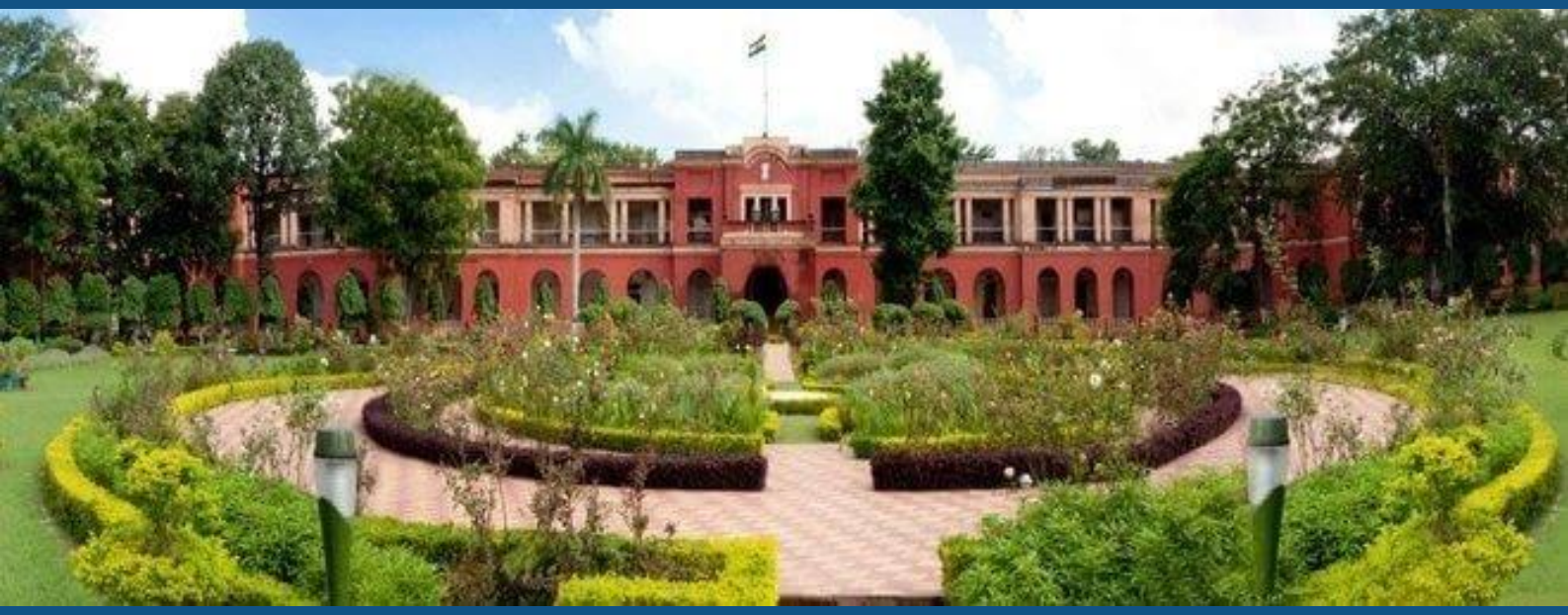
Executive Development Program

on

Integrated Low-Cost Sensors and Automation Technologies for Air Quality Monitoring and Control in Mining Industry

20th & 21st February 2025



Organized by

Coordinator:
Prof. Saifi Izhar

Co-Coordinator:
Prof. Zafar Alam

Department of Environmental Science and Engineering &
Department of Mechanical Engineering
Indian Institute of Technology (Indian School of Mines)
Dhanbad – 826004, Jharkhand, India

BACKGROUND OF THE COURSE

Poor Air quality is a global concern as it adversely effects human health and climate change. Although there are multiple sources of air pollutant emissions but industries dependent on fossil fuel and mining are major polluters due to lack of monitoring and real time control technologies. Usually air pollutants are monitored with high cost equipment and thus limits its deployment and spatial mapping of pollutants concentration in the air. The evolvement of new low cost sensor (LCS) technologies for monitoring air quality are gaining wide attention among research community, industries and regulatory bodies in developed countries because of significant reduction in cost of measurement as well as providing real-time measurements that can be directly visualised in cloud server.

Industrial Automation has still not achieved its envisioned success in the industrial workspaces because of the interdisciplinary domain knowledge that it requires, and the elevated costs which are involved in the initial infrastructural setup that it demands. With the wide availability of automated machines and robots through international suppliers, industries are now flooded with automated systems that demand skilled manpower in these domains. The academic augmentation to dynamically changing industrial problems in modern industries may now be dealt with by the availability of cross-discipline domain experts and technology integrators who are now willing to take up such challenges.

The content of the course is designed as an elementary-level course that engineers from industries and research scholars should be able to pick up well. Each module comprises theoretical lectures that lay the foundation, followed by extensive hands-on lab exercises on the same topics. This will help the participants to have enough exposure to the air quality sensors, robotics and automation domain, to pursue the subject further as real professionals in their respective institutions.

