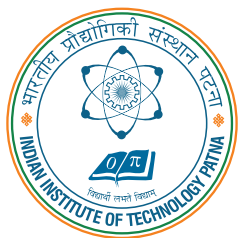


A GLIMPSE OF RESEARCH ACTIVITIES AT IIT PATNA



INDIAN INSTITUTE OF TECHNOLOGY PATNA

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About Us



Indian Institute of Technology Patna is an Institution of National Importance. Since its inception in 2008, IIT Patna has pursued excellence with steadfast determination. IIT Patna is located in Bihta, 30 Km away from Patna, the capital city of state of Bihar.

Departments in IIT Patna

Engineering

- Computer Science & Engineering
- Electrical Engineering
- Mechanical Engineering
- Civil & Environmental Engineering
- Materials Science & Engineering
- Chemical & Bio-Chemical Engineering

Basic Sciences

- Physics
- Chemistry
- Mathematics

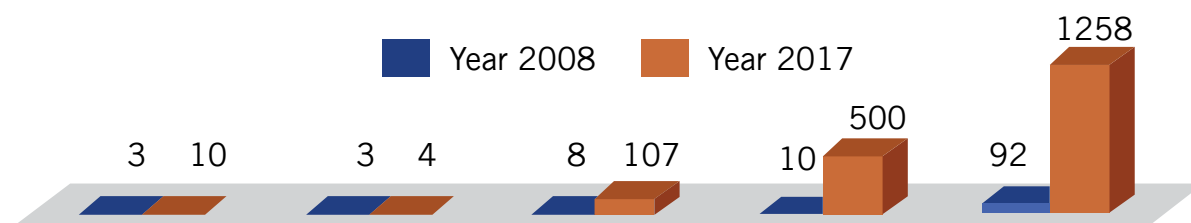
Humanities

- Humanities & Social Science

IIT Patna

Born in 2008 by the Institutes of Technology (Amendment) Act of Parliament

Growth of IIT Patna Since Inception in 2008



Growth of IIT Patna since inception in 2008		
Year	2008	2017
Departments	3	10
Academic Programs	3	4
Faculty Strength	8	107
Campus (in acres approx.)	10	500
Students	92	1258

Awards & Recognitions during the Last Five Years:

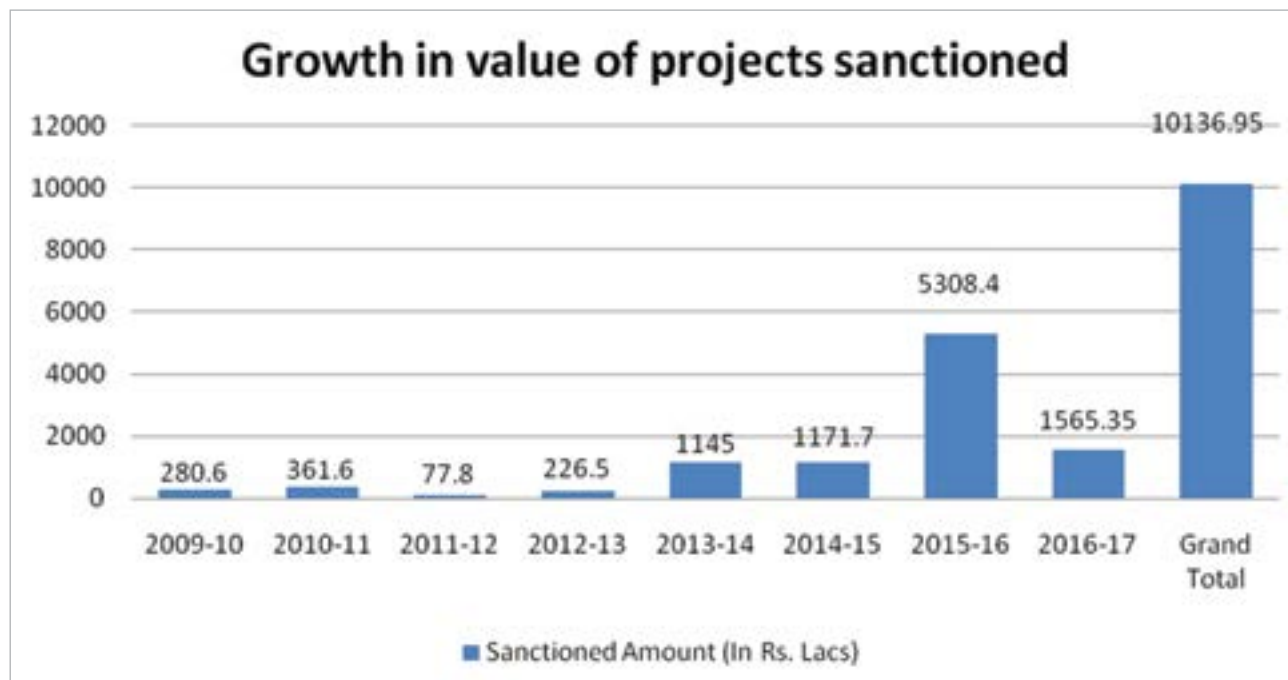
- IIT Patna has been placed 108th in QS University Ranking: Brics. This is the first time IITP has entered a QS rank list.
- Ranked 10th and 20th in NIRF ranking of 2016 and 2017, respectively.
- IIT Patna team (Binayak krishna Swami, Kumar Prabhakar, Dhanachandra N. and Rakesh Kumar Sanodiya) and has won the First Prize in Intel Higher Education Challenge on Cyber Physical Systems.
- Md. Shad Akhtar and Shweta Yadav selected for participating in the prestigious Google NLP Summit, Zurich, Switzerland.
- Dr. Subrata Hait has been conferred with the Bharat Vikas Award 2017
- Dr. Ranjan Kumar Behera has been conferred with the Bharat Vikas Award 2017
- Mr. Sanjeet Nayak and Dr. Somanath Tripathy got the 1st best technical poster award in Global Conference on Cyber Space (GCCS) held on 23 - 24th November at New Delhi.
- Dr. Amarnath Hegde has been selected for the prestigious "IEI Young Engineers Award 2017-2018 in Civil Engineering discipline.
- Dr. Sweta Sinha was awarded the 'Certificate for Best Presentation' in the recently held International Conference of Linguistics and Phonology (ICLP19) in Bangkok, Thailand.
- IIT Patna team 'Alacrity' has secured overall third position at ASME HPVC Asia Pacific 2017 held from 3rd-5th March at Jaipur.
- Best paper award to Mr. Deba Prasad Dash in Symhealth, 2017
- IITP team "INVINCIBLES IITP (Baja)" awarded 2nd position
- Best poster award to Mr. O. S. Asiq Rahman in in "International Conference on Emerging Trends in Materials, Manufacturing Engineering.
- Best paper award to Mr. Siddharth Suman in ICEEEE2017

15. Best Paper Award to Mr. Rohan Kumar Choudhary in ETWREE'17
16. Dr. Asif Ekbal, Dr. Rajiv Kumar Jha and Dr. Sudhan Majhi awarded Visvesvaraya Young Faculty Research Fellowship Award from Govt. of India
17. Best E-poster award: Sristhi and Papia Raj at 61st Annual National Conference of IPHA.
18. Dr. Maheshkumar H Kolekar (EE dept.): elevated to the grade of IEEE Senior Member.
19. Best Poster Presentation Award in ICFM 2016
20. Dr. Sriparna Saha: Associate Editor, ACM Transactions on Asian and Low-Resource Language Information Processing
21. Dr. Rajiv Misra elevated to the grade of IEEE Senior Member.
22. Mr. Atul Kumar received best poster award at ICRCs 2017
23. Ms. Pranjali Kokare received an Adobe Research Women-In-Technology Scholarship award for the year 2017.
24. Research on Sarcasm Detection by Prof. Pushpak Bhattacharyya and his team appeared in London Times.
25. Dr. Asif Ekbal awarded JSPS Invitation Fellowship from the Govt. of Japan, 2016.
26. Richa Chaudhary received best research paper award at IIM World Management Conference
27. Dr. A. K. Thakur elected as the Vice-President, ASSSI.
28. Dr. Preetam Kumar: Editorial Board Member of International Journal of Wireless Personal Communications
29. Mr. Sumit Asthana, a final year BTech CSE student, for getting the invitation to attend the Google Summer of Code Mentor Summit 2016 at Sunnyvale, California, USA from October 28 - 30, 2016.
30. Best Paper Award in CSPA - 2016 at Malacca, Malaysia
31. Best Poster Award in NTC 2016
32. Best Paper Award in FMFP 2016
33. Dr. Asif Ekbal: Associate Editor of Sadhana, 2016
34. Prof. Pushpak Bhattacharyya received Eminent Engineer Awardee, 2016
35. Pranjali Kokare (3rd year CSE) selected to attend the 2016 Grace Hopper Celebration as a Google Intern Travel Grant Recipient
36. Dr. Sriparna Saha awarded NASI-Young Scientist Platinum Jubilee Award
37. Best Paper Award to Ms Anshupriya in Recycle - 2016 at IIT Guwahati
38. Dr. S. K. Parida (EE dept.) elevated to the grade of IEEE Senior member.
39. Dr. Sudhan Majhi took up the role of 'Associate Editor' role in the journal 'Circuits, Systems, and Signal Processing'.
40. IIT Patna being conferred Education Award instituted by CMAI Association of India.
41. Dr. Sriparna Saha selected for IEI Young Engineers award 2015 in Computer Engineering discipline.
42. Dr. Debashree Guha Adhya received the National Scholarship SAIA-NSP) of the Govt. of Slovak Republic.
43. Dr. Preetam Kumar elevated to the grade of IEEE Senior Member
44. Dr. Sriparna Saha elevated to the grade of IEEE Senior member
45. Prof. Pushpak Bhattacharyya elected as Fellow of Indian National Academy of Engineering
46. Dr. Neeladri Das awarded a Poster Prize by the Royal Society of Chemistry, UK
47. Doctoral research work of Dr. Vaibhav Singhal selected as Innovative Students Projects Awards 2015 of (INAE)
48. Dr. Sriparna Saha awarded the Junior Humboldt Research Fellowship
49. Dr. Sudhan Majhi elevated to the grade of IEEE Senior member
50. IIT Patna ranked 19th in engineering Institute category according to NIRF, MHRD, Govt. of India
51. IIT Patna being conferred Education Award instituted by CMAI association of India.
52. Prof. Pushpak Bhattacharyya , President, Association of Computational Linguistics (ACL), the highest international body for coordinating, disseminating Natural Language Processing Research, 2016
53. Best M. Tech Project award in Electrical Engineering Indian society for Technical Education, 2015
54. Best B. Tech Project award (in Mechanical Engineering), Indian National Academy of Engineering , 2012, 2013, 2015.
55. Dr. Sriparna Saha received IEI Young Engineers award 2015 in Computer Engineering Discipline, 2015.
56. Dr. Naveen Kumar Nishchal, Edmund Optics Singapore Educational Award, 2015
57. Gandhian Young Technological Innovation Award to B.Tech Project of Electrical Engineering, 2014
58. Dr. Aditya Raj, Professor M N Srinivas Memorial Prize, Indian Sociological Society, 2013.
59. Dr. Nalin Bharti, Bharat ShikshaRatan award by Global Society for Health & Education Growth, New Delhi, 2013.
60. Dr. Karali Patra received the DAAD research stay fellowship, 2012.
61. Dr. Ranjan Kumar Behera and Dr. Sanjoy Kumar Parida, Associate Professor, Electrical Engineering Department were selected for the Bhaskara Advanced Solar Energy (BASE) Fellowship Program in 2014 and 2015 respectively, supported by the Department of Science and Technology, Govt. of India, and the Indo-U.S. Science and Technology Forum (IUSSTF).

Research & Development

IIT Patna has research laboratories equipped with state-of-the-art facilities in Engineering and Natural Science departments. Faculty member of departments are actively working with government agencies and various R&D organizations so as to enable the participation of IIT P in large number of cutting edge scientific research .Research & Development (R&D) Unit at IIT Patna is special unit with dedicated staff members to manage the projects and consultancies funded by external funding agencies.

Total number of projects(since inception)	Total amount of grant received for Sponsored projects	Number of projects completed
209	Rs 10136.95 Lacs	94



Growth in value of projects sanctioned	
Financial Year	Sanctioned Amount (In Rs. Lacs)
2009-10	280.60
2010-11	361.60
2011-12	77.80
2012-13	226.50
2013-14	1145.00
2014-15	1171.70
2015-16	5308.4
2016-17	1565.35
Grand Total	10136.95

Details of Patents at IIT Patna

SI No.	Title of Patent	Application No
01.	Biaxial stretching device	Indian Patent Application No :985/KOL/2013
02.	Multi Person Viewable 3D Display Device and filter Glasses based on frequency multiplexing of light	Indian Patent Application No :984/KOL/2014
03.	Whirl Detection of shaft coupled with an induction motor using full spectrum analysis of motor current signature	Indian Patent Application No : 1026/ KOL/2014
04.	Manual Wheat Harvester	Indian Design Application No:261817
05.	A process for the preparation of biopolymers	Application No.1271/KOL/2014
06.	Blind Wireless Receiver (BWR) Testbed Implementation For Single Carrier Systems	Indian Patent Application No :1337/KOL/2014
07.	Surfactant based boiling system for zero gravity	Indian Patent Application No :1208/KOL/2015
08.	New design application - Handle operated garbage & soil Collector	Indian Design Application No :272013/D/NF/ SKM
09.	“Automatic Booklet Scanning Machine (ABSM)”	Indian Patent Application No. 1082/KOL/2015
10.	An improved squirrel cage induction motor with enhanced efficiency and wide range of operating speed for application in electric vehicle	Indian Patent Application No. 201631013398
11.	Exoskeleton	Indian Design Application No : 287479
12.	A method for the synthesis of pure phase multiferroic bismuth ferrite, BiFeO ₃ (BFO) ceramics.	Indian Patent Application No : 201631037965
13.	An improved valveless micropump with dome shaped dielectric elastomer diaphragm, pumping chamber and nozzle diffuser as flow control element.	Indian Patent Application No : 201631041457
14.	Vibro Tactile feedback System using FSR	Indian Patent Application No : 201731014654
15.	A phase and stoichiometrically pure ceramic powder and a process for the preparation thereof	Indian Patent Application No : 201731019619
16.	An improved system of a passive exoskeleton to reduce manual effort in carrying load	Indian Patent Application No. 201731023607

Funding Agencies



MoUs with Foreign Universities



MoUs/ Agreements with Industries



Departments at a Glance

S.No	Name of the Department	Number of Faculty	Coursed offered
1	Computer Science& Engineering	14	B.Tech. M.Tech. Ph.D.
2	Electrical Engineering	15	B.Tech. M.Tech. Ph.D.
3	Mechanical Engineering	18	B.Tech. M.Tech. Ph.D.
4	Civil and Environmental Engineering	10	B.Tech. M.Tech. Ph.D.
5	Chemical and Biochemical Eng	05	B.Tech. Ph.D.
6	Materials Science and Eng	03	M.Tech. Ph.D.
7	Chemistry	11	M.Sc.,B.Tech. Ph.D.
8	Mathematics	09	M.Sc., M.Tech Ph.D.
9	Physics	15*	M.Sc., M.Tech Ph.D.
10	HSS	07	Ph.D.

* With one Ramanujan Faculty

Department of Computer Science & Engineering

(a) Research Vision of the Department

- To evolve into a powerhouse of excellence in CSE education to impart enduring CSE programs with rigour and relevance that help individuals acquire academic excellence, competencies, and, cutting-edge research skills and inculcating in them a social consciousness and human values
- Become a globally recognized centre for Computer Education with world class research output

(b) Research Labs

Research Lab I: Elsevier Centre for Excellence of Natural Language Processing

Aim: To conduct research and development in some of the cutting edge areas of Artificial Intelligence, Natural Language Processing and Machine Learning

Important (recent one or two) Publications:

- Md. Shad Akhtar, Abhishek Kumar, Deepanway Ghosal, Asif Ekbal, Pushpak Bhattacharyya. A Multilayer Perceptron based Ensemble Technique for Fine-grained Financial Sentiment Analysis. In *Proceedings of Empirical Methods on Natural Language Processing (EMNLP 2017)*, pp. 551-557, Denmark.
- S. Akhtar, A. Kumar, A. Ekbal and P. Bhattacharyya (2016). A Hybrid Deep Learning Architecture for Sentiment Analysis. In *26th International Conference on Computational Linguistics (COLING 2016)*, pp. 482-493, Japan

Research Lab II: Shusrut: ezDI Research Lab on Health Informatics

Aim: To conduct research and development in some of the crucial issues having great impact on health care based on Natural Language Processing and Machine Learning

- 1. S. Yadav, A. Ekbal, S. Saha, P. Bhattacharyya (2017). Entity Extraction in Biomedical Corpora: An Approach to Evaluate Word Embedding Features with PSO based Feature Selection. In *Proceedings of 15th International Conference of the European Chapter of the Association for Computational Linguistics (EACL)*, pp. 1159-1170, Spain.
- 2. S. Saha, A. Alok and A. Ekbal (2016). Brain Image Segmentation using Semi-Supervised Clustering. *Expert Systems with Applications*, Elsevier. Vol. 52, PP. 50-63

Research Labs

Research Lab III: Advanced Computing Lab

Aim: This proposed Advanced Computing lab will cater to the needs of computing resources for applications such as Large Scale Distributed Computing, Cloud Computing, High Performance Computing and Big Data Computing. Besides, setting up a private cloud, hybrid cluster and accelerators for many cores/threads, the computing will be extended for public cloud, grid. The researchers can develop prototypes and test on advanced computing facilities

Research Lab IV: Embedded Systems Integration Lab

Aim: To act as a key enabler and catalyst for Embedded System Education. To Innovate, enterprise and take leading role in R&D of Embedded System Engineering.

