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IoT Based Smart Agriculture System

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ABSTRACT

The Internet of Things (IoT) is reworking the agriculture business and helping farmers to content with huge challenges they face during the plant & soil observation area unit the challenges wherever IoT is the solution. The innovative IoT applications address the problems in agriculture and increase the standard, quantity, property and price effectiveness of agricultural production. Today's massive and native farms will leverage IoT to remotely monitor sensors that may discover soil wetness, crop growth and discover blighter and management their good connected harvesters and irrigation equipment. This project aims at observation the soil parameters like soil wetness, temperature. User is acknowledged regarding the area once there's any deviation from the expected values via Thingspeak. Alongside soil parameters, temperature detection is additionally enclosed during this project. This ensures the entire system health.

Keywords- Node MCU, Soil Moisture

INTRODUCTION

Agriculture plays a serious role for the well-being of a nation. Regions that area unit made with water and soil content can be able to manufacture food things starting from rice, wheat, cereals, pulses, vegetables and fruits. a number of the crops need a lot of quantity of water As the population is increasing day by day the water demand is additionally increasing. The environmental factors also are playing a serious role about devaluation of water reserve and water. Our globe consists of ninety-six saline waters that area unit within the oceans and the water reserve that caters to the total of the population of the world. At this time once the population is increasing and water reserve area unit decreasing there's a dire need of protective water in agricultural practices exploitation modern technique and advanced technologies. Hence this drawback statement is being self-addressed during this project and a unique approach to the matter with the technology and simple adoption are explored keeping in mind the ability and political economy in mind.

The worldwide population is anticipated to contact 9.6 billion by 2050 – this represents a serious issue for the farming business no matter fighting difficulties like extraordinary climate conditions, rising environmental change, and cultivation's ecological impact, the interest for a lot of food should be met. To satisfy these increasing desires, farming must head to new innovation. New savvy cultivating applications smitten by IoT advances can empower the husbandry business to decrease waste and upgrade profit from enhancing manure. Good farming may be a capital-intensive and advanced system of growing food cleanly and sustainable for the plenty. It's the applying of recent ICT (Information and Communication Technologies) into agriculture. In IoT-based shrewd cultivating, a framework is worked for checking the yield field with the help of sensors (light, stickiness, temperature, soil wetness, and so on.) and robotizing the water system framework. The ranchers will screen the field conditions from anywhere. IoT-based good cultivating is deeply productive when contrasted and therefore the ancient methodology.

OBJECTIVE

- To automate the management of the irrigation pumps through device input.
- To manage the irrigation pumps through user input over cloud.
- To create the system, connect via Wi-Fi to avoid wiring.
- To power the total setup exploitation standalone system exploitation alternative energy.

LITERATURE SURVEY

In this paper, soil moisture sensor, temperature and humidity sensors placed in root zone of plant and transmit data to android application. Threshold value of soil moisture sensor was programmed into a microcontroller to control water quantity. Temperature, humidity and soil moisture values are displayed on the android application.

This paper on "Automatic Irrigation System on sensing soil moisture content" is intended to create an automated irrigation mechanism which turns the pumping motor ON and OFF on detecting the dampness content of the earth. In this paper only soil moisture value is considered but proposed project provided extension to this existed project by adding temperature and humidity values.

This proposed paper is Arduino based remote irrigation system developed for the agricultural plantation, which is placed at the remote location and required water provides for plantation when the humidity of the soil goes below the set-point value. But in this we were not aware about the soil moisture level so to overcome this, drawback proposed system is included with extra feature of soil moisture value and temperature value which are displayed on the farmer's mobile application.

BLOCK DIAGRAM

The microcontroller that includes a constitutional Wi-Fi module and is that the heart of the project that takes in input from the soil device and provides output to the relay to modify on the irrigation pump. This conjointly controls the time for which the irrigation must be done. This conjointly sends knowledge to the Thingspeak which may be used for up the crop production.