EXPERTS FOR THE TRAINING PROGRAMME

Faculties of IIT (ISM) Dhanbad

COURSE CONTENTS

- Introduction to air pollution: sources, composition, and negative effects on climate change and health.
- Measurement approaches: regulatory methods and low-cost sensor (LCS) technologies in air quality monitoring.
- Performance assessment of LCS and calibration techniques.
- Real-world utility of LCS in mining industries for air quality improvement.
- Economic benefit assessment of using LCS.
- Introduction to automation technologies: relay-based control and Programmable Logic Controllers (PLCs).
- Overview of PLCs, including types of inputs and outputs, and interfacing I/O devices.
- Programming languages, instruction sets, and ladder logic applications in PLCs.

ABOUT INDIAN INSTITUTE OF TECHNOLOGY (ISM), DHANBAD

Indian Institute of Technology (Indian School of Mines) Dhanbad, popularly known as IIT (ISM) Dhanbad, is a premier technical institution located in Dhanbad, Jharkhand, India. Established in 9th December, 1926 as the Indian School of Mines by Lord Irwin, the then Viceroy of India to address the need for trained manpower related to mining activities in the country with disciplines of Mining and Applied Geology. It became an IIT in 2016. Known for its strong emphasis on mining and earth sciences, IIT (ISM) Dhanbad offers a wide range of undergraduate, postgraduate, and doctoral programs in engineering, applied sciences, management, and humanities. The institute has a rich history and has been at the forefront of research and education in mining, petroleum, and earth sciences. IIT (ISM) Dhanbad boasts a sprawling campus equipped with state-of-the-art facilities, including modern laboratories, research centres, and libraries.

Apart from academics, IIT (ISM) Dhanbad also offers a vibrant campus life with a range of extracurricular activities, clubs, and cultural events. The institute has a strong alumni network, with many graduates holding prestigious positions in academia, industry, and government sectors worldwide.

It is situated at the heart of the country's prime coking coal belt, 260 km from Kolkata with a campus spreaded over an area of 393 acres (with 218 acres of existing campus and 175 acres under acquisition and development).

ABOUT DEPARTMENT OF ENVIRONMENTAL SCIENCE AND ENGINEERING

The Department of Environmental Science and Engineering (ESE) was created out of the existing Centre of Mining Environment (established in 1987) at Institute in June 2007 with the commencement of a regular B.Tech Degree in Environmental Engineering under IIT-JEE (first of its kind offered by any national institute). The Department also offers a regular M.Tech program (since 1991) and PhD program in Environmental Science & Engineering. The students of the Department have been well received by the industries like CIL, BCCL, ECL, CCL, NCL, MCL, SECL, CMPDIL, WCL, SCCL, Sterlite, HCL, HZL, NALCO, BALCO, NTPC, L&T, and many other esteem companies along with regulatory authorities like MoEF&CC, CPCB, SPCBs, Research Organizations (CSIR Labs, CIMFR, RRLs) & academic institutes (IITs, NITs etc.), Consultancy Organizations & NGOs. The department is equipped with sophisticated equipment to cater for the needs of research. The Department is conferred with ISO 9001 and OHSAS 18001 Certification and Labs are accredited by CPCB.

ABOUT DEPARTMENT OF MECHANICAL ENGINEERING

The Department of Mechanical Engineering started the journey in 1999, and successfully completed 25 years with excellence. Presently, the department is the largest in the institute having 46 faculty members. The department offers two UG courses, one in Mechanical Engineering and another in Mining Machinery Engineering. Faculty members of the department have guided more than 200 PhD students so far. The UG and PG students are working with the faculties in the field of microfluidics, aero-acoustics, ubble dynamics, biomechanics, robotics, renewable energy, tribology, refrigeration, CFD, Fluid-structure interactions, Turbomachinery, modern-manufacturing, fluid power, mining machinery along with conventional thermal engineering and machine design. Students of the department are associated with Robotics club, Smart manufacturing, ASME students' chapter and other professional bodies. The UG and PG students of the department are associated with several national and international research and consultancy projects funded by several agencies and industries. Also, a good number of them complete their research internships abroad.

COURSE OBJECTIVE

- To understand the utility of low cost sensors in field of air quality monitoring
- To understand the need and differentiate between different types of automation systems.
- To understand various components of state-of-the-art automation technologies encountered in modern industries.
- To link up the benefits of integrating low-cost sensor and automation technologies for improving air quality in real time

LEARNING OUTCOMES

- Understand the utility of low cost sensors in monitoring real time air quality and its application in air pollutant control in industry.
- Evaluate the performance assessment of air pollutants sensors with standard monitoring technology.
- Analyze and solve an engineering problem using suitable automation technology applicable.
- Evaluate, i.e., test, detect, and monitor the working of different automation systems used in the industry

REGISTRATION FEES

- **INR /- 15,000** (Industry Personnel)
- **INR /- 5,000** (Research Scholar)

(Excluding 18% GST)

TARGET PARTICIPANTS

- Industry Personnel
- Research Scholar
- **Min number of participants 25**

IMPORTANT DATES & VENUE

- **Last Date to Apply 10th Feb 2025 (***selection will be based on first come first serve basis)*
- *The Programme will be organized at the Executive Development Centre (EDC) of Indian Institute of Technology (Indian School of Mines), Dhanbad.*
- Note: The participants will be provided kits, lunch and lectures materials. Lodging arrangement is to be done by participants only

HOW TO APPLY

Applicants are requested to send the hard copy of the filled registration form along with course fee through DD/RTGS the Demand Draft/ Proof for online transfer by speed post/scanned copy by E-mail to the Course Coordinator. The Demand Draft should be drawn in favour of “Registrar, IIT (ISM) Dhanbad” payable at Dhanbad.

