A SMART IOT BASED FARM MANAGEMENT SYSTEM CONTROLLED AND MONITORED BY WEB APPLICATION.

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Abstract - As we see in today's world, only devices like computers and mobiles are connected to the internet. The modern world has been developed by the Internet and the Internet of Things. The Internet of Things (IOT) is simply a physical device or control device, or the interconnection of physical devices consisting of electronics, sensors, software, and networks to achieve greater value and services. information exchange with the manufacturer. Now, due to our working hours, we cannot take care of the plants, such as watering the plants and checking that the plants get enough sunlight. So, we developed a web application to help farmers. This system is designed as an IOT based plant monitoring system. This project includes temperature sensor, humidity sensor, etc. including Various sensors have been used to measure values or parameters such as soil moisture, temperature, water level and soil texture. The development and implementation of sensitive technologies is one of the key steps to achieve sustainability in crop production through precision agriculture.

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***Key Words*: :** Html, sensor Network, Django, Soil Detection, Light detection, Node MCU.

1. INTRODUCTION

We live in a world where everything can be automated and regulated, but there are still some important industries in our country that are not fully automated or underutilized due to various reasons. is the price. One of these areas is agriculture. Agriculture has been one of the main occupations of humans since the earliest civilizations, and even today, manual intervention in agriculture is unavoidable. Plant control is an important part of agriculture and horticulture in our country because it can be used to grow plants under controlled conditions for optimal production. Automation of plant monitoring and management of climate parameters that directly or indirectly affect plant growth. Automation is process control that replaces industrial machinery and human labor. This paper presents the technology of a plant monitoring system that provides feedback to the user through a smartphone. An automated system will reduce the need for manpower and thus reduce the error rate. it is very impossible to monitor the efficiency of the system by introducing this technology to the farmers in a wide area, the farmers can easily monitor the system using smart phones. Also, due to our busy schedule, we cannot take care of the plants, such as watering the plants and checking that the plants are getting enough sunlight. To

facilitate this, we created an IoT-based automation system that the user can control. factory settings. such as temperature, humidity, and humidity, which can reduce water.

2. Literature Survey

We have been taught many previous works in this field by various researchers. The use of technology in agriculture plays an important role in increasing production and reducing labor.

Gowri, K Radha's paper "Greenhouse Monitoring and Scheme Based IoT Technology" presents greenhouse temperature and humidity monitoring and control system using IoT based approach. The system uses sensors, a Raspberry Pi microcontroller, and a web interface for real-time monitoring and control. The study concluded that an IoT-based approach is effective for monitoring the greenhouse environment and improving crop yields.

Gutierrez et al. The system uses a combination of soil moisture sensors, a microcontroller and a web interface for real-time monitoring and control. The researchers concluded that the system was effective in increasing crop yields and reducing water consumption.

Jagannathan and Priyatharshini's paper "Intelligent Agricultural System Using Sensors for Agricultural Automation" presents a system for automating various agricultural tasks using sensors and microcontrollers. The system uses sensors to monitor soil moisture, temperature and humidity, as well as detect weeds and pests. The study concluded that the system was effective in reducing labor and increasing crop yields.

The paper of Vaishali et al. "Mobile integrated smart irrigation control and monitoring system using IoT" presents a remote monitoring and control system for irrigation systems using mobile applications and an IoT-based approach. The system uses soil moisture sensors,

microcontrollers, and mobile applications for real-time monitoring and control. The researchers concluded that the system was effective in increasing crop yields and reducing water consumption.

The paper by Kumar et al. "A comparative study of advanced smart irrigation systems and field control using IoT" compares and contrasts different smart irrigation systems using an IoT-based approach. The researchers concluded that these systems are effective in increasing crop yields and reducing water use, but their effectiveness depends on the design and implementation of the specific system.

Overall, this paper demonstrates the potential benefits of using an IoT-based approach for agricultural monitoring and control. It also emphasizes the importance of careful system design and implementation to achieve optimal results.

3. System Architecture:

The system architecture for a web application that various sensor devices and determines sensor values for agricultural systems using IoT technology usually includes several components:

1. Sensor devices: Sensor devices are physical devices assigned in agriculture to measure various parameters such as soil moisture, temperature and soil type.

2. IoT gateway: An IoT gateway acts as an interface between the sensor device and the server side interface. It is responsible for collecting and storing sensor data and transferring it to the server for analysis.

3. server-side interface: The server-side interface is responsible for receiving the sensor data sent by the IoT gateway, storing it in the database and accessing the data through the web application interface.

