



TEXMiN Foundation

Technology Translation Research Park
(Mining: Exploration to Mineral Beneficiation)
Dept of Science & Technology, Govt. of India

**Indian Institute of Technology
(Indian School of Mines)
Dhanbad**

**NET
ZERO**



**Indian Institute of Technology
(Indian School of Mines)
Dhanbad - Established in 1926**

About the Host Institute

Campus Specialities

- 01 Rich Mining Heritage**
~100 years in Mining & Upstream Exploration.
- 02 Natural Resources Backdrop**
East India Mining belt provides unparalleled infrastructure.
- 03 Talent Pool**
IIT Tag attracts the best of the class talent pool.
- 04 Research Infrastructure**
Government grants and Faculty base provides excellent research environment.



TEXMiN Foundation

Technology Innovation in Exploration & Mining Foundation **[TEXMiN]** is a section-8 Company, an autonomous body as a **Technology Translation Research Park (TTRP)** set up by the **Department of Science and Technology, Govt of India, at IIT (ISM) Dhanbad** under the aegis of the **National Mission on Interdisciplinary Cyber- Physical Systems (NM-ICPS)** functioning for the cause of nurturing research & innovation across mining value chain.

The Director, IIT (ISM) Dhanbad, is the Chairman of the Board. The objective of TEXMiN is the development of commercially feasible solutions in the mineral exploration, processing and mining domains using cyber-physical systems such as IOT, AI/ML, blockchain, drones, robotics, and satellite imagery.

Major Activities

Major activities of the TEXMiN Foundation are:



Technology Development

Involves research in CPS, particularly in mining domain.



Centre of Excellence

Dedicated Centre for Mine Automation and Data Analytics in PPP mode.



Capacity Building

Skilling workforce aiming towards Mining 4.0.



Innovation, Entrepreneurship, and Start-up Ecosystem

TBI, Start-ups, grand challenges, promoting early innovators & entrepreneurs, seed support/ funding assistance, job creation.



International Collaboration

Carry out CPS-based research activities in mining domain, deliver commercial technology and products as per international standards.

TEXMiN Technologies



1. AI-enabled Intelligent Monitoring

Under the mission of Industry 4.0, Computer Vision is an indispensable component of the automated system and artificial intelligence. Automating the monitoring work is where AI can make a huge contribution. We have developed a digital eye for monitoring your entire mining operations.

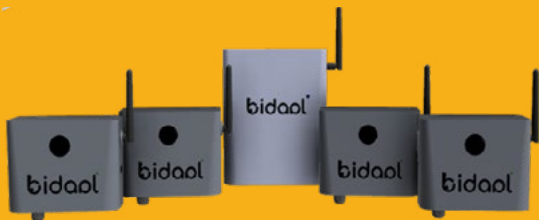
Applications

- | | |
|--|------------------------------------|
| 1. Traffic Surveillance | 4. Unsafe Condition Detection |
| 2. Quality Monitoring of Ore | 5. PPE Compliance |
| 3. Intelligent Proximity Alarming System | 6. Workforce Efficiency Management |

2. Smart Traffic Management System

An IoT-based, smart signalling system combined with AI-based analysis of logistical movements within an Industrial complex. Fleet management parameters are utilized to optimize productivity & environmental footprints. The system is available on the Dashboard in the form of Key Performance Indicators (KPIs).

The product addresses safety (collisions/accidents due to blind-spots, sharp turns, over-speeding, traffic violations etc.), productivity (queueing, delays) and carbon emissions (congestion cut and fuel saving) for industrial transportation.



Related Services

Design, installation and implementation of an automatic traffic signalling system to ease traffic congestion, and enhance safety.

Suitable installation of the system to capture speed of the vehicles/trucks, display the speed on a LED dashboard (including special keys like simultaneous multiple vehicles) at appropriate location to alert the corresponding vehicle driver, record photograph & vehicle number in case of violation with SMS notification to the driver, owner and other concern with the back-up of real time data for future reference/retrieval.

Related Services

Provides the following key features:

- Mapping of the existing light infrastructure.
- Study of existing Illumination plan for adequacy of illuminance.
- Provide the manpower details for the illumination survey.
- Preparation of standard operating procedure & control plan as per DGMS Guidelines.
- Design the illumination through the simulation model required at different locations in mines.
- To design the entire illumination system keeping in consideration the existing lights and inventory.



