# ISE NEWSLETTER

## DEPARTMENT OF INDUSTRIAL & SYSTEMS ENGINEERING, IIT KHARAGPUR

**Autumn 2020**

The Department of Industrial and Systems Engineering (ISE) was established in 1973 as the Industrial Management Centre and later elevated to a full-fledged department in the year 1983. With strong focus in research and innovation, together with academic programs tailored to address the needs of the present day technological evolution, ISE has emerged as a unique academic institution in the country. ISE offers the following degree programs:

(i) **B.Tech (4-year)** in Industrial Engineering.

(ii) **Dual Degree (5-year)** - B.Tech. in Industrial Engineering an M.Tech in Industrial Engineering and Management.

(iii) **Dual Degree (5-year)** - B.Tech in **Manufacturing Science** and M.Tech in Industrial Engineering and Management.

(iv) **Dual Degree (5-year)** programme on B.Tech in **Engineering Product Design and Manufacturing** and M.Tech in **Design And Quality Engineering**, with **Mechanical** or **Industrial Electronics** verticals.

(v) **M.Tech** (2-year) in Industrial Engineering and Management.

(vi) Master of Science **(MS).**

(vii) Doctor of Philosophy **(PhD).**

*Head of the Department:*
*Prof. S. P. Sarmah*

*Editor:*
*Dr. Sayak Roychowdhury*
*(Assistant Professor, ISE)*

*Student Editor:*
*Mr. Souvik Das*
*(Research scholar)*

*Student Co-ordinators:*
*Mr. Rishabh Singh*
*(QEDM-4th year)*

*Ms. Aishwarya Das*
*(Research Scholar)*

### Director's Message

I am happy to learn that the Department of Industrial and Systems Engineering (ISE) is publishing their Bi-annual newsletter for the year 2020. This newsletter is meant to showcase the achievements, progress and ongoing activities of the department as well as its outlook towards future. I sincerely hope this newsletter serves as one of the avenues to connect all the stakeholders of the ISE including the alumni, industries and open up opportunities and challenges to work together for designing problem solutions for products, processes and systems.

I wish the department of ISE all the best for this initiative.

Prof. V. K. Tewari
Director, IIT Kharagpur

*Prof. V. K. Tewari*

*Director,*
*IIT Kharagpur*

# Message from the Head of the Department

**I** express my sincere gratitude to the **Director of IIT Kharagpur, Prof. V. K. Tewari**, for his continuous support and encouragement in the publication of this newsletter of the Department of Industrial & Systems Engineering (ISE).  I on behalf of the entire department, welcome all of you to this newsletter group. The ISE Department of IIT KGP is well recognized nationally and internationally for its excellent contributions in teaching and research in the areas of Operations Research, Logistics and Supply chain management, Safety Analytics and Virtual Reality, Quality and Reliability, E-Business, Product Development, Assembly Automation and Healthcare Systems. Since its inception, apart from regular teaching, the department has been very active in offering training programs to a diverse group of people starting from the executives working in the industry to officials from Government organizations and faculty members from other educational institutions in the area of IE. Faculty members of the department are also closely associated with many industry partners to solve real life problems. Currently more than fifty research scholars are actively working in different areas of Industrial and Systems Engineering.

Today, digital transformation and cyber-physical systems have brought a fundamental paradigm shift in the industrial manufacturing and services industry. This has revolutionized both businesses and personal life in the recent decades and subsequently, the role of an industrial engineer has also transformed in a significant way. To address these new challenges, we at the ISE department have introduced new subjects to our curriculum, and upgraded our facilities in terms of physical infrastructure, software and hardware. The Virtual Reality Laboratory, E-business Laboratory, Logistics Systems Laboratory, and Design for Assembly and Automation Laboratory are created for conducting experiments and research work in new upcoming areas. Currently, the department is equipped with many industry relevant software packages for data analysis and modelling purposes like SAS, SPSS, DELMIA, CPLEX, ANY LOGIC, ARENA, MATHEMATICA and we are adding more to the suite. We are in the process of procuring new state-of-the-art equipment for our laboratory faclities as well, ensuring that the future graduates of our department are ready to serve the industry and the nation.  I am sure, this newsletter will act as a bridge between our students, faculty members, alumni, industry practitioners, Govt. organizations and other educational institutions to reciprocate information and ideas for shaping our future journey. I sincerely thank all the faculty and staff members of the department, the scholars, and the students for their contributions to bring this newsletter to life.



