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Revolutionizing Agriculture: Smart Agro System using IoT

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Abstract: *With cloud-based data tracking, multi-language support, and an AI chatbot, Smart Agro is a mobile app that uses Flutter, Dart, Python, TensorFlow, and Firebase to empower farmers with precision agriculture tools for sustainable and productive farming. It analyzes crop health from photos, provides advice on soil and irrigation, and supports IoT sensors for real-time insights.*

Keywords: Smart Agriculture, Precision Farming, Smart Irrigation, Climate Monitoring

I. INTRODUCTION

By combining AI, IoT, and real-time data analytics, Smart Agro tackles important farming issues and enhances resource efficiency and decision-making. By providing precise information on crop selection, irrigation, and disease management, it makes precision farming possible. It lowers agricultural losses and water waste through automated irrigation, real-time soil and weather monitoring, and machine learning-based early crop disease identification. Smart Agro enables farmers to embrace sustainable practices, increase production, and make well-informed agricultural decisions by providing tailored, data-driven advice.

II. SYSTEM OVERVIEW

The components of the Smart Agro system are:

- A mobile application developed with Dart and Flutter.
- TensorFlow and Python-based AI-based agricultural health analysis.
- Integration of IoT sensors to track soil moisture, temperature, and humidity.
- Firebase for cloud-based communication and data storage.

AI chatbot for multilingual, natural language-based assistance.

III. METHODOLOGY

- Data Acquisition: Real-time environmental data is collected using IoT sensors.
- Image Processing: The AI module processes crop images to identify ailments and offer therapies.
- Decision Support System: Based on the supplied data, the app delivers specific suggestions for irrigation and fertilizer use.
- Communication Layer: To store and retrieve data, the application uses Firebase to communicate with a cloud server.

IV. CHARACTERISTICS

- Multilingual chatbot platform
- Real-time soil and weather monitoring;
- image processing for crop disease diagnosis;

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- intelligent irrigation recommendations;
- cloud syncing and data history tracking

V. EXECUTION

A Python backend with Firebase integration and a Flutter front-end were used to execute the project. Wi-Fi was used to link IoT devices and send data. The crop disease model was trained using open-source datasets and TensorFlow.

VI. CONCLUSION

One promising stage in the transition from conventional farming to smart agriculture is smart agro. With the help ofAI,IoT, and real-time analytics, farmers can increase production, optimize resources, and make well-informed decisions. The application might completely transform India's and other countries' agricultural ecosystems.

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