3. Digital Illumination Surveying and Planning

Industrial workplaces need adequate illumination not only for safety but also for workers' efficiency. All mines (Opencast/underground), smelters, Steel Plants, FMCG Warehouses, and National Highways/ Streets need illumination planning complying with the requirement.

Immersive Technologies

- IoT-enabled 3D AR/VR and Holographic projection systems have been developed to assist in mine planning and mine design. Several mining libraries are being developed atop the hardware and software made to provide 3D experience immersive.
- Helping mining operators and managers effectively to improve safety, increase productivity, and reduce costs.
- Assist in Mine Planning and Operations Management.



Mine Communication

- Private 5G for Mines.
- GPT for the Indian mining industry, including Holographic GPT.

Deployment of wireless communication for underground mines : The product offers significant advantages in terms of safety, live displacement values, and possibilities of early detection of geological shifts, and hence leads to overall operational efficiency improvement. The solution is approved by CIMFR and NABL laboratories with respect to safety standards

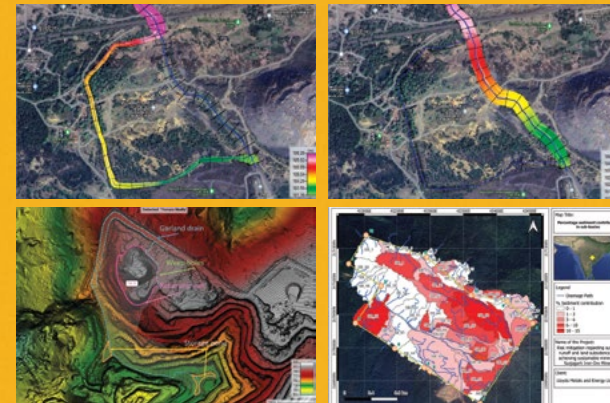


Hydrological Risk Management Solutions

- Mines often face risks associated with water and sediment, especially during the monsoon season, and leverage earth observation data from drones and satellites to provide high-resolution hydrological risks to mine managers. In addition, we also help in the design of various adaptation measures, including drainage systems, check dams, settling ponds, and other hydraulic structures that can help mine operators take suitable measures to enhance the overall safety of mining operations.

Our Solutions

- Flood Hazard Simulation
- Drainage Planning
- Embankment Planning
- Weather Monitoring & Forecast

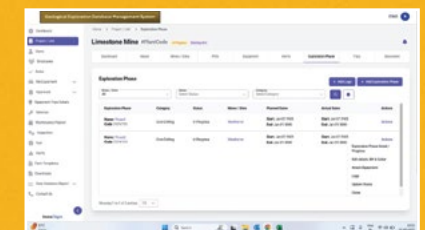
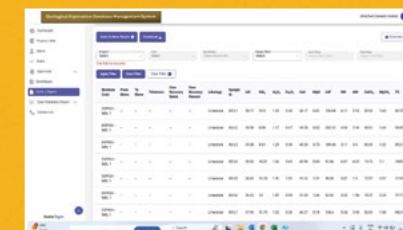
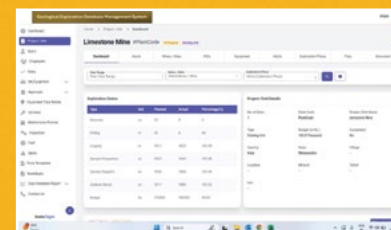
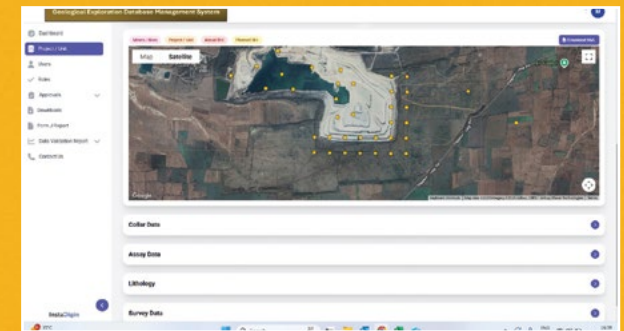
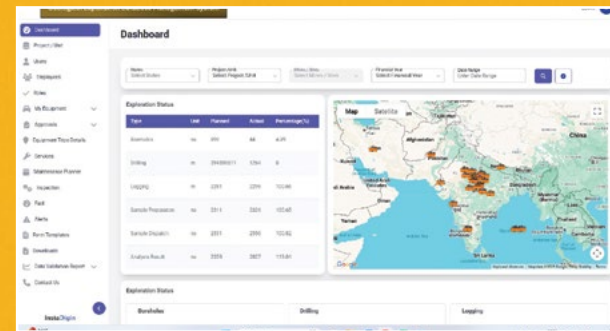


