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IoT Based Smart Crop Monitoring System

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Abstract: Advances must also be made in the field of agriculture as new technologies are introduced and used in the modern world. Various studies have been conducted and are widely used to improve the cultivation of crops. Environmental conditions in and around the field must be monitored to effectively improve crop productivity. Parameters that need to be properly monitored to increase yields include soil properties, weather conditions, humidity and temperature. The Internet of Things (IOT) is used in several real-time applications. The introduction of IOT along with sensor networks in agriculture will change the traditional way of farming. Online crop monitoring via IOT helps farmers connect to their fields anytime, anywhere. Various sensors are used to monitor and collect information about the condition of the field.
Keywords: IoT, ESP-32, Sensors, Humidity, Thingspeak

I. INTRODUCTION

Plants play an important role in maintaining ecological cycles, so proper monitoring is necessary to maintain a proper growth and health of plants. Therefore, the purpose of this chapter is to use automation to create an intelligent plant monitoring system. This theme highlights various features such as: B. Smart decision making based on real-time soil moisture. Sensors such as soil moisture sensors are used for this purpose. Soil moisture sensors measure moisture (that is, water content of various plants). When the moisture level falls below the threshold that triggers the pump, a signal is sent to the ESP32 microcontroller board. The pump stops when the absolute humidity level is reached. Sunlight plays an important role for plants. in weak sunlight. In bad weather, you can give your plants plenty of light. Create artificial light with incandescent or LED lights.

A. Objective

To develop a smart crop monitoring system using Internet of Things (IoT) technology and a sensor that can assess the situation and update the system in real time. The system’s purpose is to trigger a response that will act according to the sensor data and gives a perfect output.

II. LITERATURE REVIEW

The term "Internet of Things" refers to connecting objects, devices, vehicles, and other electronic devices to networks for the purpose of data exchange (IoT).

The Internet of Things (IoT) is increasingly being used to connect objects and collect data. Therefore, the use of the Internet of Things in agriculture is of great importance. The idea behind this project is to create an intelligent crop monitoring system connected to the Internet of Things. The microcontroller in this system is NodeMCU/ESP32.Using the DHT11 and soil moisture sensor monitors temperature and humidity in the environment as well as soil moisture. Data is available on both smartphones and computers. As a result, the Internet of Things (IoT) is having a major impact on how farmers work. It also has a positive effect on the crop yield.

Agriculture is essential to India's economy and to the survival of its people. This method aims to help farmers increase their agricultural production. Temperature and humidity sensors are among the tools used to test soil. Sensor data is sent over Wi-Fi to your field manager, and the analyzed data can be viewed in Things Speak or a bot you create.

Developing an effective IoT-based intelligent crop monitoring system is also an important demand for farmers in the agricultural sector. This research develops a low-cost weather-based intelligent irrigation system. First, we need to develop an effective drip irrigation system that can automatically adjust water flow to plants based on soil moisture. To make this water-saving irrigation system even more efficient, IoT-based communication capabilities have been added to allow remote users to monitor soil moisture conditions and manually adjust water flow. The system also includes temperature and humidity and has been updated to allow remote monitoring of these parameters via the internet.

III. METHODOLOGY

A. Block Diagram

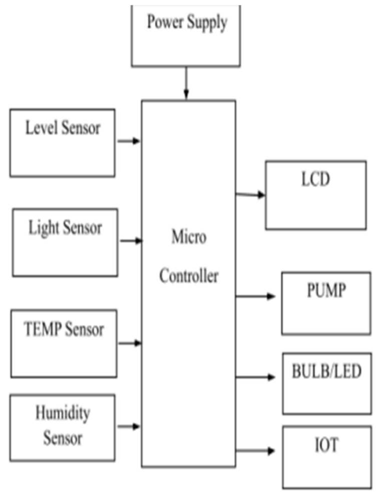

Fig 3.1. Block Diagram

B. Hardware Specifications

1) ESP-32

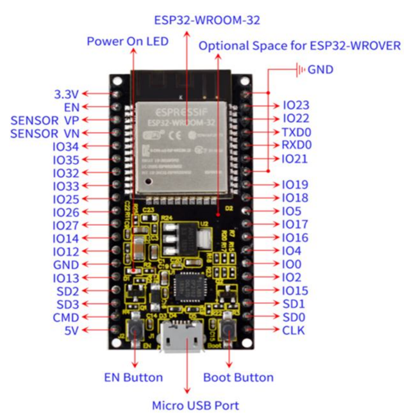

Fig 3.1. ESP-32

2) Sensors

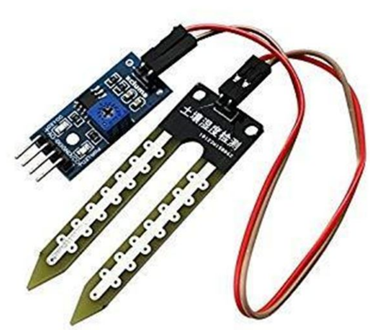

Fig 3.2. Soil Moisture Sensor

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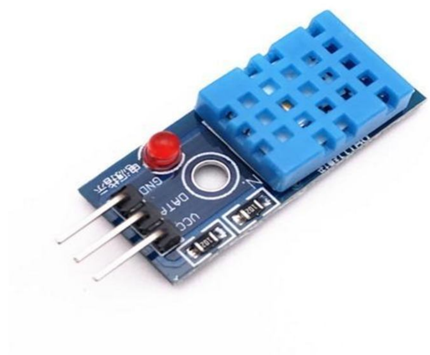


