

ISE NEWSLETTER

DEPARTMENT OF INDUSTRIAL & SYSTEMS
ENGINEERING, IIT KHARAGPUR

Spring 2021

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:

- **B.Tech (4-year)** in Industrial Engineering.
- **Dual Degree (5-year)** - B.Tech. in Industrial Engineering and M.Tech in Industrial Engineering and Management.
- **Dual Degree (5-year)** - B.Tech in Manufacturing Science and M.Tech in Industrial Engineering and Management.
- **Dual Degree (5-year)** - B.Tech in Engineering Product Design and Manufacturing and M.Tech in Design and Quality Engineering, with Mechanical or Industrial Electronics verticals.
- **M.Tech** (2-year) in Industrial Engineering and Management.
- Master of Science (**MS**).
- Doctor of Philosophy (**PhD**).



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

Editor-In-Chief:
Dr. Sayak Roychowdhury
(Assistant Professor, ISE)

Student Editor:
Mr. Souvik Das, Research
Scholar

Student Associate Editor:
Mr. Akshay Bhosale, Research
Scholar



Message from the Head of the Department

HOD's Desk

I am happy to present the spring 2021 issue of the newsletter. It will give you an idea about the recent activities in the department. We have witnessed the most difficult times due to the Covid 19 pandemic. Our very own staff member K. N. Pandey, who had been involved with the department for more than two decades, passed away in October 2020, due to COVID related complications. Also, during this period, we have lost two of our former esteemed colleagues Prof. P.L. Narasimhan, and Prof. B. Bhadury.

Prof. P. L. Narasimhan who held the position of TVS Chair professor from 2012 to 2017 also passed away in October 2020. Prof. Bhadury retired as a Full Professor in 2003 from our department. He passed away in December 2020 due to old age ailments. On behalf of our department, I convey our deepest condolences to the family members of Prof. B. Bhadury, Prof. Narasimhan and Pandey Ji.

Due to the pandemic, it has become a great challenge for the teaching community to communicate effectively with the students. With the help of digital communication systems, students have begun to take advantages of distance learning. We have also moved forward without compromising the quality of teaching-learning activities and continue to put our effort to offer the best to the students. Still, many students face difficulties in focusing on their studies outside the academic environment of the campus. We are missing the vibrant atmosphere in the department due to the prolonged absence of our students. Hope the situation will improve soon, and we will be able to start our regular activities. Stay Safe and Healthy.



Prof. S. P. Sarmah

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

Obituary

In Remembrance

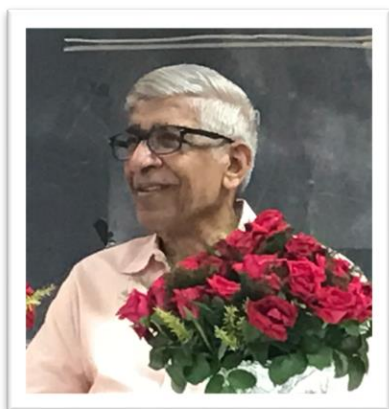
Shri Kripa Nand Pandey

Sri Kripa Nand Pandey, favorably known as Pandeyji, passed away, on 11th October 2020. During his last days he was working as the Senior Technical Superintendent at the Department of ISE. Pandeyji had been an integral part of our department since 1997. He was also an alumnus of IIT Kharagpur. He received integrated M.Sc degree in Applied Geology in 1986. From managing purchase related matters, to fixing IT problems, Pandeyji's touch was essential for the successful functioning of the department. It had not been merely one month to the celebration of his 59th birthday, Pandeyji left us due to covid related complications. May his soul rest in peace. We convey our heartfelt condolences to his family members.



Retd. Prof. P. L. Narasimhan

Prof. P. L. Narasimhan, former TVS Motors Chair Professor in the Department of ISE from 2012 to 2017, passed away on October 1, 2020. Prof. Narasimhan was an accomplished engineer, whose long experience in the industry benefitted our department immensely. Before joining IIT Kharagpur, he had a successful tenure at Lakshmi Machine Works (LMW), a leading manufacturer of textile machinery. Under his leadership of the R&D division at LMW, more than 80 patents were registered. He had vast experience in organization restructuring, product development and change management. He will be remembered in our department as a great teacher, an expert technologist and a wonderful human being.



Retd. Prof. Bikash Bhadury

Prof Bikash Bhadury, former Professor in the Department of ISE (formerly IEM), left for his heavenly abode on December 10, 2020. He joined our department in 1986, with extensive industry experience in India and USA, in the areas of industrial/manufacturing engineering and production/works management. He was associated with our department until his retirement in 2003. His research interests included reliability, maintenance, quality engineering and manufacturing management. Prof. Bhadury was a simple and a cordial academician, who was widely respected among his students and colleagues. He was a fellow of the Institution of Engineers (India).



Gold Award

IISE Chapter #660

Gold Award for IISE Chapter #660

The IISE chapter #660, which represents the students and scholars of the Department of ISE, IIT Kharagpur, has been awarded with the prestigious **"Gold Award"**, for outstanding chapter performance in 2020-21, under the **Chapter Recognition Program** of the **Institute of Industrial and Systems Engineers (IISE)**. This feat is accomplished under the guidance of **Prof. Sri Krishna Kumar**. IISE is the world's largest professional society dedicated solely to the support of the profession of industrial and systems engineers. It is an international, nonprofit association, headquartered in Peachtree Corners, Georgia, USA, that provides leadership for the application, education, training, research, and development of the discipline of ISE.



Heartiest Congratulations to all the members of IISE Chapter #660!

