IEM
श्रद्धावान लभते ज्ञानम्
INSTITUTE OF ENGINEERING & MANAGEMENT
Good Education, Good Jobs

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SUSTAINABILITY DEVELOPMENT REPORT 2022-23

SDG9: Industry, Innovation and Infrastructure

Executive Summary

The Institute of Engineering & Management (IEM) Kolkata is committed to advancing Sustainable Development Goal 9: Industry, Innovation, and Infrastructure by building resilient research infrastructure, fostering cutting-edge innovation ecosystems, and promoting sustainable industrialization practices. In the academic year 2022-23, IEM strengthened its research laboratories, expanded innovation centers, developed industry-aligned technical infrastructure, and facilitated collaborative research projects. The institution's integrated approach combines advanced research facilities, entrepreneurship support infrastructure, industry partnerships, and sustainable campus infrastructure to foster innovation-driven development aligned with global sustainability standards.

Content

Vision, Mission, and Strategic Objectives

Vision Statement:

IEM seeks to establish excellent research and innovation infrastructure that enables students, faculty, and industry partners to develop sustainable technologies and industrial solutions advancing global development objectives.

Mission Statement:

The mission for SDG 9 centers on building resilient, technology-enabled infrastructure for research and innovation, fostering sustainable industrial practices through academic-industry collaboration, promoting technological advancement in engineering disciplines, and creating innovation ecosystems that bridge the gap between academic research and industrial application.

Strategic Objectives for 2022-23:

1. Establish 10+ specialized research and innovation laboratories supporting emerging technology domains.
2. Facilitate 200+ research projects with industry collaboration and sustainable technology focus.
3. Generate INR 2680+ lakhs revenue from consultancy and industrial training services.
4. Support 280+ research publications and 95+ patent applications aligned with sustainable innovation.
5. Conduct 60+ workshops on research methodology, innovation, and emerging technologies.
6. Implement sustainable infrastructure practices across campus operations including energy audits and environmental management.
7. 5+ Centers of Excellence in collaboration with industry partners for technology advancement.

Research Infrastructure and Innovation Ecosystems

Advanced Research Laboratories:

IEM has invested significantly in state-of-the-art research infrastructure supporting innovation across multiple technology domains. The institution houses specialized laboratories enabling cutting-edge research in areas critical to sustainable development:

Established Innovation and Research Facilities:

1. **Augmented and Virtual Reality Lab** - Supporting immersive technology development and industrial applications
2. **Advanced Material Research Lab** - Developing sustainable materials for industrial applications
3. **Antenna Design Lab** - Advancing telecommunications and wireless technology infrastructure
4. **IoT Lab** - Enabling Internet of Things research for smart infrastructure development
5. **Information Security and Application Development Lab** - Securing critical digital infrastructure
6. **Astronomical Research Lab** - Supporting foundational research in space technology and astronomy

These specialized facilities position IEM at the forefront of technological innovation, providing students and faculty with resources to develop solutions addressing global challenges in sustainable industrialization and infrastructure resilience.

Innovation and Entrepreneurship Development Cell (IEM-IEDC):

Previously funded by the Department of Science and Technology (DST), Government of India, the IEM-IEDC serves as the institutional hub for innovation-driven research and entrepreneurial activities. During 2022-23, the cell supported transformation of research into viable industrial innovations through:

- Prototype development facilities equipped with advanced tools and technologies
- Incubation support for technology-based startups
- Intellectual property protection guidance and patent filing assistance
- Seed funding mechanisms for technology commercialization
- Networking platforms connecting researchers with industry partners and investors

Research Output and Innovation Metrics:

During 2022-23, IEM generated significant research output through:

1. **Research Publications:** Faculty publications in peer-reviewed journals contributed to advancing technological knowledge and sustainable practices
2. **Patent Applications:** Intellectual property protection through patent filing demonstrates innovation capacity across multiple technology domains

