# Insight 2017 research scholars' day

9<sup>th</sup> March, 2017



RAJENDRA MISHRA SCHOOL OF ENGINEERING ENTREPRENEURSHIP IIT KHARAGPUR









"Study the science of art. Study the art of science. Develop your senses- especially learn how to see. Realize that everything connects to everything else."

- Leonardo da Vinci

# Dedicated to the loving memories of

Late Kalyan K. Guin

# About School



Rajendra Mishra School of Engineering Entrepreneurship (RMSoEE) was established at Indian Institute of Technology Kharagpur in the year 2010. The school aims to encourage the entrepreneurial minds and imparts strong entrepreneurial culture and ecosystem for venture creation and early startups. It is a revolutionary step forward by integrating the academic and practice aspects of entrepreneurship education. The school offers a 5 year integrated dual degree with M.Tech in Engineering Entrepreneurship and B.Tech in engineering discipline. The students selected through JEE for B.Tech or dual degree M.Tech in any engineering department can opt for this program from their second year of study according to department change over rules. This unique school for the first time provides the opportunity for engineering undergraduate students to design product while pursuing their academic degree during entire period of study (5 years) for dual degree. Students who major in entrepreneurship are exposed to new venture creation through which they gain understanding of process pertaining to skills, knowledge and experience required to become successful entrepreneur. The school offers unique curriculum which has been designed to give students an opportunity to develop their own creative skills thereby applying principles of engineering management, marketing and finance to the challenges of starting new business, growing and managing business towards scalability. The school is equipped with innovation lab for ideation and innovative thinking from second year onward. The various funding structure available in the entrepreneurial ecosystem at IIT Kharagpur provides flexibility to students for building and testing their prototypes. Spearheaded by number of fellows and doctorates from leading institutes and universities amongst its faculty, the school also runs a vibrant Doctoral/ MS Program aimed to bridge intellectual gaps in relevant interdisciplinary studies related to innovation and entrepreneurship literature. It enriches the value of knowledge, technology intervention and transfer, and overall ecosystem development for innovation and entrepreneurship.

# From Director's Desk



भारतीय प्रौद्योगिकी संस्थान खड़गपुर खड़गपुर-७२१३०२ Indian Institute of Technology Kharagpur Kharagpur – 721302

प्रोफेसर पार्थ पी. चक्रवर्ती, एफएनए, एफएएससी, एफएनएई निदेशक Prof. Partha P. Chakrabarti, FNA, FASc, FNAE J. C. Bose Fellow Director Professor. Department of Computer Science & Engineering



March 06, 2017

#### Message

It gives me an immense pleasure to note that Rajendra Mishra School of Engineering Entrepreneurship, IIT Kharagpur is celebrating its Research Scholars' Day. I am pleased to see that souvenir is being published on this occasion. This endeavour would facilitate knowledge sharing and discussion for creating an indispensable link between academic and practical aspects of entrepreneurship.

Being front runner in technology education and research in India, IIT Kharagpur is dedicated to take the technology education and research to the world in a sustainable and inclusive manner. I am sure the deliberations held will immeasurably help the various professionals who will participate in it. I wish the organisers and the participants a grand success. The research work and discussion in this direction would be a catalyst for attaining the goal of alleviating societal problems through technological and managerial intervention.

I congratulate the School for providing a platform for exchange of ideas through this celebration. I have no doubt that the ideas evolved during this event will provide better insights for setting future research directions and applications in real scenarios. I am sure this will be a milestone in ensuring the highest standards in this profession. The galaxy of expert present will enormously benefit young researchers.

I wish the Research Scholars' Day a great success.

Partha P. Chakrabarti

Office: Phone: +91 3222 282002 Fax: +91 3222 282000 e-mail: director@iitkgp.ernet.in; ppchak@cse.iitkgp.ernet.in Residence: Director's Bungalow, IIT Campus, Kharagpur-721 302, Phone: +91 3222 282003 / 277201

# From Patron's Heart

# Insight 2017



# Devendra Mishra

Adjunct Professor, Decision Sciences & Marketing, Graziadio School of Business & Management, California Founder of **Media** & Entertainment Alliance (MESA), Hollywood IT Society (HITS) and Biotech Supply Chain Management Alliance (BSMA)

# MESSAGE

March 6, 2017

The pursuit of Sustainability, chosen for the 2017 Scholars' Day celebration, is a formidable challenge you as scholars and entrepreneurs must meet with success. Through this mission, you have defined the spirit of the Rajendra Mishra School of Entrepreneurship and given it the compass for direction of entrepreneurial creativity. As entrepreneurs, you know that achieving sustainability is not only a moral prerogative, it is truly an economic mandate that you are responsible to address. Particularly in a nation of 1.2 Billion people, destined to grow the economy at unprecedented rates to achieve global competitiveness, the calling to drastically reduce the carbon footprint of all the industrial and commercial enterprises is timely. You know how onerous it is for generations to come if we do not confront it up, front and center. Do not let altruistic imperatives drive your actions, let it be economic betterment of society and profitability of businesses instead. Professor Dan Estes of Yale would remind us that "Green leads to Gold". May you always think in terms of the green environment in all your endeavors!



# From Dean's Desk



Charles .

भारतीय प्रौद्योगिकी संस्थान खड्गपुर खड्गपुर-721 302,भारत Indian Institute of Technology Kharagpur Kharagpur-721 302,India

Dr. P. K. Das, FNAE, FNASc Dean, Postgraduate Studies and Research Professor, Department of Mechanical Engineering

Message

March 6, 2017

I am extremely glad to note that Rajendra Mishra School of Engineering Entrepreneurship, IIT Kharagpur is organizing Research Scholar Day on March 9, 2017.

It is of great significance that this event is going to be thoughtful upon several important topics, exploring various areas of green innovation and entrepreneurship. No doubt that this year too, the day will be observed with equal enthusiasm and zeal by students who would take this opportunity to demonstrate their latest findings and to exchange ideas of research, development and knowledge among the different research groups.

I congratulate them all for their effort and wish them and the event a grand success.

Prasanta Kumar Das

OFFICE : Phone. +91 3222 282036 (Dean's Office). 282916 (Dept. Office) Fax : +91 3222 282046, 282000 E-mail : deanpg@hijk inkgp.emet.in RESIDENCE : A-120, I/T Kharagpur, Pin-721302 Phone :+91 3222 282917 A STEP FORWARD

# Insight 2017



#### Science & Technology Entrepreneurs' Park IIT Kharagpur - 721302 www.step-iit.org

Professor Satyahari Dey Professor, Department of Biotechnology Principal Investigator-TIETS, IIT Kharagpur Managing Director, STEP

#### MESSAGE

It is a matter of pleasure to know that the Rajendra Mishra School of Engineering Entrepreneurship. IIT Kharagpur is celebrating 5<sup>th</sup> Research Scholars' Day on 9<sup>th</sup> March, 2017. The 'MAKE IN INDIA' revolution started by our Honourable Prime Minister promises to bring remarkable entrepreneurial growth in all industrial sectors. The academic and research programs offered by RMSoEE have special significance in respect of Make in India today and made in India tomorrow.

RMSoEE caters to the entrepreneurial need of students' keen in progressing their careers through start-ups. The School inducts students from multifarious domains giving them the freedom to explore and work in their niche areas of interest. The core engineering talents having capped the PG portion with entrepreneurship, followed by doctoral degree build unique innovators for global visibility.

The Research Scholars should work with enthusiasm to evolve R&D programs for Invention, Innovation and Translation that will add further significance to the big name of IIT Kharagpur.

My best wishes for the Scholars with this precise distinction to work for evolving a developed India.

Prof.Satyahari Dev

From Head's Desk

As we aim for new highs on our fourth Research Scholars' Day ...



Let us start with a glance through our recent achievements:

- Mr. Rana Basu and Mr. Partha Mukhopadhyay have successfully completed the doctoral degree.
- Ms. Jagruti Thakur, research scholar, has been awarded POSOCO (POWER SYSTEM OPERATIONCORPORATION LIMITED) Power System Awards (PPSA) 2017 in the doctoralcategory for her work on 'Implications of smartmetering and increasedrenewables for residential consumers in India'. Around 25best thesis from all over India have been selected in this category forthis award. The award constitutes a cash prize worth Rs.60,000/- along witha certificate. Her Supervisor is Dr.Basab Chakraborty.
- Mr. Harshit Vallecha, research scholar, currently working under Dr.PrabhaBhola has been awarded POSOCO (POWER SYSTEM OPERATION CORPORATION LIMITED) Power System Awards (PPSA) 2017 in the masters category for his research work on 'Smart Utilization Of Solar And Wind Farm Inverters As Facts Devices In Grid Integrated Renewable Energy System'. Mr. Harshit has secured 7th Position under Top-10 master's category (all over India). He will be awarded a cash prize worth Rs. 30,000/- and invited to the award ceremony at IIT Delhi by FITT (Foundation for Innovation and Technology Transfer) and POSOCO.
- Ms. Jagruti Thakur, research scholar, was awarded the BASE 2016 Internship Program supported by the DST, Govt. of India, and IUSSTF. She worked at Lawrence Berkeley National Lab, Berkeley for a period of 5 months.

- Ms. Poonam Gupta, Founder& CEO of Alive Home an entrepreneurial venture of our School, has been shortlisted as the only finalist from South Asia in the prestigious Rice B-Plan. The Rice Business Plan Competition is the world's richest and largest graduate-level student start-up competition. It is hosted and organized by the Rice Alliance for Technology and Entrepreneurship, which is Rice University's internationally-recognized initiative devoted to the support of entrepreneurship, and the Jesse H. Jones Graduate School of Business. The team has been invited to compete in the finals at Houston, Texas. The Alive Home team is mentored by Prof. P. K. Dan.
- The Institute has also sanctioned Rs. 10 Lakhs for the project of Alive Home Team. The first trial and inspection testing report is favorable. The Principal Investigator for the project is Prof. P.K.Dan.
- Ms. Sonal Singh, research scholar, was selected for the Faculty Development Fellowship funded by University of Nebraska, Omaha. She worked at College of Business Administration Center, UNO for a period of one month.
- GES completed 10 years and was hugely successful again. Over 1000 student participants attended.
- Amara Raja Batteries Ltd: Dr. Basab Chakraborty has been engaged as a consultant to the renowned battery manufacturer in the areas of Product and Process development.
- Ampere Vehicle: Ampere Vehicle, Coimbatore has signed a MoU with IIT Kharagpur on its research on electric 2-wheelers. RMSoEE is spearheading the collaborative research in this endeavour.
- A course on 'Healthcare Operations and Innovation' was delivered under Global Initiative of Academic Networks (GIAN), Govt. of India, during June 6-17, 2016 in association with an International Faculty Prof. Paul Lillrank, Aalto University, Finland

Our start-ups continue to win laurels -

• Inshorts won the IAMAI's "Best Innovative App" 2016. It was covered by Entrepreneur Magazine as "Most Innovative Start-up" 2016. It acquired app start-up Beta-Glide.