The student office bearers for the year 2020-21 are:



Avishek Pandey
President



Satchidananda Tripathy
Vice President



Kriti Karmakar
Secretary



Ashok Kumar Gaula
Treasurer

Research Scholar Day

E-Vishleshan 2021



VIRTUAL DOCTORAL COLLOQUIUM
VISHLESHAN 2021
The Speakers
Research Scholars' Day- 2021
February 27th 2021
Time: 11am-5:30pm IST
Venue: Microsoft Teams
Sponsored by
Apollonius Computational Business Solutions Pvt. Ltd.
<http://www.apollonius.in>
Department of Industrial & Systems Engineering
IISE University Chapter #660 IIT Kharagpur
IIT Kharagpur, India
<http://www.iem.iitkgp.ac.in/>
Contact: Avishek Pandey, President, IISE Chapter #660; Email: avi2010.04@gmail.com, +918637392212

The Speakers

- Prof. Jose Arturo Garza-Reyes
Centre for Supply Chain Improvement
University of Derby, Derby UK
- Prof. D. Scott Sink
ISE/Management Systems Engineering
Virginia Tech, Blacksburg, VA, USA
- Mr. Saurabh Mishra
Program Manager, Amazon, India

Scan to join

This year, the Research Scholar Day was celebrated on the virtual platform. The Doctoral Colloquium was jointly organized by the **IISE Student Chapter #660** and the **Department of ISE, IIT Kharagpur**, sponsored by *Apollonius Computational Business Solution* and *Getmyresumes.in*. Three eminent keynote speakers made the event informative and insightful.

- **Prof. Jose Arturo Garza-Reyes**, Professor, Centre for Supply Chain Improvement, University of Derby, Derby, UK delivered keynote speech on The Contribution of Industrial Engineering and Operations Management towards Environmental Sustainability – A Review of Concepts and Methodologies.

- **Prof. Scott Sink**, Professor, ISE/Management Systems Engineering, Virginia Tech, Blacksburg, VA, USA delivered keynote speech on Operational Excellence and ISE: We Engineer Value and We Integrate People, Strategy, Process and Technology.

- **Mr. Saurabh Mishra**, Program Manager, Amazon, India delivered keynote speech on Supply Chain 4.0: The Digital Transformation.

Keynote speakers

Best Poster Award

Ms. Swati Pattanaik (IIT Kharagpur) was awarded the best poster award for her poster on *"Estimation of Quality of a Single box of mangoes by simulation during export via different method"*.

Best Paper Presentation Award (Oral)

The best paper presentation award was shared by **Ms. Umabharti Rawat (IIT Roorkee)** for her paper on *"Cyber Physical Systems (CPS), Opportunities and barriers to optimise freight supply chain: A theoretical perspective"* and **Mr. Souvik Das (IIT Kharagpur)** for his paper on *"Modelling cognitive workload using eye tracking metrics and NASA-TLX"*.



Workshops and Webinars

Outreach



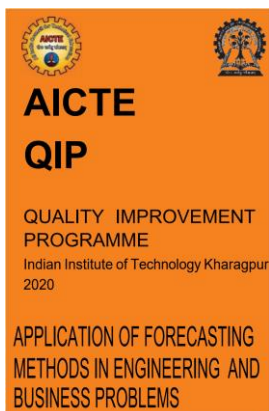
A virtual workshop on **Data Analytics using R** was organized by the Department of Industrial and Systems Engineering & IISE Chapter #660. Mr. Subhajit Sengupta, Senior Data Scientist, TCS, conducted the workshop on 7th and 8th of November 2020.

Data analytics

A webinar on the **Design of Future Supply Chain Networks** was organized by Department of Industrial and Systems Engineering IIT Kharagpur & IISE - Chapter #660. Eminent Prof. N.Viswanadham, Professor and INSA Honorary Scientist from Indian Institute of Science (IISc) Bangalore conducted the webinar on the 12th of November, 2020.



Supply Chain



Prof. Biswajit Mahanty and Prof. B. G. Menon jointly conducted one week **AICTE-QIP** sponsored workshop on the topic "**Application of Forecasting Methods in Engineering and Business Problems**" for faculty members, researchers and masters students in the Department of Industrial and Systems Engineering, IIT Kharagpur during December 6-12, 2020. Prof. G. Sen and Prof. J K Jha organised a **QIP short-term course** on "**Decision Modeling through CPLEX**" in the Department of Industrial & Systems Engineering during December 14-20, 2020.

Forecasting & Decision Modeling

A webinar on "**How Digital Technologies like IoT, Blockchain and AI Enable Industry 4.0?**" By Asidhara Lahiri, IBM, SAP CTO for Application Development was organized by the Department of Industrial and Systems Engineering and IISE Chapter #660 IIT Kharagpur on 23rd of January, 2021.

How Digital Technologies like IoT, Blockchain and AI Enable Industry 4.0?

Asidhara Lahiri
SAP CTO & Enterprise Architect, IBM
IBM Academy of Technology Member
Jan 23, 2021

IoT

Workshops and Webinars

Outreach

International Workshops under SPARC

In view of the emerging need of redesigning the human-product interface of healthcare system, a project titled “**Design and Development of Automated Systems for Ergonomic Evaluation of Human-Product Interface in Healthcare Systems**” is being undertaken under **SPARC**. This project is a collaboration between **IIT Kharagpur, India** and **Purdue University, USA**. The project is co-ordinated from India by **Prof. P. K. Ray**, of the **Department of ISE** as the Indian PI and **Prof. V. K. Tewari**, Director of IIT Kharagpur as the Indian Co-PI. Their Purdue University counterparts are **Prof. Denny Yu**, and **Prof. V. Aggarwal**, respectively, from the School of Industrial Engineering. **Two international online workshops** have been organized to discuss the current trends and practices in human interface design in healthcare automated systems. Eminent physicians **Dr. Sandip Halder** (Dr. Gray's Hospital, Elgin, UK), **Dr. Sanjay Bhattacharya** (Tata Medical Centre, Kolkata), **Dr. Kaushik Ray** (Belford Hospital, UK) and **Dr. Ashok Sarkar** (Association of Blood Cancer and Allied Diseases) participated in the discussion. **Mr. Amalendu Pal** (Board President, Indian Association of Blood Cancer and Allied Diseases) also joined in the interactive session.