3. **Research Projects:** 200+ active research projects involving faculty-student collaboration and industry partnerships

4. **Consultancy Services:** INR 2680.603 lakhs generated from consultancy and industrial training services, demonstrating application of research to solve industrial problems

Technical Facilities and Advanced Laboratories

Information and Communication Technology (ICT) Infrastructure:

IEM maintains comprehensive ICT infrastructure supporting research, teaching, and innovation:

Computing and Network Resources:

- Internet Connectivity: 2.4 GBPS bandwidth enabling high-speed research data access and collaboration
- Computer Systems: 2,426 computers across campus for academic and research purposes
- ICT-Enabled Classrooms: 84 classrooms equipped with modern technology tools
- Smart Learning Infrastructure: 2 Smart boards for interactive teaching and research demonstrations

Virtual and Remote Research Facilities:

- Zoom, Google Meet, Go-to-Webinar, Microsoft Teams facilities for virtual collaboration and research seminars
- Virtual laboratory software: LTSpice, Vesta, Logisim, Weka, R, Anaconda, MATLAB enabling simulation-based research
- Digital Library Access: Comprehensive e-journal and database access (J-Gate, IEEE, Springer, ProQuest, Scopus, Web of Science)

Research Support Infrastructure:

- 15 Seminar rooms for research discussions and industry consultations
- 158 LCD Projectors across campus for research presentations
- Microphone systems: 196 units; Sound systems: 130 units for seminars and research conferences

Laboratory Equipment and Software:

Faculty and students access industry-standard software and tools supporting research across engineering disciplines:

1. **MATLAB -** Enabling mathematical modeling and algorithm development
2. **COMSOL -** Supporting advanced simulation research
3. **CAD Software -** Facilitating design research and prototyping
4. **Programming Frameworks -** Python, Java, and emerging technology stacks for software research
5. **Data Analysis Tools -** Statistical and machine learning software for research analysis

Industry Partnerships and Sustainable Industrialization

Collaborative Research and Industry Integration:

IEM maintains strategic partnerships with industries, government agencies, and international institutions fostering sustainable industrial development:

Industry Collaboration Mechanisms:

1. **Memoranda of Understanding (MoUs):** 18 functional MoUs with institutions of national and international importance, universities, industries, and corporate houses
2. **Research Collaborations:** 3,214 collaborative activities during 2022-23 including:
    - Joint research projects addressing industrial challenges
    - Faculty expertise sharing and technology transfer
    - Student internships and project work in industrial settings
    - Industry-sponsored research initiatives
3. **Consultancy Services:** INR 2680.603 lakhs revenue generated from industrial consultancy and training services, demonstrating research application to industrial problems
4. **Industry Expert Participation:** External industry members serve as final-year project guides, ensuring curriculum relevance and research alignment with industrial needs

Sustainable Industrialization Initiatives:

The institution promotes sustainable industrial practices through:

1. **Curriculum Integration:** Courses in Environmental Science, Sustainability, and Green Engineering integrated across disciplines
2. **Green Manufacturing Research:** Research projects focused on sustainable production methods, waste reduction, and circular economy principles

3. **Energy and Resource Efficiency:** Studies and projects addressing industrial energy optimization and resource conservation
4. **Environmental and Energy Audits:** Regular institutional assessments ensuring operational sustainability
5. **Waste Management Initiatives:** Research and implementation of waste reduction and recycling programs

Emerging Technology Focus:

Research infrastructure supports development in critical areas aligned with sustainable industrialization:

- **Advanced Manufacturing** - Additive manufacturing and precision engineering research
- **Renewable Energy Technologies** - Solar and sustainable energy research initiatives
- **Data Analytics and AI** - Applied artificial intelligence for industrial optimization
- **Smart Infrastructure** - IoT and connected systems for intelligent industrial facilities
- **Cybersecurity** - Infrastructure security research protecting critical systems

