# *Leveraging the new age Perspectives*

*Annual Report 2015-16*

भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

**INDIAN INSTITUTE OF TECHNOLOGY**
**HYDERABAD**

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FROM THE
DIRECTOR

# IIT Hyderabad
# MARCHING AHEAD

If you can dream it, you can do it.

– *Walt Disney*

In November 2016 IIT Hyderabad has 2069 students and 170 full time faculty. Of the 2069 students, more than half are post graduates; 614 Ph.D. and 477 M.Tech., M.Phil. and M.Des., and the rest 978 are undergraduates. IITH has 14 academic departments covering all areas of engineering, sciences, liberal arts and design; it has a virtual department referred to as Engineering Science -- a very novel concept. In Aug 2016, IITH graduated a total of 449 students, of which 42 were Ph.Ds.

Faculty and students of IITH are at the forefront of innovations: Academic innovations, and innovative research. IITH has had 1431 publications, 35 patents filed, and nearly 300 sponsored projects and consultancy projects. Nearly 80% faculty have funded projects. Moreover, IITH has strong industry collaboration – we collaborate with nearly 50 industries. IITH has nearly 250 crs in sanctioned research funding and nearly 15 crs of industrial research and consultancy. IITH has 115 laboratories for teaching, teaching plus research, and for only research. IITH has 9 research and entrepreneurship centers. IITH has MoUs with 40 universities in the USA, Japan, Australia, and Europe.

On the academic front also, IITH is surging ahead: We have B.Tech. programs in eight engineering departments, MSc in Physics, Chemistry and Math, M.Phil. in Liberal Arts, M.Des. in Design, and Ph.D. in all 13 departments. There is strong emphasis on interdisciplinary academics. IITH has implemented a very novel academic program, referred to as, Fractal Academics – the key idea is to atomize courses, provide breadth and depth, emphasize courses in liberal arts as well as creative arts,emphasize project work, and create an interactive learning ambience. In this approach the students will be well equipped to handle challenges of any job or challenges of post graduate education. IITH offers a Minor in Entrepreneurship to all students. Form last year a double major is available to all B.Tech. students – i.e., a hardworking and enthusiastic student can get two B.Tech degrees. Students at IITH can enrich their knowledge by opting for a minor and/or an honors program. IITH is the only institution to offer DigiFab (3D-printing) to all first year students.

IITH is the first institute to start an executive M.Tech. program in Data Science for working professionals.

IITH has very active collaboration with Japan, and this collaboration is on all fronts – research, academics and infrastructure development. This is a unique collaboration which is helping propel IITH to be among the best in the world. At the infrastructure level, besides several academic buildings, Japanese architects have designed iconic structure to reflect the friendship between Japan and IIT Hyderabad – these are – Knowledge Center (library), Technology Incubation and Research Park, Convention Village, Guest House and Sports and Cultural Complex. As part of the Friendship Program, IITH and Japanese Universities have a very active student and faculty exchange program.

IITH has launched its technology business incubator and six companies have been incubated.

IITH has had several visiting faculty from Japan, USA, France, and Canada who taught fractional credit courses or regular courses.

IITH is creating a unique holistic educational ecosystem that offers interactive learning, a highly, flexible academic structure, cutting edge research, strong industry collaboration, and entrepreneurship. It is providing an environment wherein students and faculty are not afraid to experiment and celebrate their ideas.

*Prof UB Desai*

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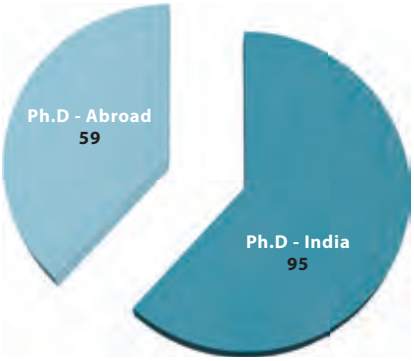
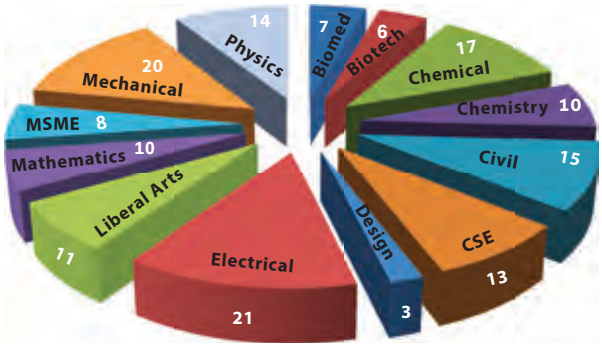
# FACULTY STATISTICS

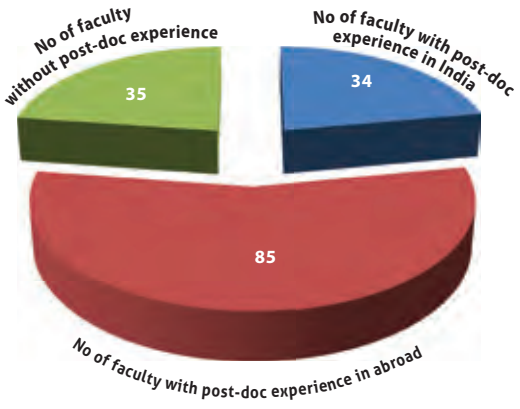
Although started in 2008, IITH started hiring faculty in late 2009. By the end of 2015-16 IITH had 154 faculty members spread across 13 academic departments. The rapid growth of IITH had attracted applicants with excellent academic and research record. In most of the departments 2 selections are done per year for regular posts. However, most of the hiring have been at the level of Assistant Professors. 77% of the faculty members do posses extensive post-doctoral experience. The following charts show the distribution and experience of faculty members in various departments.



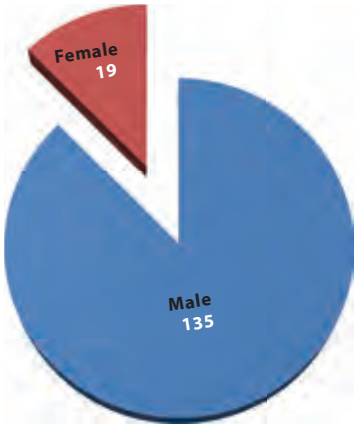

*Ph.D of Faculty Members*




*Department-wise distribution of faculty*



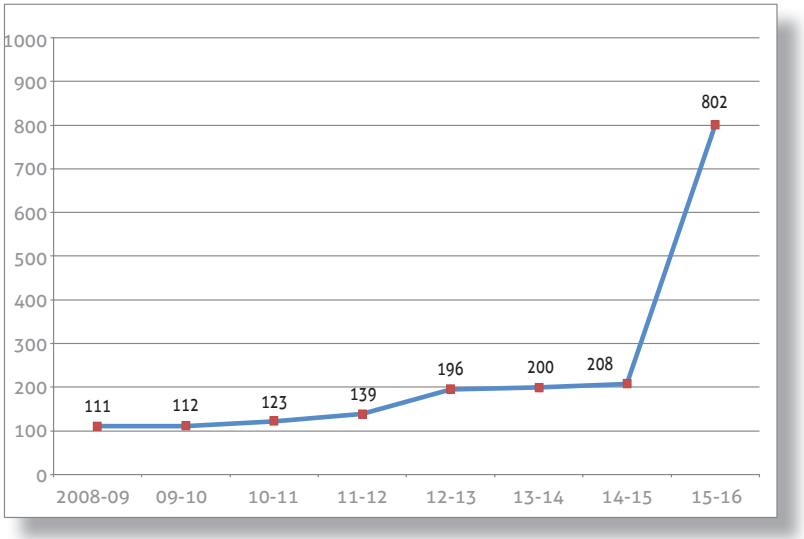

*Post-doc experience of faculty*




*Gender-wise distribution of faculty*

# ACADEMICS

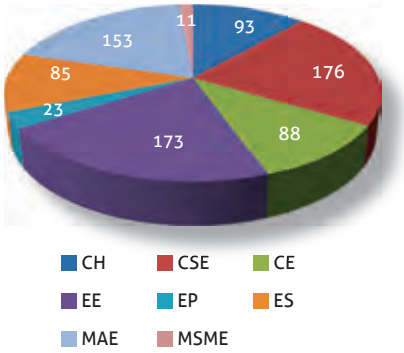
IIT Hyderabad started functioning in the year 2008 with 3 B.Tech programs; Computer Science and Engineering, Electrical Engineering, and Mechanical Engineering. Each of these programs had an intake of 40 students through JEE. In 2009 IITH started admitting Ph.D students in various departments and in 2010 almost all engineering departments started offering M.Tech programs. M.Sc programs started in the year 2010 with Chemistry Department and in the subsequent years, Physics and Mathematics departments started their M.Sc programs. M.Phil program was also stated in the year 2012 by the Liberal Arts department and M.Des program was started in the year 2014 by the Department of Design. Today IITH offers 8 B.Tech programs, 16 M.Tech programs, 3 M.Sc programs, 1 M.Des program, 5 M.Phil programs and Ph.D program in all branches of engineering, humanities, social science and arts. In addition to the regular M.Tech program, the department of computer science and engineering also started an executive M.Tech program for industry folks.

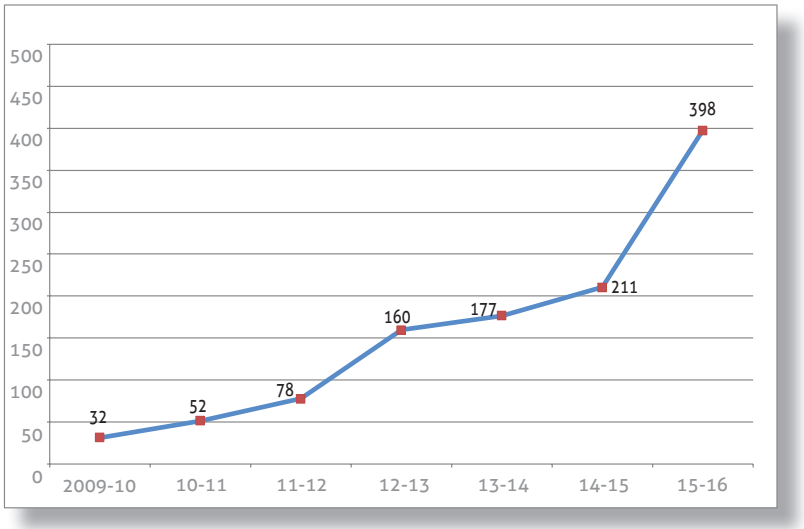



**Total number of B.Tech students admitted in each academic year**

## B.Tech

**Department-wise distribution of total students**

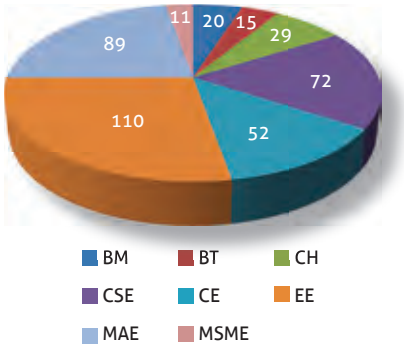



**Total number of M.Tech students admitted in each academic year**

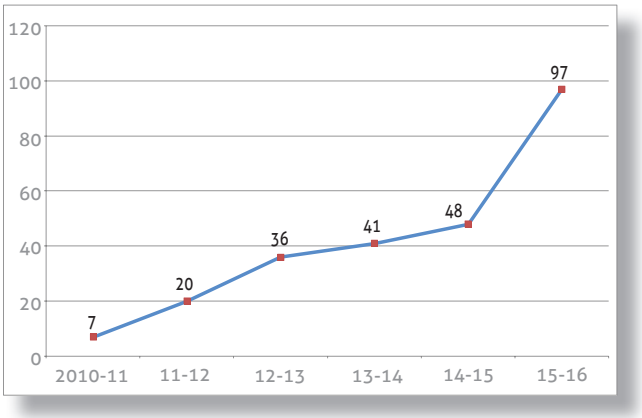
## M.Tech

**Department-wise distribution of total students**



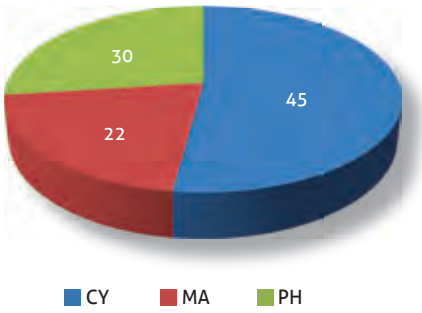
# ACADEMICS

## M.Sc.




**Total number of M.Sc students admitted in each academic year**

**Department-wise distribution of total students**



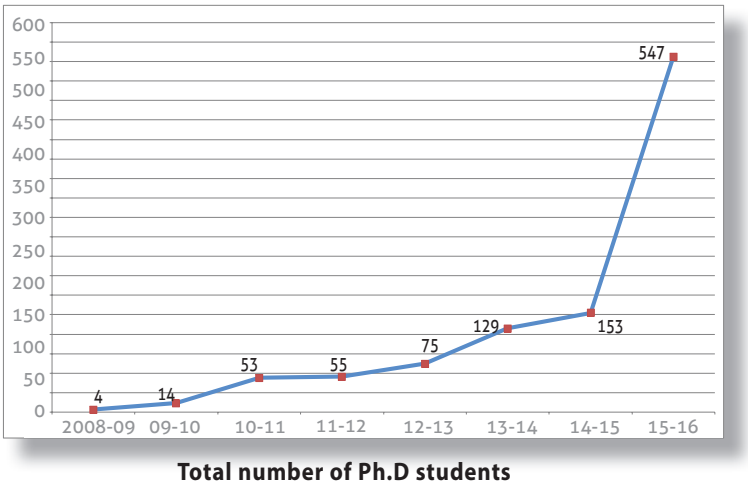

## M.Phil

| LA | |
|---|---|
| Year | No. of Students |
| 2012 | 7 |
| 2013 | 4 |
| 2014 | 4 |
| 2015 | 9 |

## M.Des

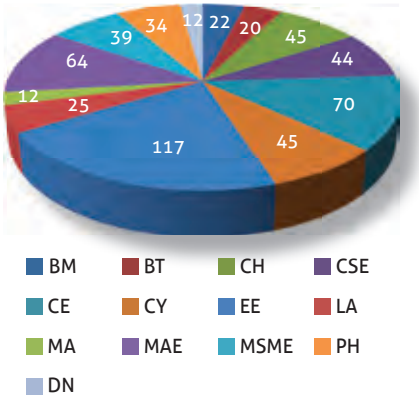
| Design | |
|---|---|
| Year | No. of Students |
| 2014 | 10 |
| 2015 | 22 |

## Ph.D




**Total number of Ph.D students admitted in each academic year**

**Department-wise distribution of total students**

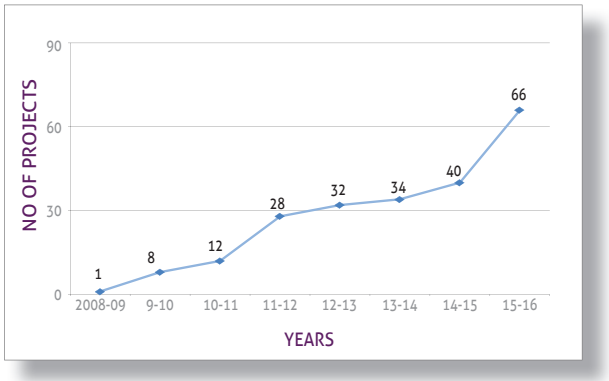



BM - Biomedical Engineering; BT - Biotechnology; CE - Civil Engineering; CH - Chemical Engineering; CSE - Computer Science & Engineering; CY - Chemistry; EE - Electrical Engineering; EP - Engineering Physics; ES - Engineering Science; LA - Liberal Arts; MA - Mathematics; MAE - Mechanical & Aerospace Engineering; MSME - Materials Science & Metallurgical Engineering; PH - Physics; DS - Design

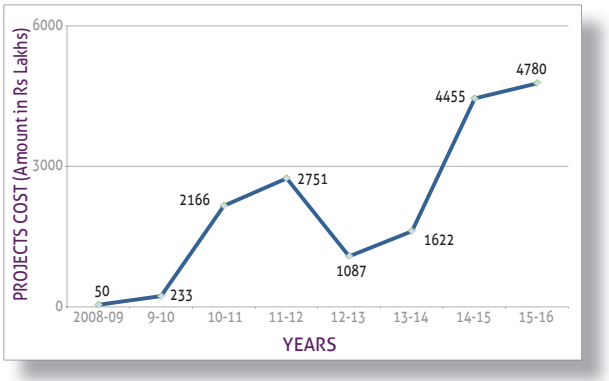
# RESEARCH

The vibrant research culture in IITH is evident from the large number of publications and the sponsored projects. By the end of 2015-16 IITH had more than 100 sponsored projects funded by national funding agencies and private companies. The trends in sponsored projects in IITH over the last 8 years are shown in the charts below.

## RESEARCH PROJECTS

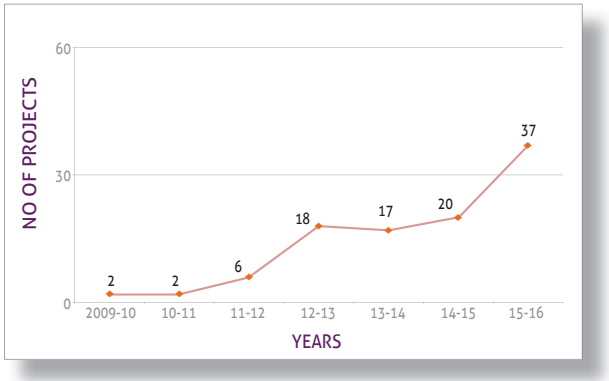



**No of Sponsored Research Projects Approved in Each Financial Year**

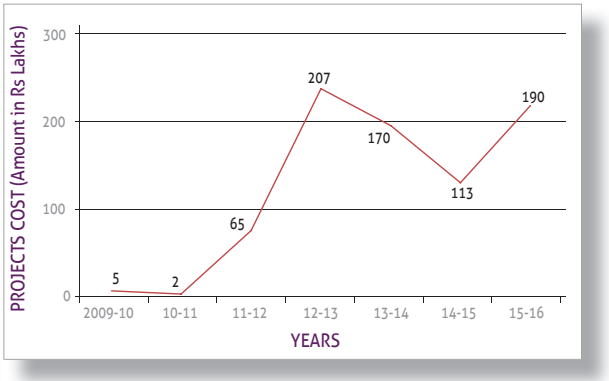



**Funding from Sponsored Research Projects**

## CONSULTANCY PROJECTS



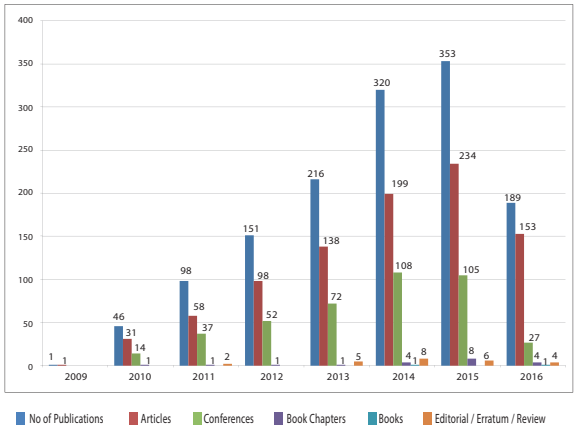

**No of Consultancy Projects Approved in Each Financial Year**



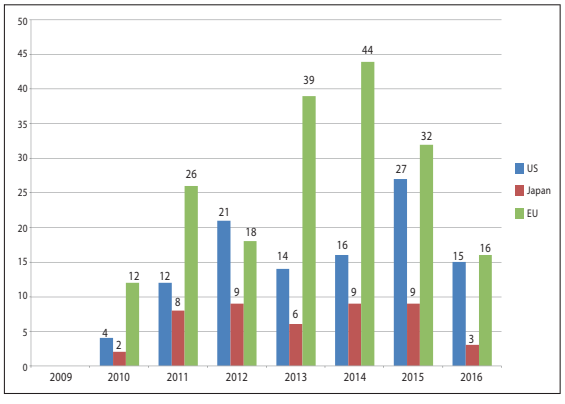

**Funding from Consultancy Projects**

## R&D

### Publications




### International co-authorship



# FIRST TIME IMPLEMENTATIONS

Though IITH is relatively young, some of the academic innovations implemented at IITH is first of its kind in Indian academic circle. Some of them are briefed below.

Fractal academics: The fractal academics implemented at IITH is first of its kind academic program. The program builds up on the concept of atomization of courses. This novel academic program exposes the students to some of the basic and advanced topics in the early semesters, creating the passion and excitement to dig deeper into the subjects. More about the fractal program at IITH may be found from https://www.iith.ac.in/fractal/frac.html

- **Digital fabrication lab:** The digital fabrication lab (3D printing) at IITH is offered to the first semester students. In this lab the students make 3D CAD models, which are then translated into the real world object with the help of a 3D printer. IITH is the only institution offering 3D printing to the first semester students.
- **Executive M.Tech program:** The department of computer science and engineering at IITH offers executive M.Tech program in Data Sciences exclusively for working professionals. The program is self-paced and the individuals do have the flexibility to complete the course in 2-4 years of duration.
- **Minor in entrepreneurship:** The minor program in entrepreneurship offered by IITH for its graduate and undergraduate students is a highly sought after program in the institute. The courses are offered by individuals from industry who themselves are entrepreneurs.
- **Double Major:** The senate of IITH has approved the double major program, in which an undergraduate student is given the opportunity to obtain two B.Tech degrees by completing extra credits from other engineering branches.
- **Creative arts series**: IITH offer a large number of creative arts (CA) courses, some of them offered by practicing professionals for its students. The CA courser are mandatory to the undergraduate students for the successful completion of a B.Tech degree.

## Inauguration of
# CENTRE FOR HEALTHCARE ENTREPRENEURSHIP

*Shri KT Rama Rao, Hon'ble Minister for IT, Industries, MA&UD, NRI Affairs of Telangana inaugurates the Centre for Healthcare Entrepreneurship*

*IIT Hyderabad opens 'Center for Healthcare Entrepreneurship' (CHE)*

*- Aligned with Startup India, dedicated to making universal healthcare a reality*

With the objective of Biomedical innovation to cater to the needs of India's less advantaged, IITH has started an interdisciplinary Center for Healthcare Entrepreneurship (CHE). The center's vision is to achieve healthcare for all and to make universal healthcare a reality. The center will strive to produce a sustainable stream of entrepreneurs and products in the biomedical space.

The CHE also offers a fellowship program in healthcare entrepreneurship. The objective of the fellowship program is to identify and nurture potential entrepreneurs to come up with innovative solutions and products that will be a paradigm shift in rural healthcare. The program is mentored by an international team comprising entrepreneurs, industrialists, and leading academicians from India and USA. The fellows will also be given the opportunity to incubate at IITH's incubation facility; giving them access to the technological expertise at IITH.

# TEACHING LEARNING CENTER (TLC)

Teaching learning centre (TLC) at IIT Hyderabad was established in January 2016 under the Pandit Madam Mohan Malviya National Mission for Teaching and Training (PMMMNMTT), a scheme by MHRD. The vision of TLC at IITH is to create an effective education ecosystem (3E). The aim is to facilitate learning in teaching to provide an academic environment which can enable the 21st century students to discover, invent, create, innovate and develop. TLC supports the IITH faculty in content development of novel courses and effective dissemination. A repository of teaching aids and toys is maintained at TLC which are made available to faculty as per requirements. The content developed is made public for the benefit of larger community.

IIT Hyderabad has a two pronged strategy for effective teacher training. General workshops are conducted for faculty in various schools/colleges across the country. In parallel, individual colleges are identified and department wise training is imparted. So far over 600 teachers from other engineering colleges have been trained in various subjects. TLC has also organised a workshop in close collaboration with Telangana academy for skill and knowledge, Govt of Telangana.

TLC is also undertaking renovation of a few classrooms at IITH to create smart classrooms to facilitate virtual classrooms and other disruptive teaching practices. TLC is also keenly extending support to IIT Bhilai, which is mentored by IITH, to seed the environment for effective teaching right from inception.

# iTIC FOUNDATION

Inventions and innovations are key words on which the foundation of IITH is built. Taking forward this ideology to a higher level of implementation, IITH started "i-TIC Foundation IIT Hyderabad" (i-TIC), which is a registered society. i-TIC has launched an incubation center called the Technology Business Incubator (TBI) funded by the department of science and technology (DST). The goal of TBI is to create a very supportive and nourishing environment for connecting industries with applied research that has the potential for commercialization

This is an excellent opportunity for those young scholars and alumni who wish to become successful entrepreneurs and see their hard work and core competencies materializing into reality. In order to achieve this knowledge based entrepreneurship, i-TIC provides the necessary facilities, guidance and mentoring, by the faculty members of IITH and industry experts, to develop an ecosystem for entrepreneurship.

# GIAN COURSES @ IITH IN 2015-16

With the aim to garner the best international experience into our system of education, enable the interaction of students and faculty with academic and industrial experts from across the world, the Govt. of India approved a new program called "Global Initiative of Academic Networks" (GIAN) in higher education. The GIAN scheme was formally launched on 30 November, 2015 by the Human Resource Development Ministry (MHRD).

Indian Institute of Technology Hyderabad had actively participated in the GIAN program and conducted two GIAN courses in December 2015.

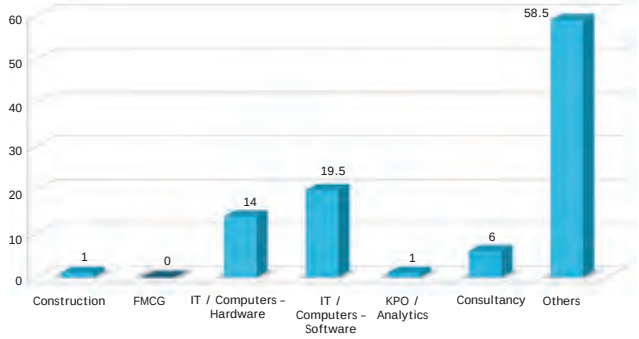
Prof. R. Srinivasan from Texas A&M University, USA along with Dr Shashidhar from the Dept. of Civil Engineering at IITH conducted the first GIAN course on "Hydrological Modeling using SWAT Model" from December 14-23, 2015. Despite a short notice, the course attracted 51 participants including international participants. Another GIAN course "Radar System Design and Signal Processing" was co-taught by Prof. Amit Kumar Mishra from University of Cape Town, S. Africa and Prof. Mohd. Zafar Ali Khan (Dept. of Electrical Engineering, IITH) from January 11-15, 2016. A total of 32 participants attended this one-week course. IIT Hyderabad is set to host more than ten GIAN courses in the summer of 2016.

# PLACEMENT REPORT 2015-16

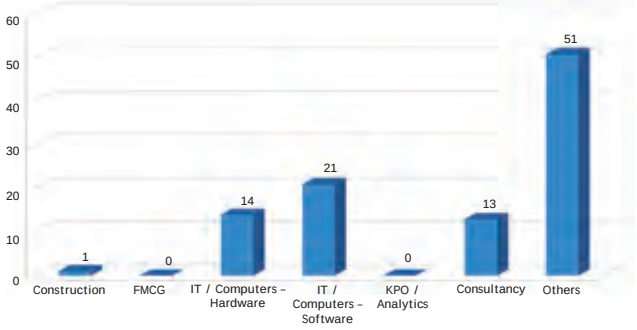
The placements at Indian Institute of Technology Hyderabad for the academic year 2015-16 have yielded 268 offers for 422 registered students. A total of 143 companies had registered for the placement process. Out of them, 92 have made it to the campus and interacted with the students of B.Tech., M.Tech., M.Des., M.Sc. and M.Phil across 14 departments. During 2015-16 some of the new recruiters were Murata Electronics, Hikari Tsushin, VE Commercial Vehicles, Vedanta, Coal India, Wellsfargo, Blue Star and Tata Advanced Systems. The top paying companies were Yahoo Japan, Hikari Tsushin and Paypal. The highest salary offered for 2015-16 was Rs.35 LPA and the average salary was Rs.11 LPA. There were seven international offers. A good number of students from UG, PG and M.Sc. have opted for higher education in India and abroad.

**2015-16 PLACEMENT DATA (in Percentage)**

**Companies (Sector-Wise)**




**No of Students Placed**




# TEQIP WORKSHOPS

The Ministry of Human Resource and Development, Government of India has initiated a long term program known as 'Technical Education Quality Improvement Program (TEQIP)' to aid transformation in the technical education system across India with support of the World Bank. The major objectives are to strengthen the institutions to produce high quality engineers for better employability, enhancing education, research and innovation, and to continuously train faculty members for effective teaching, and so on. IIT Hyderabad has been instrumental in organizing several workshops and programs, with the support of its faculty members across all disciplines. Several workshops, symposiums, and short-term courses, etc. were organized, in which more than 500 faculty members from engineering colleges across India have participated and benefited. Many of these programs were focused on national issues and cutting edge technologies. Apart from technical events, IIT Hyderabad has also taken lead in organizing workshops on softskills improvement for faculty members, in order to facilitate an overall improvement in academic system. IIT Hyderabad believes that TEQIP activities can make the much needed impact in the present education system. Programs organized last year have been tabulated below:

| Name of the Workshop | Date | No. of Participants | No. of Days | Workshop Coordinator |
|---|---|---|---|---|
| Teacher Effectiveness Nurturing Well Being - 2015 | 1-2 May, 2015 | 25 | 2 | Dr. Mahati Chittem |
| ISPAT-2015 | 25-29 May, 2015 | 32 | 5 | Dr. Mahendra Kumar Madhavan |
| Thermal analysis of Materials Using DTA, DSC, TG & Dilatometer (TAM-I & TAM-II) | 23-25 Jul and 12-14 Aug, 2015 | (16 & 14) | 6 | Dr. Bharat B Panigrahi |
| Finite Element Method | 23-25 Jul, 2015 | 16 | 3 | Dr. Syed Nizamudhin Khaderi |
| MEMS / NEMS | 14-18 Dec, 2015 | 41 | 5 | Dr. Chandra Shekar Sharma |
| Thermal analysis of Materials Using DTA, DSC, TG & Dilatometer TAM-III | 14-19 Dec, 2015 | 30 | 6 | Dr. Bharat B Panigrahi |
| Materials Microstructure Characterisation using optical and scanning Elctron microscope | 20-24 Dec, 2015 | 30 | 5 | Dr. Suhash Ranjan Dey |
| X-Ray Scaterring | 28-29 Dec, 2015 | 20 | 2 | Dr. Mudrika Khandelwal & Dr. Chandra Shekar Sharma |

# IITH Ranks 7th in NIRF


IIT Hyderabad bagged 7th rank in the first edition of National Institutional Ranking Framework (NIRF) conducted by the Ministry of Human Resource Development. A large number of parameters were identified to compare and rank the institutions which were divided into five major categories i) Teaching and Learning ii) Outreach and Industry iii) Research Productivity, Impact and IPR, iv) Graduation Outcome v) Perception. With a weighted score of 77.23, IITH emerged at 7th position.

# Alumni Cell

*Students interacting with alumni during SAM*

The institute's alumni association IITHAA is now a formally registered society under the society act of the state of Andhra Pradesh. The institute conducted its first Student Alumni Meet (SAM) on 9 Jan 2016 and around 60 alumni participated in the one-day program. The event started with brief interaction between alumni and the students of IITH in the morning at the permanent campus followed by sports and sci-tech exhibitions at the temporary campus at ordnance factory.

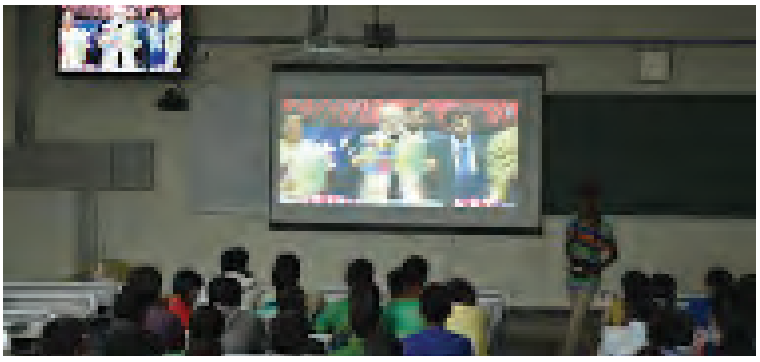
# Student exchanges

IITH is having a very healthy international exchange program with several universities. Under the exchange program with Ritsumeikan University, Japan, 10 IITH students visited Ritsumeikan University in the month of June to participate in problem based learning (PBL) program. Under this program 5 team, each comprising
2 students from IITH and 2 students worked on problems that are relevant to the Indian social scenario. The second PBL workshop was held in IITH in the month of September. The visiting Japanese students were given a number of lectures and lab tours in addition to the exposure given to the culture and heritage of India and in particular Hyderabad. Each PBL workshops were of

*Japanese students from Ritsumeikan University with IITH students during SPIC macay program*

10 days duration. In addition to the short-term exchanges, 6 students from IITH and Ritsumeikan University also participated in exchange visits that lasted 3 months.

# Startup India Launch



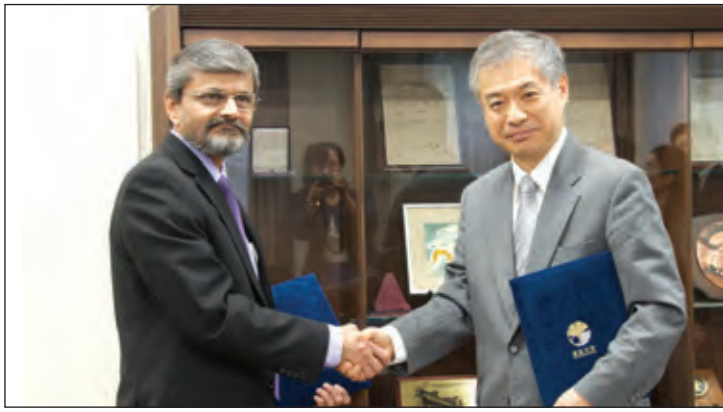
*IITH students participating in the Start - Up India launch program*

The honorable prime minster Shri Narendra Modi launched the start up India movement on 16 Jan 2016. The event was live streamed at IITH using the KNK network and students turned up in large numbers to watch the unveiling function.

# COLLABORATION WITH JAPAN

The year 2015-16 has been an eventful year for JICA FRIENDSHIP Project. This year the project completed 4 years of operations and a joint evaluation team has evaluated the project to be progressing positively in the direction of achieving the set goals.

*IITH Connect -2015, organized by JICA in Tokyo*



*MoU signing with The Graduate School of Engineering, University of Tokyo*

**Major achievements of the project include:**

- **Scholarships**: In total 37 students have been provided scholarship to study in various universities in Japan since 2012 and specifically in the current FY 10 students have been provided scholarships by JICA for pursuing Ph.D program in Japan. Further the Scholarship program has been extended till 2024 with an annual intake of 30 students.
- **Academic Interaction:** 51 Japanese faculties have visited IIT Hyderabad for various academic activities and similarly 79 IITH faculty visited Japan for activities related to joint research, workshops and symposiums. During the said interactions the faculties concerned have published several joint papers and also have begun joint research with funding from JSPS, JST / DST and also from Japanese industry.

  Additionally, these academic interactions between IITH faculty and Japanese Universities have resulted into singing of MoU with 4 Japanese Universities including with The University of Tokyo and Keio University during FY 2015-16. In addition to the said, 4 MoUs have been signed by IITH with graduate schools of other Universities.
- **Industry Interaction**: Interaction of IITH faculty with Japanese industry over the last 4 years have resulted in signing of MoU with 5 Japanese companies for research collaboration. In addition to these MoUs, industry interaction has also resulted in providing internships to IITH graduates in Japanese companies and also 4 Japanese companies started recruiting IITH graduates for their Japan operations.
- **Events**: The project has been organising 2 major annual events one each for Industry and academic interaction respectively since 2012. The Academic interaction event "IITH Japan Academic Fair" has become a popular event among IITH students planning to study in Japan where a platform has been created for direct interaction of students with the university representatives. The industry event "Connect IITH" is being organised since 2014 in Tokyo annually where a platform has been created for IITH and interested Japanese industry to directly interact and explore opportunities for joint research, internships and recruitments.
- **Workshops / Seminars & Conferences**: In addition to the regular visits for interactions, IITH faculty and Japanese universities have organised several workshops, seminars and conferences both in India and Japan during the past 4 years. During the year 2015-16 IITH with the support of JICA FRIENDSHIP Project has organised 3 workshops in India, 1 workshop in Japan and one international conference in Japan on Digital Fabrication.
- **Student Exchange**: Since the inception of the project in 2012, a total of 87 Japanese students from various Universities visited IITH and 23 IITH students visited Japanese Universities under the student exchange program for research activities and joint workshops and this is expected to increase during the next few years as more Universities are willing to participate in this program with IITH.

The project has successfully implemented various activities and events during the last financial year and is planning to expand the activities further in the current year to reach the targeted goal of the project.

# SWACCH BHARAT

Swacch Bharat activities was formally launched this year on October 2nd the birth anniversary of the father of our nation Mahatma Gandhi who tirelessly advocated the importance of cleanliness. This was followed by cleaning of the hostel area in the Ordnance Factory (ODF) campus by a large number of student volunteers. All the student volunteers were provided with adequate cleaning implements and safety gear. In addition, a formal pledge taking ceremony was also initiated at the upper dinning hall in the kandi campus at the beginning of the year. The pledge was initiated by the members of the 'Clean India Committee'. A large number of students took the pledge to make India a cleaner and greener nation. In the following weeks, a number of cleaning activities were carried out in the Kandi campus especially near the mess area. The 2016 graduating batch of students actively participated to fulfill the requirements of the Clean India Course CI 101.


*IITH Students during the clean india course*

# MoUs

In today's global economy, all leading academic institutions strive on international collaborations. With more and more inter and multi disciplinary conventional research paradigm is indispensable.

IITH in the past couple of years has been highly successful in building tie ups with leading academic institutions around the globe. Some of the MoUs that IITH has signed in the last financial year are as follows:

- Deakin University, Melbourne, Australia
- Hogskolen I Gjovik (HIG), Norway
- Purdue University, USA
- Allied Telesis Labs Limited, Newzealand
- Osaka University, CREHIM, Japan
- Osaka University, Japan
- University of Tokyo, Japan
- Graduate School of Engineering, Osaka University, Japan
- Graduate School of Engineering Science, Osaka University, Japan
- Keio University, Japan
- Keio University Japan - Graduate School of Media and Governance
- Texas Tech University, USA
- McMaster University, Canada

# INDEPENDENCE DAY CELEBRATIONS

Independence Day celebrations were held in the campus on 15 August 2015.

## FOUNDATION DAY

*Dr Anil Kakodkar inaugurating the seventh foundation day celebrations*

The seventh foundation day of the institute was celebrated on 25 March 2015 with Dr Anil Kakodkar, chair of engineering eminence at the Bhabha Atomic Research Center as the chief guest. Academic excellence awards and excellence in teaching awards were distributed during the function.

## CONVOCATION DAY

*Mr Bibek Debroy delivering the convocation address*

The Fourth Annual Convocation of IITH was held on the 8 Aug 2015 and Dr Bibek Debroy, member NITI Aayog graced the occasion as chief guest and delivered the convocation address. The function was presided over by the Chairman Board of Governors (BoG) Mr. BVR Mohan Reddy and the director Prof. U.B. Desai.

# REPUBLIC DAY CELEBRATIONS

Republic Day celebrations were held in the campus on 26 January 2016.