*Prof. S. P. Sarmah*

*Head of the Department, Department of Industrial & Systems Engineering, IIT Kharagpur*

# Department Spotlight

**L**ike every year, this year also, the scholars of ISE and the **IISE Student Chapter** of **IIT Kharagpur**, made the **Research Scholar Day (Vishleshan)** a memorable one. Eminent academician **Padma Shree Prof. Ajoy Kumar Ray** and industry expert **Dr. Purnendu Sinha (Tata Sons)** delivered keynote speeches on emerging topics like Deep learning and Industry 4.0. In addition, the student chapter organized a one-day workshop on **Data analytics using MATLAB**, in which **Dr. Souvick Chatterjee, from Mathworks** conducted an informative and interactive session. The scholars also organized a **poster competition** where they presented their current research in front of the faculty members and the guests. **Mr. Souvik Das** and **Ms. Swati Pattanaik** won the competition, while **Ms. Anima Pramanik** and **Mr. Avishek Pandey** finished as runners-up.

**INSTITUTE OF INDUSTRIAL & SYSTEMS ENGINEERS**

# Department Spotlight

## ISE fights COVID-19

The COVID-19 pandemic has posed a grave challenge to the world we know. In this crisis, the students and faculty members of ISE department are doing their part by leveraging innovative and analytical skills. Yantrakaar Technologies Pvt. Ltd., co-founded by **Rishabh Singh (QE 4th year),** has developed **AI-based Social Distancing Surveillance** products and services which can help maintain 50-75% less contact in crowded places. He was also involved in the development of a **low cost electronically controlled ventilator** under the supervision of **Prof. Aditya Bandopadhyay (Dept. of ME)** in association with **M.N. Faruqui Innovation Center**. Unlike many other ventilators in the low-cost domain, it prioritizes, controllable tidal volume and rate of flow, human synchronous breathing cycle while maintaining Positive End Expiratory Pressure (PEEP), with Air humidification, all of which are crucial components in a ventilator design.

Rishabh Singh

In a separate endeavour, ISE research scholar **Saptarshi Das** led a team of engineers in Electro Meter Corp. to develop an Ambu Bag based low cost ventilator under the supervision of NSTI. This prototype is currently awaiting approval from ICMR. **Saransh Gupta, (QEDM 4th Year),** led a team of 15 to build an AI-driven decision support system while working as an intern in **Sapio Analytics**. This model predicts the spread of COVID-19 at the hyperlocal level based on the lockdown and migration situations. The model aims to help the authorities making decisions on lockdown while minimizing the virus containment and maximizing the economic activity for the revival of the economy of the states. This solution is currently being used by The Government of Telangana. While the students and scholars are busy developing solutions, the faculty members are preparing to plunge deeper to gain more insight into the socio-economic impact of this crisis and the means to mitigate the same. **Prof. Goutam Sen** has secured funding from **SERB MATRICS** and **Cisco** to explore solutions related to mass transportation under the threat of the pandemic. **Prof. Akhilesh Kumar** has also secured a research grant from **Cisco** to study the COVID-19 vaccine supply chain. He has won round one of the SAMHAR COVID-19 hackathon organized by CDAC as well. **The Diplomatist** has published an article with the title "COVID-19 Impact on Supply Chain and the Way Ahead" by **Prof. S. P. Sarmah**. These efforts indicate that the team ISE is going above and beyond in helping the general public, health care providers, and the authorities to alleviate the adverse effects of the pandemic.