Mineral Exploration Database Management System

MEDMS centralizes exploration data, enabling teams to:

- Map boreholes, collar data, logs, samples, and assays on a single platform
- Validate data robustly for accurate, actionable insights
- Automate dashboards and statutory reports.
- Maintain comprehensive digital records of exploration progress across sites

Already deployed at UltraTech Cement Limited's limestone mines, India's largest cement producer, MEDMS is redefining how organizations manage exploration data, delivering faster decisions, reliable insights, and a fully digital exploration workflow.

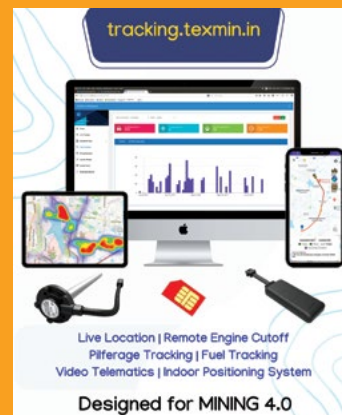


TEXMiN Telematics

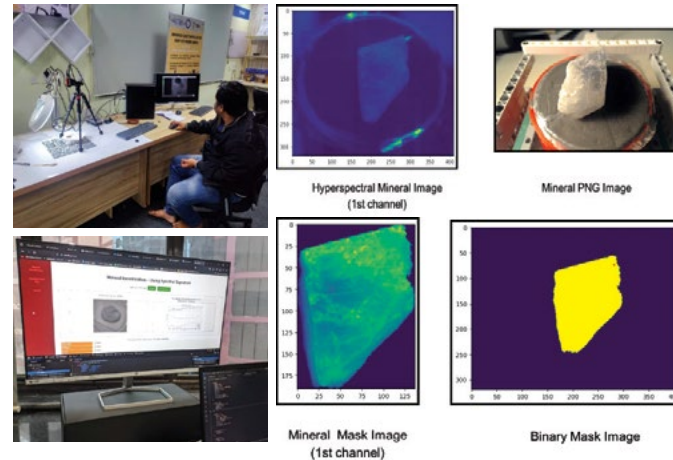
- Real-time Asset Tracking: Monitor the location and status of equipment and vehicles to maximize utilization and minimize downtime.
- Load Monitoring Solutions: Track load weights accurately, optimizing productivity and preventing overloads.
- Fuel Monitoring Solutions: Gain insights into fuel usage and consumption for better fuel management and cost savings.
- Indoor Positioning System (IPS): Achieve precise tracking
- Video Telematics: Integrate live video feeds with telematics data for a comprehensive view of vehicle operations and operator behavior, promoting safety and compliance.
- Integrated with NAVIC: All solutions are equipped with NAVIC for precise location accuracy.
- Compatible with Private 5G: Seamless and secure data

in underground and enclosed environments, enhancing safety and productivity.

transmission over private 5G networks, ensuring real-time insights across sites.



Hyperspectral Image Processing and Analysis for Critical Mineral Exploration



Intelligent Mining Solutions

Offers cutting-edge, IP-65-rated, 5G-ready, and AI-enabled drones tailored for the mining industry.

- Our UAVs, equipped with multispectral and hyperspectral imaging, deliver precise exploration, surveying, and real-time monitoring across challenging terrains.
- Thermal sensors and edge computing capabilities provide comprehensive insights and faster decision-making, ensuring safety, accuracy, and cost-efficiency.



