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Temperature and Humidity Monitoring System over Plant and Uploading into the Cloud

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Abstract – The ultimate goal of this project is to create an IoT (Internet of Things) based system that monitors temperature, humidity, and moisture from the farm. Temperature, humidity, and soil moisture sensors measure and process environmental conditions from the Arduino microcontroller. The actuator in this uses a pump to water the plants and lower their temperature. The obtained data from the sensor and the status of the actuator are sent to the Thing Speak server via the node MCU and can be remotely monitored. With the help of a smartphone or any other device. The collected data can be evaluated for various purposes. The results obtained are the effects of moisture, humidity, and pump water on the plants.

Keyword- Cloud Computing, Data Analysis, Temperature sensor, Moisture sensor.

I. INTRODUCTION

Internet of things (IoT) is now an evolving trend in India's agriculture, Internet of Things (IoT) is the latest technological revolution in the field of Telecommunications, and the government of India has already impacted the country's agriculture sector over the previous few years. By using the ability of advanced sensors, telecommunications, and the knowledge of technology (IT) to watch crops and their health in real-time, check soil vitals, develop smart irrigation systems for smart agricultural technologies, etc. Imagine. Not yet an enormous market within the global market but India is growing fast. The impact of lack of care towards plants and crops among farmers is a significant concern for the developer and researcher. The lack of knowledge among farmers to use the latest and advanced agricultural machinery with higher levels of recent technology was a significant challenge for ecological players. New technologies are being developed using the IoT and wireless sensors to create life easier for farmers. While creating IoT-based products the creator must think of the user who will be using them. The methodologies and processes required to develop products for farmers are technologies developed for the urban population, as most farmers are illiterate and lots of them have little knowledge of recent technologies. Different from the merchandise. The system could create a superb setting for those folks that want to measure in rural areas. Moreover, during the process of cultivation, the methods used within the smart agriculture system require little physical contribution, and expertise in cultivation knowledge, environment control, and operation to keep up and control the growth of the plants.

II. RELATED WORK

The observation of temperature, moisture, and humidity are type of sensors which will be read first and then get processed by a µcontroller that's Arduino UNO. The code within the microcontroller will activate the pump under certain threshold values of the parameters collected by the sensors.Sensors and actuators sent data continuously over the web to server with the assistance of Node MCU.The reading request from the client is received by the server and the monitoring of the information can be seen and administered whenever needed. To maintain the temperature and humidity condition for the plants, water is supplied with the help of a pump. The hardware comprises sensors, microcontrollers, and actuators. (DHT11) is used as humidity and temperature sensor, Arduino UNO, NodeMCU (esp8266), and also the actuator is that the water pump. The control operation is performed by the code worn out Arduino. the information is shipped over to the server continuously with the assistance of Node MCU.

III. METHODOLOGY

A simple Plant monitoring circuit is intended with few easily available components. The most parts of this circuit are DHT11 and therefore the soil moisture sensor which is capable of detecting temperature, humidity, and moisture. These parameters are sent to the Arduino which collects the information and displays the info in an LCD display module, and at the identical time and analyses the info and checks for threshold values if it crosses the brink value a pump is activated, at the identical time, Arduino sends the information to Node MCU which sends the real-time data to the server. It is often utilized in differing types of

applications such as _during cultivation of crops from sowing to harvest time and the methods used within the advanced agriculture system require little physical contribution, and expertise in cultivation knowledge, environment control, and operation to keep up and control the growth of the plants. The Live data of those parameters are sent to the ThingSpeak Cloud using Node MCU. When the parameter value reaches the utmost value of the edge, then the Pump attached to the Arduino is activated. The following prototype could be a demo test circuit and it would be later developed using a breakout board and PCB after a proper calibration of every sensor and components. Also, it'll Plot the important time data on ThingSpeak Dashboard which is able to help the farmer extend their skills in cultivation knowledge, environment control, and operation to keep up and control the growth of the plants.This is possible with the help of data that is available in the Thinkspeak channel which is stored in the excel format. This excel sheet contains multiple columns such as time, humidity, temperature and moisture of the plant collected by the sensors.

