deposit	13,822,475
	iv)	Statutory liabilities	2,278,916
	v)	Other Current Liabilities	18,523,336
	vi)	Provisions	112,527,185
		Total of Sr. No. 2	**169,032,690**
		GRAND TOTAL (1+2)	**1,133,105,741**
Sr. No.		**ASSETS**	**Current Year 2012-13**
1		**Fixed Assets**	
	i)	Land	1
	ii)	Equipments	355,379,954
	iii)	Furniture & Fixtures	83,602,701
	iv)	Library Books & Journals	12,982,307
	v)	Motor Vehicle	19,621,932
	vi)	Cycles	23,289
	vii)	Computers	14,381,793
	viii)	Capital Work in Progress	128,987,467
		Total of Sr. No. 1	**614,979,444**
2		**Current Assets, Loans and Advances, etc.**	
	i)	Inventories	729,470
	ii)	Sundry Debtors	110,492
	iii)	Receivables	4,618,320
	iv)	Fixed Deposit in Scheduled Banks	469,688,714
	v)	Savings/Current Account in Scheduled Banks	7,688,663
	vi)	Advances to Staff	2,449,062
	vii)	Advances to Others	2,078,561
	viii)	Deposits	7,326,023
	ix)	Prepaid Expenses	14,923,610
	x)	Accrued Interest	8,513,382
		Total of Sr. No. 2	**518,126,297**
		GRAND TOTAL (1+2)	**1,133,105,741**

INDIAN INSTITUTE OF TECHNOLOGY INDORE

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st MARCH 2013

(Amount in ₹)

Sr. No.		PARTICULARS	Current Year Up to 31.03.2013
		INCOME	
1		Fee from Students	42,401,856
2		Other Receipt from Students	1,133,340
3		Other Income & Miscellaneous Receipt	4,009,573
4		Interest on Short Term Deposit	18,224,857
5		Transfer from Grant-in-aid (Plan)	398,420,898
		GRAND TOTAL	**464,190,524**
		EXPENDITURE	
1		**Establishment Expenses**	167,063,662
2		**Administrative Expenses**	
	i)	Consumables-Departmental & Others	14,980,347
	ii)	Rent, Rates & Taxes	40,366,069
	iii)	Electricity & Water charges	7,333,484
	iv)	Insurance for Students	321,126
	v)	Freight Charges & Wages for Staff & Students Shifting	416,475
	vi)	Repairs & Maintenance	6,623,621
	vii)	Vehicle Running and Maintenance	6,041,631
	viii)	Postage, Telephone and Communication Charges	4,586,516
	ix)	Printing and Stationery	2,163,054
	x)	Travelling and Conveyance Expenses	8,221,960
	xi)	Hospitality and Guest House Expenses	2,034,219
	xii)	Legal and Professional Charges	1,655,884
	xiii)	Advertisement and Publicity	4,490,049
	xiv)	Merit Cum Means Scholarship	5,853,401
	xv)	Subscription/ E Journals - Library Books & Journal	24,445,055
	xvi)	House-keeping & Security Charges	24,619,014
	xvii)	Mess Charges	13,437,161
	xviii)	Stipend of Ph. D. Students	18,060,465
	xix)	Students Gymkhana & Support Expenditure	1,883,386
	xx)	Contribution to IIT Council Secretariat	100,000
	xxi)	Expenses on Events & Programs	4,076,282
	xxii)	Students Medical Expenditure	1,199,706
	xxiii	Other Revenue Expenses	1,394,457
		Total of Sr. No. 2	**194,303,362**
3		**Depreciation**	**102,823,500**
		GRAND TOTAL (1+2+3)	**464,190,524**

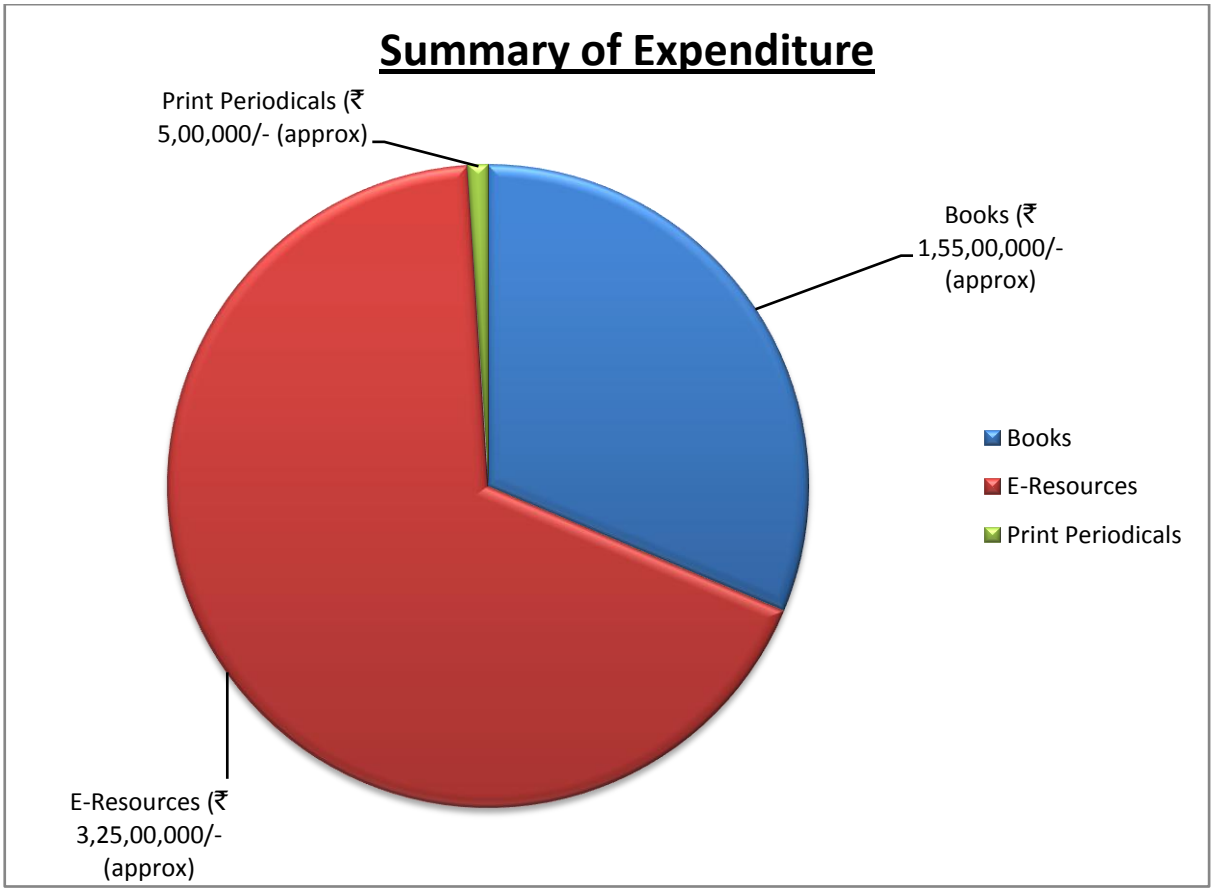
CENTRAL LIBRARY

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 23000+ 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:

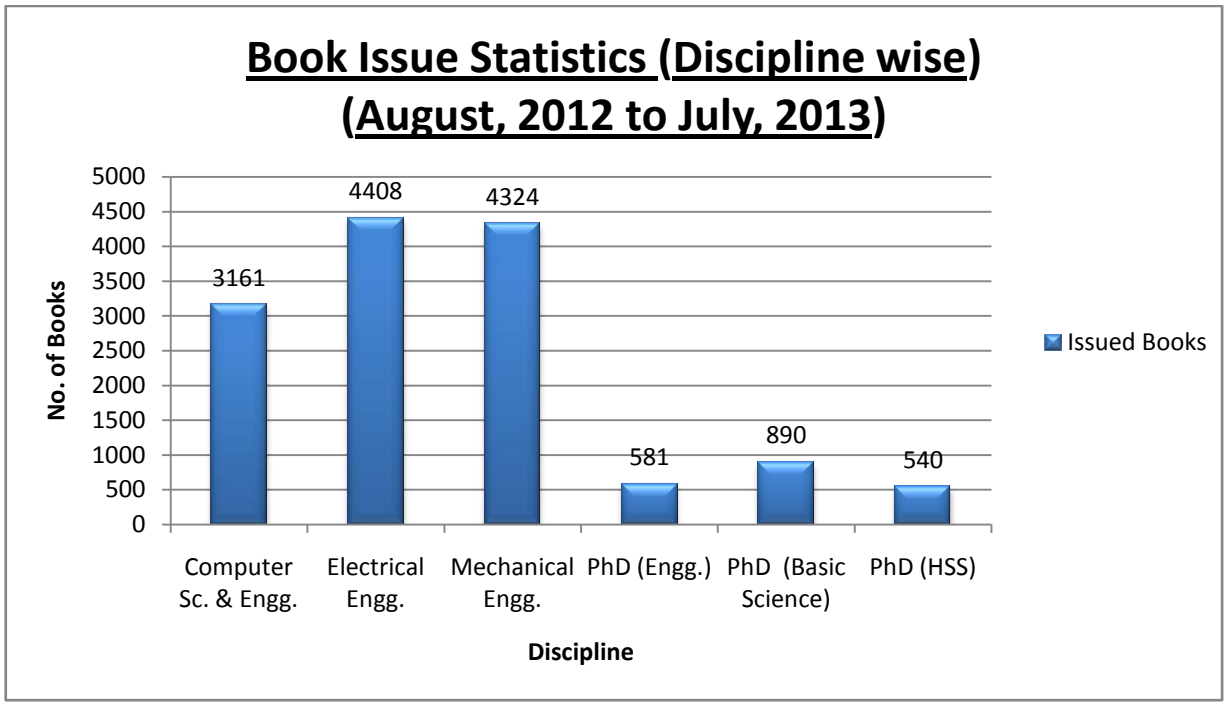
Collection:

