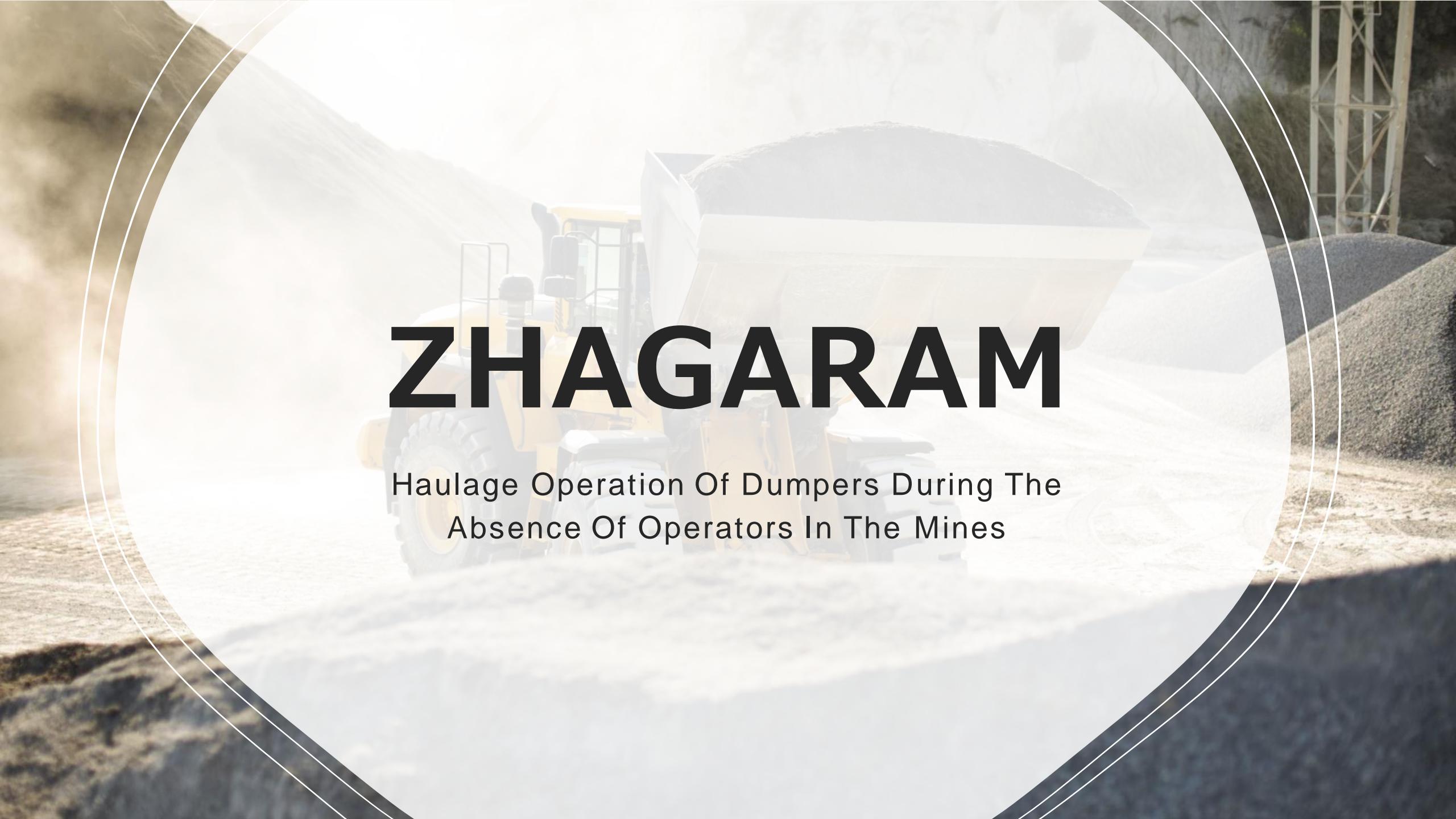


ZHAGARAM

A photograph of a yellow dump truck in a quarry. The truck is positioned in the foreground, facing towards the left. In the background, there is a large, dark pile of aggregate or rock. The sky is overexposed, appearing bright white. The overall scene is industrial and suggests a mining or quarrying operation.