NOMINATIONS & PAYMENT

The nomination letter should reach to the Course Coordinator on or before, 10th Feb, 2025 (e-mail/post) along with course fee through DD/RTGS

A copy of e-payment transaction details is requested to be sent to the Course Coordinator IIT(ISM), Dhanbad, being an Educational Institute, is exempted from Income Tax. PAN No. of ISM: AAAI0686D; GSTIN: 20AAAAI0686D1ZA Being an educational institute IIT (ISM) is exempted of Income Tax

BANK ACCOUNT DETAILS

Bank & Branch: Canara Bank, Seraidhela, Dhanbad
Account Holder: Registrar , Indian Institute of Technology (ISM), Dhanbad
Account Number: 0986101024892
IFSC Code: CNRB0000986
MICR Code: 826015003
RTGS: 0000986

ABOUT THE COURSE COORDINATORS

Dr. Saifi Izhar, PhD
Assistant Professor
Department of Environmental Science and Engineering, IIT (ISM) Dhanbad, 826004
Mobile: 9935679065
Email: saifi@iitism.ac.in

Dr. Saifi Izhar serves as an Assistant Professor in the Department of Environmental Science and Engineering department at the Indian Institute of Technology (Indian School of Mines) in Dhanbad, India. Prior to his tenure, he worked at World Research Institute (WRI) as a Postdoctoral Consultant for the Clean Air Catalyst Project for Indore city. His educational background includes a B.Tech in Civil Engineering obtained from Aligarh Muslim University, India, in 2014, as well as M.Tech and a PhD in Environmental Engineering, both acquired from the Indian Institute of Technology Kanpur, India, in 2016 and 2021, respectively. Dr. Saifi Izhar is a prolific academic and researcher with a substantial body of work to his name, including dozen research papers published in peer-reviewed international journals and conferences along with multiple research grant from national and international funding organisations and industry. He is a recipient of prestigious PhD fellowship from the International Centre for Integrated Mountain Development (ICIMOD). His broader research areas include air pollutant monitoring and characterisation, air pollutant control, source apportionment, health burden of aerosol and low-cost sensor applications.

Dr. Zafar Alam, PhD
Assistant Professor
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Email: zafar@iitism.ac.in

Dr. Zafar Alam serves as an Assistant Professor in the Department of Mechanical Engineering at the Indian Institute of Technology (Indian School of Mines) in Dhanbad, India. Prior to his tenure at IIT (ISM) Dhanbad, he worked as an Assistant Professor of Mechanical Engineering at Zakir Husain College of Engineering and Technology, Aligarh Muslim University, India, for a duration of two years. His educational background includes a B.Tech in Mechanical Engineering obtained from Jamia Millia Islamia, India, in 2012, as well as an M.Tech and a PhD in Production Engineering, both acquired from the Indian Institute of Technology Delhi, India, in 2014 and 2019, respectively. Dr. Zafar Alam is a prolific academic and researcher with a substantial body of work to his name, including an authored book, three edited books, numerous book chapters, and over two dozen research papers published in peer-reviewed international journals and conferences. His achievements also encompass six Indian patents and the receipt of two international and four national awards, notably the prestigious GYTI (Gandhian Young Technological Innovation) award twice, in recognition of his outstanding contributions to the realm of research and innovation. His research interests encompass various areas, including advanced finishing and polishing processes, non-conventional machining, additive manufacturing, industrial automation, and motion control, among others.

REGISTRATION FORM

TWO DAYS EXECUTIVE DEVELOPMENT PROGRAM

on

INTEGRATED LOW-COST SENSORS AND AUTOMATION TECHNOLOGIES FOR AIR QUALITY MONITORING AND CONTROL IN MINING INDUSTRY

VENUE: EXECUTIVE DEVELOPMENT CENTRE, IIT (ISM) DHANBAD

20 - 21 FEB 2025

ORGANIZED BY

DEPARTMENT OF ENVIRONMENTAL SCIENCE AND ENGINEERING &
DEPARTMENT OF MECHANICAL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY (INDIAN SCHOOL OF MINES) DHANBAD

1. FULL NAME (IN BLOCK LETTERS): .....

2. DESIGNATION: .....

3. MOBILE NO.....

4. MAILING ADDRESS: .....

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5. PHONE:

OFFICE: .....

MOBILE: .....

6. EMAIL: .....

7. REMITTANCE OF REGISTRATION FEE:.....

8. DD. NO. /CASH AMOUNT .....DRAWN ON .....

PLACE: .....

DATE: ..... **SIGNATURE .....**

Note: Last date of application is **10th Feb, 2025.**
Send the filled registration form as scanned copy by e-mail to – saifi@iitism.ac.in