International Online Workshop
on
Healthcare Systems and Automation
in collaboration with
IIT Kharagpur, India and Purdue University, USA
20th March, 2021, 8:30 PM IST

About the Workshop
In the context of product and worksystem development, the interface design has become a critical issue. The development of an interface in a given worksystem depends on the assessment of existing interfaces from the ergonomic design perspectives as well as technology involved. In view of the emerging need of redesigning the worksystem interface of healthcare system the workshop is organized to discuss the current technology and the issues that needs to be addressed by the researchers in order to optimize the performance of the system

Organizers

Prof P K Ray
Dean, VGSOM, IIT Kharagpur
India PI

Prof V K Tewari
Director, IIT Kharagpur
India Co-PI

Prof Denny Yu
Faculty, School of Industrial Engineering, Purdue University
International PI

Prof V Aggarwal
Faculty, School of Industrial Engineering, Purdue University
International Co-PI

Programme Overview
Welcome Address and Introduction to the Webinar
Session I
Overview of Ergonomic Issues in Healthcare
Session II
Interface Design and Development of Automated Systems for Healthcare
Session III
Impact of Musculoskeletal Injuries and Fatigue in Healthcare Workers
Session IV
Overview of Research Issues related to Interface Design and Automation in Healthcare
Session V
Interaction Session
Vote Of Thanks

International Online Workshop
on
Human-Product Interfaces and Their Performance in Healthcare Environment
in collaboration with
IIT Kharagpur, India and Purdue University, USA
30th-31st July, 2021, 8 PM IST

Programme Schedule
30th July, 2021
Welcome Address and Introduction to the Webinar
Prof P K Ray, Prof V K Tewari
Prof D Yu
Session I
Effect of Ergonomics in Designing Human-Product Interface in Healthcare System
Prof V K Tewari
Session II
Automation in Healthcare Product Interface Design: Important Issues and Challenges
Prof P K Ray
Session III
Interaction Session with the Experts
Concluding Remarks

Overview
Effective integration of technology is essential in high-risk healthcare environments to support safety and efficient care. The prime focus in healthcare industry has always been towards providing highly capable healthcare professionals with well-established infrastructure and advanced medical equipment. The health care environment is particularly challenging for interface design because of its complex, uncertain, highly demanding, and highly stressful environment. The workshop is organized to provide a general overview of the human-product interface in healthcare systems and identify the issues that will enhance the performance by optimizing the system.

Organizers

Prof P K Ray
Dean, VGSOM, IIT Kharagpur
India PI

Prof D Yu
Faculty, School of Industrial Engineering, Purdue University
International PI

Prof V K Tewari
Director, IIT Kharagpur
India Co-PI

Prof V Aggarwal
Faculty, School of Industrial Engineering, Purdue University
International Co-PI

Programme Schedule
31st July, 2021
Session I
Sensing and Machine Learning Techniques for Measuring Human Performance in Healthcare
Prof D Yu, Prof V Aggarwal
Session II
Research Issues related to Human-Product Interfaces in Healthcare System
Dr Sandip Halder, Dr Kaushik Ray
Session III
Application of Automation in Design of Human-Product Interface in Healthcare System
Session IV
Interaction Session with the Experts
Dr Sandip Halder, Dr Kaushik Ray
Dr Sanjay Bhattacharya, Mr Amalendu Pal, Dr Ashok Sarkar
Vote Of Thanks



Social Outreach

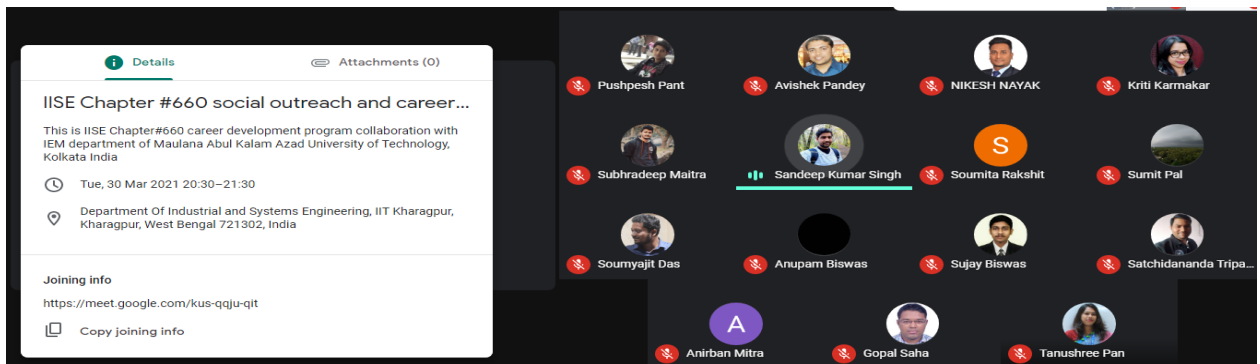
Outreach



Mr. Satchidananda Tripathy, the Vice President of IISE Chapter #660, visited Govt. Nodal High School Gaisilet, Bargarh, Odisha, India on 30th March 2021 to encourage students about technical education and promote IISE Chapter social work. He also offered token of love to the students and school administration.

School Visit

The IISE Chapter #660 also organized a career counselling program on March 30, 2021, for the graduate students, of the IEM department of the Maulana Abul Kalam Azad University.



Career counselling of graduate students



The IISE chapter # 660 collaborated with Apollonius Computational Business Solution, Kolkata and **Ramakrishna Mission, Belur**, to develop a connectivity platform for seamless information sharing on the availability of medical oxygen concentrator and oxygen cylinder to fight against the second wave of COVID-19. A web platform <http://oxyman.tech> has been developed under this initiative, to connect the patients with the volunteers. The volunteers played a key role in dissemination of information and supply of oxygen cylinders and concentrators to the patients. This humanitarian initiative was offered free of cost. It was well received in the Kolkata metropolitan area.

Covid Relief

Contact IISE Student Chapter, IIT Kharagpur

Facebook: <https://www.facebook.com/IISEKGP>

Linkedin: <https://www.linkedin.com/iise-university-chapter-iit-kharagpur-660/>

Twitter: <https://twitter.com/DeptISeIITKGP>

Instagram: @iise_iitkgp_660

YouTube: Subscribe- Industrial and Systems Engineering IIT Kharagpur

Students Spotlight

Students Activities

ISE Scholar Receives PMRF

Biswajit Kar, has been offered admission to the PhD program under the prestigious **Prime Minister's Research Fellow (PMRF) scheme** in the Department ISE, IIT Kharagpur in 2021. Biswajit started working as a PhD student under the guidance of **Prof. M. Jenamani** in Autumn 2020. He hails from Tripura. His research interests include Supply Chain, Optimization and Machine Learning. At present, he is working on designing a supply network for the optimized distribution of vaccine during the pandemic. He received his M.Tech from NIT, Warangal. During his M.Tech program, he worked on a project involving designing of the fleet management system for the movement of trucks for the Singrauli Coal Mines. He received his Bachelor's Degree in Mechanical Engineering from the North Eastern Regional Institute of Science and Technology in 2017.



