THE TECHNOCRACY
STUDENTS' TECHNICAL COMMITTEE, NIT RAIPUR

AAVARTAN'23-24

VIGYAAN
DEPARTMENT OF MINING ENGINEERING

PROBLEM STATEMENTS

MIN01. Enhancing Mine Safety Innovations.

Mining involves heavy machinery, explosives, and other hazardous materials that can cause minor accidents to fatal incidents. To reduce the risk of accidents , fatalities for mines, develop the innovative technologies or strategies to enhance safety measures in both surface and underground mines.

MIN02. Underground Mine Communication Systems.

Create robust and reliable communication systems tailored for underground mine environments, enabling seamless communication between miners and surface personnel for improved coordination and emergency response.

MIN03. Autonomous Mining Systems.

Design and implement autonomous or semi-autonomous mining systems for underground operations, aiming to increase efficiency, reduce labor costs, and minimize human exposure to hazardous environments.

MIN04. Accurate Surveying in Difficult Environments.

Surveying and mapping are indispensable in mining as geo-spatial and sub surface data constitute the foundation of any mine project. But high-precision surveying is very challenging in difficult environments, model the developing techniques and technologies for conducting accurate and high-precision mine surveys in difficult conditions, such as underground mines or areas with limited access.

MIN05. Real-Time Subsidence Monitoring.

During the extraction of minerals or ores, voids were created which leads to overlying ground to collapse, minimizing subsidence is a challenge in mining operations, based on this develop real-time monitoring systems to detect and map to track and analyze subsidence and ground movement in and around mining areas.

MIN06. Multi-Sensor Data Fusion for Surveys.

Develop Multi-Sensor Data Fusion by using algorithms and techniques to fuse data from various sensors, such as LiDAR, GNSS, and inertial measurement units to enhance the accuracy and completeness of mine surveying data.

MIN07. Advanced Subsurface Characterization.

Develop advanced subsurface characterization techniques, like seismic imaging and borehole geophysics, to enhance knowledge of orebody structures and improve underground mine planning.

MIN08. Eco-Friendly Blasting Technologies.

Develop eco-friendly blasting technologies and practices to minimize air overpressure, dust generation, and toxic gas emissions, ensuring reduced environmental impact.

MIN09. Pillar strength assessment.

pillar stability is one of the prerequisites for safe working conditions in room and

pillar mine. develop reliable methods to assess the strength and load-bearing capacity of pillars, considering geotechnical factors and stress distribution. And also develop real-time monitoring systems to continuously assess the stability of pillars during and after board and pillar mining, enhancing safety and preventing accidents.

MIN10. Emergency Evacuation Procedures.

Design efficient and well-practiced emergency evacuation procedures for man riding conveyances to ensure quick and safe evacuation in the event of emergency.

MIN11. Coal Transportation Efficiency.

Conveyors, trams, and trucks transport coal around mines, for short distances from mines to consumers, coal spillage takes place during transportation. Investigate techniques and technologies to minimize coal spillage during transportation. Develop tracking systems to ensure the timely delivery of coal and enable proactive responses to potential transportation issues.

MIN12. Innovative Water Management in Mining.

As we all know water inflow during a box cut excavation can be a significant concern,as it can impact the stability of the cut and safety of workers develop innovative water management and treatment solutions to handle water inflow during box cut excavation.

MIN13. RFID Tracking for Mine Safety.

Develop a system using RFID tags to track the movement and location of personnel inside underground mines for improved safety and emergency responses. And what are the feasibilities of implementing RFID tags in monitoring environmental conditions, such as gas levels and temperature to enhance safety protocols in underground mines.

MIN14. RFID Automation for Mine Entry.

Create a solution using RFID technology to automate the identification and tracking of vehicles and machinery entering and exiting underground mine sites.

MIN15. Innovative Roof Support Systems.

Develop innovative roof support systems and reinforcement techniques for underground mines to enhance roof stability under varying geological conditions. And advanced monitoring technologies to detect early signs of roof instability in and mines, enabling timely interventions for safety.

MIN16. Roof Stability Risk Assessment.

Develop a risk assessment framework to identify potential roof stability issues in construction projects and recommend suitable preventive measures.