Haulage Operation Of Dumpers During The
Absence Of Operators In The Mines

MEET OUR TEAM



MR. PRABHU D
ACADEMIC MENTOR



GNANA PADMESH C K
TEAM LEAD



SRINIVAS S
ROVER ENGINEER



HEMAKRISHNAN A
COM. ARCHITECT



SHANMUGHA JEYASHREE B
ELECTRONICS LEAD

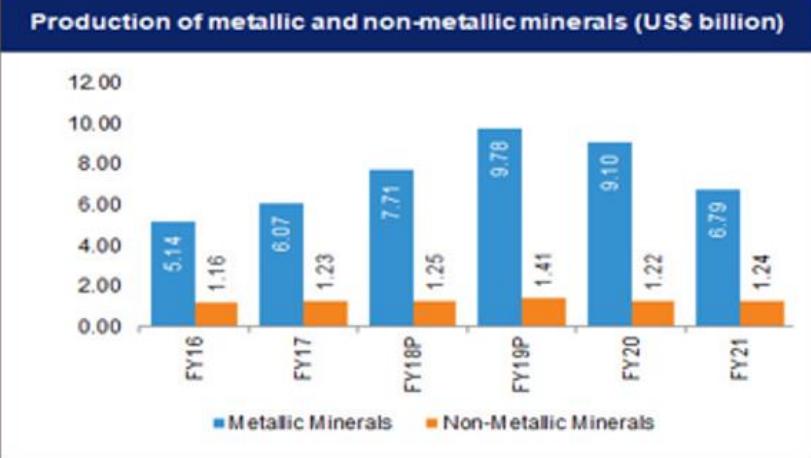


KIRUTHIKA A
CIRCUIT DESIGNER



SANDHIYA KARTHIGEYAN
DATA ANALYST

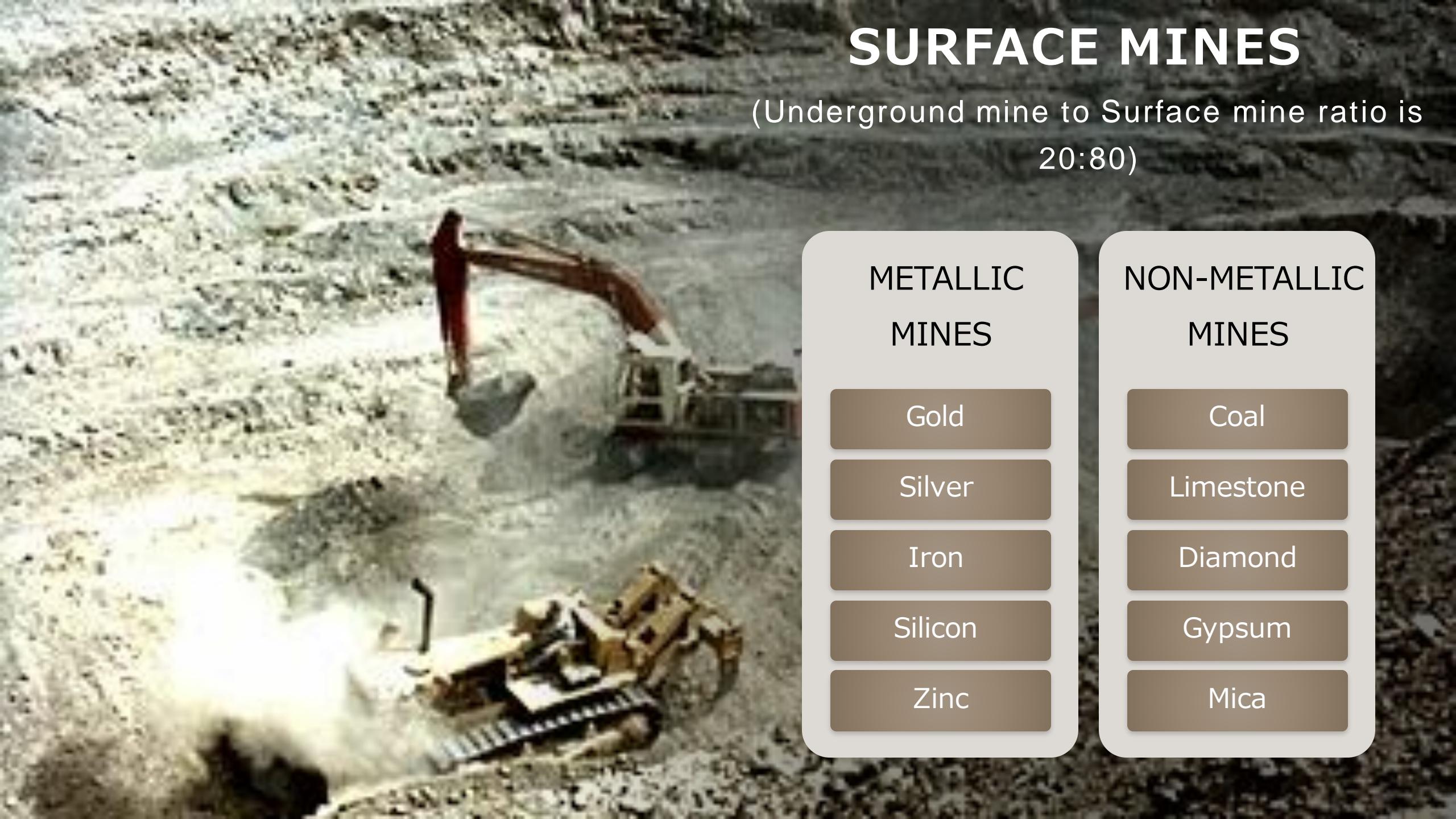
INTRODUCTION



- By the GDP of the total industrial sector,
 - 1) Contributes around 10% to 11%
 - 2) Mining done on small scale contributes 6%
- Provides job opportunities to around 700,000 individuals.

SURFACE MINES

(Underground mine to Surface mine ratio is
20:80)



METALLIC MINES

Gold

Silver

Iron

Silicon

Zinc

NON-METALLIC MINES

Coal

Limestone

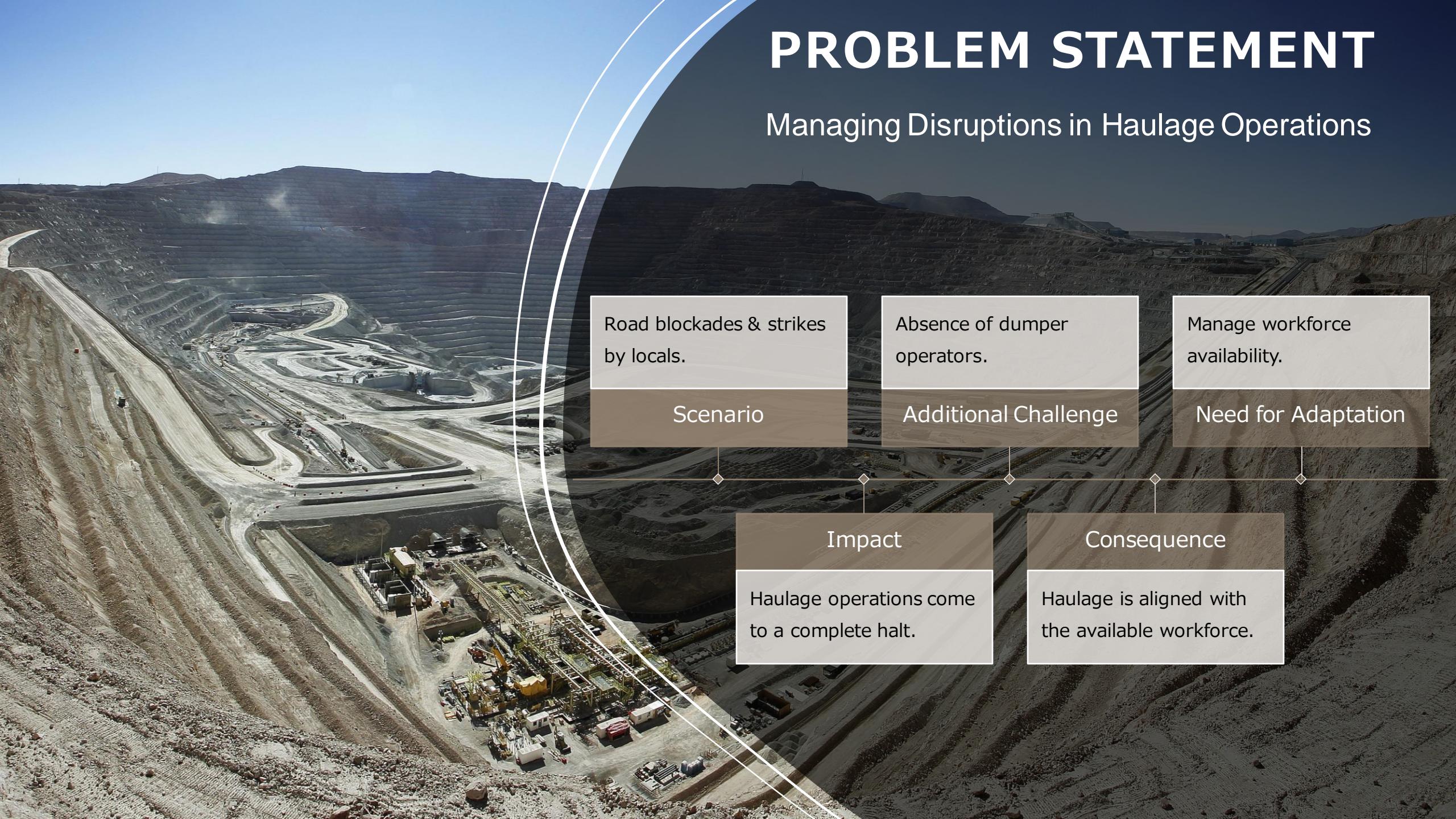
Diamond

Gypsum

Mica

PROBLEM STATEMENT

Managing Disruptions in Haulage Operations



Road blockades & strikes
by locals.

Scenario

Absence of dumper
operators.

Additional Challenge

Manage workforce
availability.

Need for Adaptation

Impact

Haulage operations come
to a complete halt.

Consequence

Haulage is aligned with
the available workforce.

PROPOSED SOLUTION

AutoHaul: PI & LoRaWAN / IoT Integration for Efficient Haulage



AUTO - DUMPER

Steering, acceleration, and brake functions are automated for efficient control using ROS



PATH DEFINITION

Poles act as nodes for intercommunication between poles & vehicles establishes navigation



PATH AUTOMATION

Nodes are strategically deployed to automate the defined path and facilitate communication to identify vehicles by name.