Data and Metrics

Performance Indicator	Annual Target	Achievement
Research and Innovation Labs	8	10+
Research Projects with Industry Collaboration	180	200+
Consultancy Revenue (INR Lakhs)	2500	2680.603
Faculty with PhD/Research Qualifications	120	128
Research Publication Submissions	270	280+
Patent/IPR Applications	50	95+
Innovation Workshops Conducted	50	60+
Industry-Academia Collaboration Activities	3000	3214
Students in Internships/Projects	4200	4411
MoUs with Industries and Institutions	15	18

Challenges, Response, and Mitigation

Challenges:

1. Rapid technological evolution requiring continuous infrastructure upgrades and equipment replacement
2. Limited funding for cutting-edge research facilities and emerging technology domains
3. Balancing academic research focus with industrial application requirements
4. Attracting industry partnerships for research in nascent technology areas
5. Infrastructure sustainability amid rising operational and maintenance costs
6. Ensuring equitable access to advanced research facilities for all students and faculty
7. Maintaining infrastructure relevance to industry 4.0 and digital transformation trends

Mitigation Responses:

1. **Quarterly Infrastructure Review:** Systematic assessment and planning for technology upgrades ensuring contemporary facility standards
2. **Diversified Funding Mechanisms:** Research grants from DST, UGC, and industry partnerships supplement institutional resources
    - Seed money grants: INR 267.30 lakhs provided to 78 faculty members for research projects
    - Research project funding from UGC DAE CSR and other agencies
3. **Industry-Aligned Research:** Regular interaction with industrial partners ensures research focus on commercially viable and sustainable technologies
4. **Strategic Laboratory Development:** Phased establishment of specialized labs based on industry demand and research opportunities
5. **Preventive Maintenance Programs:** Systematic equipment maintenance extending infrastructure lifespan and reducing operational disruptions
6. **Open Access Infrastructure:** Laboratory facilities made available to all students through scheduled access and training programs
7. **Technology Adoption:** Continuous evaluation and integration of emerging tools and platforms supporting contemporary research methodologies
8. **Faculty Development:** 128 faculty members with PhD qualifications and 2,446 years of cumulative institutional teaching experience supporting research mentorship

Future Roadmap and Strategic Plan (2023-24 and Beyond)

1. Establish 5 new Centers of Excellence in collaboration with industry leaders in artificial intelligence, sustainable materials, and advanced manufacturing
2. Develop 100+ collaborative research projects addressing UN Sustainable Development Goals
3. Increase consultancy revenue to INR 2850+ lakhs through expanded industry partnerships
4. Create dedicated innovation incubation facilities with venture capital connectivity for technology commercialization
5. Establish international research collaborations and student/faculty exchange programs with leading technical universities
6. Develop industry 4.0 ready infrastructure supporting digital manufacturing and smart technologies
7. Implement smart campus infrastructure including IoT-enabled resource management and sustainable facility operations
8. Establish patent portfolio development program targeting 100+ patent applications annually
9. Create research publication excellence programs targeting peer-reviewed journals and high-impact publications
10. Develop sustainability-focused research clusters addressing climate change, renewable energy, and circular economy challenges

