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Design of Smart Agriculture System Using Internet of things

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Abstract

Agriculture has been the essential type of revenue or essential occupation in our country from ages. Be that as it may, as of late because of unusual atmospheric conditions and accessibility of good land there has been block in agriculture. Subsequently, food security has turned into a central issue for our nation and furthermore most different nations. Thus, to beat this we go for Internet of Things (IoT) in Smart Agriculture system to upgrade the efficiency and activity proficiency in rural area. The component of this system is fostering a system that can screen dampness, temperature, moistness and even could development of animals which could destroy the assets in agriculture field by means of sensors utilizing microcontroller and on account of any disparity send an alarm message utilizing Wi-fi/3G/4G module to the farmers' smartphone.

Keywords: Internet of Things, Smart Agriculture

I. Introduction

With the populace blast, there is a fast expansion in the interest for food and farming stocks and development cycle to further develop yield, cost-viability, and nature of harvests/rural items being created with new innovation like the Internet of Things (IoT) and Artificial Intelligence. There is a need to expand yield, viability and improved creation of land per unit region taken under deliberation. It gives enormous scope business open doors to individuals. For the fostering the monetary state of the country having development in rural sector is vital. Unfortunately, numerous farmers are as yet utilizing the conventional antiquated technique which prompts low yielding of harvests. In any case, after the progressions had been executed and people had been supplanted via programmed advancements, the yields have been gotten to the next level. Hence, there is a need to involve present day advancements in the area of agriculture for the improvement in yield. In agriculture regions there has been many examination and multiple ways of utilizing new IoT technology [1]. Cloud associated system assists in crop with yielding expansion, which helps in everyday agriculture undertakings and even offers continuous observing. Hardware's that are associated have different Wi-Fi associations, which helps in checking and controlling electronic machines to help farmers in breaking down and for good activity of the harvest field. By the use of sensor gadgets and other robotized hardware gadgets, presently numerous farmers can effectively gauge dampness level, temperature and even screen their territory[2].

II. Proposed Methodology

1. Smart Agriculture System

In this everyday lives the developing pattern is the Smart Horticultural system. Agriculture has gotten the most recent patterns and methods with the improvement of innovation. One of the

significant advantages for Smart Agriculture is the availability by utilizing existing Wi-Fi technology. This system will prompt the fruitful development of Internet of Things execution in the agrarian fields as it assists with saving time on equipment arrangements for Smart Agriculture system. This system which beats the current versatile processing situation of smart gadgets and their application (Application) and assists in associating gadgets in genuine life. Here in the Smart Agriculture System, we with having three sensors in particular soil dampness, DHT 11, and ultrasonic sensor which are associated with the ESP8266 Node MCU which is associated with internet through Wi-fi[3].

Soil dampness sensor detects the dampness level in the dirt and send this data to the microcontroller which further shows it in the Blynk application [4]. The DHT 11 detects the temperature and mugginess around the field and send information to microcontroller which shows it in Blynk application.

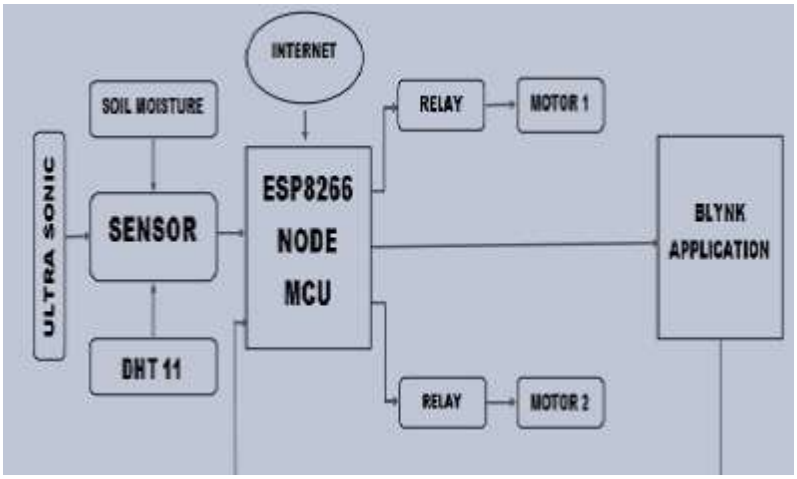

Figure 1: Smart Agriculture System using IOT outline

Hardware Requirement

1. **Soil Moisture Sensor**

Soil moisture sensor is a sensor which detects the moisture level in the field. At the point when in the field the water level is low in the Blynk application the Drove will sparkle and in the event that the water level is high the Drove won't glow. Here we associated the VCC to 5V and GND to GND of the microcontroller and the computerized pin of sensor to GPIO pin of microcontroller. The moisture in the soil is in a roundabout way estimating conductivity in the soil of the field[5]. The more wet the more conductive it is as well as the other way around.

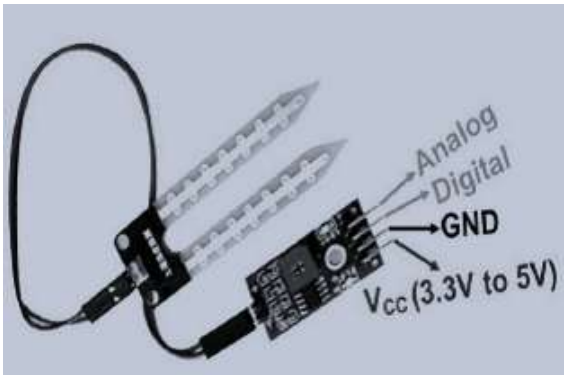

Figure 2: Soil Moisture Sensor

2. Temperature and humidity sensor

DHT22 is a minimal expense computerized sensor that utilizes a thermistor to gauge the air in the encompassing and it utilizes a capacitive humidity sensor to quantify humidity. They comprise of a NTC temperature sensor/Thermistor to gauge temperature [6]. A thermistor is a warm resistor - a resistor that changes its opposition with temperature. In fact, all resistors are thermistors - their opposition shifts somewhat with temperature - however the change is normally minuscule and challenging to quantify. The humidity detecting component is utilized, obviously, to quantify humidity, which has two terminals with moisture-holding a substrate (typically a spot of salt or conductive plastic polymer) sandwiched inside them. The variety in obstruction between the two cathodes is same to the relative humidity. The proportion of moisture in the air to the most elevated sum of moisture at a specific air temperature is called relative humidity [7].

