Team Biweekly Report Summary

Project: Smart Maintenance Platform for Aero Engine Industrial Equipment

Period: March 24 - April 6, 2025

Progress Overview

Team successfully completed project initiation and planning phases. Project Charter, requirements analysis, system architecture, risk management plan, and testing strategy are finalized. Development environment and collaboration platform are operational.

Project Progress Status

According to the project Gantt chart, during this reporting period (March 24 - April 6, 2025), the team has completed the following WBS tasks:

- Task 1 (Initiation Phase): 100% complete, including requirements analysis and confirmation, Project Charter development, project scope definition, stakeholder identification, and resource allocation
- Task 2 (Planning Phase): 100% complete, including detailed requirements specification, test plan development, risk management plan, model selection, and data requirements analysis
- Task 3.1 (System Architecture Design): Started and completed

Current project progress is fully aligned with the schedule, with no delays. All milestones for the initiation and planning phases have been achieved on time, establishing a solid foundation for the next design and development phases.

Team Contributions in Relation to WBS

- **Xuanhe Yang (28 hours):**
  - WBS 1.1: Requirements analysis and confirmation (9 hours)
  - WBS 1.3: Project scope definition (4 hours)
  - WBS 1.4: Stakeholder identification (2 hours)
  - WBS 2.4: Model selection (8 hours)
  - WBS 2.5: Data requirements analysis (5 hours)
- **Fubin Chen (22 hours):**
  - WBS 1.2: Project Charter development (2 hours)
  - WBS 2.3: Risk management plan (12 hours)
  - WBS 3.1: System architecture design (8 hours)
- **Tong Li (20 hours):**
  - WBS 1.5: Resource allocation (2 hours)
  - WBS 2.1: Detailed requirements specification (18 hours)
- **Jingxiao Han (22 hours):**
  - WBS 2.2: Test plan development (12 hours)
  - Extra work（10 hours）

Key Deliverables

1. **Project Management:** Charter, Requirements Spec, Risk Plan, WBS/RBS, Testing Strategy
2. **System Design:** Architecture, Technology Stack, Data Flow Diagrams, Interface Definitions
3. **Infrastructure:** GitHub setup, Collaboration Platform, Development Environment
4. **Proof of Concept:** Initial Date Functionality Implementation

Challenges & Solutions

- **Challenge:** Defining data requirements for ML models in complex conditions
- **Solution:** Researched standards and consulted experts

Next Steps

1. Develop Device Center and Monitoring Center modules
2. Build sensor data preprocessing pipeline
3. Implement initial fault detection model
4. Develop database architecture
5. Start frontend prototyping

Resource Summary

- **Total Working Hours:** 92 hours
- **Task Status:** All planned tasks completed on schedule
- **Project Health:** On track, all indicators meeting expectations

Biweekly Report

Name: Xuanhe Yang

Period: March 24 - April 6, 2025

Project: Smart Maintenance Platform for Aero Engine Industrial Equipment

Week 1: Project Initiation (March 24-29, 2025)

During the first week, I focused on requirement analysis and project scope definition for our ML-based aviation engine maintenance system. I led multiple stakeholder discussions to ensure alignment on project objectives. My specific contributions included:

1. **Requirements Analysis and Confirmation (March 24-27)**
    - Conducted comprehensive analysis of aviation engine maintenance requirements
    - Defined core system objectives focusing on predictive maintenance capabilities
    - Documented functional requirements for all five modules: Device Center, Monitoring Center, Data Simulation, Alert System, and Reporting System
2. **Project Scope Definition (March 25-27)**
    - Defined the project boundaries and deliverables
    - Established clear criteria for project success
    - Identified key integrations with existing systems
3. **Stakeholder Identification (March 24)**
    - Mapped all relevant stakeholders and their requirements
    - Established communication protocols for project updates
    - Documented stakeholder roles and responsibilities

Time spent: 15 hours

Week 2: Planning and Initial Architecture (March 30-April 6, 2025)

The second week was dedicated to data requirements analysis, ML model selection, and system architecture design:

1. **Data Requirements Analysis (March 31-April 1)**
    - Analyzed sensor data requirements for engine monitoring
    - Identified key parameters needed for accurate lifespan prediction
    - Created data dictionary and flow diagrams
2. **Model Selection (April 4-6)**
    - Evaluated potential ML models for engine fault detection and RUL prediction
    - Conducted literature review of CNN-LSTM, CNN-Transformer, and DBN-BiGRU models
    - Selected appropriate algorithms based on accuracy and processing requirements

Time spent: 13 hours

Challenges & Solutions

The main challenge was defining appropriate data requirements for the machine learning models while considering the complexity of aviation engine parameters. I addressed this by researching industry standards and consulting with domain experts to ensure our data acquisition plan would support accurate predictive maintenance capabilities.

Next Steps

1. Begin development of the Device Center module
2. Create data preprocessing pipeline for sensor data

Total Hours Worked

Total hours for this reporting period: 28 hours

Biweekly Report

Name: Jingxiao Han
Period: March 24 - April 6, 2025
Project: Smart Maintenance Platform for Aero Engine Industrial Equipment

Week 1: Project Initiation Phase

During the project initiation phase, I was primarily involved in the process of requirements gathering, analysis, and confirmation. Through several discussions with team members and relevant stakeholders, we clarified the project scope and defined the main objectives, focusing on the development of a machine maintenance platform and the training of its underlying predictive model.

