What is muthmir ?

Muthimr is a smart greenhouse management system that integrates **IoT** and **AI** to monitor environmental conditions, automate decisions, and provide real-time insights. It includes a mobile app for remote control, plant health tracking, and user interaction through a chatbot and greenhouse owner community.

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Chapter 1 : Project objectives

Turning challenges into opportunities, our product not only enhances existing advantages but also solves critical problems, setting a new standard for excellence in the market so our objective

- **Optimized Resource Management:** our system for efficient greenhouse management can help reduce operating costs by optimizing resource usage, such as energy and water. This addresses the challenge of higher production costs and ensures sustainable practices.
- **Remote Management Flexibility:** Through advanced remote monitoring and control functionalities, our system facilitates year-round cultivation. This capability ensures mitigating the impact of labor shortages and enhancing overall productivity and profitability
- **Data-Driven Pest and Disease Management:** By utilizing data analytics and monitoring capabilities, our system can enhance pest and disease management strategies. This improves crop health and reduces the risks associated with ideal conditions for diseases, contributing to better pest management within the greenhouse.
- **Efficient Water and Pesticide Usage:** our system's data analysis and automation can optimize water and pesticide usage, reducing overall consumption. This aligns with efficient water management and lower pesticide usage, promoting environmentally friendly practices.
- **Market Intelligence and Decision Support:** our system can provide market intelligence through data science, helping farmers make informed decisions about crop selection and market demand. This supports stable marketing operations and profitability

Chapter 2: IOT

The system includes a set of sensors that measure key environmental factors such as temperature, air humidity, soil moisture, and light intensity. Based on these readings, immediate decisions are made to maintain optimal conditions. All the collected data is then sent to the cloud for further processing and analysis.

Chapter 3: AI

3.1Tomato leaves disease detection model

Introduction:

This study aims to develop a robust detection model capable of identifying multiple tomato leaf diseases with high precision and recall.

Objectives

The goal is to enhance agricultural productivity through reliable disease monitoring.

Types of Diseases We Can Classify:

Early Blight, Healthy, Late Blight, Leaf Miner ,Leaf Mold, Mosaic Virus, Septoria ,Spider Mites ,Yellow Leaf and Curl Virus.

3.2 Chatbot Automated Greenhouse System

Introduction:

We make chatbot by RAG Framework with Gemini

Objectives:

This chatbot answers this questions:

1. General Questions about the Project

2. Questions Regarding Greenhouse Data (e.g., temperature, humidity, etc.)

3. Control of Specific Devices in the Greenhouse (e.g., air conditioning, lighting, etc.)

3.3 ML model for Identifying Tomato Growth Stages:

Introduction:

resources like water and energy are often wasted due to inaccurate assessments of the plants' needs. For instance, over-watering or under-watering may occur if the growth stage is not identified properly, so we build this model.

Objectives:

This ML model will predict the plant's growth stages based on image, allowing the smart system to automatically adjust conditions to ensure the best growing environment.

Chapter 4: Data Analysis

4.1 Data visualization

We make data visualizations to enable users to monitor key metrics like temperature, humidity, and soil moisture.

Users can easily analyze trends, identify patterns, and make data-driven decisions to optimize greenhouse conditions.

The system displays key metrics from the past 24 hours and at any time by time filters.

4.2 Predicting Electricity and water usage

It is important to track the electricity usage of the system. By monitoring energy consumption and water usage.

Users can better manage resources, improve efficiency, and make informed decisions about system operation.

By some calculations, we calculated the electricity and water usage and displayed it with data visualization.

and we will create a model that predicts electricity and water usage

5 Mobile application

- Acts as a bridge between the user and the greenhouse system.

- Enables full control over all environmental factors (temperature, humidity, light, etc.).

- Includes a community feature for communication among greenhouse owners.

- Monitors plant health, with instant notifications in case of unexpected changes.

- Provides insights into the plant's growth stage and age.

- Integrates a chatbot for answering questions and assisting the user interactively.