Towards a Sustainable Future with IoT & Automation

Our Products:

- IoT Sensors for Mine Monitoring.
- Industrial e-mobility solutions.
- AGV for heavy-weight mining equipment to be connected to a Private 5G network for teleoperation.



Real Time Ambient Air Quality Monitoring System

- **Next-Gen Technology:**
AI-powered AQ-AIMS by C-DAC, India, with advanced air quality monitoring. Aligns with "Make in India" and "Digital India" initiatives.
- **Government of India Innovation:**
Funded by MeitY under "AgriEnICS" Program.
- **Rigorously Tested:**
Data Validation & Field Trial by TEXMiN (IIT (ISM) Dhanbad) ensures accuracy.
- **Made in India, Affordable:**
Manufactured by J.M.Envirolab Pvt. Ltd. at a fraction of traditional costs. TEXMiN handles sales on GeM Portal.
- **Gol Endorsement:**
Government of India endorsed air quality monitoring system under "Make in India".

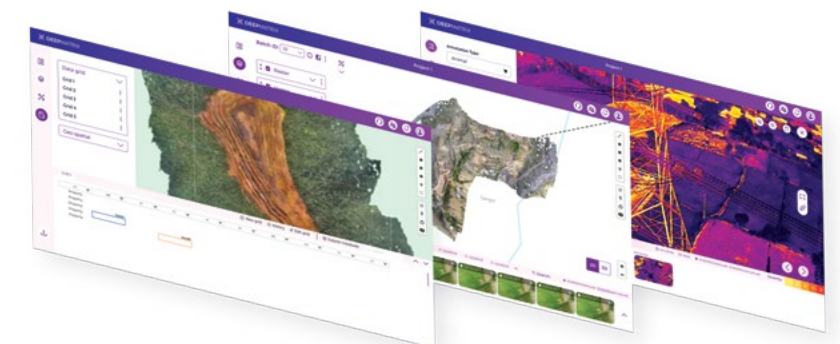


AI based Air Quality Monitoring System (AQ-AIMS)

FLY Platform

Manage all geospatial data needs from collection to visualization at single place

- With its cloud-native SaaS platform and AI-driven business model, offers comprehensive capabilities across the entire data life cycle, encompassing data ingestion through to advanced analytics.



Graphene-based Products

Specialized in bulk graphene manufacturing with exceptionally high quality without any contamination and graphene-based products in bulk quantities at very low cost, a non-chemical process, scalable, and uses a variety of carbon sources, such as coal, plastic, carbon black, and many others.

Our Products:

- Graphene Powder
- Graphene Ceramic Coating
- Graphene Thermal Interface Material
- Graphene Conductive Ink
- Graphene-based 3D Printing Filaments - 1.75 mm



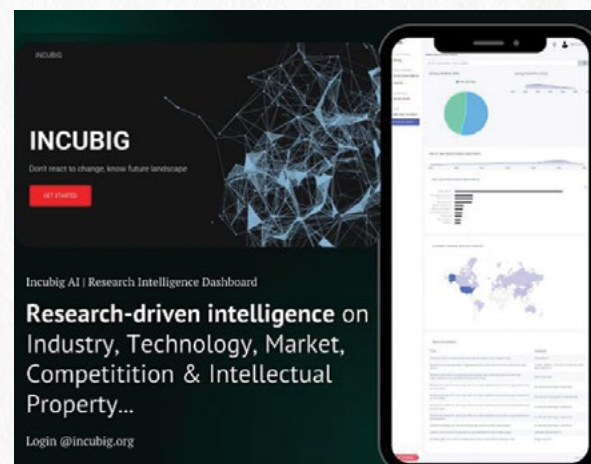
Self-Advancing (Mobile) Goaf Edge Supports (SAGES 200T) (Sponsored by Ministry of Coal, GoI)

- Automated Roof Support System “SAGES” for SAFE, PRODUCTIVE and ECONOMIC extraction of locked coals from underground mines.
- Facilitates substantial reduction in its weight and costs up to 70% of the mobile support available in the international market.



Patent & Research Intelligence Consultancy

- The AI research intelligence platform would enable any R&D, business professional to easily search millions of global research data and access personalized and predictive insights in real time.



