SMART INDIA HACKATHON 2024

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TITLE PAGE

- **Problem Statement ID –1644**
- **Problem Statement Title- A web application specifically designed for Indian coal mines to quantify their carbon footprint and explore pathways to carbon neutrality**
- **Theme-**
- **PS Category- Software**
- **Team ID-35**
- **Team Name:Tech Warriors**

Tech Warriors

Web Application for Indian Coal Mines

- **Explanation of the proposed Solution:**

A web application for Indian coal mines can enhance sustainability by integrating real-time monitoring, data analytics, and resource management systems. It can track mining operations, emissions, and energy consumption, helping to optimize resource usage and minimize environmental impact.

- **It can address the problem by:**

Integrating real-time environmental monitoring, Managing resources more efficiently, implifieng compliance by automatically tracking and reporting environmental data and its Predictive analytics and energy tracking help identify areas of energy waste and suggest improvements.

- **Uniqueness of the Solution:**

The combination of real-time monitoring, AI-driven insights, and sustainability-focused tools makes this solution stand out as a cutting-edge approach to improving environmental performance in Indian coal mines.

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TECHNICAL APPROACH

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Basic Structure and functionality:

HTML,CSS and JavaScript have been used for designing the basic layout of this Web Application.

Algorithm Development:

Next.js,Express.js-Core technologies have been used for developing the Algorithm.

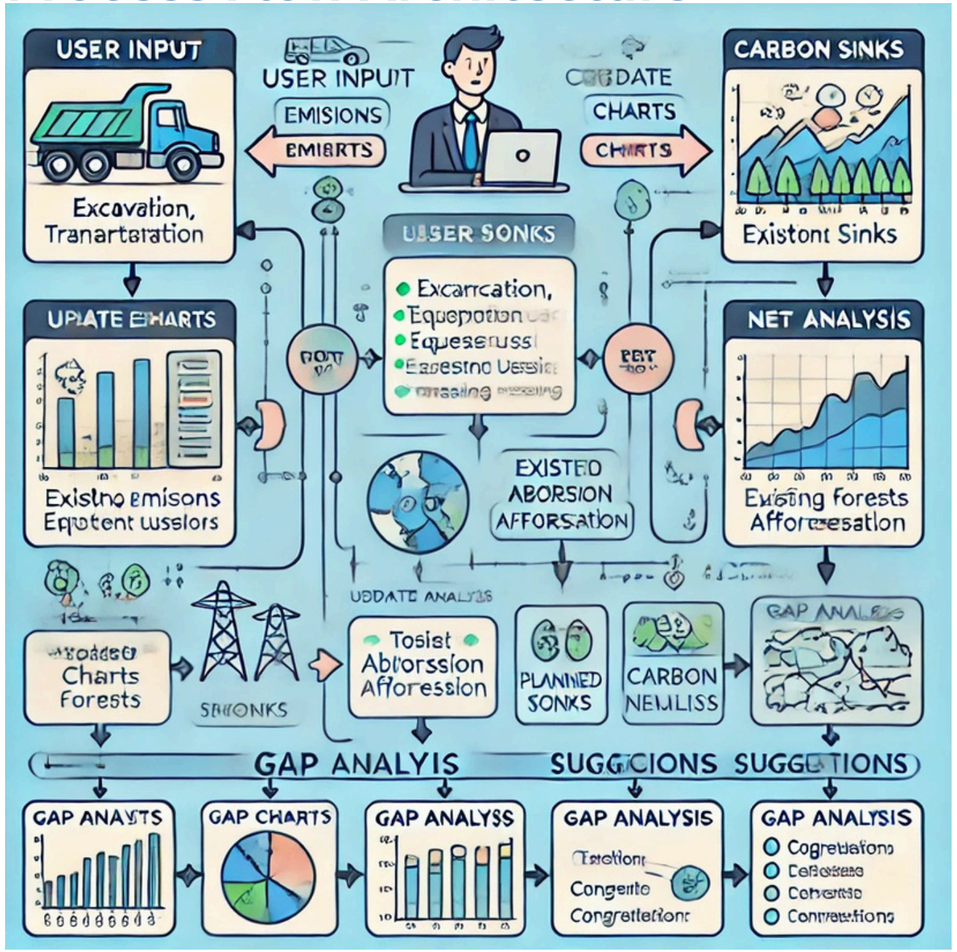
Cloud Services:

My SQL-Relational Database Management
Rest API-High responsive Rest API's.

Encryption and Security:

Custom encryption algorithm provided by 8 layer octa 512 bit encryption for secure data transmission and authentication.

Process Flow Architecture



Product status: 80% on the product is finished and further build is on progress.

FEASIBILITY AND VIABILITY

01

Feasibility of the idea

Technical Feasibility: With advancements in IoT, AI, and cloud computing, the infrastructure required for real-time monitoring and data analytics is readily available.

Operational Feasibility: Mining companies are increasingly adopting digital solutions, and integrating a web-based platform into current operations is realistic.

02

Potential challenges and risks

Data Reliability and Connectivity: Mining operations in remote areas may face challenges with stable internet connectivity, affecting real-time data transmission.

Cybersecurity Risks: As mining operations become more digitally integrated, they become susceptible to cyber-attacks.

03

Strategies for overcoming these challenges

Offline Capabilities: Develop the app with offline functionality, so data can be stored locally and synced when connectivity is restored.

Customizable Compliance Modules: Design the application with flexibility to adapt to varying regional regulations. This can include customizable reporting features that align with state-specific rules.

IMPACT AND BENEFITS

Potential impact on the target audience

- **Cost Savings**: The application can optimize resource usage, reduce energy consumption, and minimize equipment downtime, leading to substantial cost reductions.
- **Improved Compliance**: Automated monitoring and reporting tools ensure that companies meet environmental regulations, reducing the risk of fines and legal complications.
- **Skill Development**: The implementation of modern technologies offers b workers opportunities to learn new skills, increasing their employability in a more digitalized industry.
- **Data-Driven Decision Making**: Access to reliable data from the app can aid in making more informed policy decisions regarding the mining sector's environmental impact.
- **Health Benefits:** Lower air and water pollution resulting from the application's sustainability efforts lead to better health outcomes for local populations living near mining sites.

Benefits of the solution

- Reduced environmental degradation and pollution lead to healthier ecosystems and better living conditions for nearby communities.
- Historical data analysis helps in forecasting trends and making strategic plans for resource optimization.
- Predictive maintenance reduces the likelihood of equipment-related accidents.

RESEARCH AND REFERENCES

- International Energy Agency (IEA) reports on India's coal sector: Research on India's energy needs and the role of coal mining in the national energy mix.
- Central Pollution Control Board (CPCB) guidelines: Environmental norms for industries in India, including emission limits and guidelines on sustainable practices.