- The device is connected to the GPIO pin that unendingly offers input to the controller regarding the wetness content.
- Once this worth nears or becomes but the edge worth given the code instructs the GPIO pin that is connected to the relay board to activate.
- The program can loop for given amount of your time then sends a proof to deactivate the relay thereby switching of the availability.
- The node MCU that is connected to the net can update the wetness worth and conjointly receive command through Thingspeak from the user sitting in any a part of the planet.
- The Thingspeak ease the work of farmers and may be upgraded to manage alternative elements likewise.
- The total of project can work on an isolate power offer as these little modules are place at totally different places on the agricultural ground.
- The planning is formed in such some way that it is often used for drip irrigation and indoor preciseness agriculture.

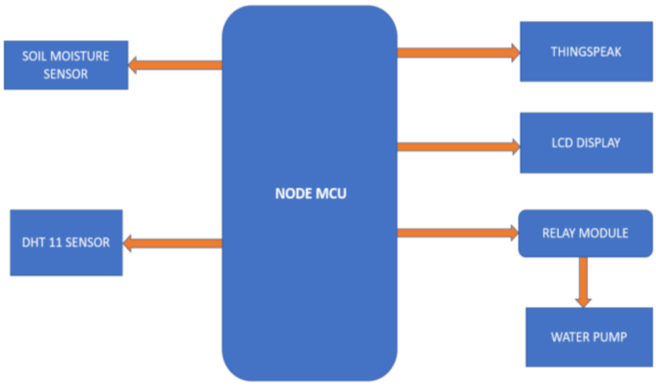

Fig.1 Block Diagram

```
const char* ssid = "PROJECT2022";    // your network SSID (name)
const char* password = "123456789";    // your network password
DHT dht(DHTPIN, DHTTYPE);
int relay=D5;
int soil=A0;
float moisture_percentage;
float temperature;
float humidity;
```

```
WiFiClient  client;
String myStatus = "";
unsigned long myChannelNumber = 1701254;
const char * myWriteAPIKey = "NFJWLMKH8E65NE08";
```

2) S ge and data from the IoT platform.

3) The following directions are –

1. The code iterates and perpetually checks the analog pin A0 and checks that input worth the threshold value already fed into the program in the meantime each knowledge retrieved from the device is being sent to the cloud IoT platform.
2. This real time value from the wetness device through pin A0 goes below the edge value, and an interrupt is seen through delay.
3. This delay can switch the irrigation pump ON through relay that gets activated because of the activation of the output pin by code running within the interrupt.
4. A library of the Arduino is used to form a timer that is already set within the program-

➢ as an example if the soil wetness level decreases below fifty and there's a necessity for the irrigation then the millis() perform is loaded to a variable A that is that the current time count.

➢ This current time is loaded to a different worker variable B that becomes a previous time count.

➢ associate at each loop the distinction between the present time count and therefore the previous time count is finished in order to calculate the interval that is hardcoded during a variable C. This worth is that the measure that the pump ought to air and irrigating the land.

➢ thus once the distinction become up to the interval time, the code instructs the GPIO pin to show off the relay.

RESULTS

Below figures shows obtained results from fields 1-3. The irrigation data for different sensors like moisture, temperature, humidity. Once it reaches the threshold(20%) level, the device provides appropriate action to the Thingspeak. Figures shows the irrigation of raw data details with moisture, temperature, humidity sensor output. This continuous graph shows well-performed device activities during feedback processing time.