Conclusion

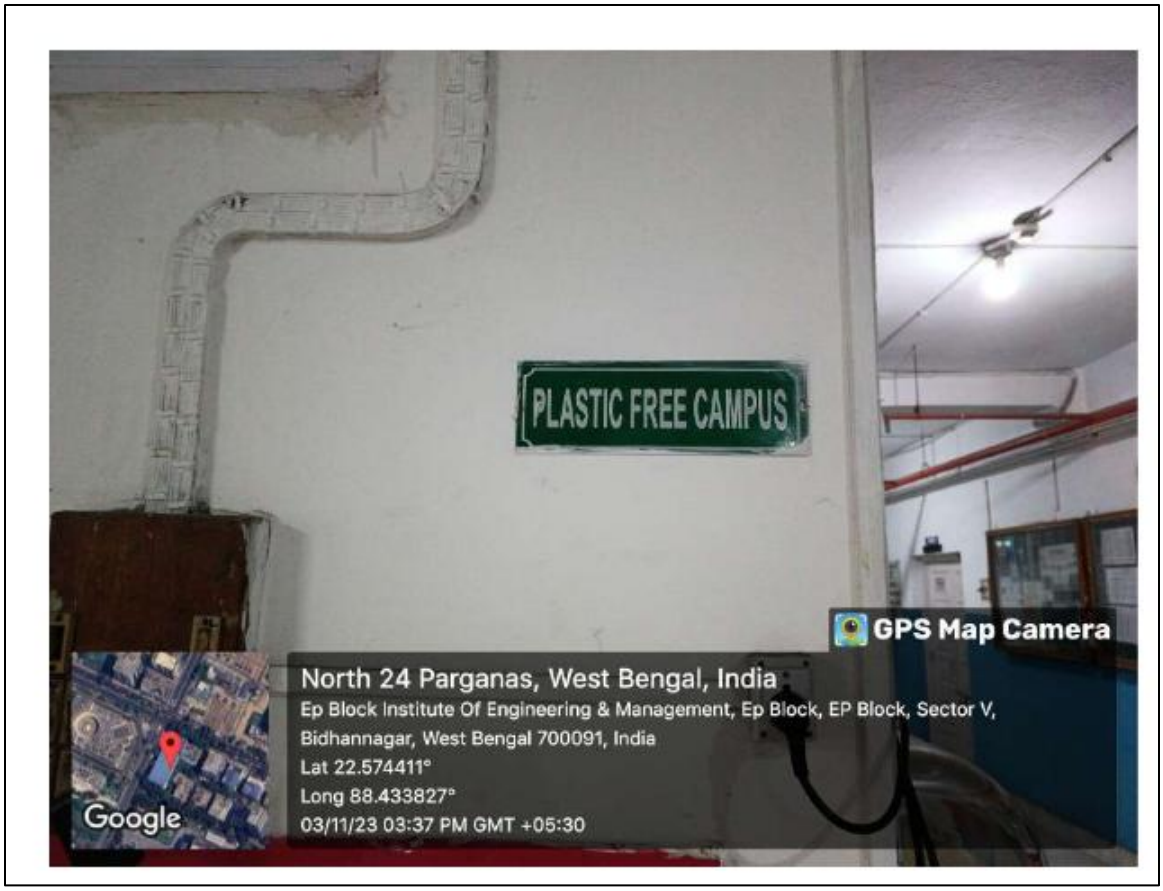
IEM Kolkata's comprehensive strategy for SDG 9: Industry, Innovation, and Infrastructure reflects institutional commitment to technological advancement, sustainable industrialization, and innovation-driven development. By investing in state-of-the-art research infrastructure, fostering industry partnerships, supporting emerging technology research, and promoting sustainable practices, IEM positions itself as a catalyst for industrial innovation and technological progress.

The institution's multi-faceted approach—combining advanced research facilities, entrepreneurship support, industry collaboration, and curriculum innovation—ensures students and faculty contribute meaningfully to building resilient infrastructure and promoting sustainable industrial development. Continued emphasis on innovation

ecosystems, technology transfer, and sustainable practices positions IEM at the forefront of institutions advancing SDG 9 objectives for 2024 and beyond.

