

Project ID: 11

Project Title: Hydroponics Based Precision Farming with Feature Optimization

Name of the Students:

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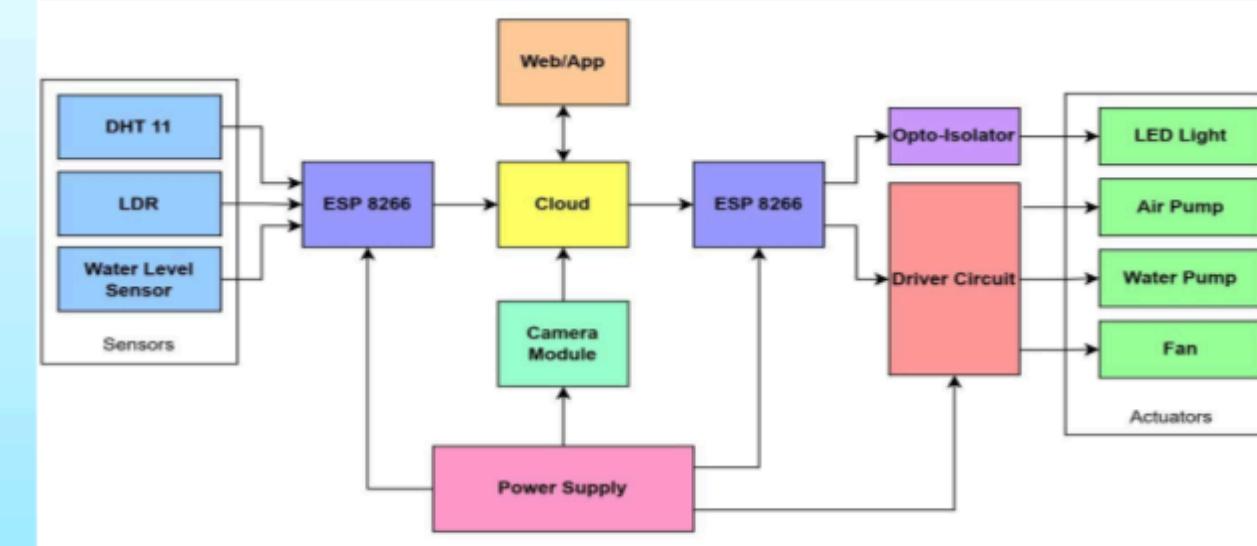
Objectives:

To automate and develop a self-sustaining hydroponics system.

Methodology:

1. Hydroponic automation: LED violet lights, air & water pumps, fan controlled by sensors & actuators with UPS module for uninterrupted power.
2. Consistent light, aeration, hydration ensured through precise environmental control.
3. Scheduled activation of violet light & air pump enhances growth conditions.
4. Easily configure Wi-Fi credentials with softAP technology for seamless network integration.
5. User-friendly control panel for remote monitoring & adjustment, ensuring real-time data sync.
6. Convenient scheduling, automatic reaction to changes, email alerts for timely intervention. Enhances user convenience & system efficiency.

Block Diagram:



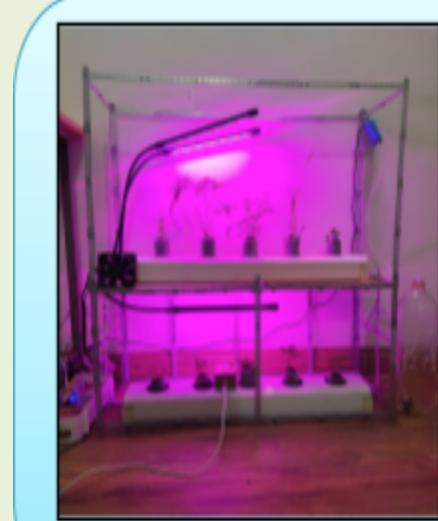
Testing and Debugging:

1. Component Check: Verify functionality of lights, pumps, fans, sensors, etc. Replace any faulty components.
2. Environment Test: Adjust light, temperature, and humidity to simulate real-world conditions; confirm system adaptation.
3. Time Schedule Test: Set different timings for lights and pumps; verify activation/deactivation according to schedule.
4. Wi-Fi Test: Connect system to Wi-Fi; troubleshoot any connection issues.
5. Interface Test: Utilize web/app interfaces for monitoring and control. Verify real-time data and responsiveness.
6. Error Handling Test: Simulate power cuts or sensor malfunctions. Ensure error detection and email alert functionality. Troubleshoot alert issues.

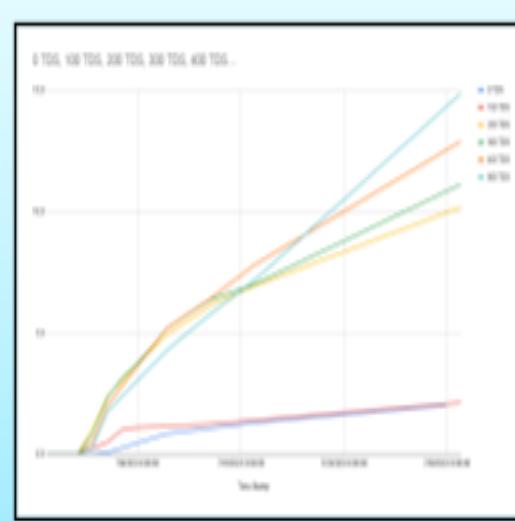
Specifications:

1. Communication Protocol: WiFi (802.11 b/g/n)
2. Power Supply Requirements: 5V 2A
3. Status Indication: LED status indicator.
4. Control Interface: Web and app-based control through WiFi.
5. Motor Activation: Controlled via microcontroller logic.
6. Temperature Range 0°C to 50°C (DHT11 sensor)
7. Humidity Range 20% to 90% RH (DHT11 sensor)
8. Data Transmission: Periodic updates to cloud server.

Result (Photo of Working Project):



Final Setup with Lights ON



Plant Height over Growth at Different TDS



Plants grown using our setup

Conclusion:

Hydroponics-based Precision Farming with Feature Optimization, based on indoor farming with temperature, Violet LED light, water level, and air pump control, has several benefits in addition to faster growth and reduced water consumption. This entire system operates on its own, there is no need for human attention, making it an ideal solution for individuals or businesses seeking to maximize crop yields while minimizing labor and resource costs.