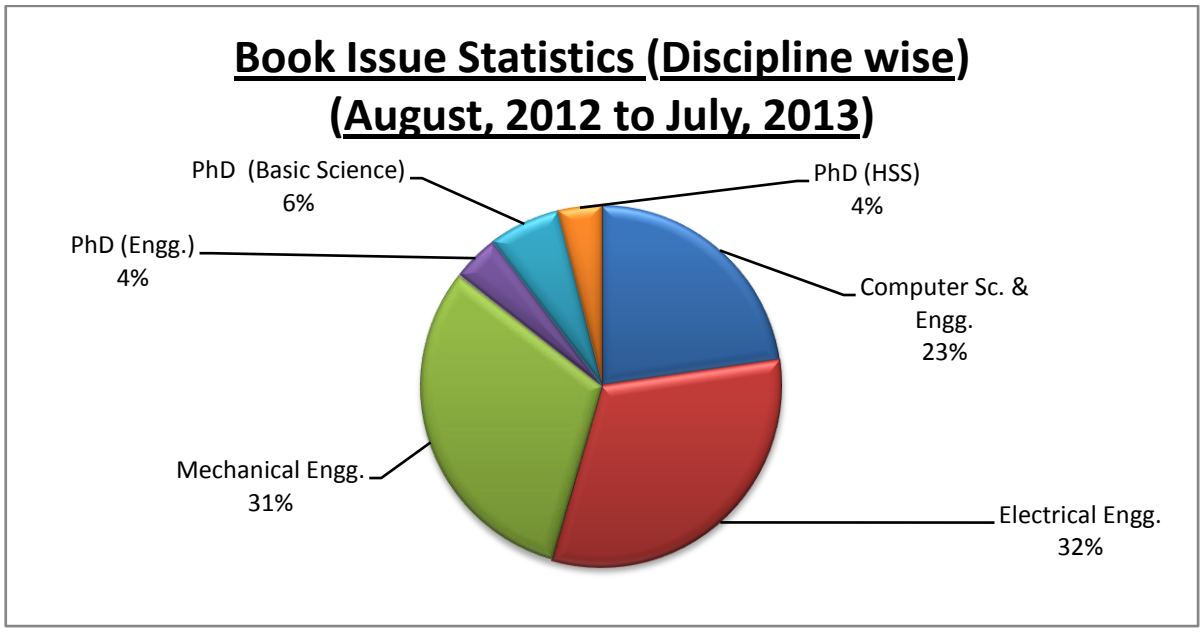
Books	E Journals	E Books	Print Journals	Magazines	Newspapers
23000 +	4184 (55 Publishers)	7600 approx.	88	65	25



Library Usage in IET and PACL Campus: **(August, 2012 to July, 2013)**

Books Issued	Photocopies	Printouts	Reading Room Usage per month (Average)
13904	28851	160074	3500 users p.m. approx





Periodicals and Newspapers (Print Format): At present, the Library subscribes to 88 Print Journals, 65 Magazines and 25 newspapers.

Electronic Resources: In today's world of Information explosion, access to electronic information resources is essential, particularly in an academic environment. Therefore, the library has developed a collection of Electronic Resources which provide access to thousands of journal articles, research papers, books, and other resources. These include ASME Journals, and IEEE XPlore Digital Library through INDEST Consortium. Access is also provided to JSTOR through INFLIBNET. Also, electronic journals published by reputed societies and publishers such as American Mathematical Society, American Chemical Society, American Institute of Physics, American Physical Society, IEEE, Wiley, Elsevier, Springer, Taylor & Francis, Emerald, Royal Society of Chemistry, Oxford University Press are subscribed by the Library. The E Resource collection also includes 7600 E Books. 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 webpage itself.

Library Services:

At present, the Library offers services as described below:

- **Lending facility**: Undergraduate students can borrow 8 books for the period of 15 days, whereas Ph.D. students can borrow up to 10 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 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.
- **SDI Services & CAS Services**: Library provides SDI services and CAS services to its users, especially research scholars and faculty members.
- **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 2.0 Initiatives: In addition to the services mentioned above, the Library has started the following Lib 2.0 initiatives in order to overcome the space and time constraints faced by all libraries when offering more traditional services:

Library Wiki : This was started with a view to making Information available to users irrespective of time or space. Users can check the Library Rules, access the Book Recommendation Form, and check the list of books any time at:
http://centrallibraryiitindore.pbworks.com/

Library Blog: This was started as a channel of communication with users. As yet, this has been used to share information about books, and to invite users' views and comments. The student community has responded well to this channel. The blog can be accessed at:
http://centrallibraryiitindore.blogspot.com/

Twitter Account: The Library also has a Twitter Account which is being used for announcements of events such as presentations on Online resources, etc. It can be accessed at:http://twitter.com/knowledgeforall

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).

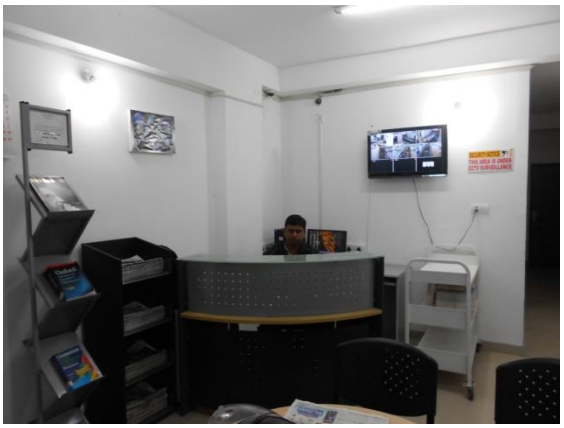
CCTV Surveillance: The Library has installed high tech cameras for the surveillance of all its 3 campuses to ensure the safety and security of its users and collections.

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

Library at Silver Springs: 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.

The Library Team:

Ms. Anjali Bandiwadekar, Dy. Librarian (Tel. 2438713 ext. 713/ anjali@iiti.ac.in)
Mr. Rajesh Kumar, Assistant Librarian, (Tel. 6563477 ext.757/ rajesh@iiti.ac.in)
Mr. Lala Ram Ahirwar, Senior Library Information Assistant (ext.757 lala@iiti.ac.in)
Mr. Gati Krushna Nayak, Senior Library Information Assistant (ext.757 gati@iiti.ac.in)
Mr. Satish Bisen, Senior Library Information Assistant (0732-4240717 satishb@iiti.ac.in)
Mr. Pallab Pradhan, Senior Library Information Assistant (ext. 757 ppradhan@iiti.ac.in)
Mr. Nitesh Singh Pawar, Senior Library Information Assistant (ext. 757 nspawar@iiti.ac.in)
Mr. Gaurav Singh, Senior Library Information Assistant (0732-4240717 gsingh@iiti.ac.in)
Mr. Sunil Kapoor, Library Attendant (ext.757, sunilk@iiti.ac.in)
Mr. Ranjeet Raghuvanshi, Library Attendant (ext. 757, ranjeetr@iiti.ac.in
Mr. Kapil Kumar Gupta, Library Trainee (0732-4240717, kapilkg@iiti.ac.in)

Important talks:

(1) **Prof. Girish S. Agarwal** (Fellow of Royal Society); Noble Foundation Chair and Regents Professor, Oklahoma State University Stillwater, OK 74078, USA
"From Quantum Interference to Entanglement"

(2) **Prof. B. Mukhopadhyaya**; HRI Allahabad
"Discovery of Higgs Boson: Reality and Myth"

(3) **Prof. Iakov Mukovskiy**; National Research Technological University "MISiS"
"Manganites: Colossal magnetoresistance and multiferroics"

(4) **Dr. Divya Maitreyi Chari**; Senior Lecturer in Physiological Sciences and Neural Engineering Group Institute for Science and Technology in Medicine Keele University, Staffordshire ST55BG
"Biomedical Engineering Strategies for Neural Repair"

(5) **Prof. V K Jain**; Mechanical Engineering, IIT Kanpur
"Evolution of Advanced Machining Processes (AMP) and their applications"

(6) **Prof. Tatsuo Okada**; Graduate School of Information Science and Electrical Engineering, Kyushu University, Japan
"Synthesis of ZnO Nano-Micro Crystals and Their Applications to Light Emitting Devices"

(7) **Dr. Avinash Deshpande**; Raman Research Institute, C.V. Raman Avenue, Bangalore
"Fascinating life-stories of pulsars"

(8) **Prof. J. Ramadas**; Centre Director, Homi Bhabha Centre for Science Education, Tata Institute of Fundamental Research
"Is science teaching an art or a science?"

(9) **Prof. Rajeeva Karandikar**; Director, CMI
"Is there a science behind opinion polls?"

(10) **Prof. Manfred Groll**; Emeritus Professor from University of Stuttgart, Germany
"Energy Supply Options for the 21st Century"

(11) **Prof. Sandip Trivedi**; Department of Theoretical Physics, TIFR
"Accelerating Universes in String Theory and Einstein's Dream"

Further Information:
http://www.iiti.ac.in/Seminars/boundaries_colloquium.html

IIT-I Central Workshop

The workshop is equipped with modern state-of-the-art instruments. Currently, the workshop is having seven sections: Machining, Welding, Forming, Foundry, Injection Molding, Fitting, and Carpentry. The workshop is supported by a team of extremely skilled operators. The IITI Central Workshop provides excellence and problem specific solutions to industries and research organization, apart from teaching students on handling the following facilities:

- Precision Turning, Facing, Drilling, Boring, Tapping.
- Surface Grinding.
- Precision Milling & Slotting.
- Injection Moulding.
- Sheet Shearing, Bending, Punching, Wire drawing.
- Arc, MIG/MAG/CO_2 -Gas Welding & Brazing.
- Induction Heating & Metal Casting.
- CNC Milling & Turning.
- CNC EDM & WEDM.
- Cutting Tool Force Measurement Dynamometer

CNC Turning Center **:**
EMCOTURN E 25 with
Sinumerik 828D controller

Apart from industrial manufacturing work it also provides hands-on-training to operators involved in research and development of industry or academics in production and fabrication of mechanical components. 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 aim.

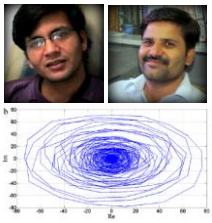
CNC Wire-EDM (WEDM Machine)
The Central Workshop accepts external orders from industries and academic institute.

