**Biweekly Report**

**Name:** XUANHE YANG  
**Period:** March 24 - April 6, 2025  
**Project:** ML-Based Device Lifespan Prediction System for Aviation Engine Maintenance

**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
   * Finalized requirements specification document after stakeholder review
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
   * Created scope statement document with stakeholder approval
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: 30 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
   * Established data collection protocols and quality standards
   * 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
   * Prepared model validation framework for upcoming implementation phase

Time spent: 5 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
3. Implement initial ML model for fault detection
4. Develop database schema for the complete system

**Total Hours Worked**

Total hours for this reporting period: 35hours