Ventilator developed by Saptarshi's team

# Student Spotlight

## The Fastest IITian

**S**hivam Singh (17IM30030) has been awarded the **Kirtan B Behera endowment award** two times in a row for being the **best all-rounder of the batch of 2017** of IIT Kharagpur for the academic year 2018-2019 and 2019-2020. Some of his achievements in sports include breaking the 100m record at Inter IIT 2019 to become the **fastest IITian ever in the history of all IITs**, winning 5 Inter IIT medals in Inter IIT 2019 including **3 Gold, 1Silver, and 1 Bronze**, part of the record-breaking 4*100m team of IIT Kharagpur at Inter IIT 2019, winner of a Silver and a Bronze medal at West Bengal state athletics championship 2018.

## PSO for Perishable Food Logistics

Aditya Singhania

**A**ditya Singhania (17IM10005) and Amrit Goswami (17IM3FP09) had a fruitful research internship experience last year in **The Hong Kong Polytechnic University**. Under the guidance of **Prof. Felix T. S. Chan** of HKPU and **Prof. M. K. Tiwari**, they contributed significantly in developing a modified **particle swarm optimization** algorithm for **production inventory routing planning** related to **perishable food logistics operation**. Their work has been published by Internation Journal of Production Research in January 2020.

Amrit Goswami
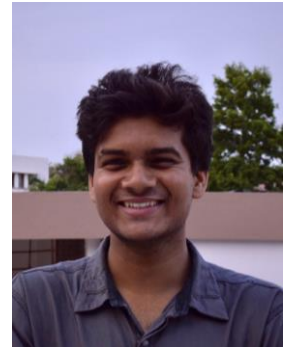
## TaSafe – Wearable Women Safety Device
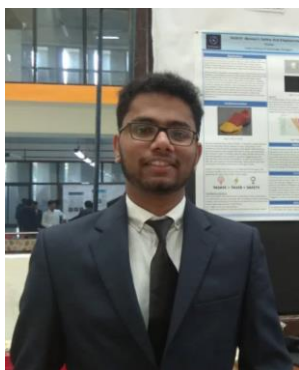
Shubham Kakde

**S**hubham Kakde (17IM30022) has designed and developed a prototype of **TaSafe** along with his **team members** Anurag Goyal (Class of 2019, Instru. Engg.), Jai Shukla (UG-5 Chemistry), Mann Goel (UG-4, Chemical Engg), Vivek Wankhade (UG-4 Physics) of **ProDex**- **A club for product designing enthusiasts in IIT Kharagpur**. TaSafe is a **foot wearable device** that ensures the safety of women by electrocuting the assailant during an ambush; at the same time it sends alerts to emergency contact for help.This product was conferred the **1st runner up** position at the **Siemens "MakeIt Real 24 Hour Hackathon"** held in Bangalore in December 2019. TaSafe was also featured as an upcoming innovation of ProDex in the 8th Inter IIT Tech Meet held at IIT Roorkee.
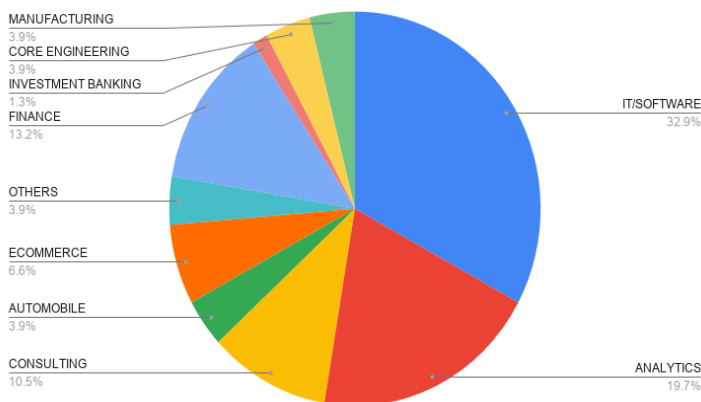
# Student Spotlight