COMMUNICATION

LoRaWAN facilitates communication. Vehicles transmit live location & speed data through nodes.

EXISTING SOLUTION

Dumper system dominates mining costs.

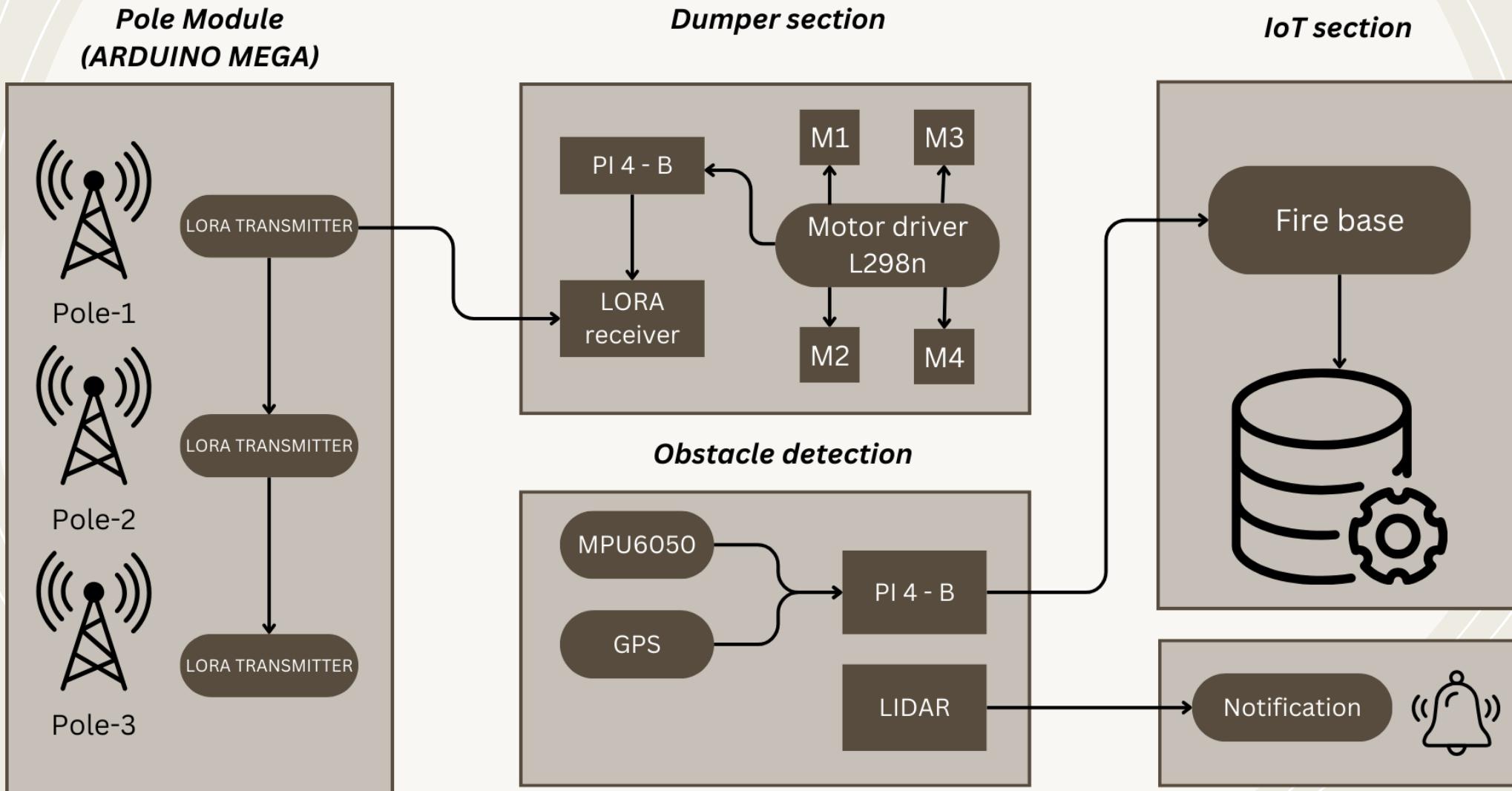
50-60% allocated to truck haulage.

Major financial impact on companies.

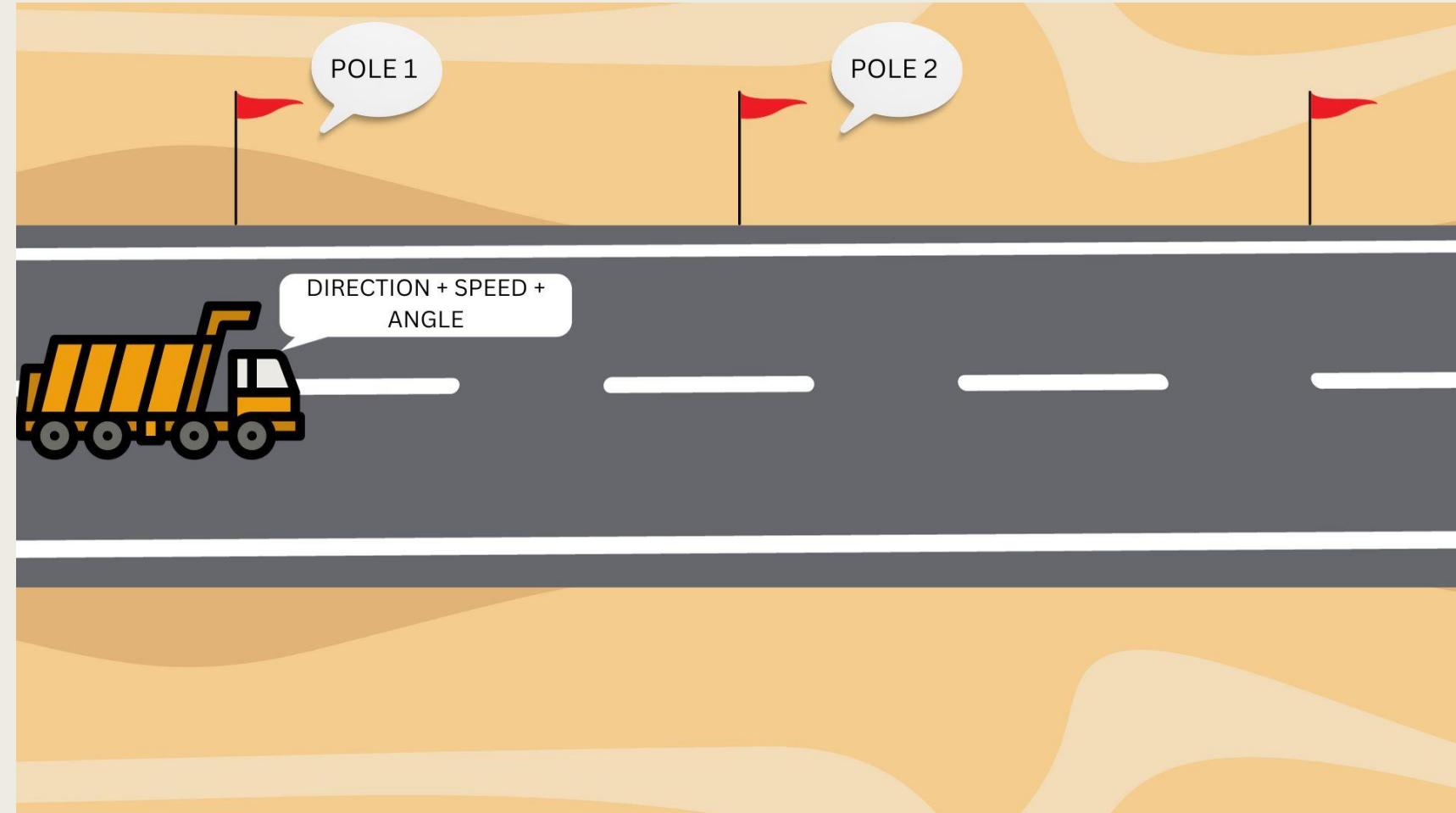
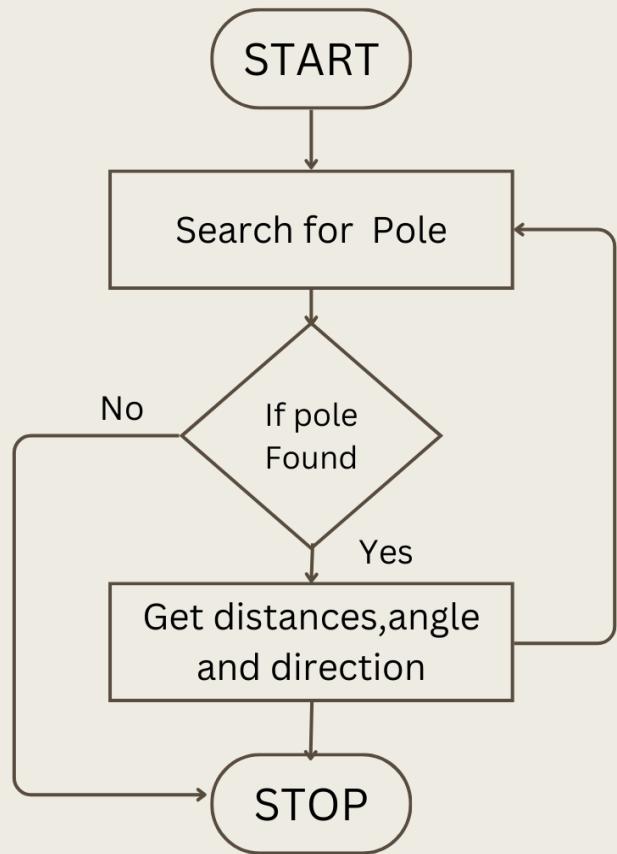
Emphasizes critical role in mining investment.