Specifically, to promote design and development of hardware based system for Improving the quality of life. Intel has donated a number of Galileo boards and Grove starter kits. Embedded Systems, IoT and OS supporting tools from ARM university program is being acquired. Students from various departments will be using this facility for project/research work. Currently this lab is operated from Hardware lab of CSE dept.

(c) Key Projects Undergoing

- A Platform for Cross-lingual and Multilingual Event Monitoring in Indian Languages, MEITY and MHRD, Govt. of India (Prof. Pushpak Bhattacharyya and Dr. Asif)
- Hindi to English Machine Translation System in Judicial Domain, MeiTY, Govt. of India (Prof. Pushpak Bhattacharyya and Dr. Asif)
- A Software Tool for the Planning and Design of Smart Micro Power Grids, MHRD (Dr Arijit and Dr. Ranjan Kumar Behera)
- Accenture IIT AI Lab, Accenture (Prof. Pushpak Bhattacharyya Dr. Asif Ekbal and Dr. Sriparna Saha)
- Development of solution to defend against Collaborative attacks in Peer-to-Peer networks, DEITY (Dr. Somanath Tripathy and Dr. Ashok Singh Sairam)

- Disaster Management Using Sparse Crowd Source Data (Dr. Joydeep Chandra and Dr. Ashok Singh Sairam)
- Elsevier Center of Excellence for Natural Language Processing, Elsevier (Prof. Pushpak Bhattacharyya, Dr. Asif Ekbal, Dr. Sriparna Saha)
- IITB IITP NLP ML (Prof. Pushpak Bhattacharyya and Dr. Asif Ekbal)
- Shusrut: ezDI Research Lab on Health Informatics, ezDI (Prof. Pushpak Bhattacharyya Dr. Asif Ekbal and Dr. Sriparna Saha)
- Information Leakage Analysis of Database Query Languages, SERB, DST (Dr Raju Halder)
- SMDP-C2SD, DEITY (Dr Arijit Mondaal and Dr. K. C. Ray)

(d) Some of the important publications

- Arjun Atreya, Ashish Kankaria, Pushpak Bhattacharyya, Ganesh Ramakrishnan, Query Expansion in Resource Scarce Languages: A Multilingual Framework Utilizing Document Structure, TALIP, Vol 16:2 (2016).
- Md. Shad Akhtar, Deepak Kumar Gupta, Asif Ekbal, Pushpak Bhattacharyya: Feature selection and ensemble construction: A two-step method for aspect based sentiment analysis. Knowledge based System, Elsevier, 125: 116-135 (2017).
- U. Sikdar, A. Ekbal and S. Saha, A Generalized Framework for Anaphora Resolution in Indian Languages, Knowledge-Based Systems, Elsevier, 109, pp 147–159 (2016).
- S. Mishra, S. Saha and S. Mondal, A Multiobjective Optimization based Entity Matching Technique for Bibliographic Databases, Expert Systems With Applications, Volume 65 pp 100-115 (2016).
- S. C. Rajat, R. R. Jeldi. I. Saha and Jimson Mathew, Binary Decision Diagram Assisted Modeling of FPGA-based Physically Unclonable Function by Genetic Programming, IEEE Transactions on Computers, 26 August (2016).
- S. Saha, S. Mitra and R. K. Yadav, A Stack Based Ensemble Framework for Detecting Cancer-microRNA Biomarkers, Genomics, Proteomics & Bioinformatics, (2016).
- Rakesh Matam and Somanath Tripathy, 'Secure Multicast Routing Algorithm for Wireless Mesh Networks', Journal of Computer Networks and Communications, (2016).
- S. Saha, A. Alok and A. Ekbal, Use of Semi-supervised Clustering and Feature Selection Techniques for Gene-Expression Data, IEEE Journal of Biomedical and Health Informatics (Retitled from the IEEE Transactions on Informatio, 20(4): 1171-117 (2016).
- Rajat S. S, Sam P. Jimson Mathew, A Flexible Online Checking Technique to Enhance Hardware Trojan Horse Detectability by Reliability Analysis, IEEE Transactions on Emerging Topics in Computing, 99, January (2017).
- Nemi Chandra Rathore and Somanath Tripathy, A Trust-based Collaborative Access Control Model with Policy Aggregation for Online Social Networks, Social Network Analysis and Mining, (2017).
- J. Prakash A V, B. R. Jose, E, Jimson Mathew, B. A Jose, A Differential Quantizer based Error Feedback Modulator for Analog to Digital Converters, IEEE Transactions on Circuits and Systems II, 09 February (2017).
- Raju Halder, Angshuman Jana and Agostino Cortesi, Data Leakage Analysis of the Hibernate Query Language on a Propositional Formulae Domain, LNCS Transactions on Large-Scale Data- and Knowledge-Centered Systems, Volume 23: 23-44 (2016).
- S. Saha and R. Das, Exploring Differential Evolution and Particle Swarm Optimization to Develop Some Symmetry Based Automatic Clustering Techniques: Application to Gene Clustering, Neural Computing and Applications, doi: 10.1007/s00521-0 (2016).
- Sumit Mishra, Sriparna Saha and Samrat Mondal, "GAEMTBD: Genetic Algorithm based Entity Matching Techniques for Bibliographic Databases", Springer Applied Intelligence, Volume:47, No. 1, pp. 197-230, 2017.
- Ajay Pratap, Rajiv Misra and Utkarsh Gupta, Randomized Graph Coloring Algorithm for Physical Cell ID Assignment in LTE-A Femtocellular Networks, Wireless Personal Communications, 91(3), pp.1213-1235 (2016).
- Sumit Mishra, Samrat Mondal and Sriparna Saha, Sensitivity-An Important Facet of Cluster Validation Process for Entity Matching Technique, Transactions on Large-Scale Data and Knowledge-Centered Systems, Vol: 29, pp. 1-39 (2016).
- M. I. Bandan, S. Pagliarini, Jimson Mathew, and D. K Pradhan, Improved Multiple Faults-Aware Placement Strategy: Reducing the overheads and Error rates in Digital Circuits, IEEE Transactions on Reliability, 66, March (2017).





- Nilotpal Chakraborty, Arijit Mondal, Samrat Mondal, Intelligent Scheduling of Thermostatic Devices for Efficient Energy Management in Smart Grid, IEEE Transaction on Industrial Informatics (2017).

- Rajiv Misra, Ram Narayan Yadav, k-Hop Neighbour Knowledge Based Clustering in CRN under Opportunistic Channel Access, International Journal of Communication Networks and Distributed Systems (IJCND), (2017).

- Nilesh Chakraborty and Samrat Mondal, On Designing A Modified-UI Based Honeyword Generation Approach For Overcoming The Existing Limitations, Computers & Security, Vol: 66, pp. 155-168 (2017).

- Md. Imran Alam and Raju Halder, Refining Dependences

for Information Flow Analysis of Database Applications, International Journal of Trust Management in Computing and Communications, 3(3), 193-223 (2016).

- A. Ekbal and S. Saha, Simultaneous Feature and Parameter Selection Using Multiobjective Optimization: Application to Named Entity Recognition, Journal of Machine Learning and Cybernetics, 7(4): 597-611 (2016).
- Shukla, Shailendra, Rajiv Misra, and Abhishek Agarwal, Virtual coordinate system using dominating set for GPS-free adhoc networks, Annals of Telecommunications, 72.3-4 pp 199-208 (2017).
- RamNarayan, Sourav Bhagat, and Rajiv Misra "Performance Analysis of Cognitive Smart-Grid Communication System using Markov Chain", Ad Hoc Networks, Volume 65, October 2017, Pages 38-54(Elsevier).
- Ram Narayan Yadav, Rajiv Misra, "On k-Channel Connectivity in Cognitive Radio Networks through Channel Assignment", International Journal of Electronics and Communication, Volume 77, July 2017, Pages 118-129. (Elsevier)
- J. Chandra, B. Mitra, N. Ganguly, Evolution of Superpeer Topologies: An Analytical Perspective, Journal of Pervasive and Mobile Computing, Volume 40, September 2017, Pages 339-358, Elsevier.
- Shweta, Asif Ekbal, Sriparna Saha and Pushpak Bhattacharyya (2017). Entity Extraction in Biomedical Corpora: An Approach to Evaluate Word Embedding Features with PSO based Feature Selection. In European Chapter of the Association for Computational Linguistics (EACL 2017), April 3-7, Valencia, Spain.
- Md Shad Akhtar, Ayush Kumar, Asif Ekbal and Pushpak Bhattacharyya (2016). A Hybrid Deep Learning Architecture for Sentiment Analysis. In proceeding of the 26th International Conference on Computational Linguistics (COLING), 11-16 Dec 2016, Osaka, Japan.
- S. Acharya and S. Saha (2016): "Importance of Proximity

Measures in Clustering of Cancer and miRNA Datasets: Proposal of an Automated Framework", Molecular BioSystems, Volume 12, No. 11, Pages 3478-3501

- S. Saha (2016): "Enhancing point symmetry-based distance for data clustering", Soft Computing, doi:10.1007/s00500-016-2477-3
- S. Mishra, S. Mondal and S. Saha (2017): Improved Solution to the Non-Domination Level Update Problem", Applied Soft Computing
- Roshni Chakraborty, Maitry Bhabsar, Sourav Kumar Dandapat, Joydeep Chandra, "A Network Based Stratification Approach for Extracting Summary Tweets for News Articles", WISE, MOSCOW, RUSSIA, 2017
- Sumit Mishra, Samrat Mondal and Sriparna Saha, "Improved Solution to the Non-Domination Level Update Problem", Elsevier Applied Soft Computing, Vol: 60, pp: 336-362, 201
- Mohammed Hasanuzzaman, Sabyasachi Kamila, Mandeep Kaur, Sriparna Saha, Asif Ekbal: Temporal Orientation of Tweets for Predicting Income of Users. ACL (2) 2017: 659-665.

(e) Academic Programs in the Department

The department offers B. Tech in Computer Science and Engineering, M. Tech (Computer Science and Engineering), M. Tech (Maths and Computing -jointly with Mathematics department) and Ph.D. program in various specialized areas of Computer Science and Engineering.

(f) Awards or Recognitions

- IIT Patna team (Binayak krishna Swami, Kumar Prabhakar, Dhanachandra N. and Rakesh Kumar Sanodiya) and has won the First Prize in Intel Higher Education Challenge on Cyber Physical Systems.
- Mr. Sanjeet Nayak and Dr. Somanath Tripathy got the 1st best technical poster award in Global Conference on Cyber Space (GCCS) held on 23 - 24th November at New Delhi.



- Md. Shad Akhtar and Shweta Yadav selected for participating in the prestigious Google NLP Summit, Zurich, Switzerland.
- Research on Computational Sarcasm by Prof. Pushpak Bhattacharyya and his team reported in Times London.
- Asif Ekbal (2017) *Visvesvaraya Young Faculty Research Award*
- Asif Ekbal (2017): JSPS Invitation Fellowship from the Govt. of Japan
- Sriparna Saha was awarded NASI-YOUNG Scientist Platinum Jubilee Award for the year 2016 in the field of Electronics, Computer Science and Engineering.
- Paper authored by Asif Ekbal, Sriparna Saha received the *Best Paper Award, Clinical NLP Workshop, COLING-16, Japan.*
- Sriparna Saha (2016) *BIRD Award*
- *Elevated to Senior IEEE Member:* Rajiv Misra, Somanath Tripathy, Sriparna Saha

- Pushpak Bhattacharyya (2016): *Eminent Engineer Award*
- Sriparna Saha (2016) *IEI Young Engineers Award in Computer Engineering*
- Suman Kumar Maji (2017) *SERB Early Career Research Award*
- Paper authored by Sriparna Saha received Best paper award in IEEE INDICON 2015
- Sriparna Saha received the French National Research Center (CNRS) Fellowship(2013)

(g) No. of Research Scholars in the Department

The CSE department has 49 full time and 9 Part-time Research Scholars.

Department of Electrical Engineering

(a) Research Vision of the Department

“To engage in the frontiers of the field and channelize the state-of-the-art knowledge to train personnel who can solve problems of relevance to the society at large. While imparting high quality education, emphasis is being imparted on taking up innovative ideas from concept stage to final product development stage via the route of basic technology research, feasibility studies, technology improvement, demonstration and product development.”

(b) Labs - Facilities Available Along with Pictures

- Basic & Digital Electronics
- Analog Electronics
- Communication
- VLSI & Embedded system
- System on Chip (SOC)
- Optoelectronics Device Fabrication

- Signal & Image Processing
- Wireless Sensor Network
- Advance Electrical
- Power System & Protection
- Instrumentation and Control
- Optical Communication
- Device Simulation
- RF and Microwave
- Electrical Workshop
- Video Surveillance Lab



(c) Key Projects Undergoing

- A Software Tool for the Planning and Design of Micro Power Grids (Jointly with IITKharagpur, and IIT Guwhati), Department of Higher Education, Ministry of Human Resource, Development and Ministry of Power, Government of India
- Teaching Learning Centre for Internet-of-Things (Smart Grid and Smart Building) , Jointly with IIT Kanpur, IIT Kharagpur and IIT Indore, Department of Higher Education, Ministry of Human Resource Development, Government of India
- ICT For Satellite Communication, DEITY
- Design and Implementation of Novel VLSI Architectures of PRNG for Cryptography Applications, CSIR, New Delhi
- SMDP-C2SD, DeitY, Delhi
- Modeling, simulation and performance optimization of Re-S/D SOI MOSFET, Department of Science & Technology (DST), Govt. of India
- Analytical investigation of subthreshold behavior of SiNT FETs, DRDO
- Cyber-Physical Systems for M-Health, Department of Science & Technology (DST), Govt. of India
- Modeling, Design and Implementation of Induction Motor Drives for Propulsion Applications, Ministry of Communications and Information Technology, Govt. of India
- Integrated Automatic Voltage Control of a High Efficient Solar PV System, Department of Science & Technology (DST), Govt. of India
- RF MEMS Filter, Department of Science & Technology (DST), Govt. of India
- High Power AC Drives for Electric Locomotive and General Purpose off Highway Applications, Department of Science & Technology (DST), Govt. of India
- Maxwell stress of Elastomer, NRB
- Video Surveillance, Department of Science & Technology (DST), Govt. of India
- Distributed Generation, Department of Science & Technology (DST), Govt. of India
- MTT using Filters, Department of Science & Technology (DST), Govt. of India

(d) Some of the Important Publications

- 1. G.L. Raja and A. Ali, Modified parallel cascade control strategy for stable, unstable and integrating processes. ISA Transactions, 2016, vol 65, pp. 394-406.
- 2. Suman Kr. Dey and AneekAdhya, "Delay-aware Green Service Migration Schemes for Data Center Traffic", IEEE and OSA Journal of Optical Communications and Networking, Vol.

8, Issue 12, pp. 962 - 976, December 2016.

- 3. Sandeep Raj, K. C. Ray, "ECG Signal Analysis Using DCT-Based DOST and PSO Optimized SVM", IEEE Transactions on Instrumentation and Measurement, Vol. 66, Issue 3, pp. 470-479, Mar. 2017.
- 4. M H Kolekar, S Sengupta, "Bayesian Network-Based Customized Highlight Generation for Broadcast Soccer Videos", IEEE TRANSACTIONS ON BROADCASTING, Vol. 61, No. 2, pp 195-209, 2015.
- 5. DeeptiGola, Balraj Singh and Pramod Kumar Tiwari, A Threshold Voltage Model of Tri-Gate Junctionless Field-Effect Transistors Including Substrate Bias Effects, IEEE Transactions on Electron Devices, 10.1109/TED.2017.2722044. (IF=2.605, h5 index 80)
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- 8. SudhanshuVerma and PreetamKumar,"Compact Arc Shaped Antenna with Binomial Curved Conductor-Backed Plane for Multiband Wireless Applications," IET Microwave Antennas and Propagation, September 2014.
- 9. Rajlaxmi Chouhan, Rajib Kumar Jha, P. K. Biswas, "Enhancement of Dark and Low Contrast images using Dynamic Stochastic Resonance," Journal in IET Image Processing, Vol. 7, Issue 2, pages 174 – 184, Mar. 2013.
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- 11. S. Payami, and R. K Behera "An Improved DTC Technique for Low Speed Operation of a Five-Phase Induction Motor" Submitted to the IEEE Transactions on Industrial Electronics, vol. 64, No. 5, pp. 3513, May 2017.
- 12. S. Payami, R. K Behera, A. Iqbal and R. Al-ammari, "Common mode voltage and vibration mitigation of a five-phase three-level NPC inverter fed induction motor drive system," IEEE Journal of Emerging and Selected Topics in Power Electronics, vol.3, no.2, pp.349-361, June 2015.
- 13. S. K. Parida, S. N. Singh and S. C. Srivastava, "Reactive Power Cost Allocation by Using a Value Based-Approach," IET Generation, Transmission & Distribution, vol.3, Issue. 9, September 2009, pp. 872-884.
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- 15. S. Das, S. Budishin, SudhanMajhi, Z. Liu, Y. L. Guan, "A New Paraunitary Generator for Polyphase Complete Complementary Codes". Submitted to IEEE Transactions on Signal processing, 2017.
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Secrecy Capacity of Underlay MIMO-CRN through Bi-Directional Zero-Forcing Beamforming,” submitted to IEEE Transactions on Wireless Communications, 2017.