Fig 3.3. DHT11 Sensor

Fig 3.4 LDR Sensor

Fig 3.5 Submersible Motor

C. Transformer

Fig 3.6 Transformer

Fig 3.7 Connecting Wires

D. PCB

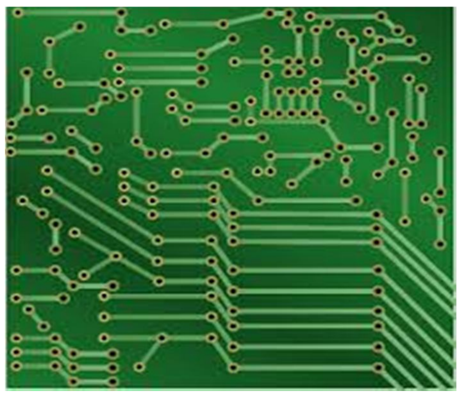


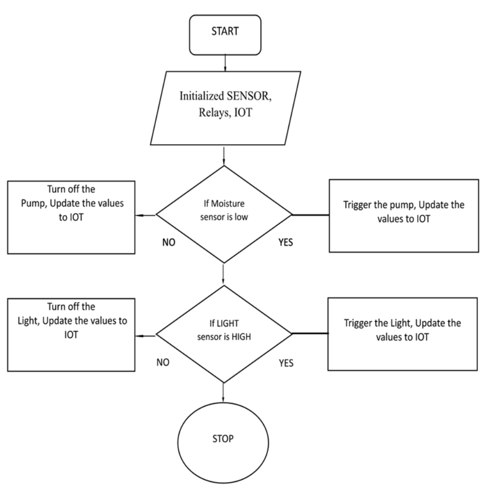
Fig 3.8 PCB

IV. ALGORITHM AND FLOWCHART

A. Algorithm

1) *Step 1* - Initialization sensors, Relays
2) *Step 2* – Checking if sensor gets triggered
3) *Step 3* – Update the unit's value on IOT
4) *Step 4* – If Light sensor value is low trigger pump and update the values to IOT
5) *Step 5* – If Moisture sensor value is low trigger pump and update the values to IOT
6) *Step 6* – Stop

B. Flowchart



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V. RESULTS

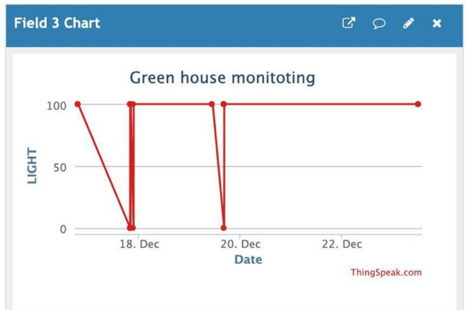

Fig 5.1 Light sensor output

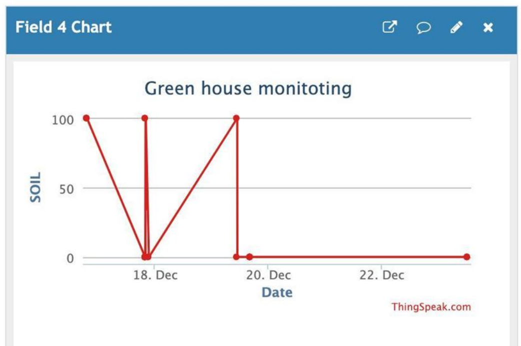

Fig 5.2 Moisture sensor output

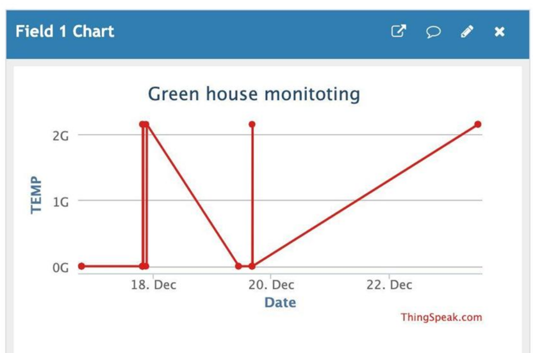

Fig 5.3 Temperature sensor output

Fig 5.4Humidity sensor output

VI. ADVANTAGES AND APPLICATIONS

A. *Advantages*

1) Automatic plant health improvement.
2) Easy to design and apply.

B. *Applications*

1) It can be used in nurseries.
2) It can be used in indoor farming.

VII. CONCLUSION

The "IOT BASED SMART CROP MONITORING" design has been successfully designed and tested. It was developed by integrating the functionality of all tackle factors used. Each module presence has been thought out and carefully placed to contribute to the unit's best functionality. Second, the project was successfully implemented with the help of sophisticated ICs and growing technology.

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