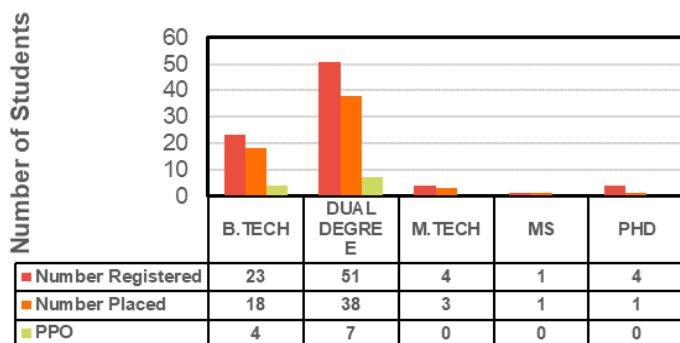## Anomalous Sound Detection for Machine Condition Monitoring

**P**arth Tiwari (16IM30025) and a team of researchers developed **anomalous sound detection techniques** which can be used for machine diagnostics. Their team proposed two different anomalous sound detection systems, one based on features extracted from a modulation spectral signal representation and the other based on i-vectors extracted from mel-band features. The first system, developed by Parth is a simple Graph-Cluster based outlier detection method, which is able to compete with (and outperform) several large deep learning-based models. The second system uses i-vectors extracted from mel-band spectra for training a Gaussian Mixture Model. Both systems have been featured in **Task-2 of the DCASE 2020 Challenge** and show significant improvement over the baseline AUC scores.

## Placement News

**T**he academic year 2019-20 has been a good year in terms of placement. Among 83 students and scholars registered with the Career Development Centre (CDC), 61 students got placed, in addition to 11 students who received pre-placement offers (PPO). The per annum median salary is INR 13.34 Lakhs and the average salary is INR 14.84 Lakhs. Some of the major recruiters include **Fractal Analytics, Honeywell, Barclays, Flipkart, Oyo, Citibank, Goldman Sachs, Adobe, Mercedes Benz, and Tata Steel.**

A number of students have opted for higher education in India and abroad. Our recent graduates are pursuing **PhD programs at Georgia Tech (USA), Clemson University (USA), NTU (Taiwan), CSE of IITKGP; MS program in Texas A&M (USA), management programs in IIM-A, IIM-C, and Essec Business School, France**. This indicates how our students and scholars are holding the ISE banner high in the corporate world as well as in academia. We wish them great success in their future endeavours.

### ISE - Sector Wise Placement

- MANUFACTURING 3.9%
- CORE ENGINEERING 3.9%
- INVESTMENT BANKING 1.3%
- FINANCE 13.2%
- OTHERS 3.9%
- ECOMMERCE 6.6%
- AUTOMOBILE 3.9%
- CONSULTING 10.5%
- IT/SOFTWARE 32.9%
- ANALYTICS 19.7%

### Placement 2020

| | B. TECH | DUAL DEGREE | M. TECH | MS | PHD |
|---|---|---|---|---|---|
| Number Registered | 23 | 51 | 4 | 1 | 4 |
| Number Placed | 18 | 38 | 3 | 1 | 1 |
| PPO | 4 | 7 | 0 | 0 | 0 |

## Faculty Excellence Award

**P**rof. Akhilesh Kumar has made us all proud by winning the **Faculty Excellence Award 2020** for Assistant Professors. He has been having an eventful year so far. He has led a team of ISE students (**Shwetank Saran, Prerit Jain, Shubham Mawa**) to win the first round of the **Innovative Implementable Idea (I3) Award for SAMHAR-COVID19 Hackathon** organized by the Centre for Development of Advanced Computing, Government of India. He has also been conferred as the **Honorary Rosalind Member** of the London Journals Press. Honours and awards aside, Prof. Kumar has also received a grant from **Cisco Research Center, USA** for the project "**A Data-Driven Decision Support System for Covid-19 Vaccine Supply Chain**". In addition to these, he has delivered an online lecture on "Predictive Maintenance 4.0" at NXP India Private Limited.