- 17. S. Pal, S. Gupta, Proposal and Analysis of a Silicon MMI Coupler Based Electronically Controllable Photonic Switch, IEEE Journal of Selected Topics in Quantum Electronics (Volume: 22, Issue: 6, Nov.-Dec. 2016, Article #: 3600214)
- 18. Y. K. Singh and A. Chakrabarty, “A Novel Technique to Estimate Complex Permittivity of Low-loss Dielectric Materials in Gigahertz Frequency Band”, IEEE Transactions on Dielectrics and Electrical Insulation, vol. 18, Issue 1, pp. 168-175, February 2011.

(e) Academic Programs in the Department

Existing Programs

- B.Tech Electrical Engineering (Strength 50)
- M.Tech Communication System & Engineering (Strength 20)
- M.Tech Mechatronics Jointly with Mechanical Department (Strength 20)
- M.Tech VLSI & Embedded System jointly with Computer Science & Engineering Department (Strength 15)
- PhD (Electrical Engineering) Program under consideration
- M.Tech Power System

(f) Recognitions in the Last Five Years

- Dr. Sanjoy, Dr. Ranjan, Dr. Preetam, Dr. Mahesh, Dr. Sudhan: Elevated to the grade of Senior Member IEEE, USA
- Dr. Ranjan Kumar Behera got Bhaskara Advanced Solar Energy (BASE) Fellowship by the Department of Science and Technology, Govt. of India, and the Indo-U.S. Science and Technology Forum (IUSSTF). For doing advanced research on Grid Interaction including Smart Grids and System Development and Integration at Tennessee Technological University, Tennessee, USA.
- Dr. Ranjan Kumar Behera and Dr. Sanjoy Kumar Parida got prestigious Bhaskar Advanced Solar Energy Research Fellowship Award, Indo-US Science and Technology Forum, Department of Science and Technology, 2014 and 2015.
- Dr. Sanjoy Kumar Parida got Young Scientist Award, Department of Science and Technology: Integration of Distributed Energy Resources to Improve the Reliability of the System, 2010.
- Dr. Preetam Kumar has been elevated to the grade of Senior Member IEEE, USA
- Rajan Kapoor, B.Tech student under the supervision of Dr. Preetam Kumar, Department of Electrical Engineering has been selected for the Gandhian Young Technological Innovation Awards 2014 for his project entitled “A Transceiver for Satellite based communication during Emergency using

TV White Spaces”. Special Session Organizer at Global Wireless Summit 2015, Hyderabad, India.

- Dr. Pramod Kumar Tiwari got Young Scientist startup grant
- Dr. Saurabh Kumar Pandey got CSIR Travel Grant for Singapore by Government of India.
- Dr. Rajib Kumar Jha received National Award for supervising Best M. Tech. Thesis (*First Prize*) in Electrical and Electronics engineering, year - 2015 by Indian Society for Technical Education, Gov. of India.
- Dr. Rajib Kumar Jha got Premium Award-2015 for Best Research Paper Published during the last Two years in IET Image Processing.
- Dr. Sumanta Gupta got research scholarship in the field of Information and Communication Technologies related to the advanced topics in Photonic Networks and Optoelectronics Systems at CEIRC in Scuola Superiore Sant Anna, Pisa, Italy.
- Dr. Sudhan Majhi got Start-up grant for Young Scientist, December 2015
- Dr. Sudhan Majhi received NI ASEAN Graphical System Design Achievement awards 2012
- Dr. Ranjan Kumar Behera selected as the featured engineer of the globe by EE Web: Link-<http://www.eeweb.com/spotlight/interview-with-dr.-ranjan-kumar-behera>, 2015.
- Dr. Ranjan Kumar Behera got young scientists award in engineering sciences, Department of Science & Technology (DST), Govt. of India, 2011.

(g) Conference/workshops in the Last Five Years

- Workshop on “Nuclear Power at your service - An insight” being organized at IIT Patna on 10th Jan 2012 in association with NPCIL.
- INUP Familiarization Workshop on “Nanofabrication Technologies” 8th – 9th October 2015.
- National Conference on Computer Vision, Pattern Recognition, Image Processing and Graphics (NCVPRIPG) from 16th -19th December 2015.
- IEEE 5G Summit at Patna on 29th March 2016.
- Short Term Course on “Recent Advances in Power Electronics for Smart Grid and Electrical Drives” from 3rd to 5th March, 2016
- Short Term Course on “FPGA Based System Design” from 25th to 31st May 2015.

(h) Other Significant Achievements

Research Labs (Developed)

- Advance Electrical Engineering Laboratory

- Solar Energy Utilization Center

Research Labs (Under Development)

- Teaching Learning Centre for Internet-of-Things
- Smart Grid Research Lab

Key Projects Undergoing

- Integrated Automatic Voltage Control of a High Efficient Solar PV System, sponsored by Department of Science & Technology (DST), Govt. of India.

Recently approved projects

- IMPRINT: A Software Tool for the Planning and Design of Smart Micro Power Grids
- Teaching Learning Centre for Internet-of-Things, Smart Grid and Smart Building, Sponsored by Department of Higher Education, Ministry of Human Resource Development, Government of India

SMART GRID LABORATORY AT IIT PATNA: Teaching Learning Centre for Internet-of-Things, Smart Grid

(i) No. of Research Scholars in the Department

No. of Research Scholars in the Department 70 PhD Awarded 12



Department of Mechanical Engineering

Research Vision of the Department:

The Department of Mechanical Engineering at IIT Patna aims to engage in the frontiers of the field and channelize the state-of-the-art knowledge to solve problems of relevance to the country and society at large. Emphasis is being laid on taking up innovative ideas from concept stage to product development *via* the route of basic technology research, feasibility studies, technology development and demonstration, and final product formation. Currently, the personnel in the Department venture in diverse multidisciplinary fields including tribology, soft-tissue mechanics, non-traditional manufacturing, laser material processing, condition monitoring, biomedical robotics, biomedical bone drilling, computational mechanics, fracture, finite element modelling, composites, micro- and nano-scale heat transfer, boiling, condensation, two-phase flows, refrigeration and air-conditioning, computational fluid dynamics, interfacial flows, soft computing, microgravity, among others.

Research Labs:

- **Sustainable Energy Research Laboratory (SERL)** has been conceived with a goal to undertake cutting edge research in nuclear and solar energy engineering with an emphasis on ballooning and bursting of fuel clad during loss of coolant accident sequence and design and development of indigenous solar thermal technology. A wing of the lab is also engages in thermal management of high power density electronics and rheological characterization of various types of non-Newtonian fluids for heat transfer applications. **Facilities and Resources:** Clad tube burst facility, Spot welding machine for thermocouple fixing, Direct current heating facility, Data Acquisition System, Thermal Imaging Camera, Micro-PIV.
- **Thermal and Fluid Transport Laboratory (TFTL)** focuses on the investigation of thermal and fluid transport during phase change for a variety of energy, water, and thermal management applications, both for ground and space based applications. Our approach relies on leveraging scalable micro-/nano-fabrication, advanced characterization, state-of-the-art experimentation, and unique model prediction capabilities to enable mechanistic insights into complex fluid, interfacial, and thermal transport processes. **Facilities and Resources:** Microgoniometer, High Speed Camera, Infrared Camera, Refrigerated and Heating Circulator, Peristaltic Pump, DAQ with 16 Channel Multiplexer, High Voltage and Current Power Supplies

- **Tribology Laboratory** aims to understand contact mechanisms at macro-, micro-, and nano-scales for designing precision and reliable equipment. The Tribology lab has resources for understanding contacting and moving surfaces under different load and speeds under rolling-sliding or purely sliding or oscillatory conditions. The laboratory collaborates with other laboratories in the Institute to develop new surface engineering techniques like coating and surface texturing. **Facilities and Resources:** Twin-Disc Tribometer, Oscillatory Tribometer, Pin on Disc Tribometer
- **Material Testing Laboratory** focuses on measuring the strength and ductility of materials under various conditions, such as temperature, tension, compression and fatigue loading. Variety of materials including metals, composite, polymers and soft tissues can be tested for their expected life. **Facilities and Resources:** Fatigue Fracture Machine, Universal Testing Machine
- **Advanced Manufacturing Laboratory** focuses on scientific investigation of advanced manufacturing processes to improve quality and productivity in the industry. Alongside, the laboratory supports advanced manufacturing requirements of projects being executed throughout the Institute. **Facilities and Resources:** Wire EDM, 3D Printer, CIM Setup, CNC Milling, CNC Lathe, Ultrasonic Machining, Micromachining Setup, Laser Scribing/Texturing Machine
- **Mechatronics and Instrumentation Laboratory** focuses on the areas of modeling, simulation, and motion planning for robots interacting with stochastic, dynamic and unstructured environments w.r.t. applications related to agricultural robotics, socially assistive robotics, and micro-manipulation of biological cells. **Facilities and Resources:** CO₂ Laser Cutting Machine, Soldering and Assembly Station, Table Top CNC Milling and Drilling Machine, 3D Printer, Underwater Robot Testing Facility, Centrifuge, Furnace, DAQ and Controllers, Electrohydraulic and Electropneumatic Training Kit, PLC Training KIT, Amphibious Robots, Magnetic Microbot,
- **Fire Research Laboratory (FRL)** at IIT Patna is emerging to facilitate studies on open and compartment pool fires both experimentally and numerically. One of the major focuses in this laboratory is to establish innovative measuring techniques for different parameters like flame emissivity, temperature, gas velocity, safety distances, heat flux to bodies in stand-alone and multiple pool fires.
- **Other Research Laboratories** in the Department include Robotics and Automation Laboratory, Metrology Laboratory, Dynamics and Vibrations Laboratory, Computational Fluid Dynamics Laboratory and CAD, CAM laboratory.
- **Facilities and Resources:** Various software, workstation and parallel computing clusters

Number of Ph.D. students: 55

Key Projects:

- Influence of Hydrogen Content on Burst Characteristics of Zircaloy-4 Cladding (BRNS)
- Enhancement of Boiling Heat Transfer via the Suppression of

Coalescence in Microgravity (ISRO)

- Drilling of Human Bone for Minimal Bone Tissue Injuries (DST)
- Monitoring of Heat Flow Phenomenon of a Low Freezing Material during Continuous casting (BRNS)
- Robust Motion Planning of Bio-inspired Amphibious Robots (DST)
- Studies on Maxwell stress and Hysteresis Characteristics of Poly-acrylic and Silicone based Elastomers (DMSRDE, DRDO)
- Inelastic Effects in Elastomers- Theoretical and Experimental Study (ARDB)
- Design Analysis of Composite Patch Repair of Structural Members by Meshfree Method (DST)
- A Self-adaptive Electronic Cooling System by Enhanced Pool Boiling (SERB-DST)
- Development of a Real Time Tool Wear Monitoring and Compensation Method for Reverse micro-EDM and micro-EDM Drilling Process (DST)
- Design of an Integral Squeezed Film Damper (ARDB)

Key Publications:

- S. Suman, M.K. Khan, M. Pathak, and R.N. Singh, 2017. Investigation of elevated-temperature mechanical properties of delta-hydride precipitate in zircaloy-4 fuel cladding tubes using nanoindentation, *Journal of Alloys and Compounds* 726: pp. 107-113.
- D. S. Thakur, M.K. Khan, M. Pathak, 2017. Solar air heater with hyperbolic ribs: 3D simulation with experimental validation, *Renewable Energy* 113: 357-368.
- S. Raj, M. Pathak, M.K. Khan, 2017. An analytical model for predicting growth rate and departure diameter of a bubble in subcooled flow boiling, *International Journal of Heat and Mass Transfer* 109: 470-481.
- Y. K. Prajapati, M. Pathak, M.K. Khan, 2017. Numerical investigation of subcooled flow boiling in segmented finned microchannels, *International Communications in Heat and Mass Transfer* 86: 215-221.
- M.R. Gunjan, R. Raj, 2017. Dynamic Roughness Ratio-Based Framework for Modeling Mixed Mode of Droplet Evaporation, *Langmuir*, 33 (28): 7191-7201.
- Jakhar, K., Chattopadhyay, A., Thakur, A., and Raj, R., 2017, "Spline Based Shape Prediction and Analysis of Uniformly Rotating Sessile and Pendant Droplets," *Langmuir*, 33 (22): 5603-5612.
- S.P. Gundupalli, S. Hait, A. Thakur, 2017. A review on automated sorting of source-separated municipal solid waste for recycling, *Waste Management*, 60:56-74, 2017.
- A. Raj, A. Thakur, 2016, Fish-inspired robots: design, sensing, actuation, and autonomy a review of research. *Bioinspiration & Biomimetics*, 11(3), 031001.
- D.K. Prajapati, M. Tiwari, 2017. Topography analysis of random anisotropic Gaussian rough surfaces, *ASME J. Tribol.*,

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- H. Pathak, A. Singh, I. V. Singh, 2016, Three dimensional quasistatic interfacial crack growth simulations in thermo mechanical environment by coupled FE-EFG approach, Theoretical and Applied Fracture Mechanics 86: 267-283.
- R. S. Anand, K. Patra, M. Steiner, D. Biermann, 2017, Mechanistic modeling of micro drilling cutting forces, International Journal of Advanced Manufacturing Technology, 88: 241-254.
- P. Kumar, S.S. Panda, 2017. Numerical simulation of Al1070 alloy through hybrid SPD process, International Journal of Advanced Manufacturing Technology, 91:1-4, 835–846.
- M. Kumar, S.Roy, SS.Panda, 2017, Numerical simulation of continuous casting of steel alloy for different cooling ambiances and casting speeds using immersed boundary method, Proc. IMechE, Journal of Engineering Manufacture,231(8):1363-1378.
- M. Imam, V. Racherla, K. Biswas, H. Fujii, V. Chintapenta, Y. Sun, Y. Morisada, 2017, Microstructure-property relation and evolution in friction stir welding of naturally aged 6063 aluminium alloy, International Journal of Advanced Manufacturing Technology, 91:5-8, 1753-1769.
- M. Imam, Y. Sun, H. Fujii, N. Ma, S. Tsutsumi, H. Murakawa, 2017. Microstructural characteristics and mechanical properties of friction stir welded thick 5083 aluminium alloy, Metallurgical and Materials Transaction A, 48(1): 208-229.

Patents:

- Mayank Tiwari, Raju Kumar, Vitthal Pandey, Pranay Kumar, Neetesh Kumar Sah, An improved system of a passive exoskeleton to reduce manual effort in carrying load, Indian Patent application no. :201731023607
- A. Saini and K. Patra, 'An improved valveless micropump with dome shaped dielectric elastomer diaphragm, pumping chamber and nozzle diffuser as flow control element', Patent application no 201631041457 dt. 05.12.2016
- L. G. Dsa and K. Patra, Vibro-tactile feedback system using FSR, Patent application no.: 201731014654 dt. 25.04.2017

Department of Civil & Environmental Engineering

Research Vision of the Department: *Innovating sustainable solutions and technology catering to the general infrastructural needs of the country and the eastern region in specific.*

Academic Programs in the Department

- B.Tech. in Civil Engineering
- M.Tech. in Civil and Infrastructure Engineering
- Ph.D in Civil Engineering

Research Laboratories

Structural Engineering and Concrete Technology Laboratory

Structural engineering and concrete technology lab serves a wide spectrum of activities relating to teaching, research and development. The primary activities include experimental study and testing of the construction materials to understand the behavior and performance on diverse conditions. It is equipped with state-of-art load/displacement controlled equipment for load application and precise instrumentation. The lab is provided with the advanced analysis and designing tools for the experimental study on model/prototype of structural elements and assemblies under various static and dynamic conditions. Seismic accelerometer and data logger are available for large and full scale investigation of load-deformation of structure including their post-peak strength and deformability up to the failure.