Awards and Achievements:

- ***Dr. E. Anil Kumar***: **DST-Indo Switzerland Fellowship** "To Develop collaboration in energy utilization and storage"

- ***Dr. Santosh Kumar Sahu***: **Indo-US Research Fellowship** on Nano Fluidics

- An all purpose terrain climbing vehicle has been developed in house by IIT-Indore team of 26 students participated in **BAJA-2013** competition for the first time. Team was placed 8th in the Computer Aided Engineering (Design & Analysis) round.



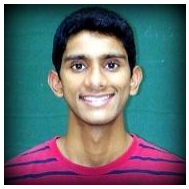
- **Best paper award** for the following paper; ***Varun Bajaj and R.B. Pachori***, "Separation of rhythms of EEG signals based on Hilbert-Huang transformation with application to seizure detection", Proceedings International Conference on Convergence and Hybrid Information Technology, 23-25 August, 2012, Daejeon, S.Korea.

- ***Mr.Dheeraj Sharma***, PhD Scholar with ***Dr. S.K.Vishvakarma***, was awarded **the IBM Ph.D. Fellowship award-2013**.

- The institute is deputing ***Dr N. S. Chaudhari***, Professor, CSE as the **Director of VNIT Nagpur**.
- ***Dr. N. S. Chaudhari*** became a **fellow of the Institution of Engineers** (India) in March 2012.
- ***Dr. N. S. Chaudhari*** was conferred the title of '**Distinguished Engineer'** by the Institution of Engineers (India) in February 2013

- ***Neetesh Saxena***, Ph.D. student received the **Tata Consultancy Services (TCS) Fellowship Award** for his research at IIT Indore (March, 2012).

- ***Archit Karandhikar, Piyush Lahoti, and Sanjeev Shenoy*** (all CSE 3rd year students) stood **second in Asia** (**first in India**) in the **ACM Inter-Collegiate Programming Contest (ICPC), Asia Regionals at IIT Kanpur** in December 2012. They have qualified to participate in the ACM-ICPC World Finals to be held in St. Petersburg, Russia in July 2013.



- ***Ashok Pancily*** was selected as **Google Student Ambassador** (GSA) for the year 2012-2013: one among 1000 GSAs from 65 countries.

- ***Jaya Thomas***, Ph.D. student received an **award by the Indo-U.S. Symposium on Women in Engineering**. The award includes: *Travel Grant, hospitality, and complimentary Registration* for the event: Indo-U.S. Symposium on Women in Engineering entitled '*Women Engineers Leading Global Innovation*' (29-31 Aug. 2012).

- ***IIT Indore*** has been inducted as a **partner in the Garuda Grid Computing Initiative** (which connects high performance computing clusters around the country) of C-DAC.

Students: Our Guiding Lights

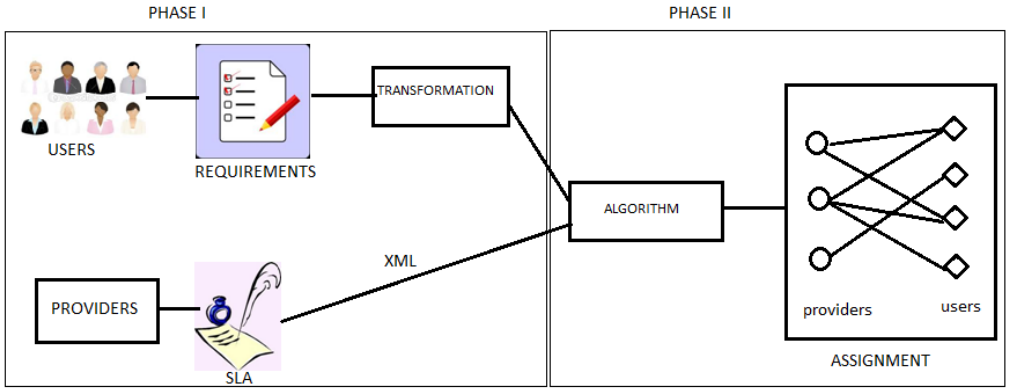
Proactive, in Social Service as much as Innovation

Our students have done us proud not only in research but also by providing solutions in the social sphere. Under the banner of AVANA, they have taken on the responsibility of educating youngsters and helping them discover their true potential.

AVANA has made such a tremendous progress in its short existence that IIT Indore is now considering adopting the two schools where AVANA initiated their activities.

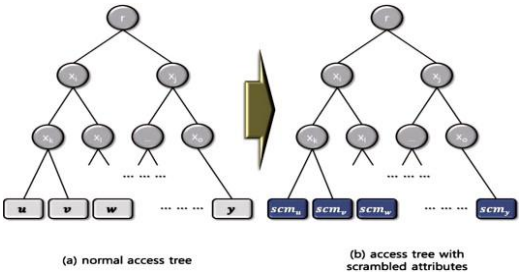
Our students are truly our guiding lights and we salute the pioneers as they venture out into the world. The legacy they leave behind is one that we need to ensure will endure, and I hope that all of us follow the path that has been laid out for us by our students.

Computer Science & Engineering



Output

Optimizing Resource Utilization in the Cloud: Ujjwal Sen & Amit Reddy with Dr. Monalisa Sarma
Using a Game Theory approach to address business objectives in cloud computing. Nash equilibrium attainment implies optimal resource utilization.

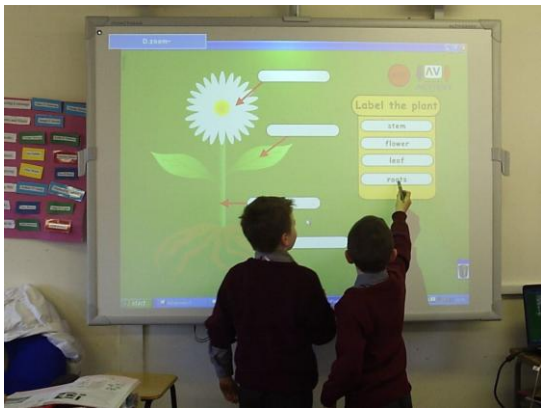


Attribute based encryption: Nihal Balani with Dr. Sushmita Ruj

- Novel scheme which touches upon both aspects – Temporal constraints and user revocation
- As proved by complexity analysis, both computational and communication complexity comparable to other schemes

Low cost Human Interface Device based Teaching Aids: Anant Palliwal with Dr. Abhishek Srivastava
→ Interactive Whiteboard (Smartboard) with Wii Technology (photograph on the right)
→ Low cost 3D Drawing in Air device

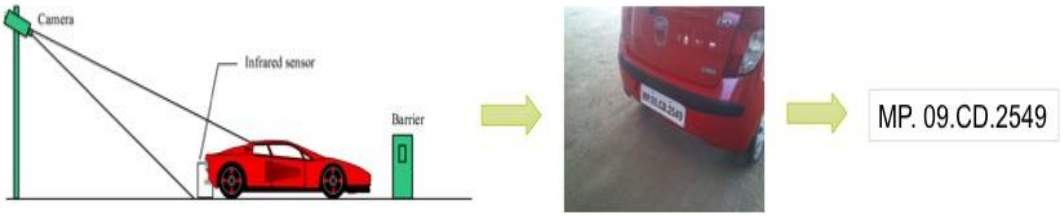
Mentally & Behaviorally challenged children → significant issues with Expressive Communication & maintaining focus
→ The novel Smartboard, which is 5% the cost of traditional ones, and is portable,
→ Potentially useful for architectural design



Enabling Technology for Mentally Challenged Children

Electrical Engineering

License Plate Recogition: Pritesh Kanani, Deepak Kumar Yadav & Aakash Gupta with
Dr. Ram Bilas Pachori & Dr. Rajesh Bodade

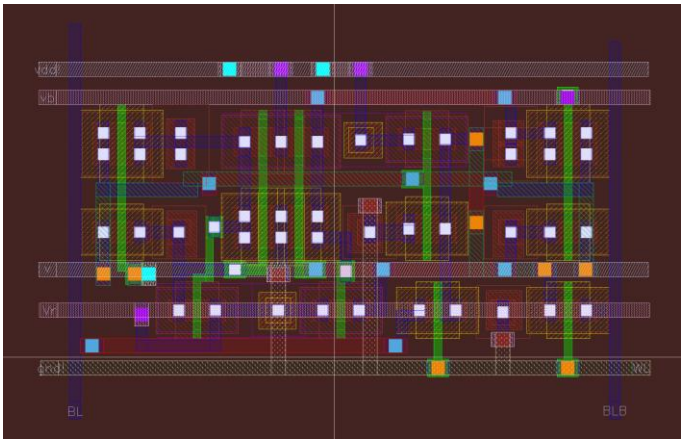


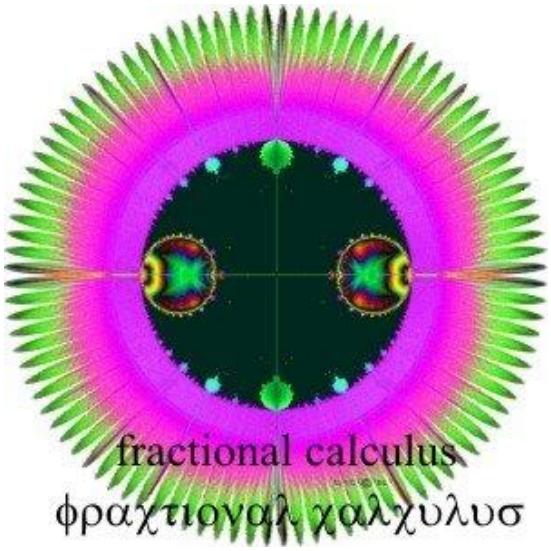
SRAM Design for Low Power Applications: Sarfraz Qureshi & Sai Kiran Vadhi with
Dr. Santosh Vishwakarma