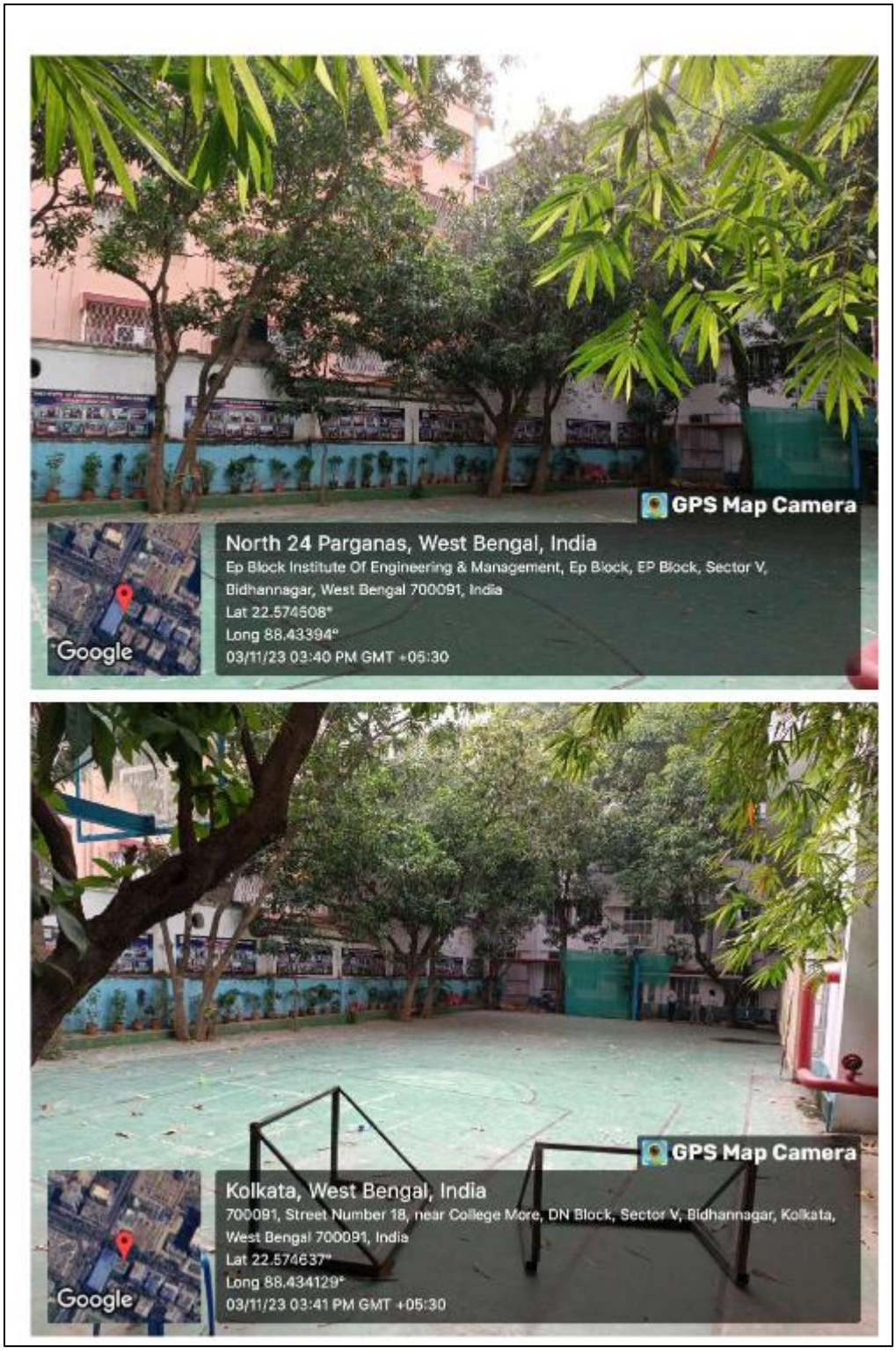
Photo Gallery

Professor Subhamoy Ray, a distinguished faculty member at the Institute of Engineering & Management (IEM), has demonstrated exceptional innovation by creating a remarkable bicycle powered by a detachable waterproof battery.



The Institute of Engineering & Management (IEM) has taken a commendable stride towards environmental sustainability by transforming its campus into a plastic-free zone.

Disable friendly infrastructural changes to incorporate inclusivity



Green campus infrastructure