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IOT based Smart Agriculture Monitoring and Irrigation System

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Abstract—In earlier days farmers used to calculate the readiness of soil and impacted doubts to create which to sort of yield. They didn't consider the stickiness, level of water and particularly atmosphere condition which was difficult to a Farmer, progressively The Internet of things (IOT) is renovating the agribusiness engaging the agriculturists hrough the broad scope of methodologies, for instance, exactness just as useful cultivating to manage difficulties in the field. IOT modernization helps in get together data on conditions like atmosphere, protection, temperature and productivity of soil, Harvest online assessment enables disclosure of wild plant, level of water, cultivation area, animal break in to the field, trim turn of events, agriculture. IOT use farmers interaction to get related with his living arrangement from any place and at whatever point. Distant sensor structures are used for watching the residence conditions and smaller scope controllers are used to control and motorize the field. To see distantly the conditions as picture and video, far off cameras have been utilized. IOT improvement can decrease the expense and update the efficiency of standard creating for farmers.

Keywords— Arduino board, Soil moisture sensor, lR sensor, Humidity sensor, Temperature sensor, WIFI module etc.

I. INTRODUCTION

We read in the newspapers for many days about farmer's losses and farmers used to work out the soil maturity and suspicions for the production of yield. They won't worry about the temperature, water level and simply climate conditions that are terrible to farmers.. The Internet of Things (IOT) is reconstructing the agri-business which enables farmers to deal with challenges in the field, for example through the broad range of strategies, such as accuracy and practical farming. IOT assists in the assembling of information regarding conditions such as climate, humidity, temperature and soil fertility, a IOT-based examination enables the discovery of wild plants, water levels, exact location, field interruption, field development, horticulture. IOT helps in assembling information IOT uses farmers to connect from anywhere to anywhere to his house. Remote sensors are used to track household conditions and smaller controls are used to control and mechanize the house shapes [1-11].

II. LITERATURE SURVEY

This project includes a portable wireless data logging system for real time process dynamics temperature control. For some applications, process variables (such as temperature, humidity, tilt, IR, Fire, soil moisture) vary with time and this should be noted for order to allow a control action at a fixed point. This paper provides an 8-bit built-in framework for a temperature sensor node that has a WiFi interface. The sensing node of the wireless temperature sensor transmits specific temperature variations to the central processing device located within the range. The central base station collects and stores the data in the file and

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simultaneously tracks the variations. The main theme of this project is to design and develop a low-cost wireless data logging system with 32-bit embedded microcontroller. The main functions of the proposed system are:

• Spontaneous temperature, humidity, tree and water monitoring

• To transfer data over internet through wifi module to server

• To implement Peer-to-Peer network and multipoint network can be established by configuring each module to operate as a sensing node.

III. PROPOSED SYSTEM

In order to increase the quality of our crop, we must use technologies that analyze the essence of the harvest and offer advice to benefit both farmers and government. The Internet of things (IOT) is revamping the agribusiness engaging the farmers by the broad assortment of techniques, for instance, accuracy and conservative cultivation to go up against challenges in the field. Use of Wireless sensor Networks In Precision Agriculture. The benefit in this report is to continuously evaluate various differentiated factors for yield and location. Precision Agriculture, as its name implies, is precise both in the area of its commodity territories and in the transport steps of soil, fertilizer etc. This invention will isolate a single plant in ten or many square meters for testing. Exactness Agriculture requires a novel programming model for each land territory, the characteristic soil write and the specific harvest or plants. For instance, every area will get its own particular ideal measure of water, compost and pesticide. In general, data collection is recommended on an hourly basis. Visitor information collection does not offer the product display extra helpful data and turns the wireless sensor network into a weight for power usage and data transmission. Fewer ongoing studies could be sufficient in respect of some moderate harvests and regions with highly stable and uniform conditions of atmosphere.

The working is as follows.

• The sensor network deployed in each section will keep updating the parameter readings in the cloud through a wifi communication module.

• Any changes with the data that can trigger to set the alarm will also be recorded and notified at the server room.

• The concerned authorities or the local can access the data and the warning notifications of the same.

• The data stored in the cloud called ThingSpeak server, where it can be used to make some analysis on fields.

A. System Architecture

To make a farmer understand the working of big labour machines and tech-devices we valuable and realistic technology for monitoring. In order to prevent this smuggling, in this project we use various sensors like tilt, flame, soil moisture, temperature and humidity and infrared sensor. And we use WiFi communication purpose. In this proposed system a novel method has been introduced to prevent the cut down of trees using server called think speak. Tilt sensor is used to determine whether the tree is cut down or not similarly temperature sensor is used to determine whether the field is on fire or not, IR sensor is used to determine object detection, moisture sensor checks the moisture content in soil and relay switch activates based on the behavior of the sensor which are implemented in fields, This value will be constantly sent to cloud through wifi which can accessed using Think view application.