3. Ultrasonic Sensor

The distance to an item is recognized by sending sonic burst in the HC-SR04 ultrasonic sensor is utilized. It contains of two ultrasonic transducers. The first goes about as a transmitter which is utilized to send sonic explodes and the other one beneficiary produces output beat on the off chance that it receives. Here the VCC is associated with 5V power supply in the ESP8266 Hub MCU and GND is associated with GND of ESP8266 Hub MCU. To send ultrasonic waves, the Trigger pin is set to high for 10µs. Then a 8 sonic blasts is send from the module at 40Khz.The ultrasonic sensor in spite of the fact that have a recognition scope of 2cm-400cm yet we have set it to 16cm according to our prerequisite[8]. Then, at that point, in Reverberation pin it will be gotten and the reverberation pin will output the time in microseconds.

4. PH Sensor

The pH sensor module comprises of a pH sensor likewise called a pH test and a sign molding board which gives an output that is proportionate to the pH esteem and can be connected straight with any miniature regulator. The pH sensor has an Oxidation-Decrease Potential (ORP) Test which mirrors the voltage relative to the inclination of the explanation to acquire or lose electrons from different substances[9]. This voltage and pH have a decreasing reliance, bring down the voltage higher the pH got.

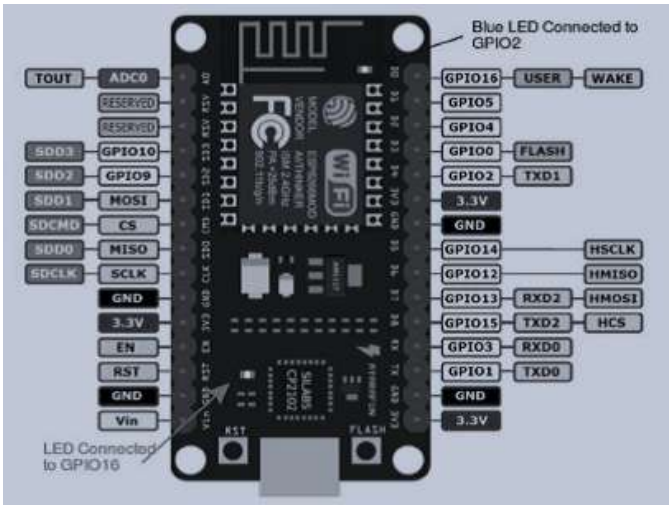

Figure 3:ESP8266 Node MCU

5. ESP8266 Node MCU

It has firmware which runs on the ESP8266 Wi-Fi SoC, and equipment which depends on the ESP-12 module. In our task we have utilized the pins D1, D2, D3, D4, D5, D6, GND and VIN.It has 30 pins. We give 5V power supply to it through the USB port. It has 16 Computerized I/O pins and 1 Simple I/O pin. A glimmer memory of 128Kb[10]. Clock Speed of 80MHz-160MHz.The microcontroller name is Ten silica 32-digit RISC computer chip Xtensa LX106.

6. ARDUINO IDE

The software where we will compose program will be Arduino IDE. The Arduino IDE is an open-source stage for programming which is for the most part utilized by developers to compose then aggregate code utilizing Arduino which is the module. Incorporating of code straightforward and simpler so a typical man can comprehend the learning system with next to no earlier coding information since this is the official programming software. For all working systems like Macintosh, windows, Linux the Arduino IDE software is promptly accessible [10].

7. Blynk Application

The Application that we will going use for controlling equipment will be BLYNK Application. It has the ability to remotely control equipment and furthermore shows sensor data. To picture and store information this application additionally makes a difference. This application has 3 primary components:

1. **Blynk application** Various gadgets and great points of interaction for the ventures can be made with the assistance of this application.
2. **Blynk Server**The organization among smartphone and equipment is laid out utilizing this.
3. **Blynk Libraries**All orders are handled here whether it be approaching or active.

Figure 4: Humidity 3 days

In this manner, involving the sensors in agriculture field makes things simpler. The data from sensor is shipped off the client utilizing cloud. In this way, any progressions inside the field might be recognized easily and early activity is accomplished in that capacity. In Blynk Application we can see the Temperature and Humidity levels. We can likewise see that the Soil is Dry or Wet. In

the event that the Soil contains no water the Drove will shine and on the off chance that the Drove doesn't sparkle it implies the soil contains Water.

Figure 5:Blynk Application Interface

III. Conclusion

Makes sense of an existential model of how in Indian agriculture Internet of Things (IoT) is applied. We have proposed a system of how Internet of things idea is utilized concerning our conventional rural practices. Later we have made sense of various sorts of sensors like Temperature sensor, moisture sensor which will be expected for our agriculture practices.AI-based conspire for the Horticultural Area comprising of a gathering of Miniature regulators, sensors, and a Merged Water Quality System. In this technique, the information combined from Sensors will be moved to Cloud for handling and Informational collection association through the Internet. The constant information will be taken care of into a ML calculation after a specific fixed time frame, in light of which it would foresee the soil state of the system.

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