Project Scope Statement: Plant Health Monitoring System

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Abstract

This document outlines the scope of the Plant Health Monitoring System project, aimed at tracking environmental conditions such as soil moisture, temperature, and humidity using sensors. The system visualizes this data on a Progressive Web App (PWA) and uses machine learning to alert users to abnormal conditions. Additionally, the PWA provides a location-based service to help users find nearby plant care centers.

1 Context of the Project

The project provides a modern solution to monitor plant health by using sensors to collect data on environmental factors that affect plant well-being. The system visualizes this data on a Progressive Web App (PWA) and uses machine learning to analyze and alert users about abnormal conditions. The PWA also integrates location-based services to guide users to the nearest plant care centers, ensuring that assistance is easily accessible.

Figure 1: Plant image

2 Problem Statement

Maintaining optimal plant health requires monitoring various environmental factors, such as soil moisture, temperature, and humidity. Without proper tools for continuous monitoring, users may overlook signs of distress or disease in their plants. This project provides a comprehensive solution by enabling users to track these conditions in real-time and receive alerts when conditions are not ideal.

3 Ambitions

The goal is to develop a system that offers real-time monitoring of environmental conditions and utilizes machine learning for predictive analysis of abnormal plant health conditions. Additionally, the system will enable users to easily locate nearby plant care centers, ensuring a proactive approach to plant care.

4 Scope Description

The system will be used in agricultural zones, home gardens, and other areas where plant health monitoring is essential.

The project will provide real-time data on soil moisture, temperature, and humidity.

Machine learning will be integrated to alert users of abnormal conditions affecting plant health.

The PWA will offer location-based services, helping users find the nearest plant care centers.

Target users include farmers, gardeners, and plant enthusiasts looking for efficient ways to monitor and care for their plants.

5 Architecture

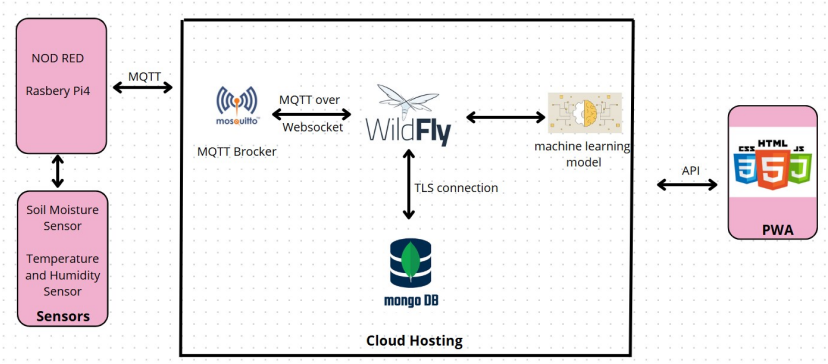

Figure 2: Project Architecture

6 Business Model

6.1 Customer Segments

- Farmers and agricultural businesses requiring plant health monitoring solutions.
- Individual gardeners and plant enthusiasts who want to optimize plant care.
- Educational institutions and research organizations for teaching or studying plant health.
- Community gardens and urban farming projects that need collective plant health assessments.

6.2 Value Propositions

- Real-time monitoring of environmental factors influencing plant health.
- Machine learning alerts for abnormal conditions affecting plants.
- Access to local plant care centers and resources for expert assistance.
- User-friendly interface for easy access to information and services.

6.3 Channels

- A Progressive Web App (PWA) available on both desktop and mobile devices.
- Social media and online marketing for user engagement and awareness.
- Partnerships with local agricultural centers and gardening suppliers to promote the system.
- Online gardening communities and forums for feedback and outreach.

6.4 Customer Relationships

- Community-building through social media and user forums for shared plant care experiences.
- Providing educational content on plant health and environmental monitoring to maintain user interest.

6.5 Revenue Streams

- Subscription model for advanced features such as detailed environmental analysis.
- Pay-per-use for professional consultations with plant care specialists.
- Affiliate marketing partnerships with local gardening centers and agricultural suppliers.
- Potential for advertising revenue from related plant care businesses.

6.6 Key Activities

- Development and maintenance of the machine learning model for environmental and health predictions.
- Regular updates to the PWA for improved user experience and new features.
- Marketing efforts to attract users and promote the system's benefits.
- Collaboration with experts and institutions for accurate diagnostics and plant care resources.

6.7 Key Resources

- A skilled development team with expertise in software engineering and data science.
- Access to a comprehensive database for plant health and environmental factors.
- Cloud infrastructure for hosting the application and processing data efficiently.

6.8 Key Partnerships

- Collaborations with agricultural universities and research centers for research and validation.
- Partnerships with local agricultural extension services to reach farmers.
- Alliances with plant care providers for access to expert resources.

6.9 Cost Structure

- Development and operational costs for the PWA and machine learning model.
- Marketing and outreach expenses to increase user adoption.
- Costs related to cloud hosting, data storage, and customer support.

7 Constraints

7.1 Working Methodology:

Agile Development

7.2 Technical Stack:

Server Side: Node.js

Database: MongoDB

Application Server: WildFly

Client Side: HTML, CSS, JavaScript

IoT Edge: Raspberry Pi 4

Sensors: DHT22 (for humidity and temperature) YL-69 (for soil moisture)

Continuous Integration: GitHub Actions

8 Project Timespan

The project is expected to be completed within six months, with the following key milestones:

- Step 1: Building the user interface – Duration: 1 week
- Step 2: Setting up the server side – Duration: 2 weeks
- Step 3: Developing the machine learning model – Duration: 2 weeks
- Step 4: Implementing location-based services – Duration: 1 week
- Step 5: Deployment and integration – Duration: 2 weeks

9 Exclusions

This project will not provide the status or health diagnosis of the plant itself. It will focus solely on providing environmental factors such as soil moisture, humidity, and temperature to help users understand potential influences on plant health.

10 Conclusion

The Plant Health Monitoring System offers a comprehensive solution for monitoring environmental conditions that affect plant health. By combining sensor data, machine learning, and location-based services, this project aims to empower users to take proactive steps in caring for their plants and accessing local support resources when necessary.