The Student Leader

Shivam Singh (17IM30030), the **Vice-President (Officiating) of Technology Students' Gymkhana / Chairman, Students' Senate** (2020-21) has taken leadership roles in several activities. These include (i) Representing the views of 14800 students before the Institute administration, (ii) Leading the team of 29 members in conducting the TSG activities and managing academic queries of all the students of IIT Kharagpur even in Online mode, (iii) Initiating an awareness program to make the freshers aware of the existing financial assistantships and scholarships offered by IIT Kharagpur, (iv) Formulating the Standard Operating Protocols along with the members of the students' senate for the smooth functioning of the whole campus activities during the COVID-19 pandemic, (v) Member of the committee headed by the Director to make major decisions related to campus functioning during the pandemic, (vi) Designing and implementing the process to bring back research scholars and students to the KGP campus, with the support of the administration and students' senate, (vii) Formulating the process of bringing back the resource-constrained students to the campus. (viii) Coordinating with the UG representatives to devise a plan on the proper functioning of the campus whenever the students are called back in high numbers, (ix) Working with the Gymkhana executives for the planning and conduction of the first-ever online elections in IIT Kharagpur, (x) Facilitating the process of constituting Research Groups under the Gymkhana along with the help of the President, TSG and G.Secs (Technology).



Students Spotlight

Students Activities

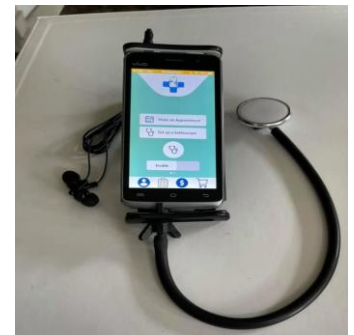
Virtual Model of IIT Kharagpur

Anuj Kumar Singh (18IM30006) had applied Virtual Reality and Work System Design in the simulation of Virtual Model of the campus of IIT, Kharagpur by using Google SketchUp software. He developed this virtual model of IIT Kharagpur for the incoming batch of students in 2020, who could not come to the campus due to the ongoing COVID 19 pandemic. The video of this model is available: <https://youtu.be/YD6AV2idv9Q>



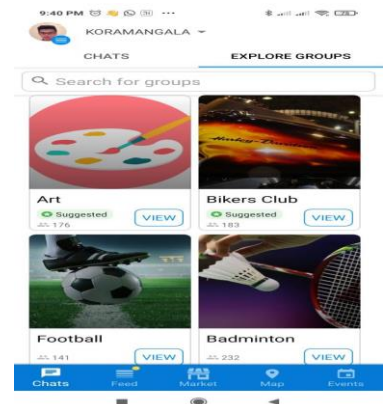
SuperCAPE

Pushkar (17QE30003), a fourth-year QEDM student, has developed a low-cost passive cape for smartphones. It provides real-time diagnostic capabilities during a telehealth consultation functioning as a Stethoscope and an Otoscope. He has also designed a high-resolution gamma detector used in medical imaging under the supervision of Sachin Junnarkar, CEO, Field Viewers Inc., and has filed a patent for the invention. Unlike other detectors in the market, the application specific integrated circuit (ASIC) board in his design is connected orthogonally to the detector board, which significantly increases the position resolution. He has also designed the process to mass-produce such detector modules.



App for Connecting Local Communities

Aniruddha Chattopadhyay (17QE30007), is a final year undergraduate student in the department of Industrial and Systems Engineering. During his internship at the early stage of a startup named Lubble, he has **built an app** that helps one connect with verified neighbours in interest-based communities. The app facilitates requesting for local help, exchanging books, discovering local meetups, staying updated with the local news and safety alerts. It enables the user to become a part of the local community. The app uses machine learning to connect people with the neighborhood groups having similar interests.



Faculty Spotlight

Faculty News

Prof. J . K. Jha wins Faculty Excellence Award

Prof. J.K. Jha, has been selected for the **Faculty Excellence Award 2021** in the Associate Professor category, by the IIT Kharagpur. Prof. Jha joined the ISE Department in 2010. At present, he is actively handling a number of responsibilities in the department as well as in the institute. He is the **examination-in-charge of the department** since 2016. At the institute level, currently he is the **warden of BCR Hall of residence**. Previously, he had been the assistant warden of BCR Hall of residence and VS Hall of residence. His main areas of teaching and research include Operations Research, Statistical Decision Modeling, Facility Planning, Supply Chain Optimization and Logistics Planning. He published/presented more than Forty papers in international journals and conferences, and his publications appeared in the leading journals like Journal of the Operational Research Society, Applied Mathematical Modelling, Computers & Industrial Engineering, International Journal of Production Research, Journal of Manufacturing Systems, Journal of Cleaner Production, etc. He has been associated with several sponsored projects. He has organized short-term courses on Facility Planning, Service Science, Quantitative Decision Modeling and Data Analytics with SAS.



Prof. V. N. Achutha Naikan is appointed as the Dean of VGSoM

Prof. V. N. Achutha Naikan has been appointed as the **Dean of Vinod Gupta School of Management (VGSoM)** in June 2021. Prof. Naikan joined the ISE Department (formerly known as the Department of Industrial Engineering and Management) in 1996 as a lecturer. In his long and prolific academic career, he has taught several industrial engineering disciplines, viz. Product Design and Development, Quality and Reliability Engineering, Industrial Engineering, and Operations Research, to name a few. He has held visiting faculty at The University of Maryland, USA, and The Chinese University of Hong Kong, Hong Kong. He has served as Co-editor-in-chief of the International Journal of Performability Engineering (2015-2016) and as advisory/ editorial board member of several other journals. He has authored more than 67 journal articles, two book chapters, and 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 and government organizations. Previously, he held the position of the Head of Subir Chowdhury School of Quality and Reliability, IIT Kharagpur. We are optimistic that VGSoM will reach new heights in academic and research excellence under his able leadership.