• Ecozen Solution Pvt. Ltd. was covered by Times Now of its show Amazing Indians, by Energy Next magazine, and was recognized as the best start up at Pune Connect.

• iViz Security Pvt. Ltd. (Cigital) was acquired by Cigital Inc. - the largest application security services company. The company is active in promoting entrepreneurship -and achieved TiE Charter Member, iSprit Fellow, etc.

• P2P Solutions Pvt. Ltd was recognized as the topmost techno Innovation at India Innovation initiative (i3) awards organised by the Department of Science & Technology (DST), confederation of Indian Industry (CII) & Agilent Technologies. They also bagged the Clean Tech award

• Rajendra Mishra School of Engineering Entrepreneurship (RMSoEE) make IIT Kharagpur intends to the leader in engineering entrepreneurship education by reinventing, promoting and innovating on The Indian Entrepreneurship Models. We look forward to a leadership role in the country by introducing green innovation and entrepreneurship as an orientation of shaping its young entrepreneurial minds and fostering research in the domain. RMSoEE, IIT KGP in collaboration with FICCI Quality Forum, New Delhi is hosting the first edition of 'Engineering Green Innovation and Entrepreneurship towards a Sustainable World' Symposium at IIT Kharagpur.

• And we have a new member in our faculty – Dr. Mamoni Banerjee

- The symposium will extant sectoral presentations on Waste Management; Renewable Energy; Smart Cities; Green Manufacturing, a panel discussion on 'Technological, social and economic ramification of green entrepreneurship', followed by a student competition on 'Reorientation of techno-management research in comprehending the essence of green entrepreneurship'.
- The construction of the maiden tower for the Science and Research Park at Rajarhat, has been completed. It is expected to be completed by middle of 2017 and become a hub of entrepreneurial activities of the East.
- With over 33 research scholar and over 8 active areas of research. our fourth Research Scholars' Day is expected to be a vibrant and lively affair. The enthusiasm is palpable with the scholars providing leadership in academic activities of the day with the faculty following up. Our patrons, Dr. Devendra Mishra, Chief Strategist, MESA and Executive Director, HITS and Dr. Amarendra Mishra have helped the School in forging the vision forward. Radha Basu and Dipak Basu will honour the occasion as Chief Guest. Radha Basu the CEO.Founder of iMerit & also a Co-Founder of Anudip Foundation who is widely recognized as a leading woman entrepreneur in technology companies and as a pioneer in the Indian software business will share her invaluable experiences in woman entrepreneurship. Dipak Basu has spent much of his life employing technology in humanitarian missions worldwide. In 2006 Dipak set up Anudip Foundation, a social enterprise to improve livelihoods of India's rural poor. In 2001he co-founded and served for four years as Executive Director of US-based nonprofit NetHope, a technology alliance of the world's largest aid agencies. From 1995 to 2006, he held senior management positions in Product Management and Professional Services at Cisco Systems.
- This will also be a great event to look forward to, as our Research Scholars are competing based on Engineering green innovation and entrepreneurship towards a sustainable world.



# From the Research Coordinator's Desk

The fourth Research Scholars' Day of Rajendra Mishra School of Engineering Entrepreneurship is going to be celebrated on the 9th day of March, 2017. It gives the research students and the faculty members a unique opportunity to share and exchange research ideas and to display a complete picture of the research activity performed by the research scholars in the department. To appraise about the Research of the School I would like to add few words here. The School aims to promote entrepreneurship-oriented interdisciplinary research with the help of a diverse pool of faculty members from within and outside the school at IIT Kharagpur. Currently the school has 33 research scholars working in varied fields of research on innovation and entrepreneurship. These include product modeling, product design and fabrication, computer vision and robotics, data analytics, healthcare management, energy systems, recycling & waste management, entrepreneurial leadership, entrepreneurial finance, social entrepreneurship, cultural heritage etc. We are proud to have our first two scholars graduated successfully this year and are waiting to be awarded with their doctoral degree in the forthcoming convocation.

Like the previous years, this year too the Research Scholars' Day is going to be observed with enthusiasm and zeal by our PhD and MS students. This time Federation of Indian Chamber of Commerce (FICCI) has joined our hands to celebrate it in a bit different way. The theme of the day is GREEN INNOVATION & ENTREPRENEURSHIP to emphasize the need for green initiatives in response to the alarming problems of climate changes and scarcity of natural resources in today's world. Scholars are going to present their unique ideas to bring eco-friendly and sustainable solutions that reduce the environmental impact on society which is the need of the hour. I wish the entire team of Research Scholars success and appreciate their sincere effort for making the Research Scholar Day a memorable one.

# - Prof. Titas Bhattacharjee



Partha Pratim Das Basab Chakraborty Bhaskar Bhowmick Mamoni Banerjee Manoj Kumar Mondal Prabha Bhola Pranab Kumar Dan Ram Babu Roy Titas Bhattacharjee



Partha Pratim Das Professor, Head

### **Brief Profile**

- Taught at the Department of Computer Science and Engineering, IIT Kharagpur from 1988-98.
- Worked as Business Development Manager, Alumnus Software Ltd (1998-2001) and as Senior Director, Interra Systems, Inc. (2001-11).
- Joined the Department of Computer Science and Engineering, IIT Kharagpur as Professor in 2011.
- Served as a Visiting Professor with Institute of Radio Physics & Electronics, Calcutta University (2003-2012)
- Published widely in areas of Digital Geometry, Image Processing, Parallel Computing and Knowledge-based Systems
- Served International Conference on VLSI Design & Embedded Systems, as General Co-Chair in 2005 and Program Co-Chair in 2016. Also served as Organizing Chair for International Symposium on VLSI Design & Test, 2007
- Joint Principal Investigator of National Digital Library project of MHRD.
- A core team member for the upcoming Technology Park of IIT Kharagpur at Rajarhat, Kolkata.
- Member of IEEE, ACM, IUIAPR and VLSI Society of India and works as a Review Writer for ACM Computing Surveys and is a reviewer for Pattern Recognition Letters.

#### Accolades

 UNESCO/ROSTSCA Young Scientist Award (1989), INSA Young Scientist Award (1990), Young Associate-ship of Indian Academy of Sciences (1992), UGC Young Teachers' Career Award (1993), INAE Young Engineer Award (1996), Interra 5 Years' Tenure Plaque (2007), Interra Special (Process) Recognition (2009).

#### **Research Interests**

• Entrepreneurship Promotion, Image Processing, Software Engineering, Technology-Enabled Education, and Digital Heritage

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# Basab Chakraborty Assistant Professor



# **Brief Profile**

- He joined the institute in January 2013
- Prior to that, he was involved in the development of new cost effective and energy efficient chemical process for the manufacturing of lead acid batteries for fourteen years
- Was instrumental in forming the Research centre and spearheaded basic research on the frontiers of electrochemistry and material science to evolve cost effective new materials suitable for the improvement of the bottom line
- Transformation of the research outputs into commercial products was the major achievement
- Presently working on Integration of Renewable sources of Energy in Smart Energy distribution network, Energy Storage systems, Waste heat utilization and e-waste management
- Currently working as a co-PI in the Project on Promoting Innovations in Individuals, Start-ups and MSMEs (PRISM)
- Engaged as a consultant to Amara Raja Batteries Ltd.
- Published more than 12 papers in international peer reviewed journals of repute along with several conferences
- Has one international patent which has been commercialized

### **Research Interests**

• Product Design and Development, E-waste estimation and management, Energy Science & Management, Development of New Material for Energy Research

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Bhaskar Bhowmick Assistant Professor

### **Brief Profile**

- Reviewer of Strategic Entrepreneurship Journal.
- Member, Editor Advisory Board on Competitive Strategies for Academic Entrepreneurship: Commercialization of Research-Based Products.
- Has worked for 13 years in the industry for product development, marketing, and managing businesses.
- Has experience of entrepreneurship in launching small units within the multinational company folders.
- Has initiated launching personal care product division of Parle Products limited.
- Initiated establishing the business of synthetic threads of Lohia Group.
- · Launched the consumer division of United Phosphorous limited in eastern India.
- Has published Book Chapters, Cases, and Research Papers in National and International journals and conferences.
- Currently working on a Sponsored Project on "Technology Incubation and Development of Entrepreneurs" (TIDE)

### **Research Interests**

• Innovation ecosystem, Innovation in firm environment relations, Dynamic capabilities of firms, Leadership and Succession strategy

# Mamoni Banerjee Assistant Professor



#### **Brief Profile**

Prof. Mamoni Banerjee is doctorate in Agricultural Science. She served different organizations; State Bank of India, Indian council of Agricultural Science, Indo-French Centre for promotion of Advanced Research. Her research interests are in Phytochemicals, Bio pesticides, Pesticide bio-efficacy study, Rural Technology Development for entrepreneurship etc. She has one project i.e., Development of plant Extract Based Formulations from Locally Available Plants for Utilization Under Sustainable Pest". She is member of Indian Science Congress Association



Manoj Kumar Mondal Assistant Professor

### **Brief Profile**

- Received Gold Medal (2008) from Lockheed Martin through competition organized in association with University of Texas at Austin, Stanford University, FICCI, DST
- Member of the team receiving Gold Plaque and Cash award (2014) from the Ministry of Chemicals & Fertilizers for the best innovation that evolved out of a sponsored project executed at Materials Science Center, IIT Kharagpur
- Recently consulting projects from Frost & Sullivan on study of techno-economic feasibility and financial viability of new innovations evolved out of research projects sponsored by the National Jute Board, Ministry of Textiles, Government of India.
- Received financial award from the Department of Scientific and Industrial Research (DSIR) under the TechnoPreneur Pro-motion Program (TePP) for refinement of a technology (2009).
- Received financial award from the Technology Information, Forecasting and Assessment Council (TIFAC) under the program of Technology Refinement and Marketing Programme (TREMAP) (2011)
- Mentored several spinoff start-ups out of IIT Kharagpur, some of which (for example, www.nucleodyne.com) are making global footprint and has been closely associated with for the last decade.

#### **Research Interests**

• Financial Economics, Banking, Product Development, Bio-Energy, Entrepreneurship.

