Biweekly Report

Name: Fubin Chen

Period: April 7 - April 20, 2025

Project: Smart Maintenance Platform for Aero Engine Industrial Equipment

Week 3: Core Function Design - UI Components (April 7-13, 2025)

During this period, I focused on designing the user interface components for our ML-based device lifespan prediction web application. I created wireframes and interactive prototypes for all five core modules:

- Designed the Device Center interface with equipment registration, listing, and detail views
- Created the Monitoring Center dashboard with real-time parameter visualization and status indicators
- Developed Data Simulation module with parameter configuration and simulation control interfaces
- Designed Alert System interface with notification center and alert classification views
- Created Reporting System with customizable report templates and visualization options

For each module, I developed responsive layout designs that optimize the user experience across different devices. I established a consistent visual language including color schemes, typography, and component styling to ensure interface cohesion throughout the application.

Time spent on UI Component Design: 18 hours

Week 4: Core Function Design - Backend Architecture (April 14-20, 2025)

This week I focused on designing the backend architecture to support our application's core functionalities:

- Designed the database architecture with MongoDB for device metadata and InfluxDB for time-series sensor data
- Developed entity relationship diagrams for key data models including devices, users, models, and alerts
- Created schema definitions with appropriate indexing strategies for optimized query performance

I developed the data models and database schema to efficiently store and retrieve device information, monitoring data, and prediction results. The database design includes optimization for handling time-series data and supporting complex queries for reporting features.

I designed the API endpoints for all five modules, ensuring they follow RESTful principles and provide the necessary data exchange between frontend and backend components. For each endpoint, I defined:

- Request/response formats with detailed JSON schema documentation
- Authentication and authorization requirements using JWT tokens

Time spent on Backend Architecture Design: 18 hours

Completed WBS Items

- **3.4 Core Function Backend Design** (WBS Item, 30 hours) - 80% Complete

   3.3 Core Function UI Design (WBS Item, 24 hours) - 85% Complete

Challenges & Solutions

The main challenge I faced was designing a database architecture that could efficiently handle both traditional relational data and high-volume time-series data from sensors. I addressed this by:

1. Implementing a hybrid database approach with MongoDB for metadata and InfluxDB for sensor data
2. Designing appropriate data partitioning strategies based on time ranges and device categories
3. Creating efficient indexing schemes to support common query patterns

Next Steps

1. Finalize the remaining backend architecture design elements
2. Begin implementation of core database models and API endpoints

Total Hours Worked

Total hours for this reporting period: 36 hours