

SMART INDIA HACKETHON-2023

Problem Statement:

Development of a Digital Platform for multimodal visibility of coal transportation.

Problem Statement ID: SIH1317

Theme: Smart Automation

Organization: Ministry Of Coal

Category: Software

Team Name: Finite Loop

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COAL TRACK DETECTOR

Description: -

Develop a unified digital platform for coal transportation, integrating data from various sources for real-time multi-modal tracking. Utilize image analytics, data integration, and advanced visualization to provide stakeholders with location, status, and condition insights. Offer analytics for optimization, ensure data security, and enhance transparency in the coal supply chain.

Abstract: -

The challenge is to create a unified digital platform for tracking coal transportation across trucks, trains, and ships, enhancing efficiency and transparency. Key aspects include data integration from various sources, image analytics for real-time tracking, user-friendly real-time visualization, advanced analytics for optimization, and robust security measures. The platform aims to provide stakeholders with multi-modal visibility, enabling better decisionmaking, reducing costs, and improving operational efficiency in the coal supply chain.

Introduction: -

The following idea of our team goes around on technical development over the transportation of coal; Which is considered as country's energy and industrial infrastructure, it encompasses various factors including: logistics, infrastructure, environmental concerns, and economic importance.

Existing System: -

This is the unique problem statement that which does not have any previous Prescribed procedure or any digital platform for coal robbery detection. The only way we have to find the coal robbery is to use the GPS tracking System.

Objectives: -

- Coal Transportation Detection is done using GPS trackers.
- Ensuring safe transportation of Coal without any burglary.
- Reducing loss of revenue to the Coal Ministry.

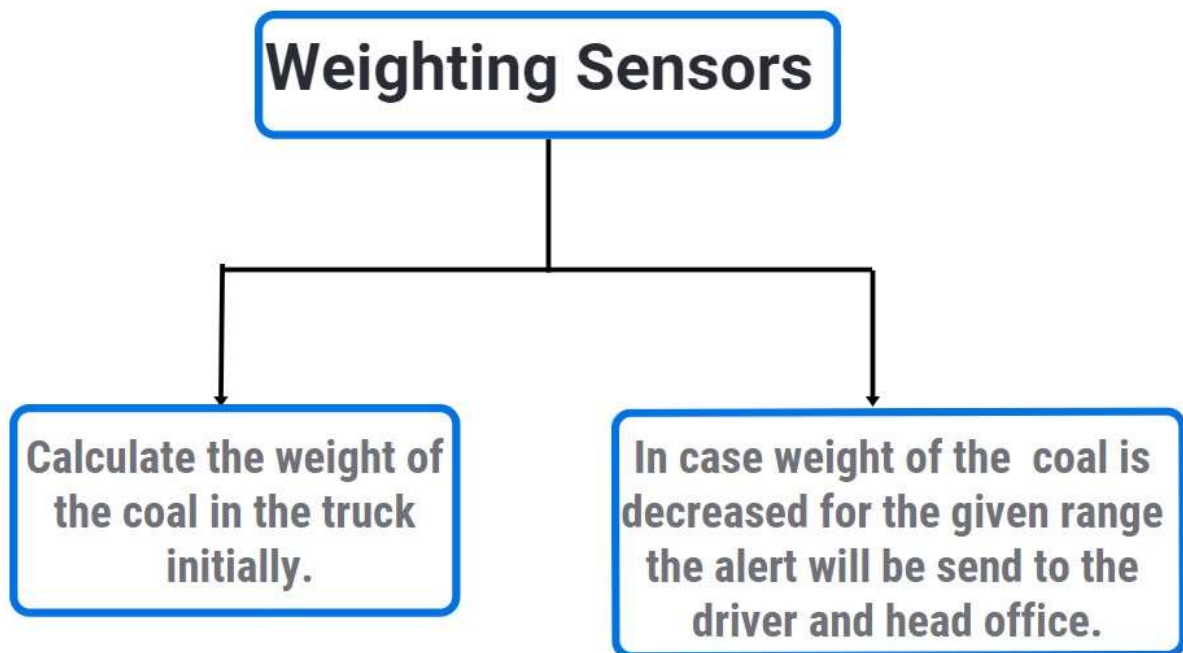
Proposed System: -

Here we are using the concept of weighting sensors. We use weighting sensors to detect the weight of the coal dumped into the container by using GPS tracking system to track the location. An indicator is present in the truck to detect the burglary i.e. other than the coal. Immediate information is sent to the authorized head office and the truck driver.