# VISITING FACULTY OFFERING CREATIVE ARTS COURSES

**Jayachandran Palazhy**

*Specialization*: Dancing and choreography

**Yuka Kataoka**

*Specialization*: Flamenco Dance

**Shalinee Kumari Jha**

*Specialization*: Madhubani Painting

**Ramana Gogula**

*Specialization*: Music

**Wasifuddin Dagar**

*Specialization*: Dhrupad

**M K Raina**

*Specialization*: Folk Theatre of India

**Purvadhanashree**

*Specialization*: Indian Classical Dance

**Shubhra Gupta**

*Specialization*: Cinema

# VISITING FACULTY OFFERING GIAN COURSES

**R. Srinivasan**

*Professor and Director of Spatial Sciences Laboratory at Texas A&M University, USA*

**Venkatesh Kodur**

*Michigan State University, USA*

**Amit Kumar Mishra**

*Department of Electrical Engineering, University of Cape Town, South Africa*

**J N Reddy**

*Texas A&M University, USA*

**Amit H. Verma**

*Purdue University, USA*

**Emmanuel Bouzy**

*Univeristy of Lorraine, France*

**Barna Saha**

*University of Massachusetts Amherst, USA*

**Matthew MacLeod**

*Stockholm University, Sweden*

**Walter Illman**

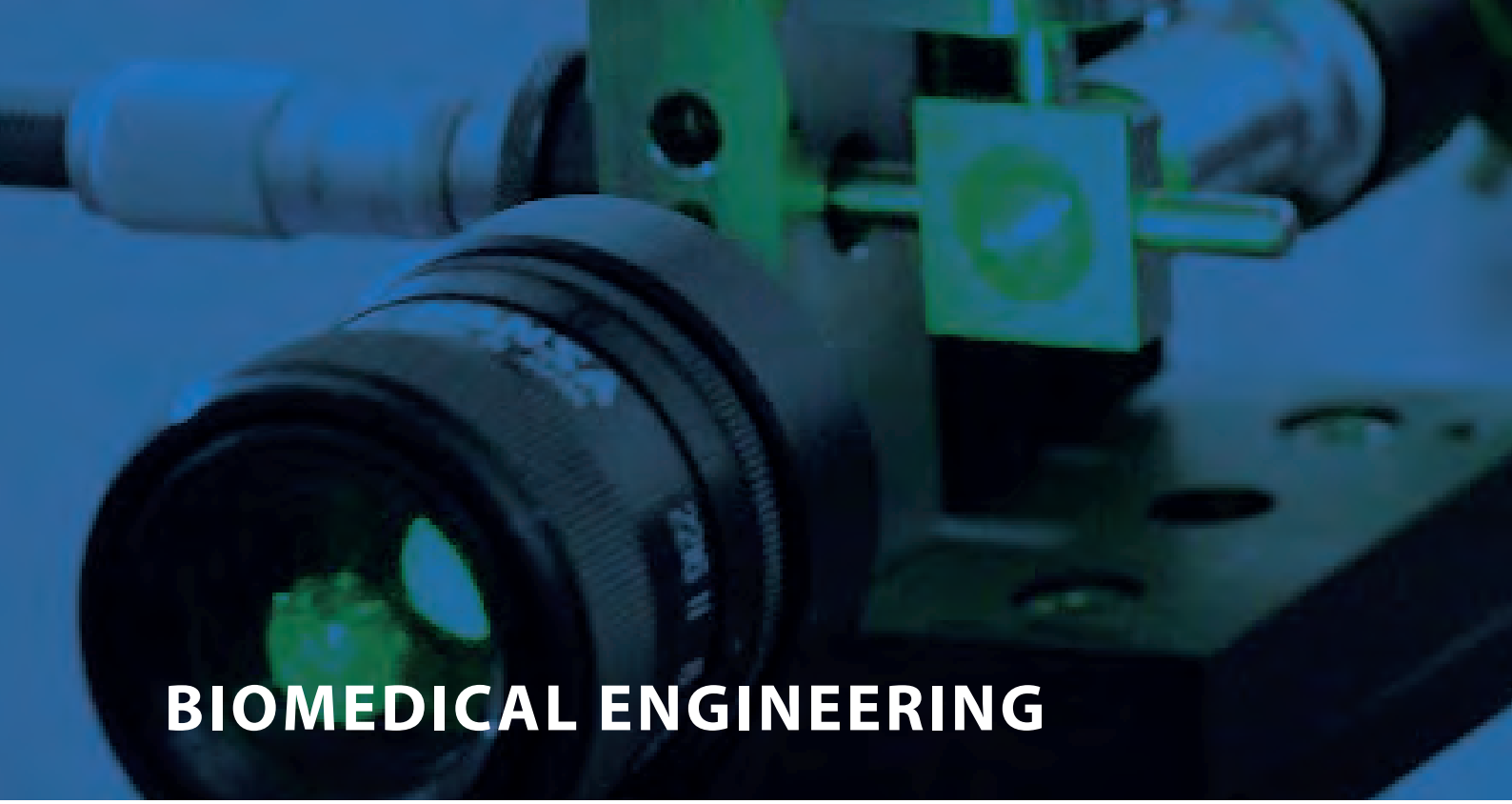
*University of Waterloo, Canada*

**Sumit Roy**

*University of Washington, Seattle, USA*

**Abdeldjelil Belarbi**

*University of Houston, USA*



# BIOMEDICAL ENGINEERING

The Biomedical Engineering Department (BME) at IIT Hyderabad is the place where boundaries between engineering and science disciplines fade in order to focus on research and education targeted for ongoing and future technology. The primary mission of the department is to foster interdisciplinary work of highest quality by bringing together a broad spectrum of faculty expertise under a single umbrella to focus on research in Biomedical engineering. By converging the engineering expertise in analytical and experimental methods to biological and medical sciences, BME aims at unveiling the unseen in biology and innovations in technology that can be translated to clinical health care. Over the past year, Biomedical Engineering at Indian Institute of Technology Hyderabad has grown to a total strength of more than forty five with one associate professor, six assistant professors, two postdoctoral fellows and many JRF, 20 Ph.D students and 18 Masters of Technology students. BME has made substantial investments in strengthening the core research facilities and course curriculum. The newly introduced BME minor program of 12 credits is designed for undergraduates to gain interdisciplinary knowledge in areas of Bioengineering. Faculty in the department of BME undertake research in broad spectrum of areas related to Biomedical Engineering/Bioengineering such as Biophotonics, Lab on a Chip Biosensors, Biophysics, Biomechanics, Neuroscience, Tissue Engineering, 3D Bioprinting and Nanomedicine. The department will continue to leverage its core strengths in emerging as one of the leading centers of excellence in Biomedical engineering in the country.

# F A C U L T Y

**Renu John**
Ph.D - IIT Delhi

***Associate Professor & HoD***

*Research Areas*: Optical imaging and low coherence microscopy, nanobiophotonics, biosensors

**Mohan Raghavan**
Ph.D - IISc., Bangalore

***Assistant Professor***

*Research Areas*: Computational Neuroscience, Motor system, Spinal cord, Bionics, Assistive devices, Rehabilitation

**Harikrishnan Narayanan Unni**
Ph.D - NTU, Singapore

***Assistant Professor***

*Research Areas*: Lab on Chip Microfluidics and Nanofluidics, Biophysics, Biomechanics

**Aravind Kumar Rengan**
Ph.D - IIT Bombay

***Assistant Professor***

*Research Areas*: Nanomedicine, Cancer Nanotechnology, Photothermal Therapy, Nanotoxicology, Triggered Drug Delivery and Theranostics

**Subha Narayan Rath**
Ph.D - NUS, Singapore

***Assistant Professor***

*Research Areas*: Regenerative medicine, stem cells, Natural biomaterials, Decellularized scaffold, stem cell 3D printing

**Falguni Pati**
Ph.D - IIT Kharagpur

***Assistant Professor***

*Research Areas*: 3D Bioprinting, Tissue Engineering and Regenerative Medicine, Biomaterials, Tissue and Organ Models

**Jyotsnendu Giri**
Ph.D - IIT Bombay

***Assistant Professor***

*Research Areas*: Nanomedicine, Regenerative medicine, Drug delivery, Therapeutics and diagnostics

## VISITING FACULTY

**Ramana Vinjamuri**

***Assistant Professor, PhD (Stevens Institute of Technology, New York)***

*Research Areas*: Brain Machine Interfaces

*Teaching Subject*: BM 1093: Principles of Design in Biomedical Engineering (1 credit)

BM 1050 Brain machine interfaces (1 credit)

## Books / Chapters

"Organ printing", Dong-Woo Cho, Jung-Seob Lee, Jinah Jang, Jin Woo Jung, Jeong Hun Park, and Falguni Pati, Morgan & Claypool publishers, 2015, CA, USA.

3D printing technology for day-to-day application, Subha N. Rath, Manorama Year Book 2015.

## Publications

### (In Peer-Reviewed Journals)

'In-situ electrosynthesized Nanostructured $Mn_3O_4$-Polyaniline Nanofibers-Biointerface for Endocrine Disrupting Chemical Detection', N. Singh, M. A. Ali, K. Suresh, V. V. Agrawal, P. Rai, A. Sharma, B. D. Malhotra and Renu John, *Sensors and Actuators B: Chemical*, 236, 781–793, (2016).

'Optofluidic bioimaging platform for quantitative phase imaging of lab on a chip devices using digital holographic microscopy', V.P. Pandiyan, R. John, *Applied Optics,* 55 (3), A54-A59 (2016).

'A biofunctionalized quantum dot–nickel oxide nanorod based smart platform for lipid detection', M.A. Ali, S. Srivastava, V.V. Agrawal, M. Willander, Renu John, B. D. Malhotra, *Journal of Materials Chemistry,* B 4 (15), 2706-2714, (2016).

'Protein Functionalized Carbon Nanotubes-based Smart Lab-on-a-Chip', M.A. Ali, P.R. Solanki, S. Srivastava, S. Singh, V.V. Agrawal, R. John, B.D. Malhotra, *ACS Applied Materials & Interfaces,* 7 (10), 5837-5846 (2015).

'Design and Simulation of Microfluidic Passive Mixer with Geometric Variation', Shubha Jain, H.N. Unni, *International Journal of Research in Engineering and Technology*, 05, (02), 55 – 58 (2016).

'Soluble Eggshell Membrane: A Natural Protein to Improve the Properties of Biomaterials used for Tissue Engineering Applications', Mahesh K. Sah, Subha N. Rath, *Materials Science and Engineering,* C, 67, 807 – 821 (2016) doi:10.1016/j.msec.2016.05.005.

'Nanofiber scaffolds influence organelle structure and function in bone marrow stromal cells', Wojtek Tutak, Jyotsnendu Giri, Peter Bajcsy, Carl G. Simon Jr., *Journal of Biomedical Materials Research Part B: Applied Biomaterials,* Volume 00B, 1-13 (2016).

## Publications

### (In Peer-Reviewed Conferences)

'Quantitative label-free sperm imaging by means of transport of intensity', P. K. Poola, V. P. Pandiyan, V. Jayaraman, Renu John, *SPIE BiOS*, 97180O-97180O-7 (2016).

'High resolution quantitative phase imaging of live cells with constrained optimization approach', V. P. Pandiyan, K. Khare, Renu John, *SPIE BiOS*, 971803-971803-1 (2016).

'Quantitative phase imaging of cell division in yeast cells and E. coli using digital holographic microscopy', V. P. Pandiyan, Renu John, *SPIE/OSJ Biophotonics,* Japan, 97920Y-97920Y-8 (2015).

'Non-interferometric quantitative phase imaging of yeast cells', P. K. Poola, V. P. Pandiyan, Renu John, *SPIE/OSJ Biophotonics,* Japan, 97920G-97920G (2015).

'3D Bioprinting for tissue engineering application'. Sindhuja D.E., Subha N. Rath, Falguni Pati, pp.33-36. ICDF2016 Proceedings of 2nd International Conference on *Digital Fabrication 2016,* Tokyo, 3-5 March.

'A Review of Hydrogels in Droplet based Bio-Fabrication Techniques'. Shahid Ansari, Mahendra D. Date, Subha N. Rath and Suryakumar S, pp.37-41. ICDF2016 Proceedings of *2nd International Conference on Digital Fabrication 2016,* Tokyo, 3-5 March.

## FUNDED RESEARCH PROJECTS 2015-16

Renu John, *Characterization of micro-nanostructures using DHM*, BRNS, November 2015, Rs. 34.0 Lakhs.

Jyotsnendu Giri, *Engineering Nanomedicine,* 2015-2020, DBT, March 2015, 32.5 Lakhs.

Jyotsnendu Giri, *Biommetic, tissue adaptive nanofiber membrane for guided tissue regeneration,* DST-Nanomission, October 2015, Rs. 70.94 Lakhs.

Jyotsnendu Giri, *Novel injectable nanofibrous cell carriers as the next generation cell therapy for cartilage repair,* 2015-2018, SERB, December 2015, Rs. 51.93 Lakhs.

Jyotsnendu Giri, *Nanoplatform-based, multimodal therapy against breast cancer stem cells and drug resistance*, DBT, March 2016, Rs. 60.56 Lakhs.

Mohan Raghavan, *Development of a reusable library of model components for human spinal cord modeling and simulation,* SERB, 16 November 2015, Rs. 24.3 Lakhs.

Aravind Kumar Rengan, *Liposome gold nanoparticles for cancer theranostics*, DST-INSPIRE, 11 January 2016, 35.0 Lakhs.

Aravind Kumar Rengan, *Biodegradable Nanoparticles for Photothermal treatment of Acne and Skin Carcinoma,* DST–SERB, 23 March 2016, Rs. 37.0 Lakhs.

## Talks Given In National / International Conferences

Renu John, '*Quantitative phase microscopy with nanometric sensitivity, Recent Advances in Optical Sciences*', RAOS 2016, University of Hyderabad, 4-5 May 2016.

Renu John, *Optical Coherence tomography for gastroenterology applications, Frontiers in Light-Matter interactions*, IIT Ropar, 4-5 March 2016.

Renu John, *3-D Optical imaging and phase microscopy: Clinical applications, Indo-Norway Workshop on Optics and Photonics in Biosensing and Bioimaging*, IIT Delhi, 22 December 2015.

Falguni Pati, *Biomimetic 3D Tissue Printing, Challenges in Product Development of Medical Implants and Devices (CPDM-2015)*, Kolkata, 18-19 December 2015.

## Workshops / Symposiums Organised

Symposium on Healthcare Entrepreneurship 2015 (SHE), Hyatt, Gachibowli, 3-4 December 2015.

Symposium on Neuronal Networks and Physiology, jointly organized by MNR Medical College and Department of BME, IIT Hyderabad, 27 April 2016.

## Awards & Recognitions

'Inspire Faculty Award, 2015', *Aravind Kumar Rengan.*

'Innovative Young Biotechnologist Award, 2015', *Aravind Kumar Rengan.*

'Early Career Research Award, 2016', *Aravind Kumar Rengan.*

*Materials Lab*

*Biophotonics Lab*

*Cell Culture Lab*

*M.Tech Teaching Lab*

# BIOTECHNOLOGY

The Department of Biotechnology (BT) has six faculty members with cutting-edge research expertise in areas encompassing: HIV integration, Cancer biology, NMR, Structural Biology, Epigenetics, DNA Repair, Amyloids & Prion protein biology, Ion channel physiology and channelopathies. Currently two post graduate degree programs are offered: M.Tech in Medical Biotechnology & Ph.D in Biotechnology. The department's laboratories are well-equipped with advance research infrastructure and equipment such as: Flow-cytometer, Fluorescence Microscope, Multi-mode Readers, High Speed & Ultracentrifuges, Cluster, Spectrophotometer, Nanodrop Reader, Cell & Microbial Culture facilities, Circular Dichroism, FPLC system etc. M.Tech students take advance courses in the first two semesters followed by research work for thesis in any of the above mentioned research fields.

Also, the M.Tech students are trained to improve their presentation skills through seminar courses and scientific writing skills through independent research proposal writing. The Ph.D program comprises of a mandatory rigorous course work followed by thesis work. Students carry out research in well-equipped above mentioned research laboratories.

# F A C U L T Y

**Basant Kumar Patel**
Ph.D - Banaras Hindu University

***Assistant Professor & HoD***

*Research Areas*: Protein misfolding, Prion & Amyloid Proteins, Yeast genetics

**Thenmalarchelvi Rathinavelan**
Ph.D - University of Madras

***Assistant Professor***

*Research Areas*: Molecular Biophysics, Computational Structural Biology, Biomolecular NMR, Molecular Modeling, Bacterial infectious diseases, Trinucleotide repeat expansion disorders

**Anindya Roy**
Ph.D - IISc, Bangalore

***Associate Professor***

*Research Areas*: DNA repair, Cancer Biology

**Rajakumara Eerappa**
Ph.D - CCMB, Hyderabad

***Assistant Professor***

*Research Areas*: X-ray Crystallography, Structural Biology, Epigenetics and DNA repair

**N.K. Raghavendra**
Ph.D - IISc, Bangalore

***Assistant Professor***

*Research Areas*: HIV-1 integrase, LEDGF/p75, UBC13, UBE2V1, UBE2V2

**Anamika Bhargava**
Ph.D - Innsbruck Medical University, Austria

***Assistant Professor***

*Research Areas* Voltage-gated calcium channels, electrophysiology, channelopathies, structure-function relationship, and imaging of ion channels

## VISITING FACULTY

**Radha Rangarajan**

CEO, Vitas Pharma

Technology Business Incubator
University of Hyderabad
Hyderabad 500046

*Teaching Subject*: BO6040: Essential topics for Bio-industry


Thermo
NANODROP 2000
TARSONS

## Publications

### (In Peer-Reviewed Journals)

New insights into in vitro amyloidogenic properties of human serum albumin suggest considerations for therapeutic precautions, N. Sharma N, V. Sivalingam, S. Maurya, A. Prasad, P. Khandelwal, S.C. Yadav, B.K. Patel. *FEBS Lett. 2015 589(24 Pt B)*, 4033-4038 (2015).

Recombinant Human Semenogelin-1 (Sg1) and Sg1 (1-159) form Detergent Stable Amyloid like Aggregates in vitro, N. Sharma V. Sivalingam, B.K. Patel, *Protein Pept Lett. 23(1)*, 87-96 (2016).

Imidazolium Tagged Acridine Derivatives: Syntheses, Structures, DNA Sensing and Anti-microbial Activities, G. Raju, V. Sivalingam, Archana, B. K. Patel, G. Prabusankar. *Journal of Molecular Structure, 1107,* 291-299 (2016).

EK3D: an E. coli K antigen 3-dimensional structure database, B. M. Kunduru, S. A. Nair and T. Rathinavelan, *Nucleic Acids Res., 44(D1)*, D675-81 (2016).

Selective preference of parallel DNA triplexes is due to the disruption of Hoogsteen hydrogen bonds caused by the severe nonisostericity between the G*GC and T*AT triplets, G. Goldsmith, T. Rathinavelan and N. Yathindra, *PLOS one*, 11(5):e0155090 (2016).

Mechanistic insights into the recognition of 5-methylcytosine oxidation derivatives by the SUVH5 SRA domain, E. Rajakumara*, N.K. Nakarakanti, M.A. Nivya and M. Satish, *Nature: Scientific Reports.,* 6, 20161 (2016) (*corresponding author).

Induction of Mincle by Helicobacter pylori and consequent anti-inflammatory signaling denote a bacterial survival strategy, S. Devi, E. Rajakumara and N. Ahmed, *Nature: Scientific Reports, 5,* 15049 (2015).

Microtubule-Dependent Mitochondria Alignment Regulates Calcium Release in Response to Nanomechanical Stimulus in Heart Myocytes. Miragoli M, Sanchez-Alonso JL, Bhargava A, Wright PT, Sikkel M, Schobesberger S, Diakonov I, Novak P, Castaldi A, Cattaneo P, Lyon AR, Lab MJ, Gorelik J. *Cell Rep. Jan 5*;14(1):140-51. (2016)

Direct Evidence for Microdomain-Specific Localization and Remodeling of Functional L-Type Calcium Channels in Rat and Human Atrial Myocytes, Glukhov AV, Balycheva M, Sanchez-Alonso JL, Ilkan Z, Alvarez-Laviada A, Bhogal N, Diakonov I, Schobesberger S, Sikkel MB, Bhargava A, Faggian G, Punjabi PP, Houser SR, Gorelik J. *Circulation. 5 Dec 22*;132(25):2372-84. (2015)

Atrial Fibrillation: Biophysics, Molecular Mechanisms and Novel Therapies, Glukhov AV, Rosenshtraukh LV, Bhargava A, Miragoli M, Boukens BJ. *Editorial. Biomed Res Int. 2015:780671*. (2015)

## Seminars Organised

Quantification of antibiotic uptake through outer-membrane protein, Dr. Harsha Bajaj, Jacobs University Bremen, Germany, 16 February 2016.

Mapping Functional Group Free Energy Patterns and Ligand Efficacies from Conformational Dynamics of β2-adrenergic G-protein Coupled Receptor,
Dr. Sirish Kaushik Lakkaraju, University of Maryland Baltimore, USA, 6 January 2016.

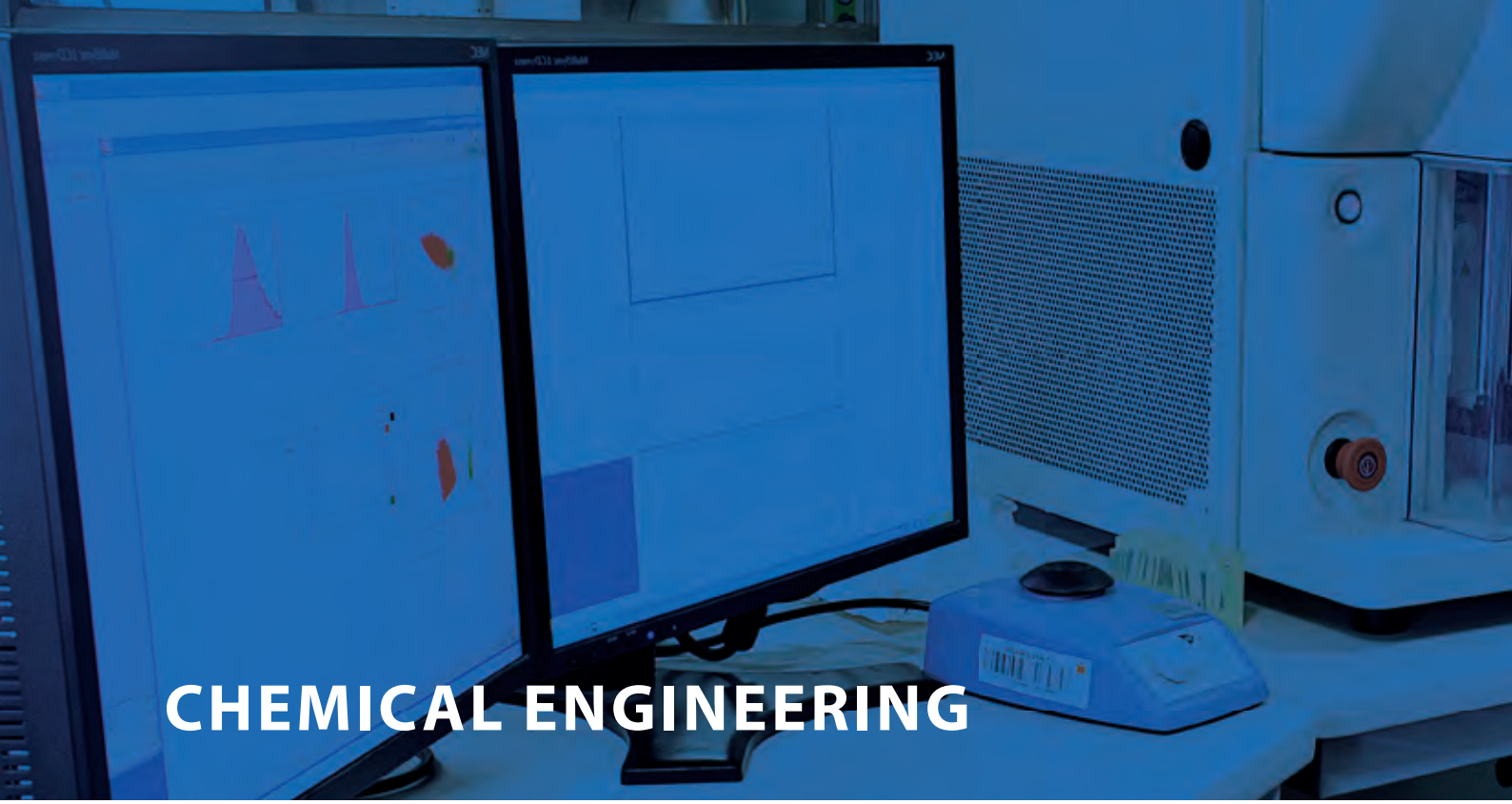
Mechanisms Regulating Alternative Splicing Networks, Dr. Ashish Misra, Department of Molecular, Cell and Cancer biology, University of Massachusetts Medical School, USA, 18 November 2015.

## Workshops / Symposiums Organised

One-day workshop on multiscale modeling of biomacromolecules with emphasis on nucleic acids, T. Rathinavelan, 19 March 2016.

## Awards & Recognitions

Early Career Research Award (ECRA), Science and Engineering Research Board, Department of Science and Technology, Government of India, *Rajakumara Eerappa.*



# CHEMICAL ENGINEERING

The Department of Chemical Engineering (ChE) at IITH is an international leader in several areas of teaching, research and outreach. Today the department has 17 faculty members, 38 Ph.D, 31 M.Tech, and 82 B.Tech students. The department's research focus falls into the following broad areas: Energy storage and conversion, Fluid Mechanics, Mineral Processing, Catalysis, Molecular & Cellular Bioengineering, Drug Delivery, Polymers, Nanosciences & Nanotechnology and Process / Stochastic Control. We have state-of-the-art infrastructure and research facilities that cover both theoretical and experimental aspects of all core research areas. The department has received numerous extramural projects, which include several inter-departmental ventures. Our undergraduate curriculum emphasizes heavily both on strong theoretical foundation as well as hands-on experience for solving real world problems. At the post-graduate level, emphasis is given to honing a student's research skills for practical applications.

# F A C U L T Y

**Kirti Chandra Sahu**
Ph.D - JNCASR, Bangalore
***Associate Professor & HoD***

*Research Areas*: Interfacial flow, bubbles and drops, linear stability analysis, lattice Boltzmann method, Numerical simulations of multiphase flows

**Chandra Shekhar Sharma**
Ph.D - IIT Kanpur
***Assistant Professor***

*Research Areas*: Nanostructured Carbon Materials, Electrospun Polymer and carbon Nanofibers, Bioinspired Functional Surfaces, Electrode Materials for Li ion battery and supercapacitors

**Vinod M. Janardhanan**
Ph.D - KIT, Germany
***Associate Professor***

*Research Areas*: Fuel cells, Heterogeneous catalysis

**Parag D. Pawar**
Ph.D - Johns Hopkins, USA
***Assistant Professor***

*Research Areas*: Biophysics, Polymicrobial Biofilms, Intercellular Interactions, Bacterial Infections

**Saptarshi Majumdar**
Ph.D - IIT Kharagpur
***Associate Professor***

*Research Areas*: Polymerization, Drug Delivery, Electrochemical Transport, Equilibrium & Non-equilibrium Thermodynamics, Process Modeling

**Debaprasad Shee**
Ph.D - IIT Kanpur
***Assistant Professor***

*Research Areas*: Metal and metal oxide catalysts, Biomass conversion, Multifunctional catalytic material

**Anand Mohan**
Ph.D - Texas A&M, USA
***Assistant Professor***

*Research Areas*: Complex Fluid Rheology, Cardiovascular Mechanics

**Phanindra Varma Jampana**
Ph.D - University of Alberta, Canada
***Assistant Professor***

*Research Areas*: Compressed Sensing, System Identification

**Sunil Kumar Maity**
Ph.D - IIT Kharagpur
***Associate Professor***

*Research Areas*: Heterogeneous catalysis, Bioenergy, Steam reforming and oxidative steam reforming, Hydrodeoxygenation of vegetable oils, Oligomerization of olefins, Thermodynamic analysis, Process design using Aspen Plus, Techno-economic analysis

**Kishalay Mitra**
Ph.D - IIT Bombay
***Assistant Professor***

*Research Areas*: Multi-objective optimization, Optimization under uncertainty, Surrogate optimization, Data based modeling, Evolutionary Computation, Optimal Control, Supply chain optimization, planning and scheduling, Computational biology

**Narasimha Mangadoddy**
Ph.D - University of Queensland - Australia
***Assistant Professor***

*Research Areas*: Mineral Processing, CFD, Multiphase Flows, Fluidization, Particulate Technology

**Lopamudra Giri**
Ph.D - University of Iowa, USA
***Assistant Professor***

*Research Areas*: Systems biology, Biochemical Engineering / biotechnology, Drug design, pharmacogenomics

# F A C U L T Y

**Meduri Praveen**
Ph.D - University of Louisville, USA

***Assistant Professor***

*Research Areas*: Energy Storage, Batteries, Nanomaterials, Energy Conversion, Photo electrochemical Water Splitting, Li-air batteries, Li-S batteries

**Devarai Santhosh Kumar**
Ph.D - IIT Madras

***Assistant Professor***

*Research Areas*: Bioprocess Technology, Bioreactors scale up, Enzyme Production, Upstream, Fermentation Technology, Downstream, Food and Nutrition, Solid State and Sub-Merged Fermentation

**Balaji Iyer Vaidyanathan Shantha**
Ph.D - IIT Bombay

***Assistant Professor***

*Research Areas*: : Biomimetic materials design, Polymer composites, Chromosome organization, Multiscale simulations

**Satyavrata Samavedi**
Ph.D - Virginia Polytechnic Institute and State University, USA

***Assistant Professor***

*Research Areas*: : Polymeric biomaterials/scaffolds, Tissue engineering, Stem cell differentiation, Drug delivery, In vitro disease models, Immunomodulation

**Arijit Sarkar**
Ph.D - IIT Bombay

***Assistant Professor***

*Research Areas*: Colloids and Interfacial Science, Polymer, Applied Mechanics

## Patents Filed

Sweta Lal, Melepurath Deepa, Vinod M. Janardhanan, Kirti Chandra Sahu, Direct paper based fuel cells for micro-nano systems, 3515/CHE/2015, filed: 9 July 2015.

Chandra S. Sharma, Shital Yadav, Illa Mani Pujitha, Tulika Rastogi, Cellulose Acetate based Non-woven Nano-fiber Matrix with High Absorbency Properties for Female Hygiene, PCT Application No. PCT/IB2015/001264, Filed: 27 July 2015

Chandra S. Sharma, Shital Yadav, Process of Fabrication of Natural Sub-micron Aligned Fibers with Controllable Geometry from a Citrus Peel Extract, PCT Application No. PCT/IB2015/0002220, Filed: 26 November 2015.

Kalagadda Venkateswara Rao, Solleti Goutham and Devarai Santhosh Kumar, Development of Low Temperature Gas Sensor by of Microbial Biofilms with Ferrites Nanomaterials, TEMP/E-1/13130/2016-CHE.

## Books / Chapters

Chandra S. Sharma, Ashutosh Sharma, Carbon based Hierarchical Micro- and Nano-Structures: From Synthesis to Applications, In Nanoscale and Microscale Phenomenon: Fundamentals and Applications, Joshi Y., Khandekar, S. (Eds.), Springer India, 2015, DOI 10.1007/978-81-322-2289-7.

Chandra S. Sharma, Manohar Kakunuri, Organic Xerogel based C-MEMS, In Carbon: The Next Silicon?, Marc Madou, Bidhan Pramanik, Victor Perez (Eds.), Momentum Press, USA, 2016.

D. Kruthi, J. Nimmy, M. Gowda and Devarai Santhosh Kumar, Solid State Fermentation vs Submerged Fermentation for the Production of L-Asparaginase, Advances in Food and Nutrition Research Elsevier Inc. 2016.

P. S. Haritha, K. Usha, G. Lakshmipriya and Devarai Santhosh Kumar, Marine Fungal and Bacterial Isolates for Lipase Production: A Comparative Study, Advances in Food and Nutrition Research Elsevier Inc. 2016.

Devarai Santhosh Kumar and Soba Kota,Chemical and Biological Aspects of Vertebrate and Invertebrate Collagens - An Emphasis on Marine Sponge Collagen, Springer Science Books, 2016.

## Publications

### (In Peer-Reviewed Journals)

Double-diffusive instability in core-annular pipe flow, K. C. Sahu, *Journal of Fluid Mechanics, 789*, 830-855 (2016).

Global linear instability of flow through a converging-diverging channel, M. R. Jotkar, G. Swaminathan, K. C. Sahu and R. Govindarajan, *Journal of Fluids Engineering - Transactions of the ASME,* 138 (3), 031301 (2016).

Instability due to double-diffusive phenomenon in pressure-driven displacement flow of one fluid by another in an axisymmetric pipe, K. D, Bhagat, M. K. Tripathi and K. C. Sahu, *European Journal of Mechanics - B/Fluids, 55*, 63-70 (2016).

Bubble motion in a converging-diverging channel, H. Konda, M. K. Tripathi and K. C. Sahu, *Journal of Fluids Engineering - Transactions of the ASME*, 138 (6), 064501 (2016).

Dynamics of an initially spherical bubble rising in quiescent liquid, M. K. Tripathi, K. C. Sahu and R. Govindarajan, *Nature Communications, 6,* 6268 (2015).

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Numerical simulation of pressure-driven displacement of a viscoplastic material by a Newtonian fluid using the lattice Boltzmann method, P. A. P. Swain, G. Karapetsas, O. K. Matar and K. C. Sahu, *European Journal of Mechanics - B/Fluids, 49*, 197-207 (2015).

A study of short term catalyst deactivation due to carbon deposition during biogas dry reforming on supported Ni catalyst, VivekPawar, Debjyoti Ray, Ch. Subrahmanyam, Vinod M. Janardhanan, *Energy and Fuels, 29*, 8047-8052 (2015).

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Prediction of solid recirculation rate and solid volume fraction in an internally circulating fluidized bed, Ravi Gujjula, Narasimha M., *International Journal of Computational Methods*, 1-24 (2015).

Candle soot derived fractal like carbon nanoparticles network as high rate lithium ion battery anode material, M. Kakunuri, C. S. Sharma, *Electrochimica Acta, 180*, 353 (2015).

In-vitro release study of hydrophobic drug using electrospun cross-linked gelatin nanofibers, A. Laha, S. Yadav, S. Majumdar, C. S. Sharma, *Biochemical Engineering Journal*, 105, 481 (2015).

Catalytic graphitization of resorcinol-formaldehyde xerogel and its effect on lithium ion intercalation, M. Kakunuri, S. Kali, C. S. Sharma, *Journal of Analytical and Applied Pyrolysis*, 117, 317 (2016).

A Comparative Study of Fuzzy Techniques to Handle Uncertainty: An Industrial Grinding Process, N. Virivinti and K. Mitra, *Chem. Engg. and Tech.*, 39, 1031-1039 (2016).

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Sodium Alginate and Gelatin Hydrogels: Viscosity Effect on Hydrophobic Drug Release, U. Bhutani, A. Laha, K. Mitra and S. Majumdar, *Mat. Let., 164,* 76-79 (2016).

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Fast and Slow Release: Synthesis of Gelatin Casted-Film based Drug Delivery System, A. Laha, U. Bhutani, K. Mitra and S. Majumdar, *Mat. Man. Proc., 31*, 223-230 (2016).

Intuitionistic Fuzzy Chance Constrained Programming for Handling Parametric Uncertainty: An Industrial Grinding Case Study, N. Virivinti and K. Mitra, *Ind. Engg. Chem. Res., 54*, 6291–6304 (2015).

Moringa Oleifera: A Review on Nutritive Importance and its Medicinal Application, G Lakshmipriya, D Kruthi and Devarai SK, *Food Science and Human Wellness., 5 (1)*, 49-56 (2016).

Pharmacological importance of integrin antagonists in the treatment of cancer, Sasidhar RE, Devarai S K and Rajeswari J, *J Cell SciTher., 6:1* (2015).

Tuning the Mechanical Properties of Polymer-Grafted Nanoparticle Networks through the Use of Biomimetic Catch Bonds, B. L. Mbanga, B. V. S. Iyer, V. V. Yashin, and A. C. Balazs, *Macromolecules, 49*, 1353-1361 (2016).

## Publications

### (In Peer-Reviewed Conferences)

Instabilities in viscosity and density stratified flow, R. Govindarajan, S. Jose and K. C. Sahu, IUTAM Symposium on Helicity, *structures and singularity in fluid and plasma dynamics*, Venice, Italy, 11-15 April 2016.

Multiscale modeling of biogas fueled SOFC, Vinod M. Janardhanan, *ECS Transactions, 68*, 3051-3058 (2015).

Two Way Coupled CFD-DEM Model to Predict Tumbling Mill Dynamics, Mayank Kumar, Narasimha M., Govender, I., *Proceedings of SAG conference edited by Bern Klein, Kelly McLeod, ReemRoufail and Fisher Wang, Paper 28*;1-17, 20-25 September Vancouver, 2015.

Dense slurry CFD model for hydrocyclone performance evaluation incorporating rheology, particle drag and lift forces, Teja Reddy Vakamalla, Narasimha M., *Proceedings of Eleventh International Conference on CFD in the Minerals and Process Industries* edited by C.B. Solnordal, P. Liovic, G.W. Delaney, S.J. Cummins, M.P. Schwarz and P.J. Witt, Paper 88:1-6, Melbourne, Australia, 7-9 December 2015.

Two-way coupled CFD-DEM model to predict tumbling mill dynamics, Mayank Kumar, Narasimha M., Govender, I., *Proceedings of Eleventh International Conference on CFD in the Minerals and Process Industries* by C.B. Solnordal, P. Liovic, G.W. Delaney, S.J. Cummins, M.P. Schwarz and P.J. Witt, Paper 77: 1-6, Melbourne, Australia, 7-9 December 2015.

Hydrodynamic study of two phase flow of column flotation using electrical resistance tomography and CFD techniques, Balraju Vadlakonda, Narasimha M., *Proceedings of Eleventh International Conference on CFD in the Minerals and Process Industries* by C.B. Solnordal, P. Liovic, G.W. Delaney, S.J. Cummins, M.P. Schwarz and P.J. Witt, Paper 92:1-6, Melbourne, Australia, 7-9 December 2015.

Simulating multi-component particles behaviour during the classification process in a hydrocyclone using multiphase CFD model, Mandakini Padhi, Teja Reddy Vakamalla, Narasimha M., *Proceedings of Eleventh International Conference on CFD in the Minerals and Process Industries* by C.B. Solnordal, P. Liovic, G.W. Delaney, S.J. Cummins, M.P. Schwarz and P.J. Witt, Paper 74:1-6, Melbourne, Australia, 7-9 December 2015.

CFD study on the effect of near gravity material on dmc treating coal using DPM and ASM multiphase model, Asha Kumari A, Narasimha M., Sreedhar, G. E., Shivakumar, R., Sharma S. K., *Proceedings of Eleventh International Conference on CFD in the Minerals and Process Industries* by C.B. Solnordal, P. Liovic, G.W. Delaney, S.J. Cummins, M.P. Schwarz and P.J. Witt, Paper 82:1-6, Melbourne, Australia, 7-9 December 2015.

Effect of Pyrolysis Temperature on Electrochemical Performance of SU-8 Photoresist Derived Carbon Films As Lithium Ion Battery Anode Material, M. Kakunuri, C. S. Sharma, *ECS Transactions, 66,* 41 (2015).

Effect of Disorder Induced by Ball Milling on the Electrochemical Performance of Catalytically Graphitized Carbon xerogel as Anode for Lithium Ion Batteries, K. M. Gopalakrishna, M. Kakunuri, C. S. Sharma, *ECS Transactions, 66*, 57 (2015).

Enabling Online Optimization and Control of Complex Models through Smart Surrogates based on ANNs, M. S. Soumitri, D. P. Pantula, S. Majumdar, K. Mitra, *IEEE Indian Control Conference, Hyderabad*, 4 – 6 January 2016, DOI: 10.1109/INDIANCC.2016.7441131.

Multi-objective Optimization of Energy Generation and Noise Propagation: A Hybrid Approach, P. Mittal, K. Kulkarni, K. Mitra, *IEEE Indian Control Conference, Hyderabad*, 4 – 6 January 2016, DOI: 10.1109/INDIANCC.2016.7441181.

Intuitionistic Fuzzy Expected Value Model for Industrial Grinding Process, N. Virivinti, K. Mitra, *IEEE Indian Control Conference, Hyderabad*, 4 – 6 January 2016, DOI: 10.1109/INDIANCC.2016.7441161.

Optimization of Low-Dose Tomography via Binary Sensing Matrices, P. Theeda, Praveen Kumar P.U., S. Sastry C and P. V. Jampana, *Proceedings of IWCIA* 2015.

On the existence of equivalence class of RIP-compliant matrices, Sampling Theory and Applications, Sasmal, P.; Sastry, C.S.; Jampana, P.V., *Sampling Theory and Applications (SampTA) 2015*.