## Centre of Excellence in Safety Engineering and Analytics

**P**rof. Jhareshwar Maiti has recently been appointed as the **Chairman** of the newly established **Centre of Excellence in Safety Engineering and Analytics (COE-SEA)**. This centre is the brainchild of Prof. Maiti, an eminent academician whose current research is focused on the applications of Data Analytics and Virtual Reality (VR) in the domain of *Safety Science*. The centre aims to become a global benchmark in training, research, consultation, and industry collaboration in Safety Engineering, by championing the implementation of **Industry 4.0** and the application of **exponential technologies** such as artificial intelligence **(AI) and VR**. Prof. Maiti has also joined several **editorial boards** of reputed **international journals in 2019-20**. These include (i) Associate Editor, International Journal of Injury Control and Safety Promotion, (ii) Chief Guest Editor for the Special Issue on Safety Analytics (for Safety Science), and (iii) Chief Guest Editor for the Special Issue on Soft Computing Approaches for Safety Studies (for Safety Science).

## Prof. P.K. Ray is Appointed as Dean of VGSoM

**P**rof. Pradip Kumar Ray has taken up the responsibility of **Dean of Vinod Gupta School of Management (VGSoM)** in July 2020. Prof. Ray joined the ISE Department (formerly known as Department of Engineering and Management) in 1989 as a lecturer. In his long and prolific academic career, he has

championed a number of Industrial Engineering disciplines, viz. **Quality Control, Human Factors, and Ergonomics** to name a few. He has held visiting faculty positions in universities across the globe, such as Eastern Mediterranean University (Cyprus) and the University of South Pacific, Fiji Islands. He has authored more than 70 journal articles, 23 book chapters, and co-authored one book disseminating his vast knowledge and research contributions. He has conducted numerous outreach programs, and has been actively involved in training, research, and consulting projects with industrial as well as Government organizations. We are positive that VGSoM will reach new heights in academic and research excellence under his able leadership.

## Prof. M.K. Tiwari is Appointed as Director of NITIE, Mumbai

**P**rof. **Manoj Kumar Tiwari (FNAE, FNASc, FIIIE, FIISE, and FIETI)** has been appointed as **the Director of the National Institute of Industrial Engineering (NITIE)**, **Mumbai** in November 2019, by MHRD, Government of India. Before joining NITIE, Prof. Tiwari was serving as the **Dean, Planning & Coordination of IIT Kharagpur** in addition to being a Professor in the Department of ISE. Prof. Tiwari is internationally renowned for his research in Manufacturing Systems, Operational Analysis, and Supply Chain Management. He has been rated as **Rank 1 among the top 100 individual researchers** across the world in Production Research by Taylor & Francis. He is the recipient of the **"Most Influential Researcher Award"** in the domain of Operations and Supply Chain Management by **School of Business and Economics, Loughborough University, London,** and the Recipient of **Mahalanobis Distinguished Educator Award from the Operations Research Society of India (ORSI)**. Prof. Tiwari also received Dr. R.P. Mohanty Gold Medal Award (2016) for Outstanding Teacher in Industrial Engineering by the Indian Institution of Industrial Engineering. Prof. Tiwari has joined NITIE on lien from IIT Kharagpur, and ISE certainly hopes to see him return after a very successful tenure.

## Prof. Jitesh J. Thakkar Joins NRTI, Vadodara

**P**rof. **Jitesh J. Thakkar** has joined **National Rail and Transportation Institute (NRTI), Vadodara** as a Professor in July 2020. NRTI is India's first University dedicated to the field of Rail and Transportation education. Previously appointed as an Associate Professor in ISE, Prof. Thakkar has left for NRTI on lien for two years. He has published a book, named **"Structural Equation Modeling"** from Springer, in 2020. We will certainly miss his intelligence and courteousness, his philosophical quips, and his active participation in departmental affairs. We wish him all the best in his new position.
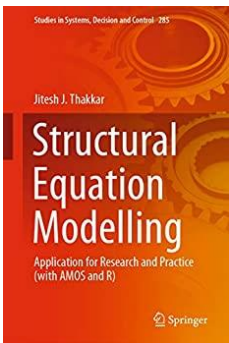
# Faculty Spotlight