Battery-operated pneumatic nebulizer



ARwave highly portable (handheld) pneumatic nebulizer: Battery-operated pneumatic nebulizer with an aesthetic design, making it easy to use. It features in-built storage for respules, making it ready for emergencies. Designed for all ages and conditions (Asthma, COPD, AR-PAH), it delivers 35% more mist, ensuring faster relief with less effort.



5G enabled Automated guided vehicle (AGV)

5G AGVS can optimize material handling and transportation processes within the mine, ensuring a smooth flow of materials and reducing downtime. They can work continuously without the need for rest or breaks, leading to improved operational efficiency.



5G Remote Terminal Unit (RTU)

5G RTU is used for connecting and controlling any sensor like flowmeter, pressure transducers, temperature sensors, Gyros, and energy meters. It shall be also be used to control any IOT device like Switching on/off devices, alarms, displays etc



TEXMiN Research Park Mandates:

- 1

Critical and Rare-Earth Minerals - from exploration to extraction
- 2

Green Mining Innovations - sustainable practices and clean technologies
- 3

4S Mining - Safe, Smart, Sustainable, and Social mining solutions
- 4

Mineral Exploration, Processing, and Beneficiation - including cyber-physical and AI-driven approaches
- 5

Circular Economy - waste-to-resource and recycling technologies
- 6

Other Emerging & Disruptive Technologies relevant to the mining sector

Critical Mineral Supply Chain



TEXMiN (Research Park) in collaboration with its host institute IIT (ISM) Dhanbad and other alliance partners has been recognized as one of the centres under National Critical Mineral Mission (NCMM). The Centre has been named as **Centre of Research Excellence in Mining and Innovation for Critical Materials (CoRE-MiN)** – focusing on the Critical Mineral Supply Chain, resource sustainability, and technological innovation.

Few Flagship Projects

1. India-UK Critical Mineral Supply Chain Observatory

The India-UK Critical Minerals Supply Chain Observatory at TEXMiN, IIT (ISM) Dhanbad is a bilateral initiative under the UK-India Ministerial Dialogue on Critical Minerals. It focuses on data-driven monitoring and forecasting of critical mineral supply chains essential for clean energy and technology sectors. The collaboration promotes joint research, data-sharing, and sustainable supply chain development to strengthen both nations’ green industrial growth.
2. Recovery of Critical Minerals from Overburden Waste Rock (OB-WR)

Objectives
 - Characterize the Mineralogy
 - Develop Process Flowsheets
 - Assess Economic Feasibility
 - Environmental Impact Analysis
3. Critical Mineral Appraisal / Feasibility Study in Key Mineral

Objectives
 - Critical Mineral Potential Assessment
 - Resource Estimation & Multi-Metal Recovery
 - AI/ML-Enabled Targeting



Hon'ble Prime Minister Shri Narendra Modi - "...critical minerals पर सहयोग के लिए एक industry guild और supply chain observatory की स्थापना का निर्णय लिया है इसका satellite campus ISM Dhanbad में होगा...."

Some Notable Technologies



Other Services of TEXMiN

- Technology Service Provider - Projects productivity improvement, upscaling and implementation of advanced integrated mine planning to assist uplift production.
- Supervision, Quality Assurance / Quality Control (QA / QC) for mineral resource mapping.
- Development & implementation of mineral exploration database management system.
- Drone Surveying and mapping of existing and upcoming mining projects.
- DPR preparation and implementation for smart mining.
- Technical support services for performance enhancement through digital transformation in the mines.
- The GIS-based platform for real-time monitoring of mining activities.
- Hyperspectral image processing and analysis for exploration in mining industry.
- Other Consultancy Services for Mining & Exploration like PFS, TEFR, DPR, Feasibility & Pre-Feasibility Report, Mine Production & Pit Design and allied services.

World Class State-of-the- Art

Driving innovation Across the Mining Value Chain (Exploration to Mineral Processing)

TEXMiN hosts a network of world-class Centres of Excellence (CoEs) that serve as hubs for advanced research, innovation, training, and technology translation in exploration, mining and mineral processing. Each centre focuses on a specific domain – from automation and geospatial analytics to digital mining infrastructure and critical minerals – collectively accelerating India’s journey toward safe, smart, and sustainable mining.

