STAGE 1: Brain Storming GD

Challenges:

(sensors issues):

Noise detection from external machines

Opportunities:

Using sensor fusion and filtering to improve data accuracy and fault detection.

Ideas:

May be extended to implement edge computing for real-time sensor fusion and noise reduction, allowing faster and more accurate fault detection directly at the machine level.

Stage 2: Mind-map & Abstract

In the food packaging industry, conveyor belts are essential for maintaining smooth and continuous operations. However, unexpected breakdowns result in costly downtime, resource wastage, and production delays. Traditional maintenance method whether scheduled or reactive fail to prevent such issues effectively.

This project proposes a predictive maintenance system for packaging conveyors in the food industry using IR and MPU6500 sensors. These sensors capture motion and vibration data, which is transmitted to the cloud and analyzed using machine learning models to detect anomalies and predict mechanical failures in advance. A real-time dashboard provides visibility into machine health, usage trends, and KPIs.

Unlike traditional maintenance methods or existing systems that rely on fixed schedules or expensive industrial-grade sensors, this solution is low-cost, scalable, and data-driven. It enables early fault detection, minimizes unplanned downtime, and supports remote monitoring, aligning with Industry 4.0 practices. This makes it more accessible and efficient than many existing market alternatives.
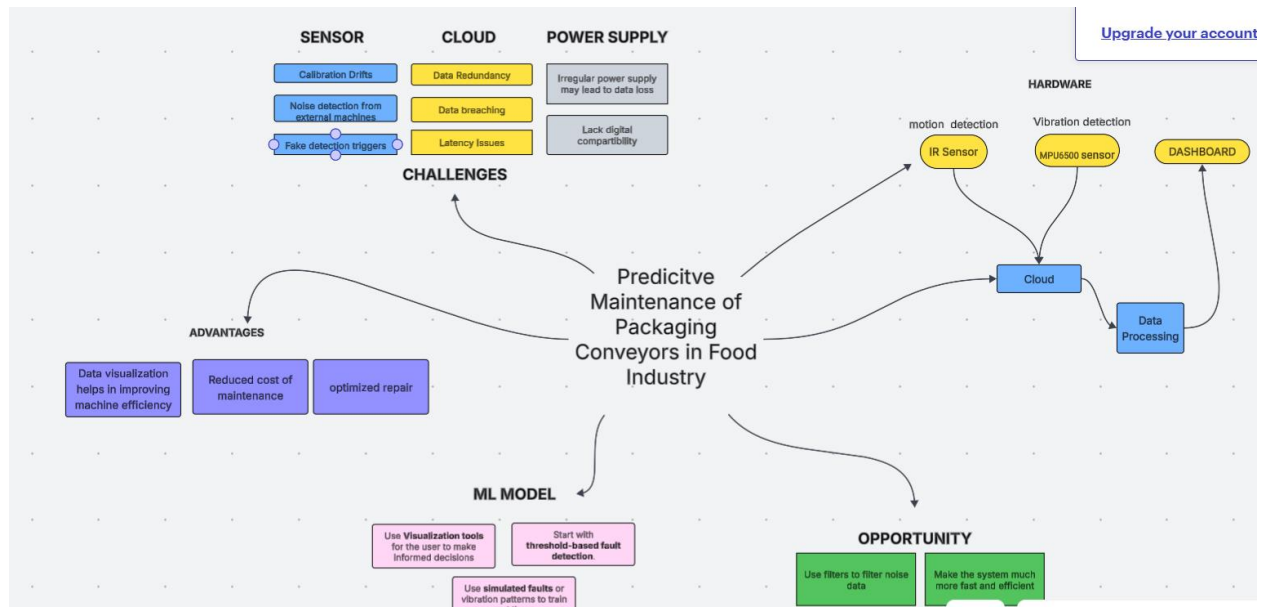
Stage 3: Questionnaire

FOR OPERATORS

What are the most common issues you face with the conveyor belts?

How do unexpected breakdowns affect the productivity of the factory?

How do you currently detect or report faults?

FOR MAINTENANCE PERSONNEL

What types of faults or breakdowns occur most frequently?

How often do u repair conveyors?

How do track the health of conveyor?

FOR PRODUCTION MANAGERS

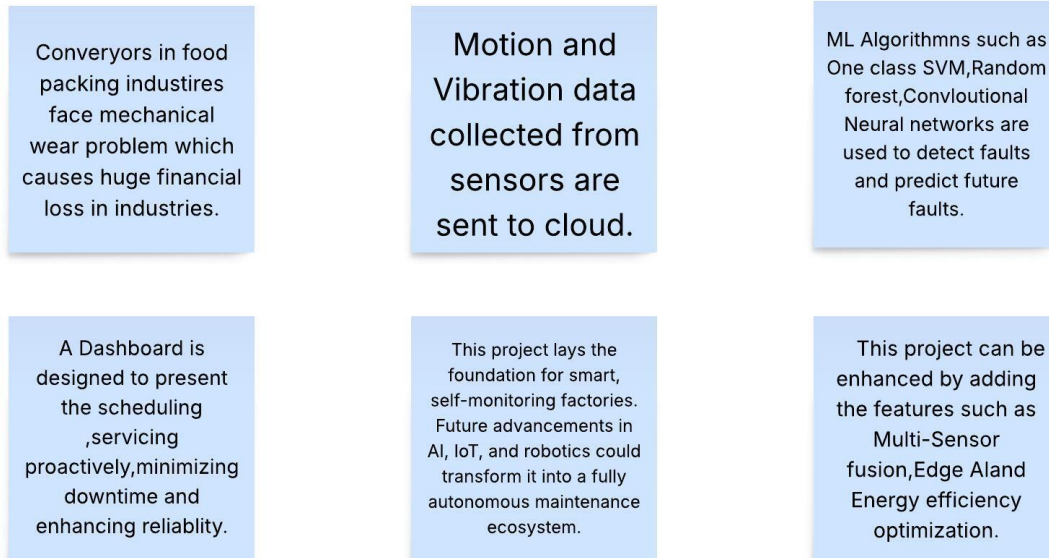How does conveyor downtime impact production targets?

What information would help you make better decisions?

FOR TECHNICAL STAFF

What challenges do you face with current monitoring or data systems?

Are there any integration or connectivity issues with existing equipment?

STAGE 4: IDEA LAYOUT

Converyors in food packing industires face mechanical wear problem which causes huge financial loss in industries.	Motion and Vibration data collected from sensors are sent to cloud.	ML Algorithmns such as One class SVM,Random forest,Convloutional Neural networks are used to detect faults and predict future faults.
A Dashboard is designed to present the scheduling ,servicing proactively,minimizing downtime and enhancing reliablity.	This project lays the foundation for smart, self-monitoring factories. Future advancements in AI, IoT, and robotics could transform it into a fully autonomous maintenance ecosystem.	This project can be enhanced by adding the features such as Multi-Sensor fusion,Edge Aland Energy efficiency optimization.

Stage 5: Ideate

- Identify critical conveyor belt components for monitoring
- Ensure Sensor placement for optimal data collection.
- Check compatibility with existing conveyor and IT infrastructure
- Establish Baseline performance data for conveyors
- Define KPI such as downtime and maintenance cost etc
- Integrate PMS with existing MMS
- Schedule regular calibration and inspection of sensors
- Stock critical spare parts to minimize repair delays
- Ensure relevance to workplace safety standards and temperature