A Distributed Parameter Model for a Solid Oxide Fuel Cell: Simulating Realistic Operating Conditions, M. D. Singh, V. G. Polisetty, P.V. Jampana, V.M. Janardhanan, *ADCHEM 2015*.

## Funded Research Projects 2015-16

Vinod M. Janardhanan, *Development of chemical kinetics model and integrated pulverized coal fired furnace performance software BHEL*, 9 November 2015, Rs. 15.70 Lakhs.

Chandra Shekhar Sharma, *Electrospun Polymer and Carbon Nanofibers for Energy, Environmental and Healthcare Applications*, DST, September 2015, Rs. 35.00 Lakhs.

Phanindra Varma Jampana, *Design of SAR Image Pre-Processing Techniques for Improving Probabilty of Correlation*, DRDL, 23 September 2015, Rs. 10.00 Lakhs.

Debaprasad Shee, *De-polymerization: Catalysis for Targeted Performance*, DST-TSDP, 13 May 2015, Rs. 62.81 Lakhs.

Kishalay Mitra, *Direct Recycling of Polystyrene based Waste Objects using Orange Peel EXTRACT for Oil Spills Remediation*, DST, March 2016, Rs. 44.00 Lakhs.

## Seminars Organised

Engineering in medicine: Rational optimization of hepatitis C treatment, Narendra M. Dixit and Department of Chemical Engineering and Centre for Biosystems Science and Engineering, Indian Institute of Science, Bangalore, February 2016.

Integrating Stochastic Model Predictive Control and Experiment Design for Nonlinear Systems, Dr Vinay Anil Bavdekar, Postdoctoral fellow, Department of Chemical and Biomolecular Engineering, University of California, Berkeley, CA, USA, March 2016

## Talks Given In International / National Conferences

*Some interesting phenomena in bubbles and drops, International Symposium on Computational Multiphase Flow*, Ritsumeikan University, Japan, 14 January 2015.

*Lattice Boltzmann simulation of pressure-driven displacement flow of immiscible liquids*, Ritsumeikan University, Japan, 15 January 2015.

*Three-dimensional simulations of a rising bubble in a self-rewetting fluid,* 68th Annual Meeting of the APS Division of Fluid Dynamics, Boston, Massachusetts, 22–24 November 2015.

*Linear stability analysis and direct numerical simulation of two layer channel flow,* 68th Annual Meeting of the APS Division of Fluid Dynamics, Boston, Massachusetts,22–24 November 2015.

*Dynamics of rising bubble inside a viscosity-stratified medium,* 68th Annual Meeting of the APS Division of Fluid Dynamics, Boston, Massachusetts, 22–24 November 2015.

*Non-isothermal spreading dynamics of self-rewetting droplets*, 68th Annual Meeting of the APS Division of Fluid Dynamics, Boston, Massachusetts, 22–24 November 2015.

Dynamics of surfactant-laden evaporating droplets, 68th Annual Meeting of the APS Division of Fluid Dynamics, Boston, Massachusetts, 22–24 November 2015.

*CFD Simulations as an alternate diagnostic tool for blocked arteries*, Chemeference (Poster Session), Hyderabad INDIA, December 2015.

*Hydrodeoxygenation of vegetable oil for Production of Green Diesel*, International Conference on Recent Trends in Energy Technologies, Department of Chemical Engineering, Haldia Institute of Technology, WB, India, 21-23 January 2016.

Kumar Mayank, Narasimha Mangadoddy, *Predicting power draw and energy spectra of a tumbling mill using two way coupled DEM-CFD model*, Mineral Processing Technology (MPT). Pune, 5-7 January 2016.

Balraju Vadlakonda, Narasimha Mangadoddy, *Investigation of column flotation hydrodynamics using ERT coupled with pressure transducers*, Mineral Processing Technology (MPT). Pune, 5-7 January 2016.

Virat Bansal, Virendra Prakash, Bhanu Venkatesh, Narasimha Mangadoddy, Aubrey Mainza, Srinivas, D., *Using the population balance model platform to build a simple comminution and classification circuit simulator: Compare prediction outputs to established mineral processing simulators,* Mineral Processing Technology (MPT). Pune, 5-7 January 2016.

Mandakini Padhi, Narasimha Mangadoddy, *Experimental and computational investigation of multi-component particle behaviour on hydrocyclone classification performance*, Mineral Processing Technology (MPT). Pune, 5-7 January 2016.

Asha Kumari A. V., Narasimha Mangadoddy, Sreedhar, G. E., Shiva Kumar, R, *CFD study on effect of NGM coal particles on DMC performance*, Mineral Processing Technology (MPT). Pune, 5-7 January 2016.

Mayank, K., Raja Banerjee, Narasimha Mangadoddy, *Development of GPU-CFD solver for swirling flows inside the industrial cyclones*, Mineral Processing Technology (MPT). Pune, 5-7 January 2016.

Teja Reddy Vakamalla, Narasimha Mangadoddy, *Measurement of air-core size and solids concentration distribution inside an operating hydrocyclone*, Mineral Processing Technology (MPT). Pune, 5-7 January 2016.

Tushar Pol, Narasimha Mangadoddy, *Flow investigation of two phase flow of column flotation using PIV and image processing techniques*, Mineral Processing Technology (MPT). Pune, 5-7 January 2016.

Bhanu Venkatesh, K., Dwarapudi, S., Abhishek Choudhary, Narasimha Mangadoddy, Veerendra Prakash, *Crash stop analysis of an industrial dry grinding ball mill: Performance evaluation and modelling*, Mineral Processing Technology (MPT). Pune, 5-7 January 2016.

Mayank, K., Govender, I., Narasimha, M., *Developing DEM-CFD two-way coupled model for charge motion in tumbling mill: Validation against PEPT*, International Communition and Classification Congress (ICCC). San Luis Potosi, Mexico, 11-15 August 2015.

Mandakini Padhi, Narasimha, M., Jeason Crasta, Mainza, A.N., Sreenivas, T., *Multicomponent particle classification in a hydrocyclone*, International Communition and Classification Congress (ICCC). San Luis Potosi, Mexico, 11-15 August 2015.

Teja Reddy Vakamalla, Narasimha Mangadoddy, *What happens when hydrocyclone operates at inclined positions? Detail flow field and performance analysis by CFD and Experiments*, International Communition and Classification Congress (ICCC). San Luis Potosi, Mexico, 11-15 August 2015.

Teja Reddy Vakamalla, Narasimha Mangadoddy, *Exploration of hydrocylone designs for improved ultra-fines classification using multiphase CFD model*, International Communition and Classification Congress (ICCC). San Luis Potosi, Mexico, 11-15 August 2015.

M. Kakunuri, Chandra S. Sharma, *Effect of Pyrolysis Temperature on Electrochemical Performance of SU-8 Photoresist Derived Carbon Films As Lithium Ion Battery Anode Material*, 227th ECS Meeting, Chicago, IL (USA), 24-28 May, 2015.

Karthik MG, M. Kakunuri and Chandra S. Sharma, *Effect of Disorder Induced By Ball Milling on the Electrochemical Performance of Catalytically Graphitized Carbon Xerogel As Anode for Lithium Ion Batteries*, 227th ECS Meeting, Chicago, IL (USA), 24-28 May 2015.

Tata N. Rao, Anulekha K. Haridas, Chandra S. Sharma, *Nano-grained Pure and $SnO_2$ Mixed $Li_4Ti_5O_{12}$ Structures as High Performance Anodes for Lithium-ion Batteries*, Advanced Automotive and Industrial / Stationary Battery Conference, Detroit, US, June 15-19, 2015.

Manohar Kakunuri, Chandra S. Sharma, *International Conference on Materials for advanced Technologies (ICMAT) 2015*, 28 June – 3 July 2015.

Chandra S. Sharma, Manohar Kakunuri, Ayush Saini and Shubham Kaushik, *Photoresist Derived Electrospun Carbon Nanofibers as High Capacity Anodes for Lithium Ion Battery, National Conference on Carbon Materials (NCCM)-2015*, Organized by Indian Carbon Society, New Delhi, 24-26 November 2015.

Chandra S. Sharma, Saptarshi Majumdar, Anindita Laha, *Electrospun Nanofibers as Drug Delivery Systems*, 3rd Soft Matter Young Investigator's Meeting at Pondicherry, 17-20 December 2015.

*Antibiotic Tolerance of Bacterial Biofilms: An Individual-Based Cellular Automata Model. International Conference on Mathematical Methods and Models in Biosciences*, Blagoevgrad, Belgium, 19-25 June 2016.

*Optimization with computationally expensive models,* 3rd Indo-German Workshop on The Advances in Materials, Reaction, and Separation Processes, IIT Guwahati, 24-25 February 2016.

*Multi-scale materials as electrodes for Li-ion batteries*, Conference on Energy and Environment, Osaka University, Osaka, March 2016.

## Workshops / Symposiums Organised

Sixth National Level Chemical Engineering Research Scholar's Symposium, ChEmference 2015, 5-6 December.

TEQIP Workshop on MEMS and NEMS (Design and Fabrication), 14-18 December 2015.

TEQIP Workshop on X-Ray Scattering Techniques (SAXS and WAXS), 28-29 December 2015.

Local Arrangements Chair, Indian Control Conference 2016, An IEEE conference organized by IIT Hyderabad and Mahindra Ecole Centrale, Hyderabad, 4–6 June 2016.

## Awards / Recognitions

Excellence in Teaching award from IIT Hyderabad for 2015 academic year, *Narasimha Mangadoddy*.

KHARE award for best paper "Predicting power draw and energy spectra of a tumbling mill using two way coupled DEM-CFD model" in the IIME International seminar on Mineral Processing Technology-2016 held at Pune during 7-9 January, 2016, *Narasimha Mangadoddy.*

*Prof U.B. Desai, Director IITH, inaugurating the ChEmference*


*Participants of ChEmference*


# CHEMISTRY

The Department of Chemistry (CY) is actively conducting research in cutting-edge areas of Organic, Inorganic and Physical Chemistry, as well as fulfilling the needs of the undergraduate program (BTech and MSc) of IIT Hyderabad. The Department of Chemistry currently has 10 faculty members. At present, there are 50+ research scholars in the department, pursuing Ph.D, and thirty four students who are enrolled in the two year M.Sc program; they are mentored by nine faculty members. Many of our M.Sc students are currently pursuing Ph.D at universities in, USA, Japan and Europe. The department also has several sponsored projects in diverse areas of Chemistry.

The department, has state of the art research facilities that include, 400 MHz NMR, ESR, BET analyser, HRMS, Single Crystal- and Powder- XRD, CD, Fluorescence/lifetime and Raman spectrometers, Atomic force microscopy (with conductive, electrostatic force, magnetic force, surface potential, nanolithography modes), Gas Chromatography-Mass Spectrometer, HPLC, Glove boxes, and many such sophisticated set-ups. The department is also equipped with necessary infrastructure, for carrying out wet chemical syntheses or related experimentation, at both undergraduate and postgraduate level. Our aim is to produce highly sought after and knowledgeable graduates for pursuing careers with academia, industry and government.

# F A C U L T Y

**Melepurath Deepa**
Ph.D - Delhi University
***Associate Professor & HoD***
*Research Areas*: Applied Electrochemistry

**Ch. Subrahmanyam**
Ph.D - IIT Madras
***Associate Professor***
*Research Areas*: Catalysis, Nanomaterials and Energy Systems

**Faiz Ahmed Khan**
Ph.D - University of Hyderabad
***Professor***
*Research Areas*: Transition Metal-mediated reactions in organic synthesis, Discovery of New Methodologies and Control of Stereochemistry in organic synthesis, Chemical Synthesis in Ionic Liquids, and Supported Catalysts, Synthesis of Natural and aesthetically pleasing.

**Gedu Satyanarayana**
Ph.D - IISc, Bangalore
***Associate Professor***
*Research Areas*: The development of transition-metal mediated novel C-H activations, domino or sequential one-pot transformations, for the construction C-C or C-heteroatom bonds. Brønsted or Lewis acid triggered domino or sequential domino one-pot methods, for the synthesis of biologically important compounds.

**G. Prabusankar Ganesan**
Ph.D - IIT Bombay
***Associate Professor***
*Research Areas*: Organometallic Chemistry, Late transition metal and main group metal chemistry, Homogeneous catalysis, Molecules to materials, and metal based drugs

**Bhabani Shankar Mallik**
Ph.D - IIT Kanpur
***Assistant Professor***
*Research Areas*: Computational and Theoretical Chemistry

**Tarun K. Panda**
Ph.D - Free University - Berlin, Germany
***Associate Professor***
*Research Areas*: Main group chemistry, Coordination chemistry, Lanthanide chemistry, Homogeneous catalysis, X-ray Crystallography and structure analysis

**Surendra Kumar Martha**
Ph.D - IISc, Bangalore
***Assistant Professor***
*Research Areass*: Materials Electrochemistry, Lead-acid, Lithium ion, Sodium ion Batteries and ultracapacitors

**D. S. Sharada**
Ph.D - University of Hyderabad
***Assistant Professor***
*Research Areas*: C-H Activation, Cross Dehyrogenative Couplings (CDC) Metal-Free Atom Incorporations, Bio-inspired Organic Synthesis, Benign Organic Synthesis, Heterocyclic Chemistry and Medicinal Chemistry

**Somnath Maji**
Ph.D - IIT Bombay
***Assistant Professor***
*Research Areas*: Synthetic Coordination /Bio-Inorganic / Organometallic Chemistry. Metal catalyzed Water Splitting / Carbon Dioxide Reduction/Hydrogen Generation

## Book Chapters

S. Ahmad, F. A. Khan, Marine Brominated Alkaloids: Isolation, Biosynthesis, Biological Activity and Synthesis. In Alkaloids: Biosynthesis, Biological Roles and Health Benefits, Eduardo Sobarzo-Sanchez, Eds., Nova Science Publishers: New York, 77–106 (2015).

## Publications

### (In Peer-Reviewed Journals)

Lead selenide quantum dots and carbon dots amplify solar conversion capability of a $TiO_2$ / CdS photoanode, K. Kokal, P.N. Kumar, M. Deepa, A.K. Srivastava, *J. Mater. Chem. A, 3*, 20715-20726 (2015).

Low cost copper nanostructures impart high efficiencies to quantum dot solar cells, P.N. Kumar, M. Deepa, P. Ghosal, *ACS Applied Materials & Interfaces 7*, 13303-13313 (2015).

Enhanced Li-ion Storage Capability of a Bismuth Sulfide / Graphene Oxide / Poly (3,4-ethylenedioxythiophene) Composite, R. Mukkabla, M. Deepa, A.K. Srivastava, *ChemPhysChem, 16*, 3243-3253 (2015).

Combining energy conversion and storage: A solar powered supercapacitor, R. Narayanan, P.N. Kumar, M. Deepa, A.K. Srivastava, *Electrochimica Acta 178,* 113-126 (2015).

Dual purpose poly(3,4-ethylenedioxypyrrole) / vanadium pentoxide nanobelt hybrids in photoelectrochromic cells and supercapacitors, B. Narsimha Reddy, M. Radha, M. Deepa, P. Ghosal, *RSC Advances 5,* 31422-31433 (2015).

Diastereoselective synthesis of tetrahydrofuran unit of (±)-6″-epi-varitriol from 5-oxabicyclo[2.1.1] hexane derivative, Surendra H. Mahadevegowda and F. A. Khan, *Indian J. Chem. B, 54B*, 958-964 (2015).

Aromaticity driven 1,6-conjugate addition of amines and phenols to cyclohexadienone derivative, R. Babu and F. A. Khan, *Tetrahedron, 72*, 699-705 (2016).

Superoxide mediated isomerization of 4-aryl-but-1-ynes to 1-aryl-1,3-butadienes, F. A. Khan and B. M. Budanur, *Tetrahedron, 71,* 7600-7607 (2015).

Effect of bridgehead substitution in the Grob fragmentation of norbornyl ketones: a new route to substituted halophenols, S. Choudhury, S. Ahmad and F. A. Khan, *Org. Biomol. Chem.,13,* 9686-9696 (2015).

Triethylamine-Mesyl Chloride/Thionyl Chloride: A Reagent for Hydrodebromination of Diquinane-Based α-Bromo-γ-Lactones, C. N. Rao and F. A. Khan, Synthesis, 47, 3027-3035 (2015).

Photoluminescent Calcium azolium carboxylates with diversified calcium coordination geometry and thermal stability, P. Suresh, Ch. Naga Babu, N. Sampath and G. Prabusankar, *Dalton Trans., 44*, 7338-7346 (2015).

A Rare Binuclear Macrocyclic Planar 20, 26 and 34 Membered Zinc-Organic Rings, P. Suresh and G. Prabusankar, *Polyhedron, 93*, 84-90 (2015).

Synthesis, characterization and applications of vinyl functionalized N-heterocyclic carbene supported ruthenium(II) derivatives, P. Suresh, V. Munisamy and G. Prabusankar, *J. Chem., 54A*, 588-595 (2015).

Crystal Structure and Solid-State Properties of Discrete Hexa Cationic Trinuclear Zinc Triazole Cluster, Ch. Naga Babu, P. Suresh, A. Sathyanarayana, P. Das and G. Prabusankar, *J. Chem. Sci., 127(8)*, 1369-1373 (2015).

Linear Cu(I) chalcogenones: Synthesis and application in borylation of unsymmetrical alkynes,

K. Srinivas, Ch. Naga Babu and G. Prabusankar, *Dalton Trans., 44,* 15636-15644 (2015).

Rhenium(I)-based Double-heterostranded Helicates, P. Saxenaa, B. Shankar, A. Sathyanarayana, G. Prabusankar and M. Sathiyendiran, *CHIMIA 69(11)*, 675-677 (2015).

Imidazolium tagged acridines: Synthesis, characterization and applications in DNA binding and anti-microbial activities, G. Raju, S. Vishwanath, A. Prasad, B. K Patel and G. Prabusankar, *J. Mole. Struct., 1107*, 291-299 (2016).

Catalytically Active Lead(II)-Azolium Coordination Assemblies with Diversified Lead(II) Coordination Geometries, Ch. Naga Babu, P. Suresh, K. Srinivas, A. Sathyanarayana, N. Sampath and G. Prabusankar, *Dalton Trans., 45,* 8164-8173 (2016).

Bismuth(III)dichalcogenones as Highly Active Catalysts in Multiple C–C Bond Formation Reactions, K. Srinivas, A. Sathyanarayana, Ch. Naga Babu and G. Prabusankar, *Dalton Trans., 45,* 5196-5209 (2016).

Facile Access to Zinc and Cadmium Selones: Highly Active Catalysts for Barbier Reactions in Aqueous Media, Ch. Naga Babu, K. Srinivas and G. Prabusankar, *Dalton Trans., 45,* 6456-6465 (2016).

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$BF_3$•$OEt_2$ mediated metal-free one-pot sequential multiple annulation cascade (SMAC) synthesis of complex and diverse tetrahydroisoquinoline fused hybrid molecules, A. H. Shinde, S. Vidyacharan and D. S. Sharada, *Org. Biomol. Chem., 14,* 3207-3211 (2016).

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One-pot C–C/C–O bond formation: synthesis of spirocyclic lactones, Pedireddi Niharika and Gedu Satyanarayana, *RSC Adv. 6*, 837–843 (2016).

## Funded Research Projects 2015-16

Surendra Kumar Martha, *Feasibility Study for the Development & Realisation of Pouch/Prismatic Sodium Ion Cells for defence applications*, DRDO-CARS, January 2016, Rs. 78.0 Lakhs.

Surendra Kumar Martha, *Development and Demonstration of High Energy Density Valve-Regulated Lead Acid (VRLA) Batteries for Remote Area Power Supply (RAPS) and Electric Vehicles (EVs)*, CERI-DST, May 2016, Rs. 57.59 Lakhs.

Somnath Maji, *Design and Synthesis of Molecular Catalysts for Chemical, Electrochemical and Photochemical Water Oxidation, Carbon dioxide Reduction and Proton Reduction and Applications of Molecular Catalysts in Functional Devices for Solar Fuels Production*, SERB-DST, 31 May 2016, Rs. 38.0 Lakhs.

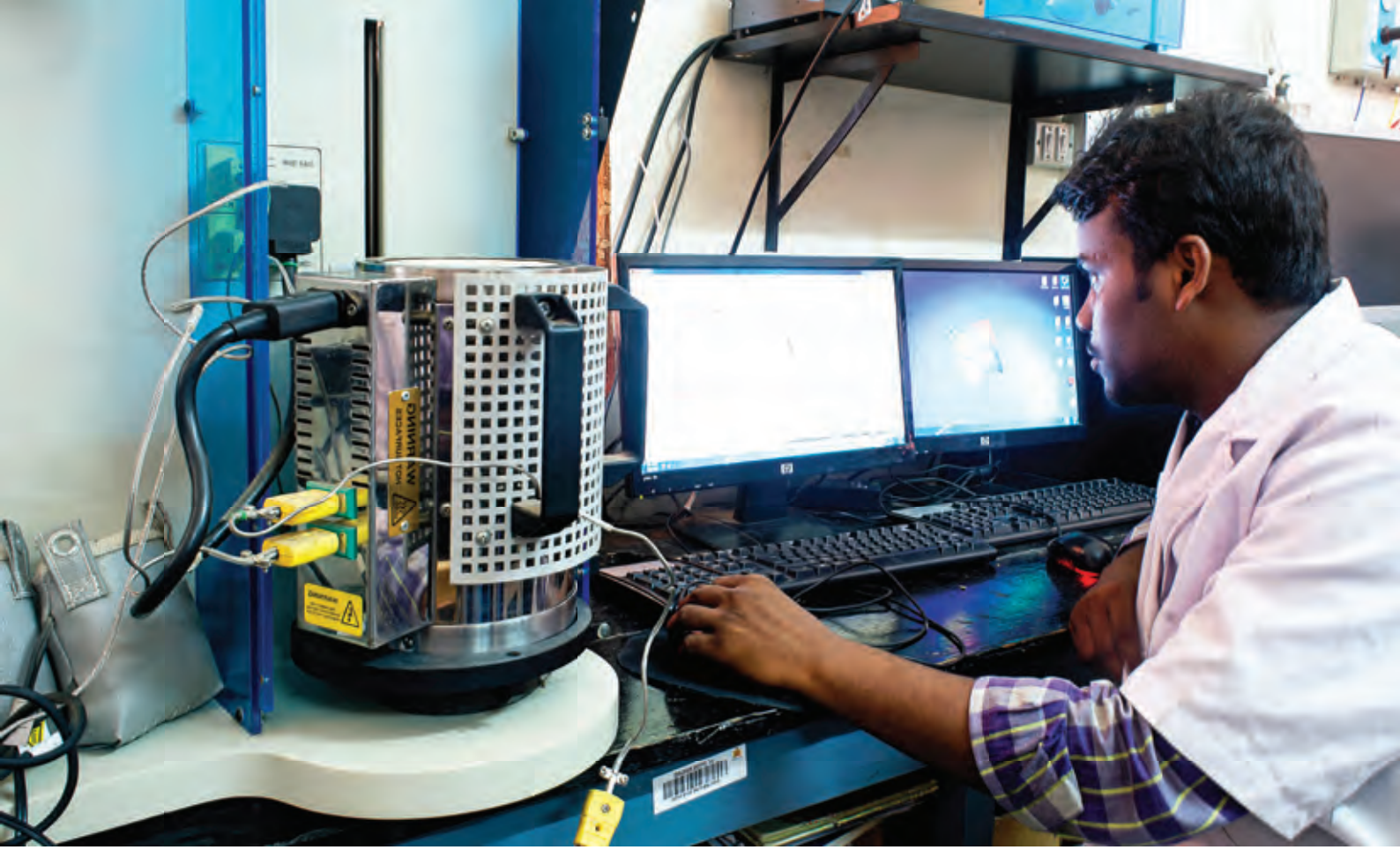
G. Satyanarayana, *Transition Metal Mediated Intermolecular C-C and Intramolecular C-N Bonds Formation: Concise Synthesis of Tetrahydroquinolines*, CSIR, 1 June 2016, Rs. 24 Lakhs.

## Talks Given In International / National Conferences

M. Deepa, P. N. Kumar, R. K. Kokal, P. Ghosal, A. K. Srivastava, *Plasmonic and Carbon Nanostructures Enhance Light Harvesting Ability of Quantum Dot Solar Cells*, 2nd workshop on Environment & Energy, Osaka University, Japan, 10-11 March.

Delivered Prof. C.N.R. Rao National Prize in Chemical Sciences Lecture in the 18th National Symposium in Chemistry (NSC-18), 4-7 February 2016.

G. Prabusankar, *Catalytically Active Lead(II)-Azolium Coordination Assemblies Through Post-Activation*



*Route, International Symposium on Functional and Applications of Soft/Hard Materials*, Ritsumeikan University, Kusatsu, JAPAN, 21 -24 January 2016.

Tarun K. Panda, *Amidophosphines and their Chalcogen Derivatives as Ligands in the Alkali and Alkaline-Earth Metal Coordination Sphere*, Department of Chemistry, Tokyo Institute of Technology, Japan 19 June 2015.

Tarun K. Panda, *Imidazolin-2-iminato Complexes of Group 2 and 4 Metals*, Department of Chemistry, Kyoto University, Japan 24 June 2015.

Tarun K. Panda, *Imidazolin-2-iminato Complexes of Group 2 and 4 Metals*, Department of Chemistry, University of Tokyo, Japan, 29 June 2015.

*Metal Free, Binder Free Electrode Architectures for Advanced Lithium-Ion Batteries*, 56th International Battery Symposium of Japan, Meieki, Nakamura-ku, Nagoya, Aichi Prefecture 450-0002, 11-13 November 2015.

*LMR-NMC as an Advanced Cathode Material for High Energy Density Lithium Ion Batteries*, Japan-Taiwan Bilateral workshop on Nano Science 2015, Osaka University, Suita Campus, 14-16 November 2015.

*Lithium-ion Batteries: Fundamentals and applications, Department of Applied Chemistry*, Graduate School of Engineering, Suita Campus, Osaka University, 16 November 2016.

*Lithium Manganese rich based NMC oxide cathodes for advanced lithium ion batteries*, Indo-US science and technology forum, Recent advances in multiscale, multiphysics, analysis of energy conversion in lithium ion batteries, VMCC auditorium, IIT Bombay, 17-19 June 2016.

## Awards & Recognitions

Prof. C.N.R. Rao National Prize in Chemical Sciences (2015), *Faiz Ahmed Khan*

Dalton Transactions poster prize in Frontiers in Inorganic and Organometallics Organized by IIT Indore, 14-15 April 2016, *Prabu Sankar Ganesan*.

The Best Poster Award in CRSI Emerging Trends in Chemistry, CRSI-MKU, 18-20 February 2016, *Prabu Sankar Ganesan*.

The Best Poster Award in 10th Mid-year CRSI Symposium in Chemistry (CRSI Mid-2015), NIT Trichy, 23-25 July 2015, *Prabu Sankar Ganesan*.

DST-DAAD PPP, visiting faculty at Ruhr University of Bochum, Germany, May 2016, *Prabu Sankar Ganesan*.

## Other Events

6 days TEQIP workshop on Electrochemical Energy Conversion and Storage (ECS-2016), IIT Hyderabad, Surendra K Martha, Ch. Subrahmanyam, M. Deepa, 9-14 May 2016.


# CIVIL ENGINEERING

Our vision is to be the frontrunners in addressing the current and future needs of society in "all things Civil". That is, in developing and constructing advanced and robust structures, laid on better foundations, in satisfying the water needs of the country, and help develop a cleaner and healthier environment free from chemical and biological pollutants. The department will focus on both applied and basic research, provide solutions for immediate use, and generate new science that will help drive the future evolution of Civil Engineering (CE). Industry interaction and academic exchanges will become an integral characteristic of our department.

The Department of Civil Engineering currently has 16 faculty members. The department offers a Bachelor of Technology (B.Tech) program in Civil Engineering, and two year and three year Master of Technology (M.Tech) programs in three specializations: Structural Engineering, Geotechnical Engineering, and Environmental and Water Resource Engineering. The three year program is 'thesis-by-research" and allows students to gain in-depth research exposure. The department also offers a Doctor of Philosophy (Ph.D) program in four specializations: Structural Engineering; Geotechnical Engineering; Water Resources Engineering;
and Environmental Engineering.

The department is developing state-of-the-art laboratory facilities in each specialization. Key advanced equipment have already been procured and labs will be used both for research and undergraduate teaching. Current facilities include laboratories in Construction Materials, Structural Engineering. Advanced Cement-based Materials, High Performance Concrete, Structural Materials, Large Scale Structures, Computational Structural Mechanics, Advanced Geotechnical Testing, Geosynthetics, Advanced Soil Dynamics, Ground Characterization, Computational Geotechnical, Water Quality Analysis, Water and Waste Water, Solid waste, Hazardous waste, Trace Contaminants, Microbiology, Air Quality Monitoring, Hydraulic Engineering, Hydrology, Geographic Information Systems (GIS).
In addition, the faculty of Civil Engineering are actively involved in multidisciplinary research and training in the area of sustainable development under "Center of Excellence in Sustainable Development" funded by MHRD. With our current and evolving faculty strength, motivated community, and exceptional laboratory facilities, we have all the necessary ingredients in realizing our vision and are confident about it.

# F A C U L T Y

**B. Umashankar**
Ph.D - Purdue University, USA

***Associate Professor & HoD***

*Research Areas*: Foundation Engineering, Reinforced Soil, Soil-Structure Interaction, Recyclable Materials in Geotechnics

**S. Suriya Prakash**
Ph.D - Missori University of Science & Technology - Rolla, USA

***Associate Professor***

*Research Areas*: Reinforced Concrete, Prestressed Concrete, Precast Systems, FRP Composites

**Kolluru V.L. Subramaniam**
Ph.D - Northwestern University, USA

***Professor***

*Research Areas*: Concrete Material, Concrete Structures

**Mahendrakumar Madhavan**
Ph.D - University of Alabama - Birmingham, USA

***Associate Professor***

*Research Areas*: Steel Structures, Steel-Concrete composites, Cold formed Steel, Retrofitting of steel structures

**Sireesh Saride**
Ph.D - IISc Bangalore

***Associate Professor***

*Research Areas*: Pavement Geotechnics, Ground Improvement, Numerical Modeling, Sustainable Design of Soil Structures

**Debraj Bhattacharyya**
Ph.D - University of New Brunswick, Canada

***Assistant Professor***

*Research Areas*: Water and Wastewater treatment, waste management, biofuel production from lignocellulosic biomass

**Amirtham Rajagopal**
Ph.D - IIT Madras

***Associate Professor***

*Research Areas*: Finite Element and Mesh less methods, Fracture and Damage Mechanics, Mechanics of composites

**Basudev Biswal**
Ph.D - University of Padova, Italy

***Assistant Professor***

*Research Areas*: Water Resources Engineering / Hydrology

**K.B.V.N. Phanindra**
Ph.D - New Mexico State University, USA

***Assistant Professor***

*Research Areas*: Groundwater Flow and Transport Modeling; Hydrogeology; GIS in Groundwater

**Asif Qureshi**
Ph.D - Swiss Federal Institute of Technology, Switzerland

***Assistant Professor***

*Research Areas*: Environmental science and health, POPs, heavy metals

**T. Shashidhar**
Ph.D - IIT Madras

***Associate Professor***

*Research Areas*: Bioremediation, Contaminant Transport Modeling, Environmental Hydraulics, Hydrology, Hydro-climatology, Remote Sensing and GIS applications, Waste water treatment, Solid and Hazardous waste management

**B. Munwar Basha**
Ph.D - IISc Bangalore

***Assistant Professor***

*Research Areas*: Computational Geomechanics, Reliability Based Designs in Geotechnical & Geoenvironmental Engineering, Municipal Solid Waste Landfills, Soil Dynamics and Earthquake Resistant Design of Retaining Structures and Rock Mechanics

# F A C U L T Y

**Riddhi Singh**
Ph.D - The Pennsylvania State University, USA

***Assistant Professor***

*Research Areas*: Rainfall runoff modelling; Uncertainty analysis; Prediction in ungauged basins; Climate and land use change impact on water resources; Multi-objective optimization; Decision making under uncertainty

**Anil Agarwal**
Ph.D - Purdue University, USA

***Assistant Professor***

*Research Areas*: Structural Engineering, Structural Fire Behavior and Design, Structural Steel Design, Steel-Concrete Composite Structures, Composite Structures, Extreme Loading Conditions, Analysis and design for Wind Loads, Structural Dynamics, Earthquake Engineering, Soil-Structure Interaction

**Surendra Nadh Somala**
Ph.D - California Institute of Technology, USA

***Assistant Professor***

*Research Areas*: Engineering Seismology, Inversion and Imaging of Seismic Source & Structure, Probabilistic Seismic & Tsunami Hazard Assessment, Computational Fracture Mechanics, Reservoir Induced Microseismicity, Structural Health Monitoring, Earthquake Resistant Design of Structures, Performance Based Seismic Design

## VISITING FACULTY

**M R Madhav**
D.Sc., FNAE

*Positions Held*: Professor in Dept. of Civil Engineering IIT Kanpur; ISSMGE Past Vice-President for Asia

**Ananthnarayanan K**

Professor, Department of Civil Engineering, IIT Madras

*Teaching Subject*: Construction Management

**Chandrasekharam D**

Chair Professor, Department of Earth Sciences, IIT Bombay

*Teaching Subject*: Geology and Geothermics

## Patents Filed

B. Umashankar, and C. Hari Prasad, An Apparatus for Measuring Transverse Pullout Resistance of a Reinforcing Element and Method Thereof, submitted to the Indian Patent Office, Application Number 2927/CHE/2015.

V. V. Rangarao, K.V.L. Subramaniam, S. Suriya Prakash, Lateral Reinforcement System and Method for Concrete Structures, Patent Number: 3001/ CHE/2015 dated 16 June 2015.

## Cep Courses Conducted

Phanindra, GIAN Course on Groundwater Flow and Transport Modeling through Fractured Geologic Media, Prof. Walter A Illman, University of Waterloo, Canada, 27 June – 08 July 2016.

GIAN course on Hydrological Modeling with SWAT, Shashidhar, December, 2015.

GIAN/TEQIP Workshop on Structural Upgrade and Strengthening of Civil Infrastructure using FRP Composites, Suriya Prakash, 18-29 July 2016.

A Mini Symposium on Wastewater Treatment & Reclamation, D Bhattacharyya, February 20, 2016.

## Books / Chapters

K. Rajagopal, Sireesh Saride, Gnanendran, CT. Special Issue on Transportation Geotechnics, Indian Geotechnical Journal, 45 (4) (2015).

Filippo Praticò, Sireesh Saride and Anand J. Puppala, Chapter 3: Selection Indicators for Stabilization of Pavement Systems, Book on Life Cycle Costing, 2nd Edition, Editor: John Bull, Whittles Publishing, Scotland, 66-90 (2015).

K. B. V. N. Phanindra, Groundwater Management using GIS Tools, M. Thangarajan, and Vijay P. Singh (Eds.), Groundwater Assessment, Modeling and Management, CRC Press, ISBN # 9781498742849 (2016).

Sangamshrestha, Vishnu P Pandey, Binaya R Shivakoti, and Shashidhar Thatikonda, Groundwater Environment in Asian Cities, Case Studies, Concepts, and Methods, ISBN 9780128031667, Butterworth-Heinemann, An Imprint of Elsevier, 542 (2015).

G. L. Sivakumar Babu, Sireesh Saride, Basha, B. Munwar Basha, Sustainability Issues in Civil Engineering, Springer Transactions in Civil and Environmental Engineering, Springer Singapore(2016).

## Publications
### (In Peer-Reviewed Journals)

Compaction Quality Control of Pavement Layers Using LWD, B. Umashankar, C. Hariprasad, and G. Kumar, *J. Mater. Civ. Eng., ASCE*, 28 (2), 04015111 (2016).

Experimental Investigation on blast response of cellular concrete, W. Nian, K.V.L. Subramaniam, and Y. Andreopoulos, *International Journal of Impact Engineering*, 96, 105–115 (2016).

Experimental evaluation of load-induced damage in concrete from distributed microcracks to localized cracking on electro-mechanical impedance response of bonded PZT, A. Narayanan and K.V.L. Subramaniam, *Construction and Building Materials*, 105, 536-544 (2016).

Direct Decomposition X-ray Diffraction Method for Amorphous Phase Quantification in Binary Blends of Siliceous Fly ash and Hydrated Cement, G.V.P. Bhagath Singh and K.V.L. Subramaniam, *Journal of Sustainable Cement-based Materials*, (2016)10.1080 /21650373.2016.1177478.

Identification of Early-age cracking in Concrete Bridge Decks, K.V.L. Subramaniam, *Journal of Performance of Constructed Facilities*, ASCE, (2016)10.1061/(ASCE)CF.1943-5509.0000915.

Quantitative XRD Analysis of Binary Blends of Siliceous Fly ash and Hydrated Cement, G.V.P. Bhagath Singh and K.V.L. Subramaniam, *Journal of Materials in Civil Engineering*, ASCE, (2016) 10.1061/ (ASCE)MT.1943-5533.0001554.

Ultrasonic Shear Wave Reflection Method for direct determination of Porosity and Shear Modulus in early age Cement Paste and Mortar, K.V.L. Subramaniam and Xiaojun Wang, *Journal of Engineering Mechanics*, ASCE, (2016)10.1061/(ASCE) EM.1943-7889.0001113.

1D Numerical Framework for Shock Compaction of Cellular Foams, W. Nian, K.V.L. Subramaniam and Y. Andreopoulos, *Journal of Aerospace Engineering*, ASCE, 29 (4) 105-115 (2016).

Utilization of Reclaimed Asphalt Pavements in Indian Low Volume Roads, Sireesh Saride, A. Deepthiand Sarath Chandra Prasad J, ASCE, *Journal of Materials in Civil Engineering*, (2015) 10.1061/ (ASCE)MT.1943-5533.0001374.

Non-linear Response of Geocell Reinforced Dense Granular Layer over Weak Soil under Circular Loading, Sireesh Saride, P. A. Fabymole, M. R. Madhav, K. R. Vijay, I*nternational Journal of Geotechnical Engineering,* 10 (1), 23-30 (2015).

Evaluation of Fly ash treated Reclaimed Asphalt Pavements for Base/Subbase Applications, Sireesh Saride, A. Deepthi, Sarath Chandra Prasad J, Anand J. Puppala and Hoyos, L. R, *Indian Geotechnical Journal*, Special Issue on Transpiration Geotechnics, 45 (4), 401-411 (2015).

Evaluation of Rutting Behavior of Geocell Reinforced Sand Subgrades under Cyclic Loading,

Sireesh Saride, K. R. Vijay and V. Suraj, *Indian Geotechnical Journal*, Springer, 45 (4), 378-388 (2015).

Nonlocal third- order shear deformation theory for analysis of laminates considering surface stress effects, P. Raghu, K. Preethi, A. Rajagopal and J. N. Reddy, *Composite Structures,* 139, 13-29 (2016).

Homogenization of periodic masonry using self consistent scheme and finite element method, K. Nitin, L. Harish, A. Rajagopal and P. Manoj, *International Journal for computational methods in engineering science and mechanics,* 17(1), 7-21, (2016).

Adaptive isogeometric analysis using a r-h adaptive strategy, B. Umesh, A. Rajagopaland J. N. Reddy, *International Journal for computational methods in engineering science and mechanics*, 17(2), 73-92 (2016).

Vibroacoustic performance of fiber metal laminates with delamination, B. Balakrishnan, S. Raja, D. Dwarkanathan and A Rajagopal, *Mechanics of Advanced Materials and Structures*, 23(12), 1369-1378 (2016).

Surface and Nonlocal effects for non linear analysis of Timoshenko beams, K. Preethi, A. Rajagopal and J. N. Reddy, *International Journal for Nonlinear Mechanics*, 76, 100-111 (2015).

A rate independent cohesive zone model for modeling failure in Quasi brittle materials, K. Nitin, A. Rajagopal and P. Manoj, *Mechanics of Advanced Materials and Structures*, 22(8), 681- 696 (2015).

Meshless Natural element method for nonlinear analysis of composite plates, S. Madhukar and A. Rajagopal, *Journal of Structural Engineering*, 42(1), 57-63 (2015).

Residual Compression Behavior of Structural Polypropylene Fiber Reinforced Concrete Exposed to Moderate Temperature, G. Srikar, A. G. Goudar and S. S. Prakash, *Journal of Concrete Structures and Materials, Springer*, 10 (1), 75-85 (2016)10.1007/s40069-016-0127-x.