## Prof. Goutam Sen Brings Multiple Projects to the Department

**D**r. **Goutam Sen**, Assistant Professor in ISE, has won multiple national and international grants this year. National grants are received from the **Science and Engineering Research Board (SERB), Defence Research and Development Organization (DRDO), and Indian Space Research Organization (ISRO)**. These projects aim to build Operations Research (OR) based decision technologies for disaster management operations. He has also received a grant from **Cisco Research Center, USA** to study planning of mass transportation systems, specifically suburban train services, during pandemics like COVID-19.  This is an implicatiom of strong interest in the government and in the industry towards the application of Industrial Engineering and Operations Research methods in critical areas such as humanitarian logistics.

## Prof. Sarmah and Pradeep Rathore's Research draws Attention

**P**rof. **S. P. Sarmah**, Head and Professor of ISE has been featured in the [Current Science Reports](#) along with his research scholar **Mr. Pradeep Rathore**. Their [research](#) explores the possibility of implementing a **circular economy in solid waste management** with the case of the city of **Bilaspur** as an example. They analyzed the economic, environmental, and societal viability of such an initiative using a Mixed Integer Programming model. Their model projects significant savings and reduction in carbon emission. **Pradeep is about to defend his PhD** and has joined as an **Assistant Professor** in **Symbiosis Institute of Management Studies, Nagpur.** Prof. S. P. Sharmah has also been nominated as an **Editorial board member** of **Transportation Research Part E: Logistics and Supply chain management**, an international journal of repute published by Elsevier.

Pradeep Rathore

## Prof. J. K. Jha Joins as Editorial Board Member

**D**r. **J. K. Jha**, Associate Professor of the Department of ISE, has joined as an Editorial Board member of the journal during 2019-2020 **"International Journal of Industrial Engineering: Theory, Applications, and Practice".**

# What's New in The Department

## New Responsibilities in the Department

**D**r. B.G.Menon, Assistant Professor of the Department of ISE has taken up two key responsibilities in the department: (**i**) **Training and Placement in charge, ISE;** and **(ii) Alumni Liason officer, ISE.** Prof. Menon completed his PhD from our department in 2013 and has joined as a faculty member in 2019.

## WSD Lab gets High Tech Equipment

**I**n a major revamp of the **Work System Design Laboratory**, ISE is in the process of procuring a **3D Motion Capture System** and an **Integrated Cognitive Ergonomics Kit**. The **Vicon 3D Motion Capture System** can track, record, model, and analyse the 3D motions of humans, machines, vehicles, and objects in both indoor and outdoor environments. The **Integrated Cognitive Ergonomics Kit (EEG, Eye Tracker, and Integration Software)** will be used to monitor the cognitive load on humans under different work conditions. The real-time electroencephalogram (EEG) system aids in the acquisition of real-time EEG data to monitor indexes of alertness, cognition, memory, and workload in complex work environments. The integration of eye-tracking data such as pupil diameter, blinks, etc. to EEG activities gives a complete brain monitoring solution and holds a great promise in developing a predictive neurophysiologic solution for intelligent allocation of tasks in the interface design.
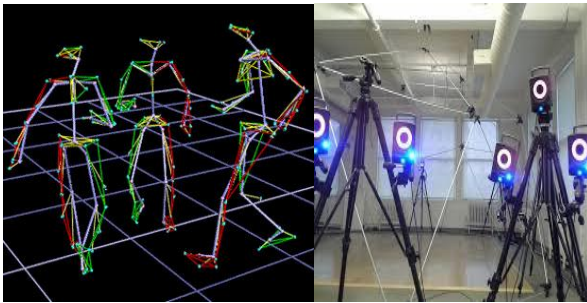
## ISE Gears up for the First Online Semester

**A**s COVID-19 disrupts the normal way of life, keeping the health and safety of the students in mind, the IIT Kharagpur authority has announced that the Autumn 2020 semester will be conducted online. Without the vibrant presence of the young students, the campus now seems eerily quiet and deserted. The ISE department has equipped the classrooms C1, C2, and C3, and the examination room E1 with high-density cameras and microphones so that the faculty members can utilize the online platform along with the chalkboards for delivering lectures.