4. Database: the database stores sensor data for future analysis and processing. It must be designed to handle large volumes of data and for easy search and retrieval.

5. Web application interface: The web application interface is the user-facing part of the system. This allows users to view real-time sensor data, access historical data, and configure system settings.

6. Analytics and Visualization Tools: Analytics and visualization tools are used to analyze and visualize data collected from sensors. These tools can provide valuable insight into farm performance and help farmers make the right decisions.

7.System architecture should be designed to ensure reliability, scalability, and security. It must manage large volumes of data, support multiple types of sensors, and provide real-time access to sensor data. In addition, the system must be designed to ensure the privacy and security of sensor data, and user authentication and access control must be implemented to prevent unauthorized access to the system.

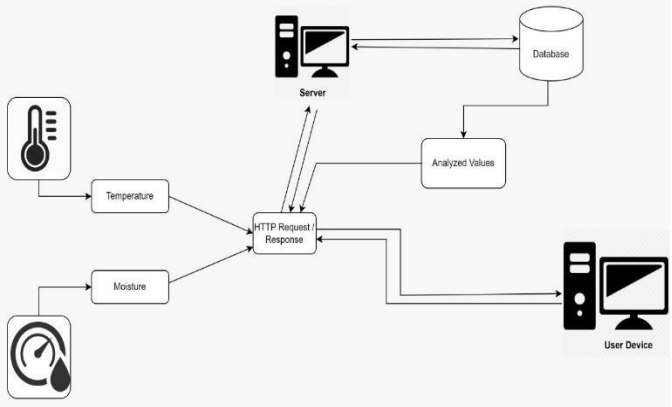


Figure 1: System Architecture Diagram

4. Parameter And Sensor Specification:

4.1 Temperature and Humidity Sensor:

The DHT11 is a low-cost digital temperature and humidity sensor. These sensors receive information from their surroundings and generate digital signals. It goes through a thermistor and a humidity sensor. The sensor is small, consumes little power and transmits signals up to 20 meters. T.

The DHT11 is a low-cost digital sensor for temperature and humidity sensing. This sensor can be connected to Arduino, Raspberry Pi, etc. to measure humidity and temperature instantly. can be easily interfaced with such microcontrollers.

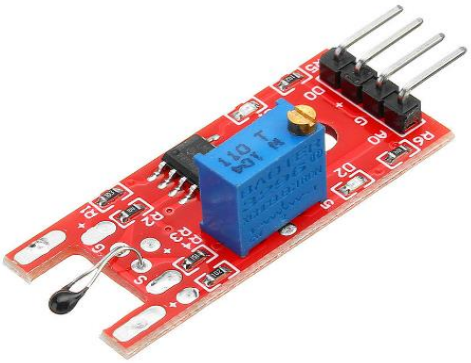


Figure 2: Temperature and sensor

4.1.1 Temperature Sensor:

SensorModel: DHT11

Voltage: +5V

Input: Temperature and humidity insurroundings

Output: Digital Signal

Units: Temperature in Celsius and Humidity in Percentage

4.2 Soil Moisture Sensor:

A water level sensor is used to measure the soil water content to measure the dielectric constant. When we put this sensor in the soil to test, the water content in the soil is displayed as a percentage.

4.2.1 Soil Moisture Sensor:

- **SensorModel:** SHT10
- **Voltage:** +3.3V
- **Input:** Water
- **Output:** Analog Signal
- **Units:** Percentage

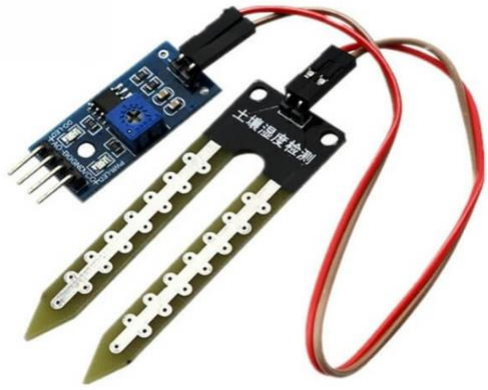


Figure 3: Soil Moisture sensor

4.3 Node MCU:

Node MCU is an open source software with an open source prototype board design. The name "Node MCU" is a combination of "node" and "MCU" (microcontroller unit). Strictly speaking, the term "Node MCU" refers to the software, not the associated development kit. The software and prototype board design are also open source. Due to limited resources, users must choose the appropriate module for their project and create software that fits their needs. Support for 32-bit ESP32 has also been implemented.