Experimental Study on Compressive Behavior of GFRP Stiffened Panels Using Digital Image Correlation, R. Naresh, S. S. Prakash and M. Ramji, *Ocean Engineering, Elsevier*, 114, 290–302 (2016) 10.1016/j.oceaneng.2016.01.034.

Improved Softened Membrane Model for Reinforced Concrete Circular Bridge Columns under Torsion, A. G. Goudar, T. G. Mondaland S. S. Prakash, *Journal of Bridge Engineering ASCE*, 21 (7), (2016) 10.1061/(ASCE)BE.1943-5592.0000907.

Experimental Evaluation of Bonded Overlay and NSM GFRP Bar Strengthening on Flexural Behavior of Precast Prestressed Hollow Core Slabs, P. Kankeri, S. S. Prakash, *Journal of Engineering Structures, Elsevier*, 120, 49–57 (2016).

Notch Stress Intensity Factor for Center Cracked Plates with Crack Stop Hole Strengthened using CFRP: A Numerical Study, S. Reddy, J. Vutkuru, M. Madhavan and V. Kumar, *International Journal of Thin-Walled Structures*, (2015)10.1016/j.tws.2015.09.018.

Experimental Studies on Strength and Stiffness Enhancement in CFRP Strengthened Structural Steel Channel Sections under Flexure, S. Selvaraj, M. Madhavanand S. Dongre, *ASCE Journal of Composites for Construction,* (2016) 10.1061/(ASCE)CC.1943-5614.0000700.

Predicting streamflow distributions and flow duration curves from landscape and climate, D. Behnam, A. Betterle, S. Basso, B. Biswal, M. Schirmer and G. Botter, *Advances in Water Resources*, 83, 285-298 (2015).

Effect of catchment characteristics on the relationship between past discharge and the power law recession coefficient, S. Patnaik, B. Biswal, D. Nagesh Kumar and B. Sivakumar, *Journal of Hydrology*, 528, 321-328 (2015).

Estimation of drainable'storage–A geomorphological approach, B. Biswal and D. Nagesh Kumar, *Advances in Water Resources*, 77, 37-43 (2015).

Effect of Increased Moisture Content on Long Term Compressibility Behavior of Orchard Hills Landfill, USA, B. Munwar Basha, Krishna R Reddy and Naveen S Parakalla, *International Journal of Geotechnical Engineering*, 10(1), 86-98 (2015).

Confronting tipping points: Can multi-objective evolutionary algorithms discover pollution control tradeoffs given environmental thresholds?, V. L. Ward, R. Singh, P. M. Reed and K. Keller, *Environmental Modelling & Software,* 73, 27-43 (2015).

Vulnerability of water availability in India due to climate change: A bottom-up probabilistic Budyko analysis, R. Singh and R. Kumar, *Geophysical Research Letters*, 42, 9799-9807 (2015).

Many-objective robust decision making for managing an ecosystem with a deeply uncertain threshold response, R. Singh, P. M. Reed and K. Keller, *Ecology and Society*, 20, 1-12 (2015).

Steel Columns Subjected to Thermal Gradient from Fire Loading: Experimental Evaluation, L. Choe, A. Agarwal and A.H. Varma, *Journal of Structural Engineering, ASCE*, 142, 1943-1955 (2016).

The earthquake-source inversion validation (SIV) project, P.M. Mai, D. Schorlemmer, M. Page, J.P. Ampuero, K. Asano, M. Causse, S. Custodio, W. Fan, G. Festa, M. Galis, F. Gallovic, W. Imperatori, M. KÃ¤ser, D. Malytskyy, R. Okuwaki, F. Pollitz, L. Passone, H. Razafindrakoto, H. Sekiguchi, S. Song, S. N. Somala, K. Thingbaijam, C. Twardzik,

M. van Driel, J. Vyas, R. Wang, Y. Yagi and O. Zielke, *Seismological Research Letters*, 87(3) 690-708(2016) 10.1785/0220150231.

## Publications

### (In Peer-Reviewed Conferences)

Load-settlement response of circular footing resting on reinforced layer system, C. Hariprasad and B. Umashankar, *15th Asian Regional Conference on Soil Mechanics and Geotechnical Engineering*, Kyoto, Japan, 9-13 November 2015.

Analysis of back-to-back retaining walls with modular block facing, S. Sasanka Mouli, B. Umashankar and M. R. Madhav, *Indian Geotechnical Conference*, Pune, 17-19 December 2015.

Effect of dilatancy angle on bearing capacity, B. Umashankar and M. Rajashekhar, *Indian Geotechnical Conference*, Pune, 17-19 December 2015.

Settlement of rigid rectangular footings on layered soils, B. Umashankar and S. Preethi, *Indian Geotechnical Conference*, Pune, 17-19 December 2015.

Early age Monitoring of Cement Mortar using Embedded Piezoelectric Sensors, Smart Structures/ NDE 2016, *SPIE*, Las Vegas, NV, 20–24 March 2016.

Damage Assessment in Concrete Structures using PZT patches, A. Narayanan and K.V. L. Subramaniam, *2nd RN Raikar Memorial Intl. Conference & Banthia-Basheer Intl. Symposium on Advances in Science and Technology of Concrete*, Mumbai, 18-19 December 2015.

Concrete using Siliceous Fly ash at very High Levels of Cement Replacement: Influence of Lime Content and Temperature, G.V.P. Bhagath Singh and K.V.L. Subramaniam, *2nd RN Raikar Memorial Intl. Conference & Banthia-Basheer Intl. Symposium on Advances in Science and Technology of Concrete*, Mumbai, 18-19 December 2015.

Investigation of Crack Propagation in Macro-Synthetic Fiber Reinforced Concrete, K.V.L. Subramaniam, S. Nakhale, and S.G. Reddy, *6th International Conference on Construction Materials: Performance, Innovations and Structural Implications*, Vancouver, Canada, 24-28 August 2015.

Lime Activation of Siliceous Fly Ash at Very High Levels of Cement Replacement, G.V.P. Bhagath Singh and K.V.L. Subramaniam, *6th International Conference on Construction Materials: Performance, Innovations and Structural Implications*, Vancouver, Canada, 24-28 August 2015.

Dynamic Properties of Compacted Cohesive Soil Based on Resonant Column Studies, Troyee T Dutta and S. Sireesh, *International Conference on Geo-engineering and Climate Change Technologies for Sustainable Environmental Management*, GCCT-2015, Allahabad, 9-11 October 2015.

Some finite element approaches for modeling of anisotropic thermoelastic mixture and periodic composites with internal microstructure, A. V. Nasedkin, A. A. Nasedkina, Rajagopal Amirtham, V. V. Remizov, 8th *International Conference of the Greek Association for Computational Mechanics, Book of Abstracts*, 12-15 July 2015, Volos, Greece. N. Pelekasis and G. Stavroulakis, (Editors). University of Thessaly Press, 2015. P. 168. ISBN 978-960-9439-36-7.

Nonlocal TSDT for analysis of laminated plates considering surface e.ects, Raghu Piska and Amirtham Rajagopal, *3rd International Conference on Modeling and Simulation in Civil Engineering*, GCE Trivandrum, India, 9-11 December 2015.

Meshfree natural neighbor galerkin method for nonlinear analysis of composite plates, Preethi Kasirajan and Amirtham Rajagopal, 18th International Congress on Composites, Lisbon, Portugal,15-18 June 2015.

Behavior of Synthetic Fiber Reinforced Cellular Light Weight Concrete Under Uniaxial Tension Loading, M. A. Rasheed and S. S. Prakash, *9th RILEM International Symposium on Fiber Reinforced Concrete*, Vancouver, British Columbia, Canada, September 2016, Paper ID No. 99.

Finite Element Analysis of Reinforced Concrete Bridge Columns under Torsional Loading, T. G Mondaland S. S. Prakash, *6th International Congress on Computational Mechanics and Simulation*, Mumbai, India, 26-29 June 2016.

Flexural Behavior of Prestressed Precast Hollow Core Slabs Strengthened with Bonded Overlay and NSM, P. Kankeri, S. S. Prakash and G. Rai, *7th International Conference on Advanced Composite Materials in Bridges and Structures, Vancouver*, British Columbia, Canada, 21-14 August 2016.

Numerical Studies on Halting Crack Growth Using Crack Stop Hole and Asymmetrically Bonded CFRP Patch, S. Reddy and M. Madhavan, *Eighth International Conference on Advances in Steel Structures*, Lisbon, Portugal, 22-24 July 2015.

Recovery of Reducing Sugar from Food Waste: Optimization of Pretreatment Parameters Using Response Surface Methodology, G.P. Marttin and D. Bhattacharyya, *Biofuels & Bioenergy International Conference and Exhibition*, MANIT Bhopal, 23-25 February 2016.

Lower Bound Bearing Capacity of Strip Footings on Jointed Rock Masses: A Reliability Based Approach, Theme: Dam, Geomatics, Geoscience, Geophysics and Hazards, Session: Risk/Reliability Assessments 2016, B. Munwar Basha, K. Chandrakanth and Arif Ali Baig Moghal, *4th GeoChina International Conference 2016*, Shandong, China 25-27 July 2016.

Effect of Fiber Reinforcement on the Hydraulic Conductivity Behavior of Lime Treated Expansive Soil: Reliability Based Optimization Perspective, Theme: Transportation Geotechnical Engineering, Session Innovative and Sustainable Geomaterials and Geosystems (2016), Arif Ali Baig Moghal, B. Munwar Basha, Bhaskar Chittoori and Mosleh Ali Al-Shamrani, *4th GeoChina International Conference 2016*, Shandong, China, 25-27 July 2016.

Potential of Soils Amended With Nano Calcium Silicate Mixture For Lead Encapsulation in an Aqueous Medium, Syed Abu Sayeed Mohammed, P. F. Sanaulla, B. Munwar Basha, Arif Ali Baig Moghal and A. M. Alnuaim, *GEO-CHICAGO 2016: Sustainability, Energy, and the Geoenvironment*, Downtown Chicago, 2016.

Variability Associated with Resilient Modulus of Stabilized Reclaimed Asphalt Pavements, R. T. Pranav, Peddinti, Sireesh Saride and B. Munwar Basha, *GEO-CHICAGO 2016: Sustainability, Energy, and the Geoenvironment*, Downtown Chicago, 2016.

Optimum Base Width of Gravity Retaining Walls of Narrow Backfilled with Recycled Materials, B. Munwar Basha, Shaik Moin Ahmed, Arif Ali Baig Moghal, Kandukuri Shankar. *GEO-CHICAGO 2016: Sustainability, Energy, and the Geoenvironment*, Downtown Chicago, 2016.

Allowable Design Strength of Geomembrane Liner for Anchor Trenches of MSW Landfills: A Reliability Based Approac, K. V. N. S. Raviteja and B. Munwar Basha. *GEO-CHICAGO 2016: Sustainability, Energy, and the Geoenvironment*, Downtown Chicago, 2016.

Computation of Probabilistic Critical Centers and Reliability Indices of MSW Landfill Slopes using Spencer Method of Slices, B. Munwar Basha, K. V. N. S. Raviteja and Sahithi Arukonda, *GEO-CHICAGO 2016: Sustainability, Energy, and the Geoenvironment*, Downtown Chicago, 2016.

Analysis and Design of Non-compact and Slender Rectangular CFT Columns Subjected to Ambient and Elevated Temperature, Z. Lai, A.H. Varma, H. Yang and A. Agarwal, *SSRC 2016 Annual Stability Conference*, Orlando, FL, 12-15 April 2016.

Numerical simulation of the three component ground velocities from the 25th April, 2015 Nepal Earthquake, S. N. Somala, *International Conference on Earthquake Engineering and Post Disaster Reconstruction Planning*, Bhaktapur, Nepal, 24-26 April 2016.

## Funded Research Projects 2015-16

Mahendrakumar Madhavan, *Study on Effect of Imperfection Based on Manufacturing Tolerances in Cold Formed Structural Steel Members*, DST, June 2015, Rs. 63.0 Lakhs.

Mahendrakumar Madhavan, *Studies on Parallel Flange Beams, Jindal Steel and Power Limited*, August 2015, Rs. 16.0 Lakhs.

Riddhi Singh, *Inter basin water transfer in India: when and how much? Adaptive multi-objective robust decision making for managing water transfers*, SERB, 4 March 2016, Rs. 25.0 Lakhs.

Anil Agarwal, S*tructural assessment and strengthening of existing telecom towers to enable them to support small wind turbine*, MNRE, February 2016, Rs. 50.39 Lakhs.

## Seminars Organised

Reproducing earthquakes in a lab: A case study of the 2002 Denali, Alaska Earthquake, Dr. Harsha Bhat, École Normale Supérieure, France, 1 April 2016.

## Talks Given In International / National Conferences

B. Umashankar, *Advanced design of retaining structures*, 3-day Short course on Advances in foundation design for buildings and critical structures, IIIT Hyderabad, 9-10 October, 2015.

S. Sireesh, *Application of Geocells in Indian Roads: A Laboratory and Field Perspective*, ASTM D35: Geosynthetics Meeting, Mumbai, India, 2 December 2015.

S. Sireesh, *IGC-15: Behavior of Geocell Reinforced Granular Bases Overlying Weak Subgrades under Single Axle Wheel Loads*, Theme Note, Indian Geotechnical Conference 2015, Pune, 19 December 2015.

S. Sireesh, *Reclaimed Asphalt Pavements: A Sustainable Solution for Indian Low Volume Roads*, At one day National Symposium on Recent Advances in Pavement Technology, MVSR Engineering College, Hyderabad, 13 March 2015.

Troyee Tanu Dutta and Sireesh Saride, *Effect of Confining Pressure, Relative Density and Shear Strain on The Poisson's Ratio of Clean Sand*, 50th Indian Geotechnical Conference, IGC-2015, Pune, Maharashtra, 17-19 December 2015.

A. Deepti, R. T. P. Pranav and Sireesh Saride, *Durability of Fly Ash Treated Reclaimed Asphalt Pavement Materials*, 50th Indian Geotechnical Conference, IGC-2015, Pune, Maharashtra 17-19 December, 2015.

P. V. N. Gautham and K. B. V. N. Phanindra, *Evaluation of Management Practices on Crop Yield and Nutrient loads in a semi-arid tropical watershed using a process based Hydrologic Model*, 36th IAHR World Congress, The Hague, Netherlands, 28 June - 03 July, 2015.

Shashidhar and Ritu Gothwal, *Mathematical Model for the Transport of Fluoroquinolone Antibiotics and its Resistant Culture in Aquatic Environment, Ecological Modeling*, The International Society for Ecological Modelling Global Conference 2016, Towson University Baltimore, USA 8-12 May 2016.

M. Madhavan, *Numerical Studies on Halting Crack Growth Using Crack Stop Hole and Asymmetrically Bonded CFRP Patch*, Eighth International Conference on Advances in Steel Structures, Lisbon, Portugal, 22-24 July 2015.

B. Biswal, *Channel networks in hydrologic response modelling: model development and validation using ecologically relevant indicators*, AGU Fall Meeting 2015, San Francisco, USA 17 December.

A. Qureshi, *Mercury in India, a review, and past and future trends*, 12th International Conference on Mercury as a Global Pollutant, Jeju, South Korea, June 2015.

B. Munwar Basha, *Design of Narrow Backfill Width Retaining Structures under Static & Seismic Loading*, Indian Geotechnical Society TC-8 Workshop on Numerical and Physical Modelling, 3 October 2015 Conducted by Department of Civil Engineering, Guru Nanak Dev Engineering College Ludhiana, Punjab, India (Invited by IGS Ludhiana chapter).

R. Singh, *Estimating the spatio-temporal distribution of surface water availability across India*, Fall meeting of the American Geophysical Union, San Francisco, December 2015.

R. Singh, *What controls vulnerability of watersheds to climate and land use change across the United States?,* Fall meeting of the American Geophysical Union, San Francisco, December 2015.

S. N. Somala, *Application of anti-aliasing filter in seismic source imaging*, IDRiM, New Delhi, 28-30 October 2015.

## Workshops / Symposiums Organised

Workshop on One health India 2016, 17-24 July 2016.

Joint Organizing Secretary and Website Coordinator for 5th International Conference on Forensic Geotechnical Engineering, Bengaluru, India, 8-10 December 2016.

## Awards / Recognitions

TTask Force Member of Telangana State Pollution Control Board, *T. Shashidhar*.

Expert member of Greater Warangal Municipal Corporation Under Ground Drainage project, *T. Shashidhar*.

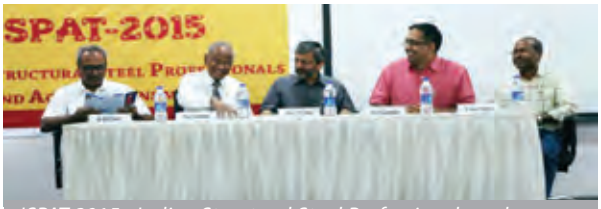
Expert member of Greater Warangal Municipal Corporation water supply project, *T. Shashidhar*.

Ramanujan Fellowship, 2012 to 2017, *S Suriya Prakash*.

IGS Dr. B B Rai Shri S N Gupta Biennial Award 2015 for the paper titled, Reliability Based LRFD Approach for External Stability of Reinforced Soil Walls, published in the Indian Geotechnical Journal, Vol. 43, Issue 4, October-December 2013 (292-302), adjudged as the best paper on Earth and Earth Retaining Structures published through the Indian Geotechnical Society, *B. Munwar Basha and G.L.S. Babu*.

## Other Events

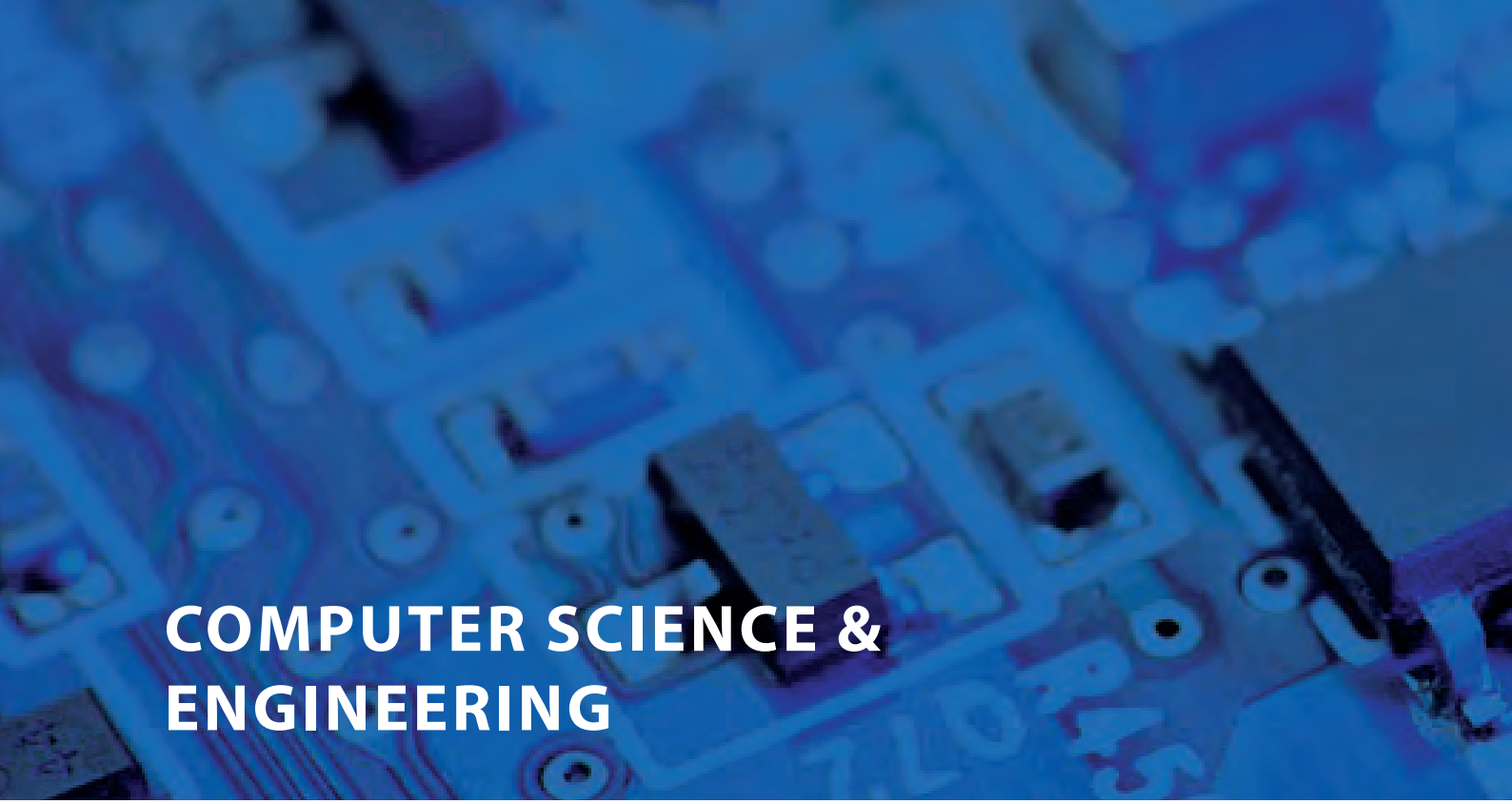
M. Madhavan, A TEQIP sponsored five day workshop on Structural Steel Design titled ISPAT 2015, May 25-29 2015.




*ISPAT 2015 - Indian Structural Steel Professionals and Academicians Meet*

*GIAN course on Hydrological Modeling with SWAT, Dec 2015*

*Workshop on Healthcare India*



# COMPUTER SCIENCE & ENGINEERING

The Department of Computer Science and Engineering at IIT, Hyderabad is poised for a giant leap through research in cutting-edge computing and technology, while imparting top-class education through innovative pedagogy. The department offers undergraduate (B.Tech) and postgraduate programs (M.Tech. and Ph.D), short courses (Continuing Education Programmes) customized to the needs of industry, and a new Executive M.Tech program in Data Science intended for working professionals from August 2015. The department comprises 15 young faculty members (with several adjunct faculty from reputed academic and industry backgrounds) who are actively engaged in research areas including theoretical computer science, algorithms, graph theory, networking, distributed systems, databases, compilers, machine learning, image/video processing, data mining and information retrieval. The faculty have large sponsored research projects in the application domains of cyber-physical systems (DeitY, Govt of India) and disaster management (in collaboration with Japan). The department also has regular collaborators in industry and academia, such as KDDI labs (Japan), Uurmi Systems, IISc (Bangalore), Tel Aviv University (Israel), NTU (Singapore), Royal Holloway University of London, INRIA (France) etc. The department has risen in stature over its short existence, evidenced by steadily improving opening and closing JEE ranks each year (418 and 879 respectively in 2016). To know more about the department and research interests of the faculty, please visit http://cse.iith.ac.in/.

# F A C U L T Y

**Bheemarjuna Reddy Tamma**
Ph.D - IIT Madras
***Associate Professor & HoD***

*Research Areas*: Converged Cloud Radio Access Networks, 5G, SDN, IoT/M2M, and Green ICT

**N. R. Arvind**
Ph.D - Institute of Mathematical Sciences,Chennai
***Assistant Professor***

*Research Areas*: Graph theory, algorithms and combinatorics

**C. Krishna Mohan**
Ph.D - IIT Madras
***Associate Professor***

*Research Areas*: Video Content Analysis, Machine Learning, Sparsity Based Methods, Deep Learning

**Vineeth N Balasubramanian**
Ph.D - Arizona State University, USA
***Assistant Professor***

*Research Areas*: Machine Learning, Deep Learning, Computer Vision, Multimedia Computing

**Ch. Sobhan Babu**
Ph.D - IIT Bombay
***Associate Professor***

*Research Areas*: Big Data Analytics

**Sathya Peri**
Ph.D - University of Texas at Dallas
***Associate Professor***

*Research Areas*: Parallel Programming, Software Transactional Memory, Distributed Systems, Theory of Databases, Algorithm analysis, Networking algorithms

**Subrahmanyam Kalyanasundaram**
Ph.D - Georgia Tech, USA
***Assistant Professor***

*Research Areas*: Theoretical Computer Science, Randomzied Algorithms, Complexity Theory, Combinatorics

**Upadrasta Ramakrishna**
Ph.D - University of Paris and INRIA, Paris
***Assistant Professor***

*Research Areas*: Compilers, High Performance Computing, Programming Languages

**M. V. Panduranga Rao**
Ph.D - IISc Bangalore
***Associate Professor***

*Research Areas*: Theoretical Computer Science

**Manish Singh**
Ph.D - University of Michigan, USA
***Assistant Professor***

*Research Areas*: Databases, Data Mining, HCI, Information Retrieval, Information Visualization

# F A C U L T Y

**Kotaro Kataoka**
Ph.D - Keio University, Japan

***Visiting Assistant Professor***

*Research Areas*: Internet Architecture, Software-Defined Networking (SDN), Network Functions Virtualization (NFV), Network Operation, Post-Disaster Networking, Any Fun Applications

**Antony Franklin**
Ph.D - IIT Madras

***Assistant Professor***

*Research Areas*: Wireless Networks, Edge Computing, 5G Networks and Systems

**Maunendra Sankar Desarkar**
Ph.D - IIT Kharagpur

***Assistant Professor***

*Research Areas*: Recommendation Systems, Information retrieval, Social Network Analysis, Data Mining, Machine Learning

**Manohar Kaul**
Ph.D - Aarhus University, Denmark

***Assistant Professor***

*Research Areas*: Scalable Machine Learning, Spatial Databases, Computational Geometry/ Topology

## VISITING FACULTY

**Kaushik Saha**

Director, Systems R&D, Samsung Research India, Delhi

*Teaching Subject*: Pervasive Computing Lab

**Poh Tiong San**

Asst. Manager, Allied Telesis Asia Pacific Pvt Ltd, Singapore

*Teaching Subject*:: Advanced Network Engineering

**Sachin A. Desai**

Network Engineer, Allied Telesis, Bangalore

*Teaching Subject*:: Advanced Network Engineering

## Patents Filed

Thomas Valerrian, Pasca Santhappan, Bheemarjuna Reddy Tamma, and Antony Franklin, Traffic Steering in Aggregated LTE Wi-Fi Networks, India Patent No: 4705/CHE/2015, Filed: September 2015.

## Publications

### (In Peer-Reviewed Journals)

Interference Mitigation in Wireless Mesh Networks through Radio Co-location Aware Conflict Graphs, Srikant Manas Kala, Pavan Kumar Reddy, M. Ranadheer and Bheemarjuna Reddy Tamma, *Springer Wireless Networks*, 22(2), 679-702 (2016).

Phantom Cell Architecture for LTE and its Application in Vehicular IoT Environments, Hatim Lokhandwala, Vanlin Sathya and Bheemarjuna Reddy Tamma, *EAI Endorsed Transactions on Future Internet*, 15 (5) (2015).

Content based medical image retrieval using dictionary learning, M. Srinivas, R. Ramu Naidu, C. S. Sastry and C. Krishna Mohan, *Neurocomputing (Elsevier)*, 168, 880-895 (2015)doi: 10.1016/j.neucom.2015.05.036.

Adaptive learning based heartbeat classification, M. Srinivas, Tony Basil, and C. Krishna Mohan, *Bio-Medical Materials and Engineering*, 26 (1), 49-55 (2015)doi: 10.3233/BME-151552.

Iris classification based on sparse representations using on-line dictionary learning for large-scale de-duplication applications, N. Pattabhi Ramaiah, and C. Krishna Mohan, *SpringerPlus*, 4 (1), 238 (2015) doi: 10.1186/s40064-015-0971-1.

The Chromatic Discrepancy of Graphs, N. R. Aravind, Subrahmanyam Kalyanasundaram, R. B. Sandeep and Naveen Sivadasan, *Discrete Applied Mathematics*, 184, 40–49 (2015).

An Optimal Algorithm for Computing Frieze-Kannan Regular Partitions, Domingos Dellamonica, Subrahmanyam Kalyanasundaram, Daniel Martin, Vojtech Rödl and Asaf Shapira, *Combinatorics, Probability and Computing,* 24 (02), 407-437 (2015).

The chromatic discrepancy of graphs. N.R. Aravind, Subrahmanyam Kalyanasundaram, R.B. Sandeep, Naveen Sivadasan, *Discrete Applied Mathematics*, 184, 40-49 (2015).

Active batch selection via convex relaxations with guaranteed solution bounds, S. Chakraborty, V. Balasubramanian, Q. Sun, S. Panchanathan, J. Ye, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 37 (10), 1945-58 (2015).

Adaptive Batch Mode Active Learning, S. Chakraborty, V. Balasubramanian, S. Panchanathan, *IEEE Transactions on Neural Networks and Learning Systems*, 26 (8), 1747-1760 (2015).

Conformal Predictions for Information Fusion, V. Balasubramanian S. Chakraborty, S. Panchanathan, *Annals of Mathematics and Artificial Intelligence*, 74, 45-65 (2015).

Computer-Vision-Assisted Palm Rehabilitation With Supervised Learning, K. M. Vamsikrishna, D. P. Dogra, M. S. Desarkar, *IEEE Trans. Biomed. Engineering,* 63(5), 991-1001 (2016).

Preference Relations Based Unsupervised Rank Aggregation for Metasearch, M. S. Desarkar, S. Sarkar, P. Mitra, *Expert Syst. Appl.* 49, 86-98 (2016).

## Publications

### (In Peer-Reviewed Conferences)

Min-O-Mee: A Proximity Based Network Application Leveraging The All Joyn Framework, Hatim Lokhandwala, Srikant Manas Kala and Bheemarjuna Reddy Tamma, *IEEE CoCoNet (Special Session on Mobile Social Networks)*, Trivandrum, 613-619 (2015)10.1109/CoCoNet.2015.7411252.

Radio Co-location Aware Channel Assignments for Interference Mitigation in Wireless Mesh Networks, Srikant Manas Kala, Pavan Kumar Reddy M, Ranadheer Musham and Bheemarjuna Reddy Tamma, *IEEE ICACCI, Kochi,* August 201510.1109/ICACCI.2015.7275580.

Reliable Prediction of Channel Assignment Performance in Wireless Mesh Networks, Srikant Manas Kala, Ranadheer Musham, Pavan Kumar Reddy M and Bheemarjuna Reddy Tamma, *IEEE ICACCI, Kochi*, August 2015, 10.1109/ICACCI.2015.7275577.

Towards bandwidth efficient TDMA frame structure for voice traffic in MANETs, Naresh Vattikuti, Mallesham Dasari, Himanshu Sindhwal and Bheemarjuna Reddy Tamma, *IEEE International Conference on Electronics, Computing and Communication Technologies (CONECCT)*, Bangalore, 1-6 July 2015, 10.1109/CONECCT.2015.7383883.

Energy-efficient Femtocell Placement in LTE Networks, Arun Ramamurthy, Vanlin Sathya R, Varsha Venkatesh, Rithi Ramji and Bheemarjuna Reddy Tamma, *IEEE International Conference on Electronics, Computing and Communication Technologies CONECCT*, Bangalore, 1-6 July 2015, 10.1109/CONECCT.2015.7383858.

Predicting Performance of Channel Assignments in Wireless Mesh Networks through Statistical Interference Estimation, Srikant Manas Kala, M Pavan Kumar Reddy and Bheemarjuna Reddy Tamma, *IEEE CONECCT*, Bangalore, 1-6 July 2015, 10.1109/CONECCT.2015.7383864

Maximizing Dual Cell Connectivity Opportunities in Small Cells Deployments, Vanlin Sathya, Anil Kumar Rangisetti, Arun Ramamurthy and Bheemarjuna Reddy Tamma, *NCC, IIT Guwahati*, March 2016.

Velocity Based Dynamic Flow Mobility in Converged LTE/Wi-Fi Networks, Prasanth Sharma, Thomas Valerrian Pasca S, Naveen Kamath and Bheemarjuna Reddy Tamma, *NCC, IIT Guwahati*, March 2016.

Classification of medical images using edge-based features and sparse representation, M. Srinivas, D. Roy and C. Krishna Mohan, *Proc. IEEE Int. Conf. on Acoustics, Speech and Signal Processing (ICASSP 2016)*, Shanghai, 912-916, March 2016, 10.1109/ICASSP.2016.7471808.

Discriminative feature extraction from X-ray images using deep convolutional neural networks, *Proc. IEEE Int. Conf. on Acoustics, Speech and Signal Processing (ICASSP 2016)*, Shanghai, 917-921, March 2016, 10.1109/ICASSP.2016.7471809.

Nearest Neighbor Minutia Quadruplets Based Fingerprint Matching with Reduced Time and Space Complexity, T. Rao, N. P. Ramaiah, V. R. Reddy and C. Krishna Mohan, *IEEE 14th Int. Conf. on Machine Learning and Applications (ICMLA 2015),* Miami, FL, 378-381, December 2015, 10.1109/ICMLA.2015.124.

Multi-level classification: A generic classification method for medical datasets, M. Srinivas, R. Bharath, P. Rajalakshmi and C. Krishna Mohan, *17th Int. Conf. on E-health Networking, Application & Services (HealthCom 2015),* Boston, MA, 262-267, October2015, 10.1109/HealthCom.2015.7454509.

Sparsity-Based Iris Classification Using Iris Fiber Structures, N. Pattabhi Ramaiah, N. Srilatha, C. Krishna Mohan, *Proc. IEEE Int. Conf. of Biometrics Special Interest Group (BIOSIG 2015),* Darmstadt, Germany, 1-4, September 2015, 10.1109/BIOSIG.2015.7314621.

Feature selection using deep neural networks, Debaditya Roy, K. Murty, and C. Krishna Mohan, *Proc. IEEE Int. Joint Conf. on Neural Networks (IJCNN 2015)*, Tempe, Miami, USA, 1-6 July 2015, 0.1109/IJCNN.2015.7280626.

Statistical Model Checking of Opportunistic Networks (with Shiraj Arora and Ankit Rathor), *Proc. 11th Asian Internet Engineering Conference*, 2015.

Epidemic Analysis Using Traditional Model Checking and Stochastic Simulation, Kanishka Chauhan and Moiez Gohar, *Proc. 16th Intl. Conf. on Bioinformatics and Computational Biology*, 2015.

Whether to Invest in Energy Saving Technologies or Elsewhere? A Decision Support Tool, Kanishka Chauhan and Moiez Gohar, *Proc. The Asian Conference on Sustainability, Energy and the Environment*, 2015.

On the Expressive Power of Read-Once Determinants, N. R. Aravind, Pushkar S. Joglekar, *Foundations of Computation Theory*, 95-105, 2015.

Parameterized Lower Bound and NP-Completeness of Some H-Free Edge Deletion Problems, N.R. Aravind, R.B. Sandeep, Naveen Sivadasan, *9th Annual International Conference on Combinatorial Optimization and Applications COCOA 2015*: 424-438.

Parameterized Lower Bounds and Dichotomy Results for the NP-completeness of H-free Edge Modification Problems, N.R. Aravind, R.B. Sandeep, Naveen Sivadasan, *Latin American Theoretical Informatics Symposium 2016*: 82-95.

A Crowdsourced Approach to Student Engagement Recognition in e-Learning Environments, A. Kamath, A. Biswas, V. N. Balasubramanian, *IEEE Winter Conference on Applications of Computer Vision (WACV),* Lake Placid, USA, 7-9 March 2016.

Fine-Tuning Human Pose Estimations in Videos, D. Singh, V. N. Balasubramanian, C.V. Jawahar, *IEEE Winter Conference on Applications of Computer Vision (WACV),* Lake Placid, USA, 7-9 March 2016.

Similarity-based Contrastive Divergence Methods for Energy-based Deep Learning Models, A. Ravi Sankar, V. N. Balasubramanian, *Proceedings of The 7th Asian Conference on Machine Learning,* Hong Kong, 391-406, 20-22 November 2015.

Batch Rank: A Novel Batch Mode Active Learning Framework for Hierarchical Classification, S. Chakraborty, V. Balasubramanian, A. Ravi Sankar, S. Panchanathan, J. Ye, *Proceedings of the 21st ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, Sydney, 99-108, 10-13 August 2015.

Scaling Up the Training of Deep CNNs for Human Action Recognition, M. S. Rajeswar, A. R. Sankar, V. N. Balasubramanian, C. D. Sudheer, *IEEE International Parallel and Distributed Processing Symposium Workshop (IPDPSW)*, Hyderabad, India, 1172-1177, May 2015.

Model Selection Using Efficiency of Conformal Predictors, R. Jaiswal, V. Balasubramanian, *International Symposium on Statistical Learning and Data Sciences, London*, UK, 20-23 291-300 April 2015.

DBExplorer: Exploratory Search in Databases, Manish Singh, Michael J Cafarella, H. V. Jagadish, *ACM Extending Database Technology, Bordeaux,* France, 15-18 March 2016, 10.5441/002/edbt.2016.11.

Information Exploration in E-Commerce Databases, Manish Singh, *Springer International Conference on Big Data Analytics*, Hyderabad, 15-18 December 2015.

Hybrid Approach to Distributed Wi-Fi Performance Assessment for Multi-floor Structures, Deepak

Bhardwaji, Kotaro Kataoka, V. Amith Vikram and Vishal Hirani, *proceedings of The 9th International Conference on Software*, Knowledge, Information Management & Applications (SKIMA 2015), 135-142, 2015.

Auto-Configuration of SDN Switches in SDN/Non-SDN Hybrid Network, Rohit Katiyar, Prakash Pawar, Abhay Gupta and Kotaro Kataoka, *proceedings of ACM Asian Internet Engineering Conference 2015 (AINTEC '2015)*, 2015

Performance Evaluation of Wireless Ad-hoc Network for Post-Disaster Recovery using Linux Live USB Nodes, Vaibhav Garg, Kotaro Kataoka and Siva Subramanya Rohith Talluri, *The IEEE WiMob 2015 Workshop on Emergency Networks for Public Protection and Disaster Relief*, 125-131, 2015.

A Self-contained Software Suite for Post-Disaster ICT Environment Using Linux Live USB, IARIA, Vaibhav Garg, Kotaro Kataoka and Sahil Sachdeva, *The Eleventh International Conference on Networking and Services (ICNS),* 17-23, 2015.

Lite Flow: Lightweight and distributed flow monitoring platform for SDN, Naman Grover, Nitin Agarwal and Kotaro Kataoka, *Proceedings of 1st IEEE Conference on Network Softwarization (NetSoft)*, 1-9, 2015.

Load-Aware Dynamic RRH Assignment in Cloud Radio Access Networks, Debashisha Mishra, Amogh PC, Arun Ramamurthy, Antony Franklin, and Bheemarjuna Reddy Tamma, *IEEE Wireless Communications and Networking Conference (WCNC)*, Doha, Qatar, 3-6 April 2016.

Improving Data Quality by Leveraging Statistical Relational Learning, Larysa Visengeriyeva, Alan Akbik, Manohar Kaul, *International Conference on Information Quality (ICIQ)*, 2016.

Efficient Fault-tolerance for Iterative Graph Processing on Distributed Dataflow Systems, Chen Xu, Markus Holzemer, Manohar Kaul, Volker Markl, *IEEE International Conference on Data Engineering (ICDE)*, 2016.

New Lower and Upper Bounds for Shortest Distance Queries on Terrains, Manohar Kaul, Raymond Chi-Wing Wong, Christian S. Jensen, *Proceedings of Very Large Databases (PVLDB)*, 2015.

R-Apriori: An Efficient Apriori based Algorithm on Spark, Sanjay Rathee, Manohar Kaul, Arti Kashyap, PIKM, *Ph.D. student workshop at CIKM*, 2015.

## Funded Research Projects 2015-16

Vineeth N Balasubramanian, *Automatic, Recognition of Hand-drawn Sketches for Learning Environments*, IBM, August 2015, USD 3000.

Vineeth N Balasubramanian, Data Analytics for Security and Surveillance, Govt. of Telangana, August 2015, Rs. 20.0 Lakhs.

Vineeth N Balasubramanian, *Conformal Prediction for Reliable Machine Learning*, DST, December 2015, Rs. 9.8 Lakhs.

Ramakrishna Upadrasta, *Scalable Compiler, Technologies for Modern Heterogeneous Architectures*, AMD, 12K USD.

Ramakrishna Upadrasta, *Compilers for Secure Architectures*, ANURAG, DRDO, Rs. 10.0 Lakhs.