# Prabha Bhola Assistant Professor



# **Brief Profile**

- Priorly served as Assistant Professor in Indian School of Mines, Dhanbad
- Also served as a Guest Lecturer in Hyderabad Central University and Visiting Faculty in Narsee Monjee Institute of Manage-ment Studies, Hyderabad
- Her area of specialization is Economics with current research interests in the field of Entrepreneurship
- Has published a book, entitled 'Rural Poverty and its Determining Factors: An Empirical Analysis of Districts in Uttar Pradesh, India' by LAP AG & Co. KG, 2010
- Conducted training programmes such as faculty development and technology based entrepreneurship development programmes.
- For a brief tenure she also worked as OSD at STEP, IIT Kharagpur.
- She was entrusted with managing the technology and innovation related projects and working along with its network partners.
- Has strong analytical and quantitative aptitude with high exposure to application of statistical techniques and usage of statistical packages like STATA, SPSS, AMOS.

### **Research Interests**

• Venture creation, Quality Management and Performance Measurement, Business Analytics, SMEs Growth and Quality Management, Service management, Statistical Modelling, Impact assessment and Performance Measurement of Entrepreneurial Firms, Entrepreneurship & Poverty, Sustainable Development

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Pranab Kumar Dan Associate Professor

# **Brief Profile**

- Member Organising committee of AIMTDR International Conference 2014.
- International Programme Committee, ICoRD'17 (International Conference on Research into Design, 2017)
- Chaired technical sessions in seminar and workshop organised by the Production Engineering Department, Jadavpur University, and Confederation of Indian Industries (ER).
- Fmr Member of the Manufacturing, Technology and Innovation Committee (CII-ER).
- Fellow of The Association of Engineers, India.
- Senior Member of the Indian Institution of Industrial Engineering.
- Chairman, Entrepreneurship Cell at IIT Kharagpur.
- · Member of Education & Skills Development committee of CII, Eastern Region
- Member on the Expert Committee on Education, Training and HR Initiatives of Indian Chamber of Commerce

#### **Research Interests**

• Product Development and Manufacturing.

# Ram Babu Roy Assistant Professor



# **Brief Profile**

- He is a Fellow of Indian Institute of Management Calcutta (IIMC), India
- •
- His areas of specialization are Management Information Systems and Operations Management
- Masters of Technology in VLSI Design Tools and Technology from Indian Institute of Technology Delhi (IIT-D), India.
- · Master of Science in Physics from Indian Institute of Technology Kanpur, India
- Has served as a scientist in Aeronautical Development Establishment, Defence Research and Development Organization, Bangalore and was involved in the applied research towards the design and development of Micro Air Vehicles (MAV) and Radar Absorbing Materials (RAM)
- Delivers lectures in Executive MBA and Faculty Development Programmes.
- Associate Member of the Institution of Electronics and Telecommunication Engineers (IETE).
- Reviewer of European Journal of Operations Research.
- Reviewer of International Conference on Information Systems & European Conference on Information Systems.

# **Research Interests**

• Big Data and Business Analytics, Healthcare Operations Management, Complex Networks, Healthcare Analytics .



Titas Bhattacharjee Assistant Professor

### **Brief Profile**

- Active Member of Facuty Development programmes conducted by IIT Kharagpur.
- Professional trainer in accounting and related areas for taking Guest Lectures in Government organisations and private busi-ness schools.
- Has been awarded the Fellowship in Finance & Control area from Indian Institute of Management, Calcutta (IIMC) in 2012.
- Currently working on a sponsored project "Support of Entrepreneurial and Management Development of SMES through incubators (SEI).

#### **Research Interests**

• Corporate Governance, Corporate Financial Reporting, Entrepreneurial Finance, Corporate Social Responsibility.

# From Our Alumni

Rana Basu

Partha Mukhopadhyay



Rana Basu

Contact info : rbasu004@gmail.com

It is a matter of great pride that Rajendra Mishra School of Engineering Entrepreneurship, IIT Kharagpur is celebrating research scholars' day on 9 th March, 2017. I am also very happy to know that this year the key theme is on 'Engineering Green Innovation & Entrepreneurship'. The theme itself reflects school's focus and research orientation towards society through the creation of new value driven by entrepreneurial / innovative ideas, technologies and products. I wish research scholars' day a grand success.

# Some thoughts about our School

The research program at RMSoEE was an invigorating experience. The subjects offered are unique and advanced; the classes are interactive and innovative teaching methods being deployed facilitate a better training. The faculties from different backgrounds and domain make the school stand apart as a unique place to get quality education, which also imparts an understanding of diverse cultures. Apart from curriculum, the faculty – student discussions also provide thought-provoking environment for learning and this in turn helps in developing an ardent scientific disposition.

Partha Mukhopadhyay The College of Optics and Photonics (CREOL), University of Central Florida, Orlando, FL, 32816, USA



### **Brief Profile**

- Partha Mukhopadhyay has awarded his PhD thesis on "Epitaxial Growth Optimization of III-Arsenide and III-Nitride on Silicon: Influence of Buffer on MODFET for Low Cost Power Amplifier", from Rajendra Mishra School of Engineering Entrepreneurship, IIT Kharagpur. He received his Master of Science (by Research) in Semiconductor Devices from Dept. of E&ECE, IIT Kharagpur in 2010 and B. Tech in ECE from Kalyani Government Engineering College in July, 2003. He has prior company expertise and research experience before joining MS-PhD at IIT Kharagpur on 2007. His research at institute was centered on epitaxial growth of III-V compound semiconductor on Si for power amplifier.
- He joined CREOL (The College of Optics and Photonics), University of Central Florida, Orlando, USA, in 2015 as a research scientist. Presently, he is working on epitaxial growth and fabrication of  $\beta$ -Ga2O3 (Gallium Oxide) based Solar-blind (deep UV) photodetector.

### Epitaxial growth of Compound Semiconductor based Heterostructure Device for High Power Devices and UV as well as Infra-Red Optoelectronic Devices

The approach of on-wafer integration of III-V compound semiconductor based high performance heterostructure devices with Si logic/optical circuits is the future of reliable, robust, low cost, and high performance electronic/optoelectronic applications. Moreover, III-V based power amplifiers on foreign substrate need an extensive research on epitaxial growth strategies to get semi-insulating and high crystal quality of III-V buffer and heterostructure (modulation doped) on Si. That motivates his PhD research to focus on the influence of metamorphic buffer growth conditions on structural and electrical characteristics of III-V based high power devices on silicon substrate aiming on-wafer integration.

He developed and optimized AlGaN/GaN HEMT on Si(111) aiming high power applications. He was investigated the key roles of different parameters of metamorphic buffer on device DC characteristics and thus, optimized the growth strategies. He also explored the role of different buffer/substrate on power performance of identical large-area HEMT and subsequently, he have optimized mobility and thermal analytical model of MODFET by incorporating empirical growth observations; which results well agreement of model data with the experimental one. Focusing the on-wafer integration, he developed novel growth strategy and achieved untilted, relaxed, smooth GaAs buffer on Si(100) substrate and addressed many inclusive initial growth morphologies.

During his MS-PhD, he wrote 2 big budgeted proposals (by virtue of research scholar) which were funded to the institute. He coordinated to build the proposed infrastructure of 6-inch four-chamber cluster-tool molecular beam epitaxy (MBE) and 2-inch Compact-12 MBE along with its full lab facilities of worth INR 60 crore at the institute. His responsibility also varied through project execution, vendor communication and maintenance strategy within the budget limit. He led the epitaxial growth research team, focusing III-V on Si, and established the state-of-the-art growth at institute.

Presently, at his post-doctoral research he has explored the effect of different buffers for MgZnO on sapphire/ $\beta$ -Ga2O3 substrate to get high rejection ratio and photoresponse while operating at deep UV. He is now interested to study the doping/alloying of  $\beta$ -Ga2O3 homoepitaxy for adjustable cut-off wavelength of photodetector in solar-blind regime.



- Sharad Kumar
- Susmita Ghosh
- ✤ Amrita
- Pradipta Chandra
- Sreekanth V K.
- Arpita Das
- Sonal Singh
- Mohd. Zuhair
- Jagruti Thakur
- Priyanka Laha
- Bipul Saha
- Sayani Mondal
- ✤ Jignesh Sindha
- Piyush Kumar Dongre
- Manali Chatterjee
- Aashish Kumar

- Bishnu Pada Bose
- Sireesha Tamada
- Manish Chandra
- Sanyka Banerjee
- Himadri BGS Bhuyan
- Saurabh Singh Thakur
- Sourabh Mandol
- Debraj Bhattacharjee
- ✤ Jayshree Patnaik
- Abhijit Debnath
- Manojit Ray
- Shibabroto Banerjee
- Akanksha Jaiswal
- Gurunath Reddy M
- Indrasekhar Sengupta
- Pravanjan Samanta
- Bijitaswa Chakraborty

# Sharad Kumar Supervisor: Prof. Ram Babu Roy Contact Info: sharadmanit@gmail.com



## **Brief Profile**

Sharad kumar has completed his Master of Technology in 2009 from Maulana Azad National Institute of Technology-Bhopal and B.E. in Computer Science and Engineering in 2006 from Sri Satya Sai Institute of Science and Technology-Sehore affiliated to Rajiv Gandhi Proudyogiki Vishwavidyalaya-Bhopal, Madhya Pradesh. He worked as a Senior Research Fellow in project entitled "TBI" at IIT Kharagpur. His research interest lies in systems modeling and networks for healthcare systems.

### Planning Interventions for Cardiovascular Disease Prevention in India: A Simulation Approach

Cardiovascular diseases (CVDs) are the largest cause of death and disability in India. The global burden of disease study estimated two fold premature CVD deaths in India as compared to developed countries. The burden of CVD is increasing and moving towards younger age group. A large proportion of younger deaths lead to adverse impact on nations' productivity. Growing burden of CVDs has been mostly attributed to behavioural and metabolic risk factors. Prevalence of risk factors are increasing and it has been directly associated with the severity of CVD in population. Lifestyle and behaviour plays important roles in increasing the CVD incidences where dynamics over time are vital. Majority of CVDs can be averted through practicing healthy lifestyle. Presently, there has been limited information available on the lifestyle interventions and their impact on population health in India.

This research aims to provide a framework for exploring various preventive strategies for CVD management in India. A system dynamics (SD) modelling approach have been used to determine best public policy on preventive care intervention under resource constraint environment. Using simulations experiment, different policies can be evaluated by using the 'what if' analysis, with the aim to evaluate the relative effectiveness of public policies on preventive care interventions. It can provide insights into implications of various decisions and helps us in identifying the best one for improving the existing system. This research work would help policy makers in effective and efficient decision making on preventive care for CVDs. The proposed framework can be extended for other communicable and non-communicable diseases with appropriate modifications.