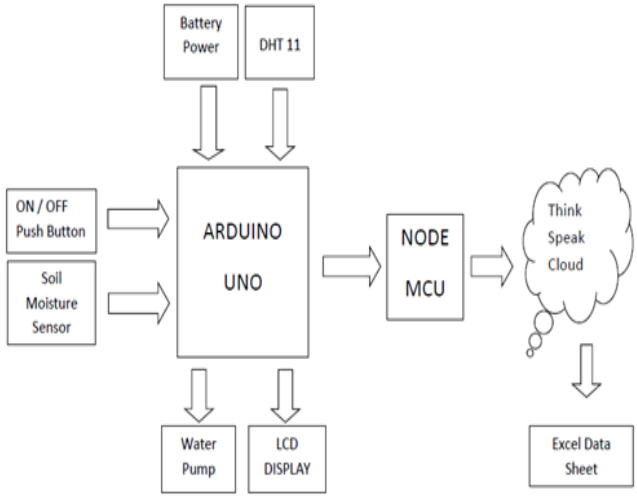

Fig.1 Working of System

IV. COMPONENTS

(A) ARDUINO UNO R3:

Arduino UNO R3 uses an ATmega328P microcontroller board . It contains 14 digital input/output pins, in which 6 can also be used as PWM outputs, and also have six analog i/p, and it also contains a 16 MHz Crystal oscillator (CSTCE16M0V53-R0), an ICSP header, a USB connection port, a power jack for external power supply and also a reset button. An Arduino board contains everything that supports the microcontrollers; we just have to connect the arduino to a computer using a power or USB cable with an AC-DC battery to kick start. In Italian "UNO" means one and was chosen to mark the release of Software (IDE) 1.0 i.e. Arduino Software. Arduino refers to the UNO board and the 1.0 version of software(IDE). USB Arduino UNO had a UNO board in their first series and the Arduino platform was the reference for an extensive list of past, current or outdated boards.

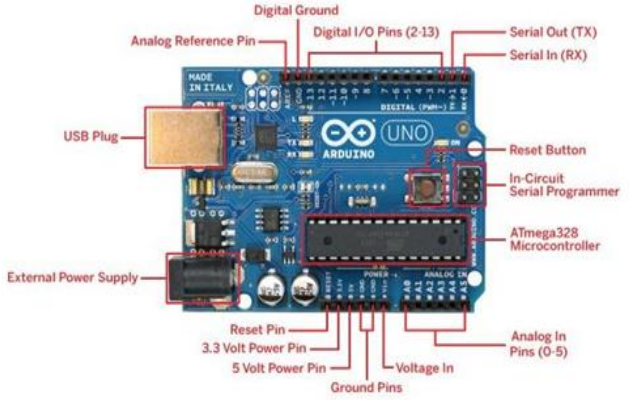

Fig.2 Pin Diagram of Arduino UNO

(B) NODE MCU:

NODE MCU is a freely available electronic platform for users. It is easy to use. Arduino boards they are always ready to the read inputs from light on the sensor, a finger on a button, convert it into an end result, start the LED,motor activating, online issuing, in this orb project Arduino is employed to display the message on the LCD per the code written within the Arduino software, Whenever the lean switch senses the instant of bread board and Arduino gets the signal.

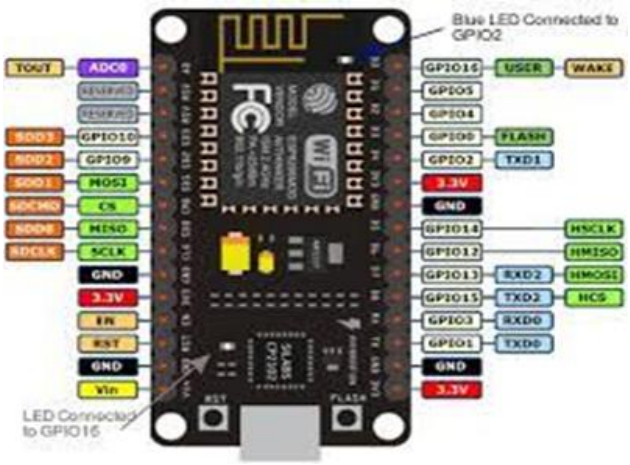

Fig.3 Pin Diagram of Node MCU

(C) SOIL MOISTURE MODULE

This water content in the soil is measured by this sensor and it also can be used to gauge the quantity of stored water in the soil horizon. These sensors do not measure water in the soil directly. Infact, they measure changes in some other soil property that is related to water content in a predictable way.