Seismic Accelerometer and Data Logger (for large scale system)



Universal Testing Machine



Seismic Accelerometer and Data Logger (for small scale system)



Ultrasonic Concrete Testing Machine



Rebound Hammer

Thrust Research Areas:

Structural dynamics | Seismic performance of structures | Vibration control of structure | Low-cost housing | Fluid-structure interaction | Shock waves





Project:

Seismic response, damage and vulnerability of structures in Patna for future earthquakes [Funding Agency: SERB, DST, GoI; Budget: Rs. 21.39 lakhs].

Geotechnical Engineering Laboratory

Geotechnical engineering lab works towards developing the cost-effective and sustainable Geotechnical solutions to meet the country's infrastructure needs on the firm basis of classical soil mechanics concepts. The lab is equipped with the advanced tools used for cost effective ground improvement and foundation techniques. Equipment are available for determining Soil properties like shear strength, specific gravity, water content, dry density, Atterberg limits, permeability, compaction & consolidation etc. The

lab can be used for studying different type of soil including expansive soil and liquefiable, scour and erosion, construction quality control, foundations and anchors, stability of slopes, geomechanics, foundation design, slope and retaining wall design, foundations on expansive soils, site investigations and ground improvement techniques.

			
Static Cone Penetration Testing Equipment	Direct Shear Test Apparatus Digital	Electronic California Bearing Ratio Test	Oedometer

Thrust Research Areas:

Ground improvement | Static behavior of foundation | Effect of soil heterogeneity on foundation | Geoenvironmental & Toxic waste disposal

Soil Dynamics Laboratory

Soil dynamic lab works towards developing safe and sustainable design solutions for the earthquake resistant Geotechnical structures in and around the region. This lab is supported by Geotechnical lab and can be effectively utilized for studying dynamic properties of the soil, soil-structure interaction properties of structures, carrying out soil microzonation, soil liquefaction and amplification studies. The lab is fully equipped with software tools like GeoStudio to aid in its research objectives.

				
Fully Automatic Cyclic Triaxial Test Equipment	MASW Test Apparatus	Pile Integrity Test Apparatus	Shake Table	Block Vibration Testing Machine

Thrust Research Areas:



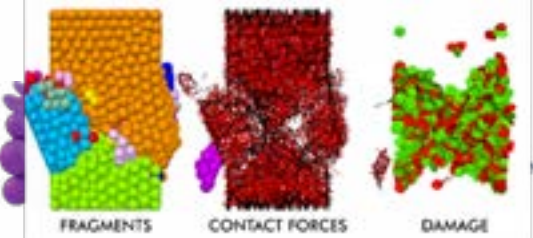
Geotechnical earthquake engineering | Behavior of foundation under dynamic loading | Probabilistic studies in geotechnical engineering

Project:

Microzonation of Jaipur City Based on Shear Wave Velocity [Funding Agency: DST, GoI, Budget: Rs. 16.02 lakhs].

Railway Engineering Laboratory

Railway engineering lab works to develop the design standards for high-speed rail tracks in India. It is equipped with large scale pullout apparatus and direct shear apparatus. This lab can be used effectively for studying the stability of the existing rail tracks to allow the movement of high-speed trains and devise strategies to recycle the used ballast so that further quarrying of rock may be reduced.

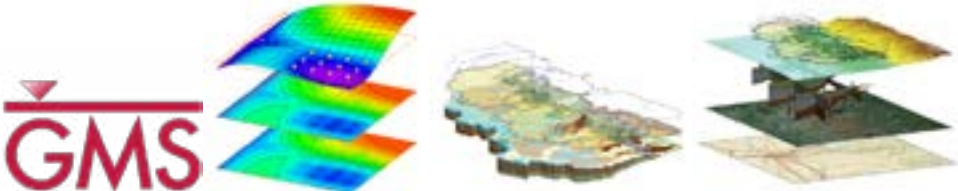
		
<p>Large scale Direct shear apparatus</p>	<p>Large scale Pullout apparatus</p>	<p>Particle Flow Code (PFC) Version 5</p>

Thrust Research Areas:

Role of Geosynthetics in improving the performance of railway ballast | Determination of shear strength parameter of railway ballast | Recycling of fouled railway ballast

Water Resources Engineering Laboratory

Water resources engineering lab works to develop cutting edge technology and provide optimal solutions to real world problems encompassing water resources management, with thrust area on simulation-optimization based solutions through robust computational platforms for optimal management of groundwater resources. Groundwater Modelling System (GMS) Aquaveo v(10) is installed in the laboratory for numerical modelling of groundwater systems.


<p>Groundwater Modelling System (GMS) Aquaveo Version 10.</p>

Thrust Research Areas:

Numerical Modelling of Groundwater Systems | Groundwater Flow and Solute Transport | Groundwater Pollution Sources Identification | Hydrogeological Data Analysis | Groundwater Aquifer Quality and Quantity Assessment | Compliance and Predictive Monitoring Network Design

Environmental Engineering Laboratory

The Environmental Engineering Laboratory tests and assesses water, hazardous materials, and biological samples. Its purpose is to be an innovative research-driven organization that provides the highest value and highest quality environmental testing, monitoring, assessment, and information services to benefit both citizens and the natural environment. To this end, the Lab operates in a flexible, innovative, manner that is responsive to the needs and expectations of individuals and of government programs. The lab is equipped with the following advanced equipments:

- **Atomic Absorption Spectrometer (AAS):** for quantification of 16 elements including heavy metals in aqueous samples; can measure down to parts per billion (ppb) in a sample.
- **Microwave Digestion System:** for preparation of all types of samples (rocks, plant, soil, food, pharmaceuticals, plastics, metals) for elemental analysis by AAS or ICP-MS.
- **TOC Analyser:** for quantification of organic carbon content in environmental samples across a dynamic operating range of 0.5 to 50,000 ppm.
- **Ion Chromatography:** for separation and quantification of different cations, anions and polar compounds present in environmental, water and wastewater samples.
- **Inductively Coupled Plasma Mass Spectrometry (ICP-MS):** for detecting metals and several non metals even at very low concentrations.

				
Atomic Absorption Spectrometer	Microwave Digestion System	TOC Analyzer	Ion Chromatography	Inductively coupled plasma mass spectrometry (ICP-MS)

Thrust Research Areas:

Environmental application of nanotechnology and novel composite material | Colloid & solute fate and transport | Waste treatment and resource recovery | Vermistabilization of industrial sludge | Biological production of nano-silica from agro-industrial waste

Projects:

- *Evaluate the fate and transport and implication of engineered nanoparticle retention in porous media [Funding Agency: DST, GoI, Budget:30.44 lakhs].*
- *Arsenic immobilization by in-situ synthesis of iron-based adsorbent under reducing environment within porous media [Funding Agency: DST-WTI (Water Technology Initiative), Budget:39.36 lakhs].*
- *Varied profiling of bio-macromolecules for energy and byproduct assessment employing electrochemical tools [Funding Agency: SERB, DST, Budget: Rs.14.40 Lakhs].*
- *Development of Ganga Grams under Namami Gange Programme with Support of Technical Institutions [Funding Agency:MHRD& National (NMCG), Ministry of Water, Budget: Rs.5.00 Lakhs].*
- *Development of Gravity-based Household Filter for Simultaneous Removal of Arsenic and Iron Contamination of Groundwater in Patna District, Bihar, India.[Funding Agency:Shastri Indo-Canadian Institute; Budget:Rs. 6 Lakhs].*
- *Occurrence, Fate and Removal of Emerging Contaminants in Surface Water[Funding Agency:Shastri Indo-Canadian Institute, Budget: CAD \$12,500.00]*

Selected Recent Journal Publications

- V. Puri, P. Chakraborty, S. Anand and S. Majumdar (2017) Bamboo reinforced prefabricated wall panels for low cost housing, *Journal of Building Engineering*, 9, 52-59.
- Anshupriya and S. Hait (2017) Comparative assessment of metallurgical recovery of metals from electronic waste with special emphasis on bioleaching, *Environmental Science and Pollution Research*, 24(8), 6989-7008.
- A. Samanta and Y.-N. Huang (2017) Ground-motion scaling for seismic performance assessment of high-rise moment-resisting frame building, *Soil Dynamics and Earthquake Engineering*, 94, 125-135.
- Syed K.K. Hussaini, B. Indraratna and J.S. Vinod (2016) A laboratory investigation to assess the functioning of railway ballast with and without geogrids, *Transportation Geotechnics*, 6, 45-54.
- B. Datta, C. Petit, M. Palliser, H.K. Esfahani and O. Prakash (2017) Linking a Simulated Annealing Based Optimization Model with PHT3D Simulation Model for Chemically Reactive Transport Processes to Optimally Characterize Unknown Contaminant Sources in a Former Mine Site in Australia, *Journal of Water Resource and Protection*, 9(5), 432-454.

- S. Kalidindi, M. Vecha, A. Kar and T. Raychoudhury (2017) Aluminum-cerium double-metal impregnated activated carbon: a novel composite for fluoride removal from aqueous solution, *Water Science and Technology: Water Supply*, 17, 115-124.
- S. Chakraborty, K. Roy and S. Raychaudhuri (2016) Design of Re-Centering Spring for Flat Sliding Base Isolation System: Theory and
A Numerical Study, *Engineering Structures*, 126, 66-77.
- V. Singhal and D.C. Rai (2016) In-plane and out-of-plane behavior of confined masonry walls for various tothing and openings details and prediction of their strength and stiffness, *Earthquake Engineering and Structural Dynamics*, 45, 2551-2569.
- A. Hegde and T.G. Sitharam (2016) Behaviour of geocell reinforced soft clay bed subjected to incremental cyclic loading, *Geomechanics and Engineering*, 10(4), 405-422.

Awards and Recognitions for Students and Faculty Members

- **Mr Rohan Kumar Chowdhry**, M.Tech student has proudly received the Best Paper Award in ETWREE-2017, an International Conference for the paper titled “Vermicomposting of primary clarified tannery sludge employing *Eisenia fetida*” at MVGR College of Engineering, Vizianagaram, Andhra Pradesh.
- **Mr Angshuman Das**, Ph.D scholar won First Prize in SHILP-2016 for the paper titled “One-Dimensional Seismic Energy Transmission along Heterogeneous Layered Soil” at IIT BHU, Uttar Pradesh.
- **Ms Anshupriya**, Ph.D scholar has proudly received Best Paper Award in Recycle-2016 for the paper titled “Extraction of Cu and Zn from high grade printed circuit board scraps by conventional and hybrid bioleaching” at International Conference on Waste Management, 2016, IIT Guwahati, Assam.
- **Dr Vaibhav Singhal** is the receipt of the Innovative Student Project Award from the Indian National Academy of Engineering (INAE) for his doctoral research work, 2015.
- **Dr Amarnath Hegde** is the receipt of the IGS-Prof. Leonard’s Award for Best Ph.D Thesis in Geotechnical Engineering for the year 2013 & 2014 by Indian Geotechnical Society, New Delhi in 2015.
- **Dr Subrata Hait** is the receipt of the Albert Nelson Marquis Lifetime Achievement Award from the Marquis Who’s Who, USA in 2017.
- **Dr Subrata Hait** conferred with Bharat Vikas Award, 2017.

Department of Materials Science & Engineering

Research Vision of the Department:

- Pioneers in teaching and research
- Best course curriculum
- Excellent job / higher study prospects for students
- Collaboration with industries by projects and consultancy

Mission of the Department:

- State-of-the art laboratories
- Faculty members from diversified field with strong industry background and foreign exposure
- Pioneering mentors from industry / academia across the globe

Research Lab: The Department of Materials Science & Engineering has developed laboratories for advancement of research in several areas of Materials Science and Engineering. Currently, there are three (03) research laboratories having three sub-units associated with each one of them.

1. Metallurgical and Materials Engineering Lab (a. Plasma Spray Lab, b. Metallographic & Corrosion Lab, c. Mechanical Testing Lab)- Metallurgical and materials engineering lab in department of MSE has set-up the world-class plasma spray coating facility (OerlikonMetco, USA), which has the potential of fabricating the large domain of metal and ceramic coating for the wear and corrosion resistance applications. In addition, sophisticated micro indentation with the scratch tester (Microtest, Spain) is a part of mechanical testing lab. For characterizing the corrosion behaviour of coating/substrate, corrosion lab consisting of potentiostat/galvanostat (GAMRY, USA) has been established. Apart from these, basic sample preparation lab containing the low speed diamond saw (Buehler, USA), grinder and polisher (Allied Hi-Tech, USA) is an added compliment. One of our MSE faculties is working in the area of plasma sprayed coating since a decade.

2. Ceramics & nanomaterials lab(a. Nanomaterials Lab, b. Materials chemistry lab, c. Ceramics lab)- Ceramic and nanomaterials lab in department of MSE focuses on the area of materials chemistry of advanced materials which probes into the synthesis issues for the nanoparticles (via materials chemistry routes) and try to understand the complexities involved via different structural characterisation methods.

3. Polymer science and technology lab (a. Polymer characterization lab, b. Polymer processing lab, c. Polymer synthesis lab)- Polymer science and technology lab in department of MSE has set-up the world-class polymer synthesis, processing and testing lab. Polymer processing lab facilities:-Haake internal mixer (Thermo Fisher Scientific), micro injection molding machine (Thermo Fisher Scientific), compression molding machine, two roll mixing mill and moving die rheometer. Polymer testing and characterization lab facilities:- Universal testing machine (Zwick-Roell), dynamic mechanical analysis (TA instruments), modular compact rheometer (Anton-Paar) and thermogravimetric analyzer (TA instruments). Polymer synthesis lab:- Fume hoods, laboratory island tables and basic facilities for polymer synthesis .Ongoing research activities:-Projects related to polymer science and technology with specialization in adhesion, blends / alloys, composites (micro and nano), hybrid fillers (conventional / nano), thermal stability and chemical modification of polymers.

Research Publications:

- Microstructural and Mechanical Behavior of Spark Plasma Sintered Titanium Carbide with Hybrid Reinforcement of Tungsten Carbide and Carbon Nanotubes, M Sribalaji, B Mukherjee, A Islam, A. K Keshri. Materials Science and Engineering: A, 702, 10-21, 2017
- In-situ formed graphene nanoribbon induced toughening and thermal shock resistance of spark plasma sintered carbon nanotube reinforced titanium carbide composite, M. Sribalaji, Biswajyoti Mukherjee, S. R Bakshi, P. Arunkumar, K. Suresh Babu, A. K. Keshri, Composites Part B: Engineering 123, 227–240, 2017
- On the peculiarities of phase developments involving Zn²⁺-doped ZrO₂ system, K.Kumar, T Jaro , AChowdhury, ScriptaMaterialia, 138, 71-74, 2017
- Synergistic effects of ultrasonication and ethanol washing in controlling the stoichiometry, phase-purity and morphology of rare-earth doped ceria nanoparticles, K Singh, Rishu Kumar, A Chowdhury, UltrasonicsSonochemistry 36, 182-190, 2017
- Carbon dot e Unique reinforcing filler for polymer with special reference to physico-mechanical properties, P.R. Sreenath, Seema Singh, M.S. Satyanarayana, Prolay Das, K. Dinesh Kumar, Polymer, 112, 189-200, 2017.
- Preferentially fixing nanoclays in the phases of incompatible carboxylated nitrile rubber (XNBR)-natural rubber (NR) blend using thermodynamic approach and its effect on physico mechanical properties, Satyanarayana M. S., A. K. Bhowmick, K. Dinesh Kumar, Polymer, 99, 21-43 2016.

Current Sponsored Projects:

- Title of the project: Fabrication of robust plasma sprayed rare earth oxide hydrophobic coating for the high temperature and wear resistance applications, SERB-DST, Rs. 26.74 Lakhs)
- Plasma Sprayed Carbon Nanotube and Graphene Reinforced Alumina Hybrid Nanocomposite Coating with Enhanced Properties for Light Metal Alloys (ISRO, Rs.19.40 Lakhs)
- Title of the project: Synthesis & characterisation of faceted nanocrystalline powders of Ceria-Zirconia and related system. Sponsored by: SERB-DST, Rs. 26.75 Lakhs
- Title of the project: Simultaneous improvement of low temperature and room temperature properties of rubbers, Sponsored by: DENKA, JAPAN, Rs. 20 Lakhs.