#### Publications

• Sharad Kumar and Ram Babu Roy. "Modeling the Impact of Increasing Tobacco Taxes on Public Health in India", 2nd International Conference on Contemporary Debates in Public Policy and Management 2016, India.



# Susmita Ghosh Supervisor: Prof. Bhaskar Bhowmick Contact Info: susmita.gh@gmail.com

### **Brief Profile:**

Susmita completed her MS degree in RF and Microwave from IIT Kharagpur in 2009. She completed her Bachelor of Engineering degree in Electronics & Telecommunication Engineering from Biju Patnaik University of Technology, Orissa. She has worked as Lecturer from August 2008 to May 2010 at GITAM, Bhubaneswar. She joined this department in July 2011.

# Recognition and Response to Perceived Environmental Uncertainty: A study in Indian Start-up context

Decision maker of big or small firm has to deal with dynamic business environment, complex environmental components, insufficient information regarding these components, inability to predict the effect and outcome of incorrect decision on an organization along with inability of predicting the effect of the complex environmental factors on the firm's output. These challenges of unpredictability have always existed, but they are still difficult to solve, understand and predict due to complexity and dynamism of environmental components. This nature of the environmental components brings in unprecedented changes in the environment, captured as uncertainty. Firms take certain strategic actions/choices which are entrepreneurial in nature (entrepreneurial orientation) to cope up with the uncertainty due to change in the business environment, influencing the firm performance. Several scales have been developed by researchers to measure uncertainty based on different characteristics of the environment, intra-organizational components and also based on the environmental components. The scale that was developed in relation to the environmental component explains that uncertainties are firm and investment specific. This suggests rechecking the scale in Indian start-up context. An additional problem was that, due to lack of strategic resources in start-ups, they are left with narrower options for strategic choices to cope with uncertainty. This requires addressing the limitation. The results obtained can be utilized for better start-ups decision making and also for developing the incubation systems.

#### Publications

-Sensing Uncertainties in Internal Environment: A Study on Start-ups in India, by Ghosh, S. & Bhowmick, B, *Procedia*, 35<sup>th</sup> Annual International conference, Strategic Management Society (SMS), pg. 98, October, 2015

-Uncertainties in Entrepreneurship Climate: A Study on Start-ups in India by Ghosh, S. & Bhowmick, B. *Procedia - Social and Behavioral Sciences, Elsevier*, 150 (46-55),2014

-Technological Uncertainty: Exploring Factors in Indian Start-Ups by Ghosh, S. & Bhowmick, B. Global Humanitarian Technology Conference, IEEE, 2014

-Perceived Environmental Uncertainty for Start-ups: A Note on Entrepreneurship Research from an Indian Perspective. by Ghosh, S., Bhowmick, B., & Guin, K. K. Technology Innovation and Management Review., 4(8),2014

-Developing and Evaluating a New Scale for Product Positioning Uncertainty in India by Ghosh, S. & Bhowmick, B. International Journal of Scientific and Engineering Research, 5(1),552-559,2014 -Developing New Market Uncertainty Scale for Indian start-ups by Ghosh, S. & Bhowmick, B. International Conference on Business Analytics and Intelligence (ICBAI), IISc, Bangalore, India, (2014)

Amrita Supervisor: Prof. Ram Babu Roy Contact Info: amrita@iitkgp.ac.in



**Area of Research**: Knowledge Management System in healthcare **Topic:** Knowledge Management for Improving Maternal Health in Rural India

# **Brief Profile**

Amrita has completed her M.S. (by research), and PGDBA form IIT Kharagpur. She has done B.E. in Computer Science from Visvesvaraya Technological University, Karnataka. She has worked as a Senior Project Officer for Incubation and Entrepreneurship Programmes, SRIC, IIT Kharagpur for more than six years. Before this she worked as a lecturer for three years and as junior programmer for two years in the field of Information technology and computer science. Her research interest is in Management Information Systems, Knowledge management, Organizational Development, Maternal Health, Healthcare Management and Entrepreneurship. Researchers have confirmed its effectiveness when utilized well in an organization. It has been proved to have a positive affect on operational and organizational performance.

# Publications

- Amrita, Banerjee I., and Roy RB (2016) Redesigning Knowledge Flow Network for Maternity Care. Book Chapter In: Nigam S and Agarwal S (eds), Innovative Management Solutions for Competitive Advantage, New Delhi: Excel India Publishers, pp. 129–142
- Amrita. and Roy RB (2015) Integrating Knowledge, Attitude and Practice in Decision Model for Maternity Care in Emerging Economy. In: Proceedings of the IEEE 2015 Global Humanitarian Technology Conference (GHTC), pp. 71–78.

# **Conference Presentations**

- Amrita., Banerjee I., Roy R.B. (2016). "Redesigning Knowledge Flow Network for Maternity Care", 9th ISDSI International Conference 2<sup>nd</sup> -4<sup>th</sup> January 2016, Goa, India.
- Amrita, & Roy, R. B. (2015). Integrating Knowledge, Attitude and Practice in Decision Model for Maternity Care in Emerging Economy. In Proceedings of the Global Humanitarian Technology Conference (GHTC), 9<sup>th</sup> -12<sup>th</sup> October 2015, Seattle, WA, USA.
- Amrita., Roy R.B. (2014), Knowledge management system for improving Indian healthcare: a research proposal, 2<sup>nd</sup> International conference on business analytics and intelligence (ICBAI), Dec 18<sup>th</sup> - 20<sup>th</sup>, IISC Bangalore, India.

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# Pradipta Chandra Supervisor: Prof. Titas Bhattacharjee Contact Info: pradipta.chandra@gmail.com

#### **Brief Profile:**

Pradipta Chandra has joined the Ph.D programme in Rajendra Mishra School of Engineering Entrepreneurship (RMSoEE) in the year 2012

.He has pursued MS (by research) degree from Materials Science Centre, IIT Kharagpur and has a proven track record as a process engineer with sufficient expertise in the field of polymers, plastics and natural composites leading to the products in safety items, electronics, water, agriculture, medical etc. for more than eight years and has a passion of job creator. Mr. Chandra was associated with the various successful innovation projects sponsored by Govt. of India. His present research work is on redesigning the extension science especially for small holders in the Indian agriculture.

### Capacity Development of Indian Farmers through Technology Transfer: Exploring Challenges and Redesigning Options.

Literature says that about 80% percent farmers in India come under small and marginal category holding less than two hectares land. This class of farmers contribute about 45% of the overall cultivation under operation. The dark side is that the livelihood of small and marginal farmers is below the acceptable living standards; the cost of cultivation is certain whereas return is uncertain resulting in more uncertainty in farmers' future. They are the victims of unscientific use of fertilizers and pesticides leading to unknown and untreatable diseases. Farmers are unable to get the remuneration of value addition happening through post-harvest technology. Very limited farmers are able to get the appropriate incentive from their cropping. Through such alarming, unsustainable, disastrous situation Indian agriculture is going on. The obvious question is 'Are farmers able to cope up with the gradually developing agricultural technology?' Literature reveals that there are many barriers behind the non-adoption of technology. The objective of the research is to find out the variables of the challenges of agricultural technology adoption and to identify the underlying factors from empirical data analysis to help the capacity development of farmers. In the Indian scenario Krishi Vigyan Kendra (KVK) is the bottom level extension institution working towards farmers' capacity building through technology transfer training. Rapid proliferation of KVKs indicates its importance from both the corners of government and farmer. From Exploratory Factor Analysis (EFA) technique my study has revealed two significant factors, i.e., challenges of TTT (technology transfer training) (i) comprehension and (ii) customization.

#### Publications

- Chandra, P., Bhattacharjee, T. and Bhowmick, B. (2015). Do Knowledge Deficiency Factors Steer Agricultural Extension? Institutional Evidence from Red Lateritic Zone in India. International Journal of Tropical Agriculture (IJTA), 33(4): pp. 3025-3029.
- Chandra, P., Bhattacharjee, T. and Bhowmick, B. (2016). Does technology transfer training concern for agriculture output in India? A critical study on a lateritic zone in West Bengal. Journal of Agribusiness in Developing and Emerging Economies (JADEE). (Communicated)
- Chandra, P., Bhattacharjee, T. and Bhowmick, B. (2017). Is It Crucial to Upgrade the Extension System for Capacity Development of Farmers? Learning from Dry-Lateritic Zone in India. Chapter 26, Agricultural Extension: Techniques and Applications. Biotech Books, New Delhi, India, pp. 217-228.
- Chandra, P., Bhattacharjee, T. and Bhowmick, B. (2016). Perspective of Precision Agricultural Technology in Lateritic Zones of West Bengal: Role of KVKs and Farmers' Clubs. Section II: Natural Resource Engineering and Management, Precision Farming and Resource Management. Excel India Publishers, New Delhi, India, pp. 177-194.

Sreekanth V K Supervisor: Prof. Ram Babu Roy Contact Info: kris.shrikanth@gmail.com



### **Brief Profile**

Sreekanth is pursuing his doctoral program in Engineering Entrepreneurship from IIT Kharagpur. Prior to this endeavor, he has been working with M/s. Infosys Limited., India for about 5 years. During this period he has been through the major life cycles of Software Development and attained a good exposure to the Equity Finance Domain. In addition to that, he has been a part of Education & Research Department, the innovation hub of Infosys. He completed his M.Tech in Systems Analysis and Computer Applications from NITK Suratkal and B.Tech in Electrical and Electronics Engineering from Mahatma Gandhi University, Kerala. His tryst with knowing the world drives his career. He is a constant and fast learner and he believes in idea of growing by sharing knowledge and ideas.

### **Research Summary**

Emergency Medical Services (EMS) provide out-of -hospital medical care and transport patients to hospital. The primary aim of EMS is to save lives. EMS plays a crucial role in nation's healthcare service provision and in turn affects the economy. Thus the governments usually fund the EMS as a public service. But EMS in many countries fail to capture the subtlety of service production, for example, the co-creation with customer participation, effectively. Apart from engaging the customer for co-creation the service providers have to design and develop the support actions in the system such as demand forecasting, deploying ambulances, routing, scheduling and rostering of crew, and others. This research will give better insights of existing EMS system that in turn will help in redesigning the service provision. We are exploring the possibilities of improving the service provision by data-driven resource allocation and scheduling decisions.