(D) LM393 IC:

The LM393 Comparator IC is employed as a voltage comparator during this Moisture sensor module. Preset (10KΩ Pot) is connected with pin 2 while Moisture sensor pin is connected with pin 3. The comparator IC will compare the brink voltage set using the preset (pin2) and therefore the sensor pin (pin3).

(E) DHT11 SENSOR:

This sensor is an inexpensive sensor which is digitally used for detecting the humidity as well as temperature of a particular area. The DHT11 sensor is easy to interface with many **µ**controllers such as: Arduino, Raspberry Pi, etc. to measure the humidity and temperature continuously. A DHT11 humidity and temperature sensor is available as a module as well as just a sensor.

(F) 16x2 LCD DISPLAY MODULE:

In embedded projects we commonly use 16x2 LCD Modules, the reason is cheap price, programmer-friendly, and its availability.

V.RESULTS AND DISCUSSION

The data regarding the parameter level is uploaded on the ThingSpeak server by specifying the Write API key of a specific channel - Humidity & Temperature Monitoring & Uploading on IoT. The Channel shows the details such as the temperature, humidity, and moisture for which the channel has been working since, the last entry made on the channel, total number of entries made on the channel.The user can monitor the level of these parameters in the place where the module is installed from any part of the world.
Field 1 provides the information about humidity, Field 2 provides the information about Temperature and Field 3 gives information on Moisture.

When the parameter value reaches the utmost value of the edge, then the Pump attached to the Arduino is activated. The following prototype could be a demo test circuit and it would be later developed using a breakout board and PCB after a proper calibration of every sensor and components. Also, it'll Plot the important time data on ThingSpeak Dashboard which is able to help the farmer extend their skills in cultivation knowledge, environment control, and operation to keep up and control the growth of the plants. Apart from the growth of plants the farmer can save a lot of money by properly analyzing the data shared by the module.