→ Low Power Consumption
→ 4x Memory Capacity

as compared to traditional SRAMS

This development is expected to boost the development of novel

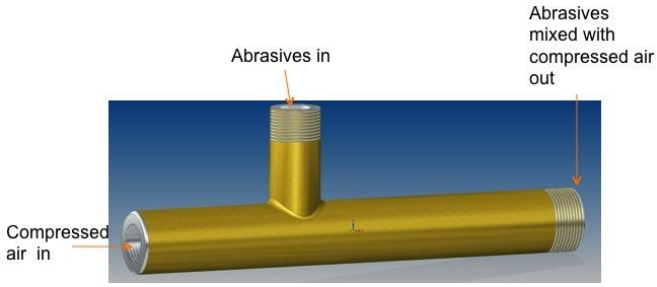




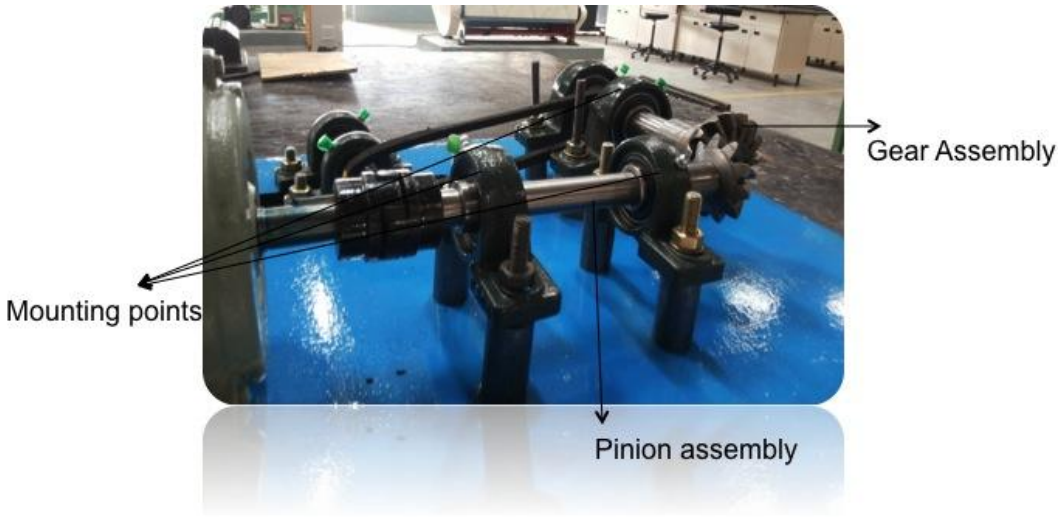
Fractional Calculus in Signal Processing: Varun Joshi with Dr. Ram Bilas Pachori.

Fractional Calculus provides a way to convolve signal with a complex kernel in order to simulate and characterize the effects of the measuring device and any interference in observation.

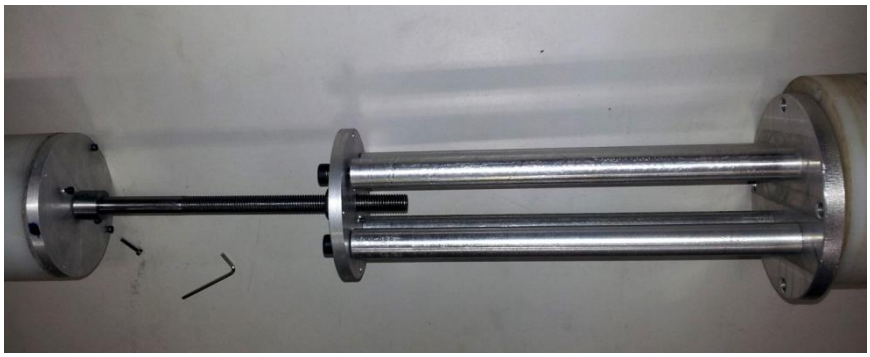
Mechanical Engineering



Abrasive Jet Machining Apparatus – Design, Fabrication & Testing:
Keshav Kumar & Bharath Bhushan with Dr. Neelesh K. Jain



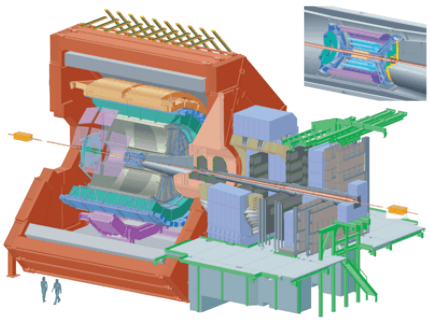
Design & Fabrication of noise and vibration test-rig for bevel gear box: Brahm Pratap with Dr. Neelesh K. Jain and Dr. Anand Parey



Design & Fabrication of an underwater glider: Akshat Kumar, Gaurav Parchani & Shanmukh Santosh with Dr. Santhakumar

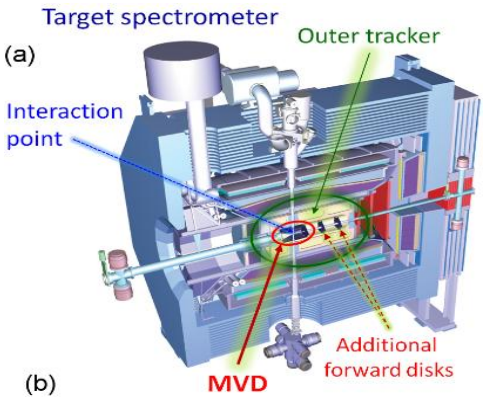
Novel aspect of the system: it is closed and involves no mass transfer between the glider and the surroundings. It uses a mechanism involving simple DC motors and a screw to change the volume of the body and disturb the equilibrium.

IIT Indore's Strategic Partnership with CERN



IIT Indore joined the ALICE Collaboration, a CERN experiment, in May 2013. The European Centre for Nuclear Research (CERN) is running the largest experiments in the world – the recently-discovered Higgs Boson is a testament to the continued success of CERN programs.

The ALICE Collaboration aims to probe the nature of the Strong Interaction, one of the fundamental forces of nature and perhaps the least understood. Collisions between lead atoms at about a million trillion degrees form a Quark-Gluon Plasma for a few nanoseconds. The resultant shower of particles is detected and their energy spectrum decoded by the detectors surrounding the plasma.



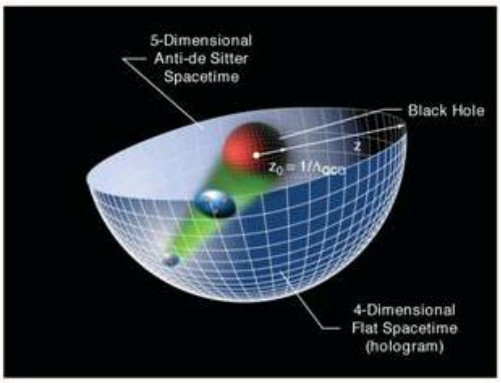
Dr. Raghunath Sahoo and Dr . Ankhi Roy are heading the IIT Indore efforts in Experimental Particle Physics in the ALICE Experiment. Dr. Ankhi Roy also heads the IIT Indore section of the PANDA collaboration, another fundamental particle probe, which aims to understand the nature of Quantum Chromodynamics – the theory of Strong Interactions.

Dr. Raghunath Sahoo (IITI ALICE Leader) at the CERN CMS facility that discovered the Higgs Boson

IIT Indore – ALICE MoU signing

IIT Indore and the Indian Neutrino Observatory

After the discovery of the Higgs Boson, particle physics experiments are now focusing are exploring the physics beyond the Standard Model.
In this context, the Indian Neutrino Observatory is being constructed in the Bodi West Hills Reserved Forest in Tamil Nadu.
The INO will study flavour mixing between the three different kinds of neutrinos – massless particles that permeate through matter with very little interaction.



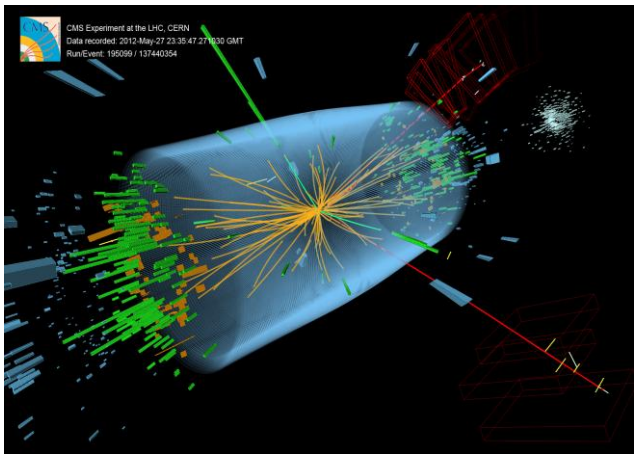
Contribution from IIT Indore:
International collaborations with CERN
→ *To find exact structure of Higgs sector.*
→ *To find out the answer to the hierarchy problem*.