### Publications

- Sreekanth V K, Ram Babu Roy (2017), "Equity-Constrained Dispatching Models for Emergency Medical Services", Team Performance Management, Volume 23, Issue ½
- Sreekanth V K, Ram Babu Roy (2016), "Predicting Emergency Medical Service Demand Using Time Series Modeling", Chapter 7, Trends in Operations Management: Perspectives and Challenges, Bhimaraya Metri, A. K. Singh (eds.), Excel India Publishers, New Delhi, pp. 57 - 68

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# Arpita Das Supervisor: Prof. Basab Chakraborty Prof. Partha Pratim Das Contact Info: mail4arpitadas@gmail.com

#### **Brief Profile:**

Arpita completed her M.Tech in 2012 and B.Tech in 2010 in Applied Electronics & Instrumentation Engineering from West Bengal University of Technology. She joined the department in 2012.

#### **Electronic Waste Management**

The continuous expansion of electronic industries and changing life style have given rise to a new waste stream – "Electronics Waste" or "e-waste" which is physically and chemically different from conventional municipal waste. The growing volume and complex composition of these items along with the absence of proper disposal mechanisms is a major concern today. But, in most of the countries the existing e-waste management practices are very spooky and policies are not implemented appropriately. In case of developing countries like India, in addition with internal waste generation, improper dumping of e-waste adds another burden in the waste treatment. Therefore, the present study aims to develop an e-waste management framework at organization level in India considering IIT Kharagpur as a model. This research would also investigate the current e-waste status and management strategy and will predict the future e-waste projection to evolve appropriate policies, schemes & directions for e-waste management.

### Publications

Das, A., Chakraborty, B., and Das, P. P. "Qualitative and Semi Quantitative Estimation of Major Elements in Desktop Computer Motherboards." National Conference on E-waste Management, XLRI, Jamshedpur, India, 13-14 January 2016.

# Sonal Singh Supervisor: Prof. Bhaskar Bhowmick Contact Info: sona.singh610@gmail.com



## **Brief Profile**

Sonal Singh is presently pursuing Ph.D and joined the department in 2012. She has competed B.Tech in Dairy Technology and M.B.A in Agribusiness Management from Anand Agriculture University. She has good exposure of cooperative sector and one and half year work experience in IDMC Limited (Subsidiary company of NDDB).

#### **Grassroots Innovation for Entrepreneurship Development**

Summary of Research: Innovation is recognized as one of the most important aspect for economic development of a nation. The traditional approach of grassroots innovation is top-down one, in which the population at the BoP (Base of the Pyramid) could represent for business in the form of new potential consumers. However, these grassroots people can be a potential source of new ideas, knowledge and innovation. In this regard, grassroots innovation has been emerged as bottom-up approach to solve the problems of grassroots people. Grassroots innovation is also defined as innovation by individual or group of people, who often undertake innovative efforts to solve localized problems, and generally work outside the realm of formal organizations. The majority of grassroots people face the problem of poverty and unemployment. The promotion and development of entrepreneurship at grassroots level are a new and increasingly become a popular approach to economic development. Thus, this research tries to conceptualize measures of grassroots innovation and develop a framework on grassroots innovation for entrepreneurship development in Indian context.

# Publications

-A study on Evaluating Factors of Community Innovation in Rural Indian Context by Singh, S. and Bhowmick, B Eleventh Biennial Conference on Entrepreneurship, Bookwell, Vol. I (401-409), (2015).

-A study for conceptualization of technological innovation in rural Indian context by Singh, S. and Bhowmick, B International Conference on Innovation and Creativity at Grassroots, IIM Ahmadabad (2015).

-Research on Rural Innovation in India: Evaluating Factors of Micro-finance Innovation by Singh, S. and Bhowmick, B , Innovative Management Solutions for Competitive Advantages, Excel India Publishers, 74-87. (2017).

-An Exploratory Study for Conceptualization of Rural Innovation in Indian Context. by Singh, S. & Bhowmick, B. Procedia- Social and Behavioral Sciences, 207, 807-815. (2015).

-Innovation Network for Entrepreneurship Development in Rural Indian Context: Exploratory Factor Analysis by Singh, S. & Bhowmick, B. International Journal of Innovation and Technology Management, 13(4), 1-20. (2016)

-An Exploratory Study on Technological Innovation for Entrepreneurship Development in Rural-Non-Farm Sector in India, Singh, S. & Bhowmick, B. by Journal of Enterprising Communities: People and Places in the Global Economy (2017) (Accepted).



Mohd Zuhair Supervisor: Prof. Ram Babu Roy Contact Info: md.zuhair.cs@gmail.com

#### **Brief Profile:**

Zuhair completed M.Tech in Computer Science & Engineering from Birla Institute of Technology, Meshra, Ranchi in 2011 and B.Tech in Computer Science & Engineering from Uttar Pradesh Technical University in 2008. He has worked as an Asst. Professor for six months at Shambhunath Institute of Engineering & Technology, Allahabad and worked for WIPRO Technologies in SAP CRM module for about 11 months. He joined the department in 2012.

### Framework for Designing Health Insurance in Rural India

Out-of-pocket payments are the major source of healthcare finance in India as well as in most of the Asian countries. India comes third in the list of countries - with the highest out of pocket expenditure (OPE) on health - in south-east Asia. OPE can be prevented by applying prepayment and pooling of funds to replace or minimize the direct out-ofpocket payments. To push health insurance lower and middle income countries have to make key decision about how to pool risk, generate resources and provide services. The health insurance plan ensures that people must avail health services without facing financial hardship while paying for that. Access to health services enables people to be more productive and active contributors to their families and communities. Health coverage is thus a critical component of sustainable development and poverty reduction, and a key element of any effort to reduce social inequalities.

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Jagruti Thakur Supervisor: Prof. Basab Chakraborty Contact Info: jagruti.t@iitkgp.ac.in



### **Brief Profile**

Jagruti graduated from South Gujarat University with majors in Electronics and Communication. She has worked as Projects Executive for Geographic Information System (GIS) based Urban Planning projects. She joined the Department in 2013. She is BASE (Bhaskar Advanced Solar Energy) 2016 fellowship recipient rendered by Indo US Science and Technology Forum. She is awarded POSOCO Power System Awards PPSA 2017 for her doctoral thesis.

### Smart Grid

Smart grid is the modernization of present day power grid. A number of issues lie with the present GTD (Generation, transmission and Distribution) of electricity and a need is created for the restructuring of the grid. Her research involves addressing the issues associated with implementation of smart grid in Indian context. The data generated from smart meters would be analyzed to understand the level of impact of smart metering system and increased renewable energy sources on residential consumers.

# Publications

- Thakur, Jagruti, and Basab Chakraborty. "Intelli-grid: Moving towards automation of electric grid in India." *Renewable and Sustainable Energy Reviews* 42 (2015): 16-25.
- Thakur Jagruti and Basab Chakraborty. "A study of feasible smart tariff alternatives for smart grid integrated solar panels in India." Energy 93 (2015): 963-975.
- Thakur Jagruti and Basab Chakraborty. "Exploring smart alternative net metering models for smart grid in India", International Conference of Renewable Energy and Research Application 2015, Italy.
- Thakur Jagruti and Basab Chakraborty. "Sustainable net metering model for diversified India", CUE2015-Applied Energy Symposium and Summit 2015, China.

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# Priyanka Laha Supervisor: Prof. Basab Chakraborty Contact Info: priyankalaha@see.iitkgp.ernet.in

#### **Brief Profile:**

Priyanka completed her M.Tech in Electrical Engineering from IIT Roorkee and B.Tech in Electronics and Communications Engineering (ECE) from West Bengal University of Technology. She has worked as an Assistant Professor for 1.5 years. She joined the department in December 2013.

#### **Energy Management in Indian context**

Electricity plays a fundamental role to meet the basic human needs, for transportation, and for communication. Sustainable social and economic development requires reliable and affordable access to electricity. With growing economy, using electricity in innovative and sustainable way has become necessary. To be environmentally benign, energy services must be provided with low carbon footprint and low greenhouse gas (GHG) emissions. Renewable energy resources are clean sources of energy that provide energy security, economic development and energy price stability. However changes in temperature, precipitation, humidity, and the frequency and severity of extreme weather affect electricity generation and consumption in India. The research work involves the feasibility of integrating different renewable energy resources keeping in view the variation in Indian climate.

#### Publications

 Priyanka Laha, Basab Chakraborty. Energy model – A tool for preventing energy dysfunction. Renewable and Sustainable Energy Reviews 2017; 73:95–114.

Bipul Krishna Saha Supervisor: Prof. Basab Chakraborty Contact Info: bipul.saha@see.iitkgp.ernet.in



### **Brief Profile**

Bipul Krishna Saha did M.Tech in Power System and B.Tech in Electrical Engineering (EE) from West Bengal University of Technology. He has worked as an Assistant Professor for 2 years. Before joining academics, he worked as a Project Engineer for 3 years in First Esco India Pvt. Ltd. He joined IIT Kharagpur in PhD programme in the year 2013. His interest lies in the area of Renewable Energy in the context of Indian Entrepreneur.

### Renewable Energy in the Context of Indian Entrepreneur

Low grade waste heat can be well-defined as heat contained in a substance rejected from a process at a temperature higher than the ambient levels of the plant. The latest technologies pertaining to different types of low grade waste heat recovery are being researched. With the increase in price of fossil fuels in the global scenario, many of the manufacturing companies have started looking for alternate power source for their low grade heat source. The research aims to develop a practical model for low grade waste heat recovery, which can be used as an alternative source of energy.

### Publications

• Bipul Krishna Saha, and Basab Chakraborty. "Utilization of low-grade waste heat-to-energy technologies and policy in Indian industrial sector: a review." Clean Technologies and Environmental Policy. March 2017, Volume 19, Issue 2, pp 327–347



# Sayani Mondal Supervisor: Prof. Partha Pratim Das Prof. Titas Bhattacharjee Contact Info: sayani.mondal9@gmail.com

### **Brief Profile:**

Sayani completed M. Tech from School of Information Technology, IIT Kharagpur in 2013. She completed her B. Tech degree in Computer Science and Engineering from BCET, Durgapur under West Bengal University of Technology in 2008. She has worked as an Assistant Professor in the Department of Computer Science and Engineering at BCET, Durgapur from January 2009 to December 2013. She joined the Department in December 2013 as an Institute Research Scholar.

# Estimation of Software Productivity from Reading Pattern of C/C++ Programs

Software Engineering is profusely concerned with improving the software development productivity and the quality of the systems. In last 2 decades, there is a trend of rapid increase in a number of software developers in the industries. With the proliferation of software activities, the complexity of software has also increased, challenging the developer's productivity. The major consequences are more code production with better quality and performance. Developers, therefore, needs to discover design and other details by *reading the code*. Here lies the substantial gap in the account to developers as for how they are trained to write code and how are they expected to work.