## Talks Given in International / National Conferences

Bheemarjuna Reddy, *Radio Co-location Aware Channel Assignments for Interference Mitigation in Wireless Mesh Networks*, IEEE ICACCI, Kochi, August 2015.

Subrahmanyam Kalyanasundaram, *Introduction to Randomized Algorithms, Invited talk at Research Promotion Workshop for Introduction to Graph and Geometric Algorithms*, University of Kashmir, May 2015.

Subrahmanyam Kalyanasundaram, *Algorithms for Regularity Lemmas, Invited talk, the pre-conference school for CALDAM 2016 cum Indo-Hungarian School on Discrete Mathematics*, Thiruvananthapuram, February 2016.

Statistical Model Checking of Opportunistic Networks, 11th Asian Internet Engineering Conference, 2015), Thailand.

Panduranga Rao, Kanishka Chauhan and Moiez Gohar, *Epidemic Analysis Using Traditional Model Checking and Stochastic Simulation*, Proc. 16th Intl. Conf. on Bioinformatics and Computational Biology, Las Vegas, 2015.

N.R. Aravind, *On the Expressive Power of Read-Once Determinants, Foundations of Computation Theory 2015*, Gdansk, Poland, 18 August 2015.

N.R. Aravind, Parameterized Lower Bound and NP-Completeness of Some H-Free Edge Deletion Problems, 9th Annual International Conference on Combinatorial Optimization and Applications, Houston, U.S.A, 19 December 2015.

V. N. Balasubramanian, *Conformal Prediction, Workshop on Machine Learning*, Central University of Rajasthan, Ajmer, 25 January 2016.

*Kernel SVMs and Beyond,* Workshop on Machine Learning, Central University of Rajasthan, Ajmer, 25 January 2016.

V. N. Balasubramanian, *Deep Learning for Big Data,*

CDAC Workshop on Hadoop for Big Data Analytics, Hyderabad, India, 8 January 2016.

V. N. Balasubramanian, *Model Selection Using Efficiency of Conformal Predictors,* International Symposium on Statistical Learning and Data Sciences, London, UK, 20 April 2015.

Ramakrishna Upadrasta, *Integrating Polly into LLVM Mainstream*, HiPC Academic BoF on Compilation Research using LLVM, in Conjunction with HiPC 2015, Bangalore, 17 December, 2015.

Manish Singh, *DB Explorer: Exploratory Search in Databases*, ACM EDBT, Bordeaux France, 16 March 2016.

Manish Singh, *Information Exploration in E-Commerce Databases*, International Conference on Big Data Analytics, Hyderabad, 18 December 2015.

Kotaro Kataoka, *Moderator, Panel discussion: ICT Preparedness and Application to Natural Disaster, and Role of WIDE*, WIDE Project Meeting, May 2016.

Kotaro Kataoka, *IPv6 Networking*, A Three-day Programme on Migrating to IPv6, Institute for Development and Research in Banking Technology, December 2015.

Antony Franklin, *Load-Aware Dynamic RRH Assignment in Cloud Radio Access Networks*, IEEE Wireless Communications and Networking Conference (WCNC), Doha, Qatar, 3-6 April 2016.

## Workshops / Symposiums Organised

*Conformal Prediction for Reliable Machine Learning*, DST-EPSRC Indo-UK Initiative for Applied Mathematics, 15-18 December 2015, Hyderabad, India http://www.iith.ac.in/~vineethnb/indoukworkshop2015/index.html

## Awards / Recognitions

Visvesvaraya Young Faculty Research Fellowship award for 2016-2020, *Bheemarjuna Reddy Tamma*.

Best Paper award at IEEE ICACCI 2015 conference for the paper titled Radio Co-Location Aware Channel Assignments for Interference Mitigation in Wireless Mesh Networks, *Bheemarjuna Reddy Tamma*.

The Heterogeneous Compilers for Modern Architectures team of IITH has been designated as a Collaborating Partner of Polly Labs (http://pollylabs.org), an international initiative to help promote Polyhedral Compilation in the LLVM Compiler, Ramakrishna Upadrasta.

Polly as an Analysis Pass in LLVM. Cash award of $5,500 as stipend for exposing the analysis of Polyhedral Compilation into the LLVM compiler. Student proposal accepted into the Google Summer of Code (GSoC) 2016, Ramakrishna Upadrasta and Utpal Bora.

Cutting-edge Research towards Next Generation ICT in Collaboration of India and Japan under SAKURA Exchange Program in Science, Japan Science and Technology Agency (JST), JPY 1,417,350 for Research Internship at The University of Tokyo, Japan for 4 IIT Hyderabad students, Duration, 28 February - 13 March 2016. Fund received and executed by The University of Tokyo, *Kotaro Kataoka*.

## Invited Presentations

Invited Talk by Dr. Saurabh Joshi, Property-Driven Fence Insertion using Reorder Bounded Model Checking, 20 May 2015.

Invited talk by Dr. Sujit Gujar from Écolepolytechniquefédérale de Lausanne (EPFL), Mechanism Design for heterogeneous resource allocation with strategic agents 6 July.

Invited Talk by Prof. Kesav Nori on Vernacular Programming Languages And A Programming Paradigm Inspired by Panini's linguistic insights And Hoare's Grand Challenge.

Invited Talk by Dr. Mahima Agumbe Suresh on Tackling Communication and Control Challenges for Cyber Physical Infrastructures.

Invited Talk by Dr. Sunil Sherlekar on Basic Research, IP Protection & Startups: What We Should Do in India.

Invited Talk by Dr. Naresh Manwani on Learning in presence of noise.

Invited Talk by Dr. Rahul Nagpal on Energy Optimization for Clustered VLIW Processors.

Invited Talk by Prasanth Chatarasi on Polyhedral Optimizations of Explicitly Parallel Programs.

Invited talk by Dr. Parasara Duggirala on Dynamic Analysis of Cyber-Physical Systems.

Invited talk by Professor Ravi Vatrapu on Social Set Analysis: A Set-Theoretical Approach to Computational Social Science.

Invited Talk by Mainack Mondal: Managing user privacy in online social networks.

Invited Talk by Dr. Manish Gupta: Community-based outlier detection from networks.

Invited Talk by Dr. Balaji Raman: Stochastic

Models for System-Level Performance Analysis of Multimedia Embedded Systems.

Invited Talk by Dr. Anand Mishra: Understanding Text in Scene Images.

Invited Talk by Prof. Rodney Van Meter on Networks of Networks of Quantum Repeaters.

Invited Talk by Chetan Verma on Automated Web Video Classification.

Invited Talk by Prof. Sanjay Rajopadhye: 'Simplifying Reductions'.

Internet: Past, Present and Future - Focusing on The Other Billion -, Prof. Kilnam Chon, Keio University / KAIST, 29 December 2015 at IIT Hyderabad.

Hop-by-Hop Reliable, Parallel Message Propagation for Intermittently Connected Mesh Networks, Prof. Hideya Ochiai, The University of Tokyo, 28 September 2015 at IIT Hyderabad.

Cooperative ITS to Support Autonomous Driving, Prof. Manabu Tsukada, The University of Tokyo, 28 September 2015 at IIT Hyderabad.

Networks of Networks of Quantum Repeaters, Prof. Rodney Van Meter from Keio University, 25 September 2015 at IIT Hyderabad.

The Polyhedral Model: Past Present and Future, Prof. Sanjay Rajopadhye, Professor, Colorado State University, USA, 3 August, 2015.

High performance parallel computing software: from basics to exa-scale technology, Prof. Reiji Suda, University of Tokyo, Japan, 4 November, 2015.

Polyhedral Compilation with PENCIL: A Platform-Neutral Compute Intermediate Language for Accelerator Programming, Prof. Albert Cohen, INRIA Senior Research Scientist, ÉcoleNormaleSupérieure, Paris, France, 23 November, 2015.

Automatic Video Mashup Techniques for Multimedia Systems, Dr. Mukesh Saini, University of Ottawa / New York University Abu Dhabi, 14 December 2015.

The Latent Power of Absurd Ideas aka Robust Query Processing, Professor Jayant Haritsa, Professor at Indian Institute of Science (IISc), Bengaluru, India, 4 November 2015.

High Quality Search: Ranking Models and System Design, Dr. Jiaul Paik, Postdoctoral researcher at the University of Maryland, College Park, USA, 26 August 2015.

## Other Events Organised

Connect IITH 2015, August 25th, 2015 http://friendship.iith.ac.in/?page_id=324

IITH-UoT Student Meeting, September 28th-29th, 2015 http://friendship.iith.ac.in/?page_id=427

Japanese Lectures for FRIENDSHIP Scholars, Instructor: Yuka Kataoka, Duration: 1st batch - 3 days in July, 2nd batch - 3 days in August, 2015

i.school Workshop on Experience Design in India, Collaboration with i.school @ Univ of Tokyo, 20-21 Feb 2016

Special Lecture by Prof. Kilnamhttps://goo.gl/photos/NKrQZ5nSwXhivs6Y9.

Special Lecture by Prof. Rodhttps://goo.gl/photos/cFCH8m1VbCx2mvSi6.

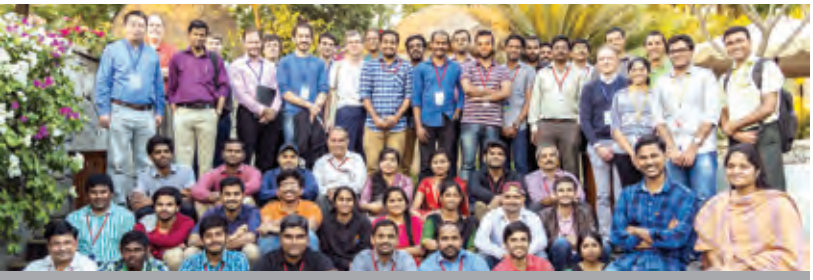
IITH-UoT Student Meeting, Special Lectures by Profs. Ochiai and Tsukadahttps://goo.gl/photos/cPBhETEWaEGLCnsX8; https://goo.gl/photos/dzonP6xk5YeAkptu5.

Connect IITH and other meetingshttps://goo.gl/photos/xWvwtW9fyjfSNNpbA.

Advanced Network Engineering by AlliedTelesishttps://goo.gl/photos/yr9Xe5JYSGmmD7Lp6.

LA1210 by Yuka Kataokahttps://goo.gl/photos/y1T8LZCKunzYz1Bt8https://goo.gl/photos/pbLKyyBTquAJRvH56.

Japanese Lectures for FRIENDSHIP Scholarshttps://goo.gl/photos/5FQsJ867d1TM8Mz79https://goo.gl/photos/BshVFADrym5Xpc458



*IndoUK Workshop - December 2015 - VNB*

*NMS Research Group Inauguration on 1st January 2016*

# DESIGN

The youngest department at IIT Hyderabad, Design currently offers two postgraduate degrees: Master of Design (MDes) and Ph.D in Design. MDes is a full-time two-year program providing a broad-based understanding of design along with student-driven specializations in varied domains. The MDes in Visual Design, began in July 2014, focuses on creative thinking, building elements and history of Design from a predominantly visual perspective. Additional specialized courses allow students to diversify into domains like interaction design, experience design, moving images, contemporary photography, design education, design for well-being, collaborative design, urban environments, managing creative industries, and mobility design.

Ph.D in Design provides a unique platform to pursue practice-based and practice-led research in art, design, culture, creative practices and related areas. The doctoral program aims to infuse the practice-oriented spirit into research in/through/on design, alongside other more traditional modes of doing research in design. The department plans to intervene creatively in the space between technologies and people. This involves engaging in key emerging areas such as: adapting technology to socio-cultural needs, enabling of rights-based and equitable development work, user-operated technologies, participatory and collaborative design, professional ethics /
sustainability, product systems and services, design and education, wellness and crowd-sourced design.

In 2016, the Department of Design has launched a Design Innovation Centre with the support of Ministry of Human Resource Development, which focuses on design research and design innovation. A Current project under the Design Innovation Centre is Digital preservation of tangible and intangible Heritage.

# F A C U L T Y

**Deepak John Mathew**
Ph.D - MS University of Baroda
***Associate Professor & HoD***

*Research Areas*: Photography, Elements of design, Aesthetics, History of Design

**Prasad S. Onkar**
Ph.D - IISc Bangalore
***Assistant Professor***

*Research Areas*: Product Design, Computer Aided Conceptual Design, 3D Sketching, Virtual reality, Haptics, Collaborative Design, Interactions design and Kinematics.

**Neelakantan P K**
Ph.D ongoing at IIT Bombay
***Assistant Professor***

*Research Areas*: Architectural Design

## Publications
### (In Peer-Reviewed Journals)

Article on 'Fish and Bridge, Deepak John Mathew, *IA&B*, December, 2015.

Photo essay in 'Exteriors and Facades of Kamakura' Deepak John Mathew, *Indian Architecture and Builder*, November 2015.

'Doob Gaya Flum Duba Diya Hum ne,' photo essay, Deepak John Mathew, *IA&B*, June, 2015.

Controlled direct 3D sketching with haptic and motion constraints, Prasad S. Onkar and Dibakar Sen, *International Journal of Computer Aided Engineering and Technology (IJCAET)*, Vol. 8, No. 1/2, 2016.

## Publications
## (In Peer-Reviewed Conferences)

Immersive virtual reality to enhance the spatial awareness of students, Fabin Rasheed, Prasad Onkar, and Marisha Narula, 2015, *proceedings of the 7th International Conference on HCI*, IndiaHCI, 17-19 December 2015 (IndiaHCI'15).

## Invited Lectures

Deepak John Mathew, 'Documentary Photographs,' workshop at M.S. University of Baroda, 2015.

Deepak John Mathew , 'Alternative Photography Techniques and Imaging,' workshop and lecture at College of Fine Arts, Trivandrum, 2015.

Deepak John Mathew , 'Documentary Photography,' lecture series at College of Fine Arts Trissur, 2015.

Deepak John Mathew, Invited Artist at Pune Biennale, 2015.

Deepak John Mathew, Invited Artist (group show) at Birla Academy of Art and Design, 2015.

## Workshops / Symposiums Organised

'Experimental Design Education - Hyper Werk as a laboratory for Learning and Researching,' by Anka Falk, Lead, Hyder Werk, Academy of Art and Design Basel, Switzerland, 8 October 2015.

'How Designers Think: Product Design at the Base and the Top of the World Income Pyramid,' by Santosh Jagtap, Assistant Professor of Industrial Design in the Department of Design Sciences, Lund University, Sweden, 3 September 2015.

'To exclaim or to explain!' by Sameer Sahasrabudhe, Researcher, Tata Institute of Social Science, Mumbai, 5 October 2015.

'Meaning and Design: On Names,' by Prof. Madhava Prasad, 10 February 2015.

'Sculpture and Mural,' workshop and seminarby Jagruti Dutta, renowned sculptor from Baroda, 2015.

'Cinema,' workshop and seminar, Sanu John Varghese, camera person from Bollywood cinema, 2015.

'Newspaper making,' workshop, Amitlal, editor, Indian Express, New Delhi, 2015.

'Script writing and Story-telling in graphic novels,' Prof. Prakash Moorthy, Professor and HOD, Srishti Institute of Art, Design & Technology, Bangalore, 2016.

'On Cinema,' seminar and talk by S.B. Saxena, National Institute of Design, Ahmedabad, 2016.

'Graphic Design,' seminar and talk by Prof. Anil Sinha, National Institute of Design, Ahmedabad, 2016.

'Typography,' seminar and talk by Nevin John, Deloitte, 2016.

'Calligraphy,' by Prof. Santosh, J.J. School of Art, Mumbai, 2016.

## Awards / Recognitions

Shijith V.P., Ph.D. Guide: Dr. Deepak John Mathew.

Photography Exhibition at Lalitkala Akademy Art Galley, Kozhikode, May, 2015, Group Exhibitions at Lalitkala Akademy Art Galleries Kozhikode and Malappuram, 2015 and 2016 , Photography Exhibition with famous Polish Photographer at IIT Hyderabad.

Photography Special Jury Award from Kerala, 2016.

Fabin Rasheed and Marisha Narula (MDes) guided by Dr. Prasad Onkar Academic Excellence, Research Excellence, DST-Lockheed Martin Top 30 Innovations. One among the innovators to present in the presence of the Vice President of India during National Conference on Social Innovation.

Anandakrishnan S.K (Ph.D), Guide: Dr. Deepak John Mathew participated at the Clipboard Art Exhibition, August, 2015, Kochi and Life Caleidoscope, May 2015, Delhi.

Pallavi Verma (MDes) got selected as one amongst 20 students innovators all over the World in Tokyo summer innovation programme, The University of Tokyo, and Academic Excellence, Award Jan-May and Aug-Dec 2015 and was invited as board member/staff for Tokyo summer innovation programme, 2016

Seemant Chourey (MDes), Co Design Initiative with Konda Reddy Community- Nominated for NDTV Design Awards, 2015.

*Talk by Dr. Mathai Fenn on visual imagination*

*Seminar Talk on Typography by Rupesh Vyas*

*Seminar talk by Anika from Germany*

*Seminar talk by Sahasrabudhe on interaction design*

Clay modeling workshop by Jagruti Dutta.

Power of Hands - photo essay by Deepak John Mathew

Action Drawing Organised by the Department of Design

Action drawing class by Deepak John Mathew

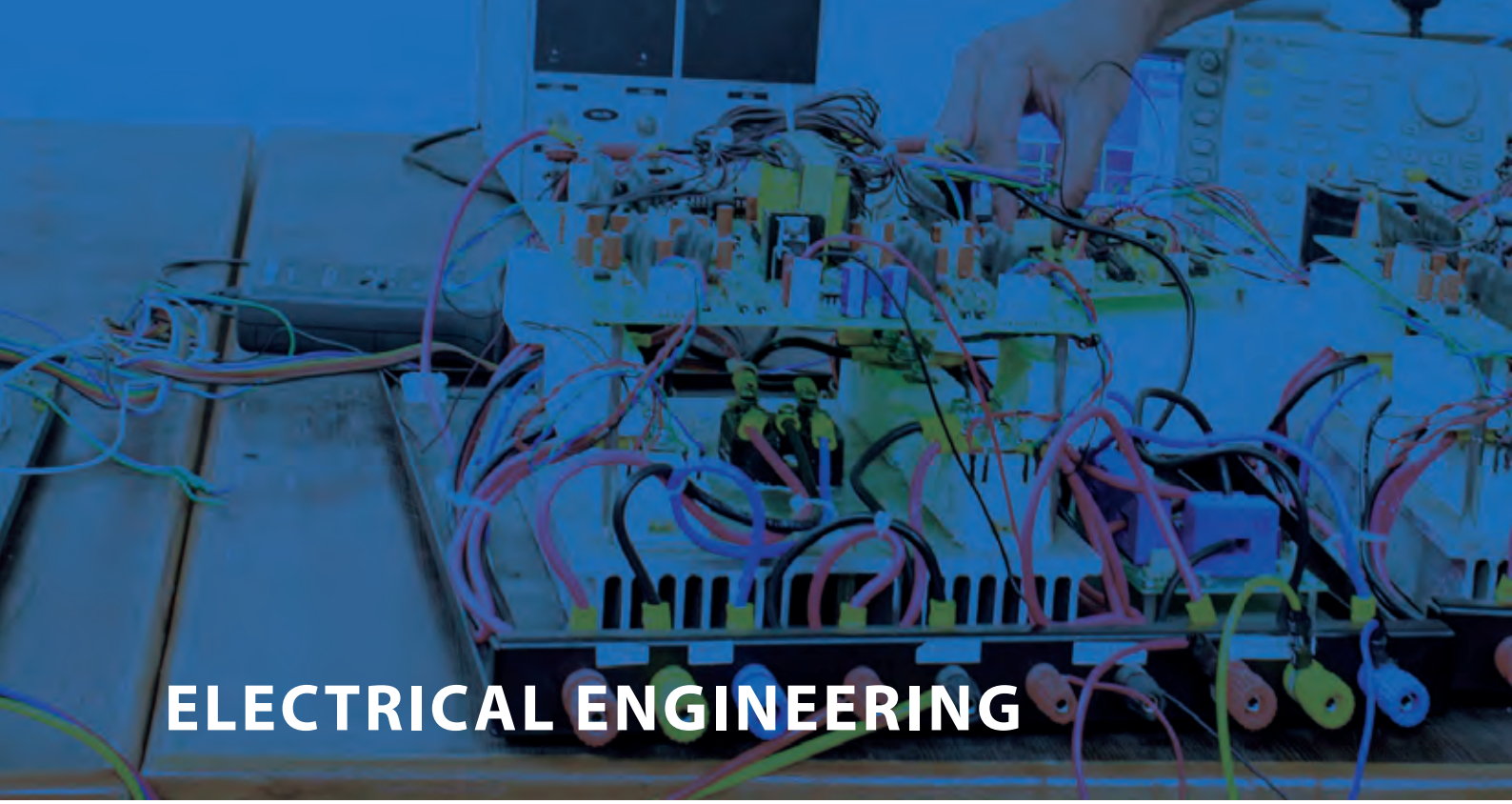
Prahlad Tippaniya at Design department

*Photo workshop by Deepak John Mathew*

*Exhibition by DJM in Ahmedabad*

*Birla Akademi Exhibition by Deepak John Mathew*

*Jayachandran palazhi - lecture demo at Design department*



# ELECTRICAL ENGINEERING

The Department of Electrical Engineering (EE) at IIT Hyderabad offers a vibrant environment for under graduate, post graduate education and research in many areas of Electrical Engineering. This is one of the earliest department started in IITH. Faculty members of the department are engaged in cutting edge technology research and also very passionate about teaching. The department currently has 18 faculty, 3 staff and 328 (B.Tech - 178, M.Tech - 89 and Ph.D - 61) students. The broad areas of research which are the focus of the department are as follows:

- Microelectronics and VLSI (Micro): The main thrust of this group is on affordability, low power and portability. The goal is to push the limits of silicon in achieving the above as well as being on the frontier of new viable technologies. The research areas that are focused on are 3-D ICs, Analog/RF IC design, Micro scale Energy Harvesting, Pervasive Computing, Data acquisition systems, Biosensors development.
- Communications and Signal Processing (CSP): The main research areas of this group are Cooperative Communication, Speech and Multi-Media Signal Processing, Source Coding, Space-Time Coding, Information Theory, Cognitive Radio/Radar, Cyber Physical Systems, Image and Video Quality Assessment.
- Power Electronics and Power Systems (PEPS):The main research areas of this group are Smart Grids, Micro Grids, Power System Dynamics, Multilevel Inverters, Switched Mode Power Conversion, Wide Area Monitoring, Protection and Control, Information Technology Architectures, Common Information Model (CIM).
- Systems and Control (Syscon): The main research areas of this group are Identification and Estimation, Fault Diagnosis, Micro Grid/ Smart Grid, Advanced Control applications, Statistical Process Monitoring and Control.

# F A C U L T Y

**Mohammed Zafar Alikhan**
Ph.D - IISc Bangalore

***Professor & HoD***

*Research Areas*: Space-time coding, Space-time signal processing, Joint Baseband-RF optimization, Software defined radio, Cognitive radio and cyber physical systems

**UB Desai**
Ph.D - Johns Hopkins, USA

***Professor***

*Research Areas*: Wireless Communication and Signal Processing

**Vaskar Sarkar**
Ph.D - IIT Bombay

***Assistant Professor***

*Research Areas*: Power Market, Demand Side Management, Wide Area Monitoring and Control, Microgrid, Grid Integration of PV system

**Amit Acharyya**
Ph.D - University of Southampton, UK

***Assistant Professor***

*Research Areas*: Signal Processing Algorithm and VLSI Architectures, VLSI systems for next generation healthcare systems, Low Power Design Technique, Electronic Aspects of Pervasive Computing, Bio-informatics, Digital Arithmetic, Linear Algebra, Numerical Analysis, Computer-aided designs, VLSI for Communication systems

**Shiv Govindsingh**
Ph.D - IIT Bombay

***Associate Professor***

*Research Areas*: 3D IC Technology, Characterization Micro/Nano fluidics, Electronics cooling, Solar cell

**Sri Rama Murty Kodukula**
Ph.D - IIT Madras

***Assistant Professor***

*Research Areas*: Signal Processing, Speech Analysis, Pattern Recognition and Deep Learning

**K. Siva Kumar**
Ph.D - IISc Bangalore

***Assistant Professor***

*Research Areas*: Multilevel inverters, open-end winding induction motor drives, Microgrids, Power quality and control

**Ketan Detroja**
Ph.D - IIT Bombay

***Associate Professor***

*Research Areas*: Advanced Process Control, Quality control, Fault detection and diagnosis, Co-operative Control

**Soumya Jana**
Ph.D - UIUC, USA

***Assistant Professor***

*Research Areas*: Biomedical image analysis, Telecardiology, Smart camera networks, Multimedia signal processing, 3D/4D media content generation, Real time information theory, Stochastic spatio-temporal modeling, Monte Carlo inference

**Ashudeb Dutta**
Ph.D - IIT Kharagpur

***Assistant Professor***

*Research Areas*: Analog and Radio Frequency circuit design, Energy Harvesting and Biomedical circuit design

**Kuchi Kiran Kumar**
Ph.D - University of Texas at Arlington, USA

***Associate Professor***

*Research Areas*: 5G, wireless communication, signal processing

**P. Rajalakshmi**
Ph.D - IIT Madras

***Associate Professor***

*Research Areas*: Wireless Communications, IoT/CPS, Sensor Networks, Embedded Systems

# F A C U L T Y

**G. V. V. Sharma**
Ph.D - IIT Bombay
***Assistant Professor***

*Research Areas*: Communication, Signal Processing, Photonics, Circuits

**Sumohana S. Channappayya**
Ph.D - The University of Texas at Austin, USA
***Assistant Professor***

*Research Areas*: Image and Video Quality Assessment, Multimedia Communication, Biomedical Image Processing

**Shiva Ramakrishna Vanjari**
Ph.D - IISc, Bangalore
***Assistant Professor***

*Research Areas*: Biosensors, BioMEMS, CMOS Sensors

**Ravikumar Bhimasingu**
Ph.D - IISc Bangalore
***Assistant Professor***

*Research Areas*: Computer-aided power system analysis and modeling, AI techniques applications for power systems security improvement, Power System protection and optimization, Distribution system automation, Wide Area Monitoring, Protection and Control, Protection and Control of Micro Grids

**Yemula Pradeep Kumar**
Ph.D - IIT Bombay
***Assistant Professor***

*Research Areas*: Smart Grids, Demand Response, Interoperability, IT Architectures for Power Systems, Renewable Energy

**Sushmee Badhulika**
Ph.D - University of California, USA
***Assistant Professor***

*Research Areas*: Nanoelectronics, flexible electronics, paper based electronics, electrochemical sensors

**Abhinav Kumar**
Ph.D - IIT Delhi
***Assistant Professor***

*Research Areas*: Resource allocation, Wireless Communications and Networking, Device-to-Device Communications, LTE-U, IoT, Energy efficient communications

**Swati Gupta**
Ph.D - University of Strathclyde, UK
***Assistant Professor***

*Research Areas*: Organic thin-film transistors, Organic solar cells, Flexible electronics, Transition metal oxide thin-film transistors

**Kaushik Nayak**
Ph.D - IIT Bombay
***Assistant Professor***

*Research Areas*: Device Electronics, Nano-electronics, Physical and Wave Electronics

## DISTINGUISHED VISITING FACULTY

**Mathukumalli Vidyasagar**
The University of Texas at Dallas

*Teaching Subjects*: EE5420 - Introduction to Compressed Sensing, EE5430 - Compressed Sensing, EE5410 - Nonlinear Control Theory

## VISITING FACULTY

**Y Ramesh**
Electrical & Computer Engineering,The University of Texas at Austin

**S. K. Nandy**
Supercomputer Education and Research Centre, Indian Institute of Science, Bengalore, India

## CEP Courses Organised

Mohammed Zafar Ali Khan, GIAN course on Contemporary Radar System Design and Signal Processing by Prof. Amit Mishra, University of Cape Town

## Patents Filed

Sreekanth Dama, Kiran Kuchi, Abhinav Kumar, Thomas, Bheemarjun Reddy Tamma, Method for Accessing a Channel in a Wireless Communication Network, Provisional, 689/CHE/2015, 7 April 2015.

Sreekanth Dama, Kiran Kuchi, Abhinav Kumar, Thomas, Bheemarjun Reddy Tamma, Method for Accessing a Channel in a Wireless Communication Network, US application, 15018571, (Priority from 689/CHE/2015), 9 February 2016.

Kiran Kuchi, Method and System for Generalized-DFT-precoded-OFDM to Design a Waveform with Low PAPR, Provisional, 2196/CHE/2015, 29 April 2015.

Kiran Kuchi, Method and System for Generalized-DFT-precoded-OFDM to Design a Waveform with Low PAPR, PCT, PCT/IB2015/055381, 25 August 2015.

Kiran Kuchi, Method and System for Pilot Transmission with Low Peak to Average Power, Provisional, Application No 3316/CHE/2015, 30 June 2015.

Kiran Kuchi, Shahriar Emami, Method and Apparatus for a Cluster Specific CSI Feedback, PCT, US 14/616, 268.

Thomas V.S., Bheemarjun Reddy Tamma, Antony Fanklin, Traffic steering in aggregated LTE-Wi-Fi Networks by 4th September, Provisional, 4705/CHE/2015, 4 September 2015.

Sreekanth Dama, Thomas Valerrian Pasca, Vanlin Sathya, Bheemarjun Reddy Tamma, A RACH Procedure for C-IoT Devices, Provisional, 24 October 2015.

Kiran Kuchi, Method and Apparatus for Synchronization, Provisional, 5712/CHE/2015, 5 October 2015.

Kiran Kuchi, Method and System of Pre-Coding a Waveform for Synchronization in A Communication Network, Indian patent, 201641000827, 8 January 2016.

Kiran Kuchi, Method and System for Transmitting and Receiving a Waveform with Low PAPR, Indian patent, 201641000865, 9 January 2016.

Kiran Kuchi, Method and apparatus for Reducing Phase Discontinuities in A Tone Phase Shift Keying, Provisional patent, application 201641005999, 22 February 2016.

Kiran Kuchi, Method and System of Pre-Coding a Waveform in A Communication Network, Provisional patent application, 201641006273, 23 February 2016.

Kiran Kuchi, Method and System of Pre-Coding a Wave form for Synchronization in a Communication Network, Patent of Addition for Indian Patent Application No. 201641000827, 19 February 2016.

Kiran Kuchi, Method and System of Pre-Coding a Waveform for Synchronization in a Communication Network, Indian patent, 201641000827, 8 January 2016.

Kiran Kuchi, Method and System for Transmitting and Receiving a Wave form with low PAPR, Indian patent, 201641000865, 9 January 2016.

Kiran Kuchi, Method and Apparatus for Reducing Phase Discontinuities in A Tone Phase Shift Keying, Provisional, 201641005999, 22 February 2016.

Kiran Kuchi, Method and System of Pre-Coding a Waveform in a Communication Network, Provisional, 201641006273, 23 February 2016.

Kiran Kuchi, Method and System of Pre-Coding a Waveform for Synchronization in a Communication Network, Indian Patent of addition, 201643005867, 19 February 2016.

Kiran Kuchi, Interference Cancellation Enhancement In Hetnets Through Coordinated Simo/Mimo Interference Codes, US application, 14890461 (Priority from 2160/CHE/2013), 11 November 2015.

Kiran Kuchi, Method for scheduling a single tone demodulation pilot transmission in a wireless communication network, US application, 3316/CHE/2015 cognate with 6601/CHE/2015, 7 January 16.

Kiran Kuchi, Method and apparatus for synchronization using single tone pilots, Provisional Application, 201641000785, 8 January 16.

Kiran Kuchi, Method for synchronization using single tone synchronization pilots, Provisional to Complete Application, 201641000785, 14 January 2016.

P. Rajalakshmi, U. B. Desai, R. Thirumurugan, Akshay Jhadav, Ultra-compact Internet of Things (Iot) enabled power monitoring module, Appln. No. 5376/CHE/2015, 7 October 2015.

## Books / Chapters

Progress in Systems Engineering, Proceedings of the Twenty-Third International Conference on Systems Engineering, Advances in Intelligent Systems and Computing, Henry Selvaraj, Dawid Zydek, Grzegorz Chmaj, Springer International Publishing, 2015, Switzerland, 10.1007/978-3-319-08422-0_57.

## Publications
### (In Peer-Reviewed Journals)

An Efficient Direct Solution of Cave-Filling Problems, K. Naidu, Mohammed Zafar Ali Khanand L. Hanzo, *IEEE Transactions on Communications*, 99, 1-14 (2016).

Achievable Rates of Underlay Based Cognitive Radio Operating Under Rate Limitation, A. Patel, Mohammed Zafar Ali Khan, S. Merchant, U. Desai and L. Hanzo, *IEEE Transactions on Vehicular Technology*, 99, 1-23 (2015).

A Novel LMMSE based Optimized Pervez-Vega Zamanillo Propagation Path Loss Model in UHF/ VHF Bands for India, Bolli Sridhar and Mohammed Zafar Ali Khan, *Progress in Electromagnetic Review*, 63, 17-33 (2015).

Fast Computation of Generalized Water-Filling Problems, K. Naidu and Mohammed Zafar Ali Khan, *IEEE Signal Processing Letters*, 22 (11), 1884-1887 (2015).

Generalised analytical framework for the stability studies of an AC microgrid, K. Manjunath and V. Sarkar, *IET J. Eng.,* 10.1049/joe.2016.0045.

Frank Vectorcardiographic system from Standard 12 lead ECG: An effort to enhance cardiovascular diagnosis, S. Maheswari, A. Acharyya, M. Schiarity and P. E. Puddu, *Journal of Electrocardiology*, 231-242, (2015).

A Robust Reliable and Low Complexity on chip f-QRS Detection and Identification Architecture for Remote Personalized Health Care Applications, N. Vemishetty, A. Jain, A. Amber, S. Maheswari, A. Jagirdar and A. Acharyya, *Journal of Low Power Electronics*, American Scientific Publishers, 11 (3), (2015).

Graphene heals thy cracks, Computational Materials Science, S. D. Bhattacherjee, V. P. K. Miriyala, K. V. Shekhar, S. G. Acharyya and A. Acharyya, *Elsevier*, 84-89 (2015).

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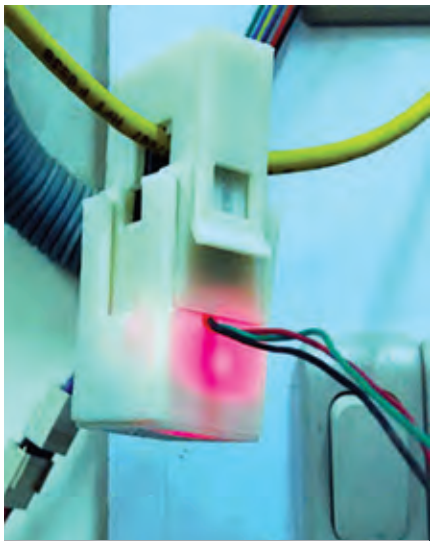

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A Novel Soft Lithography Approach for Fabricating Carbon Nano Tube Based Flexible Three Dimensional Microelectrode Tip Array for Functional Electrical Stimulation Applications, G D V Santosh Kumar, Mohan Raghavan, Siva Rama Krishna Vanjari, *International Workshop on Physics of Semiconductor Devices (IWPSD)*, IISc Bangalore, 7-10 December 2015.

Free Standing, Ultra-smooth, Sacrificial Layer Independent SU-8 Membranes for MEMS applications, Jose Joseph, Shiv Govind Singh, Siva Rama Krishna Vanjari, *International Workshop on Physics of Semiconductor Devices (IWPSD)*, IISc Bangalore, 7-10 December 2015.

Optimized ultra-thin Ti Passivation for achieving high quality fine pitch bump less Cu-Cu Wafer-on-Wafer bonding at $175^0$ C, Asisa Kumar Panigrahi, Satish Bonam, Siva Rama Krishna Vanjari, Shiv Govind Singh, *International Workshop on Physics of Semiconductor Devices (IWPSD)*, IISc Bangalore, 7-10 December 2015.

Highly Conductive Carbon doped Zinc Oxide Electrospun nanofibers for sensing applications, Brince Paul, Durga Prakash, Shiv Govind Singh, Siva Rama Krishna Vanjari, *International Workshop on Physics of Semiconductor Devices (IWPSD)*, IISc Bangalore, 7-10 December 2015.

Microfabrication of Hydrophilic SU-8 Micro-beam for Bio/Chemical Sensing Applications, Srinivasan B, Siva Rama Krishna Vanjari, Shiv Govind Singh, *International Workshop on Physics of Semiconductor Devices (IWPSD)*, IISc Bangalore, 7-10 December 2015.

Highly sensitive SAM modified electrospun zinc oxide nanofiber based label free biosensing platform. Brince Paul, Durga Prakash, Shiv Govind Singh and Siva Rama Krishna Vanjari, *IEEE SENSORS, 2015*, 1-4., Busan, South Korea.

A low power, area efficient fpga based beam forming technique for 1-D CMUT arrays, Bastin Joseph, Jose Joseph, Siva Rama Krishna Vanjari, *IEEE 37th Annual International Conference on Engineering in Medicine and Biology Society (EMBC)*, 2015, 4371-4374, 2015, Milan, Italy.

Fabrication of SU-8 based Capacitive Micromachined Ultrasonic Transducer for low frequency therapeutic applications, Jose Joseph, Shiv Govind Singh, Siva Rama Krishna Vanjari, *IEEE 37th Annual International Conference on Engineering in Medicine and Biology Society (EMBC)*, 2015, 4371-4374, 2015, Milan, Italy.

Room temperature desorption of Self Assembled Monolayer from Copper surface for low temperature and low pressure thermocompression bonding, Tamal Ghosh, E Krushnamurthy, Ch Subrahmanyam, Asudeb Dutta, Siva Rama Krishna Vanjari, Shiv Govind Singh, *IEEE 65th Electronic Components and Technology Conference (ECTC)*, 2200 -2204, May 26-29, SanDiego, USA.

Low temperature, low pressure CMOS compatible Cu-Cu thermo-compression bonding with Ti passivation for 3D IC integration, Asisa Kumar Panigrahi, Satish Bonam, Siva Rama Krishna Vanjari, Shiv Govind Singh, *IEEE 65th Electronic Components and Technology Conference (ECTC),* SanDiego, USA, 2200-2204, 26-29 May.

Improving Resiliency in Renewable Energy Based Green Microgrids Using Virtual Synchronous Machines Controlled Inverter, Y. V. Pavan Kumar, Ravikumar Bhimasingu, *Proc. of IEEE Power and Energy Society International Conference on Innovative Smart Grid Technologies Asia 2015 (ISGT Asia)*, Bangkok, Thailand, 1-6, November 2015, 10.1109/ISGT-Asia.2015.7387178).

Refined Hybrid Microgrid Architecture for the Improvement of Voltage Profile, Pinjala

Mohana Kishore, Ravikumar Bhimasingu, *Proc. of 5th International Conference on Advances In Energy Research (ICAER-2015)*, Indian Institute of Technology Bombay (IITB), Mumbai, India, December 2015.

Fast Identification of Fault Location with Fault Passage Indicators under Network Reconfiguration, Pradeep Yemulaand Viplav Chaitanya, *India Smart Grid Week (ISGW) 2015*, March 2015.

Techno-Economic Analysis of Off-Grid Rooftop Solar PV System, Piyush Sharma, Haranath Bojjam and Pradeep Yemula, *16th IEEE International Conference on Power Systems (ICPS)*, New Delhi, March 2016.

Survey of Smart City Frameworks, Charan Teja S, Pradeep Kumar Yemula, *India Smart Grid Week (ISGW) 2016*, March 2016.

eTVSQ based Video Rate Adaptation in Cellular Networks With alpha-Fair Resource Allocation, N. Eswara, S. Channappayya, A. Kumarand K. Kuchi, *IEEE WCNC 2016*.

Key Exchange Protocols for Secure Device-to-Device Communications in 5G, R. Sedidi and A. Kumar, *Wireless Days, 2016*.

Base Station Switching WithCoMP in Cellular Networks, Yoghitha Rand A. Kumar, *NCC 2016*.

Fuzzy logic based cell selection framework for downlink uplink decoupled cellular networks, S. Sandeep Kumar, A. Kumarand K. Detroja, *NCC 2016*.