Methodology: -

- Weight Sensors:

Weight sensors, also known as load cells, are transducers or sensors that convert a mechanical force (weight or load) into an electrical signal. These sensors are widely used for measuring weight, force, and pressure in various applications across different industries. Weight sensors are designed to be highly accurate and reliable, making them essential in tasks that require precise weight or force measurements.

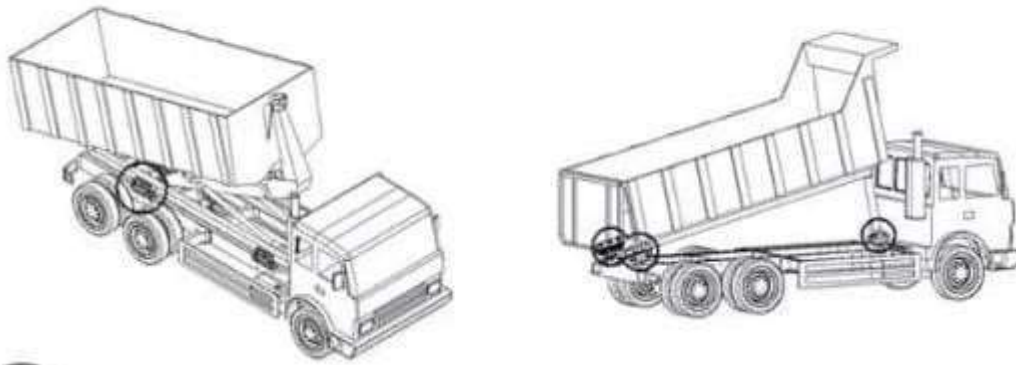


Role of weight sensors in project:

Preventing Theft and Fraud: Weight sensors can be used as a security measure to prevent theft or fraud during coal transportation. Unauthorized removal of coal can be detected by monitoring weight changes.