Consultancy Projects:

- Development of Comprehensive Plasma Spray Process Maps for Ceramic Powder Manufactured by Carborundum Universal Limited (CUMI), Kerala (Carborundum Universal Limited (CUMI), Kerala, Rs.8.00 Lakhs) Consultant Name: Dr.Anup Kumar Keshri

- Fabrication of Plasma Sprayed Coating with Improved Thermal Shock Resistance, Non Wetability to Molten Iron/Slag and Moderate Wear Resistance. Tata Steel Ltd. (Rs.8.00 Lakhs) Consultant Name: Dr.Anup Kumar Keshri
- Factors influencing the tack strength of rubbers (MRF Tyres, Chennai, India, Rs.23.00 Lakhs) Consultant Name: Dr. Dinesh Kumar Kotnees

Visits Abroad by Faculty Members:

- Anirban Chowdhury - attending 6th International Congress on Ceramics (ICC-6) for an oral presentation (Dresden, Germany) Aug. 21-25, 2016
- Anup Kumar Keshri- attending 5th International Conference on Materials Science and Engineering Technology, Tokyo, Japan, October 29-31, 2016,
- Dinesh Kumar Kotnees - Project discussion (DENKA Co., Ltd., Tokyo, Japan) April 2017

Invited Lectures by Faculty Members:

- Interplay between bulk viscosity and surface energy in autohesive tack of rubber-tackifier blends *by* Dinesh Kumar Kotnees (ITC Grand Chola Hotel, Chennai, India)
- Improving Metal-Rubber Adhesion via Multifunctional Oxide Coating *by*Anirban Chowdhury (CIPET APM-2017, Banglore, India)
- Thermal Sprayed Coatings & Composites: Science, Engineering and Applications (TSCC-2016) *by* Anup Kumar Keshri (MNIT Allahabad, India (Organized by Global Initiative of Academic Networks (GIAN))

Awards or Recognition:

- Rishu Kumar: Best M.Tech. student from MSE (2016)
- Nishta Singh: Best M.Tech. thesis award from MSE (2017)
- Amrita Roy: Best M.Tech. student from MSE (2017)

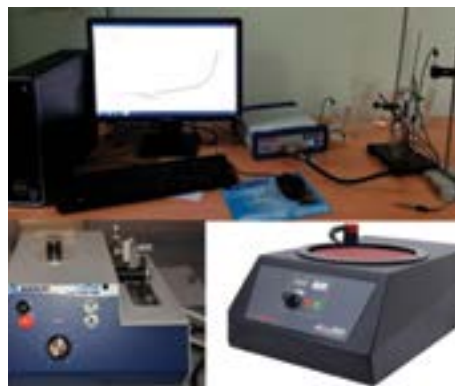
Other Significant Acheivements:

- Amrita Roy: Pursuing PhD in IIT Kharagpur
- Ravi Kiran : Pursuing PhD in IIT Kharagpur
- Nishta Singh: Campus Placement in Software Company

No. of Research Scholar in the Department: 14



Plasma spray lab



Metallographic and corrosion lab



Mechanical testing lab



Nanomaterials lab



Materials chemistry lab



Ceramics lab



Polymer characterization lab



Polymer processing lab



Polymer synthesis lab

Department of Chemical & Biochemical Engineering

Vision:

To achieve national and international recognition through the educational and research achievements and the professional service of our faculty, staff and students.

Academic Programs:

1. Doctor of Philosophy in chemical engineering is started from July,2014.
 - 7 PhD students are enrolled
2. B.Tech in Chemical Engineering is started from July,2016
 - 22 students are enrolled in 2016
 - 28 students are enrolled in 2017

Research Lab:

Bio-Chemical Engineering

The main focus of this lab is to develop suitable and sustainable process technologies to reclaim and reuse of different water streams containing diverse pollutants such as synthetic dyes, bio-active and/or biorefractory compounds, etc. In addition, this lab is also dedicated to study microwave assisted processing of materials especially bio-materials.

Computational Nanoscience Lab

Primary objective is to understand the interfacial and the dynamic properties of complex fluid at molecular scale. Particularly, wetting behavior of fluid on physically/chemically modified surface, Phase transition adjacent to the surfaces, Self-assembled monolayer in application of chemical sensors etc.

Process System Engineering Lab

The objective of this lab is intensification of process design and improvement of existing processes towards inherently cheaper, safer, energy efficient and cleaner process systems. This lab emphasizes on innovation and creativity while employing state-of-the-art technology and tools for process synthesis, design and retrofit.

Solid-Gas Interaction Lab

The lab intends to work in the field of clean energy application. In the initial phase, the lab will primarily investigate novel routes for synthesis of ammonia gas at low pressure using nitrides as catalysts. Moreover, conversion of CO₂ to CH₄ is also challenging and future work will be dedicated to explore new photocatalyst for the mentioned reaction.

Bio Research Engineering Lab

- To valorize the bio-resources and waste for sustainable energy production.
- To provide Bioengineering based solutions to the energy and environmental issues.
- To produce highly efficient and trained manpower in the area of bioprocess engineering through B.Tech, M.Tech and PhD projects.

Research Facilities:

Basic Facilities

Biosafety Cabinet, Fume Hood, Incubator, Muffle Furnace, Hot Air Oven, Autoclave, Digital Colony Counter, Ultrasonic Cleaner with Heater, Work-Bench, Distillation Unit, Ultrasonic Probe, Radiometer, Peristaltic Pump, Digital Camera, Vacuum Pump, Vortex Mixture, pH Meter, Microwave Oven etc.

Advance Facilities:

- Customized Photo-Reactor System
- Microwave Synthesis System
- UV-Vis Spectrophotometer
- LC-MS/MS
- Fixed Bed Reactor (in process)
- Linux cluster (in process)
- Goniometer (in process)
- Gas Chromatography (in process)
- FTIR (in process)
- BET TPDR (in process)



Simulation Lab



Atmospheric Incubator



Portable Autoclave



Muffle Furnace



Biosafety Cabinet



Photoreactor



Microwave Reaction System

Recent Publications:

- **Sushant Kumar**, T. Pavludis, V. Singh, H. Nguyen, S. Steinhauer, C. Pursell, B. Clemens, J. Kioseoglou, P. Grammatikopoulos, and M. Sowwan*, Hydrogen Flux through Size Selected Pd Nanoparticles into Underlying Mg Nanofilms, *Advanced Energy Materials*, Accepted, 2017, (**Impact factor = 16.7**).
- **Nitin Dutt Chaturvedi**, Zainuddin Abdul Manan, and Sharifah Rafidah Wan Alwi. "Amathematical model for energy targeting of a batch process with flexible schedule." *Journal of Cleaner Production*, 2017. (**Impact factor= 5.7**)
- R. Mullen, B. Keene, **S. Khan**, A. Paluch, N. Rai, L. Romanielo, T. Rosch, E. Maginn, Cassandra: An Open Source Monte Carlo Package for Molecular Simulation, J. Shah, E. Marin- Rimoldi,, *Journal of computational chemistry*; 2017 (**Impact factor= 3.6**)
- **Nitin Dutt Chaturvedi**. "Minimizing energy consumption via multiple installations aggregate production planning." *Clean Technologies and Environmental Policy*, 2017. (**Impact factor 3.3**)
- **Nitin Dutt Chaturvedi** "Minimizing energy requirement in batch water networks" (2017) *Industrial & Engineering Chemistry Research*.56 (1), 241–249 (**Impact factor= 2.5**).
- **Verma, P.**; Samanta, S.K. "Degradation kinetics of pollutants present in a simulated wastewater matrix using UV/TiO₂ photocatalysis and its microbiological toxicity assessment", *Research onChemical Intermediates*, 2017.
- **Verma, P.**; Samanta, S.K. "Comparative assessment of antibiotic potency loss with time and its impact on antibiotic resistance", *Comparative Clinical Pathology*, 25(6); 1163-1169, 2016.

Project:

(i) A coupled process for simultaneous ethanol and methane production from enzymatically pretreated algal biomass (PI: Dr. Sanjeev Kumar) (Aug 2016 to Aug 2019) (Sponsored by SERB, DST)

Workshop conducted:

- Name of the Workshop: Workshop on Fluid Mechanics
- Name of the Convenors:
Dr. A. K. Verma, MA,
Dr. P. K. Srivastava, MA
Dr. M. Pathak, ME
Dr. S. K. Samanta, CBE
- Duration: July 14, 2016 – July 17, 2016
- Place-IIT Patna

Department of Physics

Research Vision of the Department:

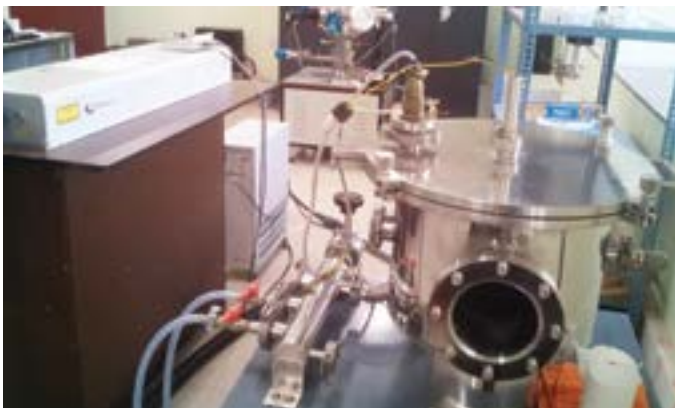
The vision of the department is to Become a Globally Recognized Physics Learning Centre with significant contributions towards Research Output, Teaching excellence, R&D activity, Industry Collaboration The theme being global excellence & local relevance.

Mission of the Department:

- The department is committed to engage in high quality research and pursuit of excellence in teaching.
- The faculty members of the department are actively involved in research and development in challenging areas of both theory and experiment. Currently, the main research emphasis of the department comprises of Condensed Matter Physics, Optics, Quantum Information, Biophysics, Renewable Energy and Atomic & Molecular Physics. Emphasis is given towards the recent applications, relevant for recent technological advancement. Department has a number of ongoing/approved projects of total amount 7.55 crore.

Academic Programs:

- M. Tech program in Nanoscience and Nanotechnology has been started since July 2012.
- Department is also offering 2 year M. Sc. program in Physics from July 2016.
- Description of the Labs & Instrument Facilities



Thin Film Lab

PLD, Vacuum Coating Unit, Spin Coating, Dip Coating, LB coating unit



Liquid Nitrogen Lab

Liquid Nitrogen Plant



XRD Lab

X-ray Diffractometer



SEM Lab

Field Emission Scanning electron microscope



Material Characterization Lab

Raman, UV-Vis Spectrophotometer, PL, Solar Simulator, DSC-TGA



Computational facility: IBM Blade Server, 32GB, 42U



Device Lab

Battery Tester, Glove Box, BET Surface area Analyzer, Picnometer



Physics Lab - 1

Ball Mill, Arc Melting, Quartz coating



Electrical Characterization Lab

Electrical Characterization Lab Function Generator, Magneto-electric Set-up, Vector Network Analyzer, Impedance Analyzer, Ellipsometer



Several fiber optic devices on a vibration isolation table.



External Cavity Diode Laser automated with computer



High precision sensitive balance, ultrasonicator, Hot plate & magnetic stirrer, oven, refrigerator, and vortex mixture..



Optics Research Laboratory - Digital Holography

Ongoing Projects:

- Development of Indigenous Technology for High Energy Density LiPo Battery for Low Temperature Applications, RCI, DRDO, Budget : INR (in lakh) - 300.00 (for equipment) + 237.00 (other heads)
- Graphene and other 2D materials based spintronics and topological insulators, DST (INSPIRE Faculty Scheme), Budget 35 Lakh
- Electromagnetically Induced Transparency and Slow Light in a Two dimensional Magneto Optical Trap (2D MOT), SERB, DST, Budget 29.4 Lakh
- Coherent Control & Interferometry using Bose-Einstein Condensate, Science & Engineering Research Board, DST, Gol, Budget 15.24 Lakh
- Real time detection and sizing of single protein molecule using a nano plasmonic-photonic hybrid micro resonator, SERB (Extra Mural Research Funding), Budget 55 Lakh
- Fluctuations in DNA for molecular recognition, Science & Engineering Research Board, DST, India, Budget 43 Lakh
- Photoionization and Electron Scattering Dynamics of Free and Confined Atomic Systems, Science & Engineering Research Board, DST, India, Budget 25 Lakh

Total Amount of ongoing project:
755 L

Some of the Important Publications (Last Five Years)

- S. J. Ray, L. Alff – Superconductivity and Dirac Fermions in 112-phase Pnictides, *Physica Status Solidi (B)*, 254, 1, 1600163 (2017)
- S. J. Ray - First-Principles study of MoS₂, Phosphorene and Graphene based Single Electron Transistor for gas sensing applications, *Sensors and Actuators B: Chemical*, 222, 492-498 (2016)
- Forbidden Regimes in Distribution of Bipartite Quantum Correlations due to Multiparty Entanglement Asutosh Kumar, Himadri Shekhar Dhar, R. Prabhu, Aditi Sen(De), and Ujjwal Sen *Phys. Lett. A* 381, 1701-1709 (2017).
- Conclusive Identification of Quantum Channels via Monogamy

of Quantum Correlations Asutosh Kumar, Sudipto Singha Roy, Amit Kumar Pal, R. Prabhu, Aditi Sen(De), Ujjwal Sen *Phys. Lett. A* 380, 3588-3594 (2016).

- Superiority of photon subtraction to addition for entanglement in a multimode squeezed vacuum Tamoghna Das, R. Prabhu, Aditi Sen(De), and Ujjwal Sen *Phys. Rev. A* 93, 052313 (2016).
- Survival of time-evolved correlations depends on whether quenching is across critical point in XY spin chain Utkarsh Mishra, Debraj Rakshit, and R. Prabhu *Phys. Rev. A* 93, 042322 (2016).
- Excited state hydrogen bonding fluorescent probe: Role of structure and environment, D Dey, M K Sarangi, A Ray, D Bhattacharyya, D K Maity. *J. of Luminescence* 173, 105 (2016).
- A case study of photo induced electron transfer between riboflavin and aliphatic amine: Deciphering different mechanisms of ET operating from femtosecond to microsecond time domain, C. Sengupta, M. K. Sarangi, A. Sau, D. Mandal, S. Basu: 25 (2015).
- Probing DNA Bending Kinetics by yNhp6A with Ultrafast Temperature Jump Spectroscopy, M K. Sarangi, M. Nelson-Holte, J. Maher, A. Ansari. *Biophysical Journal* 108, p400a (2015).
- High order harmonic generation from SF₆: Deconvolution of macroscopic effects. B. Wilson, K. Fulfer, S. Mondal, X. Ren, J. Tross, E. Poliakoff, J. Jose, A-T Le, R. Lucchese, and C. Trallero, *The J. Chem. Phys.* 145,224305 (2016)
- S. Chatterjee, A. B. Ringane, A. Arya, G. M. Das, V. R. Dantham, R. Laha, S. Hussain, *Nanopart Res.* 18, 242 (2016).
- Gour M. Das, R. Laha, and V. R. Dantham, *J. Raman. Spec.* 47, 895 (2016).
- Improvement in Thermoelectric Properties by Tailoring at In and Te Site in In₂Te₅, *J. Electron. Mater.* 45, 5540 (2016).
- Unified Model for External Trap in a Cigar-shaped Bose-Einstein condensate, A. Nath and Utpal Roy, *J. Phys. A* 47, 415301 (2014).
- Cigar-shaped Bose-Einstein condensate under Bi-chromatic Optical Lattices: An Exact Analytical Treatment, A. Nath and Utpal Roy, *Laser Phys. Lett.* 11, 115501 (2014). (*Selected for free access and the article of the year*)
- Enhanced quantum sensitivity in a vibrating diatomic molecule due to rotational amendment, S. Ghosh and Utpal Roy, *Phys. Rev. A* 90, 022113 (2014).
- Mesoscopic Quantum Superposition of the Generalized Cat state: A Diffraction Limit, S. Ghosh, R. Sharma, Utpal Roy, and P. K. Panigrahi, *Phys. Rev. A* 92, 053819 (2015)
- Effect of Sb deficiency on the thermoelectric properties of Zn₄Sb₃, Anup V. Sanchela, C. V. Tomy, Ajay D. Thakur, *Sol. St. Commun.* 218, 49 (2015).
- Growth and angular dependent resistivity of Nb₂Pd_{0.73}S_{5.7} in superconducting single crystal fibers, A. K. Yadav, H. Sharma, A. D. Thakur, C. V. Tomy, *Mater. Chem. and Phys.* 164, 46 (2015).

