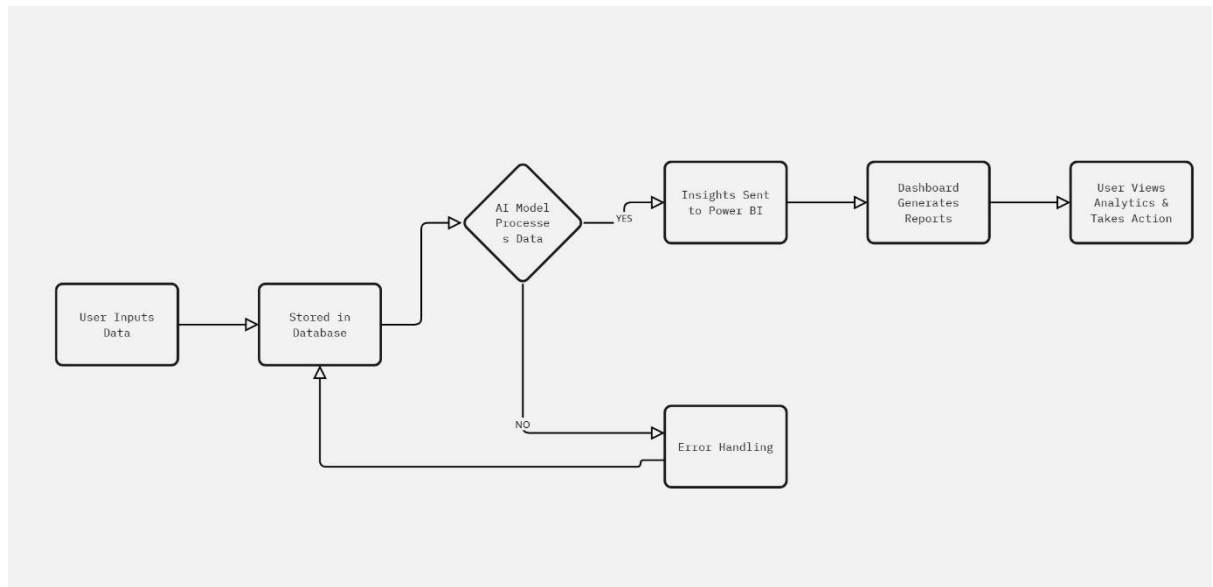


AI AND IOT TECHNOLOGY IN AUTOMOTIVE PARTS MANUFACTURING

Introduction

This project aims to optimize **automotive parts manufacturing** using **AI-driven predictive analytics**. The system will use **AI models** to analyze production data and **Power BI for visualization**, helping manufacturers improve efficiency, reduce defects, and minimize downtime.

Data Flow Diagram



User Inputs Data:

- Data is **collected manually** by operators
- Inputs include **sensor readings, production stats, maintenance logs, and quality control data.**

Stored in Database:

- The system **stores data** in a **structured format**
- The database ensures **data integrity and accessibility** for AI analysis.

AI Model Processes Data:

- The AI model analyzes stored data to extract **patterns, predict failures, and recommend optimizations.**
- Uses **Machine Learning & Deep Learning models** like:
 1. **Regression models** for predictive maintenance.
 2. **Classification models** for defect detection.
 3. **CNN-based image recognition** for quality control.

Insights Sent to Power BI:

- Once processed, AI-generated insights are **formatted and transferred to Power BI** for visualization.
- Insights help managers **monitor performance and take quick decisions**.