AdS-CFT Correspondence: our best hope for a Theory of Everything

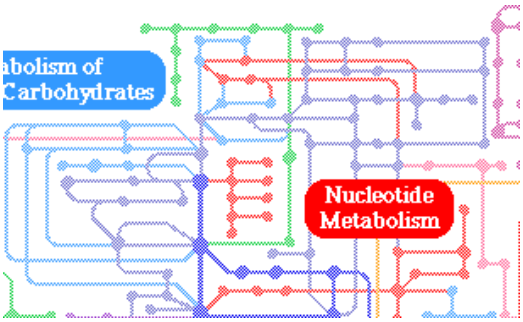
This Large Hadron Collider event (below) shows characteristics expected from the decay of the SM Higgs boson to a pair of Z bosons

High Energy Physics –
Theory & Phenomenology

Dr. Manavendra Mahato
&
Dr. Subhendu Rakshit



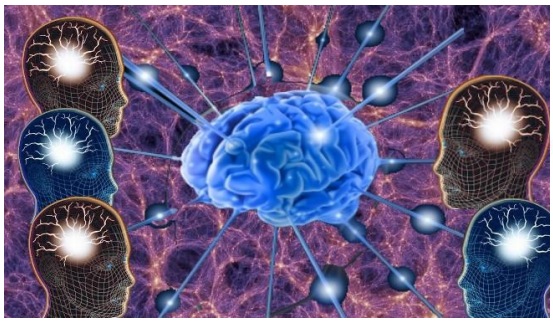
Complex Systems Laboratory: Dr. Sarika Jalan



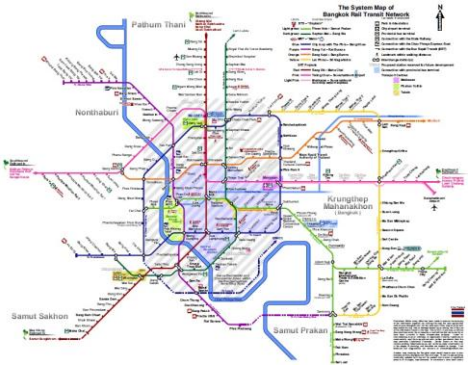
Metabolic

Social

Neural



Transportation

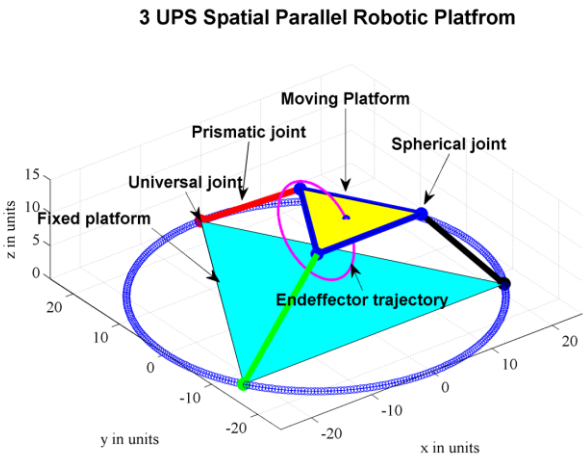


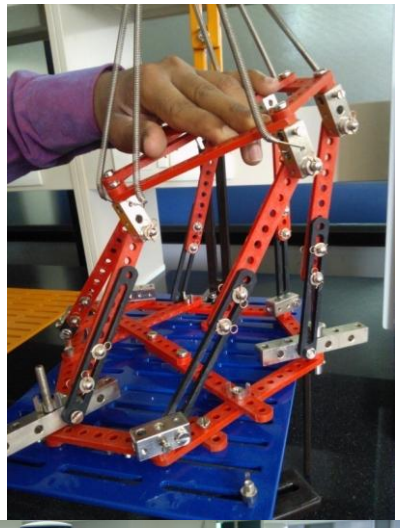
Complex systems and chaos have been difficult to characterize. Dr. Jalan's group has demonstrated that viewing complex systems as networks and inter-relationships and dynamics between elements of networks leads to a novel understanding of behavior of these systems. This can and does lead to predictive power for complex systems, leading to significant impact on the design and construction of networks, which is Dr. Jalan's expertise. This is achieved through Random Matrix Theory

Statistical properties of complex atomic spectra: This will help Condensed Matter research.

Random Matrix Theory: Applications

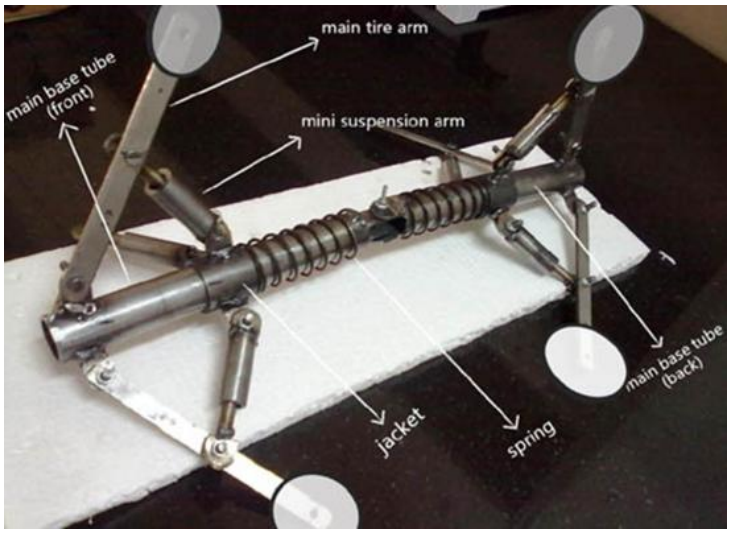
Hexapod with 6 degrees of freedom



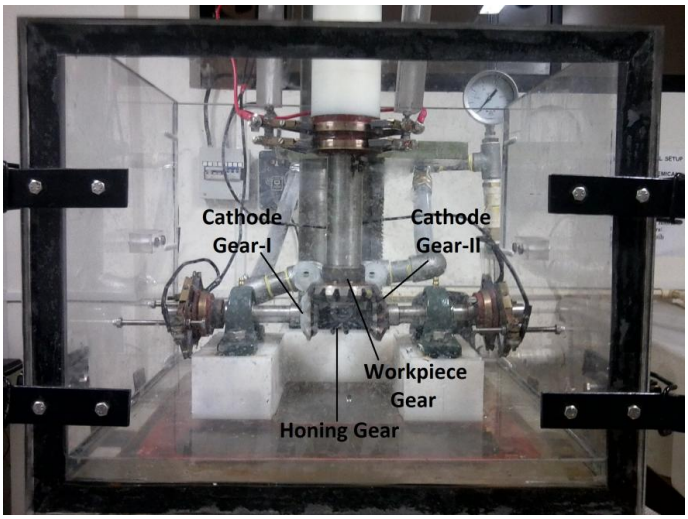


Robotics
Dr. M Santhakumar's Lab

$XY\Theta_Z$ Motion Platform



Pipe Inspection & Cleaning Robot (PIACR)

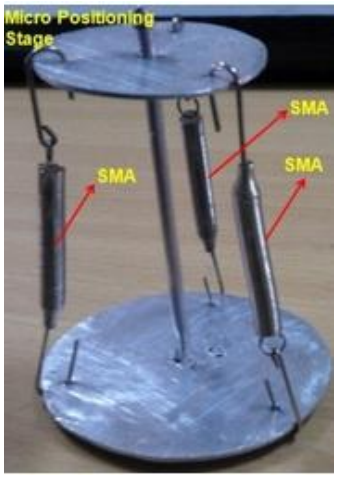


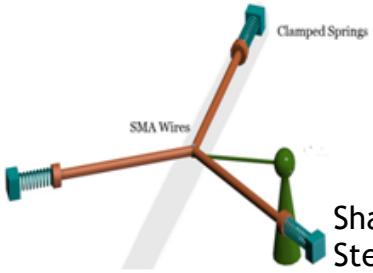
Photograph of the machining chamber for the finishing of bevel gears by ECH (ElectroChemical Honing).

Dr. Neelesh K. Jain's novel gear laboratory

Mechatronics

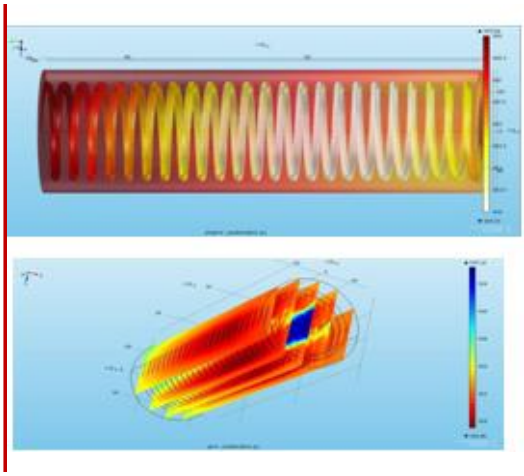
Dr. I A Palani's Mechatronics Laboratory

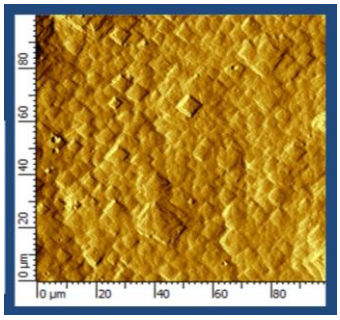




Shape Memory Alloy actuated Stewart Platform for micro-positioning (patent filed) & slider crank made by **Dr. I.A. Palani**

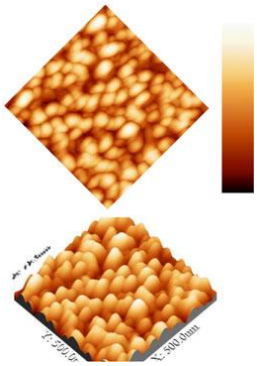
In this mechanism we use a proper load ~ 2N to stretch or extend shape memory alloy spring/link. Deflection occurs in the spring/link. If we flow current through the spring, the heat generated will result in the contraction of the spring which affects the deflection and hence the rotation of the link which is similar to the link slider crank mechanism.





The figure shows the surface of a high-quality crystalline thin film made with the Pulsed Laser Deposition Technique by **Dr. Krushna Mavani**, who works on high-quality materials synthesis in the form of multilayers and thin films to tailor the magnetic, electrical and optical functions. She investigates Metal-Insulator transitions and related phenomena by engineering the effects of strain in thin films.

The figure on the right shows Atomic Force Microscope image of [00z] oriented surface for Ca doped $LaMnO_3$; this material is used to read the data from magnetic storage devices such as computer hard disc. Using high resolution x-ray diffraction and synchrotron based x-ray scattering studies Dr. P.R. Sagdeo experimentally proved that strain plays very crucial role in these types of magnetic materials.