BLOCK DIAGRAM



FLOW CHART

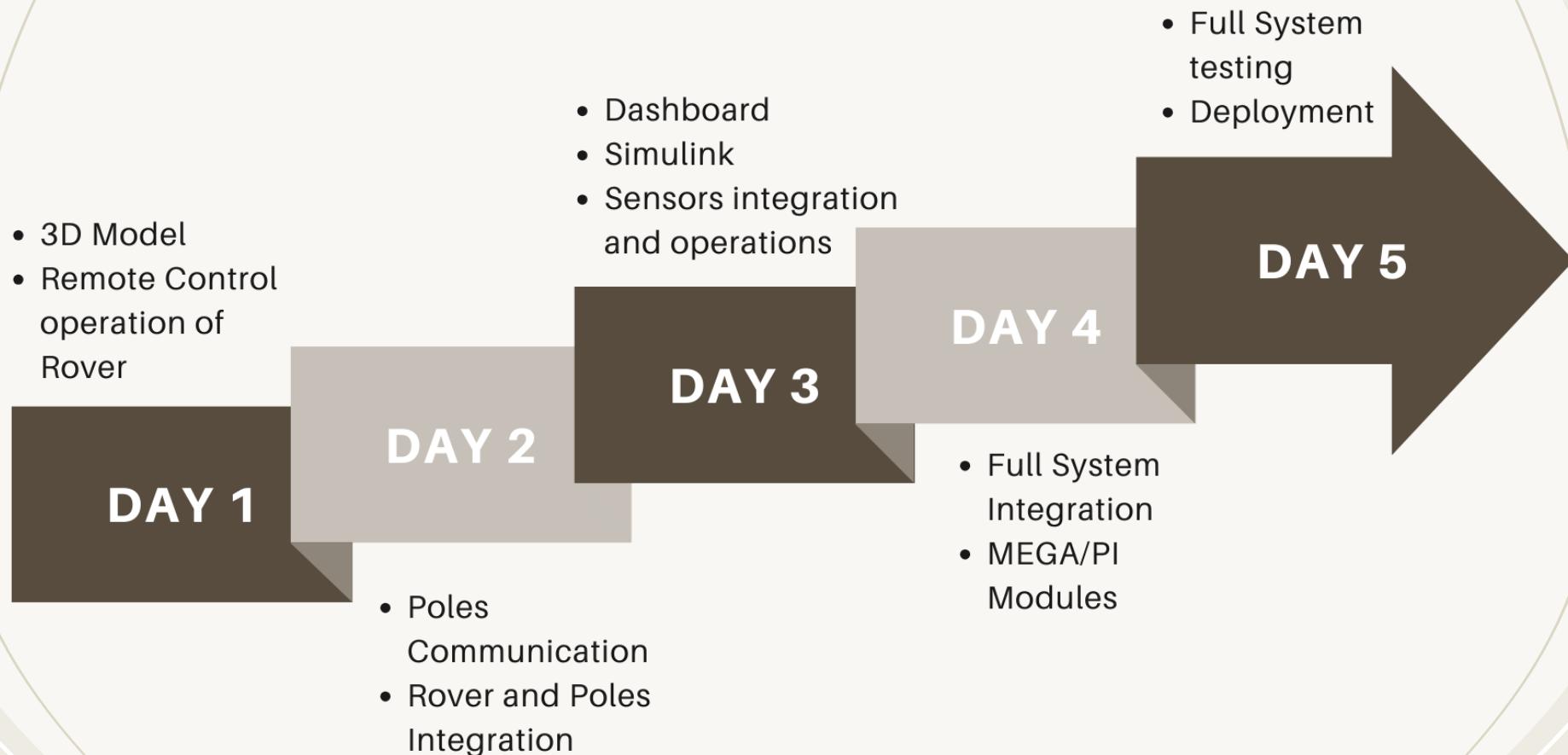


Vehicle Module

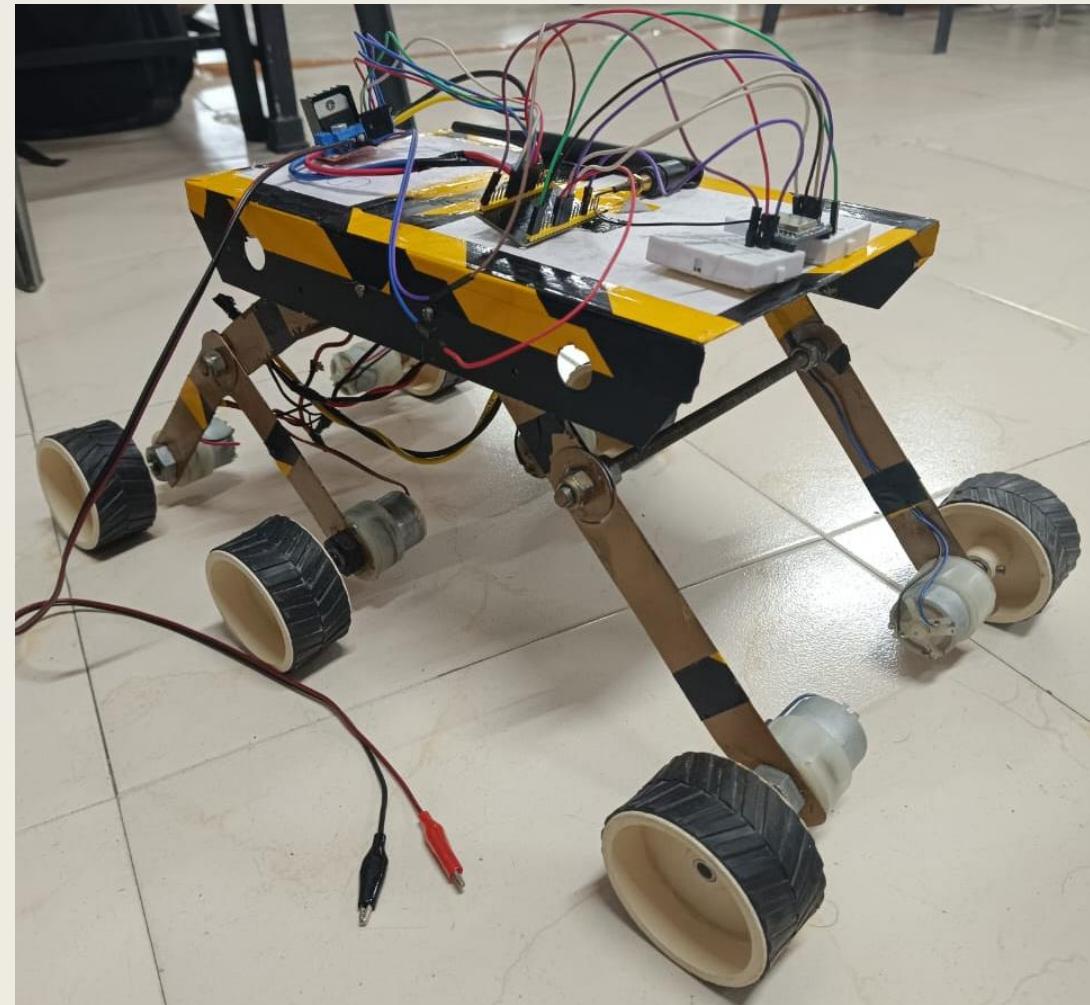
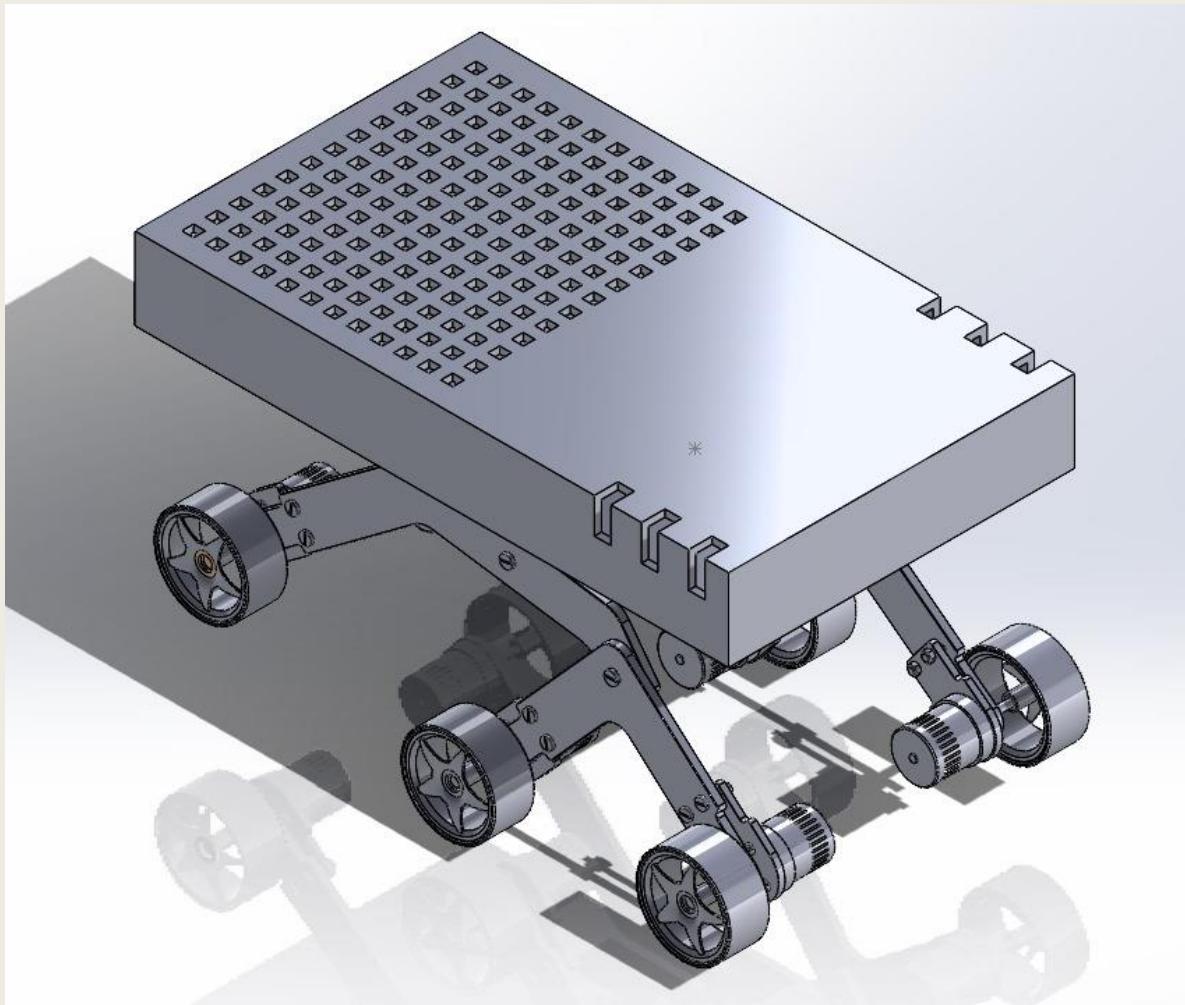
COMPONENTS REQUIRED

<u>Vehicle</u>	<u>Pole</u>	<u>Software required</u>
<ul style="list-style-type: none">• L298 Motor• Lora and Antenna• Motor-12V DC• LIDAR mini S• Neo 6M GPS• ADXL 335 accelerometer• Raspberry Pi 4• Servo Motor	<ul style="list-style-type: none">• Arduino Mega• Lora• Antenna• OFC's	<ul style="list-style-type: none">• Arduino IDE• PI - OS• Firebase• HTML, CSS• SMS Chef• Pushing box• Simulink