Energy efficient rate coverage with base stations switching and load sharing in cellular networks, S. Sandeep Kumar and A. Kumar, *COMSNETS 2016*.

Large-Area Tactile Skins Prepared with Thin-Film Technology, A.P. Gerratt, H.O. Michaud, S. Gupta, and S.P. Lacour, *SID Display week*, San Francisco 2016, doi: 10.1002/sdtp.10767.

## Funded Research Projects 2015-16

Mohammed Zafar Alikhan, *TVWS Trials Deity,* 18 March 2015, Rs. 30.9 Lakhs.

Amit Acharyya, *Indigenous Hybrid Sensor and Processing Integration Technology Development for Defence System on Chip Applications*, DRDO, March, 2016, Rs. 99.7 Lakhs.

Amit Acharyya, *Design of FPGA based AFDX switch and implementation on NETFPGA*, RCI, DRDO, December 2015, Rs. 9.9 Lakhs.

Kuchi Kiran Kumar, *5G Research and Building Next Gen Solutions for Indian Market,* Deity, 24 September 2015, Rs. 637 Lakhs.

S. Badhulika, *Low cost, low power water purification technique using Graphene based electrode*; SERB, DST; Government of India, 2015-2018, Rs. 32 lakhs.

Kuchi Kiran Kumar, *Converged Cloud Communication Technologies*, Deity, 27 June 2014, Rs. 95.0 Lakhs.

G. V. V. Sharma, *Pandit Madan Mohan Malaviya National Mission on Teachers and Training*, MHRD, December 2015, Rs. 100.0 Lakhs.

## Talks Given In International / National Conferences

V. Sarkar, *Integration of Renewable Driven Distributed Generations through Microgrid*, National Power System Conference, A.U. College of Engineering, 25 September 2015.

K. Sivakumar, *Five level single phase inverter scheme with fault tolerance for islanded photovoltaic applications*, International Conference on Information Technology and Electrical Engineering, Chiang Mai, 29-30 October 2015.

Detroja K. P., *Microgrid Economy Through Optimal Design*, the 2nd Indian Control Conference, Hyderabad, 4-6 January 2016.

Detroja K. P., *Model-Based Stator Interturn Short-circuit Fault Detection and Diagnosis in Induction Motors*, the 7th International Conference on Information Technology and Electrical Engineering, Chiang Mai, 29-30 October 2015.

*TPSK Design for Three Tone Allocation*, 3GPP TSG-RAN WG1 Meeting, R1-160730, Mlata, Source:IITH, CEWiT, Reliance-Jio, 15–19 February 2016.

*NB-PSS Design*, 3GPP TSG-RAN WG1 Meeting, 1-160729, Malata, Source: IITH, CEWiT, Reliance-Jio, 15–19 February 2016.

*Design Options for Uplink Modulation and Reference Signals*, 3GPP TSG-RAN WG1 NB-IoT Ad-Hoc Meeting, R1-160070, Budapest, Hungary, Source: IITH, CEWiT, Reliance-Jio, 18-20 January 2016.

*Design considerations for DL Reference Signals*, 3GPP TSG-RAN WG1 NB-IoT Ad-Hoc Meeting, R1-160068, Budapest, Hungary, Source: IITH, CEWiT, Reliance-Jio, 18-20 January 2016.

*Design Options for NB-PSS and NB-SS*, 3GPP TSG-RAN WG1 NB-IoT Ad-Hoc Meeting, R1-160066, Budapest, Hungary, Source: IITH, CEWiT, Reliance-Jio, 18-20 January 2016.

*Design Considerations for NB-PBCH and NB-PDCCH*, 3GPP TSG-RAN WG1 NB-IoT Ad-Hoc Meeting R1-160065, Budapest, Hungary, Source: IITH, CEWiT, Reliance-Jio, 18-20 January 2016.

*Prioritization of NB-IoT in TDD bands*, 3GPP TSG-RAN WG1 NB-IoTAdhocR1-160174, Budapest, Hungary,

Source: Reliance Jio, CEWiT, IITH, 18–20 January 2016.

*Guidelines for NB Primary Synchronization Sequence Design*, 3GPP TSG-RAN WG1#82 R1-156123, Malmo, Sweden, Source: IITH, CEWiT, RIL-Jio, IITB, 5–9 October 2015.

*Generalized Precoded OFDMA (GPO) – a SCFDMA variant for achieving near unit PAPR and low out of band emission*, 3GPP TSG-RAN WG1#82 R1-156093, Malmo, Sweden, Source:IITH, CEWiT, RIL-Jio, IITB, 5–9 October 2015.

*Coexistence Results for LAA DL only and Wi-Fi DL+UL*, 3GPP TSG-RAN WG1#81 R1-153404, Japan, Source: IITH, 21 May 2015.

S. S. Channappayya, *No-Reference Image Quality Assessment Using Statistics of Sparse Representations*, SPCOM 2016, Bengaluru, 15 June 2016.

S. S. Channappayya, *Face Image Quality Assessment for Face Selection in Surveillance Video using Convolutional Neural Networks,* IEEE GlobalSIP 2015, Orlando, FL, USA, 15 December 2015.

Ravikumar Bhimasingu, *Improvements in the Grid Integrated Renewable Energy Based Microgrids*, 2nd Workshop on Environment and Energy, Osaka University, Japan, 10 March 2016.

Pradeep Yemula, *Delivered Master Tutorial session on Introduction to Smart Grids in the India Smart Grid Week 2015*, March 2015.

Pradeep Yemula, *Delivered Master Tutorial session on Introduction to Smart Grids in the India Smart Grid Week 2016*, March 2016.

Pradeep Yemula, *Delivered Lecture in faculty development program on Research Challenges in Smart Grids on the topic of Power System Control Center*, EMS SCADA to Smart Grid Applications, 7 November 2015.

Swati Gupta, *Performance of Indium Gallium Zinc Oxide Thin-film Transistors in Saline Solution*, Electronic Materials Conference, Ohio (USA), June 2015.

## Workshops / Symposiums Organised

P. Rajalakshmi, Symposium on Healthcare Entrepreneurship, SHE 2015, 3 December 2015.

Pradeep Yemula, Real-Time Contingency Analysis in Power Control Centers, Sarma Nuthalapati, Electricity Reliability Council of Texas (ERCOT), USA, 16 November 2015.

Kiran Kuchi, US-India Smart and Connected Communities Workshop, IIT Delhi, 9-11 June 2016.

P. Rajalakshmi, Indo-Japan RoundTable on Collaboration Hub for Research in ICT, 19 January 2016.

P. Rajalakshmi, ISDF 2016.

## Awards / Recognitions

Visvesvaraya Young Faculty Fellowship Award from the Department of Electronics and Information Technology, Ministry of Communications and Information Technology, Government of India for year 2015-16, *Amit Acharyya*.

Young Engineers Award 2015-16, The Institution of Engineers (IEI) in Electrical Engineering discipline, *S. Badhulika*.

The Young Engineer Award in Electronics and Telecommunication Engineering, Institution of Engineers, India (IEI) in 2015, *Amit Acharyya*.

Visiting Research Fellow in the School of Electronics and Computer Science in the University of Southampton, UK (2015-16), *Amit Acharyya*.

Fellowship from the University of Liverpool, UK in Summer, 2015, *Amit Acharyya*.

Cadence design contest winner (2nd place) : 2015, *Ashudeb Dutta*.

IEEE Member, *Ravikumar Bhimasingu.*

Reviewer for IEEE Transactions on Power Delivery, *Ravikumar Bhimasingu*.

Reviewer for IET Generation, Transmission & Distribution, *Ravikumar Bhimasingu*.

Reviewer for Electric Power Components and Systems, *Ravikumar Bhimasingu*.

Review for the IEEE Transactions on Power Electronics, *Ravikumar Bhimasingu*.

Reviewer for Ain Shams Engineering Journal, *Ravikumar Bhimasingu*.

Best Paper Award (honorable mention) in COMSNETS 2016, Bangalore, India, *Abhinav Kumar.*

## Other Events

Workshop on Digital Design through Arduino and Matrix Analysis through Octave, conducted jointly with the IEEE Comsoc/SP chaper, Hyderabad, at IIT Hyderabad.

# LIBERAL ARTS

The Department of Liberal Arts (LA) at IIT Hyderabad is a leading center for the study of a highly diverse range of subjects including Anthropology, Cultural Studies, Economics, English, Sociology and Linguistics. Unique in its constitution and vision, the department of Liberal Arts at IIT Hyderabad strives to pursue excellence in teaching and research to benefit students, academics and the wider society.

The primary focus of the Department of Liberal Arts at IIT Hyderabad is to produce world-class research in the broad fields of humanities, social sciences. The broad areas of ongoing research in the department are Economic growth, Macroeconomics, Monetary economics, International finance, Gender studies, Cultural studies, Clinical Psychology, Positive Psychology, Literary Theory, Rhetoric and Composition, Modernist Fiction, Literature and the Visual Arts, Health Psychology, Psycho-oncology, Cultural Psychology, Indigenous Healing, Organizational behaviour, Social psychology, Medical Anthropology, Anthropology of the Media, Linguistics, and Cognition.

With a congregation of excellent faculty having expertise on diverse range of subjects, Liberal Arts at IIT Hyderabad is devoted towards the development of teaching and research that has both academic and practical relevance. The department of Liberal Arts offers academic programs for Ph.D., M.Phil and Minor Economics. The department also offers LA electives to the B.Tech program.

# F A C U L T Y

**Badri Narayan Rath**
Ph.D - ISEC, Bangalore
***Associate Professor & HoD***
*Research Areas*: Econometrics, Economic Growth, and Industrial Economics

**Amrita Deb**
Ph.D - BHU, Varanasi
***Assistant Professor***
*Research Areas*: Positive psychology, clinical psychology, personality psychology

**Indira Jalli**
Ph.D - Hyderabad Central University
***Assistant Professor***
*Research Areas*: nation and culture

**Srirupa Chatterjee**
Ph.D - IIT Kanpur
***Assistant Professor***
*Research Areas*: Contemporary and Multiethnic American Fiction

**Prabheesh K.P.**
Ph.D - IIT Madras
***Assistant Professor***
*Research Areas*: International Finance, Monetary economics, Applied econometrics

**Mahati Chittem**
Ph.D - University of Sheffield, UK
***Assistant Professor***
*Research Areas*: Health Psychology, Medical Psychology, Psycho-oncology

**Shubha Ranganathan**
Ph.D - IIT Bombay
***Assistant Professor***
*Research Areas*: Cultural psychology, qualitative research methods, gender and mental health, public health in India

**N. Haripriya**
Ph.D - Syracuse University - NY, USA
***Assistant Professor***
*Research Areas*: Anthropology of Media, Health, Gender, Globalisation

**Nandini Ramesh Sankar**
Ph.D - Cornell University, USA
***Assistant Professor***
*Research Areas*: 20th-Century British and American Poetry, Modernist Fiction, Literature and the Visual Arts, Literature and Ethics

**M. P. Ganesh**
Ph.D - Cornell University, USA
***Assistant Professor***
*Research Areas*: Work Team Dynamics, Self-Leadership, Mentoring, Virtual and Cross-Cultural Collaborations, Eco-Friendly Behaviours

**Prakash Chandra Mondal**
Ph.D - IIT Delhi
***Assistant Professor (On contract)***
*Research Areas*: Theoretical Linguistics, Philosophy of Language, Cognitive Science

## ADJUNCT FACULTY

**Nimmi Rangaswamy**
Ph.D - University of Mumbai

**Paresh Kumar Narayan**
Ph.D - Monash University, Australia

## Books / Chapters

Srirupa Chatterjee, The Scarlet Letter and Other Writings, Editor. Orient Blackswan Pvt. Ltd, (2016) Hyderabad, India.

Prakash Mondal, Language and Cognitive Structures of Emotion, Palgrave Macmillan (2016) London/New York.

## Publications

### (In Peer-Reviewed Journals)

What is the Value of Corporate Sponsorship in Sports?, Paresh Kumar Narayan, Badri Narayan Rath, Prabheesh K.P., *Emerging Markets Review*, 26, 20-30 (2016).

Nonlinear Causality between Crude Oil Price and Exchange Rate: A Comparative Study of China and India, Debi Prasad Bal and Badri Narayan Rath., *Energy Economics, 51*, 149-156 (2015).

Determinants of Bank Profitability during Post-reform Periods: Evidence from India, Global Business Review, Seenaiah K, Badri Narayan Rath, Amaresh Samantaraya, 16(5 Suppl), 82S-92S (2015).

Mina Loy's 'Parturition' and L'Écriture Féminine, Swathi Krishna S. and Srirupa Chatterjee, *The Explicator*, 73.4, 257-61 (2015).

What is the value of corporate sponsorship in sports?, Paresh Kumar Narayan, Badri Narayan Rath and K.P. Prabheesh, *Emerging Markets Review*, 26, 20–33 (2016).

Illness experiences, collective decisions, and the therapeutic encounter in Indian oncology. Qualitative Health Research, A. Broom, M. Chittem, V. Bowden, N. Muppavaram, S. Rajappa Doi: 1049732316648125.

From Victimhood to Survivor-Hood: Reflections on Women's Agency in Popular Films on Sex Trafficking in India, N. James and S. Ranganathan, *Psychological Studies*, 61 (1), 76-82 (2016).

Review of THE RIGHT SPOUSE: Preferential Marriages in Tamil Nadu. By Isabelle Clark-Decès. *Pacific Affairs Vol 88* No. 4, 950-952 (2015).

Pentagon Performance Model of Indian MFIs A Study of Institutional Enablers, Balammal, A., Madhumathi, R., & Ganesh, M. P., *Paradigm*, 20(1), 1-13 (2016) doi: 10.1177/0971890716637694

## Publications

### (In Peer-Reviewed Conferences)

Export Diversification and Total Factor Productivity Growth in Emerging Market Economies, Badri Narayan Rath, *European Economics and Finance Society (EEFS-2015) Conference*, Centre for European Policy Studies, Brussels, 11-14 June, 2015.

Trade Diversification and TFP growth in case of South Asian Region, Badri Narayan Rath, *52nd Annual Conference of Indian Econometrics Society*, IIM Kozhikode, 5-7 January, 2016.

The Dynamic Linkage between Exchange Rate, Stock Price and Interest Rate in India, Badri Narayan Rath, *Applied Financial Modelling Conference*, Deakin University, Melbourne, 4 February, 2016.

Positive psychology and HRM, Amrita Deb, *Second International Conference on Stress Management Professional*, Osmania University, Hyderabad, November 2015.

Avengers and Heroic Outlaws: The Mythic Sorority in Joyce Carol Oates's Foxfire: Confessions of a Girls Gang, Srirupa Chatterjee, *PCA/ACA Annual Conference*. Seattle, WA, USA, 22-25 March 2016.

Introduction to the Use of E-Views in Data Analysis in Social Science Research, K.P. Prabheesh, *Research Methodology Course for Research Scholars,* Council for Social Development, Hyderabad, 9–18 March 2016.

Macroeconomic Policy: Monetary Policy and Fiscal Policy, K.P. Prabheesh, Centre for Economic and Social Studies (CESS), Hyderabad, 16-17 November 2015.

How can we support you, let us count the ways: The challenges faced and resources available to ECPPs in limited-resource, Chittem, M., & Odiyo, P., as part of a *symposium presented by the Special Interest Group of Early Career Psycho-oncology Professionals within the International Psycho-oncology Society (IPOS)* during the joint World Congress by IPOS and APOS at Washington, DC, USA (2015).

## Funded Research Projects 2015-16

Mahati Chittem, *The changing landscapes of survivorship: A psychosocial study of cancer from a multi-stakeholder perspective*, University of Queensland, Brisbane, Australia, July 2015, 0.86 Lakhs.

## Seminars Organised

Comparative Literature and Liberal Arts: Deciphering the Theoretical Interrelatedness and the Pragmatic Extensions, Dr. Amith Kumar P. V., Department of Comparative Literature and India Studies at the English and Foreign Languages University, Hyderabad, 20 January 2016.

Cognition of Bilingualism, Dr. Ramesh Kumar Mishra, Center for Neural and Cognitive Sciences, University of Hyderabad, 17 February 2016.

The Stock Markets and Indian Budgets, Aam Aadmi, Dr. Jayan Jose Thomas, Department of Humanities and Social Sciences, Indian Institute of Technology Delhi, 8 March 2016.

Cultivating Distress: Farmer Suicides and Public Policy Failure in India, Dr Nanda Kishore Kannuri, Indian Institute of Public Health (IIPH), Hyderabad, 16 March 2016.

The Ak□ara in Brāhmic Writing Systems, Dr. Gautam Sengupta, Center for Applied Linguistics and Translation Studies and the Center for Neural and Cognitive Sciences, University of Hyderabad, 30 March 2016.

Disciplines in Dialogue: Preliminary Notes concerning a Conversation between Disability Studies and Medical Humanities. Dr. Hemachandran Karah, Department of Humanities and Social Sciences, Indian Institute of Technology Madras, 13 April 2016.

## Talks Given In International / National Conferences

Badri Narayan Rath, *Lecture on Measurement of Productivity and Efficiency using Quantitative Techniques for workshop on Capacity Building for Faculty Members of Management and Social Sciences*, sponsored by ICSSR, New Delhi, and organised by NIT Rourkela, 27 February 2016.

Badri Narayan Rath, *Lectures on Introduction to Macroeconomics and Monetary and Fiscal Policies in India to officers of the Directorate of Economics & Statistics*, Department of Planning, Government of UP, Organized by ASCI Hyderabad, December 21, 2015.

## Workshops / Symposiums Organised

Two-day IPOS Academy international workshop on Psychological Distress in Cancer: Identifying it and Providing Support, Chittem, M., January 2016.

## Awards & Recognitions

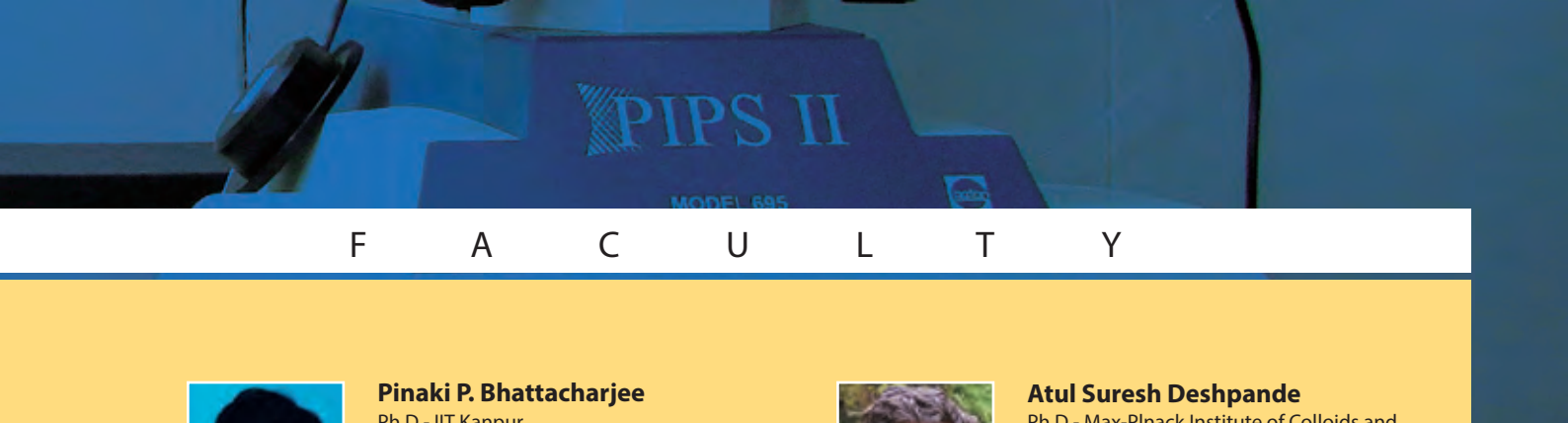
University of New South Wales Collaboration Award sponsored by University of New South Wales, Sydney, Australia, *Mahati Chittem*.

Health and Behavior International Collaborative Award sponsored by the Society for Health Psychology (American Psychological Association Division 38), *Mahati Chittem*.


# MATERIALS SCIENCE & METALLURGICAL ENGINEERING

The Department of Materials Science and Metallurgical Engineering (MSME) at IITH started in 2008 with the vision "Atoms to Applications", aiming to be a globally recognized centre of excellence in materials research, translating fundamental understanding into development of innovative, sustainable and environment-friendly technologies and products for social needs. Currently, MSME has eight faculty members with research interests spanning across various disciplines of structural, functional and computational materials science. One of the recent focuses of the cumulative and collaborative effort of the department is to understand the materials genome by correlating composition, structure, processing, characterization and properties ('The MSME Pentagon').

The MSME department at IITH offers unique innovative courses, which are unparalleled with courses at other IITs. Research programs are closely designed with national research laboratories and industries. Currently, MSME has over 30 Ph.D and 14 MTech students working in fundamentals to advanced and emerging areas, some of which are thermo-mechanical processing, thin films and devices, nano-materials, soft matter, biomaterials, energy materials, and electron microscopy. The department publishes around 15 journals papers every year and has INR 3.1 Cr of project funding. The department started its bachelors program in July, 2014 with a unique curriculum comprised of fractal courses which facilitates expansion of the core subject acumen as well as personal skills. The department prepares its students for research roles as well as other professional roles by providing a conducive environment for all round development.




# F A C U L T Y

**Pinaki P. Bhattacharjee**
Ph.D - IIT Kanpur

***Associate Professor & HoD***

*Research Areas*: Physical Metallurgy – High entropy alloys – Texture – EBSD – Rolling and High temperature rolling – Microstructural studies

**Atul Suresh Deshpande**
Ph.D - Max-Plnack Institute of Colloids and Interfaces - Potsdam, Germany

***Assistant Professor***

*Research Areas*: Synthesis chemistry – energy materials - biomaterials

**Suhash Ranjan Dey**
Ph.D - University Paul-Verlaine - Metz, France

***Associate Professor***

*Research Areas*: Titanium alloys – CIGS/CZTS solar cells - Electrodeposition

**Saswata Bhattacharya**
Ph.D - IISc Bangalore

***Assistant Professor***

*Research Areas*: Phase field modelling – microstructural evolution in alloys and oxides – ferroelectric domains – discrete dislocation dynamics – modeling deformation in solids

**Ranjith Ramadurai**
Ph.D - IISc Bangalore

***Assistant Professor***

*Research Areas*: Multifunctional oxides – multiferroics – ferroelectricity – gas sensors – high-k dielectrics – hybrid materials- thin films – scanning probe microscopy

**Mudrika Khandelwal**
Ph.D - University of Cambridge, UK

***Assistant Professor***

*Research Areas*: Nature inspired materials, antifouling materials, flexible conducting paper

**Bharat B Panigraphi**
Ph.D - IIT Kharagpur

***Associate Professor***

*Research Areas*: Powder metallurgy – dilatometry- sintering processes

**Subhradeep Chatterjee**
Ph.D - IISc, Bangalore

***Assistant Professor***

*Research Areas*: Phase Transformations, Electron Microscopy, Welding and Solidification Processing, Microstructural Modelling

## VISITING FACULTY

**Nobuhiro Tsuji**

***Professor, Kyoto University, Japan***

*Teaching Subject*: FC5452-Dislocation Theory for Mechanical Behaviors of Metals

## CEP Courses

Saswata Bhattacharya, Certificate course on Micromechanics: fundamental concepts and applications in the study of microstructural evolution at TATA Steel R&D Centre, Jamshedpur, 5-11 February 2016.

## Patents Filed

An improved process for the preparation of stable nano silver suspension having antimicrobial activity, Janardhanan Revathi, Nellipudi Satya Moulika, Avvaru Venkata Sai, Atul Suresh Deshpande, Karuppiah Murugan, Neha Yeshwanta Hebalkar, Ravula Vijay, Tata Narasinga Rao, Govindan Sundararajan, Indian patent filed – 2016

Improved process for Wood derived Carbon - Metal oxide composites prepared by nanocasting of wood for electrode materials in lithium ion batteries, Janardhanan Revathi, Atul Suresh Deshpande Tata Narasinga Rao, Indian patent filed –2016.

## Book Chapters

Perovskites and Related Mixed Oxides, Ed. By P. Granger, V.I. Parvulescu, S. Kaliaguine and W. Prellier – Chapter 10-Piezoelectrics and multifunctional composites – Dr. Ranjith Ramdurai and Dr. Vijaynandhini Kannan, Vol. I, Wiley-VCH (2015).

## Publications

### (In Peer-Reviewed Journals)

Evolution of microstructure and texture during thermo-mechanical processing of a two phase Al0.5CoCrFeMnNi high entropy alloy, I.S. Wani, G. Dan Sathiaraj, M.Z. Ahmed, S.R. Reddy and P.P. Bhattacharjee*, *Materials Characterization 118*, 417-424 (2016).

Strain rate dependent microstructural evolution during hot deformation of a hot isostatically processed nickel base superalloy, S. Satheesh, T. Raghu, Pinaki P. Bhattacharjee, G Appa Rao and U. Borah, *Journal of Alloys and Compounds*.

Ultrafine grained AlCoCrFeNi2.1 eutectic high entropy alloy, I.S. Wani, T. Bhattacharjee, S. Sheikh, Y. Lu, S. Chatterjee, P. P. Bhattacharjee*, S. Guo and N. Tsuji, *Materials Research Letters*.

Microstructure and texture of heavily cold-rolled and annealed fccequiatomic medium to high entropy alloys, G.D. Sathiaraj, M.Z. Ahmed and P.P. Bhattacharjee*, *Journal of Alloys and Compounds*, 664, 109-119(2016).

Effect of heavy cryo-rolling on the evolution of microstructure and texture during annealing of equiatomic CoCrFe MnNi high entropy alloy, G.D. Sathiaraj, P.P. Bhattacharjee*, Che-Wei Tsai and Jien-Wei Yeh, *Intermetallics 69*, 1-9 (2016).

Effect of cold-rolling strain on the evolution of annealing texture of equiatomic CoCrFeMnNi high entropy alloy, G. D. Sathiaraj andP.P. Bhattacharjee*, *Materials Characterization 109*, 189-197 (2015).

Effect of prior recovery treatment on the evolution of cube texture during annealing of severely warm-rolled Al-2.5wt.%Mg alloy, J.R. Gatti and P.P. Bhattacharjee*, *Metall Mater Trans A 46*, 4966-4977(2015).

Constitutive modelling for predicting peak stress characteristics during hot deformation of hot isostatically processed nickel base superalloy, S.S. Satheesh Kumar, T. Raghu, Pinaki P.Bhattacharjee, G. Appa Rao and Utpal Borah, *Journal of Materials Science 50*, 6444-6456 (2015).

Effect of starting grain size on the evolution of microstructure and texture during thermo-mechanical processing of CoCrFeMnNi high entropy alloy, G. D. Sathiaraj and P.P. Bhattacharjee*, *Journal of Alloys and Compounds, 647*, 82-96 (2015).

Microstructure, texture and tensile properties of a severely warm-rolled and annealed duplex stainless steel, M. Ahmed and P.P. Bhattacharjee*, *Steel Research International 87*, 472-483(2016).

Investigation of optimum annealing parameters for formation of dip coated CZTS thin film, Sushmita Chaudhari, P.K. Kannan and Suhash R. Dey, *Thin Solid Films, 612,* 456-462 (2016).

Pulsed electrode position of $Cu_2ZnSnS^4$ absorber layer for photovoltaic application, Sushmita C.S., Palli Srinivas, P.K. Kannan and Suhash R. Dey, *Thin Solid Films, 600*, 169-174 (2016).

Theoretical and Experimental Study of Copper Electrodeposition in a Modified Hull Cell, P. Srinivas and Suhash R. Dey, *International Journal of Electrochemistry, 3482406 (2016)*, http://dx.doi.org/10.1155/2016/3482406.

Tunable ferroelectric domain orientation in polycrystalline and highly oriented NBT thin films, Kumaraswamy Miriala and Ranjith Ramadurai, *Materials letters, 178*, 23- 26(2016).

Studies on Local Structural Inhomogeneity and Origin of Ferroelectricity in Yttrium chromite Ceramics, Venkateswara Rao Manepalli and Ranjith Ramadurai, *MRS Advances*, (2016), http://dx.doi.org/10.1557/adv.2016.222.

Investigations on Dielectric phase transition behavior of Pb(Fe0.5-xScx)Nb0.5O3 Multiferroic Ceramics, Bandi Mallesham and Ranjith Ramadurai, *MRS Advances*, (2016), http://dx.doi.org/10.1557/adv.2016.145.

Effect of Crystal Structure and Cationic Order on Phonon Modes across Ferroelectric Phase Transformation in Pb(Fe0.5-xScxNb0.5)O3 Bulk Ceramics, B. Mallesham, B. Viswanath and R. Ranjith *AIP Advances*, 6, 015116(2016).

Insight on the ferroelectric properties in a $(BiFeO_3)_2$ $(SrTiO_3)_4$ superlattice from experiment and ab initio calculations, E. Bruyer, A. Sayede, A. Ferri, R. Desfeux, R.V. K. Mangalam, R. Ranjith and W. Prellier, *Applied Physics Letters 107,* 042904(2015).

Artificial neural network modeling on the relative importance of alloying elements and heat treatment temperature to the stability of α and β phase in titanium alloys, N. S. Reddy, B. B. Panigrahi, C. M. Ho, J. H. Kim and C. S. Lee, *Computational Materials Science, 107*, 175-183(2015).

A phase-field study of domain dynamics in ferroelectric BCT-BZT system, S. Bandyopadhyay, T. Jogi, K. Miriyala, R. Ramadurai and S. Bhattacharyya, *MRS Advances, (2016)*, 10.1557/adv.2016.384.

Anisotropic Li intercalation in LixFePO4 nanoparticle: a spectral smoothed boundary phase-field model, L. Hong, L. Liang, S. Bhattacharyya, W. Xing and L –Q. Chen, *Physical Chemistry Chemical Physics,* 18, 9537 (2016), 10.1039/C6CP00267F.

An integrated fast Fourier transform based phase-field and crystal plasticity approach to model re-crystallization of three dimensional polycrystals, L. Chen, J. Chen, R. A.Lebensohn, Y. Z. Ji, T. W.Heo, S. Bhattacharyya, K. Chang, S. Mathaudhu, Z. K. Liu and L-Q. Chen, *Computer Methods in Applied Mechanics and Engineering*, 285, 829 (2015), doi:10.1016/j.cma.2014.12.007.

In situ tunability of bacteria produced celluloses by additions in culture medium, M. Khandelwal, A.H. Windle, N. Hessler, *Journal of Materials Science*, 51(10), 4839 (2016).

Microstructure Formation in Dissimilar Metal Welds: Electron Beam Welding of Ti/Ni, S. Chatterjee, T.A. Abinandanan, G. Madhusudhan Reddy and K. Chattopadhyay, *Metallurgical and Mater. Trans*. A, 47A, 769-776 (2016).

Ultrafine grained AlCoCrFeNi2.1 eutectic high entropy alloy, I.S. Wani, T. Bhattacharjee, S. Sheikh, Y. Lu, S. Chatterjee, P. P. Bhattacharjee, S. Guo and N. Tsuji, *Mater. Res. Lett.*, 1–6 (2016).

## Publications
### (in Peer-Reviewed Conferences)

Comparison of grain growth texture in binary Ni-60wt.%Co and multicomponent equiatomic CoCrFeMnNi high entropy alloys, G.D. Sathiaraj and P.P. Bhattacharjee, *69th NMD-ATM*, Coimbatore, India ((best oral presentation in the non-ferrous category) 13-16 November 2015.

Development of beta Ti-xNb alloys through DFT and P/M route for orthopaedic implants, K. Rajamallu, Manish K. Niranjan and Suhash R. Dey, *Transactions of PMAI 41(2)*, 2016.

Effect of stacking sequences in the formation of CZTS thin film using electron beam evaporation, P. K. Kannan, Sushmita Chaudhari and Suhash R. Dey, EU PVSC 2016, *32nd European PV Solar Conference and Exhibition*, Munich, Germany, Conference Proceedings, 2016.

Effect of annealing and stabilizing agent on the formation of CZTS films using a simple dip coating technique.Sushmita Chaudhari, P. K. Kannan and Suhash R. Dey, EU PVSC 2016, *32nd European PV Solar Conference and Exhibition*, Munich, Germany, Conference Proceedings, 2016.

CIGS Thin-films by Non-Vacuum Based Pulse Electrodeposition Technique on Flexible Glass Substrates for Solar Cell Applications, Bulusu V. Sarada, Sreekanth Mandati, Sean Garner, Suhash R. Dey and Shrikant, V. Joshi and Tata N. Rao, *IEEE PVSC 43, 43rd IEEE Photovoltaic Specialists Conference*, Portland, USA, Conference Proceedings, 2016.

Effect of Triethanolamine on the formation of CZTS films using a simple dip coating technique, Sushmita Chaudhari, P. K. Kannan and Suhash R. Dey, IEEE PVSC 43, *43rd IEEE Photovoltaic Specialists Conference*, Portland, USA, Conference Proceedings, 2016.

Fabrication of biocompatible Ti-Nb-Sn through powder metallurgy route for orthopaedic implants, RajamalluKarre, Manish K. Niranjan, Bhupendra Sharma, Sanjay Kumar Vajpai, Kei Ameyama and Suhash R. Dey, *TITANIUM 2015, 13th World Conference Titanium 2015*, San Diego, USA, Conference Proceedings, 1691, 2016.

Correlation between processing map domains and microstructure of 50% hot compressed IMI 834 Ti alloy, K. Basanth Kumar, Rajamallu Karre and Suhash R. Dey, *TITANIUM 2015, 13th World Conference Titanium 2015*, San Diego, USA, Conference Proceedings, 343, 2016.

Peak stress studies of hot compressed TiHy 600 alloy, Basanth Kumar Kodli, Kuldeep K. Saxena, Suhash R. Dey, Vivek Pancholi and Amit Bhattacharjee, ICAAMM-2016, *International Conference on Advancements in Aeronautical Materials for Manufacturing*, MLRIT Dundigal, Materials Today: Proceedings, Accepted.

Microstructural evolution in hot compressed IMI 834 titanium alloy, K. Basanth Kumar, Kuldeep K Saxena, Suhash R. Dey, Vivek Pancholi and Amit Bhattacharjee, *GUWI 2015, 5th Gleeble User Workshop India*, NML Jamshedpur, Conference Proceedings, 22-28, 2015.

Mechanically activated synthesis of nanocrystalline $Cr_2AlC$ powders, Y. Rajkumar, P. A. Aakash, S. Bhattacharya and B. B. Panigrahi, Trans. PMAI, 2015.

Effect of Template and Processing Conditions on $BiFeO_3$ Nanofoams Synthesized by Sol-gel Method, M. Usha Rani, Atul Suresh Deshpande* and Ranjith Ramadurai, *International Conference on Magnetic Materials and Applications (ICMAGMA-2015)*, VIT University, Chennai, E45, 3 December 2015.

Synthesis of Thermally Stable Mesoporous Ceria Silica Nanoparticles, Anandkumar Mariappan and Atul Suresh Deshpande, *Second Annual TCIS Summer Research Symposium*, TIFR Centre for Interdisciplinary Sciences, Hyderabad, 24-25 June 2015.

Wood Derived Cellulose Templated Carbon - SnOx Anode Material for Lithium Ion Battery Applications, J. Revathi, A. S. Deshpande and T. N. Rao, *7th Indo Korean joint workshop on Green mobility and Energy materials*, Hyderabad, 26-27 November 2015.

Synthesis of porous carbon by catalyst assisted soft templated method using sucrose, Damodar D and A. S. Deshpande, *Second Annual TCIS Summer Research Symposium*, TIFR Centre for Interdisciplinary Sciences, Hyderabad, 24-25 June 2015.

Effect of Precipitating Agents On $BiFeO_3$ Nanoparticles Synthesized by Co-Precipitation Method, M. Usha Rani, A.S. Deshpande* and R. Ranjith, *Second Annual TCIS Summer Research Symposium,* TIFR Centre for Interdisciplinary Sciences, Hyderabad, 24-25 June 2015.

Evolution of Interfacial Dislocation Networks in Particle-Strengthened Alloy Systems During High Temperature Creep: A Discrete Dislocation Dynamics Study, Tushar Jogi and Saswata Bhattacharya, *Transactions of the Indian Institute of Metals*, 69, 507, 2016 10.1007/s12666-015-0774-7.

Contextualising Engineering Education to 21st Century - MBA style education for engineering, Mudrika Khandelwal and Kadam Aggarwal, *Journal of Engineering Education Transformations,* special issue, 2016.

## Funded Research Projects 2015-16

Mudrika Khandelwal, *Polymer and carbon based three dimensional micropatterned fabric with enhanced wettability contrast*, DST-UKIERI, April 2015, Rs. 25.0 Lakhs.

Mudrika Khandelwal, *Novel low cost antifouling materials for health care and food packaging industry SERB fast track young scientist*, Aug 2015, Rs. 33.0 Lakhs.

## Talks Given In International / National Conferences

Mudrika Khandelwal, *Contextualising Engineering Education to 21st Century - MBA style education for engineering*, ICTIEE 2016, Pune, 11 January 2016.

Subhradeep Chatterjee, *Joining of Incompatible Materials: Fusion Welding of Dissimilar Metals in IIW-Hyderabad Workshop on Advances in Materials Joining Technologies*, Hyderabad, 29 May 2015.

Subhradeep Chatterjee, *Microstructure Development in High Energy Beam Processed Ti/Ni Dissimilar Welds,* International Conference on Solidification Science & Processing-VI, Hyderabad, 26 November 2016.

## Awards / Recognitions

Best Oral Presentation Award, ICAAMM-2016, International Conference on Advancements in Aeronautical Materials for Manufacturing, *Mr. Basanth Kumar Kodli (Ph.D. student of Dr. Suhash Ranjan Dey)*.

Guest Professor at Prof. Kei Ameyama's Group, Ritsumeikan University, Japan in June-July 2015 (40 days) under DST-JSPS joint project, *Suhash Ranjan Dey*.

MRSI – Medal, Materials Research Society of India (MRSI) – Medal for young Materials Researcher for the year 2016, *Ranjith Ramadurai*.

The best student paper award in 7th International Conference on Creep, Fatigue and Creep-Fatigue Interaction, IGCAR, Kalpakkam, INDIA, *Saswata Bhattacharya*.

Gandhian Young Innovation Appreciation 2016, *Mudrika Khandelwal.*

## Other Events

Suhash Ranjan Dey, TEQIP Workshop on Materials Microstructure Characterization using Optical and Scanning Electron Microscopy, Indian Institute of Technology Hyderabad, India, 20-24 December 2015.

Bharat B. Panigrahi, TEQIP Workshop on Teacher Effectiveness Nurturing Well Being, Indian Institute of Technology Hyderabad, India, 1-2 May, 2015.

Bharat B. Panigrahi, TEQIP Workshop on Thermal analysis of Materials Using DTA, DSC,TG & Dilatometer (TAM-1), Indian Institute of Technology Hyderabad, India, 23-25 July 2015.

Bharat B. Panigrahi, TEQIP Workshop on Thermal analysis of Materials Using DTA, DSC,TG & Dilatometer (TAM-2), Indian Institute of Technology Hyderabad, India, 12-14 August 2015.

Bharat B. Panigrahi, TEQIP Workshop on Teacher Effectiveness Nurturing Your Well Being, Indian Institute of Technology Hyderabad, India, 6-7 December 2015.

Bharat B. Panigrahi, TEQIP Workshop on Thermal analysis of Materials Using DTA, DSC,TG & Dilatometer (TAM-3), Indian Institute of Technology Hyderabad, India, 14-19 December 2015.

Bharat B. Panigrahi, TEQIP Workshop on Materials Microstructure Characterization using optical and scanning electron Microscopy, Indian Institute of Technology Hyderabad, India, 20-24 December 2015.

Bharat B. Panigrahi, TEQIP Workshop on X-ray Scattering Techniques (SAXS and WAXS), Indian Institute of Technology Hyderabad, India, 28-29 December 2015.

# MATHEMATICS

The Department of Mathematics was one of the six departments that was founded along with the Institute and offers programmes at the masters and doctoral level. Since its inception, the department has made a conscious effort to grow in sync with the directions of the Institute and an awareness of the larger needs of the society. In consonance with this philosophy, the department envisages the following:

"To foster eclecticism and excellence in mathematical education and research which is well poised between abstraction and application."