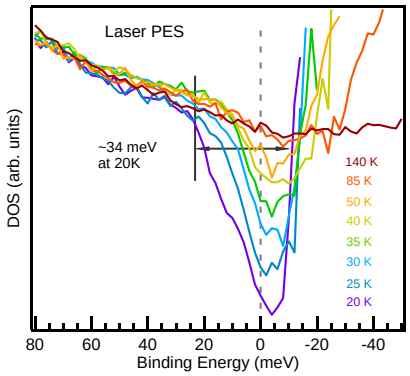
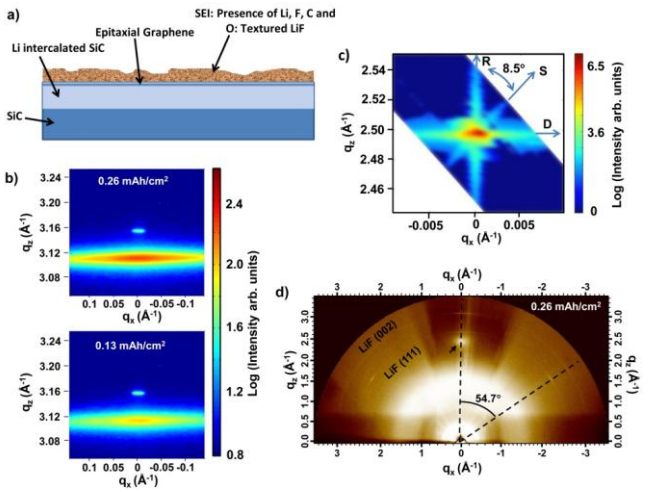


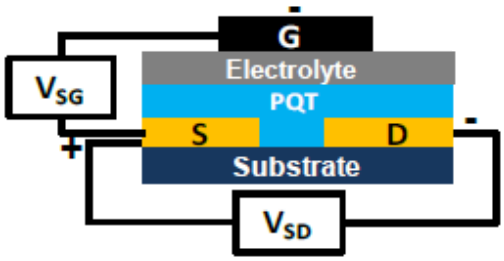
Figure attached here is from **Dr. Preeti Bhobe**'s recent study that demonstrates the applicability of PES in understanding the gap-opening in a material displaying unconventional ground state i.e. ferromagnetic insulator.

Energy Storage for the Future

Dr. Sudeshna Chattopadhyay is developing novel techniques to figure out ways to design and fabricate materials that can efficiently store and deliver energy.

Ref. Sudeshna Chattopadhyay and Albert L. Lipson, et. al. *Chemistry of Materials* 24 (15), 3038 (2012); *J. Phys. Chem. C* 116 (39), 20949 (2012).

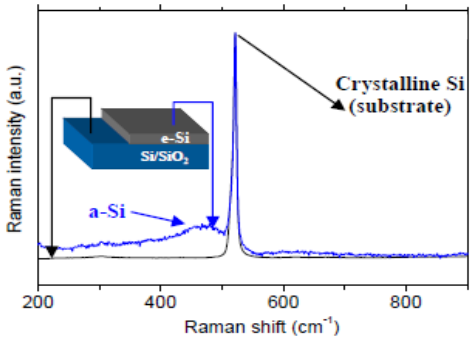


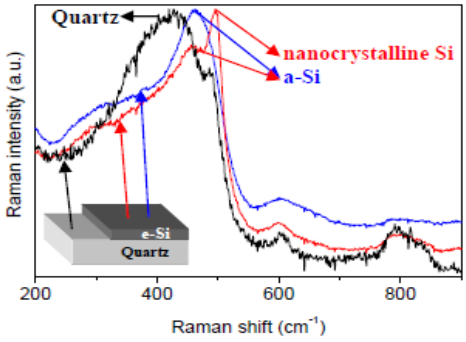


Schematic of a conducting polymer based resistive memory device

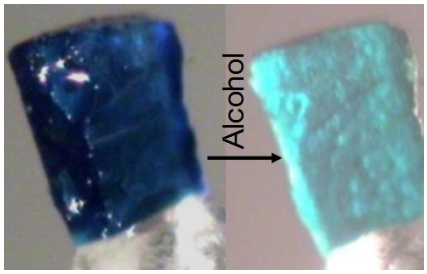
Dr. Rajesh Kumar

Surface Science & Engineering



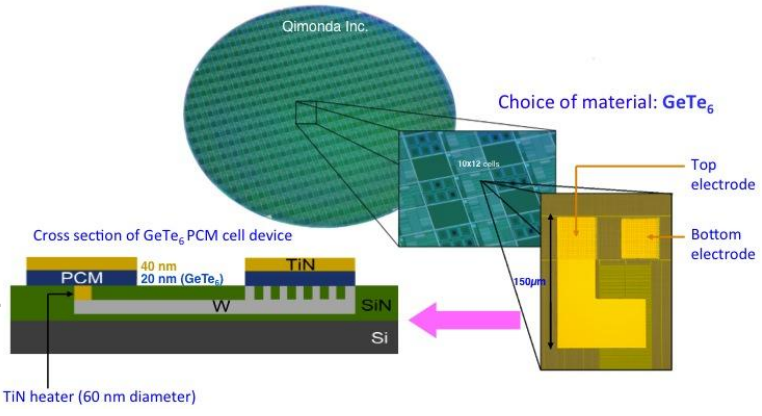


Dr. Shaikh Mobin investigates single crystal to single crystal reversible/ irreversible transformations involving processes such as vapor diffusion, photochemical process, thermal annealing and absorption process. These find ready applications in testing for alcohol, for instance.



Dr. M. Anbarasu investigates phase-change materials that may be utilized for memory applications.

Applications of phase-change materials are not limited to flash memories, though. Fast-switching modulators with a wide variety of applications are being explored



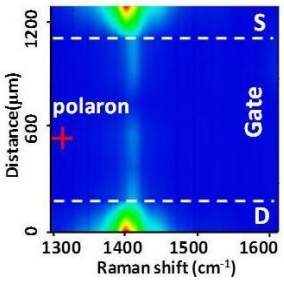
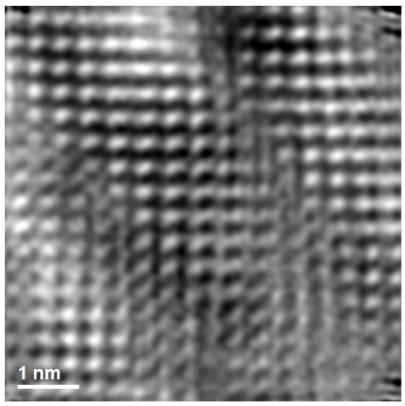


Figure shows Raman image of a conducting polymer based memory device. The device is fabricated in a thin film transistor (TFT) geometry but the operation of the device is different from that of a transistor. The image shows that the memory device is in the "On state" and the Raman signal corresponding to 1400 cm-1 represents the conducting form the polymer (Polaron). More details are available in Rajesh Kumar et al. *J. Am. Chem. Soc.* **134**, 14869 (2012)

Dr. Rajesh Kumar

Surface Science & Engineering

Magneto-electricity is related to the co-existence of magnetic and ferroelectric ordering in a material. These materials can change the future of memory devices by introducing magnetic writing using electric probe. Dr. Somaditya Sen investigates changes in multiferroicity due to change of size and localized deformation.



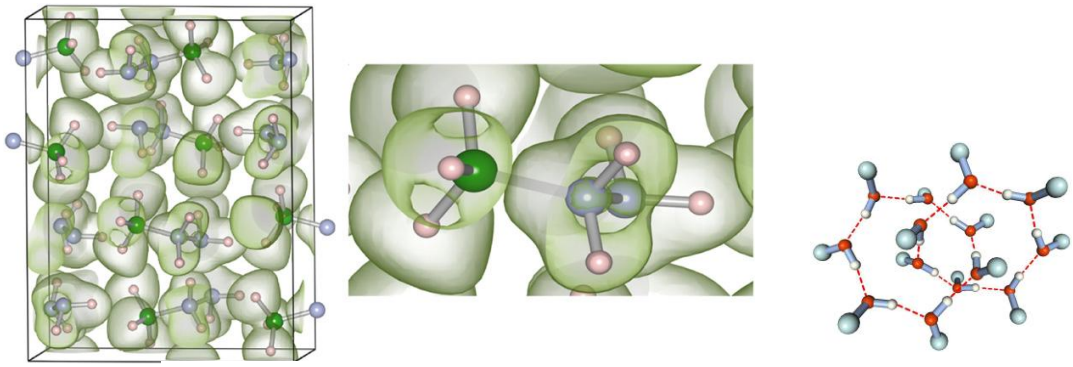
Dr. Somaditya Sen

Surface Science & Engineering

Crystals of Bi2Te3 grown by CVD (Chemical Vapour Deposition). Possible applications include semiconductor memory devices and phase modulators that can switch at speeds of a few kHz.

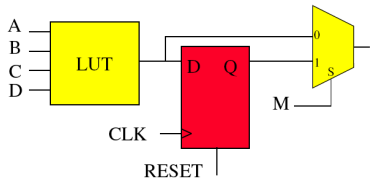
Dr. Satya Bulusu & **Dr. Biswaroop Pathak** compute the chemical stability of molecular structures in order to construct materials with specific properties for diverse applications.

Computational Chemistry



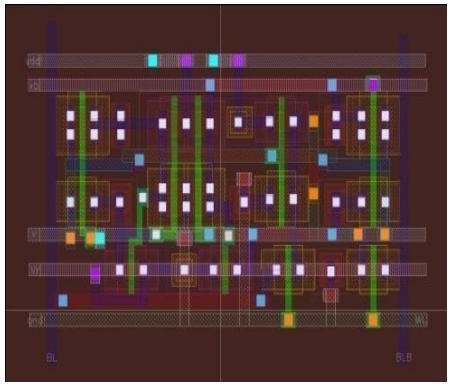
The Electron Localization Function of HB

Reduced-power FPGA



Configuration Logic Block (CLB)

Low-power 2x bit SNL SRAM: Novel Design

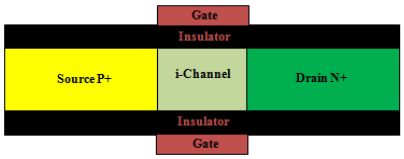


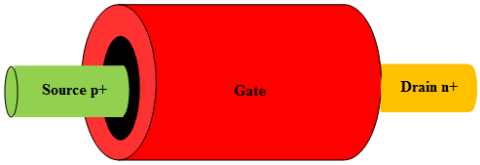
Sarfraz Qureshi
&
Sai Kiran Vadhi

B.Tech. EE
students

Dr. S.K. Vishwakarma's Systems Design Lab

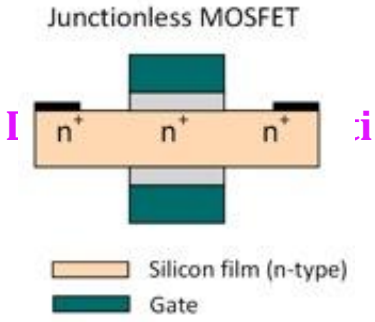
Tunnel Field Effect Transistor (TFET)

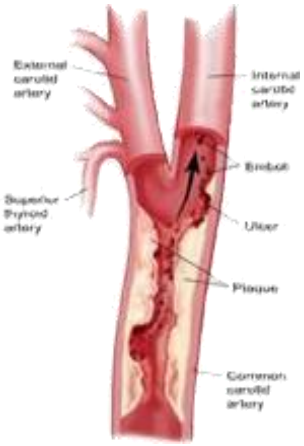




Cylindrical GAA TFET

Junctionless MOSFETs, developed by Dr. Abbhinav Kranti, are being optimized for ultra low power logic, analog/RF and dynamic memory applications. Such low-power devices will increase the performance of circuits many-fold.