TIMELINE

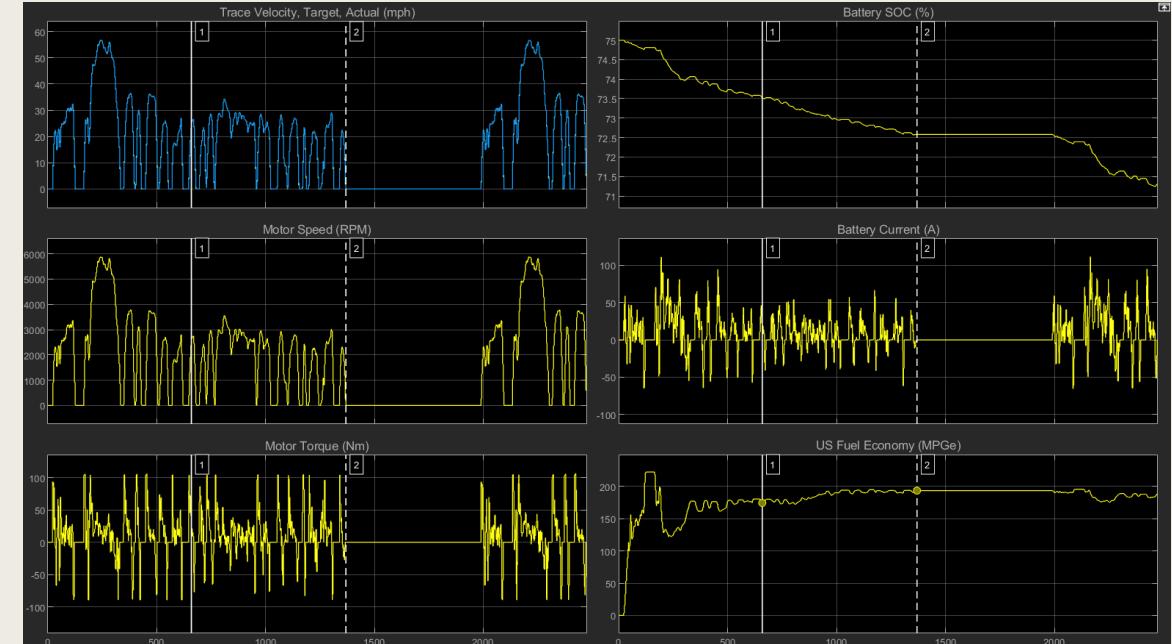
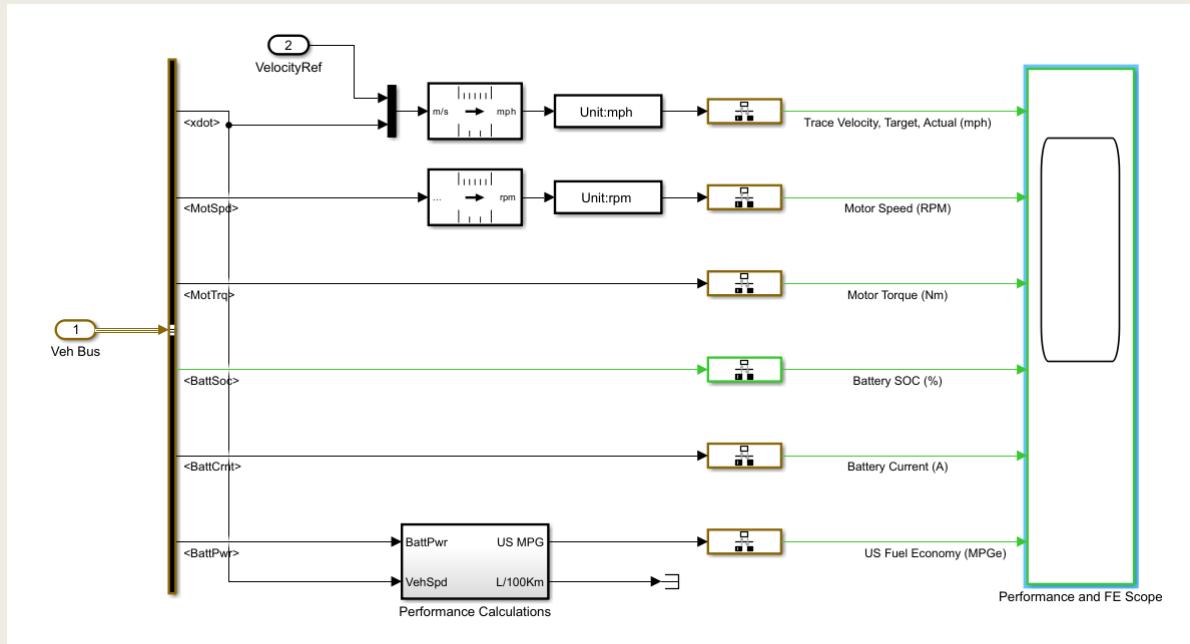


DAY 1



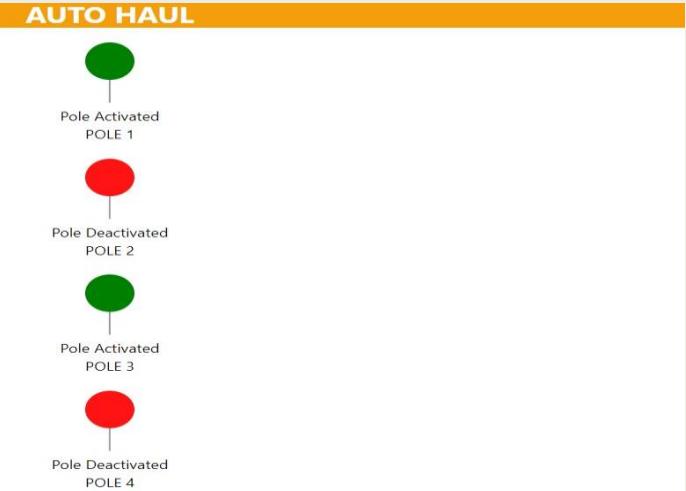
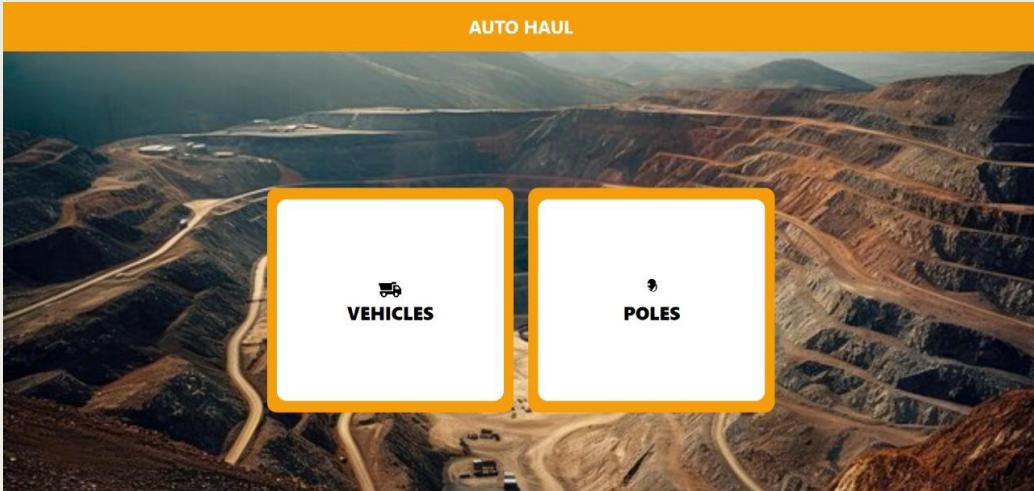
DESIGN, FABRICATION AND TESTING ROVER