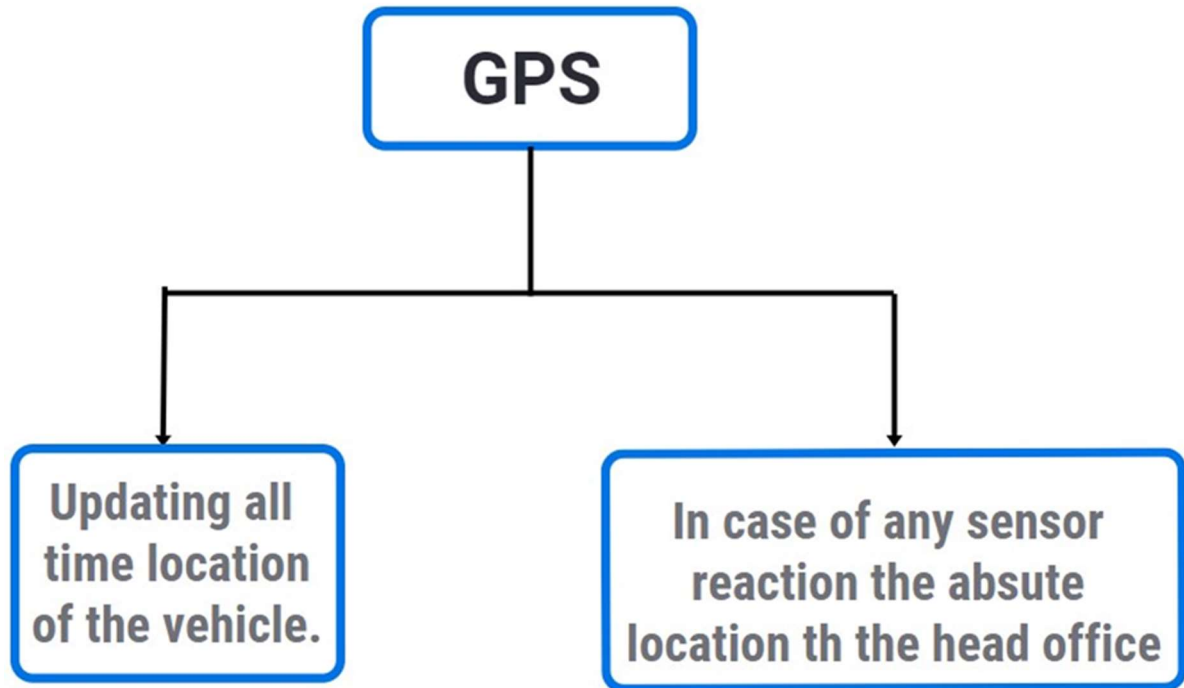
Weighting sensors



Weighting sensor arrangement in trucks

GPS-Global Positioning System:

GPS stands for "Global Positioning System." It is a satellite based navigation system that allows users to determine their precise location, velocity, and time, anywhere on Earth or in Earth's orbit. The system was developed and is maintained by the United States Department of Defence (DoD).



Role of GPS in project:

Real-Time Location Tracking:

GPS tracking allows for real-time monitoring of the location and movement of coal-carrying vehicles, such as trucks, trains, and ships.

This real-time visibility improves logistics by enabling efficient scheduling, route optimization, and load balancing.



Live Tracking of Vehicles using GPS

Optimized Route Planning:

GPS data can be used to optimize transportation routes, reducing travel times and fuel consumption.

This not only enhances efficiency but also reduces transportation costs, which is crucial for economic considerations.

Environmental Impact Assessment:

GPS tracking can help assess the environmental impact of coal transportation. It enables the measurement of factors like fuel consumption, emissions, and transportation efficiency, which can inform efforts to minimize the project's environmental footprint.

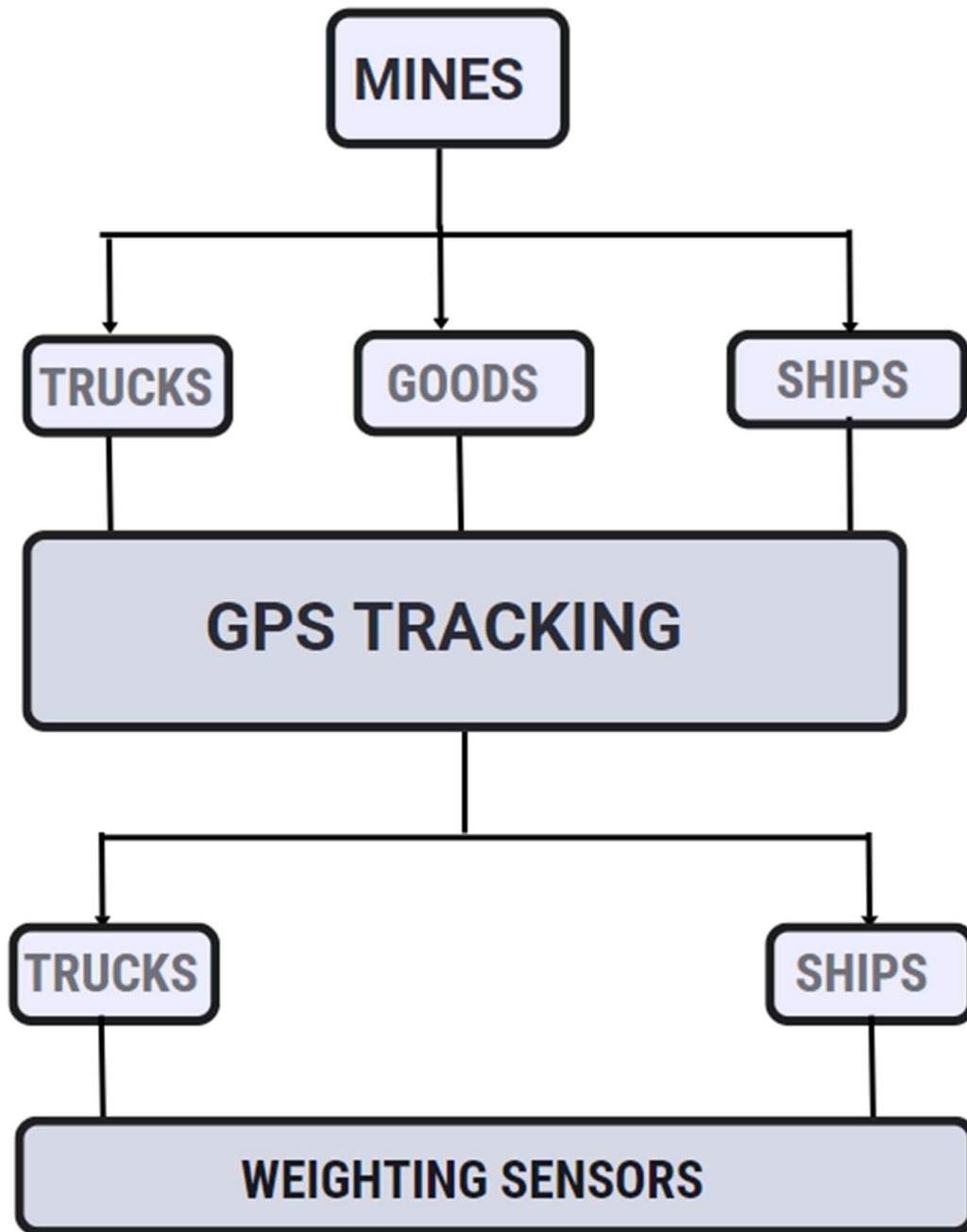
Implementation of the Software and Sensors:

