# Data-Driven Decision-Making through Predictive Analytics on a Mining Truck Fleet

FUNDING DETAILS

Heavy haul trucks deployed in mining operations in oilsand pits need to switch from auto to manual mode and undergo manual inspections during their fueling cycle. We plan to implement an automated inspection technology for continuous monitoring of a fleet of vehicles. A radio communication network in mesh configuration, with each vehicle working as a node, will be implemented. The collected data will be validated and interpreted through machine learning model(s) for predictive analytics on vehicle maintenance. An integrated software platform will be implemented for remote monitoring of engine status, exterior conditions, and trends to inform predictive maintenance.
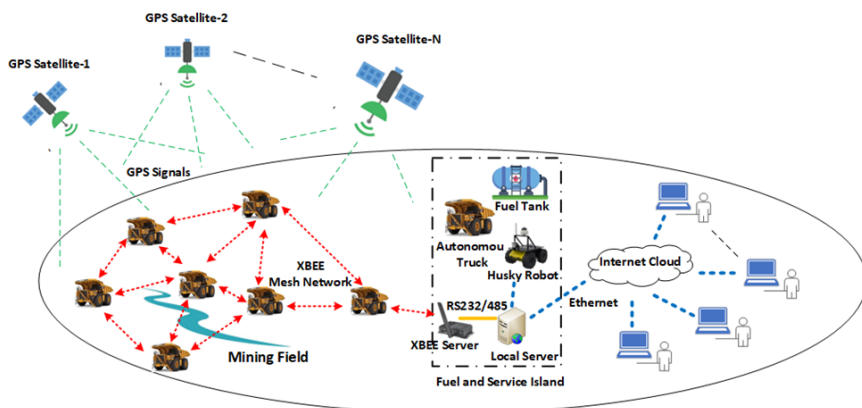
RECIPIENT:
NAIT- Dr. Quamrul Huda

PARTNERS:
Imperial Oil Limited

TOTAL BUDGET:
$1,000,000

AI FUNDING:
$500,000

PROJECT DATES:
MAR 2025 – FEB 2027

PROJECT TRL:
Start: 6
End: 7

APPLICATION

Application of this technology will enable our partner in the oil sands industry to implement complete autonomous operations and predictive maintenance of a mining haul truck fleet. The ability towards data-driven decision making through application of machine learning models on real-time vehicle data will inform efficient fleet operations and maintenance. The outcomes will be cost reductions, increased operational safety, reduction of air pollution, lower greenhouse gas emissions due to less vehicle idling.

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PROJECT GOALS

- Deployment of sensor data acquisition system to a fleet of 3-7 trucks.
- Implement connectivity between trucks and server through mesh networking.
- Development of a simulator environment and performance optimization of inspection robot.
- Development of data analytic models for interpretation of sensor data acquired from field deployments.
- Implementation of image processing and AI algorithm for truck fault detection.

BENEFITS TO ALBERTA

The project will bring economic, social, and environmental benefits to Alberta. Automation of vehicle inspection and data-driven decision making on predictive maintenance will add to economic benefits and help the industry partner in achieving a broader goal of cost reduction of $1 per barrel of synthetic crude oil production. Reduction of human inspectors at mining site in Alberta weather conditions will improve workplace safety and reduce infrastructural burden in mining operations. Reductions of GHG emissions on the order of mega tonnes of CO_2e per year for a typical oilsands mining fleet of operation is anticipated.

1 Publication

2 Students Trained

1 Project Job

2 Future Jobs

1 New Product/Service

100-200 kt/yr Future GHGs Reduced

CURRENT STATUS

MAY 2025
- Project initiated.
- Senor deployed in one truck.
- Data acquisition, testing, and validation in process.