Our Centres of Excellence

**Coal India Innovation and Incubation Centre**

Fostering industrial innovation, technology development, and startup incubation in coal mining and allied sectors.

**CIL Centre of Innovation in Mining (IMiN)**

A collaborative initiative with Coal India Limited for developing indigenous, future-ready mining solutions.

**Carlson Geodesy Centre**

Specialized in advanced geodesy, mine surveying, and precision mapping for modern mining operations.

**Sandvik Mine Automation Learning Centre**

Enabling knowledge and skill development in next-generation mine automation and digital control systems.

**UK-India Critical Minerals Observatory (Satellite Campus)**

Dedicated to research, data intelligence, and international collaboration in critical mineral resources and supply chains.

**Digital Mining Infrastructure Lab**

A testbed for real-time data integration, IoT-enabled mining systems, and AI-based process optimization.

**ESRI India Geospatial Centre of Excellence**

Advancing GIS-based analytics, spatial data infrastructure, and decision intelligence for exploration and mine management.

**3DS-Mining Technology Excellence Centre**

Leveraging Dassault Systèmes’ 3DEXPERIENCE platform for simulation-driven mine design, planning, and digital twin applications.

**Adani Enterprise Limited: 4S Mining Excellence Centre (4SMEC)**

Promoting Safe, Smart, Sustainable, and Secure (4S) mining through advanced blasting, monitoring, and automation technologies.

**Centre for Digital Transformation and Excellence in Mining and Monitoring**

Focused on integrating technologies for digital mine monitoring, safety, and performance optimization.

**GeoTech Drill Core Digitisation Laboratory for Critical Minerals**

Transforming geological data management through core digitization, 3D visualization, and AI-enabled interpretation.

**Lab of Geophysics for Sustainable Mining “GEO SM Lab”**

High-resolution, non-destructive geological core analysis through advanced Multi-Sensor Core Logger (MSCL) and X-ray imaging technologies.



**FabLab/Maker Space for CPS Technologies-**

Prototyping cyberphysical systems for mining

**Rapid Prototyping Lab**

Rapid design hub
faberware doog thing

**Idea Thinking Lab**

Innovation hub for concept development and design thinking

**AR/VR Lab**

Immersive visualization for mine planning, safety training and simulation

**Mine Automation Lab**

Testing and demonstration of intelligent mine control systems

**Mine Simulation Lab**

Virtual modeling for operational optimization training

TEXMIN Labs

Our Partners, Collaborators & Industry Outreach

Government Ministries & Public Sector Units



Academia & Research Institutions



Industry & Technology Partners



Skill, Innovation & Business Ecosystem



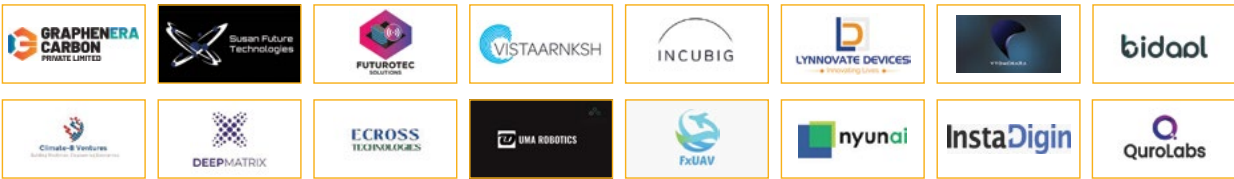
Our Startup Ecosystem

Startup Opportunities at TEXMiN



Interested in Building The Startup Ecosystem? **JOIN US !!**

A few of our flagships:



Join India's Mining Tech Transformation

TEXMiN-Technology Translation Research Park

Key Focus Areas:

- Critical & Rare Earth Minerals - Exploration & Extraction
- Green & 4S Mining - Safe, Smart, Sustainable, Social
- Mineral Exploration, Processing, Beneficiation & Cyber-Physical Systems
- AI/ML, Predictive Maintenance, Autonomous Equipment
- Circular Economy & Sustainable Resource Use
- Next-Gen Mining Technologies

Scan to Apply for TEXMIN
Call for Innovation



WHY APPLY?



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TEXMiN Foundation

Technology Translation Research Park

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