In the development of the Project Charter, I took the lead in refining the Resource Breakdown Structure (RBS) and the corresponding Work Breakdown Structure (WBS). I categorized the overall project into three main components: core functionality, non-core functionality, and predictive model development and training. Based on this decomposition, I revised and enhanced the existing Gantt chart to reflect a more detailed schedule, clearly outlining task durations, dependencies, and milestones.

In addition, I assigned specific team members to each task to ensure accountability and improve execution efficiency. The total time spent on this phase was approximately 11 hours.

Week 2: Project Planning Phase

During the planning phase in the second week, I was mainly responsible for designing the **project testing strategy**, which covers **unit testing, integration testing, system testing**, and **user acceptance testing**.

- **Unit Testing** is planned to be conducted in parallel with the development process, with developers being responsible for testing their own modules to ensure baseline functionality and stability.
- **Integration Testing** will be divided into two stages: one for core functions and another for non-core functions. Once the development of each module is completed, the respective module lead will organize integration testing to validate the correctness of data exchange and interface interactions.
- **System Testing** will be performed after all modules are integrated, aiming to verify the stability and performance of the overall system across all business processes.
- **User Acceptance Testing** will take place during the pre-release phase, where selected target users will participate in real-world scenario testing, providing feedback to further refine the system.

When designing the testing plan, I also referenced previous project experiences and tailored the testing timeline and responsibilities based on the specific characteristics of this project. The total time spent during this phase was approximately **11 hours**.

Biweekly Report

Name: Fubin Chen
Period: March 24 - April 6, 2025
Project: Smart Maintenance Platform for Aero Engine Industrial Equipment

Week 1: Project Charter Development (March 25-29, 2025)

During this week, I focused primarily on developing the Project Charter for our ML-based device lifespan prediction web application. I successfully defined the project scope, objectives, and deliverables through collaborative sessions with team members.

I established a comprehensive structure for the project, breaking it down into five core functional modules: Device Center, Monitoring Center, Data Simulation, Alert System, and Reporting System. For each module, I outlined key features, dependencies, and implementation priorities.

The Project Charter documentation included stakeholder identification, preliminary resource allocation, initial risk assessment, and a baseline project schedule. I also established key performance indicators to measure project success and created a communication plan to ensure effective information flow.

Time spent on Project Charter Development: **11hours**

Week 2: Risk Management & System Architecture (March 30-April 5, 2025)

This week was divided between developing the Risk Management Plan and creating the System Architecture Design:

Risk Management Plan (March 30-April 5)

I conducted a thorough risk assessment for our project, identifying potential technical, operational, and resource-related risks. For each identified risk, I evaluated both probability and impact, creating a risk prioritization matrix. I developed specific mitigation strategies for high-priority risks, focusing particularly on challenges related to machine learning model accuracy, data quality issues, and integration complications. The plan includes risk monitoring protocols and contingency plans for critical risks.

Time spent on Risk Management Plan: **7 hours**

System Architecture Design (April 2-3)

I designed the system architecture for our application, establishing a three-tier structure that includes:

- **Presentation layer (frontend web interface)**
- **Application layer (business logic and ML components)**
- **Data layer (database structure and storage mechanisms)**

I defined the technology stack, selecting appropriate frameworks and libraries for both frontend and backend development. The architecture accommodates all five main functional modules while ensuring scalability and maintainability.

Time spent on System Architecture Design: **11 hours**

Biweekly Report

Name: Tong Li

Period: March 24 - April 6, 2025

Project: Smart Maintenance Platform for Aero Engine Industrial Equipment

Week 1: Project Initiation Phase

Resource Allocation

During the project initiation phase, I was primarily responsible for planning and allocating project resources. Through in-depth discussions and coordination with the project team, I thoroughly assessed the human, technical, and hardware resources required for the project and developed a detailed resource allocation plan.

For human resource allocation**, based on the role definitions in the project charter, I clarified the division of responsibilities among team members and established a cross-functional collaboration mechanism. Communication tools and schedules were agreed upon to ensure efficient coordination across all roles.**

For technical resource planning**, I confirmed the adoption of the** Vue.js + Spring Boot **technology stack, allocated server resources for model training and deployment, and verified the availability of key datasets.**

For infrastructure preparation**, I set up a** GitHub-based **code management environment, configured a team collaboration platform (**Feishu Docs + WeChat**), and established development and testing server environments.**

This phase took approximately 10 hours **in total, laying a solid resource foundation for subsequent development.**

Week 2: Project Planning Phase

Detailed Requirements Specification

During the project planning phase, I led the drafting of the Detailed Requirements Specification (DRS)**. By systematically analyzing project objectives and technical solutions, I translated high-level requirements into actionable technical specifications.**

For functional requirement refinement**, based on an** RBS (Requirements Breakdown Structure)**, the system was decomposed into seven functional modules, including:**

Device Management **(enabling device selection with list and filtering functions),**

Prediction Service **(providing health status and lifespan predictions for devices),**

Real-time Monitoring Center**, and others.**

Input and output data for each module were clearly defined.

For requirements validation**, I established a** requirements traceability matrix **and organized a** requirements review meeting **with key stakeholders to discuss and finalize the solution.**

This phase required a total of 10 hours**, and the resulting documentation provided clear guidance for subsequent design and development.**