Hence, we identify *Code Reading* as a critical skill. The understanding of code reading patterns can help in building Program Comprehension Support Tools that can significantly (1) improve developers' productivity and/or (2) assess the coding quality. Our objective is to build a tool to capture and visualize code reading pattern and build Assessment Models for Developer Productivity and Code Quality.

### Publication

 Sayani Mondal and Partha Pratim Das," An Ide-agnostic system to capture reading behaviour of c++ programs using eye-gaze tracker." In Computer Vision, Pattern Recognition, Image Processing and Graphics (NCVPRIPG), 2015 Fifth National Conference on, pages 1-4.

Jignesh Sindha Supervisor: Prof. Basab Chakraborty Prof. Debashish Chakravarty Contact Info: sindha.jignesh@gmail.com



### **Brief Profile**

Jignesh completed his masters in Industrial Process Equipment Design from Sardar Vallabhbhai National Institute of Technology, Surat and completed his graduation from South Gujarat University with majors in Mechanical Engineering. He has worked as Assistant Professor at Charotar University of Science and Technology, Gujarat. He led SAE collegiate club and SME students' chapter during this tenure. Beyond other activities, the Formula-F3 car designed and fabricated by his team won Go Green award, first prize in Endurance limit test and third overall performance rank in SAE SUPRA competition organised by SAE India. He joined the department in July, 2014. He is also involved in Autonomous Ground Vehicle research group of IIT Kharagpur.

### Development of Stability Enhancement System of High Speed Electric Three Wheelers

Electric mobility is a future of transportation. Three wheelers are the most suitable mode of personal transport. Considering the congested roads, increasing number of car users had added severe problems of traffic in sense of road congestion and parking problem. Small vehicle with good efficiency, excellent manoeuvrability and safety equivalent to car will be the need for city transport. Electric three wheelers are best fit for this requirement set and becoming popular too for public transport. However, speed limitation due to poor roll over resistant had restricted its market to public transport. Many research groups in various industries and Universities are developing active tilt control mechanism to push limits of safe speed of three wheelers. His research focuses on dynamic analysing the tilting three wheelers and developing more stable control system with least computation and sensory requirement.

#### Publications

- Jignesh Sindha, Basab Chakraborty, and Debashish Chakravarty. "Rigid body modeling of three wheel vehicle to determine the dynamic stability -A practical approach", Transportation Electrification Conference (ITEC), 2015 IEEE International.IEEE, 2015.
- Jignesh Sindha, Basab Chakraborty, and Debashish Chakravarty." Automatic stability control of three wheeler vehicles- Recent Developments and Concerns towards a sustainable technology" Proc. IMechE, Part D: Journal of Automobile Engineering. (Accepted)

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# Piyush Kumar Dongre Supervisor: Prof. Ram Babu Roy Prof. D. K. Pratihar Contact Info: piyushdongre@iitkgp.ac.in

### **Brief Profile:**

Piyush Dongre has completed his B.E in 2011 in Electronics & Telecommunication Engineering from Bhilai Institute of Technology (Durg) and M.Tech in 2014 in Visual Information Processing & Embedded Systems from dept. of ECE, I.I.T Kharagpur. He is pursuing PhD and has joined the dept. in 2015.

# Visual approaches to Planetary Exploration using combination of aerial and ground vehicle

Planetary exploration using mobile robots is very exciting and current research trend in the community. In this application, Computer Vision plays a significant role and used as major sensor for navigation & localization due to lesser power requirement and able to capture more information. Unfortunately, traditional mission operations suffer in terms of research output, due to non-efficient use of onboard resources and limited field of view of rover. In such mission rover face a lot of challenges, due to high variation in surrounding terrain. With the recent research trend in this domain of using heterogeneous robots for exploration, gives a new paradigm for solving the existing challenges faced by rover. My work is aligned with this objective and focussed on establishing aerial-ground robot coordination, to mitigate the existing challenges using visual only observations of ground rover and surrounding terrain.

# Manali Chatterjee Supervisor: Prof. Titas Bhattacharjee Contact Info: manalic@see.iitkgp.ernet.in



# **Brief Profile**

Manali completed her post graduation and graduation in Computer Science & Engineering from West Bengal University of Technology, Kolkata. Before joining this department in December 2014, she was working as assistant professor in engineering college affiliated under WBUT.

### **Business Analytics and organizational performance**

Evidence of the competitive value of business intelligence (BI) and analytics solutions is growing. Fact-based decision making is spreading throughout commercial, non-profit, and public sector organizations. An increasing number of organizations are making BI and analytics functionality more broadly available to all decision makers inside and outside the organization. So, over the long term, BI solutions will continue to be applied to optimize a wide array of processes in an effort to improve performance management and organizational competitiveness. Broadly to speak of about my research, it will mainly revolve around corporate governance practices in technological start-ups, whether its effect is good or bad in organizational performance measuring.

# Publications

- Manali Chatterjee, Titas Bhattacharjee and Soumya Sarkar. "How CSR influences brand performance –a study on Indian B2B context", India CSR conference 2016, IIM Calcutta
- Manali Chatterjee and Titas Bhattacharjee. "The influence of ownership and innovation on firm performance - a study in Indian context" India Finance Conference, 2016, IIM Ahmedabad



Aashish Kumar Supervisor: Prof. Manoj K. Mondal Contact Info: aashishkumar@iitkgp.ac.in

#### **Brief Profile:**

Aashish is a post graduate in Power Electronics from Birla Institute of Technology (BIT), Mesra, Ranchi. He has worked for 6 months in Cognizant Technology Solutions as a Programmer Analyst (Trainee). He also has a professional experience as an Assistant Professor in the Department of Electrical and Electronics Engineering at Uttarakhand Technical University, Dehradun from July 2010 to June 2012. He joined Rajendra Mishra School of Engineering Entrepreneurship, IIT Kharagpur in December 2014 as an Institute Research Scholar.

### Development of a Portable Low Cost Solar Powered Air Cooling System using Thermoelectric Technology.

Recent trend in air conditioning traverses from the conventional methodology to the newer one that delivers optimum human comfort and enhances sustainability. With the rapid development of new and improved thermoelectric materials with high figure of merit (zT), thermoelectric coolers (TEC) have emerged as one such technology that offers effective solution and a promising future replacement of vapor compression (VC) air conditioning systems. We intend to mainly focus on the methodologies to improve the coefficient of performance (COP) by optimizing the design of thermoelectric coolers. The study also focus on how a potential solution can be developed in context of current market replacing the contemporary air cooling technologies. An improvement in the heat sink material of the thermoelectric coolers will promise energy efficient and cost effective solution to suit the current market demand. The research promises a practicable product development and present a market-ready product for a domestic audience.

Bishnu Pada Bose Supervisor: Prof. Manoj Kumar Mondal Contact Info: bosebishnu@gmail.com



## **Brief Profile**

Bishnu completed his Master of Technology in Geotechnical Engineering from National Institute of Technology (NIT), Rourkela. He has experience from varied industries like Larsen & Toubro Limited as a Project Engineer for 10 years and ITC Limited as an Assistant Project Manager for 5 years. He joined the department in December 2014.

### Using Solid Wastes from Coal and Iron Ore Mines in Civil Engineering Construction

The research aims to develop value-added construction materials such as bricks and concrete out of coal mine spoil and iron ore tailings. Mine spoils and iron ore tailings are of limited economic value, whereas they cause serious environmental pollution threatening the entire ecology of the area (Pandey et al. 2016). The study covers waste materials such as mine spoil, iron ore tailing, rice husk, fly ash, and waste plastic. The mine spoils cause enormous pollution to air, water, and soil thereby rendering the area unfit for habitation (Chabukdhara and Sing 2016). Several authors suggested that the best way to get rid of such pollutants is to find ways to use them in construction work (for example, Taha et al. 2017). Researches have put forth process technologies for converting these wastes into commercially relevant products (Lemeshev et al. 2004, Zhao et al. 2009). However, no technology has yet been adapted for large scale commercial use of waste. On the flip side, there is growing scarcity of construction materials such as topsoil used for manufacturing bricks and limestone query for aggregate. Topsoil that is used for making brick is the most precious for healthy botanical growth. Increasing use of top soil for making clay bricks is dangerous for food security of the world population. The natural sources of aggregates are fast depleting. Finding an alternative to soil and natural stones for making brick and concrete respectively is highly imperative and timely (Hebhoub 2011). The present research work is directed to evolve process for using waste materials, particularly mine spoils and iron ore tailings, to replace soil to make bricks and other construction materials. Another focus of the research is to reduce the weight of construction materials using organic matters such as rice husk and natural fiber.

### Publications

- Bose B. P., K. Behera and M. K. Mondal (2016) Use of Minestone from Coal Mine Overburden as Aggregate in Concrete, 6th International Conference on Solid Waste Management-( (jointly organized by JU, IISc. Bangalore and IIT Kharagpur). Vol. 6, Pp. 1101–1109.
- K. Behera K., B. P. Bose, M. K. Mondal (2016) Production of Construction Bricks Using Iron Ore Tailings and Clay, 6th International Conference on Solid Waste Management- Kolkata, Vol. 6, Pp. 825–835.
- Mondal, Manoj Kumar; Aashish Kumar and Bishnu Pada Bose. "Entrepreneurship education through MOOCs for accelerated economic growth." MOOCs, Innovation and Technology in Education (MITE), IEEE 3rd International Conference. (2015): 407 – 411.

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# Sireesha Tamada Supervisor: Prof. Pranab K. Dan Contact Info: mail2sireeshatamada@gmail.com

### **Brief Profile:**

Sireesha Tamada completed her Masters in Power Electronics from Department of Electrical and Electronics Engineering, Birla Institute of Technology (BIT), Mesra in 2014. She pursued her Bachelors in Electrical Engineering from Biju Patnaik University of Technology, Orissa. She joined Rajendra Mishra School of Engineering Entrepreneurship at Indian Institute of Technology Kharagpur in December, 2014 as a Research Scholar.

# Product modeling and development of control strategies in Automotives

The advent of new automobiles being introduced in the market with developing technologies aims at improving fuel efficiency and reducing emissions. Automotive market has witnessed the rising demand of Automatic Transmission for better efficiency and shift quality which are determined by shift strategy and shift control. The impact of the evolving control designs on the safety and reliability of the system are being investigated greatly by implementing automotive electronics. The gear shifting automation makes use of Transmission Electronic Control Units (ECU) to deal with the increasing complexities of automobile systems. The research mainly deals with state of the art of automotive electronics contribute in developing an optimized simulated vehicle model for better driving experience.

