Summary of the Graduation Project on Smart Technology Applications in Agriculture

Valley Higher Institute for Engineering & Technology

Ministry of Higher Education

Introduction

The project explores the integration of advanced technologies in agriculture to address global challenges such as climate change, population growth, and resource depletion. The goal is to enhance crop productivity and environmental sustainability by developing a smart agriculture system that incorporates Flutter, FlutterFlow, AI (Gemini AI), cloud services, Firebase, Firestore, and IoT

Objectives

The main objectives are to:
1. Develop a user-friendly mobile application using Flutter and FlutterFlow.
2. Implement a smart irrigation system using the ESP32 microcontroller and IoT sensors.
3. Utilize Gemini AI for effective plant disease identification

Methodology

The project follows a systematic approach, adopting agile methodologies for iterative development. Key technologies explored include:

- **Flutter and FlutterFlow:** For building the mobile application interface.

- **AI (Gemini AI):** For plant disease identification through machine learning algorithms.

- **IoT:** Using the ESP32 microcontroller to integrate various sensors and automate the irrigation process.

- **Cloud Services:** Firebase and Firestore for data storage and management.

Smart Irrigation System

The system uses IoT sensors (DHT22 for temperature and humidity, soil moisture sensor, and water level sensor) integrated with the ESP32 microcontroller to monitor environmental conditions and control irrigation schedules. This ensures optimal water usage and plant health.
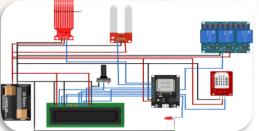
AI-Powered Plant Disease Identification

Gemini AI leverages machine learning to analyze images captured by the device's camera, diagnosing potential plant diseases. This feature provides timely insights, enabling farmers to take proactive measures to prevent disease spread and optimize crop yields.

Conclusion

The project demonstrates the potential of combining Flutter, FlutterFlow, IoT, and AI to create innovative solutions for agriculture. This integration not only enhances productivity and efficiency but also promotes sustainable farming practices. The smart agriculture system developed serves as a model for future technological advancements in the agricultural sector.

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