**Project Code and Title**

Code: Terrarium@182

Title: Smart Terrarium Monitoring System

**Motivation and Background**

The motivation behind this project stems from the growing interest in smart home automation and the integration of IoT technologies in daily life. Specifically, the focus is on developing a smart terrarium system that utilizes ESP32-CAM for plant recognition and monitoring. The project addresses the need for a sophisticated, yet user-friendly system that can help plant enthusiasts and casual users alike in maintaining optimal conditions for plant growth.

Background research highlighted the importance of consistent monitoring in terrarium environments. Key factors such as temperature, humidity, soil moisture, and light are crucial for plant health. The ESP32-CAM's ability to capture high-quality images and its compatibility with ESP32-S3 boards for data processing and transmission makes it an ideal choice for this application.

**Current Progress**

Hardware Setup: The ESP32-CAM and ESP32-S3 boards have been successfully integrated. The camera is operational and can capture images within the terrarium environment. An initial stage of the mash network has been established.

Software Development: Initial stages of software development have been completed. This includes basic image capturing routines and integration with Espressif Rainmaker for data management.

Sensor Integration: Temperature, humidity, and soil moisture sensors have been integrated and are successfully transmitting data to the ESP32-S3 board.

Data Management: Preliminary data management protocols have been established, enabling the collection and basic analysis of sensor data.

**Future Work (Semester 2)**

Advanced Image Processing: Develop algorithms for plant recognition and health monitoring using the ESP32-CAM. This includes identifying signs of plant distress or disease.

Data Analytics Enhancement: Enhance the data analytics capabilities to provide more insightful information about the terrarium's environment and plant health.

User Interface Development: Create a user-friendly interface for users to monitor and control their terrarium on mobile phone and on the gateway device. This interface will display real-time data and images and allow users to adjust settings remotely.

System Integration Testing: Conduct comprehensive testing to ensure seamless integration of all components and functionalities, including stress testing under various environmental conditions.

Documentation and Training Material: Develop detailed documentation and training materials for end-users, outlining the setup, usage, and maintenance of the smart terrarium system.

Prototyping: Craft and test prototype with precise dimension to ensure its exquisiteness to fit in an office environment.

Pilot Testing: Initiate pilot testing with a select group of users to gather feedback and make necessary adjustments before the final rollout.

This roadmap for Semester 2 focuses on refining the system and ensuring it is user-friendly, reliable, and effective in a real-world terrarium environment.