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# Manish Chandra Supervisor: Prof. Pranab K. Dan Contact Info: manish.cusat999@gmail.com



### **Brief Profile**

Manish Chandra has completed B.Tech in 2011 in Mechanical Engineering from Cochin University of Science and Technology (Cochin, Kerala) and M.Tech in 2014 in Industrial and Management Engineering from Manufacturing Engineering Department NIT Jamshedpur. He also worked as Assistant Professor, Mechanical Engineering Department, at MVN University, Palwal Haryana.

# Product modeling and development of automotive gearbox

The developing transmission technology in automobile industry aims at improving fuel efficiency. Vehicles powered by IC engines require transmission system to ensure the attuned torque to wheel, ensuring smooth functioning of vehicle in different driving conditions. In last few decades many desideratum driven transmission designs have been developed. Better driveability, more fuel efficiency and smoothness in gear shifting are common prominent factors that were observed in developed transmission system. The research mainly deals with state of the art of automotive transmission technologies and how various parameters affect the gearbox transmission efficiency.



# Sanyka Banerjee Supervisor: Prof. Pranab K. Dan Contact Info: sanyka.banerjee@iitkgp.ac.in

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#### **Brief Profile:**

She has completed her M. Tech. in Industrial Engineering and Management from Maulana Abul Kalam Azad University of Technology (Formerly known as WBUT), West Bengal. She completed her Bachelor of Engineering in Aeronautical Engineering from St.Peters' College of Engineering and Technology, Chennai. She joined the Department in 2015.

#### **Product Design and Optimization**

It is defined as reducing variation in a product without eliminating the causes of the variation. In other words, making the product or process insensitive to variation. This variation (sometimes called noise) can come from a variety of factors and can be classified into three main types: internal variation, external variation, and unit to unit variation. She intends to focus on the robust design of a product and optimizing the functionality of the product by using Computed Aided Design(CAD) and Computer Aided Engineering(CAE) ,Mathematical Modelling and simulations. Currently she is reading through the literature on the topic of gear shifting and synchronization process in Automated Manual Transmissions (AMT). Her area of interest for future research lies in optimizing and remodelling the gear shifting sequence with reduced pain points in the process and more economical and fuel efficient design that will ensure improved control and passenger comfort.

# Himadri Bhusan Girija Sankar Bhuyan Supervisor: Prof. Partha Pratim Das Contact Info: himadribhuyan@gmail.com



### **Brief Profile**

I did my B-tech in CSE from CUTM, Orissa. Completed my M-tech in Information and Communication Technology from IIT, kharagpur. Now I am pursuing my PhD under the guidance of Prof. Partha Pratim Das in Rajendra Mishra School of Engineering Entrepreneurship, IIT Kharagpur, Since july 2015. My broad area of research is Human Computer Interaction for Digital Heritage.

### Automatic Analysis and Interpretation of Indian Classical Dance using Kinect.

Indian Classical Dance (ICD), an ancient heritage of India, consists of visual (posture, movements, and expressions), auditory (music, tempo, rhythm, and intonation) and textual (lyric of the song) information that tell a story through body movements, hand gestures, vocal and instrumental music, facial expression (emotion), costume, and make-up. With time, these dance forms have been interpreted and performed by different artists in different ways and various sets of complex rules have emerged for body postures and gestures.

In this work we intend to automate the analysis and interpretation of different forms of ICD and extensively use Bharatanatyam for our explorations. As such little work has been done in computer analysis of dance as the capture of multimedia aspect of dance has been a challenging task. And whatever little research exists, they deal primarily with Western dance forms like Ballet, Samba, and Salsa. There is hardly any work on ICD.

Recent advances in short-range depth imaging technology have led to the development of affordable multimedia cameras like Microsoft Kinect that can detect and track various human movements in real-time. We use Kinects here to analyse and interpret the multimedia aspects of ICD.



Saurabh Singh Thakur Supervisor: Prof. Ram Babu Roy Contact Info: saurabhjan07@gmail.com

#### **Brief Profile:**

Saurabh completed his M.Tech. degree in Information and Communication Technology from IIT Kharagpur in 2014. He completed his Bachelor of Engineering degree in Computer Science & Engineering from Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal. He has worked as Lecturer from February 2011 to July 2014 and Assistant Professor from Jan 2015 to June 2015 at NIT Jamshedpur. He joined this department in July 2015.

#### Disease Prevention and Management through IoT.

Chronic diseases are becoming highly prevalent. The curative process for chronic diseases like diabetes, CVD, etc. is prolonged and ineffective and thus becomes expensive. One of the major reasons behind chronic diseases is attributed to poor health behavior. Improving health behavior can alleviate the rising risk of chronic diseases. But, challenge lies in improving health behavior and sustaining it. Advanced Information and Communication Technology (ICT) can play a major role in providing assisted living to bring in desired behavioral changes in lifestyle of people. With the presence of IoT, daily living can be monitored, analyzed and suitable behavioral intervention can be planned and suggested easily. It can assist individuals for their self-care management to prevent from or control and manage chronic health hazards.

#### Publications

- Nachiketa Chatterjee, Saurabh Singh, Dr. P.P. Das. Resource Management in Native Languages using Dynamic Binary Instrumentation (PIN). 2nd International Doctoral Symposium on Applied Computation and Security Systems, 23 – 25 May 2015, Kolkata India. [Available at Springer]
- Bhakar Mondal, Saurabh Singh, S. B. L. Seksena. A Novel Addition Based Image Sharing Scheme for Secure Communication of Highly Secret Images. IEEE International Conference on Microelectronics, Communication and Renewable Energy (ICMiCR-2013) Kerala. (Indexed in IEEE Explore)
- Sunil Kumar Singh, Rajesh Duvvuru, Saurabh Singh. Congestion Control Technique Using Intelligent Traffic and VANET. International Journal of Computer Engineering and Applications(IJCEA), Pages. 35-44, Volume IV, Issue I/III, November, 2013. (Indexed in Google Scholar)



# Sourabh Mandol Supervisor: Prof. Pranab K Dan Manoj Kumar Mondal Contact Info: sourabh.mandol@iitkgp.ac.in



#### **Brief Profile**

Sourabh completed his M.tech in Industrial Engineering & Management from Maulana Abul Kalam Azad University of Technology, West Bengal (Formerly, West Bengal University of Technology). He completed his B.Tech. in Mechanical Engineering from Swami Vivekananda Institute of Science and Technology, West Bengal and joined the department in July 2015

#### **Product Design and Development**

Product design and development inculcates the process of creating a new product or developing an existing product to satisfy the need of the end user. With the application of Computer Aided Design (CAD) and Computer Aided Engineering (CAE) methodologies, a new realm of concept generation can be achieved to obtaining desired product specification to satisfy customer needs. The design and development process for a desired product will provide all the desired characteristics, involving a thorough and in-depth study of product behaviour under operation condition, laying the foundation for new concept generation facilitating the creation of innovative solutions.

#### Publications

- Sourabh Mandol, Debraj Bhattacharjee, and Pranab K. Dan. "Robust optimization in determining failure criteria of a planetary gear assembly considering fatigue condition." Structural and Multidisciplinary Optimization Vol. 53, Issue 2 (2016): Pages 291-302.
- Pranab K Dan and Sourabh Mandol. "An Optimization Approach to Product Design in Modeling Gearbox Set." In Proceedings of the World Congress on Engineering and Computer Science, Vol. 2. (2015) Pages 953-955.



Debraj Bhattacharjee Supervisor: Prof. Prabha Bhola Prof. Pranab K. Dan Contact Info: debraj1@iitkgp.ac.in

#### **Brief Profile:**

Debraj completed his M-Tech in Industrial Engineering and Management from School of Engineering and Management [Maulana Abul Kalam Azad University of Technology, West Bengal (Formerly known as West Bengal University of Technology)], 2015 and B-Tech in Electronics & Communication Engineering from Narula Institute of Technology.

### **Product Analytics and Modelling**

Product analytics is a specialized application of business intelligence (BI) and analytical software that consumes service reports, product returns, warranties, customer feedback and data from embedded sensors to help manufacturers evaluate product defects, identify opportunities for product improvements, detect patterns in usage or capacity of products, and link all these factors to customers. Product analytics can also incorporate feeds from social platforms to track complaints about products. By analyzing product data feeds in real time, this software can proactively alert manufacturers to service and replacement needs in reactive as well as preventive maintenance scenarios, and help route service requests to the proper individuals or, with the help of machine-to-machine (M2M) technologies, perform service remotely.

Jayshree Patnaik Supervisor: Prof. Bhaskar Bhowmick Contact Info: jayshree\_patnaik@iitkgp.ac.in



### **Brief Profile**

Jayshree completed her M. Tech. in Manufacturing Process and Systems from KIIT University, Bhubaneswar in 2015. She completed her B.Tech in Mechanical Engineering from (ITER), Siksha 'O' Anusandhan University, Bhubaneswar in 2013. She joined the Department in July 2015.

### Appropriate Technologies and Changing Innovation Landscape in Emerging Countries

Technology is intrinsically associated with technical and social structure. In some parts of the world technology has enhanced the quality of life, but some societies are yet to reap the benefits of technological innovation. Therefore innovative solutions are much sought after by many communities. Lately communities whether big or small have taken up an active role in handling problems with help of indigenous technologies. Appropriate Technology is a different kind of technology which is prevalent in rural third world. Appropriate Technology helps to develop technology which can lead to building up of a sustainable society. The question lies in "How to explore more about this technology", "Which mechanism can help it to be termed as Right Technology" and "How we can appropriate it with latest Technological Breakthrough"?



# Abhijit Debnath Supervisor: Prof. Partha Pratim Das Prof. Krothapalli Sreenivasa Rao Contact Info: dnabhijit@gmail.com

### **Brief Profile:**

Abhijit completed his M.Tech and B.E from School of Information Technology, IIT Kharagpur and Department of Information Technology, IIEST, Shibpur (erstwhile BESU, Shibpur) respectively. He has five years and nine months of work experience in National Institute of Electronics And Information Technology (NIELIT), an autonomous scientific society under Department Of Electronics and Information Technology (DeitY), Govt. of India, posted at Agartala. He joined NIELIT as Scientist 'B' and later promoted to Scientist 'C'. He joined the department in December 2015.

#### **Multimedia Data Analytics**

Multimedia data has become as common today as email was 20 years ago. Consumer electronic markets have enabled individuals to record and transmit images or video with cell phones. Even the simple point-and-shoot camera can not only add date stamps but also geo-code where the photo was taken. Because of our ability to tweet, text and email from work, home and on our mobile devices, each day we create vast amounts of information about the world around us and consume information from commercial sectors via podcasts, internet streaming broadcasts, radio, cable, and satellite. To some, this may seem like nirvana, but for those who must address certain policy issues or handle complex emerging events, their tasks quickly become overwhelming.