Faculty Spotlight

Faculty News

Prof. Mahanty is appointed as Advisory Committee Member of NITIE



Prof. Biswajit Mahanty has been appointed as the Advisory Committee Member of the **National Institute of Industrial Engineering (NITIE)**, Mumbai, India in September 2020. He is a senior professor in the Department of ISE, with more than thirty five years of teaching, research and industrial consulting experience. Prof. Mahanty's areas of interest include Operations Research, System Dynamics, Operations Management, and Information Systems. He has been the principal investigator of more than twenty industrial consulting projects and seven sponsored research projects. Prof. Mahanty is also an author of the book "Responsive Supply Chain" published by the prestigious CRC press.

Prof. Sarmah is appointed as Associate Editor of CAIE and OPSEARCH

Prof. S. P. Sarmah, Head and Professor of the Department of ISE, has been appointed as the **Associate Editor of the journal "Computer & Industrial Engineering (CAIE)"** in the field of Logistics and Supply Chain Management. He has also been appointed as the **Senior Associate Editor of OPSEARCH**. Professor Sarmah's research interests primarily include logistic and supply chain management, inventory management, and reverse logistics. Currently his research focus is in the development of eco-friendly logistics systems, logistics management of Indian trucking industry, management of city logistics and waste management. He is the lead investigator of the project titled Management of Inland Waterways Logistics Systems, funded by the Ministry of Shipping, GOI.



"The goal of mankind is knowledge. That is the one ideal placed before us by Eastern philosophy. Pleasure is not the goal of man, but knowledge. Pleasure and happiness come to an end. It is a mistake to suppose that pleasure is the goal. The cause of all the miseries we have in the world is that men foolishly think pleasure to be the ideal to strive for. After a time man finds that it is not happiness, but knowledge, towards which he is going, and that both pleasure and pain are great teachers, and that he learns as much from evil as from good.

... Now this knowledge, again, is inherent in man. No knowledge comes from outside; it is all inside. What we say a man "knows", should, in strict psychological language, be what he "discovers" or "unveils"; what a man "learns" is really what he "discovers", by taking the cover off his own soul, which is a mine of infinite knowledge."

- Swami Vivekananda on Karma-Yoga

New Research Projects

Research

Prof. Goutam Sen awarded with Startup Research Grant

Dr. Goutam Sen, Assistant Professor in ISE, has been awarded with the **Startup Research Grant** (formerly known as Early Career Research Award) by the **Science and Engineering Research Board, (SERB) DST, Govt. of India**. This fund will be utilized to develop a game-theoretic model for vehicle interdiction in urban transportation networks. He has also received funding for the project titled **"Development of Spatial Decision Support Systems for Emergency/Disaster Management"** from the **Indian Space Research Organization (ISRO)**. His paper titled **"User Aggregation Models for a Video-on-demand (VoD) System"**, co-authored with **Subrato Mondal**, a dual-degree student of ISE, has been short-listed for the **IEEM2020 Outstanding Conference Paper Award**. Only about 3% of all submissions are selected based on the review results, and the nominations received.



Research Project on Exponential Technology from DST

The project titled **"AI and virtual reality modelling and collaborative learning of risk and situational awareness in the socio-technical system under disruptions"** has been initiated in the Department of ISE, and Centre of Excellence in Safety Engineering and Analytics (COE-SEA) in December, 2020. This project is funded by **SERB, DST** under the scheme of **Core Research Grant**. The project has **Prof. J. Maiti as PI, Prof. B G Menon and Prof. S. Roychowdhury from ISE as Co-PI, Prof. S. Mishra and Prof. P Mitra from CSE department as Co-PI**. This project aims to develop a comprehensive **exponential technology based** (e.g. AI and VR) collaborative learning platform for theorizing risk and situational awareness under man-made disruptions (e.g., accident or disaster) in the socio-technical systems. It involves measuring and modeling of situational awareness under disruption (i.e., perception, comprehension, and projection) among people using AI, VR, and human sensing tools and technologies.

*"...in education, the most important factor must be the **inspiring atmosphere of creative activity**. And therefore the primary function of our University should be the constructive work of knowledge. Men should be brought together and full scope given to them for their work of intellectual exploration and creation; and the teaching should be like the overflow water of this spring of culture, spontaneous and inevitable. **Education can only become natural and wholesome when it is the direct fruit of a living and growing knowledge.**" – Excerpt from the lecture **"The Centre of Indian Culture"**, delivered in Madras, February 1919, by **Rabindranath Tagore***

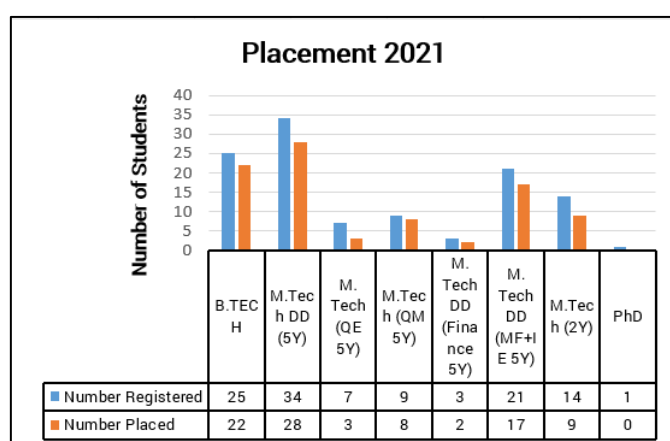
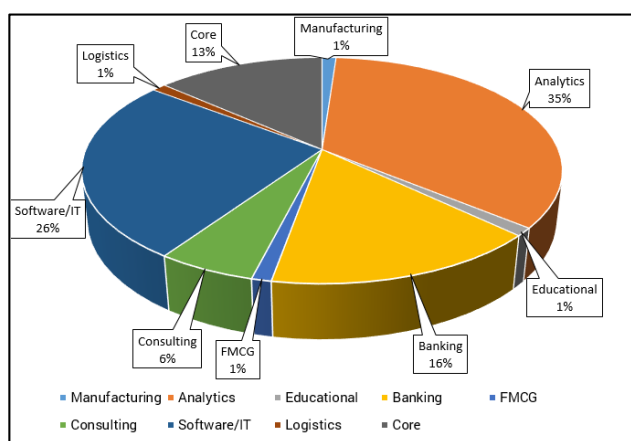
Department News

Other news

Placement news

The academic year 2020-21 has been a good year in terms of placement. Among 114 students and scholars registered with the Career Development Centre (CDC), 89 students got placed. The per annum median salary is **INR 13.50 Lakhs** and the average salary is **INR 15.70 Lakhs**. Some of the major recruiters include **Fractal Analytics, Honeywell, Barclays, Flipkart, Accenture Japan, Citibank, ICICI Bank, Cardekho, Goldman Sachs, and Tata Steel**.