Figure 4: Node MCU

5. Methodology:

A use case for IoT in smart farming could be when the soil moisture sensor reads the soil moisture level and automatically turns on the watering motor. The temperature sensor reads the temperature near the field and transmits these details to the farmer's mobile phone. Farmers can take measures if the temperature is not suitable for the crop. Smoke detectors can also be used in the field, if there is an accidental fire in the field, a message can be sent to the farmer through a mobile phone and sprinklers can be automatically turned on in the field to extinguish the fire.

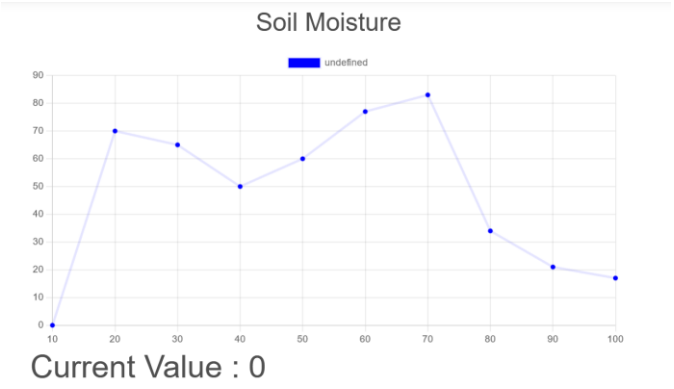
5.1 Automatic Irrigation Sprinkler:

In an automatic irrigation sprinkler, this will be connected to a sensor in the sprinkler system. The system will operate based on the soil moisture conditions in the field. If the level of moisture in the soil is measured, this sprinkler will automatically turn on with the help of a sensor. Otherwise, it will continue to spray until it reaches that level

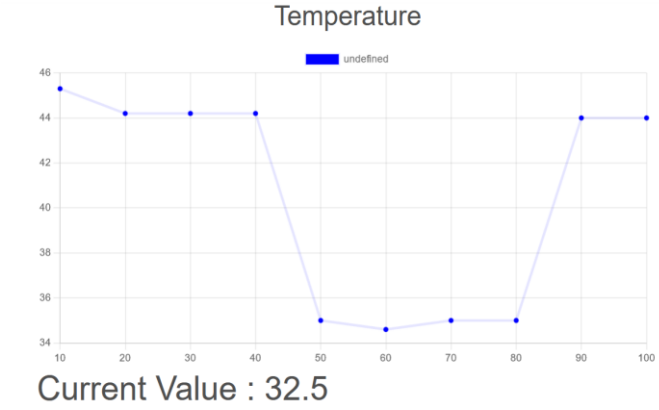
Figure 5: Irrigation Sprinkler

6. Result:

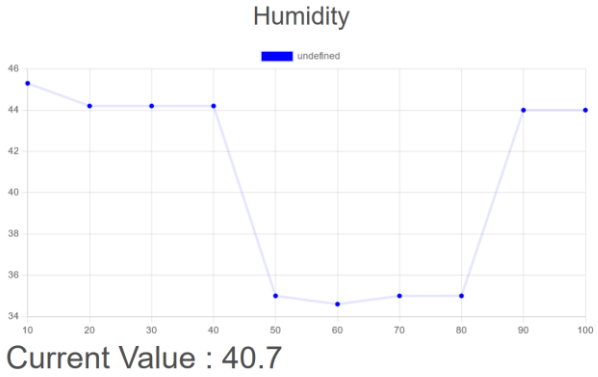
1. Soil Moisture Reading Chart:



2. Temperature Reading Chart:



3. Reading Chart:



7. Conclusion:

The system was designed to monitor soil temperature, moisture, and humidity, and the project provided an opportunity to study existing systems and their features and shortcomings. The proposed system can automate the irrigation process using a motor (on/off) depending on the optimal condition of the plant and sensor values. This is one of the most effective measures in agriculture, it helps to prevent irrigation or watering the soil and thus prevent crop damage. Farmers can monitor the work online through the Front-End structure. By doing this, water consumption and power consumption by the motor will be reduced and saved for future use. Through this project it can be concluded that IOT and automation can lead to significant growth in agriculture. smart agriculture based on IOT Of course, it is the use of high technology that can prove to be an important step to ensure production and increase the productivity of agriculture. Additionally, the proposed IoT model will help farmers become financially empowered and monitor their land remotely

8. Refarances:

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