- Effect of nominal substitution of transition metals for excess Fe in Fe_{1+x}Se superconductor, Anil K. Yadav, Anup V. Sanchela, Ajay D. Thakur, C.V. Tomy, Sol. St. Comm. 202, 8 (2015).
- Enhancement in thermoelectric properties of FeSb₂ by Sb site deficiency, Anup V. Sanchela, Ajay D. Thakur, C.V. Tomy, J. of Mater. 1, 205 (2015).
- Growth, characterization, vortex pinning, and vortex flow properties of single crystals of the iron chalcogenide superconductor FeCr_{0.02}Se, Anil K. Yadav, Ajay D. Thakur, and C. V. Tomy, Phys. Rev. B 87, 174524 (2013).
- Vortex states in superconducting nanowires, K. Hirata, Ajay D. Thakur, and S. Ooi, Physica C 493, 47 (2013).
- Vortices in Superconducting Nano-networks with antidot arrays, K. Hirata, Ajay D. Thakur, S. Ooi, T. Mochiku, Cent. Eur. J. Phys. 10, 576 (2012).
- Sumit Bhushan and Raghavan K Easwaran, A novel theoretical design for generation of slow light in two dimensional magneto optical trap using electromagnetically induced transparency (Applied Optics, Vol. 56, Issue 13, pp. 3817-3823 (2017)
- Gour M. Das, Anil B. Ringne, Venkata R. Dantham, Raghavan K. Easwaran and Ranjit Laha, "Numerical investigations on photonic nanojet mediated surface enhanced Raman scattering and fluorescence techniques", Optics Express (Accepted on June 28, 2017 for publication)
- S. K. Rajput and N. K. Nishchal, "Optical asymmetric cryptosystem based on photon counting and phase-truncated Fresnel transforms," Journal of Modern Optics 64 (2017) 878-886.
- S. K. Rajput and N. K. Nishchal, "Optical double image security using random phase fractional Fourier domain encoding and phase retrieval algorithm," Optics Communications 388 (2017) 38-46.
- A. Fatima and N. K. Nishchal, "Discussion on comparative analysis and a new attack on optical asymmetric cryptosystem," Journal of Optical Society of America A 33 (2016) 2034-2040.
- B. Javidi, A. Carnicer, M. Yamaguchi, T. Nomura, E. Perez-Cabre, M. S. Millan, N. K. Nishchal, R. Torroba, J. F. Barrera, W. He, X. Peng, A. Stern, Y. Rivenson, A. Alfalou, C. Brosseau, C. Guo, J. T. Sheridan, G. Situ, M. Naruse, T. Matsumoto, I. Juvells, E. Tajahuerce, J. Lancis, W. Chen, X. Chen, P. W. H. Pinkse, A. P. Mosk, and A. Markman, "Roadmap on Optical Security," Journal of Optics 18 (2016) 083001.
- A. Fatima, I. Mehra, and N. K. Nishchal, "Optical asymmetric cryptosystem using equal modulus decomposition and multiple diffractive imaging," Journal of Optics 18 (2016) 085701.
- I. Mehra and N. K. Nishchal, "Optical asymmetric image encryption using gyrator wavelet transform," Optics Communications 354 (2015) 344-352.
- D. Kumar and N. K. Nishchal, "Recognition of three-dimensional objects using joint fractional correlator and nonlinear joint fractional correlator with the help of digital Fresnel holography; A comparative study," Optical Review 22 (2015) 256-263.
- I. Mehra, K. Singh, A. K. Agarwal, U. Gopinathan, and N. K. Nishchal, "Encrypting digital hologram of three-dimensional object using diffractive imaging," Journal of Optics 17 (2015) 035707.
- S. K. Rajput, D. Kumar, and N. K. Nishchal, "Optical encryption system based on phase mask multiplexing and photon counting imaging for multiple image authentication and digital hologram security," Applied Optics 54 (2015) 1657-1666.
- I. Mehra and N. K. Nishchal, "Optical asymmetric watermarking using modified wavelet fusion and diffractive imaging," Optics & Lasers in Engineering 68 (2015) 74-82.
- I. Mehra and N. K. Nishchal, "Wavelet-based image fusion for securing multiple images through asymmetric keys," Optics Communications 335 (2015) 153-160.
- S. K. Rajput, D. Kumar, and N. K. Nishchal, "Photon counting imaging and polarized light encoding for secure image verification and hologram watermarking," Journal of Optics 16 (2014) 125406.
- S. K. Rajput and N. K. Nishchal, "An optical encryption and authentication scheme using asymmetric keys," Journal of the Optical Society of America A 31 (2014) 1233-1238.
- I. Mehra and N. K. Nishchal, "Image fusion using wavelet transform and its application to asymmetric cryptosystem and hiding," Optics Express 22 (2014) 5474-5482.
- I. Mehra and N. K. Nishchal, "Asymmetric cryptosystem for securing multiple images using two beam interference phenomenon," Optics and Laser Technology 60 (2014) 1-7.
- S. K. Rajput and N. K. Nishchal, "Fresnel domain nonlinear image encryption scheme based on Gerchberg-Saxton phase retrieval algorithm," Applied Optics 53 (2014) 418-425.
- I. Mehra, S. K. Rajput, and N. K. Nishchal, "Cryptanalysis of an image encryption scheme based on joint transform correlator with amplitude- and phase-truncation approach," Optics & Lasers in Engineering 52 (2014) 167-173.
- S. K. Rajput and N. K. Nishchal, "Known-plaintext attack on encryption domain independent optical asymmetric cryptosystem," Optics Communications 309 (2013) 231-235.
- S. K. Rajput and N. K. Nishchal, "Image encryption using polarized light encoding and amplitude- and phase-truncation in Fresnel domain," Applied Optics 52 (2013) 4343-4352.
- I. Mehra, S. K. Rajput, and N. K. Nishchal, "Collision in Fresnel domain asymmetric cryptosystem using phase truncation and authentication verification," Optical Engineering 52 (2013) 028202.
- S. K. Rajput and N. K. Nishchal, "Known-plaintext attack-based optical cryptosystem using phase-truncated Fresnel transform," Applied Optics 52 (2013) 871-878

Academic Programs:

- B.Tech. 1st Semester for all Engineering Branches (Theory and Laboratory)
- B.Tech. 4th, 5th & 6th semester electives
- M.Tech.-Nanoscience and Nanotechnology (Since 2012)
- M.Sc. Physics (Since 2016)
- Ph.D. Physics (Since 2009)

Awards or Recognitions in the Last Five Years

- **S J Ray**- DST-INSPIRE Faculty Fellowship (direct mode), 2016
- **M K Sarangi**- Novozymes and Holck-Larsen foundation fellowship (2016), U. of Aarhus, Denmark
- **V R Dantham**- Our research work reported in Journal of Raman spectroscopy has been highlighted in the homepage of Nature India in 2016
- **A D Thakur**- Outstanding Reviewer Award from Elsevier
- **Raghavan K E**- Nominated for Inspire Teachers Network, a program initiated in 2013 by the Honble President in (2016).
- **Utpal Roy**- *Our work selected as the "Article of the year" and for free access in one of the highest impact journal, Laser Physics letters: Cigar-shaped Bose-Einstein condensate under Bi-chromatic Optical Lattices: An Exact Analytical Treatment, Laser Phys. Lett. 11, 115501 (2014).*
- **N. K. Nishchal**- Senior Member, SPIE - The International Society for Optics & Photonics (2015), OSA - The Optical Society (2015). Research paper included in the 15 Highly Cited Articles in Applied Optics published in the journal over the last 2 years (June 24, 2015): "Known-plaintext attack-based optical cryptosystem using phase-truncated Fresnel transform," Applied Optics 52 (2013) 871-878. Research papers included in the 15 Highly Cited Articles in Applied Optics published in the journal over the last 2 years (March 26, 2015): "Image encryption based on interference that uses fractional Fourier domain asymmetric keys," Applied Optics 51 (2012) 1446-1452. Total number of citations = 1475, *h*-index = 23, *i* 10-index = 41 (Source: Google Scholar)
- **Initiation of the 1st Academic Society at IIT Patna: Inauguration of the physics society of IIT Patna was held on 30th January, 2016**, by Guest of Honor: Prof. Pushpak Bhattacharyya (Director, IIT Patna), Prof. Ratnamala Chatterjee (IIT Delhi), and Dr. Utpal Roy (HoD-Physics).
- 1st Publication of 17 AMPS - Annual Magazine of Physics Society 2016-17
- Physics Society, IIT Patna organized four workshops and 12 lectures by eminent physicists in last one year and celebrated National Science Day too.

No. of Research Scholars in the Department: 40

Department of Chemistry

Research Vision of the Department

The main vision of the Department of Chemistry at IIT Patna is to promote research to achieve the goal of "Discovery with delivery". We want to create advanced molecular sciences facilities for doing research in the chemical sciences. Dedicated researchers are sure to reap the harvest of such an effort and consequently chemical innovation and discovery is foreseen. We should not restrict ourselves to discoveries only, the mission is to create deliverables

that are of utmost social requirement through this discoveries. The department also strives to develop globally competent skilled manpower to undertake the challenge of performing cutting edge research and innovation. Preeminence in core areas of Chemistry will enable to strengthen the foundation upon which chemistry faculty can contribute to interdisciplinary and multidisciplinary research that addresses societal problems through innovation. The department will distinguish itself by its inventive and successful research initiative, and by its strong cross-disciplinary, interdisciplinary, and multi-disciplinary collaborations both within and beyond the Institute.

The number of PhD students conducting their doctoral research in the department is around 20. The department so far has produced 6 PhD students and these students have joined reputed Institutions in the world like IIT Madras, University of Akron, Ohio (USA), LIDyL CEA Saclay (France), Ecole Polytechnique (France) as post-doctoral fellows.



Laboratory:

- Glyco- chemistry Lab (Dr. Amit Kumar)
- Theoretical chemistry lab (Dr. Rajagopala Rao), Awards: Dr. Rajagopala Rao have been awarded DST-INSPIRE Faculty award -2015
- Supramolecular Synthesis lab (Dr. Neeladri Das), Awards: Dr. Neeladri Das have been awarded the "Chemical Science" Poster Prize at 6th EuCheMS (The European Association for Chemical and Molecular Sciences) conference on Nitrogen Ligands held in Beaune France (13-17th Sept, 2015). This prize was given by the Royal Society of Chemistry (RSC), UK.
- Ultrafast Spectroscopy Lab (Dr. Debabrata Seth)
- Gas Phase and computational Laboratory (Dr. Ranganathan Subramanian)
- Catalysis Lab (Dr. Sahid Hussain)
- Green Synthesis Lab (Dr. Md. Lokman H Choudhury)
- Biochemistry and Molecular Lab (Dr. Prolay Das)

Equipments/ Softwares

Glycochemistry

- Flash Chromatography
- Low Temperature Bath with Magnetic Stirrer
- Rotavapor
- Melting Point Apparatus
- Fume Hood

Theoretical chemistry lab

- Facilities : Linux OS based cluster: 16 nodes (256 cores)
- Software : Gaussian 16, Gauss view 6, Molpro

Supramolecular Synthesis Lab

- Glove box (one)
- Programmable oven (one)
- Chiller(one)
- Fume hoods (three)
- Rotary evaporator (two)

Ultrafast Spectroscopy Lab

- Ultrafast Spectrometer

Gas Phase and computational Laboratory

- Arbitrary waveform generator from Tektronix: For research in signal stimulus solution and for generation of complex signals.
- Microwave generator from Aniritsu: used for generating microwave and are designed to provide stable and controllable microwave power required by many heating processes and industrial application
- Software: Gaussian 09, Gaussian 16

Catalysis Lab

- pH & conductivity meter, UV photoreactor
- Centrifuge Machine
- Schlenk line
- Rotavapor

Green Synthesis Lab

- Programmable Microwave reactor (1)
- Rotavapor (1)
- Automatic melting point (1)
- Fume Hood (3)
- Programmable Oven (1)

Biochemistry and Molecular Lab

- UV-Vis spectrophotometer with Peltier Element from Cecil, UK
- Transilluminator from Pacific Images, Taiwan
- Mini Submarine Gel Electrophoresis from Hoefer, USA
- Vertical midi gel from Hoefer, USA
- Vertical slab dual minigel from Hoefer, USA
- PCR Thermalcycler from G-Biosciences, UK
- Minicentrifuge from Dynamica, Australia and Vortex mixer from Jeitech, Korea, etc., (<https://www.iitp.ac.in/index.php/departments/school-of-basic-sciences/chemistry/facilities.html>)

Common Lab

- Equipments and Location provided in Annexure- I

Publications

- Metal-Free Catalyst-Controlled Chemoselective Synthesis of Aryl α -Ketoesters and Primary α -Ketoamides from Aryl Acetimides. Yogesh Kumar, Yogesh Jaiswal, Mukta Shaw and Amit Kumar^{*[a]}. *ChemistrySelect*, 2017, DOI: 10.1002/slct.201701322
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- Molecular diversity from the three-component reaction of 2-hydroxy-1,4-naphthaquinone, aldehydes and 6-aminouracils: a reaction condition dependent MCR. R. Bharti, P. Kumari, Tasneem Parvin* and Lokman H. Choudhury* *RSC Adv.*, 2017, 7, 3928-3933.
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Projects

- Functionalization of the Carbohydrates: Designing New Strategies for the Synthesis of Natural and Modified Sugars via Metal Catalysis (Sponsored by SERB-DST).
- Imidates: A New Class of N-H Directing Group for C(sp²)-H Activation and Tools for Synthesis of Highly Functionalized Heterocycles (Sponsored by CSIR-DELHI).
- Polymer synthesis and characterization,
- Supramolecular chemistry using coordination chemistry
- Quantum dynamical studies on bimolecular reactions of practical and fundamental interest, Funded by DST-INSPIRE
- Photophysics of small molecules in different organized assemblies. Study of thermodynamics properties of ionic liquids-solvent mixture.
- Exploration of Multicomponent Reactions (MCRs) Towards Green Synthesis of Novel Functionalized & Sequence Regulated Macromolecules, sponsored by SERB, DST Govt. of India.

Department of Mathematics

A. Research vision of the Department

The department will enhance its computational facilities to support and encourage research in complex computations including big data problems which is quite challenging.

Our objectives include pursuing high quality cutting edge research, imparting the knowledge at different levels to train the human resource, interacting with potential users and offering to collaborative or consultancy solutions.

B. Labs - Facilities

Research Lab I: Statistical Lab



Research Lab II: High Performance Computing Lab



Research Lab I: Signal Processing for Wireless Communications Lab



C. Key Projects Undergoing

- Estimation under Censored Data, SERB(DST), Dr. Y M Tripathi, Amount Rs. 15.44 Lakhs
- Nonlinear Singular Differential Equations Arising in Real Life, SERB(DST), Dr. A K Verma, Rs. 16.52 Lakhs
- Blind Symbol Timing Offset (STO) and Carrier Frequency Offset (CFO) Estimation and Implementation over OFDM, and MIMO-SC-FDMA testbed, SERB(DST) Young Scientist, Dr. S Majhi, Amount Rs. 40.00 Lakhs (approx.)
- Development of Aggregation operators for fusion of uncertain data: A special emphasis to interrelated data and information measures of uncertain data, DST-SERB (Early Career Research Award), Dr. Debashree Guha Adhya (PI), Dr. Y.M. Tripathi (Co-PI), Amount Rs. 14.34 Lakh (Approx.)

D. Some of the Important Publications

- Information measures in the intuitionistic fuzzy framework and their relationships, Satyajit Das, Debashree Guha and Radko Mesiar, IEEE Transactions on Fuzzy System (Accept, 2017).
- Anuj Kumar, Prashant K. Srivastava, Yasuhiro Takeuchi, (2017) Modeling the role of information and limited optimal treatment on disease prevalence, Journal of Theoretical Biology, Vol. 414, 103-119.
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- M. Chandru, T. Prabha, P. Das, V. Shanthy, A numerical method for solving boundary and interior layers dominated parabolic problems with discontinuous convection coefficient and source terms, Differential Equations and Dynamical Systems, doi:10.1007/s12591-017-0385-3, Springer, (2017), ISSN No:0971-3514.
- Y.M. Tripathi, Somesh Kumar and C. Petropoulos. Minimax estimators for the lower-bounded scale parameter of a location-scale

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- TanmayKayal, Y.M. Tripathi, DevendraPratap Singh and M. K. Rastogi.Estimation and prediction for Chen distribution with bathtubshape under progressive censoring. Journal of Statistical Computation and Simulation, Vol. 87(2), 348–366, (2017).
- S. Singh and Y.M. Tripathi, Bayesian estimation and prediction for a hybrid censored lognormal distribution.IEEE Transactions on Reliability, Vol. 65, 782-795, (2016).
- Y.M. Tripathi, Somesh Kumar and C. Petropoulos, Estimating the shape parameter of a Pareto distribution under restrictions. Metrika, 79, 91-111, (2016).
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- Vikas Kumar Mishra, Nutan Kumar Tomar, On complete and strong controllability for rectangular descriptor systems, Circuits, Systems, and Signal Processing, 35 (4), 1395-1406, (2016).
- ArindamKundu, Sumit Kumar, Nutan Kumar Tomar, Shiv Kumar Gupta, Call option price function in Bernstein polynomial basis with no-arbitrage inequality constraints, Journal of Inequalities and Applications, (2016), DOI 10.1186/s13660-016-1097-x.
- Rahul Radhakrishnan, Abhinoy Kumar Singh, ShovanBhaumik, Nutan Kumar Tomar, Multiple sparse-grid Gauss–Hermite filtering, Applied Mathematical Modelling 40 (7), 4441-4450, (2016).
- Satyajit Das, DebashreeGuha and RadkoMesiar, Extended Bonferroni Mean under Intuitionistic Fuzzy Environment Based on Strict t-conorm, IEEE Transactions on Systems, Man and Cybernetics: Systems, 47 (8), 2083-2099(2016).
- Satyajit Das, DebashreeGuha and BapiDutta, A web-based medical diagnostic support system driven by using fuzzy and intuitionistic fuzzy rule based inference mechanism, Applied Intelligence, 45(3), 850–867, (2016).
- Anuj Kumar and Prashant K. Srivastava, Vaccination and Treatment as Control Interventions in an Infectious Disease Model with Their Cost Optimization, Communications in Nonlinear Science and Numerical Simulation..
- A. R. Adhikari, Z. Liu, Y. L. Guan, Sudhan Majhi, S.Budishin, Optimal Binary Periodic Almost-Complementary Pairs, IEEE Signal Processing Letters, 2017.