A number of students have opted for higher education in India and abroad. 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.



New Member in ISE Family



Mrs. Shampa Goswami (nee Chatterjee) has joined the Department of ISE as **Senior Technical Superintendent**. She has been an institute employee since 1997. Her previous postings were at the Office of Dean (Continuing Education), Dean(Alumni Affairs & International Relations) and Centre for Educational Technology(CET). Prior to joining IIT Kharagpur she worked at M/s TATA STEEL, Jamshedpur for 5(five) years.

"...It is our responsibility as scientists, knowing the great progress which comes from a satisfactory philosophy of ignorance, the great progress which is the fruit of freedom of thought, to proclaim the value of this freedom; to teach how doubt is not to be feared but welcomed and discussed; and to demand this freedom as our duty to all coming generations."

- Excerpt from the public address "The Value of Science", by Richard P. Feynman

Alumni Focus

ISE Alumni

Building an ISE (IEM) Alumni Network

We, at the Department of ISE wish to stay connected with our alumni. Please follow us on the social media pages to get the latest updates on the department.

Facebook: <https://www.facebook.com/ISEIITKharagpur>

Linkedin: <https://in.linkedin.com/school/iitkgp.ise/>

We believe our strong alumni community can bring incredible value to our students and scholars. Their diverse experience can help the department in shaping the future course of actions, as well as support the students into making more informed career decisions. Moreover, ***we will be celebrating the Golden Jubilee of the Department of ISE in 2023***. **We sincerely appeal to all the members of the ISE alumni to participate in the grand celebration.** This is why we are creating an alumni database. **Please take a few minutes to fill up this google form** <https://forms.gle/jqHRN6p1Y98heCun8> . We assure you, your information will remain confidential with us.

Featured Alumni

In this issue of ISE Newsletter, we are featuring two of our former students. Mr. Aravindan Srinivasan graduated with M.Tech in 2007 from ISE (then IEM). He currently works for Moog Inc. as the **Head of Asia Pacific Manufacturing Engineering (Supply Chain) in Moog Inc.** Dr. Suman Banerjee, received his PhD from the Department of ISE in 2019, and is at present working as an **Assistant Professor in IIT Jammu, in the Department of Computer Science and Engineering.** Both of them shared their experiences and insights with the ISE Newsletter team.

Mr. Aravindan Srinivasan

Head of Asia Pacific Manufacturing (Supply Chain) , Moog Inc. (IITKGP-IEM, 2007 batch)

Mr. Aravindan Srinivasan is a Manufacturing Leader with over 20 years of experience delivering best in class manufacturing engineering capabilities in factory and supply chain environments. He has an unconventional educational background. Having completed a course in National Council of Vocational Training (NCVT) in 1999, he went on to join the industrial workforce. In parallel to the full time work, he pursued his education and completed his Bachelors degree in Industrial Engineering in 2007. Aravindan joined IIT KGP IEM department in 2007 and graduated in 2009. He has worked in diverse organizations like GE, Indian Railways, Hindustan Aeronautics Limited and Rolls-Royce. He grew up in Bangalore around the aerospace industry. He currently works for Moog Inc. as Asia Pacific Manufacturing Engineering (Supply Chain) Head. Prior to that, he worked at **Rolls-Royce** for eleven years, eventually becoming **Chief Technical Officer of International Aerospace Manufacturing Pvt. Ltd. a Rolls-Royce & HAL JV.** He is passionate about the field of manufacturing and enjoys hiking in his free time.



Alumni Focus

ISE Alumni

Q.1) What is your most memorable experience at IIT KGP?

Sipping the adrak wala chai at Tikka and discussing various topics with my batch mates is something I will always crave for in my life.

Q. 2) What made you choose the M Tech program in ISE (IEM) in IITKGP ? Please give us your insights on how students should explore avenues for higher studies?

My Bachelors was in Industrial Engineering. It was a natural choice to look at IEM (ISE) as the choice for my masters. Also, having worked in Industry for over 8 years by the time I joined KGP for my M.Tech. I had realized the versatility of the Industrial Engineering tools and techniques in its ability to make positive impact on day to day life in industry. Be it Safety or productivity or quality I had seen Industrial Engineering in action and was in love with the same.

Regarding higher education, **I feel that coming into a master's program with a couple of years of work experience does help in being able to appreciate the IE concepts better.** This also helps in making an informed choice of electives based on one's interest given his/her work experience to either strengthen a topic interest or fill a knowledge gap (I enrolled in Multivariate statistics and Multivariate quality for strengthening my quality background while Financial Management and Software Engineering to close my knowledge gap).

Q.3) How did ISE (IEM) of IITKGP help you shaping up your career?

For a start, I stopped saying theory and practice are different. My time at ISE(IEM) helped me learn the theoretical models with practical connect. Once I went back to industry, I started seeing the ISE(IEM) models in action and gaps in application if any. The learnings from KGP helped me in questioning the gaps in application pragmatically and making improvements that resulted in improved performance for the organizations I worked for, which in turn led to my professional growth. I would like to share the **experience of helping a manufacturing organization set up a factory floor applying the Work System Design concepts I learnt in ISE(IEM).** The end result was an efficient & ergonomic factory floor that was appreciated by both customers and employees of the factory. I have lost count of the number of times Multivariate Statistical tools I learnt in KGP has helped me in spotting and fixing problems in my career.

Q.4) Tell us briefly about your journey after IIT KGP.

I joined Rolls-Royce in India (the jet engine maker) straight out of KGP. **As an Engineer in supply chain management, I had the opportunity to work across India and around multiple countries on varying products.** The journey took me to work in UK for a couple of years. I had the opportunity to support setting up of green field factory and expansion of existing factory. We solved business and technical problems (thanks to the models I learnt in KGP). I even got an opportunity to lead a \$25Mil facility as Chief Technical Officer delivering complex jet engine products and working on the technology strategy for the business. In my current role, **I lead a multinational-multi cultural team of engineers and managers located across Asia Pacific region to coach and mentor suppliers in implementing Zero Defects manufacturing practices.**

Alumni Focus

ISE Alumni

Q.5) Tell us how students can prepare to assume corporate leadership roles in future?