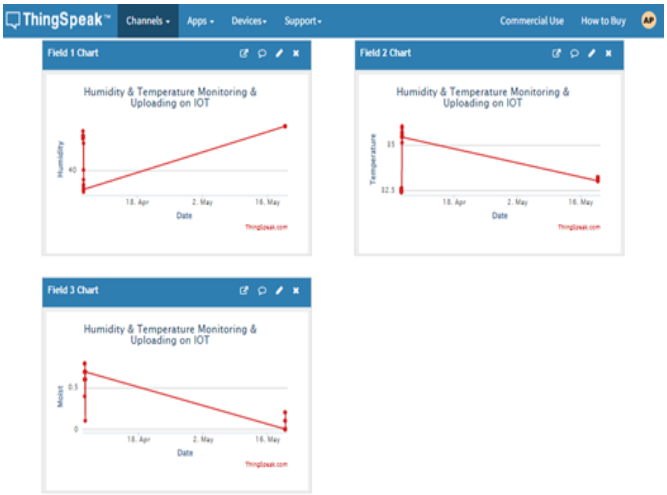

Fig. 4 Result Displayed on Thinkspeak

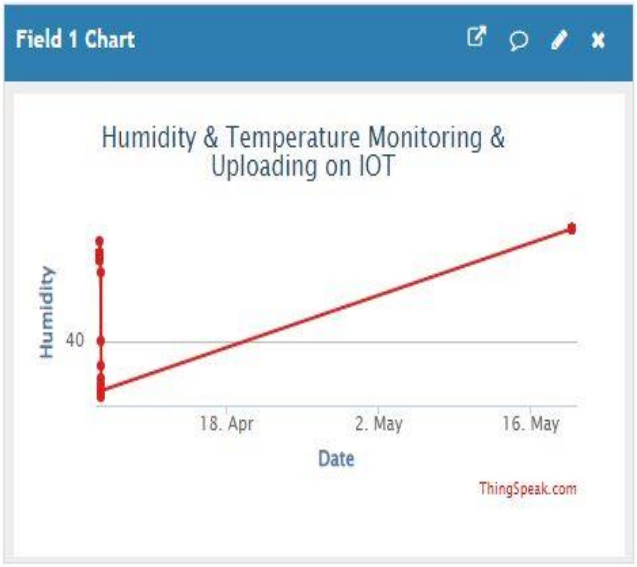

Fig. 5 Result Displayed for Humidity

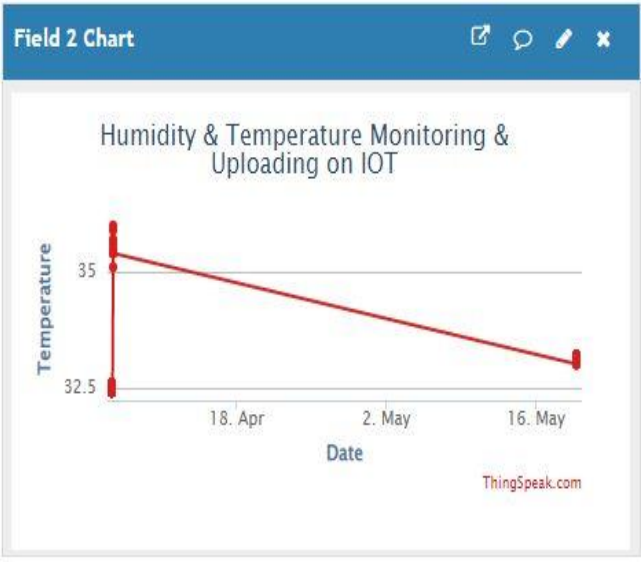

Fig. 6 Result Displayed for Temperature

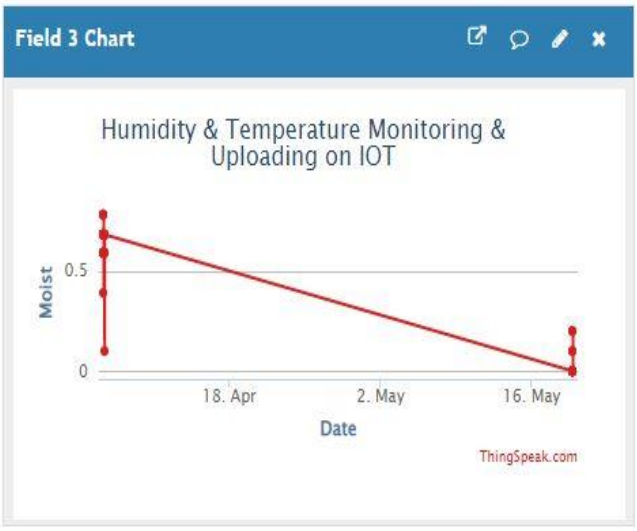

Fig. 7 Result Displayed for Moisture

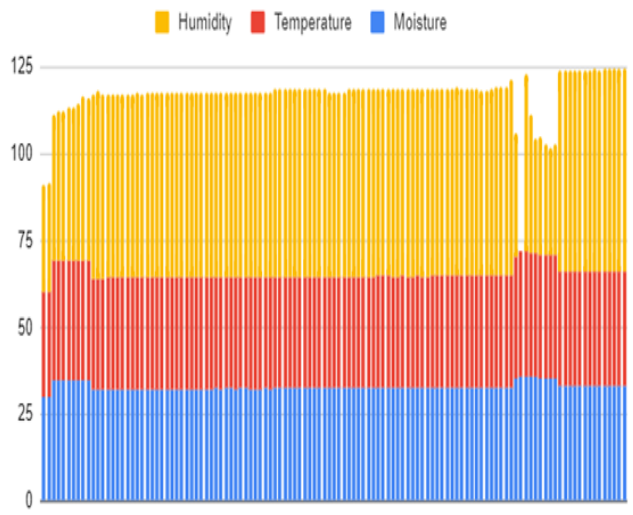

Fig. 8 Statistical Representation

Table 1 Data feeds on channel

SNO.	TEMP	HUM	MOIST
1.	43	34.6	0.1
2.	43	34.61	0.25
3.	44	34.6	0.29
4.	45	34.7	0.3
5.	47	34.78	0.39
6.	47	34.8	0.4
7.	48	35.2	0.44
8.	48	35.5	0.45
9.	48	36	0.451
10.	49	36.2	0.46

VI.CONCLUSION AND FUTURE SCOPE

The model continuously monitors moisture, humidity and temperature over plants and uploads it to the cloud using ThingSpeak. The system we propose can achieve its primary goal, mainly to build a system which monitors soil and plants health. The water pump will be turned on automatically whenever the soil needs to be watered.

Agriculture is the most important factor for any country. It plays a vital role. This system will help us to secure that factor. This will also help us to increase the technical proficiency of the country. Also, concepts like IOT, Data Analytics and artificial intelligence would help to enhance the credibility of the system.

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