E. Academic programs in the Department

The department is currently running M. Tech (Mathematics and Computing), M.Sc. (Mathematics) and Ph.D. programs.

F. Awards or recognitions in the last FIVE years

- Dr. D G Adhya awarded National Scholarship SAIA-NSP by Govt. of Slovak Republic (2016)
- Dr. Sudhan Majhi awarded Visiting Research Fellow, University of Michigan Dearborn, USA (2016)
- MrAnuj Kumar, was awarded IMS Prize in Biomathematics by Indian Mathematical Society (2014)
- Mr. Dhruv Gupta, visiting scholar Max Planck Institute for informatics, Germany (2014)
- M.Tech. students are awarded DAAD fellowship (each year)
- Dr. Sudhan Majhi, Associate Editor, Circuit, system and signal processing, Springer
- Best teacher award: Dr. P K Srivastava (2013)
- Chairman’s Gold medal: Mr. Amit Kumar (2016), Mr. Deepak Kr. Gupta, (2015), Mr. Govind (2014)
- Dr. A K Upadhyay, Member of NBHM North-Central Regional Library Committee (2012-17)
- K. Kanth, S. Gupta, Sudhan Majhi, IEEE Students’ Technology Symposium, India, 2016. (Best paper award)

G. Other significant achievements

- Dr. P. K. Srivastava was nominated as resource person for reputed IITPAL initiative of MHRD and recorded 7 lectures on Indefinite Integrals of 10+2 level being telecasted by SWYAMPBABHA channel.
- Workshop on Sobolev Spaces February 16 - 23, 2017.
- One day Symposium on Modeling and Computation on April 9, 2016, supported by National Mathematics Initiative (DST), IISc Bangalore. For details click here

- A Four day workshop on Fluid Mechanics: Modeling, Analysis And Computation is being organized in IIT Patna from 14th-17th, July 2016.

H. No. of Research Scholars in the Department

There are 37 research scholars working in the department.

Department of Humanities and Social Sciences

(a) Research Vision of HSS:

The Department of Humanities and Social Sciences envisions establishing itself as one of the best research platforms to young minds who have the undying thirst for knowledge. Past and ongoing researches in Economics, English language and literature, Linguistics, Management, Psychology, Public Health and Sociology not only try to answer useful inquiries but also try to use learning and imaginative actions as powerful tools to add to the enrichment and progress of human society.

(b) Labs & Facilities Available:

The Department has various laboratories that encourage contemporary research in Humanities and Social Sciences:

Knowledge Centre on Child and Women



With support from UNICEF office of Bihar, the Department of Humanities and Social Science is developing Knowledge Centre on Women and Children. It has reference materials related to condition of Child and Women in Bihar.

Language Laboratory



Language Lab has been set up with an intention to involve students to actively participate in English language learning exercises and get more practice than otherwise possible in a traditional classroom. It has capacity of 50 students and uses a popular English Teaching Software named Clarity.

Linguistic Laboratory



This is being established with an aim to facilitate world class research in major areas of Linguistics. It has working space for research assistants and scholars and sufficient storage space for various types of equipment. The laboratory also has provision for a sound proof Acoustic Room/ Whisper Room to enhance precision on Acoustic Phonetics and Phonology research.

Public Health Research and Documentation Laboratory



Public Health lab is equipped with latest softwares and data sets to analyze various concurrent public health issues. Researchers in this lab are engaged in analysing wide spectrum of health issues, such as, perception of health, environmental health, health informatics, and so on. Apart from research we also take up documentation of vital health data and design specific research methods for empirical surveys.

Sociological Research and Community Outreach Laboratory



It has working space for cutting edge research and is rooted in rigorous theoretically informed way of knowing social reality. This laboratory is computer equipped and encourages group interactions. The *Unnat Bharat Abhiyan* (UBA) was coordinated from this laboratory. We also guided several public engineering projects of the B.Tech. students here, including *Aadhyan*.

(c) Key Projects Undertaken in Last Five Years:

- i. Waste Management Training to Reduce Health Hazards of Solid Wastes in Patna (PI- Dr. Papia Raj, funded by the Centre for Energy and Environment, IIT Patna)
- ii. A Concurrent Study of MGNREGA implementation in Bihar (PI- Dr. Aditya Raj: Funded by the Department of Rural Development, Government of India)

(d) Some Selected Important Publications:

- Smriti Singh, Revisiting the Mahabharata: Draupadi's voice in Divakaruni's *The Palace of Illusions*, Cultural Intertexts, Cluj-Napoca: Casa Cartiide Stiinta, Vol. 3 (2015), pp 123-132
- Smriti Singh, Self- assessment of Oral Proficiency among ESL learners, *ELTVoices*, Vol. 5, No.1 (2015), pp1-7
- Smriti Singh, Narrating a Subaltern Consciousness: Bama's Sangati, *International Journal of English and Literature*, Vol 5 No. 5 (2014), PP.113-118
- Nalin Bharti and Gopal Ganesh, Is Labour Law a Hindrance in India's Public Enterprises Reforms? *OPTIMUM STUDIA EKONOMICZNE*, NR 5 (83) 2016.
- Takács István, Nalin Bharti, FDI in Central and Eastern Europe's (CEE) Agribusiness What Lessons for India?, *Foreign Trade Review*, Vol 51, Issue 2, 2016, pp-113-146.
- Nalin Bharti, Kumar Gaurav and Chandan Kumar, IT-ITES trade of SAARC countries: does kaleidoscopic comparative advantage work? *Int. J. Transitions and Innovation Systems*, Vol. 5, No. 1, 2016, pp-80-96.
- Priyanka Sinha and Nalin Bharti, India's Import Tariff Evaluation during Recent Financial Crisis, *Foreign Trade Review*, February 2014 49: 45-93
- Raj, Aditya (2015). Textualized realities of Dalit girl child in India: Unraveling Bama's 'Sangati', in Prasad, R and S. Rehana (eds.) *Child Studies: Children in English Literature*, Rajesh Publications: New Delhi, 168-177, 2015 (with Pooja)
- Raj, Aditya (2015). "Representation of Indian Women in Select Indian Diasporic Literature", *Global Research Forum on Diaspora and Transnationalism*, 5-11, 2015 (with Pooja).
- Raj, Papia & Aditya Raj (2016). "International Call Centers: Consumptionscapes of Urban India". *Research Process* 4(1):22-31.
- Raj, Papia & Aditya Raj (2015). "An Analysis of Waste Production in Patna". *International Sociological Association e Symposium for Sociology*, Vol 5(2): 1-13

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- Nayak, K.V. and P. Raj.(2017). Perception of health among female adolescents of Oraon tribe in Jharkhand. *Indian Journal of Social Development*.Vol.17. No.1. pp. 81-95.
- Priyanka Tripathi, Reinventing the Intimate Voices: A Close Reading of Indian Women's Autobiography in English, Consciousness, Literature and the Arts (University of Lincoln), Vol. 17, No. 3, December 2016
- Biswas, Sanjib Kr. and Priyanka Tripathi, Relocating Women's Role in War: Rereading TahminaAnam's A Golden Age, The Criterion: An International Journal in English, Vol.8, No.1, February 2017. 522-528
- Sanjib Kr Biswas and Priyanka Tripathi, America's Quest for Spiritualism: Influence of Oriental Philosophy on Select American Poets, Daath Voyage: An International Journal of Interdisciplinary Studies in English, Vol.1, No.4, December, 2016. 81-93
- AimanReyaz and Priyanka Tripathi, "Accepting with Grace: Realism, Redemption and Reconciliation in JM Coetzee's Disgrace", DAS LITERARISCH: A Biannual Peer Reviewed International Referred Journal of English Literary Studies and Creative Writings, Vol. 2, Issue 1: Jan-June 2016. 41-47
- Partha Bhattacharjee and Priyanka Tripathi, Ethnic Tensions and Political Turmoil: Postcolonial Reading of Chimamanda Ngozi's Purple Hibiscus, Language in India, Vol.17, No. 2, March 2017. 443-450
- Chaudhary, R. (2017).Demographic factors, Personality & Entrepreneurial Inclination: A Study among Indian University Students. *Education+Training*, Vol. 59 No. 2, pp. 171-187.
- Chaudhary, R. (2017). Corporate Social Responsibility and Employee Engagement: Can CSR help in redressing the engagement gap? *Social Responsibility Journal*, Vol. 13 No. 2, pp. 323-338.
- Chaudhary, R. & Rangnekar, S. (2017) Development Climate & Work Engagement: A Multilevel Study. *Evidence-based HRM: a global forum for empirical scholarship*, Vol.5 No.2, pp. 166-182.
- Chaudhary, R. & Rangnekar, S. (2017). Socio-demographic contextual factors & Work Engagement: An Empirical Analysis, *Emerging Economy Studies*, 3(1), 1-18.
- Sinha, S. (2016). 'Indian Schools of Logic: A Critical Assessment in *International Journal of Sanskrit Research*'. Pp 170- 172
- Sharma, Sandeep & Sweta Sinha. (2017). 'Psycho- Analytical Investigation of Stress among students of Higher Technical Education in India: A Case Study' in *International Journal of Indian Psychology*, 4(2) 93.

(e) Academic Program in the Department:

The Department offers compulsory English language teaching as well as various electives for BTech and PhD students of the institute. Moreover, the department also has PhD program in different disciplines of Humanities and Social Sciences.

(f) Selected Awards/Recognitions in the last Five Years:

- Dr. Aditya Raj was awarded Professor M. N. Srinivas Memorial Prize 2013 received [Constituted in 2001, by the Indian Sociological Society, this prestigious prize is given to young Sociologist (under 40) for noteworthy publication. Dr. Aditya Raj is 11th winner and the 1st from a new IIT. Other winners from the IIT system are Professor R. Robinson (IIT Mumbai, 2001), Dr. V. Arora (IIT Delhi, 2008), Dr. P. Vigneswara (IIT Delhi, 2009) and Dr. A. Chakrabarti (IIT Kanpur, 2010)]
- Dr. Nalin Bharti received diploma of appreciation in the IV international Scientific Conference on the series of 'Public Sector in the Modern Economy' at University of Bialystok , Poland, 23-24 Oct, 2014.
- Dr. Richa Chaudhary received the conference best research paper award at the Fourth Pan-IIM World Management Conference, held at IIM Ahmedabad from December 13-15, 2016 for paper titled "CSR & Turnover Intentions: Examining the Underlying Psychological Mechanisms"
- Kriti Gupta got best research paper award for work titled, "Exploring anasakti: A look into personal understanding" in the National Seminar on "Psychological Sciences: Current Perspectives and Emerging Avenues of Practice, Training and Research" organized by Centre for Psychological Sciences, School of Human Sciences at Central University of South Bihar (24th March to 26th March, 2017).
- Srithi and Dr. Papia Raj received best E-poster award for the paper titled "Exploring the Potential of Health Informatics as an approach for Improving Maternal Health" in the session on "Information Technology, E-learning & Social Issues in Public Health" at the 61st Annual National Conference of Indian Public Health Association (IPHA) organized by the Department of Community

(g) Other Significant Achievements:

Dr. Nalin Bharti offered two Online Courses through NPTEL on Infrastructure Economics & Economics of IPR.

The faculty members of the Department also serve in the Editorial and Peer-Review board of various International and National Journals of repute.

(h) No. of Research Scholars in the Department:

Currently there are 33 PhD scholars enrolled. They are at different stages of research. Seven PhD students have graduated from the department.

Sophisticated Analytical Instrument Facility (SAIF)

Sophisticated Analytical Instrument Facility (SAIF) at IIT Patna is a Department of Science and Technology, Govt. of India sponsored facility for data collection/characterization of research samples/materials by paying nominal charges. This facility is open for internal (IIT Patna users) as well as external researchers from academia, research laboratories as well as industries. Presently, SAIF IIT Patna is equipped with two major analytical instruments (i) Single Crystal X-Ray Diffractometer(SC-XRD) and High Resolution-Liquid Chromatography Mass Spectrometer (HR-LCMS) having HPLC & UHR-TOF mass spectrometer. The other sanctioned instrument is a 500 MHz NMR, which is under purchase process.

Vision

- To carry out analysis of samples received from the institutions/industries/individuals etc.
- (ii) To provide facilities to scientists so as to enable them to carry out measurement for Research.
- (iii) To acquire and develop capability for preventive maintenance, testing and repair of sophisticated instruments.
- (iv) To organize short term courses/workshops/seminars etc. on the use and applications of various instruments and techniques for research students, teachers and personnel from other laboratories, universities and industries.
- (v) To organize short term courses/workshops/seminars etc. on the use and applications of various instruments and techniques for research students, teachers and personnel from other laboratories, universities and industries.
- (vi) To train technicians for maintenance and operation of sophisticated instruments; and promote and participate in projects aimed at the development of prototypes of sophisticated instruments or to augment the capabilities of existing instruments.
- (vii) To

Available Instruments:

1. High Resolution Liquid Chromatography–Mass Spectrometer (HR-LCMS)

It has two parts

A. Ultra High Resolution Time of Flight (UHR-TOF) mass spectrometer

Make: Bruker Germany **Model:** Impact HD UHR-TOF mass spectrometer

Specification: Apollo II Electrospray Ionization source, high mass Quadrupole mass filter, CID collision cell, Novel ion cooler, orthogonal Pulsed ion extraction and UHR Time-of-Flight mass analyzer, Syringe pump for direct injection, Apollo II APCI II Source, Biotools 3.2 software, Direct probe option, N₂ generator with integrated air compressor

Mass Range: 20 - 40000 m/z **Mass resolution:** 40,000 FSR (Full sensitivity resolution)

B. High-Performance Liquid Chromatography (HPLC)

Make: Thermo Scientific **Model:** Thermo Scientific Dionex Ultimate 3000 Rapid Separation LC (RSLC) systems

Specification: HPG-3400RS –Binary rapid separation pump, Manual injection, TCC-3000 SD Thermostatted Column compartment, dad-3000RS Diode Array Detector optical system, 3D DAD software,



HR-LCMS, SAIF IIT Patna

2. Single Crystal X-Ray Diffractometer(SC-XRD)

Instrument Details:

Make: Bruker Germany Model: AXS D8 QUEST

Specification: D8 QUEST, Horizontal Goniometer, Fixed Chi stage, Goniometer head manual, Photon 100 CMOS Detector, two pinhole collimator(0.3/17mrad, 0.6/17mrad), Ceramic Tube KFF Mo-2K-90c, Head turned by 90°, Video microscope SCD, APEX3 w. SHELXTL S/W, Cryostream-700plus extended range low Temperature



Single crystal XRD Lab, SAIF IIT Patna

Recent Publications (2016-2017) Using SAIF Facilities and where SAIF IIT Patna has been Acknowledged:

- Yogesh Kumar, Yogesh Jaiswal, and Amit Kumar *J. Org. Chem.*2016, 81, 12247–12257.
- Yogesh Jaiswal, Yogesh Kumar, Rima Thakur, Jagannath Pal, Ranga Subramanian, and Amit Kumar, *J. Org. Chem.*2016, 81, 12499–12505.
- Banibrata Maity, Aninda Chatterjee, Sayeed Ashique Ahmed, Debabrata Seth, *Journal of Luminescence*2017, 183, 238-250.
- Jana, A.; S. Bhowmick,; Kaur, S.; Kashyap, H. K.; Das, N. *Dalton Trans.*,2017, 46, 1986.
- Jana, A.; Das, N. *Chemistryselect*,2017, 2, 4099.
- Richa Mishra and Lokman H. Choudhury, *RSC Advances*,2016, 6, 24464-24469.
- Shaik Karamthulla, Asim Jana, Lokman H. Choudhury, *ACS Combinatorial Science*,2017, 19, 108-112.
- Ruchi Bharti, Pooja Kumari, Tasneem Parvin, Lokman H. Choudhury *RSC Advances*, 2017, 7, 3928-3933.
- Richa Mishra, Anoop Kumar Panday, Lokman H. Choudhury, Jagannath Pal, Ranga Subramanian, Ajay Verma, *European Journal of Organic Chemistry*, 2017, 19, 2789-2800.

Incubation Centre (IC)

A) Research Vision of the Centre

Incubation Centre IIT Patna aims to be the leading technology business incubator in the country for the development of products and intellectual property in the area of Electronic System Design and Manufacturing (ESDM), and Medical Electronics.

This IC is a collaboration of IIT Patna, Ministry of Electronics and IT(MeitY) and Government of Bihar. The primary objective of IC is to promote innovation and entrepreneurship with the aim to identify, nurture and translate technological ideas and innovation in the broad area of Electronic System Design and Manufacturing sector and Medical Electronics i.e. Micro Electro Mechanical Systems (MEMS: Lab on Chip), Low Cost Medical Diagnostic System, Low Cost Ultrasound, Electronic Device Reliability and Medical/Industrial X-ray Tubes, Medical Telemedicine related Electronic products along with other industrial and consumer electronic products.