DAY 2



RETROFITTING SIMULATION & HARDWARE INTERFACE USING MATLAB SIMULINK

DAY 3



AUTO HAUL

vehicle no : 0

Vehicle Id : 0

Speed : 0

past pole : 0 next pole : 1

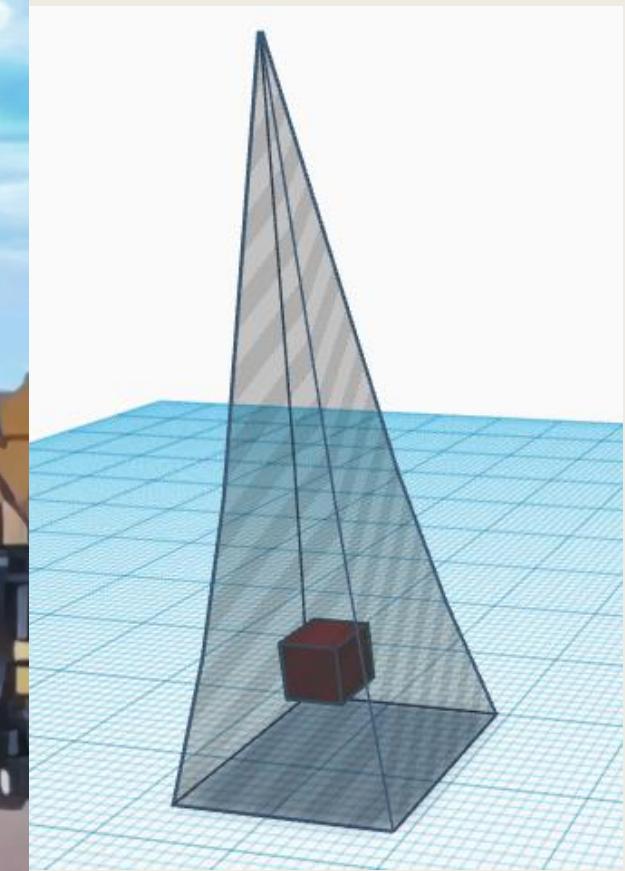
latitude : 17.38714 longitude : 78.491684

stop

© OpenStreetMap contributors

DASHBOARD

FUNCTIONALITY

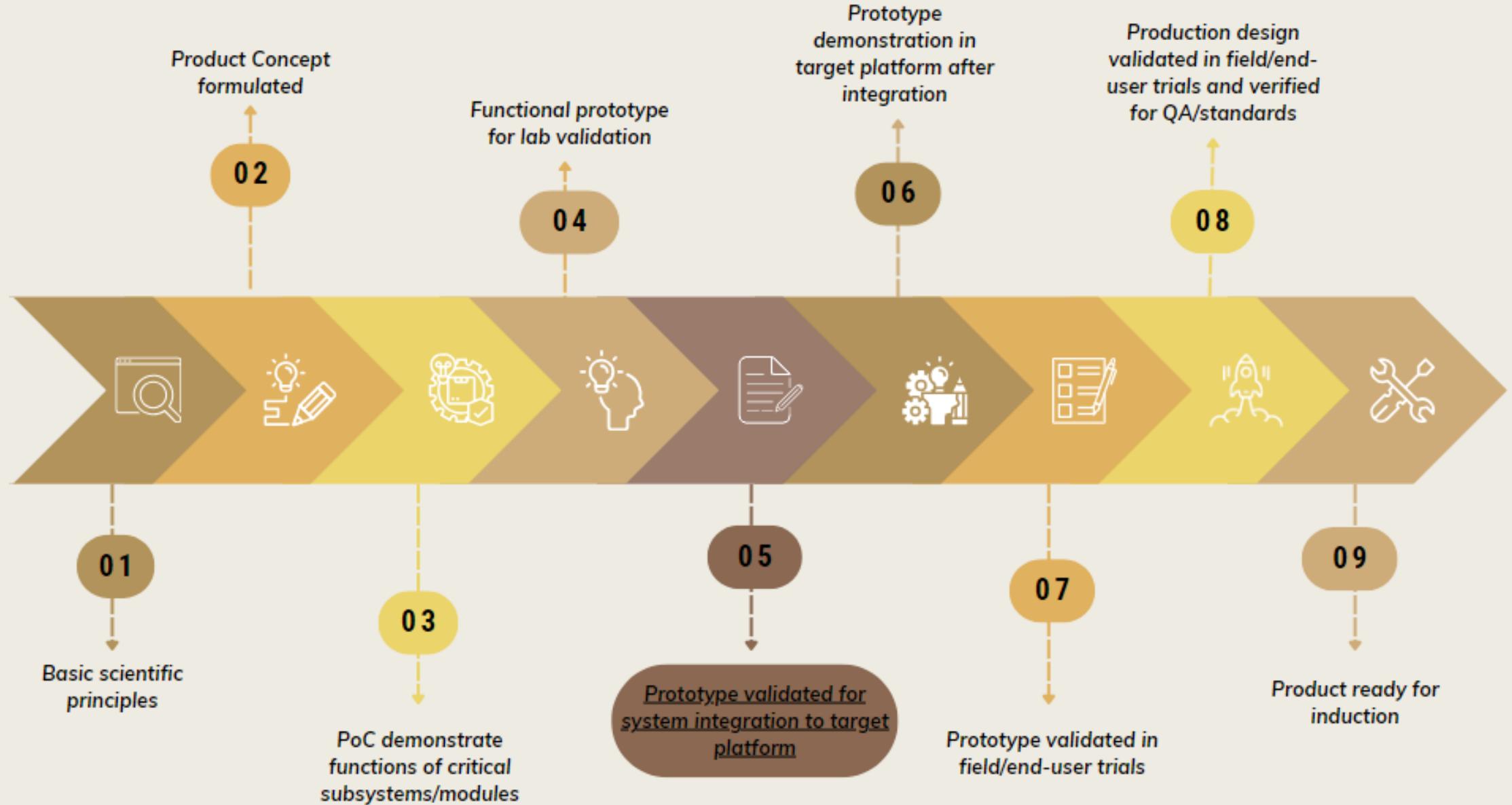


MARKET ANALYSIS

- Dumper transports – 13.5K to 15K pounds
- Average Cost of the Dumper – 60lakhs to 65lakhs
- Manufacturers – Komatsu, Caterpillar, Birla
- Profit margin – 45%