I would like to assure each student that theory and practice are not a miles apart. The performance of organization can be more predictable and significantly higher when we apply the Industrial and Systems Engineering models in practice. Be aware that corporate terminologies may be different to the one we read in academics. I would strongly recommend the students use the models they learn in KGP but ensure they translate the same to the corporate terminology/language to succeed. Internships are the right time to invest in learning the corporate language. Use it effectively. Do remember the pareto principle of 80-20 rule. In work environment, 80% is collaboration, networking and other human interaction challenges. 20% is your technical and/or technological competency be open for that.

Q.6) What is your take on the relevance of the M.Tech in Industrial and Systems Engineering in the present corporate world? Any suggestions on how we can develop specialized M Tech programs which will benefit the students' careers as well as the industry?

I can talk for myself and a significant number of my batch mates from KGP, who all are doing well in their careers. The M.Tech in IEM has made us a class ahead in our professional life. The subjects that we learnt are applied on a regular basis. I acknowledge that not all subjects are applicable for all industries. That is where the idea of elective subjects start making a big impact. As mentioned earlier, having some work experience did help me in clearly know what my career is. It helped me in selecting the right elective that I use each day of my work life. I also want to mention that innovation drives our future. Taking up topics unrelated to my experience (e.g. Financial Mgmt. & Software Engg.) helped me in engaging and interacting with my colleagues in those departments effectively (remember the 80-20 rule I mentioned earlier).

With reference to the specialized M.Tech Programs, I have experienced significant skill/knowledge gap in industry on the use of data & statistics for problem solving and also Industry domain specific Industry 4.0 implementation. While the topics mentioned could be treated as the ambit of Mathematics, Computer Science and Electronics departments, I strongly believe ISE as an interdisciplinary department can takes those concepts and apply the same in a comprehensive Industrial-Business system. A dedicated M.Tech program for bringing the data and technology studies under the Systems Engineering umbrella would benefit industry immensely.

Q.7) What would be your message to our current students?

Focus on the fundamentals. Enjoy the learning experience. Create your own opportunities when you don't find a ready one.

Alumni Focus

ISE Alumni

Dr. Suman Banerjee

Assistance Professor at Department of Computer Science and Engineering, India Institute of Technology, Jammu

Q1. What is your most memorable experience at IIT KGP?

My entire stay at IIT Kharagpur is memorable for me. In particular, I have enjoyed the academic life of IIT KGP the most. Working till late night in the lab, spending a long time thinking on one problem these are the memorable experiences of IIT KGP.

Q2. Please give us your insights on how fellow research scholars should explore avenues for getting better career prospects? Any suggestions regarding preparing the proposals for getting PhD admission under a supervisor of your choice?

I would like to answer the second question first. First, the student should understand where his interest lies. Once, he gets answer the next step is to explore what are the current works that are going on in that area. The final step is to prepare a proposal and carry out Ph.D. thesis work under the supervision of a professor who works in that area. After getting his Ph.D. the student should again think whether he likes the academic environment (working on unsolved problems, teaching courses, publishing articles, mentoring students, etc.). If he likes then perhaps a faculty position in a university may be a good career option. If not then industry may be the remaining option.

Q3. How did ISE of IITKGP help you shaping up your career?

My background was in Computer Science. At the initial stage, I was a bit nervous about how I will conduct my research in the ISE Department. Slowly, I discover that there is a significant intersection between CSE and ISE. As the research orientation at the ISE Department is applied, it helps me to think about any problem from the application point of view. Other than that I have learnt many things from fellow research scholars that helped me a lot.

Q4. Tell us briefly about your journey after IIT KGP.

After graduating from IIT Kharagpur, I spent almost a year at IIT Gandhinagar as an Institute Post Doctoral Fellow. Subsequently, in October 2020, I joined the Department of **Computer Science and Engineering, Indian Institute of Technology Jammu as an Assistant Professor** which I am continuing till date.

Q5. How does the supervisor play an important role during the PhD tenure?

I strongly believe that the major research contributions of the thesis work should come from the Ph.D. student himself/herself. However, at the initial stage, a student can take the help of his supervisor to choose the right problem. Also, the supervisor can play an important role by judging the progress, giving important directions, suggesting proper venues for publishing, and so on.



Alumni Focus

ISE Alumni

Q6. What is your take on the relevance of the PhD in Industrial and Systems Engineering in the present academic world?

To my understanding, the scope of Industrial and Systems Engineering in today's world is quite widespread. It touches almost every aspect of human life. Starting from manufacturing, logistics, supply chain management to sales, marketing, customer behavior prediction; the entire life cycle of a product comes under the scope of Industrial and Systems Engineering. So, in this domain today the sky is the limit! In particular use of modern technologies including machine learning, IOT, data analytics, etc. to solve industrial engineering problems adds a new dimension.

Q7. What would be your message to our current research scholars?

My message will be very short and simple. Whatever problem you are choosing for your Ph.D., try to go to the root of the problem and do a detailed literature review. This helps in many ways. First, it will help you to judge how good or relevant the problem is. Also, it will help you to compare your solution approach with the relevant existing approaches.



Publication Watch

ISE Publication

Below is the list of publications appeared in journals and conference proceedings from the Department of ISE in 2021 (as of July 2021).