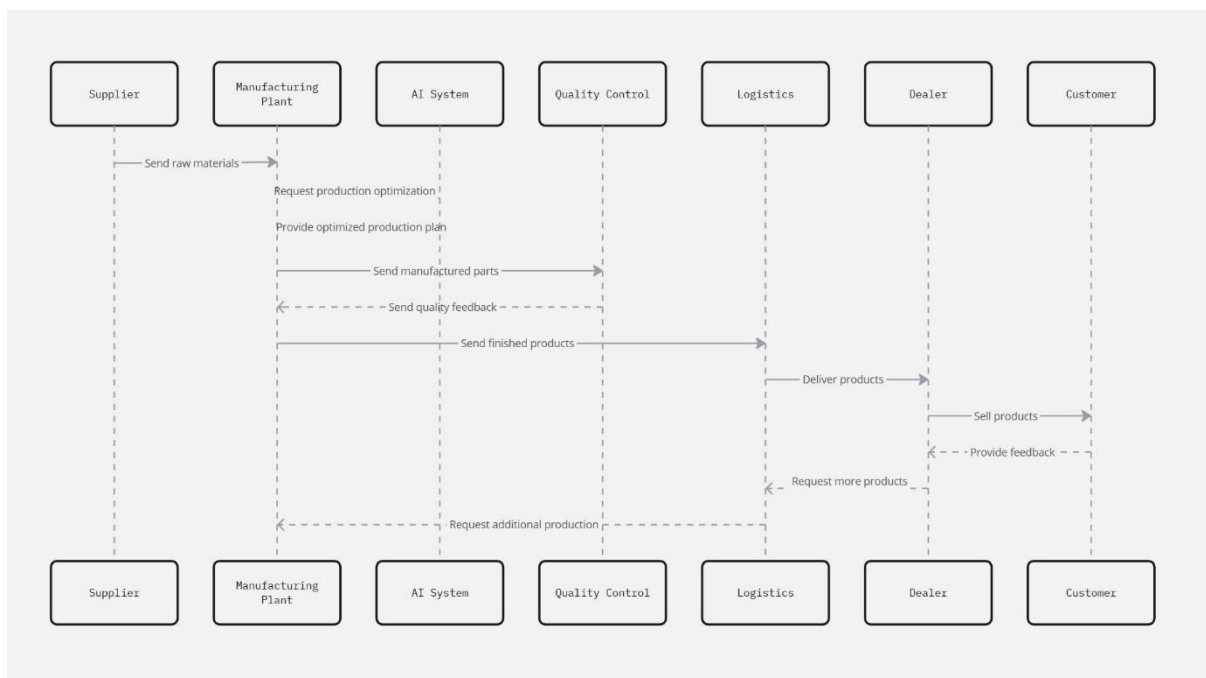
Dashboard Generates Reports:

- Power BI **creates interactive dashboards** to present insights in a **user-friendly manner**.
- The dashboard **displays key metrics** using graphs, charts, and heatmaps.

User Views Analytics & Takes Action:

- The factory manager or technician **reviews the dashboard reports** and makes **data-driven decisions**.
- Based on insights, they take **corrective and preventive actions**.

UML Diagram



Supplier → Manufacturing Plant

- The supplier sends raw materials to the manufacturing plant based on demand and inventory levels.
- The AI system can predict material requirements and optimize procurement to prevent shortages or overstocking.

Manufacturing Plant → AI System

- The manufacturing plant requests production optimization from the AI system based on incoming orders, raw material availability, and machine capacity.
- The AI analyzes real-time data to optimize production schedules, reduce waste, and maximize efficiency.

AI System → Manufacturing Plant

- The AI system provides an optimized production plan based on historical data, demand forecasting, and machine learning models.
- The AI ensures minimal delays and smooth production workflow by suggesting optimal batch sizes and timelines.

Manufacturing Plant → Quality Control

- Once the parts are manufactured, they are sent to the Quality Control department for inspection and testing.
- AI-driven quality control can automate defect detection using computer vision and sensor data analysis.

Quality Control → Manufacturing Plant

- If quality issues are detected, feedback is sent to the manufacturing plant for corrective actions or re-manufacturing.
- The AI system can track recurring defects and suggest improvements to minimize errors in future production.

Manufacturing Plant → Logistics

- After passing quality checks, finished products are sent to the logistics team for distribution.
- AI assists in route optimization, vehicle scheduling, and inventory tracking to ensure efficient delivery.

Logistics → Dealer

- The logistics team delivers products to dealers according to optimized schedules and demand forecasts.
- AI helps predict dealer demand and ensure inventory levels are balanced across different locations.

Dealer → Customer

- The dealer sells the products to end customers.
- AI-driven recommendations can improve customer targeting and sales strategies.

Customer → Dealer

- Customers provide feedback on product quality and performance.
- AI analyzes feedback to detect trends and improve future product quality.

Dealer → Logistics

- If demand increases, the dealer requests additional products from logistics to restock inventory.
- AI predicts restocking needs based on sales data and automates reorder processes.

Manufacturing Plant → Supplier

- If more raw materials are required due to increased demand, the manufacturing plant requests additional materials from the supplier.
- AI automates procurement planning, reducing delays and ensuring seamless production.