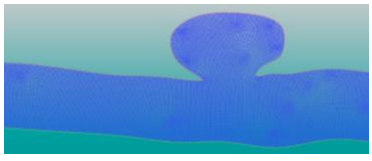




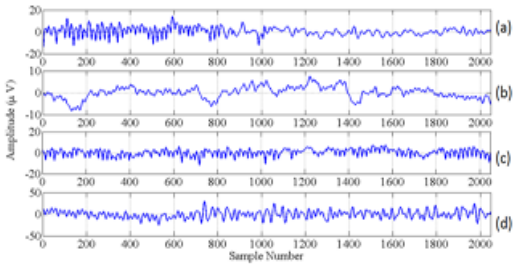
Stenosis (blockage of blood vessel) in the carotid artery.
Results in stroke (loss of brain function due to disturbance in blood supply to brain).

Centre for Fluid Dynamics

Dr. S. Dhinakaran

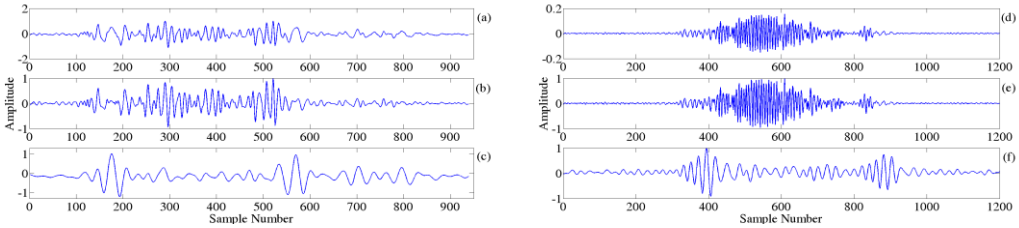


Grid structure for the non-Newtonian blood flow field in a diseased cerebral artery with aneurysm.

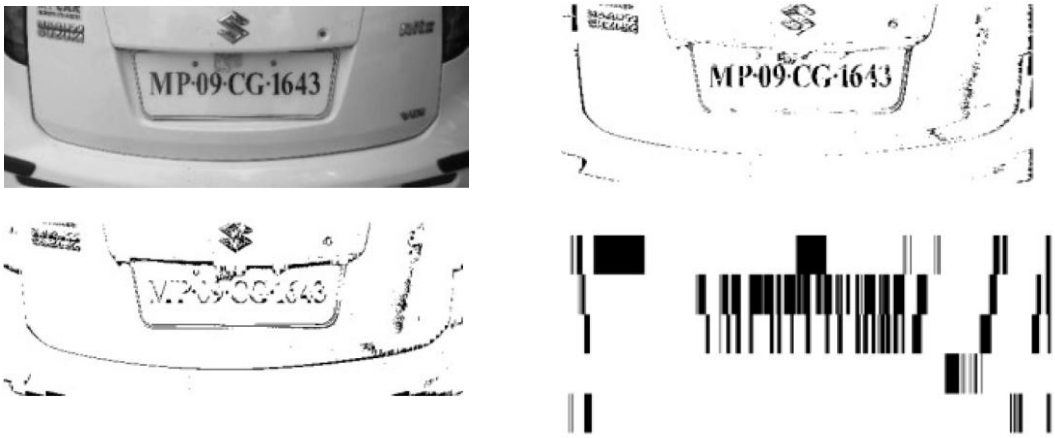


The example of EEG signals of different emotional states: (a) happy, (b) neutral, (c) sad, and (d) fear.

Signal Analysis Lab, IIT Indore: New methodologies for analysis and classification of bio-signals like electroencephalogram (EEG), electrocardiogram (ECG), center of pressure (COP), and phonocardiogram (PCG) for medical diagnosis are being aimed at IIT Indore. Epileptic Seizures, Human Emotions, Cardiac Disorders, etc are being examined and analyzed using Signal processing



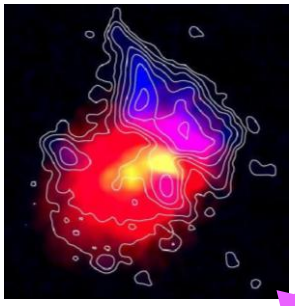
The examples of constrained TQWT based separation of FHS and murmurs for a heart beat cycle: (a)-(c) mitral regurgitation signal, high pass reconstructed signal (murmur) , and low pass reconstructed signal (FHS) respectively; (d)-(f) aortic stenosis signal, high pass reconstructed signal (murmur) , and low pass reconstructed signal (FHS) respectively.



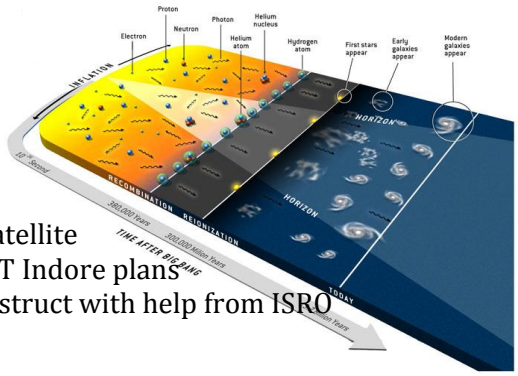
License Plate recognition through a wavelet analysis and a Bayesian approach. An efficient algorithm for license plate recognition and representation has been developed. This algorithm can be applied to a wide class of pattern recognition problems.

Data Acquisition & Signal Processing In the Real World

The result of two galaxy clusters, millions of light years across, at 10 million degrees, clashing into each other at 5000 km/s – resulting in the Biggest Bangs in the universe that dwarf Supernovae



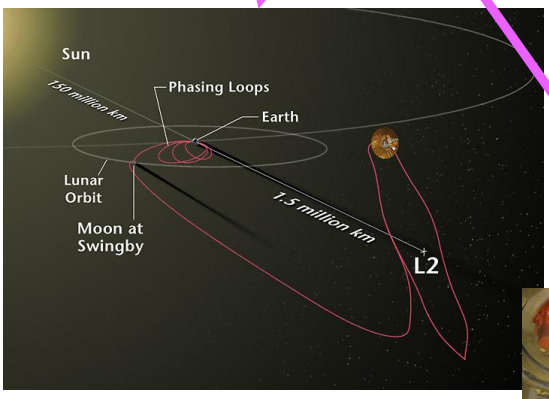
A Brief History of the Universe

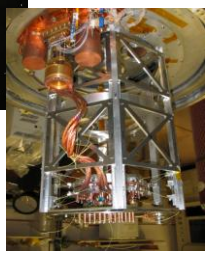


The Satellite that IIT Indore plans to construct with help from ISRO

Dr. Siddharth Savyasachi Malu

The IIT Indore Astrophysics Satellite





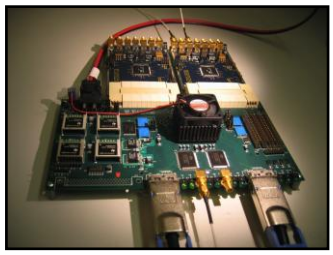
The kind of sensitive receiver system that will form the core of the IIT Indore Cosmic Origins Satellite

Rapid Development of Radio Astronomy Instrumentation

The first IIT Indore Radio Telescope will see First Light in August 2013 – the use of Embedded Systems at 5, 10 and 14 GHz is a novel feature.

In ~5 years, IIT Indore will have an Array of ~30 dishes – these will be a Proof-of-Concept for a full Astrophysics Satellite Mission to L2 point (above)

Field Programmable Gate Array (FPGA)



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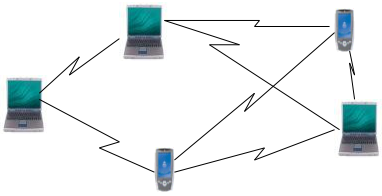


Figure 1. Nodes has no centralized administration and each node act as router

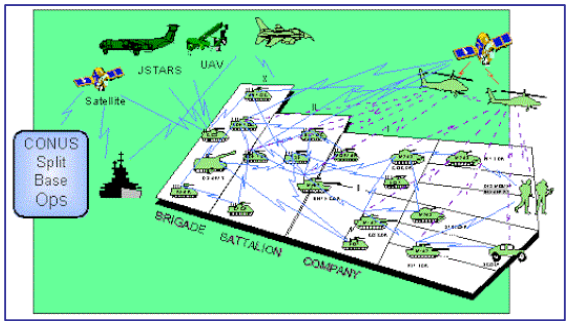
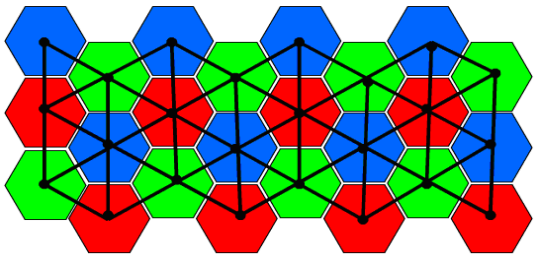


Figure 2. A collection of wireless computing nodes dynamically forming a network without any existing infrastructure with limited resources. Has dynamic topology no fix number of node.