- When it comes to the implementation/embedding of software with the transportation of particular natural resources, that includes three another separate way which are

Transportation by Roads:

The transportation through Roads becomes the first and foremost type. This is due to the coal will be mined from inside the ground, so basically road transportation comes first into the picture and further based upon the needs it will be shipped into either ships or trains. Now, we are going to discuss about the implementation of tech methods in this type of transportation

*As we are discussing about the road transportation, we can easily say that there may be some sort of disturbance to the shipment and can even become difficult to decide how and what have been missing in the shipment. We can point out some of the disturbances as wind carrying, weather, robberies, etc., so while resolving thus issues we will be using some tech devices and will be operated through software designed especially for those devices.



*Firstly, we will start by introducing weight sensors to the truck or the shipment carrier. This helps us a lot where we can easily monitor how much amount of package is being missing and at the same time, we can say for what reason too.

*Later on, an algorithm will be implemented so that if the weight sensor sends a report of losing huge amount of coal, which we make to trigger alarm for the driver of the shipment where we consider that as robbery. If the coal is being missing slightly then at some particular instinct the driver

will be alerted that more amount of coal being carrying away by the wind and the driver re-adjusts the covers on top of shipment.

*Lastly, we will be encountered with the formidable problem i.e, tracking the shipment and giving alternate directions to the shipment driver, so that the shipment didn't need to be delay. But for this problem we require technical support and as well as man power. For implementing the solution, we place GPS (Global Positioning System) in the shipment's cabin and fix some of the most commonly used routes to transport. If any problems are there in those fixed routes, then the driver will be alerted foremostly and asked to take diversion. This completes the road transportation.

Transportation by Railways:

Basically, the transportation through railways will have the designated routes and cannot be changed. But can use the technology of weight sensors and alert the pilot to make a check over the weight of shipment/cabin it has to be.

Transportation by Seaways:

This type of transportation don't have any loop holes in the process of shipping the shipment and is well in it's own way. If necessary the weight sensors can also be assigned and a GPS too. This improves the protection too.

End users: - Coal contractors, Ministry of Coal.

Conclusion: -

By this implementation method we aim to make transportation of natural resources in the way of sustainable development, and also make sure the end-user will not lose his shipment without even knowing the cause. This takes up a lot of changes over shipment of natural resources here in this case it's coal (as it is mentioned).