The Department has young and dedicated faculty working both in pure and applied branches of Mathematics who actively collaborate with their counterparts from the other engineering departments. Faculty members have achieved many distinctions - for instance, they have been invited to be part of research committees of the Government of India, are established resource personnel in programmes promoting both basic and advanced Mathematics, are members of the editorial board of reputed journals.

Despite its nascency, the department can already boast of a very healthy publication record. So far the number of peer-reviewed publications with IITH affiliation stands at a respectable 80, with more than 30 international journal publications. Further, the faculty have garnered many externally funded research projects to the tune of Rs. 75 Lakhs.

# F A C U L T Y

**D. Sukumar**
Ph.D - IIT Madras
***Assistant Professor & HoD***
*Research Areas*: Functional Analysis, Operator Algebras, Numerical Linear Algebra

**C. S. Sastry**
Ph.D - IIT Kanpur
***Associate Professor***
*Research Areas*: Wavelets, Computed Tomography, Sparsity seeking optimization techniques

**Balasubramaniam J.**
Ph.D - Sri Satyasai Institute of Higher Learning
***Associate Professor***
*Research Areas*: Fuzzy Logic Connectives, Approximate Reasoning

**P. A. Lakshmi Narayana**
Ph.D - IIT Kharagpur
***Assistant Professor***
*Research Areas*: Convection in Porous Media, Stability of Flows

**G. Ramesh**
Ph.D - IIT Madras
***Assistant Professor***
*Research Areas*: Functional Analysis, Operator Algebras

**Tanmoy Paul**
Ph.D - ISI Calcutta
***Assistant Professor***
*Research Areas*: Functional Analysis, Banach Space Theory, Geometry of Banach Spaces

**Venku Naidu Dogga**
Ph.D - IIT Madras
***Assistant Professor***
*Research Areas*: Harmonic analysis, Functional analysis

**CH VG Narasimha Kumar**
Ph.D - TIFR Bombay
***Assistant Professor***
*Research Areas*: Number Theory

**Pradipto Banerjee**
Ph.D - University of South Carolina
***Assistant Professor***
*Research Areas*: Number theory

## VISITING FACULTY

**Prabhakar Akella**
***Visiting Assistant Professor***
*Teaching Subjects*: Combinatorics and Graph theory, Numerical Analysis for M.Sc
Complex analysis, Linear algebra, Calculus for B.Tech

## Publications

### (In Peer-Reviewed Journals)

Reliable Resource-Constrained Telecardiology via Compressive Detection of Anomalous ECG Signals, B. S. Chandra, C. S. Sastry and S. Jana, *Computers in Biology and Medicine*, 66, 144-153 (2015).

Content based medical image retrieval using dictionary learning, M. Srinivas, R. R. Naidu, C. S. Sastry, and C. K. Mohan, *Neurocomputing*, 168, 880-895(2015).

The Composition of Fuzzy Implications: Closures with respect to Properties, Powers and Families, N.R. Vemuri and B. Jayaram, *Fuzzy Sets and Systems*, 275, 58-87 (2015).

Homomorphisms on the Monoid of Fuzzy Implications and the Iterative Functional Equation I(x,I(x,y)) = I(x,y), N.R. Vemuri and B. Jayaram, *Information Sciences*, 298, 1-21 (2015).

SISO Fuzzy Relational Inference systems based on Fuzzy Implications are Universal Approximators, S. Mandal and B. Jayaram, *Fuzzy Sets and Systems,* 277, 1-21 (2015).

Nonlinear thermal instability in a horizontal porous layer with an internal heat source and mass flow, Anjanna Matta, P. A. L. Narayana and A. A.Hill Acta *Mechanica* (2016).

Nonlinear Stability of Double-diffusive Convection in a Porous Layer with Throughflow and Concentration based Internal Heat Source, N. Deepika, and P. A. L. Narayana, *Transport in Porous Media*, 111, 751-762 (2016).

Double-diffusive Hadley–Prats flow in a porous medium subject to gravitational variation, 102, 300-307, (2016) Anjanna Matta, P. A. L. Narayana and A. A. Hill, *Int. Jnl of Thermal Sciences,* 102, 300-307 (2016).

Cone nonnegativity of Moore–Penrose inverses of unbounded Gram operators, T. Kurmayya and G. Ramesh, *Ann. Funct. Analysis,* 7, No. 2, 338-347 (2016).

Weyl-von Neumann-Berg theorem for quaternionic operators, G. Ramesh, *J. Math. Phys*. 57 (No. 4), 043503, 7(2016).

On the polar decomposition of right linear operators in quaternionic Hilbert spaces, G. Ramesh and P. Santhosh Kumar, *J. Math. Phys.* 57 (No. 4), 043502, 16 (2016).

On the structure of absolutely minimum attaining operators, Ganesh, Jadav; Ramesh, Golla; Sukumar, Daniel, *J. Math. Anal. Appl.*428, no. 1, 457-470, (2015).

Remarks on q-exponents of generalized modular functions, CH. V. G. Narasimha Kumar, *Funct. Approx. Comment. Math*.53, no. 2, 177–188 (2015).

## Publications

### (In Peer-Reviewed Conferences)

On the existence of equivalence class of RIP compliant matrices, P. Sasmal, C. S. Sastry and P.V. Jampana, *Sampling Theory and Applications, Washington*, 25–29 May 2015.

Optimization of low-dose tomography via binary sensing matrices, Theeda Prasad, P.U. Praveen Kumar, C.S. Sastry, P.V. Jampana, *Combinatorial Image Analysis, ISI Kolkata*, 24-27 November 2015.

Preservation of the Exchange Principle under Lattice Operations on Fuzzy Implications, N.R. Vemuri and B. Jayaram, *8th Intl. Summer School on Aggregation Operators*, Katowice, Poland, 7–10 July 2015.

Linear Stability of Double Diffusive Convection of Hadley-Prats Flow with Viscous Dissipation in a Porous Media, N. Deepika, and P. A. L. Narayana, *Procedia Engineering,* 127, 193-200 (2015).

Influence of Internal Heat Source on Thermal Instability in a Horizontal Porous Layer with Mass Flow and Inclined Temperature Gradient, Anjanna Matta and P. A. L. Narayana, *Conference World Academy of Science, Engineering and Technology*, International Journal of Mathematical, Computational, Physical, Electrical and Computer Engineering, 9, 396-400 (2015).

Effects of Viscous Dissipation and Concentration Based Internal Heat Source on Convective Instability in A Porous Medium with Throughflow, N. Deepika and P. A. L. Narayana, *Conference World Academy of Science, Engineering and Technology*, International Journal of Mathematical, Computational, Physical, Electrical and Computer Engineering, 9, 410-414 (2015).

Biggest open ball in invertible elements of Banach Algebra, *Banach Algebras and Applications,* The Fields Institute, Toronto, Canada 4-12, August 2015.

## Seminars Organised

Algebraicity of Fourier coefficients of half-integral weight modular forms, Dr. Narasimha Kumar, Assistant Professor, IITH, 7 September 2015.

Level sets of condition spectrum, Mr. S Veeramani, IITH, 28 September 2015.

Approximate Solutions of Integral Equations, Dr. Rekha P. Kulkarni, IIT Mumbai, 28 September 2015.

Frames in matrix Fock spaces, Dr. R. Radha, IIT Madras, 30 September 2015.

Biggest open ball in invertible elements of a Banach algebra, Ms. Geethika Sebastian, IITH, 26 October 2015.

Absolutely minimum attaining operators, Mr. Jadav Ganesh, IITH, 2 November 2015.

Reliable resource-constrained telecardiology via compressive detection of anomalous ECG signals, Mr. B. Sandeep Chandra, IITH, 9 November 2015.

On the gaps between non-zero Fourier coefficients of cusp forms of higher weight, Dr. Narasimha Kumar, IITH, 6 January 2016.

Some basic properties of infinite Toeplitz operator defined on l^2(Z), Mr. S Veeramani, IITH, 27 January 2016.

Operators commuting with translations, Dr. D. Venku Naidu, IITH, 10 February 2016.

Local to Global Principle, Mr. Surjeet Kaushik, IITH, 6 April 2016.

On conservation laws with discontinuous flux, Dr. Sudarshan kumar, Centro de Investigación en Ingeniería Matemática UDEC, Chile, 6 May 2016.

## Talks Given In International / National Conferences

J. Balasubramaniam, *Fuzzy Implications: An Algebraic Perspective*, 8th Intl. Summer School on Aggregation Operators, Katowice, Poland, 7 July 2015.

P. A. L. Narayana, *Linear and sonlinear fluid flow stabilities and numerical methods*, Emerging Trends in Fluid Mechanics, Christ University, Bangalore, India 29-30 April 2016.

G. Ramesh, *On minimum attaining closed operators*, International Workshop on Operator Theory and Applications, IWOTA 2015, Tbilsi, Georgia, 6-10 July 2015.

G. Ramesh,*Gave 10 lectures on Mathematical Training and Talent Search (MTTS) 2015,* SSN College of Engineering, Chennai, 2-18 June 2015.

D. Sukumar, *Gave 10 lectures on Mathematical Training and Talent Search (MTTS) 2015*, SSN College of Engineering, Chennai, 18 May - 2 June 2015.

CH. V. G. Narasimha Kumar, *the gaps between non-zero Fourier coefficients of cusp forms of higher weight*, Invited talk given at Workshop on Automorphic forms, KSOM, Kozhikode, 10-16 February 2016.

## Workshops / Symposiums Organised

Math Summer Camp for School Students, 9-14 May 2016.

# MECHANICAL & AEROSPACE ENGINEERING

The Department of Mechanical & Aerospace Engineering (MAE) has faculty members with specializations in the fields of solid mechanics, structural vibration and control, acoustics, robotics, materials, manufacturing, rapid-prototyping, fluid mechanics, heat transfer, combustion, computation fluid dynamics, etc. Currently, the Department has established many state of-the art teaching and research labs, and is offering undergraduate (B.Tech.) and post graduate (M.Tech and Ph.D.) programs in Mechanical Engineering.

The UG and M.Tech programs have a dual orientation towards a strong foundation in fundamentals coupled with a strong industry orientation. The latter results in hands-on experience on software tools for Computer-aided Design, Finite-Element Analysis, Computational Fluid Dynamics, Kinematic and Dynamics, Computational Mathematics, etc., in the many project oriented courses in the curriculum. This prepares the students to take up jobs in India's burgeoning Industrial R&D sectors after they graduate. The M.Tech program has one year in advanced course-work followed by one year of thesis work, in which research problems in either applied industrial or fundamental research areas can be taken up, on the choice of the student.

The Ph.D program has a strong foundation of advanced course-work for one year, which is more rigorous than usual in most IITs, followed by research work in fundamental areas, where the focus is on developing the capacity for independent research and research leadership in the student. Because of the generous funding available through MHRD, very high-end research equipment has been installed at IITH to facilitate Ph.D research.

# F A C U L T Y

**Raja Banerjee**
Ph.D - University of Missouri Rolla - USA
***Associate Professor & HoD***

*Research Areas*: High fidelity CFD, Multiphase flow, spray & atomization, Lattice Boltzmann method

**V. Eswaran**
Ph.D - State University of NY at Stony
***Professor***

*Research Areas*: Computational fluid dynamics and heat transfer, Finite volume methods, Turbulence modelling

**N. V. Reddy**
Ph.D - IIT Kanpur
***Professor***

*Research Areas*: Digital Fabrication, Design and Manufacturing

**R. Prasanth Kumar**
Ph.D - IIT Kharagpur
***Associate Professor***

*Research Areas*: Multibody Dynamics, Robotics

**M. Ramji**
Ph.D - IIT Madras
***Associate Professor***

*Research Areas*: Composite Repair, Damage Mechanics in Composites, Buckling Analysis of Stiffened CFRP panel, Experimental Mechanics

**K Venkatasubbaiah**
Ph.D - IIT Kanpur
Associate Professor

*Research Areas*: Computational Heat Transfer and Hypersonic Flows

**Abhay Sharma**
Ph.D - IIT Roorke
***Associate Professor***

*Research Areas*: Experimental and Numerical studies in Joining and Welding, Sustainable Manufacturing

**B. Venkatesham**
Ph.D - IISc, Bangalore
***Assistant Professor***

*Research Areas*: Acoustics & vibration

**S. Surya Kumar**
Ph.D - IIT Bombay
***Assistant Professor***

*Research Areas*: Additive manufacturing

**Ashok Kumar Pandey**
Ph.D - IISc, Bangalore
***Assistant Professor***

*Research Areas*: Linear and Nonlinear Vibration, Vehicle Dynamics, MEMS

**Chandrika Prakash Vyasarayani**
Ph.D - University of Waterloo, Canada
***Assistant Professor***

*Research Areas*: Time delayed systems, parameter identification, structural dynamics, MEMS

**Viswanath Chinthapenta**
Ph.D - Brown University, USA
***Assistant Professor***

*Research Areas*: Computational Solid Mechanics, Bio Mechanics, SHM, Composites, Fracture Mechanics

**Nishanth Dongari**
Ph.D - University of Strathclyde, UK
***Assistant Professor***

*Research Areas*: Microfluidics, Rarefied gas dynamics, Compressible gas flows

**Harish Nagaraj Dixit**
Ph.D - Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore
***Assistant Professor***

*Research Areas*: Vortex dynamics, hydrodynamic stability, interfacial flows, thin films, coating

# F A C U L T Y

**Karri Badarinath**
Ph.D - National University of Singapore
***Assistant Professor***
*Research Areas*: Bubble dynamics, high-speed imaging, experimental fluid mechanics

**Pankaj S Kolhe**
Ph.D - The University of Alabama, USA
***Assistant Professor***
*Research Areas*: Alternative Fuels, Combustion and Flow diagnostics, IC Engines, and Turbomachines

**Saravanan Balusamy**
Ph.D - University of INSA of Rouen, France
***Assistant Professor***
*Research Areas*: Combustion, Laser Diagnostics, IC Enginesn

**Syed Nizamuddin Khaderi**
Ph.D - University of Groingen, Netherlands
***Assistant Professor***
*Research Areas*: Solid mechanics, impact mechanics, fluid structure interaction

**R Gangadharan**
Ph.D - IISc, Bangalore
***Assistant Professor***
*Research Areas*: Non-destructive testing and Evaluation, Structural Health monitoring, Analysis and design of Composite Structures

**Prashant Saxena**
Ph.D - University of Glasgow, Scotland, UK
***Assistant Professor***
*Research Areas*: Continuum Mechanics, Nonlinear Elasticity, Biomechanics, Magneto-Mechanics

## CHAIR PROFESSOR

**V. K. Saraswat**
DAE Homi Bhaba Chair
Former Secretary, Dept. of Defence R&D (GoI), Scientific Advisor to Raksha Mantri, Director General of DRDO & ADA

## CEP Courses

M. Ramji, Short Term Course on Fracture Mechanics, Siemens Ltd., Chennai, India, 19-20 October 2015.

R. Gangadharan,Mechanics of Composite Materials-2 credit course, 8 participants from CYIENT, June 2015.

## Patents Filed

K. P. Karunakaran, S. Suryakumar, Sajan Kapil, Realization of the composite injection moulds with conformal cooling channels through Hybrid Layered Manufacturing, Indian Patent, Application Number: 4762/MUM/2015(2015).

## Book Chapters

Coupled Electromagnetic–Structural Simulation of Magnetic Pulse Welding, Advances in Material Forming and Joining, R. Narayanan, U. S. Dixit, Springer, 2015.

Environmentally Friendly Machining, Handbook of Manufacturing Engineering and Technology, Nee, A. Y. C., Springer, 2015.

Optimisation of variable stiffness plates in Composite materials and structures in aerospace engineering, E Carrera, Transtech publications, 2016, Torino, Italy.

Magnetic Artificial Cilia for Microfluidic Propulsion in Advances in applied mechanics, Elsevier, 2015, Daniel S. Balint, Stéphane P.A. Bordas.

## Publications

### (In Peer-Reviewed Journals)

GPU accelerated VOF based multiphase flow solver and its application to sprays, Rajesh Reddy, R. Banerjee, 117, 287-303 (2015).

Study of disintegration of a high speed liquid jet using VOF method, Rajesh Reddy, R. Banerjee, 15, 305-312, (2015).

Energetics of Constant Height Level Bounding in Quadruped Robots, P. Murali Krishna and R. Prasanth Kumar, *Robotica*, 34, 403-422 (2016).

Progressive Failure Analysis of CFRP Laminate With Interacting Holes Under Compressive Loading, Sourabh Khedkar, Viswananth Chintapenta, Mahendrakumar Madhavan and M. Ramji, *Journal of Comp. Mat.,* 49(26), 3263-3283 (2015).

An Experimental and Numerical Investigation of Progressive Damage Analysis In Bonded Patch Repaired CFRP Laminates, M. Kashfuddoja and M. Ramji, *Journal of Comp. Mat.,* 49(4), 439-456 (2015).

Local Zone Wise Elastic And Plastic Properties Of Electron Beam Welded Ti-6Al-4V Alloy Using Digital Image Correlation Technique: A Comparative Study Between Uniform Stress And Virtual Fields Method, K. M. Saranath and M. Ramji, *Opt. and Lasers in Engng.*, 68, 22-234 (2015).

A Linear Least Squares Approach For Evaluation of Crack Tip Stress Field Parameters Using DIC, R. Harilal, C. P. Vyasarayani and M. Ramji M, *Opt. and Lasers in Engng.*, 75, 95-102 (2015).

Fatigue Crack Growth Study Of CFRP Patch Repaired Al 2014-T6 Panel Having An Inclined Center Crack Using FEA And DIC, R. Srilakshmi, M. Ramji and Viswananth Chintapenta. *Engng. Frac. Mech.*, 134, 182-201 (2015).

Critical Analysis of Adhesive Layer Behaviour in Patch Repaired CFRP Panel Involving Digital Image Correlation, M. Kashfuddoja and M. Ramji, *Journal of Comp. Mat.*, 49(16), 2015-2028 (2015).

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Magnetic Pulse Welding: An efficient and environmentally friendly multi-material joining technique, Angshuman Kapil, Abhay Sharma, *Journal of Cleaner Production*, 100, 35-58(2015).

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An Integrated model for Assessment of Electromagnetic Force Field due to Arc Welding, N. B. Dahiwale, Angshuman Kapil, Abhay Sharma, *Science and Technology of Welding and Joining*, 20, 7, 563-570(2015).

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Multi-Point Injection Minimum Quantity Lubrication Machining, Nilanjan Banerjee, Abhay Sharma, *Materials Science Forum*, 108-111(2015).

Dissimilar friction stir welds in AA2219-AA5083 aluminium alloys: Effect of process parameters on material inter-mixing, defect formation, and mechanical properties, P. Mastanaiah, Abhay Sharma G. adhusudan Reddy, *Transactions of the Indian Institute of Metals*, Springer, 1-19(2015).

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Galerkin-Arnoldi algorithm for stability analysis of time-periodic delay differential equations, A. Zaid, A. Sadath, T. Uchida, and C.P. Vyasarayani, *Nonlinear Dynamics*, 82(4), 1893-1904 (2015).

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Progressive failure analysis of CFRP laminate with interacting holes under compressive loading, S Khedkar, V Chinthapenta, M Madhavan, M Ramji, *Journal of Composite Materials* 49 (26), 3263-3283.

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Fish-hook in classifier efficiency curves: An update, K. Nageswararao, B. Karri, Sep. *Pur. Tech*., 158 31-38 (2015)

Nonlinear response of a microbeam under combined direct and fringing field excitation, P. N. Kambali and A. K. Pandey, *J. Comput. Nonlinear Dynam.,* 10(5), 051010-1-10 (2015).

Coupling and tuning of modal frequencies in direct current based microelectromechanical system arrays, P.N. Kambali, G. Swain, A.K. Pandey, E. Buks, and O. Gottlieb, *Appl. Phys. Lett.,* 107, 063104-1-6 (2015).

Pull-in analysis of non-uniform microcantilever beams under large deflection, S. S. Singh, P. Pal, and A. K. Pandey, *J. Appl. Phys*., 118(20), 204303-1-10 (2015).

Capacitance and force computation due to direct and fringing effects in MEMS/NEMS arrays, P. N. Kambali and A. K. Pandey, *IEEE Sensors J.*, 16(2), 375-382 (2016).

Precise identification of <100> directions on Si{001} wafer using a novel self-aligning pre-etched technique, S.S. Singh, S. Veerla, V. Sharma, A. K. Pandey, and P. Pal, *J. Micromech Microeng.,* 26(2), 025012-1-5 (2016).

Frequency analysis of linearly coupled modes of MEMS arrays, P.N. Kambali, G. Swain, and A.K. Pandey, *J. Vib. Acoust.,* 138(2), 021017-1-9 (2016).

Dynamics of Cross-Flow Heat Exchanger Tubes With Multiple Loose Supports, A. Sadath, Harish N. Dixit, C. P. Vyasarayani, *J. Pres. Vess. Tech.*, 138, 051303 (1-10) (2016).

## Publications

### (In Peer-Reviewed Conferences)

Experimental and numerical modal analysis to investigate the effect of fluid fill level on sloshing frequency and structural natural frequency of a rectangular tank, Mayur Kothari, Atul Jadhav, B. Venkatesham, R. Banerjee, *National Symposium on Acoustic Acoustic for Ocean Environment*, Goa, 7-9 October 2015.

Numerical study of cavitation of bubble growth with high density ratio using pseudopotential lattice Boltzmann method, G. Saritha, R. Banerjee, *Proceedings of the 17th ISME Conference, ISME-T-026*, New Delhi, 3-4 October, 2015.

Spray characterisation for iso-octane and n-butanol blends at elevated pressure and temperature conditions, Amit Anurag, Rakesh Kale, Raja Banerjee, *24th National Conference of IC Engine and Combustion*, Dehradun, 30 October - 1 November 2015.

Compensations for Tool Path to Enhance Accuracy during Double Sided Incremental Forming, R Lingam, J Asghar, A Bhattacharya, N V Reddy, *ASME International Manufacturing Science and Engineering Conference* (MSEC 2015, June 2015) Charlotte, 8-12 June 2015.

Importance of Feature Sequencing in Incremental Forming, R Lingam, C L Harikrishnan, I V M Kishan, N V Reddy, *ASME International Manufacturing Science and Engineering Conference* (MSEC 2015, June 2015) Charlotte, 8-12 June 2015.

Optimal blank shape Prediction Considering Sheet Thickness Variation for Multistage Deep Drawing, A Agrawal, N V Reddy, P M Dixit, *ASME International Manufacturing Science and Engineering Conference* (MSEC 2015, June 2015) Charlotte, 8-12 June 2015.

Finite geometry correction factor for stress intensities of rigid line inclusion, Prataprao H. Patil, Syed N. Khaderi and M. Ramji, *International Conference on Computer Aided Engineering (CAE-2015)*, Department of Aerospace Engineering, GITAM University, Hyderabad, 10-12 December 2015.

Multiphase approach on heat transfer performance of micro-channel using hybrid carbon nanofluid, Rajesh Nimmagadda and K. Venkatasubbaiah, *Proceedings of the ASME 2015 International conference on Nanochannels*, Microchannels and Minichannels, InterPACKICNMM 2015, San Francisco, California, USA, 6-9 July 2015.

Effects of coupled modes in MEMS/NEMS devices under direct and fringing electrostatic fields, P.N. Kambali and A.K. Pandey, *International Congress on Sounds and Vibrations*, Florance, 12-16 July 2015.

Performance of MR damper based on experimental and analytical modeling, P. Prakash and A. K. Pandey, *International Congress on Sounds and Vibrations*, Florance, 12-16 July 2015.

Dynamic analysis of tire forces and moment using hybrid approach, Bibin S., A. Gavade, and A. K. Pandey, *International Congress on Sounds and Vibrations*, Florance, 12-16 July 2015.

Computation of modal frequencies and shapes of a non-uniform simply-supported beam, B. Purohit and A. K. Pandey, *12th Internal Conference on Vibration Problems*, IIT Guwahati, 14-17 December 2015.

Frequency and pull-in analysis of non-uniform MEMS cantilever beam, S.S. Singh, P.Pal, A.K. Pandey, Poster Presentation, *18th International Workshop on the Physics of Semiconductor Devices*, IISc Bangalore, 7-9 December 2015.

Statistical Processing of Subjective Test Data For Sound Quality Evaluation of Automotive Horn, Tapan K. Mahanta, B. Venkatesham and B. Karri, *Proceedings of NSA 2015*, Goa, 7-9 October 2015.

Experimental Measurement of Breakout Noise from the Rectangular Duct, Nagaraja Jade and B. Venkatesham, *Proceedings of NSA 2015*, Goa, 7-9 October 2015.

Measurement of Damping Properties of Beeswax By Using Oberst Beam Method and Center Impedance Method, Sachin Bhirodkar and B. Venkatesham, *Proceedings of NSA 2015*, Mysore, Goa, 7-9 October 2015.

Analysis of Structural–Acoustic Coupled Problem in Context with A Musical Instrument: VEENA, Amogh R N and B. Venkatesham, *Proceedings of NSA 2015*, Mysore, Goa, 7-9 October 2015.

Experimental and Numerical Modal Analysis to Investigate the Effect of Fluid Fill Level on Sloshing Frequency and Structural Natural Frequency of a Rectangular Tank, Mayur Kothari, Atul Jadhav, B. Venkatesham, and R Banerjee, *Proceedings of NSA 2015*, Mysore, Goa, 7-9 October 2015.

Analysis and Development of Centrifugal Fan Noise Prediction Methodology, Shedolkar Pravin, B. Venkatesham and K Venkata subbaiah, *Proceedings of NSA 2015*, Goa, 7-9 October 2015.

Prediction of Acoustic Natural Frequencies For Arbitrary Geometries By Impedance Mobility Compact Matrix (IMCM) Approach, Veerabhadra Reddy and B. Venkatesham, *Proceedings of NSA 2015*, Mysore, Goa, 7-9 October 2015.

Optimum Design Methodology For Extended Inlet And Extended Outlet (EIEO) Muffler, Saifee Aliakbar, A. Harshad Keskar and B. Venkatesham, *Proceedings of NSA 2015*, Goa, 7-9 October 2015.

Thermo-Mechanical Modelling of Arc Welding, M.A. Somashekara, M. Naveenkumar, Avinash Kumar, Vinayak Mathur, Abhay Sharma, S. Suryakumar and Viswanath Chinthapenta, *International Symposium Globalization in Joining Technology and Materials Science - Enhancing Collaboration Network in Greater Asia Region*, Osaka University, Osaka, Japan, 14 October 2015.

Feature Based Weld-Deposition for Additive Manufacturing of Complex Shapes, P. Jayaprakash Sharma, and S. Suryakumar, *International Mechanical Engineering Congress & Exposition* (ASME-IMECE 2015), Houston, Texas, USA, 13–19 November 2015.

A Novel Method to Manufacture Complex Metallic Objects with Abrupt Overhangs using Orthogonal Layers, P. Jayaprakash Sharma and S. Suryakumar, *International Conference on Digital Fabrication (ICDF-2016)*, Tokyo, Japan, 3-5 March 2016.

A Review of Hydrogels in Droplet based Bio-Fabrication Techniques, Shahid Ansari, Mahendra D. Date, Subha Narayan Rath and S. Suryakumar, *International Conference on Digital Fabrication (ICDF-2016)*, Tokyo, Japan, 3-5 March 2016.

Laser diagnostics for characterization of sprays formed by a collapsing non-equillibrium bubble, Y. S. Kannan, S. Balusamy, B. Karri, *Journal of Physics Conf. Series, Vol 651 (1)*, IOP Publishing http://dx.doi.org/10.1088/1742-6596/656/1/012114.

Damage evolution studies in carbon fiber reinforced polymer composites using active and passive thermography, S. Das, N. R. Kolanu, G. Raju, *NDE national conference*, 26-28 November, Hyderabad, 2015.

## Funded Research Projects 2015-16

Raja Banerjee, *Development of a GPU enabled VOF based two-phase CFD solver to simulate flow dynamics in a steel producing converter*, JFE Steel Corporation, Japan, 13 January 2016, Rs. 45.0 Lakhs.

R. Prasanth Kumar, *Development of Telepresence Robot for Health Care – Phase 1*, Asian Institute of Gastroenterology, 24 May 2015, Rs. 3.6 Lakhs.

M. Ramji, *Flexural behavior of open hole CFRP laminates under transverse loading: An Experimental and Numerical Study*, DST, December 2015, Rs. 23.53 Lakhs.

M. Ramji, *Static and Fatigue Compression Test Results of MYK Grout M65 Cubes*, MYK SCHOMBURG INDIA PVT LTD, 2015, Rs. 6.00 Lakhs.

Abhay Sharma, *Machining of Pure Tungsten with Improved Productivity and Quality*, DMRL, July 15, Rs. 24.0 Lakhs.

B. Venkatesham, *Acoustic Analysis of Afterburner screech Liner,* Gas Turbine Research Establishment, February 2016, Rs. 66.5 Lakhs.

B. Venkatesham, *Development of India Specific car audio tuning parameters*, Hyundai Motor India Engineering Pvt. Ltd, June 2015, Rs. 17.8 Lakhs.

B. Venkatesham, *Development of Noise attenuation methodology of a single stage axial fan*, Bharat Heavy Electricals Ltd, R& D Division, August 2015, Rs. 7.5 Lakhs.

B. Venkatesham, *Development of Transformer Noise attenuation concepts using Numerical models and experimental measurements*, Bharat Heavy Electricals Ltd, R&D Division, January 2016, Rs. 7.5 Lakhs.

Ashok Kumar Pandey, *Coupled dynamics of MEMS and NEMS arrays,* CSIR, 1 January 2016, Rs. 17.46 Lakhs.

Pankaj S Kolhe, *Novel Flow Blurring Injector Characterization* Using Point and Planar Optical Diagnostic Techniques, DST, 6 June 2016, Rs. 34.0 Lakhs.

R. Gangadharan, *Experimental studies on delamination failure of fiber reinforced composites under static and fatigue loading*, SERB, 2 Feb 2016, Rs. 23.5 Lakhs.

Prashant Saxena, *Mathematical Modelling and Analysis of Magneto-active polymers*, Science and Engineering Research Board, SERB, 20 January 2016, Rs. 38.0 Lakhs.

## Seminars Organised

State-of-the-art technology of visualization in welding arcs, Prof. Manabu Tanaka, Osaka University, 9 February 2015.

Welding Metallurgy, Prof. Kazuhiro Ito, Osaka University, 9 February 2015.

Organiser of the Public Lecture Series: The New Wave in Physics, Astronomy and Technology, C. S. Unnikrishnan, TIFR Mumbai, 31 March 2016.

## Talks Given In International / National Conferences

J. Sumit, K. Sharang, R. Banerjee, *Uncertainty Estimation in Determining Liquid and Vapour Penetration Lengths for Diesel-Like Spray Injections*, 2nd Frontiers of Computational Physics Conference: Energy Science 2015, Zurich, Switzerland, 3-5 June 2015.

N. V. Reddy, *Advances and Challenges in Double sided Incremental Forming*, Invited Talk, International Conference on Precision, Meso, Micro and Nano Engineering (Copen 2015), IIT Bombay 10-11 December 2015.

N. V. Reddy, *Metal Forming: Mass Production to Mass Customization, Key note, Design and Manufacturing for Product Life Cycle (DPLC) 2016*, BITS Pilani Hyderabad, 19-20 March 2016.

N. V. Reddy, *Flexible Forming Processes, Pravartana 2016: A TEQIP Symposium on Mechanics*, IIT Kanpur, 12-14 February 2016.

M. Ramji, *Damage Mechanism in open hole CFRP Panel being subjected to tensile, compressive and flexural loading: Experimental and Numerical Approach,* INCCOM-14, 14th ISAMPE National Conference, Hyderabad, India, 22 January 2016.

M. Ramji, *A novel way to extract crack tip stress field parameters using DIC Technique*, Fatigue Durability India 2015, International Conference on Fatigue, Durability & Fracture Mechanics, IISc Bangalore, India, 28 May 2015.

M.A. Somashekara, M. Naveenkumar, Avinash Kumar, Vinayak Mathur, Abhay Sharma, S. Suryakumar and Viswanath Chinthapenta, *Thermo-Mechanical Modelling of Arc Welding, International Symposium Globalization in Joining Technology and Materials Science - Enhancing Collaboration Network in Greater Asia Region*, Osaka University, Osaka, Japan, 14 October 2015.

P. Jayaprakash Sharma, and S. Suryakumar, F*eature Based Weld-Deposition for Additive Manufacturing of Complex Shapes, International Mechanical Engineering Congress & Exposition* (ASME-IMECE 2015), Houston, Texas, USA, 13–19 November 2015.

Y. S. Kannan, S. Balusamy, B. Karri, *Laser diagnostics for characterization of sprays formed by a collapsing non-equilibrium bubble*, 9th International Symposium on Cavitation CAV2015, Lausanne, Switzerland, 6-9 December 2015.

A. K. Pandey, *Design aspect of MEMS devices, Faculty Development Workshop*, Gokaraju Rangaraju Institute of Engineering and Technology, Hyderabad, 20 November 2015.

A. K. Pandey, *Linear and nonlinear frequency tuning of MEMS arrays*, 18th International Workshop on the Physics of Semiconductor Devices, IISc Bangalore, 7-9 December 2015.

A. K. Pandey, *Design and fabrication of MEMS devices,* National workshop on Recent Trends and Research Opportunities in Manufacturing Processes, VNR Vignana Jyothi Institute of Engineering and Technology, Hyderabad, 10 March 2015.

A. K. Pandey, *Design perspectives of MEMS devices*, National workshop on Recent Trends in MEMS, NEMS, and VLSI, KL University, Vijaywada, 9 March 2015.

A. K. Pandey, *Design aspect of MEMS and NEMS, National workshop on Micro-Electro-Mechanical Systems-MEMS-2K15,* Usha Rama College of Engineering, Telaprolu, Krishna Dist., 3 September 2015.

Harish N. Dixit, *Interfacial fluid mechanics: coatings, capillary attraction and moving contact lines, Pravarthana 2015*, IIT Kanpur, 26 April 2015.

V. Chinthapenta, Discrete dislocation plasticity, *Pravartana-2015*, IIT-Kanpur, 25 April 2015.

V. Chinthapenta, *Thermomechanical modelling of Arc Welding, International Symposium: Globalization in Joining Technology and Materials Science – Enhancing Collaboration Network in Greater Asia Region* - Arata Memorial Hall, Joining and Welding Research Institute (JWRI), Osaka University, 12-14 October 2015.

## Workshops / Symposiums Organised

V. Chinthapenta, Advances in Composite materials at Gudlavalleru Engineering College, Seshadri Rao Knowledge Village, Gudlavalleru, 11 September 2015.

V. Chinthapenta, Non-linear Fem of Steel Structures, Indian Structural steel Professionals and Academicians meet (ISPAT-2016). TEQIP-II, IIT Hyderabad, 6-11 June 2016.

V. Chinthapenta, FEM and NLFEM lectures A TEQIP course on the Concepts and applications of the finite element method, IIT-Hyderabad, 13-18 June 2016.

## Awards / Recognitions

Outstanding reviewer - Optics and Lasers in Engineering May 2015. (An Elsevier Journal), top 10th percentile of reviewers for the Journal, in terms of the number of manuscript reviews completed in the last two years, *M. Ramji*.

Ramanujan Fellowship by SERB, *Prashant Saxena*.

## Other Events

B Venkatesham, Faculty coordinator of CIS Internship

A.K. Pandey, C.S. Sharma, and P. Pal,Teqip workshop on MEMS and NEMS (Design and Fabrication), 14–18 December 2015.

Syed Nizamuddin Khaderi, Fundamentals of Finite Element Method: Overview, Theory and Concepts with Demonstrations, 23-25 July 2015.

Syed Nizamuddin Khaderi, Concepts and applications of the finite element method, 13-18 June 2016.

# PHYSICS

The Department of Physics, IIT Hyderabad is one of the most vibrant and active departments in the institute and it conducts cutting edge research in many frontier areas of physics such as high energy physics, condensed matter physics, atomic and molecular physics and Laser physics. The department has 14 faculty at present and trying to expand in various areas of physics. The theme of the department is to focus on conducting research on physical phenomena across all energy scales - from the subatomic to the cosmic and become an outstanding center for physics in the next decade.

The department offers Ph.D, M.Sc and B. Tech (Engineering Physics) programs. Since its inception, faculty has established several research labs (Advanced Functional Materials Lab, MEMs lab, Magnetic Materials and Device Physics Lab, Micromagnetism Lab, Advanced Detector lab, Materials Design and Simulations Lab). In addition to the above research labs, department of physics also has sophisticated M. Sc and B. Tech laboratories which enrich student's technical skills in addition to theory. The department also has plans to establish a computational nano-science lab, a Physics-at-small-scales Lab and a Laser & Photonics lab. It plans to offer an integrated Ph.D. program in Physics and an interdisciplinary M.Tech program in Nano-Science & Technology.

# F A C U L T Y

**Anjan Giri**
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***Professor & HoD***

*Research Areas*: Flavour Physics and CP violation, Neutrino Physics and BSM Physics

**Prem Pal**
Ph.D - IIT Delhi
***Associate Professor***

*Research Areas*: MEMS, Silicon Micromachining, Thin film for MEMS, Wet anisotropic etching

**Saket Asthana**
Ph.D - IIT Bombay
***Associate Professor***

*Research Areas*: Functional Materials, Photonic Ceramics, Piezoluminescence, Magneto- luminescence, Electric field driven effects, Cation Engineering, Materials Chemistry routes to synthesis new materials

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*Research Areas*: Exploring thermoelectric materials, Scintillators, Magnetism in solids, Superconductivity, Elastic and mechanical properties of Solids, Materials under extreme conditions.

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*Research Areas*: Theoretical condensed matter Physics, Electronic Structure, Surface and interface Physics, Quantum Transport

**Anurag Tripathi**
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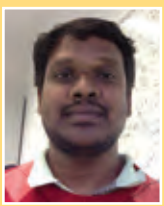
*Research Areas*: Theoretical High Energy Physics, Perturbative Quantum Chromodynamics, Scattering Amplitudes, Feynman loop integrals



**Bhuvanesh Ramakrishna**
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*Research Areas*: Ultrafast laser spectroscopy, Ultrafast Nonlinear Optics, Organic material based Photovoltaics (BHJ, DSSC, ss-DSSC and Hybrid)

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***Assistant Professor***

*Research Areas*: String Theory, Classical and Quantum Gravity,Quantum Field Theory

**Raghavendra Srikanth Hundi**
Ph.D - Harish Chandra Research Institute
***Assistant Professor***

*Research Areas*: Physics beyond standard model, Neutrino masses

**Suryanarayana Jammalamadaka**
Ph.D - IIT Madras
***Assistant Professor***

*Research Areas*: Magnetic materials, spintronics, mesoscopic physics, thinfilms /device physics, magnetic nanoparticles, Graphene, magnetostrictive sensors, photovoltaics, non volatile memory

**Vandana Sharma**
Ph.D - PRL, Ahmedabad
***Assistant Professor***

*Research Areas*: Femtosecond lasers systems, Attosecond Pulse Trains and Ultrafast atomic and molecular dynamics

## Publications

### (In Peer-Reviewed Journals)

Hologram of a pure state black hole, Shubho R. Roy and Debajyoti Sarkar, *Phys.Rev.* D92 126003, 21 Pages, 126003-1 126003-21 (2015)

μ→eγ in a supersymmetric radiative neutrino mass model, R.S. Hundi, *Phys. Rev.,* D93, 015008 (2016)

First measurement of muon-neutrino disappearance in NOvA, P. Adamson, A. Giri et. al., *Phys. Rev*. D, 93, 051104 (2016)

Precise identification of <100> directions on Si{001} wafer using a novel self-aligning pre-etched technique, S. S. Singh, V. Swarnalatha, V. Sharma, A. Pandey, and P. Pal, *J. Micromech. Microeng.*, 26, 25012(5) (2016)

Investigation of room temperature deposited silicon dioxide thin films for the surface texturization of monocrystalline {100} silicon, A. Ashok and P. Pal, *Micro & Nano Letters*, 11, 62-66 (2016)

Pull-in Analysis of Non-uniform Microcantilever Beams under Large Deflection, S. S. Singh, P. Pal, and A. K. Pandey, *J. Applied Physics*, 118, 204303, 1-10 (2015).

