Predictive Maintenance Project Plan (8-Week Timeline)

Project Timeline

- Duration: January 2023 – March 2023
- Total Duration: 8 Weeks
- Project Type: Independent Data Science Project

Week 1 – Project Setup

- Create GitHub repository and folder structure
- Design project documentation layout
- Set up virtual environment and requirements.txt

Week 2 – Data Simulation

- Develop IoT sensor simulation logic
- Generate 12 months of hourly sensor readings
- Simulate machine failures with drift patterns
- Save sensor_readings.csv and failures.csv

Week 3 – Azure SQL Integration

- Create Azure SQL database
- Create sensor_readings and failures tables
- Upload simulated data to Azure SQL
- Verify connection using pyodbc/sqlalchemy

Week 4 – Feature Engineering

- Load data from Azure SQL
- Generate rolling windows (6h, 12h, 24h)
- Create trend features (deltas)
- Create y_failure_72h target label

Week 5 – Exploratory Data Analysis

- Visualize sensor distributions
- Analyze pre-failure drift
- Generate heatmaps, boxplots, and correlation charts
- Document insights

Week 6 – Model Training

- Train Logistic Regression baseline
- Train Random Forest & Gradient Boosting
- Handle class imbalance
- Hyperparameter tuning

Week 7 – Model Evaluation

- Generate ROC curve and confusion matrix
- Analyze precision, recall, F1-score
- Assess feature importance
- Finalize best model and save model.pkl

Week 8 – Documentation & Publication

- Write full README.md
- Add diagrams and figures
- Upload project plan to /docs/
- Polish GitHub repository
- Publish final version

Status Tracker

- Week 1 – Setup ..... [ ]
- Week 2 – Simulation ..... [ ]
- Week 3 – Azure SQL ..... [ ]
- Week 4 – Feature Engineering ..... [ ]
- Week 5 – EDA ..... [ ]
- Week 6 – Model Training ..... [ ]
- Week 7 – Evaluation ..... [ ]
- Week 8 – Documentation ..... [ ]