Network Security

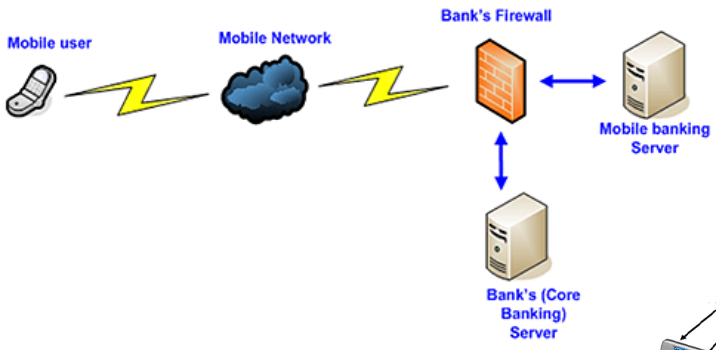
Cell phone networks: switching from one 'cell' to another seamlessly – optimal ways of doing so.

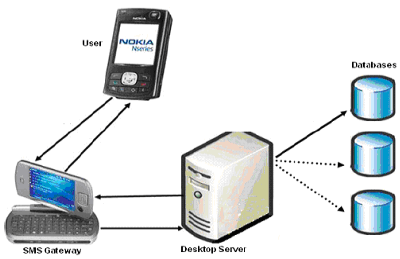


Optimization, Network & Security

Dr. Narendra Chaudhari

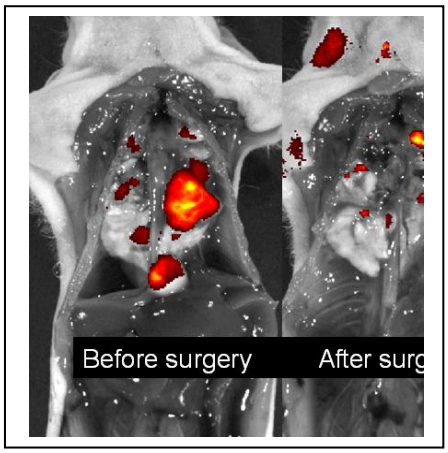
Wireless networks are more complicated and vulnerable to attack compared to wired networks. We have proposed such a scheme which could provide a strong authentication, confidentiality, integrity and non-repudiation for SMS services.



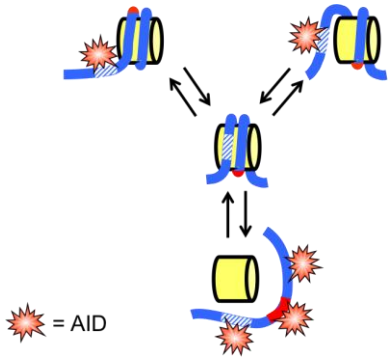


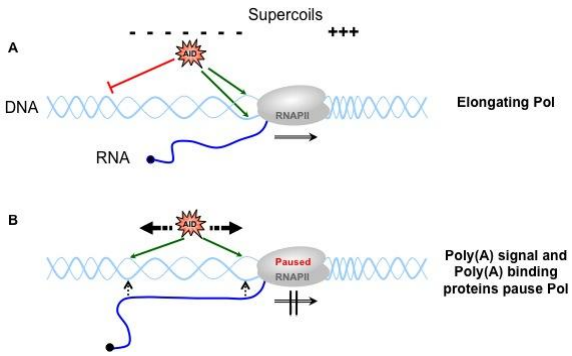
Security in Wireless Cellular Networks And Their Applications

Optimal Drug Delivery



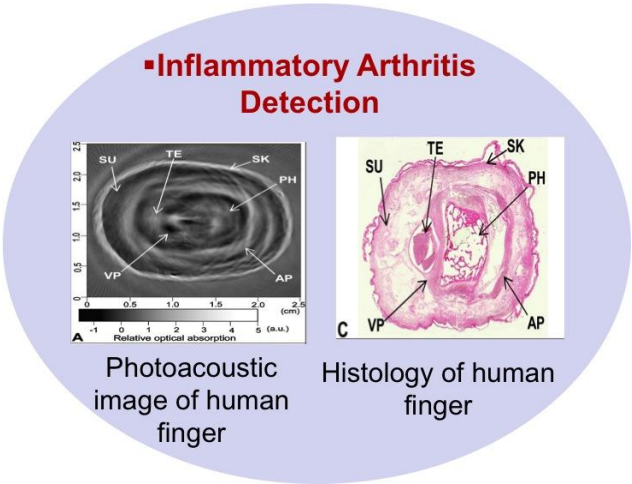
Cancerous and tumorous growths need to be treated with drugs as well as radiation. The effectiveness of drug delivery in surgery as well as chemotherapy depends on the model of drug delivery used. **Dr. Chelvam Venkatesh** optimizes these drug delivery methodologies.





Molecular Immunology

Members of the Biosciences and Bioengineering Interdisciplinary research group at IIT Indore conduct research on a variety of topics that have urgent and immediate applications in the Biomedical field. Examples shown here include **Dr. Prashant Kodgire**'s work on the Molecular Biology of the Immune system, including Auto-Immune Disorders and AIDS, imaging of critical auto-immune disorders (on the right) and changing immune disorders and diseases at the molecular level.

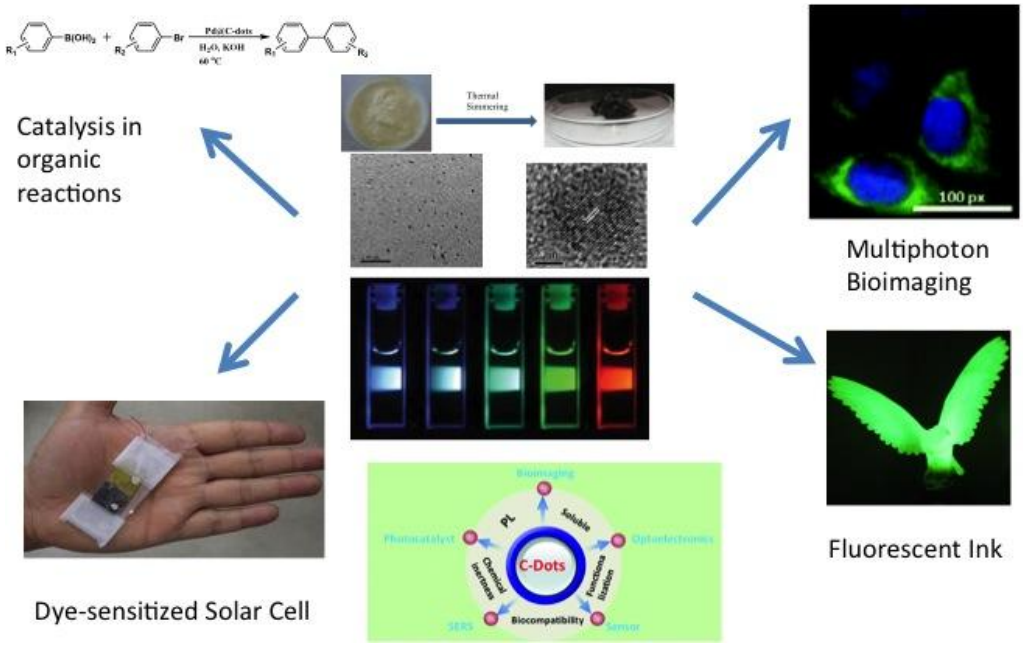


Biomedical Imaging

1–Hydrogen Cylinder 2–Argon Cylinder 3–Pressure Transducer 4–Pirani Gauge
5-Calibrated Cylinders 6-Thermostatic Bath 7-Vacuum Pump 8-DAS

Dr. Anil Kumar's Heat Transfer Laboratory

Dr. E. Anil Kumar works on novel methods to trap and store heat energy. Shown in the figure above is an apparatus that his laboratory has designed and constructed.



Dr. Tridib K. Sarma's Nanomaterials Laboratory

International Joint Projects

Dr. Sudeshna Chattopadhyay has received a fellowship from the Deutscher Akademischer Auchtausch Dienst (German Academic Exchange Service or DAAD) for collaborative work with Prof. Uwe Klamradt of the RWTH Aachen University on Confinement induced structural change in polymeric template. Her work will address the critical problem concerning the control of structures at the nanometric length scales – reproducible control of patterns. She aims to address this with self-assembly processes; her work on polymer substrates has demonstrated successfully that polymer thickness change may lead to a practical solution.
Dr. Chattopadhyay has an active collaboration with the Argonne National Laboratory in Illinois, USA, which she uses for Small-angle scattering X-ray experiments and for X-ray Photoelectron Spectroscopy.

Dr. Ankhi Roy is collaborating with the Forschungszentrum Juelich GmbH Germany COSE-FFE on studies of ω Meson decays with WASA (Wide Angle Shower Apparatus) -at-COSY, which is addressing one of the key issues in the Physics of Fundamental Particles: Symmetry Breaking in the context of Quantum Chromodynamics – the theory of Strong Interactions – the force that keeps the protons and neutrons together in the nuclei of atoms. Symmetry Breaking in particles formed with protons and neutrons are expected to yield clues about the origins of the Strong Force, and therefore, about the laws of physics that hold all known matter together.

International MoUs

S.No.		Institutions	Purpose	Signed	Effective
1.		Saarland University, Germany	Student Exchange Programme	12.11.2010	5 years
2.		Keele University, UK	Academic	31.01.2012	5 years
3.		French Language and Education	The French Language Tutor Programme	16.02.2012	01.08.2012 to 30.04.2013
4.		Alliance Francaise de Bhopal	Academic	16.05.2012	3 years
5.		Ecole Internationale Des Sciences Du Traitement De L'Information-France	Academic	21.05.2012	Till mutually agreed
6.		New Mexico State University, USA	Academic	01.10.2012	5 Years
7.		University of Wisconsin-Milwaukee, USA	Academic	03.10.2012	Till mutually agreed
8.		Fraunhofer-Gesellschaft zur Forderung der angewandten Forschung, Germany	Academic	30.10.2012	5 Years
9.		Uchicago, Argonne LLC, IL, USA	Academic	05.12.2012	5 Years
10.		University of Wiscosin-Madison	Academic & NASA Research Projects	28.01.2013	10 Years
11.		ALICE Collaboration, CERN, Geneva	For the Construction, Maintenance & Operation of ALICE Detector	02.05.2013	10 Years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