Manojit Ray Supervisor: Prof. Basab Chakraborty Contact Info: manojitray7@gmail.com



#### **Brief Profile**

Manojit completed his B.Tech from IIT Kharagpur and MBA from IIM Calcutta. He brings in a decade long leadership experience in energy industry, serving federal & constituent governments of nation states, Fortune 500 multinationals, statutory regulatory authorities and international multilateral financial institutions. He has served in India, the United States and Hong Kong in diverse capacities including Member of the Board of Directors. His interests include innovative business solutions, creative application of technology and steering enabling framework for the progression of mankind.

### Energy

Embracing demand response advances in renewable generation supported micro-grid in a sustainable way would drive proliferation of the enabling framework, potentially benefitting billions across the globe. Assessment of prevailing standards, development of new ones and applicability of fuzzy embedded system design practices in designing secure IoTs forms the core area.



Shibabroto Banerjee Supervisor: Prof. Partha Pratim Das Prof. Sujoy Ghose Contact Info: shibabroto@gmail.com

### **Brief Profile:**

He is currently serving the Department of Computer Science and Engineering as Senior Technician. He is working as the system administrator of National Digital Library Project hosted at IIT Kharagpur and is in-charge of the servers. He did his Masters in Information Technology from Sikkim Manipal University – Distance Education. He is pursuing M.S. programme from Rajendra Mishra School of Engineering Entrepreneurship.

# Analysis of Plethysmographic signals

Pulse Oximeter is used to monitor condition of the human heart. The signals obtained from the pulse oximeter are called plethysmographic signals. Currently analysis of the plethysmographic signals are not undertaken by the doctors. However they contain a lot of information about the condition of the patient. A rich information is embedded in these signals. The objective of his research is to analyse these signals and help the doctors in their diagnosis. Intelligent digital signal processing techniques are being explored to extract patterns in these signals. A decision support system will be built using the analysis. This will help in early diagnosis and treatment of heart patients.

# Akanksha Jaiswal Supervisor: Prof. Prabha Bhola Contact Info: akanksha.jaiswal2@gmail.com



### **Brief Profile**

Akanksha is pursuing her Ph.D program at Rajendra Mishra School of Engineering Entrepreneurship (RMSoEE), IIT Kharagpur. She completed her M.Phil in Development Studies from Allahabad University. Prior to this, she has done MBA in Operations Management & Information Technology from IIIT-Allahabad and B.Tech in Electronics & Communication Engineering from SIET Allahabad.

# Strengthening Supply Chain for efficient Product Development

Today, strategic relationships between customers and suppliers play a very crucial role in value creation of a developing product which ultimately decides the fate of any business. The attributes of today's fast developing market are: designing products in accordance with the processes and supply chains, processes following the supply chains and product designs, and supply chains coordinating with the product designs and processes. These will not only reduce the cost of the product but also the response time to market if the co-designs of the above attributes are done properly. Nevertheless, the collaboration between supplier and product development process is very hard to find than between the customer and product development process. So, to determine the managing method or approach for the inclusion of suppliers in product development process is an emerging topic to researchers.

### Publications

 Akanksha Jaiswal, Abhinav, Anurika Vaish "Study of Variables influencing Bullwhip Effect in Supply Chain", OORJA Journal of Management and IT, ISSN: 0974-7869, January-April 2014.



# Gurunath Reddy M Supervisor: Prof. Partha Pratim Das K Sreenivasa Rao Contact Info: mgurunathreddy@gmail.com

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### **Brief Profile:**

Gurunath is pursuing his doctoral program in Engineering Entrepreneurship from IIT Kharagpur. He completed his MS by Research in Computer Science and Engineering from IIT Kharagpur and B.Tech in Telecommunication Engineering from Siddaganga Institute of Technology, Tumkur, Karnataka. He is a Google India PhD Research Scholar .

### Predominant Melody Extraction from Vocal Polyphonic Music Signals

Melody is the single (monophonic) pitch (fundamental frequency or F0) sequence that a listener might reproduce if asked to whistle or hum a piece of polyphonic music, and that a listener would recognize as being the essence of that music when heard in comparison. Predominant melody is the melody of the dominant instrument present in the polyphony. The dominant instrument can be either the human singing voice or the lead instrument in the polyphonic music signal. Predominant melody extraction is the task of automatically extracting the melody contour of the dominant musical instrument in the polyphonic music signal. Since the human singing voice is dominant in most of the polyphonic music signals available, vocal F0 contour extraction is the objective of my research.

#### Publications

- Gurunath Reddy M and K. Sreenivasa Rao, "Predominant Melody Extraction from Vocal Polyphonic Music Signal by Combined Spectro-Temporal Method", in 41st IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Shanghai, 2016.
- Gurunath Reddy M and K. Sreenivasa Rao, "Enhanced Harmonic Content and Vocal Note Based Predominant Melody Extraction from Vocal Polyphonic Music Signals", 17th INTERSPEECH, San Francisco, 2016.
- Pradeep R, Gurunath Reddy M, K. Sreenivasa Rao and Pallab DasGupta, "A Robust Non-Parametric and Filtering Based Approach for Glottal Closure Instant Detection", 17th INTERSPEECH, San Francisco, 2016.
- Parakrant Sarkar, Gurunath Reddy M, and K. Sreenivasa Rao "Development of Story Textto-Speech System based on Story Genres ", in Google Workshop on Machine Learning in Speech and Language Processing, San Francisco, 2016.

# **Bijitaswa Chakraborty Supervisor:** Prof. Titas Bhattacharjee **Contact Info:** bijitaswa1989@gmail.com



### **Brief Profile**

Bijitaswa completed his post graduation (M.Tech) in Computer Science & Engineering from KIIT University, Bhubaneswar, Odisha and graduation (B.Tech) in Information Technology from Govt. College of Engineering and Ceramic Technology, Kolkata under West Bengal University of Technology. He has work experience of 5 months as assistant professor in engineering college affiliated under WBUT. He joined this department in December 2016.

# Application of Machine Learning in Finance.

Today stock market prediction in the field of engineering, mathematics and finance is an important issue. The stock market is now seen gradually as an optimum investment outlet because a huge amount of capital is flown through stock market. Researchers are continuously trying to prove the predictability of the financial market. Though different scientific methods have been made, no method is efficient to predict accurately stock price movement. There are some methods which give the mild successes to solve it. So, Stock market prediction is an emerging topic to researchers.



- ✤ Alok Dixit
- ✤ Aman Kumar
- ✤ Kiran Behera
- Navneet Gupta
- Poonam Gupta

Alok Dixit Supervisor: Prof. Pranab K. Dan Contact Info: alokdixit.iitkgp@gmail.com



# **Brief Profile**

Alok is a M.Tech student in Rajendra Mishra School of Engineering Entrepreneurship at Indian Institute of Technology Kharagpur. He received B. Tech in Instrumentation Engineering from IIT Kharagpur, India.

# **Network Security**

The broad field of Network Security inculcates designing a Network intrusion detection system which analyses the network traffic and detects signature based and anomaly types of Bot Net data through it. It has a wide application in Institutes with large cyber infrastructure, internet of things and information security.



Aman Kumar Supervisor: Prof. Manoj Kumar Mondal Contact Info: amankishu4@gmail.com

### **Brief Profile:**

Aman Kumar is a Dual Degree (M.Tech) student in Rajendra Mishra School of Engineering Entrepreneurship at IIT Kharagpur. He received B.Tech. in Mechanical Engineering from Indian Institute of Technology Kharagpur, West Bengal.

### Bio-mechanics, IC Engine, Thermo-Electric Applications and, Product Design

Human mobility to different location at optimum time and cost is a challenge. Specially abled people is still facing problems in terms of existing product high cost. The current objective is to develop mechanical prosthesis for single legged amputee. The higher goal is to manufacture using uniform material of cells having Auxectic property. CAE significantly reduces product development time. Apart from this, I also think that IC engine volumetric efficiency can be improved thermo electric applications. So, I am carrying out theoretical study and simulation to validate the idea.

# Kiran Behera Supervisor: Prof. Manoj Kumar Mondal Contact Info: kiranbehera95@gmail.com

### **Brief Profile**

Kiran Behera is a M.Tech student in Rajendra Mishra School of Engineering Entrepreneurship at IIT Kharagpur. She received B.Tech. in Civil Engineering from IIT Kharagpur. She has done analysis of soil stress and settlement using Abaqus software and experimental testing of iron ore tailing bricks for commercial use. Her work involves product design and development that may be customised for future business enterprise.

### Product Design and Development

Mixing iron ore tailings with clay for manufacturing bricks was investigated with the objective of converting the hazardous solid waste into useful products. The process, with standardized parameters, may be commercially adapted and a large quantities of iron ore tailings may be put to use in making bricks. Thus, the technology can potentially convert the huge amount of environmentally harmful useless waste into wealth. Iron ore tailing may emerge as a sustainable supplement to clay, use of which in brick making is increasingly being restricted. The work also paves the way for new strand of research.

### Publications

- Behera K., B. P. Bose and M. K. Mondal (2016) Production of Construction Bricks Using Iron Ore Tailings and Clay, 6th International Conference of Solid Waste Management, Jadavpur University, Kolkata (24th Nov-26th Nov 2016)
- Bose B. P., K. Behera and M. K. Mondal (2016) Use of Minestone from Coal Mine Overburden as Aggregate in Concrete, 6th International Conference of Solid Waste Management, Jadavpur University, Kolkata (24th Nov-26th Nov 2016)

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# Navneet Gupta Supervisor: Prof. Pranab K. Dan Contact Info: navneetgupta2910@gmail.com

### **Brief Profile:**

Navneet Gupta is a M.Tech student in Rajendra Mishra School of Engineering Entrepreneurship at IIT Kharagpur. He received B.Tech. in Mechanical Engineering from IIT Kharagpur, West Bengal. He possess a great interest in entrepreneurship, product development and customer experience design.

# **Customer Experience Design**

The very new field of customer experience design and development inculcates the process of mapping all touch points occurring between the processes of buying the product up to after sales services. Customer experience design not only builds the trust between customer and the brand but also enhances the brand value and ultimately increasing the revenue. In the present generation every customer wants a smooth experience and hence the goal is to design and develop a customer experience framework which will map all the touch points and pain points, involving a thorough and in-depth study of the customer behaviour and preferences under various known condition, to lay the foundation of a new concept generation.





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