MARKET READINESS

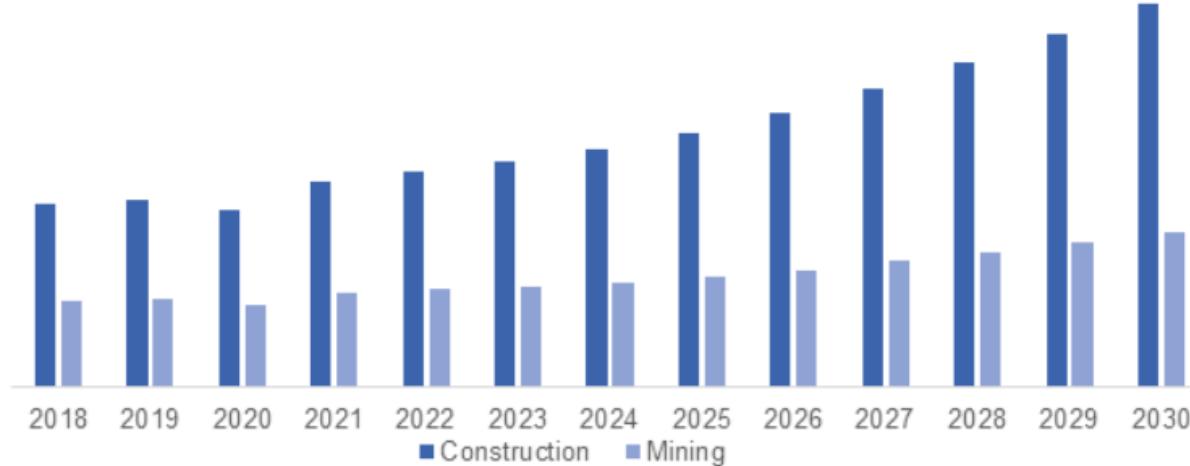


BUSINESS MODEL

<p><i>Key Partners</i></p>  <ul style="list-style-type: none">• Dump Truck Manufacturers• Hardware Suppliers• Communication Infrastructure Providers• Software Developers	<p><i>Key Activities</i></p>  <ul style="list-style-type: none">• Retrofitting Services• Communication Network Setup	<p><i>Value Propositions</i> ★</p> <ul style="list-style-type: none">• Labor Cost Reduction• Increased safety• Operational efficiency• Customisable retrofitting• Comprehensive control system	<p><i>Customer Relationship</i></p>  <ul style="list-style-type: none">• Training and Support Programs• Continuous Communication• Feedback Loop <p><i>Channel</i></p>  <ul style="list-style-type: none">• Partnership with Equipment Suppliers• Direct Sales - mining• Construction company	<p><i>Target Audience</i></p>  <ul style="list-style-type: none">• Mining Companies• Construction Companies• Logistics and Transportation Providers• Equipment Rental Companies
<p><i>Cost Structure</i></p>  <ul style="list-style-type: none">• Installation Costs• Operational Costs• Research• Development cost		<p><i>Revenue Stream</i></p>  <ul style="list-style-type: none">• Subscription-based maintenance and support services• Service Contract• Hardware Sales		

MARKET SIZE

Global Dump Trucks Market Size, By End-Use, 2018 to 2030 (USD Million)



3.1 USD BILLION
2022

CAGR of
6.3%

4.2 USD BILLION
2027

The global mining automation market is projected to be worth USD 4.2 billion by 2027, growing at a CAGR of 6.3% during the forecast period.

proof



Unique Infrastructure



Flexibility



Adaptability



Reduction of Operators

VALUE PROPOSITIONS

SDG RELAVANCE



Industry, Innovation, and Infrastructure

Justification: Promoting innovation and infrastructure development in the mining sector, improving efficiency and reducing disruptions caused by external factors

Decent Work and Economic Growth

Justification: Enhancing economic growth and providing more stable employment opportunities in the mining industry.

Sustainable Cities and Communities

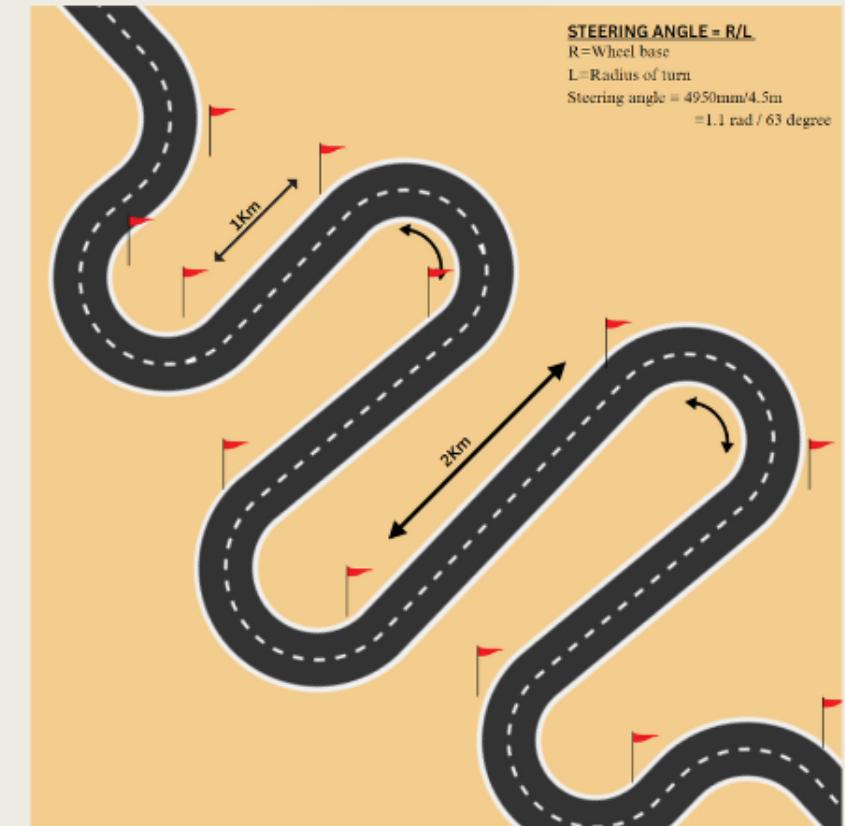
Justification: Reduces disruptions in transportation, contributing to more sustainable and resilient communities by ensuring smooth material flow, especially in mining regions.

BUDGET

Poles

Component	Qty	Price
OFC Cables	15Km (Rs. 6.80/m)	1,02,000
Arduino AtMega R3 2560	1	3,250
Poles and Fabrication - 1219 x 100 (2 Kg)	12 (Rs. 2750/pole)	33,000
LoRa Transmitter	12 (Rs. 450/pole)	5,400

*Budget quoted for the imaginary path of 15Km designed by us



Predefined path

BUDGET

Component	Qty	Price
MPU6050	1	100
12m 360 degree 2D Lidar Sensor	1	15,800
GPS	1	445
Controller PCB	1	2,000
Aluminium Low Pressure Spring	1	1,600
Brake Actuator	1	16,500
120 V Linear Actuator	1	2,400
Servo Motor	1	450
Total		39,350

*Budget quoted for the imaginary path of 15Km designed by us

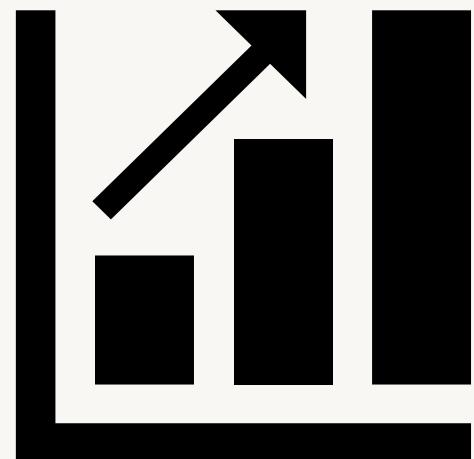
FUTURE SCOPE

Designing a Customized PCB to replace Raspberry Pi and Arduino Mega

Drastically reduce component costs and Enhanced System Integration

Implementing VR Module through 360-degree Camera

Capture Dumper Movements in Mines



A yellow front-end loader is dumping gravel into the bed of a large dump truck. The truck is covered in a layer of gravel. In the background, there are piles of gravel and a metal lattice tower. The foreground is a dirt surface.

THANK YOU