1. S. Atta and G. Sen. A new variant of the p-hub location problem with a ring backbone network for content placement in VoD services. *Computers and Industrial Engineering*, 159, 2021.
2. S. Banerjee, P. Banjare, B. Pal, and M. Jenamani. A multistep priority-based ranking for top-n recommendation using social and tag information. *Journal of Ambient Intelligence and Humanized Computing*, 12(2):2509–2525, 2021.
3. S. Banerjee, M. Jenamani, and D.K. Pratihari. Earned benefit maximization in social networks under budget constraint. *Expert Systems with Applications*, 169, 2021.
4. S. Das, A. Garg, J. Maiti, O.B. Krishna, J.J. Thakkar, and R.K. Gangwar. A comprehensive methodology for quantification of bow-tie under type II fuzzy data. *Applied Soft Computing*, 103, 2021.
5. A. De, A. Choudhary, M. Turkay, and M.K. Tiwari. Bunkering policies for a fuel bunker management problem for liner shipping networks. *European Journal of Operational Research*, 289(3):927–939, 2021.
6. A. De, J. Wang, and M. K. Tiwari. Fuel bunker management strategies within sustainable container shipping operation considering disruption and recovery policies. *IEEE Transactions on Engineering Management*, 68(4):1089–1111, 2021.
7. K. Dhalmahapatra, J. Maiti, and O.B. Krishna. Assessment of virtual reality based safety training simulator for electric overhead crane operations. *Safety Science*, 139, 2021.
8. A. Ghadge, S. Bag, M. Goswami, and M.K. Tiwari. Mitigating demand risk of durable goods in online retailing. *International Journal of Retail and Distribution Management*, 49(2):165–186, 2021.
9. S.K. Ghatak and B. Mahanty. Evaluating intra-project knowledge growth and its effect on co-located software team output. *Quality and Quantity*, 2021.
10. P. Jaiswal, A. Singh, S. C. Misra, and A. Kumar. Barriers in implementing lean manufacturing in Indian SMEs: a multi-criteria decision-making approach. *Journal of Modelling in Management*, 16(1):339–356, 2021.

Publication Watch

ISE Publication

11. K. Kumar, S. Singh, and S.S. Banwait. Optimum design and selection of wire rope for hot rolling shop applications. *OPSEARCH*, 58(1):29–53, 2021.
12. M.S. Mahapatra and B. Mahanty. Effective public procurement of food grains: A case of India under differential charges. *Computers and Industrial Engineering*, 154, 2021.
13. B. Mishra, B. Mahanty, and J.J. Thakkar. A quantifiable quality enabled servitisation model: benchmarking Indian automobile manufacturers. *International Journal of Production Research*, 59(9):2667–2689, 2021.
14. P. Pant, S. Dutta, and S.P. Sarmah. Intangible supply chain complexity, organizational structure and firm performance. *International Journal of Logistics Management*, 2021.
15. T.D.P. Patra and J.K. Jha. A two-period newsvendor model for prepositioning with a post-disaster replenishment using bayesian demand update. *Socio-Economic Planning Sciences*, 2021.
16. P. Rathore and S.P. Sarmah. Investigation of factors influencing source separation intention towards municipal solid waste among urban residents of india. *Resources, Conservation and Recycling*, 164, 2021.
17. P. Rathore and S.P. Sarmah. Modeling and identification of suitable motivational mechanism in the collection system of municipal solid waste supply chain. *Waste management (New York, N.Y.)*, 129:76–84, 2021.
18. R. Rathore, J.J. Thakkar, and J.K. Jha. Evaluation of risks in foodgrains supply chain using failure mode effect analysis and fuzzy VIKOR. *International Journal of Quality and Reliability Management*, 38(2):551–580, 2021.
19. K.N. Reddy and A. Kumar. Capacity investment and inventory planning for a hybrid manufacturing–remanufacturing system in the circular economy. *International Journal of Production Research*, 59(8):2450–2478, 2021.
20. K.N. Reddy, A. Kumar, and N.R. Velaga. Scenario-based two-stage stochastic programming for a hybrid manufacturing–remanufacturing system with the uncertainty of returns, quality and demand. *Sadhana -Academy Proceedings in Engineering Sciences*, 46(1), 2021.

Publication Watch

ISE Publication

21. T.M. Rofin and B. Mahanty. Impact of wholesale price discrimination on the profit of chain members under different channel power structures. *Journal of Revenue and Pricing Management*, 20(2):91–107, 2021.
22. T.M. Rofin, M.S. Mahapatra, and B. Mahanty. Impact of green retail operations on the profit of the manufacturer and the retailer under different pricing strategies. *OPSEARCH*, 58(1):125–143, 2021.
23. J.H. Ruan, Z.X. Wang, F.T.S. Chan, S. Patnaik, and M.K. Tiwari. A reinforcement learning-based algorithm for the aircraft maintenance routing problem. *Expert Systems with Applications*, 169, 2021.
24. S. Samanta, G. Sen, and S.K. Ghosh. A literature review on police patrolling problems. *Annals of Operations Research*, 2021.
25. S. Sarkar, S. Vinay, C. Djeddi, and J. Maiti. Text mining-based association rule mining for incident analysis: A case study of a steel plant in India. *Communications in Computer and Information Science*, 1322 CCIS: 257–273, 2021.
26. A. Singh, M. Jenamani, J.J. Thakkar, and N.P. Rana. Propagation of on-line consumer perceived negativity: Quantifying the effect of supply chain underperformance on passenger car sales. *Journal of Business Research*, 132:102–114, 2021.
27. S. Singh, R. Kumar, R. Panchal, and M.K. Tiwari. Impact of covid-19 on logistics systems and disruptions in food supply chain. *International Journal of Production Research*, 59(7):1993–2008, 2021.
28. S. Singh, B. Mahanty, and M.K. Tiwari. IoT and semantic-based manufacturing system in the era of industry 4.0. *Lecture Notes in Mechanical Engineering*, pages 35–45, 2021.
29. S.K. Singh, M. Jenamani, D. Dasgupta, and S. Das. A conceptual model for Indian public distribution system using consortium blockchain with on-chain and off-chain trusted data. *Information Technology for Development*, 27(3):499–523, 2021.

Publication Watch

ISE Publication

30. P.K. Tarej, J.J. Thakkar, and B. Nag. Development of a decision support system for assessing the supply chain risk mitigation strategies: an application in Indian petroleum supply chain. *Journal of Manufacturing Technology Management*, 32(2):506–535, 2021.
31. A.V. Thomas and B. Mahanty. Dynamic assessment of control system designs of information shared supply chain network experiencing supplier disruption. *Operational Research*, 21(1):425–451, 2021.
32. Mahapatra, M. S., Pradhan, P. C., & Jha, J. K. (2021). Sourcing decisions with order allocation under supply disruption risk considering quantitative and qualitative criteria. *Operational Research*, 1-43.
33. S.K.Ghatak, B.G. Menon and B. Mahanty. Identifying, prioritizing and ranking of factors influencing the PhD milestones' completion delays. *Quality and Quantity*, 2021.



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