

1. Project Planning & Management

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Project Proposal

The **Manufacturing Downtime Prediction Project** focuses on analyzing historical machine data to understand the causes and patterns of equipment failures.

The primary objective is to identify the key metrics and operational conditions that influence machine breakdowns and to **predict when the next failure is likely to occur**.

By developing a predictive maintenance model, the project aims to help the manufacturing team **minimize unplanned downtime, optimize maintenance schedules, and reduce overall operational costs**.

The analysis will be based on the **AI4I 2020 Predictive Maintenance Dataset**, which includes sensor readings (such as air temperature, process temperature, rotational speed, torque, and tool wear).

Project Plan

Timeline: 6-week plan

- **Week 1–2:** Data understanding and preprocessing
- **Week 3–4:** Exploratory data analysis (EDA) and feature engineering
- **Week 5:** Predictive modeling and evaluation
- **Week 6:** Dashboard visualization and presentation

Milestones:

- Data preparation (exploration and cleaning)
- Data modeling
- Insights and correlations
- Predictive model
- Power BI dashboard

Resources:

Power BI, GitHub, and documentation tools (Word, PowerPoint).

Task Assignment & Roles

Responsibility	Team Member
Data collection & cleaning	Rania, Israa
Data understanding & documentation	Israa Aya, Rania, Toka
Exploratory Data Analysis (EDA)	Aya, Mayada
Data transformation & data modeling	Aya, Toka
Analyzing data	Aya, Israa, Rania, Hend, Toka, Mayada
Dashboard visualization & reporting	Aya, Israa, Rania, Hend, Toka, Mayada

Risk Assessment & Mitigation Plan

Risk	Potential Impact	Mitigation Strategy
Incomplete or noisy data	Inaccurate insights	Data validation & cleaning rules
Model overfitting	Poor generalization	Cross-validation and tuning
Team coordination delays	Timeline impact	Weekly progress check-ins
Dashboard misinterpretation	Wrong decisions	Add clear labels and tooltips

KPIs (Key Performance Indicators)

KPI	Description
Failure Prediction Accuracy	Accuracy of identifying machines likely to fail
Downtime Reduction	Percentage decrease in machine downtime
System Uptime	Overall machine uptime rate
User Adoption Rate	Stakeholders using the dashboard