Influence of A-site cation disorder on structural and magnetocaloric properties of $Nd_{0.7}$–xLax$Sr_{0.3}MnO_3$ (x=0.0, 0.1, 0.2 & 0.3), V. Sudharshan, P. Pal, and S. Asthana, *J. Rare Earths,* 33, 1072-1080 (2015).

Removal probability function for Kinetic Monte Carlo simulations of anisotropic etching of silicon in alkaline etchants containing additives, H. Zhang, Y. Xing, M. A. Gosálvez, P. Pal, and K. Sato, *Sensors and Actuators A*, 233, 451-459 (2015).

A comprehensive review on convex and concave corners in silicon bulk micromachining based on anisotropic wet chemical etching, P. Pal and K. Sato, *Micro and Nano Systems Letters*, 3, 1-42 (2015).

Anisotropic etching in low concentration KOH: Effects of surfactant concentration, P. Pal, A. Ashok, S. Haldar, Y. Xing, and K. Sato, *Micro & Nano Letters*, 10, 224-228 (2015).

Particle swarm optimization-based continuous cellular automaton for the simulation of deep reactive ion etching, Y. Li, M.A. Gosalvez, P. Pal, K. Sato, Y. Xing, *J. Micromech. Microeng*., 25, 055023, 13, (2015).

Structural, ferroelectric and piezoelectric properties of chemically processed, low temperature sintered piezoelectric BZT-BCT ceramics, Subir Roy, Rajlaxmi Maharana, S. Rangaswamy, Sarabjit Singh, Pawan Kumar, T. Karthik, Saket Asthana, V.V. Bhanu Prasad, Samir Kamat, *Mater. Res. Express*. 3 035702 (2016).

Investigation of near room temperature magnetocaloric, magnetoresistance and bolometric properties of $Nd_{0.5}La_{0.2}Sr_{0.3}MnO_3$: $Ag_2O$ manganites, Sudarshan Vadnala, Prem Pal, Saket Asthana, *J Mater Sci: Mater Electron*, 27, 6156 (2016).

Raman modes and Born-effective charges in AgNb1/2Ta1/2O3: A density-functional and Raman scattering study, Ganga Prasad K, Manish K. Niranjan, Saket Asthana, R. Karthikeyan, *J. Am.Ceram. Soc.* 99, 332 (2016).

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Band gap tuning and orbital mediated electron - phonon coupling in $HoFe_1$- $xCrxO_3$ , Ganesh Kotnana and S. Narayana Jammalamadaka *J. Appl. Phys*. 118, 124101 (2015)http://dx.doi.org/10.1063/1.4931155.

Remote control of magnetostriction-based nanocontacts at room temperature, S. Narayana Jammalamadaka, S. Kuntz, Oliver Berg, W. Kittler, U. M. Kannan, J. Arout Chelvane, and Christoph Suergers Nature Scientific Reports 5, 13621 (2015) DOI: 10.1038/srep13621.

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## Publications

### (In Peer-Reviewed Conferences)

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The Structural And Electronic Properties of Cubic $AgMO_3$(M=Nb, Ta) by First Principles Calculations, K. Gangaprasad, Manish K. Niranjan, and Saket Asthana, *AIP Conf. Proc*. 1728,020102 (2016).

Global and Local Structural Variations near the Antiferroelectric Regime in $Na_{0.5}Bi_{0.5}TiO_3$, Karthik Thangavelu, S. Rayaprol, V. Siruguri, P.U. Sastry, Saket Asthana, *AIP Conf. Proc*. 1665, 030030 (2015).

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Microstructural Studies of $AgNbO_3$ Ceramics by Using Complex Impedance Spectroscopy, K. Gangaprasad, T. Durga Rao, Manish K. Niranjan, and Saket Asthana, *AIP Conf. Proc*. 1665, 110038 (2015).

Effect of A-site ionic size variation on TCR and electrical transport properties of $(Nd_{0.7}$-$xLax)_{0.7}Sr_{0.3}MnO_3$ with x=0,0.1 and 0.2, Sudarshan Vadnala, Saket Asthana, Prem Pal and S. Srinath, *IOP Conf. Series: Materials Science and Engineering* 73 012047 (2015).

Lattice dynamics and electronic structure of mixed halofluoride scintillators under high Pressure, V. Kanchana, N. Yedukondalu, and G. Vaitheeswaran, *AIP Conference Proceedings*, 1665, 09009 (2015) DOI:10.1063/1.4917989.

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Optically isotropy in scintillator host compounds $M_2LaCl_5$ (M = Rb, and Cs): Ab-initio Study, G. Shwetha, G. Vaitheeswaran and V. Kanchana, *AIP Conference Proceedings*, 1665, 120026 (2015)DOI: 10.1063/1.4918133.

Thermoelectric properties of $CuAlCh_2$ (Ch = S, Se and Te), Vijay Kumar Gudelli, G. Vaitheeswaran and V. Kanchana, *AIP Conference Proceedings*, 1665, 110275 (2015)DOI: 10.1063/1.4918083

Thermoelectric properties of binary LnN (Ln=La and Lu): First principles study, P. C. Sreeparvathy, Vijay Kumar Gudelli, V. Kanchana, G. Vaitheeswaran, A. Svane and N. E. Christensen, *AIP Conference Proceedings*, 1665, 110008 (2015)DOI: org/10.1063/1.4918064.

Laser-driven proton and deuteron acceleration from a pure solid-density H2/D2 cryogenic jet, J Kim, M Gauthier, B Ramakrishna *et al*., *57th Annual Meeting of the APS Division of Plasma Physics Bulletin of the American Physical Society 60*, 16–20 November 2015; Savannah, Georgia.

Spectral Features in Laser Driven Proton Acceleration from Cylindrical Solid-density Hydrogen Jets, C Curry, M Gauthier, B Ramakrishna *et al*. *Bulletin of the American Physical Society* 60, 16–20 November 2015; Savannah, Georgia.

Proton shock acceleration using a high contrast high intensity laser, C Roedel, C Curry, M Gauthier, B Ramakrishna *et al*., *Bulletin of the American Physical Society 60*, 16–20 November 2015; Savannah, Georgia.

Studies on ion acceleration using ultra-short high intensity laser pulses at RRCAT. P. A. Naik, M. Tayyab, S. Bagchi, B. Ramakrishna, A. Upadhyay, J. A. Chakera, and P. D. Gupta, *National Laser Symposium*, Indore, 2-15 December 2015.

Magnetic domain and domain wall in Co/Pt multilayer, A. Talapatra and J. Mohanty, *AIP Conference Proceedings*, 1731, 130027(1)-130027(3) (2016).

Magnetic property of electrodeposited nano-crystalline CoFe thin films, A. Soundararaj and J. Mohanty, *AIP Conference Proceedings,* 1731, 0800060(1)-0800060(3) (2016).

## Funded Research Projects 2015-16

Saket Asthana, *Electric field driven phase stabilization and structure property correlation in A-site disordered lead-free piezoceramics,* DST-SERB, 18 September 2015, Rs. 49.0 Lakhs.

Bhuvanesh Ramakrishna, *Laser Matter Interaction,* Ramanujan Fellowship, DST, November 2015,
Rs. 16 Lakhs.

Bhuvanesh Ramakrishna, *Multi Petawatt Laser plasma Intercation – A New Frontier in Physics*, DST Fast Track, January 2016, Rs. 23 Lakhs.

Bhuvanesh Ramakrishna, *Enhanced ion heating in buried layer targets*, DST-DAAD, October 2015, Rs. 10.7 lakhs.

Jyoti Ranjan mohanty, *Micromagnetic modeling and magnetic microscopy studies in magnetostrictive thin films*, DMRL/DRDO, March 2016, Rs. 9.97 Lakhs.

Jyoti Ranjan mohanty, *Investigation of room temperature exchange bias in thin films*, CSR-UGC-DAE, March 2016, Rs. 1.35 Lakhs.

Raavi Sai Santosh Kumar, *Development of femtosecond transient absorption spectrometer for exciton dissociation studies at a donor / acceptor interface in hybrid solar cell*, DST, 12 February 2016, Rs. 21.20 Lakhs.

Suryanarayana Jammalamadaka, *Scanning tunneling microscope studies on magnetostrictive FeGa thin films; LTHM; In-situ magnetic and structural studies*, UGC-CSR-DAE, March 2016, Rs. 1.35 Lakhs.

Vandana Sharma, *Designing and fabrication of reaction microscope to study ultrafast dynamics of atoms and molecules*, DST, 30 June 2015, Rs. 27.87 Lakhs.

## Seminars Organised

Nature of Superconductivity due to site dilution of attractive centers, Dr. G. Venkateswara Pai, HRI, Allahabad, 12 January 2016.

Super conducting junctions as detectors of Dirac fermions and Majorana modes, Dr. M. Maiti JINR, Dubna, 14 January 2016.

High Energy Physics@LHC: A TOP Perspective, Dr. P. Sharma, Univ. Adelaide, Australia, 25 January 2016.

Precision Reactor Antineutrino Studies with PROSPECT Experiment, Mr. Pranava Teja Surukuchi Illinois Institute of Technology, Chicago, USA, 19 February 2016.

Standard model and the Higgs boson(s) at the Large Hadron Collider, Dr. Priyotosh Bandyopadhyay, Universit`a di Lecc, Italy, 1 March 2016.

Closing in on the Standard Model like Higgs boson?, Dr. Sanjoy Biswas, Korea Institute for Advance Study, Seoul, 4 March 2016.

Nanomaterials for next generation energy storage devices and reversible ion-exchange to control magnetism, Dr. Bijoy Kumar Das, Karlsruhe Institute of Technology, Germany, 17 March 2016.

Nature inspired computational architectures, Dr. Saurabl Bose, University of Canterbury, New Zealand, 18 April 2016.

## Talks Given In International / National Conferences

*$\mu \rightarrow e\gamma$ in a supersymmetric model, Recent Trends in Astro Particle and Particle Physics*, IISc Bangalore, 11-12 October 2015.

*KEKFF-$B_2$Tip Workshop at KEK: New Physics in strangeless semileptonic and leptonic b decays*, 26-29 October, 2015.

*National Workshop on Frontiers in High Energy Physics*, IMSc., Chennai: Some Aspects of Flavour Physics, 22-25 March, 2016.

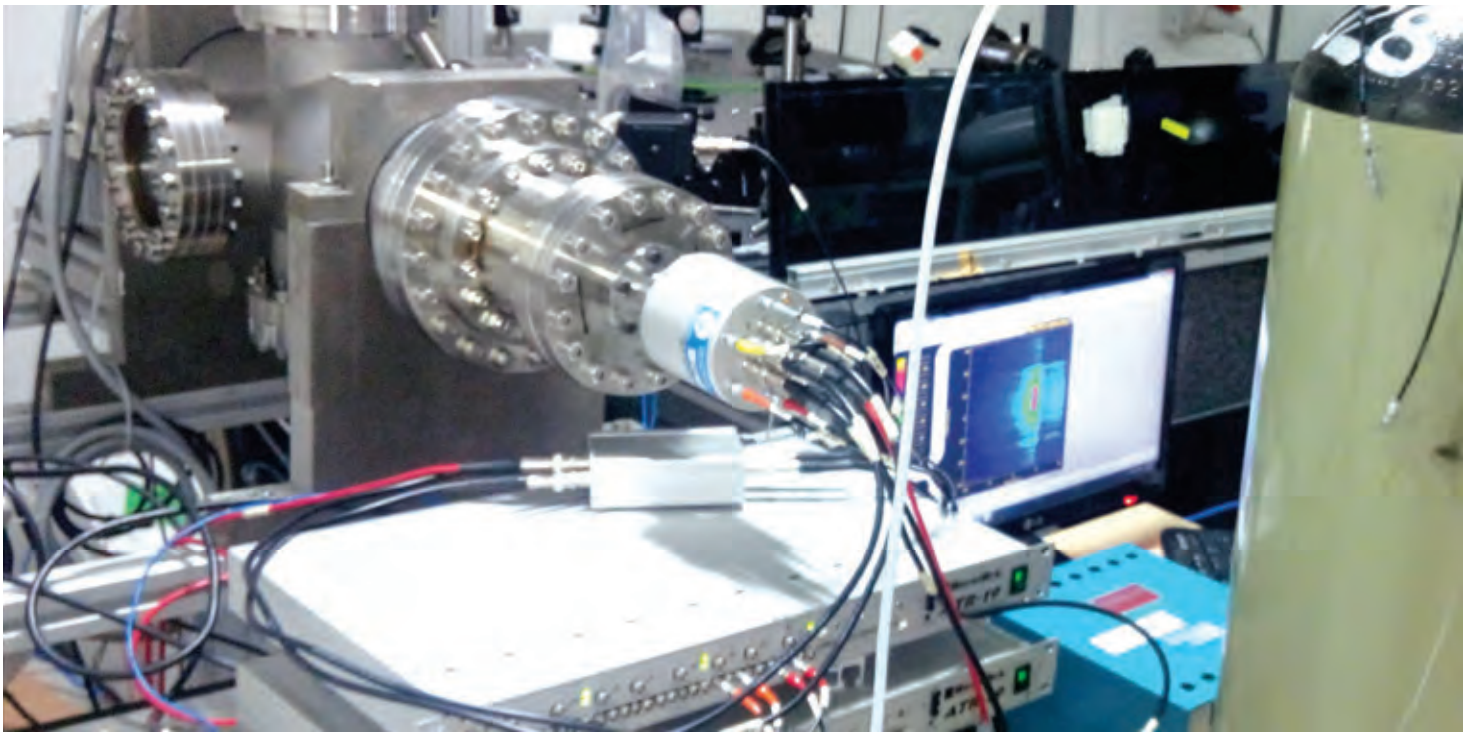
*Silicon Dioxide Deposited at Room Temperature for MEMS and Silicon Surface Texturing*, International conference on Energy, Functional Materials And Nanotechnology (ICEFN-2016), Kumaun University Nainital, Uttarakhand, India, 27-29 March 2016.

*Structural, vibrational and ferroic properties of $AgTaO_3$ from first principle calculations*, XXVII IUPAP Conference on Computational Physics, CCP2015, Indian Institute of Technology Guwahati, Assam, India, 2 - 5 December 2015.

*The Structural And Electronic Properties of Cubic $AgMO_3$ (M=Nb, Ta) By First Principles Calculations*, International conference on condensed matter and applied physics (ICC)-2015, Bikaner, Rajasthan, 30-31 October 2015.

*Hard to soft ferroelectric transition with enhanced piezoelectric properties assisted by global and local structural variations in a lead free 0.92NBT-0.08BCZT ceramics*,World Congress and Expo on Nanotechnology and Materials Science, Dubai, UAE,13-15 April 2015.

*Electronic structure and thermoelectric properties of natural minerals, Advanced Materials for Energy and Environmental Applications (AMEEA- 2015)*, Department of Physics, Bharathiar University,



Coimbatore, 18-20 March 2015.

*Generalized Unitarity to set up Feynman Master Integrals, Saha Theory Workshop: Multi-loop and multi-leg processes for precision physics at the LHC*, Kolkata, 23-27 February 2016.

*Differential Equations Method and Generalized Unitarity for solving Feynman Integrals*, Workshop on High Energy Physics Phenomenology, Kanpurm 04-13 December 2015.

*Laser driven ion acceleration*, First Newton- Bhabha-UK-India bilateral meeting on High Field Science, Trivandrum, March, 1 March 2016.

*Generation of Energetic Particles in Intense Laser Matter Interaction*, Conference on High intensity Laser Science, Israel, 22-26 February 2016.

*Exploring nanoscale and ultrafast dynamics of magnetic multilayer system for application*, DAE-SSPS2015, Noida, India, 21-25 December 2015.

*Understanding microscopic ultrafast magnetization dynamics in magnetic multilayer*, ICMAGMA 2015, Vellore, India, 2-4 December 2015.

*Ultrafast magnetization dynamics in magnetic multilayer*, UFS 2015, Kolkata, India, 19-21 November 2015.

*Imaging local magneto-structural properties with scanning probe*, EMSI 2015, BARC, Mumbai, India, 8-10 July 2015.

*Magnetic domain dynamics in magnetic multilayer*, IJWMN 2015, Bhubaneswar, India, 9-12 January 2015.

*Vector-like leptonic dark matter and its signature at LHC, invited talk given in a conference Frontiers in High energy physics 2016*, held at IMSc. Chennai, during 22–25 March 2016.

*Dark matter: From cosmos to collider, invited talk given in a national seminar Advances in astroparticle physics,* held at School of physics, Sambalpur University, Odissa, during 19-20 February 2016.

*Vector-like fermion dark matter: From cosmos to collider*, invited seminar given in the department of physics, IIT Guwahati, on 20 January 2016.

*Vector-like leptonic dark matter and collider signatures*, invited talk given in a conference Recent trends in Astro-particle and particle physics held at CHEP, IISc Bangalore, 11-12 October 2015.

*On the Role of D/A Interface in Organic Solar Cells*, Sai Santosh Kumar Raavi, 2nd Workshop on Environment and Energy, Osaka University, Japan, 10-11 March 2016.

*Ferromagnetism and exchange bias in graphene nanoribbons,* Osaka University, Japan on 24 February 2015.

*Magnetostrictive materials and their applications*, Osaka University, Japan on 24 February 2015.

*Resistive switching behavior in ultra-thin LSMO/SRO superlattices*, Kansai University on 25 February 2015.

*Remote control of magnetostriction based nanocontacts at room temperature*, ICMAGMA – 2015, Vellore, Tamil Nadu 2-4 December.

*Presentation on Detection of ultrafast heat pulses from the molecular magnet Mn12-Ac* – at high field sweep rates, ICMAGMA – 2015, Vellore, Tamil Nadu 2-4 December.

## Workshops / Symposiums Organised

Five days TEQIP Workshop on MEMS and NEMS (Design & Fabrication), Indian Institute of Technology Hyderabad, 14-18 December 2015.

## Awards / Recognitions

Fast-Track young scientist award (June 2015), DST, *Vandana Sharma*

Visiting fellowship (2015-2016), JNCASR, *Saket Asthana*.

## Other Events

Dr. Shubho R. Roy, Co-organized the first lecture in the Public Lecture Series with Dr. Harish N. Dixit. Title: The New Wave in Physics, Astronomy and Technology, C. S. Unnikrishnan (Tata Institute of Fundamental Research, Mumbai), 31 March 2016.

# Innovation **Activities**

**IIT Hyderabad has vibrant sci-tech activities both as part of their curriculum and extra-curricular activities round the year. Right from the day of inception, IIT Hyderabad had several sci-tech activities starting from astronomy, robotics, automotive, electronics, programming etc. Several innovative projects are carried out throughout the year with some projects winning competitions held at inter IIT technical meets.**


## Hand Symbol Interpreter

***OVERVIEW***

***The idea behind the project was to make use of flex sensors along with accelerometer and gyro sensor to build a device which can be used for interpreting hand symbols.***

### *DESCRIPTION*

The device makes use of flex (resistance) sensors along with accelerometer and gyro sensor to convert hand symbols into text. The flex sensor gives a resistance value according to the folding of the finger. It gives a high value for a curled finger and low value for a straight finger. The flex sensors are connected to the *arduino* which in turn processes the signals along with signals from accelerometer and gyro sensor to produce an output. Different inputs are mapped to various output, which can be text, speech or anything you want.

### *APPLICATION AND FUTURE PROSPECTS*

We primarily wanted to use this device for the mute and the dumb people. This can be used for easing the communication with other people who do not understand sign languages.

A basic model for symbol-to-speech interface has also been developed. Apart from this use, we can also use it for controlling home appliances. We are working on integrating a Bluetooth module to make it wireless. The product is expandable if optimized for code to print symbols

# Escort **Robot**

## DESCRIPTION

This project is about making of an escort robot which guides a guest/visitor who is new to a location from one place to the other. It implements an efficient search algorithm to find the shortest feasible path from the current location to any target location. Our algorithm can extract data from any general layout created in AutoCAD software and creates a database of all traversable co-ordinates of a map. Our search algorithm generates an optimal path very efficiently from those feasible co-ordinates. It also detects moving obstacles while in motion and waits until the obstacle stops blocking its way. It also has information about the location of every stationary obstacle .To make this process user-friendly, we are using an android app which takes the current and target locations as inputs from the user and sends the data to robot.

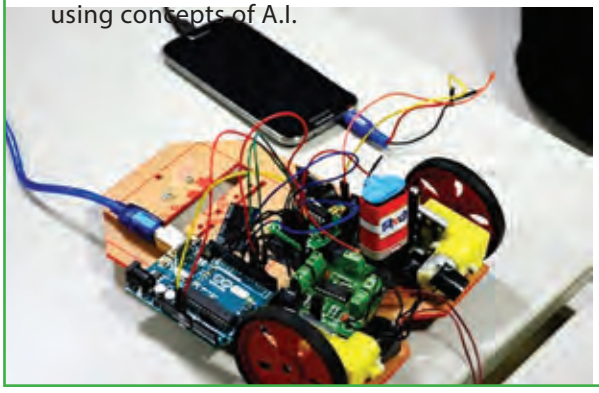
## APPLICATION AND FUTURE PROSPECTS

Major application could be mounting a detector for explosives and hazardous materials and those detection in the building is possible without human involvement in the search.

In future it is possible to make dynamic changes in the path followed by the robot by scanning the environment by image processing to make it even more accurate and increase its applicability.

An android app and import the current code into a java script, so that it could be implemented through the android app only, which would reduce the hardware cost and processing demands.

It can use its ability to process image of its environment to dynamically make maps of a location along with escorting using concepts of A.I.



# Quad**copter**

## DESCRIPTION

This project involves making of a quadcopter that is mounted with a camera and is capable of live streaming of the events to the ground or a mobile phone. This project involves building a quadcopter, assembling and mounting the required hardware on it for the live streaming.

## APPLICATIONS AND FUTURE PROSPECTS

Quadcopter has been successfully used in several applications lkie security surveillance, traffic control, unmanned deliveries etc. It is expected that these devises will play a major role in day-to-day life in the coming future.

**Current activities:** A quadcopter that is capable of moving in disaster sites and count the number of people entrapped in an unfortunate location (like flood surrounded regions).

# BAJA Student India **2016**

## DESCRIPTION

In this project an engine is provided and the students are asked to build a single seated all-terrain vehicle.

## PROSPECTS AND OUTCOME OF THE PROJECT

IITH students have cleared the prelims of BAJA Students event based on the design and evaluation. Later the IITH team built the vehicle and tested it. Among the 400 teams around the country, IITH has secured 33$^{rd}$ position.

# Elan 2016

ELAN 2k16, one of the biggest techno cultural fests of India concluded on 31st January after a three day fun filled extravaganza. Since its inception, ELAN has grown bigger and better every year and this seventh edition of ELAN is a testament to the effort put in by the students. This year, the theme of ELAN was "The Devil's Carnival". As a build up to the fest, a Quadcopter workshop was conducted where students learnt how to build a quadcopter handson. Online events like CricIt for cricket lovers, a selfie contest in association with Infocus, the photography club of IIT Hyderabad and the online literary festival were conducted throughout the year. Having a sense of social awareness and giving back to society, Elan organized a cloth donation drive, blood donation camp and a health camp in association with NSS, IIT Hyderabad. In the run up to the fest, ELAN also organized a flash mob at the Forum Sujana Mall which created a great deal of buzz among the students, participants and viewers.

Day one began with the face painting and mehendi competitions and setting up the art exhibits for some exquisite and beautiful work by students from various colleges. The Nrithyanjali and Loose your feet participants brought the audience to life with their astounding moves and incredible talent. Other events such as Conversation Cofee, JAM and AAA were also conducted on day one.

The second day saw mind boggling participation for all the technical, cultural, informal and literary events. The institute corridors and lecture halls were filled with continuous activity by the participants of Robo wars, Robo Soccer, Robo epic, poster presentation and various other quizzing prelims. Manthan (Hindi band competition), ElaneJung (English band competition), Vibrazione and Octave participants entertained the crowd with their own compositions. While informal events were being held on the informal stage to entertain the students, students were also busy participating through the day in the Quiz conclave, quizzing their hearts out in the BizSciTech, General and MELA quizzes, and testing out their luck in the Wheel of Fortune.

With the standards being set by the first two days, the third day of ELAN only made the feel better by setting the stage for one of the highlight events of ELAN, Mr. & Ms. ELAN, in the evening. Beautiful girls walked the ramp to set the temperatures rising, auditioning for the Femina Miss India beauty pageant, which was then followed by the war of DJs. This was judged by DJ Iqbal. For the first time, ELAN also organized a cultural workshop on contemporary dance, during the time of the fest. Break free(Group dance competition) saw some tremendous performances by professional dance schools and college dance troupes. While on informal stage, the duo dance competition also saw some romantic performances. The technical and literary events set the institute corridors and lecture halls abuzz with a tremendous amount of participation. It was then the time for the organizing team of ELAN to roll down some tears down their cheeks after a yearlong hard work.

IIT HYDERABAD PRESENTS

# ηVISION 2016

Started in 2011, ηvision is the technical fest organized by the students of IIT Hyderabad with a motto of providing a platform to the technical enthusiasts of our country to explore and innovate and showcase their technical and engineering prowess. Over the past 5 years, ηvision has gradually evolved from an inter college festival to one of the recognized technical fests of our country.

ηvision en riches everyone it touches. People who come here to compete go back with tons of learning. They go back and proudly tell their peers they have been to ηvision. They are applauded by their Principals in front of their whole college (this really happened. Atleast twice). They learn from the other people. We learn from them.

But we feel, it impacts us, the organizers more than anybody else. Everyone who was an organizer/ volunteer for ηvision learns important life skills like thinking on the spot, time management, etc. It helped countless people from IITH find their passion, and we hope you will be among them.

We are growing exponentially adding more events and reaching more people every year. With a broader scope and bigger ideas. With a myriad of events spread across a plethora of domains, ηvision 2016 was a platform which shall integrate technology with challenging life problems. A festival full of promise, ηvision 2016 shall be a journey more exciting and enthralling than any other to bring out the real geek in any techie

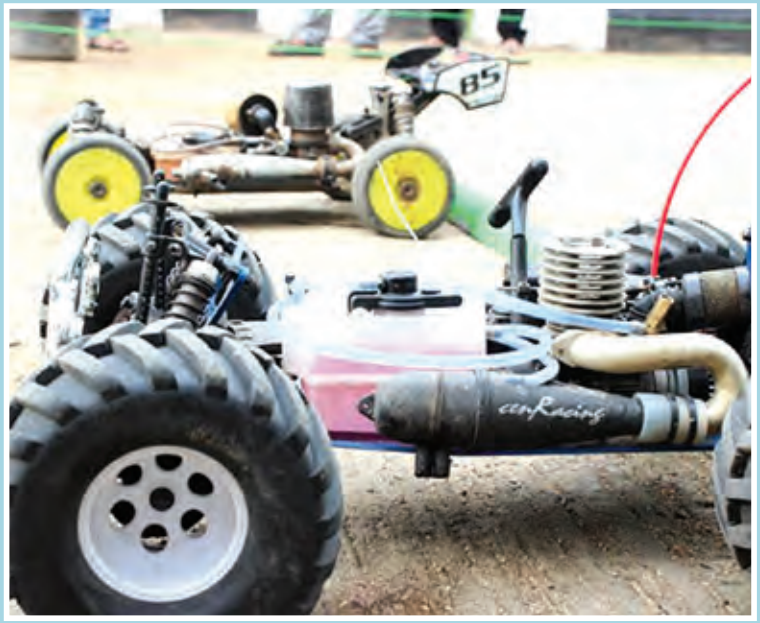

## CULTURAL COUNCIL

Cultural Council - The Fun Factory of IITH. We had a great year (2015-'16) this time. Two cultural nights, 2 DJ+Ice cream nights, one fresher specific cultural night(Grand Masti), were the major events conducted by the Cultural Council. Each clubs had their own workshops.

Quizzes by Literary Society (LitSoc), dance workshop by Dance club (Shuffle), acting sessions and workshops by Drama Club (Rang De Manch), guitar sessions and vocal sessions by Music club (Vibes) and many more. Best of all was Photography Club (Infocus), photo walk, different types of photography and most importantly placement diaries and they put in a continuous effort.

Clubs individually perform in other college fests with their own effort and support from the institute. Movie club (Behind the Lens) and VFX club have made many videos and vines in the past year.

Arts club (Gesture) have done their best in showing the importance of art to the students. We acknowledge hostel office, securities and all others who helped for everything during this academic year. To summarize, the cultural council did their best and achieved many things.



## SCI TECH COUNCIL

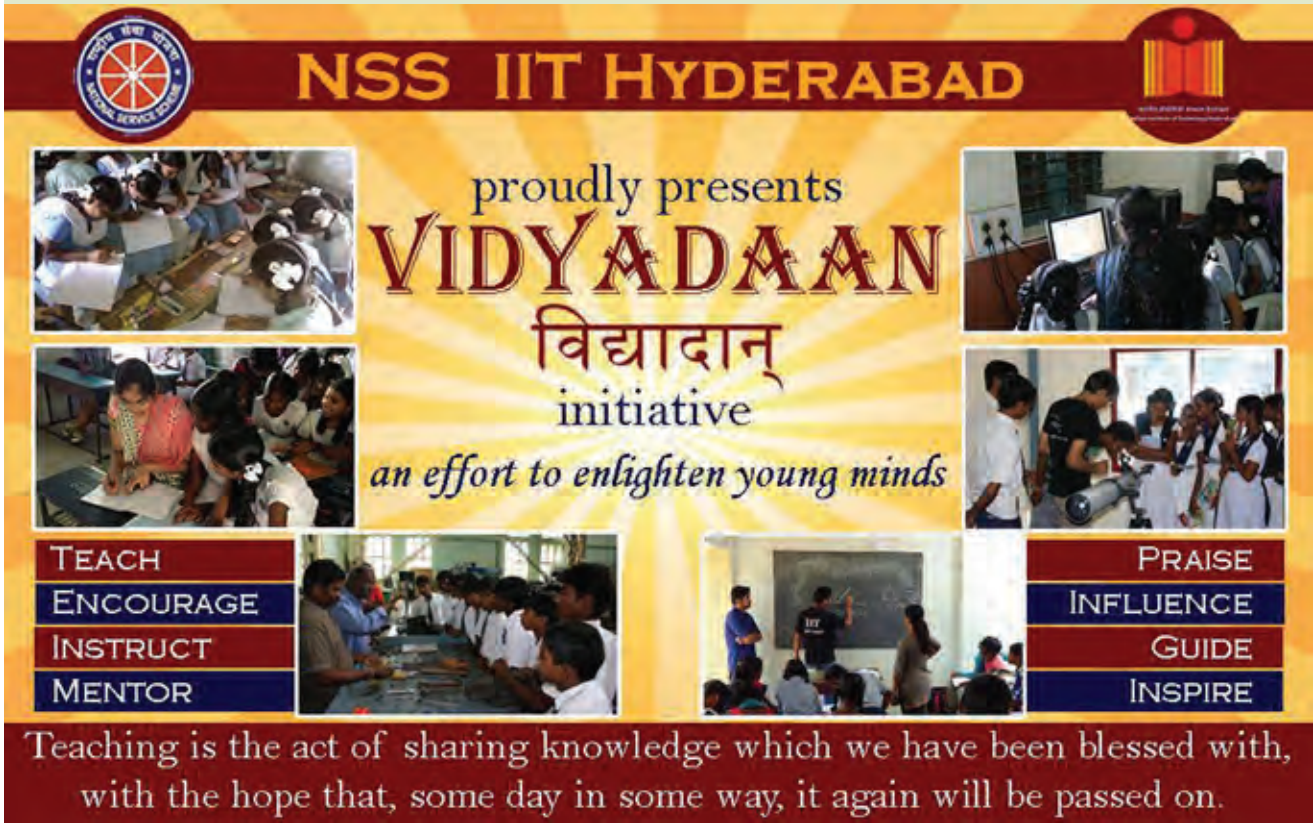
It was another exceptional year for Science and Technology activities at IIT Hyderabad. We have crossed many milestones this year in introducing new tech events, collaborations and a club as well.

# NSS Activities 2015-16

## VIDYADAAN

Vidyadaan is one of the most successful events of NSS IITH, helping struggling village students with their studies. NSS IITH has been doing Vidyadaan in many nearby villages. Every weekend enthusiastic volunteers take part in this activity of imparting education to the village students. These volunteers take classes for 6 to 10th standards.

NSS IITH has conducted Mathematics exams in the schools. This exam was aimed to understand their weak points in the subject and thus, to support them with necessary training. That is not the end,they are given a complete analysis. NSS IITH is going to conduct many such exams wherein students will learn from their students.



## ORPHANAGE VISIT

In the Month of November NSS IITH decided to light up the faces of under-privileged children who have been taken under the wing of Mahima Ministries, a social services organization. The NSS volunteers carried snacks, sweets and various eatables along with some firecrackers for the kids. The volunteers received a very warm welcome from the care-takers of the children.

The volunteers did a wonderful job in keeping the kids entertained for the duration of their short stay. They told them stories, played games and, to top it all, left them with some firecrackers to have a blast this Diwali. After an hour or so, the volunteers bid them goodbye leaving them with really sweet and precious memories to be looked back upon with a smile. Credit must be given to Mahima Ministries for holding the hands of these tiny tots when luck and family had deserted them. The work of such organizations must be brought to the forefront for everyone to see and perhaps even lend a helping hand if need be, as NSS IITH attempted to do.

## GANDHI JAYANTI CELEBRATIONS - SWACHH BHARAT ABHIYAN

On the eve of Gandhi Jayanti, NSS IITH conducted an event in the hostel premises. This was attended by Dr. Prem Pal (NSS Coordinator) and Dr. Mahendra Madhavan (Coordinator Swachh Bharat Abhiyan @ IITH), many graduating students, NSS volunteers, hostel and housekeeping staff. The event was started by paying obeisance to Mahatma Gandhiji. We had excellent speeches given by Dr. Prem Pal, and some of the enthusiastic NSS volunteers on Gandhiji and also Shastriji who shares his birthday with Gandhiji.

After paying homage to those great freedom fighters we had Dr. Madhavan preside over the function. He talked about the Swacch Bharat Abhiyan and its importance. Now the event came to its important part .All the attendees picked up their broomstick and started cleaning the hostel premises and all around the Ordnance factory. The event even got more important as Dr. Prem Pal and Dr. Madhavan themselves sprung into cleaning the streets along with other attendees. This event was a great success and this success is attributed to all those NSS volunteers who attended the event.

## PUBLIC HEALTH CHECKUP CAMP

The NSS IITH has taken an active participation in the organization and coordination of the Public Health Checkup Camp on 21st November 2015 which was conducted in Uttarapalli, a village honourably adopted by IIT-Hyderabad under the noble scheme of Unnat Bharat Abhiyan. The overwhelmingly successful heath camp was initially envisaged solely for a regular dental and ocular check-up of the students of primary school. However, upon receiving a tremendous response from the students, it was extended to all the villagers.

The volunteers set out for Uttarapalli early in the morning and were diligent in getting all the infrastructure ready. Their prolonged enthusiasm throughout the day supported the entire staff of doctors to check the health conditions with precision and speed with great fervor.

NSS IIT Hyderabad expresses its sincere gratitude to the Elan Social Cause team of IIT Hyderabad, Lions' Club (Greater Patancheru) and M.N.R Medical College, Sangareddy for bearing equal responsibility of the health check-up camp as a whole and transforming the endeavour into success.

## SELF DEFENCE CLASSES

Self-defence classes is an unexplored initiative taken up by the NSS IITH team with collaboration with the Women's Cell of IIT Hyderabad in the spring semester of 2016. The intention is for every individual to possess basic self-defence skills, which might come in handy in unwanted and adverse situations.

The classes were conducted in the evening hours of Monday, Wednesday and Friday of every week throughout the months of March and April. The classes commenced with various warm-up exercises followed by stretching exercises. Then, the instructors went on to teach a plethora of kicks and punches thoroughly in a manner as systematic as possible, only as far as what the students could fathom.

There has been a steady attendance of 30 students throughout the classes, which makes the inaugural version of self-defence classes successful. NSS believes that such basics of combat need to be imparted to one and all so that everyone can be able to defend oneself from unexpected assailants.

## CHILDREN'S DAY


On the eve of Children's day, the NSS IITH took the cheer of the day to the Uttarpalli government school and ODF ZPHS. In both schools, the volunteers were greeted with warmth by the teachers and students. The program commenced with the teachers infusing the importance of the day into the heads of the students with their words of wisdom.

Following this, a bunch of events and contests were organised by the volunteers for the children. These included elocution, drawing, quiz and rangoli-making contests. There was active participation from the students in all of these events. Towards the end of their sojourn, was the prize distribution ceremony.

## BLOOD DONATION CAMP

Blood donation camps were organised at the temporary campus (ODF Estate Yeddumailaram) and the permanent campus (Kandi, Sangareddy) of IIT Hyderabad to celebrate the occasions of National Republic day and National Independence Day respect in association with the Sangareddy District Hospital. The event witnessed an unprecedented number of donors, over 112; comprising mostly of the students, faculty and working staff of IIT Hyderabad. 'Bugga' an initiative by NSS IITH for Fighting Leukemia, also saw a good response with around 80 students registering their White Blood Cell type into the database.

## PHOTOGRAPHY WORKSHOP

NSS IITH and Infocus IITH collaboratively conducted a hands-on workshop for ODF school students on different types of photography. NSS IITH firmly believes that apart from imparting education to the under-previleged students, creative activities such as Photography etc. should also be encouraged.

# SPORTS

With a strength of around 500 students, the National Sports Organization started its full-fledged program in August for the academic year 2015-16. The list of events goes as follows:

### *FRIENDSHIP RACE*

It was conducted on 2nd August 2015 as a part of freshmen interaction on eve of International Friend ship day. It had a huge participation of around 600 from students, staff and faculty with their family members. Prizes for the event were distributed on the eve of Independence Day.

## Interaction Matches

As another major part of freshmen interaction program, football, cricket, volleyball, basketball, badminton etc. were conducted from the date of registration till 10th August 2015.

## NSO

Our first NSO interaction with freshmen was conducted on 3rd August. The main aim of NSO, IIT Hyderabad is to inculcate sportive spirit in the students. With four coaches in total for various events and sports equipment for about 8 team events, aquatics and athletics, it has been and is functioning smooth. New registrations for NSO were invited from the freshmen. After enrolment, NSO hours have been conducted on every Wednesday and Friday for all the NSO registered B.Techs.

### INTERNATIONAL DAY OF YOGA

On 21st June 2015, IIT Hyderabad celebrated the first International Day of Yoga.
Starting with director's speech we gave a presentation on Yoga, what does it mean, its history, development, and benefits of doing it with two videos of demonstration about yoga asana followed by demonstration of asanas to the audience and made them do some basic asanas and pranayama.

# SPORTS

## INTER IIT SPORTS MEET 2015

Camp for Inter IIT Sports Meet 2015 started on 29th November with a total participants of 118 in various events like Badminton(M&W), Basketball(M&W), Cricket, Football, Hockey, Lawn Tennis(M&W), Table Tennis(M&W), Volleyball(M&W), Weight lifting and athletic events. It went smooth with full-fledged facilities and proper food till 9th December. As there were heavy floods in Tamil Nadu State, IIT Madras had to cancel the Inter IIT Sports Meet on the decision of the Inter IIT Sports Board Meeting which happened through video conference.

## RUN FOR UNITY

It was organized on 31st October 2015 on the eve of Rashtriya Ekta Diwas. It had huge participation from students, faculty and staff.

## FRIENDLY TOURNAMENTS

Students of IIT Hyderabad have played friendly practice matches with institutes like BITS Hyderabad, GITAMS Hyderabad, Medak district teams and ODF employees' team.

Students also participated in friendly tournaments with CBIT, IIIT Hyderabad, etc.

## INTRAMURAL SPORTS

Informal leagues for badminton, basketball, cricket, hockey, volleyball, table tennis, football and kabaddi were conducted. The 8th annual sports meet was Interdepartmental. As there was no Inter IIT Sports Meet, we organised Inter Departmental Sports Meet in which UG, PG and staff participated better than ever and made students compete in the same level as in Inter IIT sports meet. It covered all the team events along with athletic events as that of the Inter IIT sports meet. Women's basketball was introduced. Prizes were distributed on Gymkhana day.

## GYMKHANA DAY

On 12th April, prizes were distributed for winner teams of various events and rolling shield for General Champion Ship for the department which bagged highest points. Mementos for Sports person of the year and for the best athlete were also given.


GLIMPSES OF OUR **NEW CAMPUS**

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