The overall project outlay for setting up the IC is Rs 47.10 crore. The project is being implemented through joint funding from MeitY (Rs 22.10 crore) and Government of Bihar (Rs.25 crore) as matching Grant. This IC is being set up in area of 3000 square meters constructed space with state of the art facilities designated for ESDM incubation.

IC is expected to give an impetus to entrepreneurship amongst interested students, faculty and external innovators. The total project duration to set up the Incubation Centre is 5 years; the IC aims to incubate 10 ideas each years with a clear focus to build commercial ventures out of these ideas.

B) Programs in the Department

Incubation Centre offers two types of programs to aspiring entrepreneurs.

Two Year Incubation Program

The two year regular incubation program at the IC IITP is designed to support aspiring entrepreneurs and start-ups for idea validation, product development, building and testing prototypes and early stage scaling of innovations. IC IITP will enable the start-ups with:

- Fully furnished office space, conference rooms, internet and communication facilities
- State of the art laboratories for Electronic System Design, Development and Prototyping, PCB Prototyping and Assembly, Testing and Measurement, Mechanical packaging and Product Prototyping
- Guidance by mentors from Industry, IIT Patna faculty, Bio Design Centre of AIIMS Delhi, Investors and IC management on business, technology, IPR and other aspects
- Investor Connect, which will help in getting needed funds
- Access to specially designed training material on relevant issues like understanding Intellectual Property, product development life cycle, marketing and financial planning.
- Assistance to develop strategic relationships with key collaborators in related industries in order to increase market penetration and shorten the sales cycle.
- A seed funding of up to 10 lakhs

The centre can admit upto 10 startup companies or teams each year to this program.

Three Months Pre-incubation Program

The three months pre-incubation program at the IC IITP is designed to support aspiring entrepreneurs for evaluating the commercial viability of their idea, develop a technology approach to implementing their idea, develop a business plan and to prepare for a regular two year incubation program.

Admission Process

Eligibility

Incubation Centre is a pan-India centre. Admission to the programs is open to students, faculty members, innovators and startup companies. Only Indian nationals are eligible to apply.

Application Submission

Aspiring entrepreneurs or startup companies are required to submit a business plan detailing the idea, the approach to implement the product and to make it commercially viable. A template of the business plan is available in IC website www.iciitp.com.

Completed business plans are to be submitted to the e-mail id manager_ic@iitp.com or iciitp@iitp.ac.in

Evaluation and selection

Evaluation of the submitted business plans are done periodically by an expert panel (Project Evaluation Team). The panel comprises of experts from medical, technology, entrepreneurship and investment areas. Shortlisted startups/teams will be invited for a presentation before the expert panel. Selected companies/teams will be admitted to the programs.

C) Labs and Facilities Available

Incubation Centre has state of the art laboratories, suitable for electronic product development, for the use of Incubated companies.

Electronics System Design and Prototype Lab

Electronics system design and prototype lab is equipped with high end workstations, software for electronic system design such as Eagle and Matlab, electronic work benches, microcontroller boards and similar facilities required to design and prototype electronic systems.

PCB Design and Manufacturing Lab

PCB design and manufacturing lab is an advanced state of the art lab providing equipment for end to end implementation of PCB from a design file. The equipment includes machines for milling, drilling, cutting and routing of PCBs, through hole plating, lithography, legend printing, pick and place, baking and multi-press to create upto 8 layer PCBs. The lab also provides equipment to rework on an implemented PCB.

Testing and Calibration Lab

Testing and calibration lab has an array of equipment required to test and calibrate PCBs such as pattern generators, real time spectrum analyzers, mixed signal oscilloscopes, source meters, logic analyzers etc.

Mechanical Packaging and Product Prototyping Lab

Mechanical Packaging and Product Prototyping lab allows incubated companies to create product prototypes and has equipment such as 3D printers.

D) Key Projects Undergoing

The Incubation Centre currently companies/teams undergoing two year incubation program.

Bionic Hope Pvt Ltd

An enthusiastic team of 5, mostly alumni of IIT Patna, is working in the area of assistive devices. Their product, active upper limb prosthesis with tactile feedback, uses proprietary technology to make the lives of upper limb amputees easier and better at an affordable cost. The project has been selected for a 43 lakh IIPME grant by BIRAC.

4Mirror Technologies

This two member team from Bangalore is developing a device for remote patient monitoring. Once developed, it can save lives by enabling a doctor to remotely monitor patients in critical conditions and provide instructions to paramedics for management of the emergency.

MEDEIT

This two member team is developing a device that will enable detection of cataract. The product can greatly reduce the need for doctors for initial screening of cataract, thus making cataract detection much more accessible and easier.

HM IOT

This team is working on two devices that will enable IoT enabled patient monitoring and patient data management.

Dentedge Healthcare

Dentedge team is working on an IoT enabled diagnostic device for early identification of dental problems. Once the consumer purchases the device, it will keep updating the user of dental health and will also enable Dentedge to offer customized dental services to the user.

Mridula Singh and Team

This three member team from IIT Patna is working on an EEG based monitoring system for paralyzed patients.

Incubation Centre



Fully Furnished Office Space



Electronic System Design and Prototype Lab



Electronic Work Bench Setup



PCB Design and Manufacturing



Lab

Testing and Calibration Lab



Centre for Earthquake Engineering Research

Under the aegis of Department of Civil and Environmental Engineering, Indian Institute of Technology Patna

Research Vision:

Of all the natural disasters, earthquakes are the most feared one as they lead to a huge loss to life and property. The increasing population and the rising urbanization in India suggest that the impact of earthquake on human population is bound to increase in the coming decades. Therefore, there is a need to conduct research to assess the types of damages due to earthquakes and the methods to prevent them. In this context, Centre for Earthquake Engineering Research (CEER) is going to be established under the aegis of Department of Civil and Environmental Engineering at the Indian Institute of Technology Patna.

Keeping in mind of the possible earthquake in the Himalayas and in Bihar this research centre is aimed at evaluating risk and looking for corrective measures in the northern Indian states, in particular for Bihar. This centre can be useful for providing information and tools for risk management, emergency planning and also useful for civil protection, prevention and preparedness.

The main objective of the centre is to work towards earthquake risk mitigation in the region and in the country. The objective of the centre may be achieved by

- advancing the practice of earthquake engineering
- improving understanding of the impact of earthquakes on the physical, social, economic, political, and cultural environment
- advocating comprehensive and realistic measures for reducing the harmful effects of earthquakes.

In addition to conducting research the centre intends to disseminate its findings to earthquake professionals who are involved in the practice of earthquake engineering, through various mechanisms including workshops and seminars. The centre also intends to conduct education and outreach programs to reach students, policy makers, and others interested in earthquake related issues. The overall mission of this centre is to develop, validate, and disseminate seismic design technologies for buildings and infrastructure to meet the diverse economic and safety needs of the society.

The centre will have the state-of-the art laboratory facilities as well as teaching/training infrastructure. The laboratory testing facility will be comprised of large and small-scale cyclic testing facility, biaxial shake-table test bed, high capacity computational facility etc. The teaching/training, computational and audio-visual facilities will be shared along with Centre for Endangered Language Studies.

CEER's Vision:

To have a community in which potential earthquake losses are widely understood and for which realistic steps have been taken to address those risks.

CEER's Role:

To become a pioneer in earthquake engineering investigations and in the dissemination of earthquake risk reduction information both in Bihar and nationally in cooperation with its regional partners.

IIT Patna is thankful to Shri Harivansh Narayan Singh, Honourable Member of Parliament of India for his kind support to establish the CEER. For any information regarding the CEER, please contact Dr. Vaibhav Singhal (email: singhal@iitp.ac.in).

Centre for Endangered Language Studies

Research Vision:

Centre for Endangered Language Studies (CELS) -a specialized centre for carrying out researches on the endangered languages is being set up under the aegis of the Department of Humanities and Social Sciences at IIT Patna. The centre is being set up through the MPLADS with a vision to help the endangered language communities to revive and maintain their languages and also to instill a sense of pride and loyalty towards their native language. The chief mission of this centre is to work for the minor/ tribal/ endangered languages of the state of Bihar and adjoining areas. In addition, the centre would also collaborate with the institutes and universities of the neighboring states to work for minor/tribal/ endangered languages along the state borders.

Since this centre is the first of its kind in the state of Bihar so it will be open to collaborations with local universities and institutes to facilitate easy data collection and documentation. Collaborating with local institutes and universities will also add to the man power. The Centre will prove excellent space for carrying out researches in language documentation, field survey, computational linguistics, language typology and related areas of Linguistics and Applied Linguistics. Computer Scientists, Engineers and academicians from across the globe shall be pooled in to accomplish the set objectives. For higher research and work output the centre will explore options of collaborating with other universities and institutes running similar centres with common goals and shared objectives across India. Efforts will be taken to attract collaborations with foreign institutes so that CELS is always updated with the latest research tools and techniques.

Recent International Conferences

15th - 17th December 2016



The past few decades have witnessed rapid advances in sophisticated circuits, algorithms and systems to tackle many difficult problems and the hardware/software platforms to realize these solutions in physical form. Many of these solutions have been in the form of portable, embedded or wearable devices and systems while others have been distributed, decentralized and massively networked. A system on Chip (SoC) technology embodies and symbolizes much of these advances. A SoC system comprises of several cooperating, interacting, potentially heterogeneous hardware/firmware/software sub-systems.

The objective of the Sixth International **Symposium on Embedded computing and system Design (ISED)** and co-located event **Int'l Conf. on Cyber-physical Systems, Networking and Applications**, is to provide a congenial yet serious platform for experts from academia and industry to interact with young researchers in Computer Electrical and Electronics Engineering. Developments in these domains will have a large role to play in future electronic system design and technologies focusing on being user-friendly, eco-sensitive and energy efficient. The symposium would enable fruitful discussions between experts and other delegates leading to concrete contributions towards advancing the state of the art. Original, unpublished research papers are solicited from industrial and academic researchers. ISED strives to spur and share, examine and accelerate innovations and studies in a range of related areas, including but not limited to the following conference tracks:

- Embedded System Design (ESD)
- Software System and Application Design (SSD)
- Real-time systems and Applications (RTA)
- Signal Processing and Applications (SPA)
- Wireless/Wired Communication Systems and Networks (WCSN)

- Power System Automation (PSA)
- Internet of Things for healthcare Applications (ITHA)
- Emerging Technology and System Design (ETD)
- Power Aware System Design (PSD)
- High-Performance Computing Systems (HPCS)
- Analog/Mixed-Signal System Design (AMS)
- Digital System Design and Validation (DSD)
- Management of Data including Big Data and Analytics (MDBA)
- Sustainable Computing and Management (SCM)
- Information and Cyber Security (ICS)
- Mobile Cyber-physical Systems (MCS)
- Ubiquitous Computing and Embedded Engineering (UCE)
- Computer Vision and Image Processing Applications (CVIP)
- Sensor Networks and Systems (SNS)
- Building Machine Learning Systems (BMS)
- RFID, RF Engineering and Microwave Systems(RRM)

15th Asian Conference on Solid State Ionics & International Workshop at IIT Patna

27th - 30th November 2016



IIT Patna organized 15th Asian Conference on Solid State Ionics during November 27-30, 2016 in association with the Asian Society for Solid State Ionics (ASSSI) and Indian Solid State Ionics Society (ISSIS). Solid state ionics (SSI) is a multidisciplinary scientific and industrial research field that deals physics and applications of ion transport phenomena in solid. This research field has tremendous technological applications in the area of energy storage. SSI is currently at the center stage of R & D activity across the globe due to its potential for finding an effective cost efficient solution for clean & green energy alternative. In Asia, the Asian Society for Solid State Ionics (ASSSI) was founded in 1986. Asian society for solid state ionics (ASSSI) started holding Asian Conference on Solid State Ionics (ACSSI) as biennial event since 1988 beginning at Singapore. Since then, this chain of conference has been held in different Asian countries. Though it is an Asian conference, scientist and intellectuals from 17 countries including Europe, North & South America and Australia apart from member Asian countries took active participation in this event making it truly international in technical content and quality of interaction. The total number of participants was 289 with more than 100 international participants. Present ACSSI was the 15th in the chain of ACSSI conferences. This is the fourth time; this conference was held in India and for the first time in the eastern part of India at Patna under the banner of Indian Institute of Technology (IIT) Patna.

At this conference, high quality technical deliberations on wide variety of subject/topics including; theory & modelling of Ionic/Electronic/Mixed conductors, Novel Techniques in Solid State Ionics, Ionic Liquids, Conducting Polymers, Polymer Electrolytes, Polymer Nanocomposites, Ceramics, Composites, Solid State Ionic Device & their components i.e.; Sensors, Storage/conversion devices (secondary batteries, supercapacitors, fuel cells, their integrated module), Electrochromic display devices, Nano-Ionics etc., were held in the presence of internationally accomplished expert speakers in the subject area. To sum the series of lectures included 3 plenary, 34 keynote, 32 invited lectures in addition to 48 oral and 175 poster presentations. This event was a unique opportunity for budding scientists and youngsters for understanding the subject fundamentals important to analyze the pros and cons of the ionic materials for technological applications in devices.

The conference was preceded by a 3 day international research training workshop on “concepts & applications of materials in devices”. It was restricted to 36 participants only to ensure proper laboratory training sessions with attention on each participants during training session.

A wonderful “cultural evening” was an important part of the twin events where the traditional cultural heritage of the ancient city of Patliputra was showcased to the international audience. Getting charged with wonderful cultural events, few senior Chinese and Korean Scientists also performed during the cultural evening making it truly international culturally as well.

The events proved very fruitful for IIT Patna in terms of visibility in scientific community across the globe. It also emerged in a number of international collaboration during a “research meet” held under the Chairmanship of the IIT Patna Director. Dr. A. K. Thakur, the conference chairman was also elected as the vice president of the Asian Society for Solid State Ionics.

Prof. Pushpak Bhattacharyya, Director, IIT Patna gave inaugural address welcoming the Chief guest - Dr. G. Satheesh Reddy, Scientific Advisor to Defence Minister, Govt. of India, New Delhi; guest of honour-Professor K. L. Chopra, Padmashri, former Director IIT Kharagpur; distinguished guest- Prof. B. V. R. Chowdari from NTU, Singapore, and Professor Junichi Kawamura, President, ASSI from Sendai, Japan.



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आईआईएम के फेलो प्रोग्राम में भविष्य

पटना | कार्यालय संकटग्रस्त

आईआईटी, एनएसआईटी और एनआईटी में शुक्रवार को कार्यशाला आयोजित हुआ। दोनों संस्थानों में आईआईएम इंदौर के प्रोफेसर आदित्य बिल्लोरे मुख्य वक्ता व अतिथि थे। उन्होंने छात्रों को उच्च शिक्षा में उपलब्ध अवसरों से स्पर्श कराया। उच्च शिक्षा के महत्व और उसकी उपयोगिता को चिन्हित करते हुए छात्रों को गुणवत्ता पूर्ण शिक्षा ग्रहण करने की सलाह दी।

उन्होंने आईआईएम इंदौर में संचालित हो रहे फेलो प्रोग्राम इन मैनेजमेंट (एफओएम) कोर्स के बारे में छात्रों को अवगत कराया।

बोले प्रो. आदित्य

- आईआईटी, एनएसआईटी और एनआईटी में कार्यशाला
- आईआईएम इंदौर के प्रोफेसर आदित्य बिल्लोरे ने दिए टिप्स

03 संस्थानों में आदित्य बिल्लोरे मुख्य वक्ता थे

वर्षों एफओएम कोर्स को छात्रों के लिए उचित बताया। साथ ही इसमें दाखिले के लिए होनेवाली प्रवेश परीक्षा की जानकारी दी। उन्होंने कहा कि प्रवेश परीक्षा देशभर में आयोजित की जाएगी।

राइटिंग एप्टीट्यूट टेस्ट और क्वॉंटिटिव एप्टीट्यूट टेस्ट से सफल किए जाएंगे। इसमें पीजी या चार वर्षीय स्नातक पास आवेदन कर सकते हैं। दाखिले के लिए चयन होने के बाद संस्थान की ओर से स्टडिपेंड भी दिया जाता है। एनएसआईटी के रजिस्ट्रार कृष्ण मुरारी ने बताया कि संस्थान छात्रों के प्रगति व उत्थान के लिए प्रतिबद्ध है। आईआईटी पटना के रजिस्ट्रार सुधाप बंडेय ने बताया कि समूह-समूह पर इस तरह की कार्यशालाएं होती रहेंगी। एनआईटी के प्रो. संजय कुमार ने बताया कि उच्च शिक्षा के लिए छात्रों को अभी से ही तैयार करने के उद्देश्य से कार्यशाला आयोजित की गई थी। शुक्रवार को एनएसआईटी के रजिस्ट्रार भी मौजूद थे।

GIAN Courses Conducted:

IIT Patna has actively participated in inviting foreign faculty members and researchers to conduct short-term courses through Global Initiative Academic Network (GIAN) framework of Govt. of India.

IIT Patna has already conducted ten courses through this, and few more will be held in near future.

Institute Functionaries

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