## New Staff Members of ISE

**M**r. Jayanta Dey and Mr. Furqanul Haque have joined ISE as administrative staff in 2020. While this is Mr. Haque's first responsibility in IIT Kharagpur, Mr. Dey has been associated with the institute since 1987.

Mr. J. K. Dey

Mr. F. Haque

# Alumni Focus

**T**wo former students of ISE (formerly known as Department of Industrial Engineering and Management, IEM) have been awarded the *Young Alumni Achiever Award 2020 (YAAA) by IIT Kharagpur*. This award is a recognition for outstanding early career contributions made by the alumni (age 45 or younger) of this esteemed institute. **Mr. Rutvik Doshi** (IEM 1999 batch) and **Mr. Sourabh Bansal** (IEM 2007 batch) received this prestigious award this year. We took this opportunity to reach out to them and learn about their experiences in IIT and beyond. We are immensely thankful to both of them for taking the time to answer our questions.

## Mr. Rutvik Doshi

**Managing Director and General Partner at Inventus Capital Partners
Industrial and Systems Engineering (formerly IEM, 1999 batch)**

*Q: What is the most memorable part of your life at IIT KGP?*

Ans. The friends I made at KGP and the bonding I shared with them is by far the most memorable part of life at KGP. Even after 20 years, my best friends are the ones that I made during my KGP days.

*Q. How did your time in IITKGP help you shaping up your career?*

Ans. The balanced mix of good academic life, availability of resources (both academic and extracurricular), and the chance to interact and make friends with students from all over the country shaped me and my personality. In addition to the excellent academic background, I got a chance to indulge in **various social and cultural activities** throughout my 4 years. I was actively involved **in organizing and volunteering for the spring fest**. Those experiences helped develop my personality and leadership skills. The inter-personal skills developed in the halls of residence and in working for activities like Spring Fest prepared me well to take on the corporate world and helped me excel.

*Q. Tell us briefly about your journey after IIT KGP.*

Ans. After IIT I joined a software company in Calcutta but soon I left for the US to join an early-stage startup in the internet space. I worked in the US for around 7 years in engineering roles. I was also awarded 6 patents for my work during that time. I decided to do my MBA from INSEAD, France in 2006/2007. Post-MBA I joined Google as a product manager and moved back to India to join Google's Bangalore office. At Google, I was part of the team which built the early speech recognition products (which are now part of Android, Google Home, etc).  After spending 4 years at Google I had a short stint as an entrepreneur before becoming a VC. I joined Inventus Capital, an early-stage VC firm in 2012, and am currently one of the Managing Directors there.

*Q. Tell us how the students can prepare to assume leadership roles in the future?*

Ans. My advice to current students would be to **maintain a healthy balance between academics and activities**. Life at KGP provides an opportunity for every student to develop their interests and participate in various activities like music, theatre, sports, etc. Being involved across academics and activities is critical to developing the right skills needed to thrive in their careers.

*Q. What is your take on the relevance of Industrial and Systems Engineering in the present corporate world?*

Ans. Most products that we consume today are becoming multi-disciplinary in nature. For e.g an electric car is no longer a domain of mechanical engineers but is a mash of mechanical, electrical, material science, and software. **Industrial engineers are trained to thrive and succeed in multi-disciplinary environments**. Hence the systems thinking and academic skills gained at IIT become extremely relevant in the future where all industries/products are a mash of multiple disciplines.

My profession requires me to be a generalist and be able to understand various kinds of tech businesses'. I truly believe that my training as an industrial engineering training has helped me appreciate technology better and the systems which make it work.