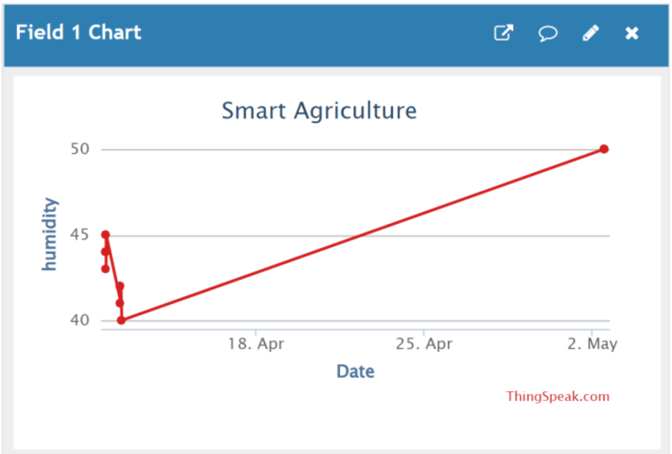

Figure.2 Displays humidity vs date analysis

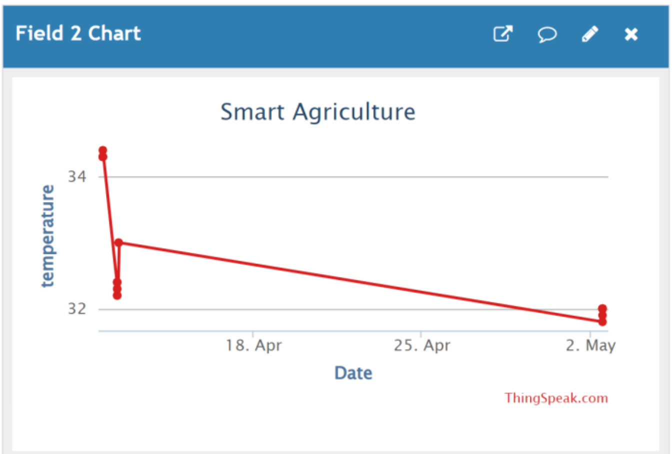

Figure.3 Displays temperature vs date analysis

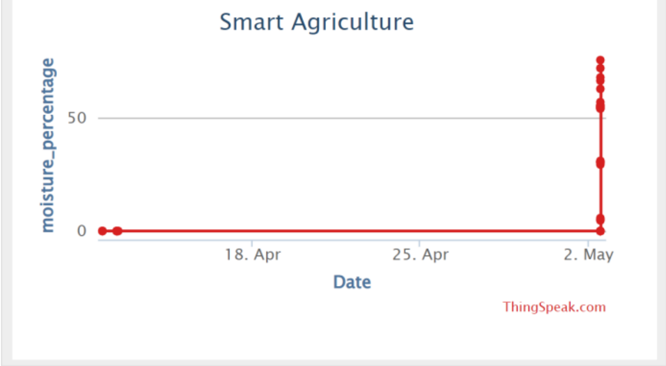

Figure.4 Displays moisture_percentage vs date analysis

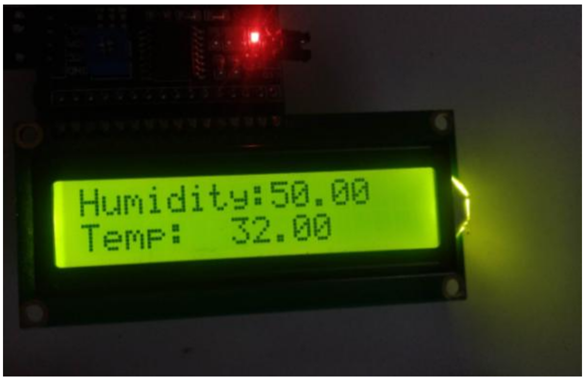

Figure.5 Led displays the value of humidity and temperature of soil

Fig.6 LCD displays the value of Moisture percentage of Soil

CONCLUSION

The project was aimed toward building a reasonable resolution for irrigating the agricultural land as per the soil wetness content. The most objective was accomplished and an outline of the operating model was displayed on with the reasons of various elements and code used for the implementation. The system was controlled by the IoT app named Thingspeak and so it is often used for future analytics an improvement of the project. The long-term scope of the project would be to expand it space from not simply irrigation however a full ton of alternative parameters like pH of the soil, crop rate of growth, sort of crop etc. and feed that knowledge to Thingspeak to urge helpful. So, with the help of this technology we can help the farmers for agriculture purposes.

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