*Q. What would be your message to our current students?*

Ans. "*My only advice to current students would be to go with the flow and stay focused on doing what they like the best*".

## Mr. Sourav Bansal
**Co-Founder & Managing Director of Magicrete,**
**Industrial and Systems Engineering (formerly IEM, 2007 batch)**

*Q. What is the most memorable part of your life at IIT KGP?*

Ans. Bhaat sessions at Cheddi's/Billoo's& between classes at Nescafe canteen, ILLU preparation times, are some of my most memorable moments of KGP life.

*Q. How did IIT KGP and the department of ISE (then IEM) help you become an entrepreneur?*

Ans. Time spent at the institute provided me with all the time needed to understand and nurture my strengths & shape my identity. I used to look forward to the **Kshitij tech fest** (& tech fests of others IITs/IIMs) to participate in BPlan& product development competitions. Courses on **Production Planning, Supply Chain Management & Quality Control** proved to be useful as they found application in real-world problems. (Contd..)

Also taking up **some electives on Entrepreneurship at VGSOM** was quite helpful. I still remember doing my BTech project in RFID based indoor positioning system and the department was most supportive in getting the equipment required from abroad to establish a lab setup for the same. I had to sell the idea to my project guide. This was my first stint with entrepreneurship.

*Q. Tell us briefly about your journey after IIT KGP. What made you co-found Magicrete?*

Ans. Before even graduating out of Kgp I had made up my mind of starting a venture. I hail from a business family and that made the choice easy for me. On graduating, I started scouting for an opportunity that would help put technology to use to solve problems in one of the largest industries out there – Real Estate. I stumbled across this amazing product called AAC Blocks that had the potential to disrupt the red clay brick industry and went on to set up a manufacturing facility for the same. Since then we have continued onto our mission of helping people build their homes better, faster & cheaper by the use of innovative construction technologies.

*Q. Tell us about your inspirations as an entrepreneur.*

Ans. Grew up reading about successful businessmen & entrepreneurs like Mukesh Ambani & Narayan Murthy in magazines/dailies like Business world & Economic Times. Having started up in 2007, saw startups like Flipkart, Ola, Make My Trip evolve at the same time as us. Their sheer scale and rapid growth have always amazed me.

*Q. What are the important things upon which the students should focus on to become an entrepreneur? What would be your message to our current students?*

Ans. For students wanting to start their own ventures, my advice would be that one should be willing to take risks & dare to dream big.

Search for the opportunity starts with **Customer Need Identification**. While doing this one can go about identifying how leveraging technology can help in bringing about cost/ time/ resource efficiency in the industry. Nothing better if you can find such an opportunity in your domain of engineering because no one is expected to know your domain better than you. Try to relate to the problems faced by the industry. **Summer internships in industries are excellent opportunities** to do the same.

   *"Make the best use of your time at the campus as these are the most precious and dynamic years of your life."*

# Publication Watch

**B**elow is the list of publications appeared in journals and conference proceedings in 2020 from the ISE department.

1. Atta, S., Sen, G. (2020) Multiple allocation p-hub location problem for content placement in VoD services: a differential evolution based approach , Applied Intelligence,50 (5),1573-1589

2. Banerjee, S., Banjare, P., Pal, B., Jenamani, M. (2020) A multistep priority-based ranking for top-N recommendation using social and tag information , Journal of Ambient Intelligence and Humanized Computing.

3. Banerjee, S., Jenamani, M., Pratihar, D.K. (2020) A survey on influence maximization in a social network , Knowledge and Information Systems,62 (9),3417-3455

4. Banerjee, S., Jenamani, M., Pratihar, D.K. (2020) Maximizing the earned benefit in an incentivized social networking environment: a community-based approach , Journal of Ambient Intelligence and Humanized Computing,11 (6),2539-2555

5. Boehmer, J.H., Shukla, M., Kapletia, D., Tiwari, M.K. (2020) The impact of the Internet of Things (IoT) on servitization: an exploration of changing supply relationships , Production Planning and Control,31 (43864),203-219

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