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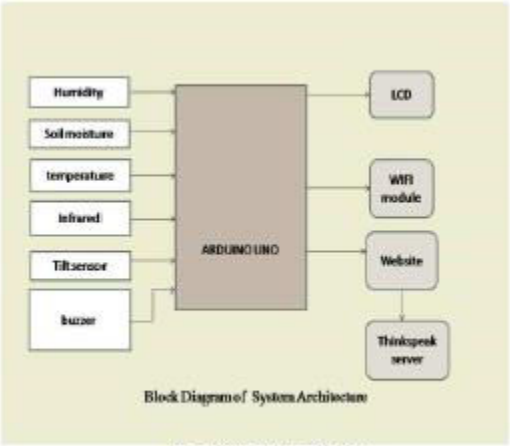

Fig 1. System Architecture

B. Workflow Diagram

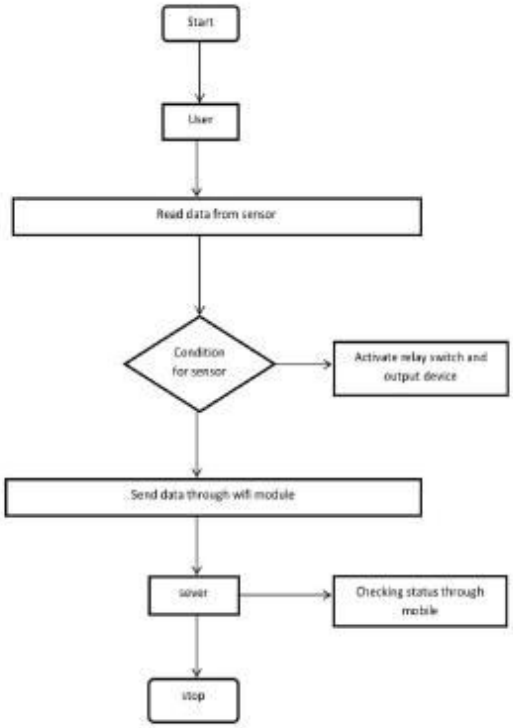

Fig 2. Workflow diagram

IV. IMPLEMENTATION

Step1: First we Write the code in Arduino IDE then upload the code to Arduino board. Based on the behavior of sensors arduino transfer the data to the cloud server called Thing Speak server.

Step2: Then we Connect all the sensors, wifi module, relay switch, led and buzzer with arduino board.

Step3: While connecting arduino board and IDE (Integrated Development Environment) through a data cable where this cable helps in providing the voltage required to run the hardware Arduino Board and also to see the serial output.

Step 4: Then once the data is uploaded to arduino hardware and connected to a Arduino IDE, The project starts to work.

Step 5: Then based on the behavior of the Sensor, arduino board starts working, following are the functionalities of all the sensor once the board is activated:-

Temperature and humidity sensor: initially Once the board is activated, instantly it will start showing the exact temperature and humidity in that particular place. Hence this sensor helps in detecting the temperature and humidity.

Fig 3. Temperature sensor

Soil Moisture sensor: This sensor helps in providing the exact moisture content in the soil. If the moisture content is below 40% then automatically motor will get started.if the moisture is more than that motor will stop automatically. Soil moisture is basically the content of water present in the soil. This can be measured using a soil moisture conducting probes that act as a probe.

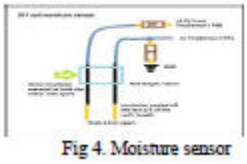

Fig 4. Moisture sensor

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Tilt sensor: only two possible outputs in this sensor, initially the sensor should be fixed to a tree and the initial value will be 1 or 90*. If tree falls the sensor will be either 0* or 180* or the digital value would be 0. Hence this sensor will get activated once the tree is fallen, and simultaneously buzzer will get activated. All the sensors and the controller will be set up at the tree. When tree logging occurs, the cutting of trees generated due to axing the tree is sensed by the tilt sensor. Arduino through the relay switch activates the buzzer notifying the security personnel. Also if the tree bends beyond threshold angle, the buzzer is activated

Fig 4. Tilt sensor

IR sensor: If any object passed through the field. This sensor will get activated and the same information is sent to the cloud and user. The IR sensor is a board that combines a distance and some processing circuit. It not only provides an path output but also a binary indication of the presence of any object and an analog representation of that particular object

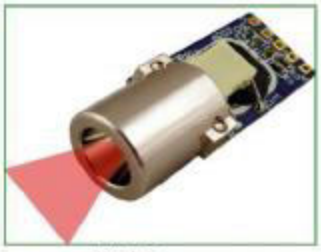
Fig 5. IR sensor

Fire Sensor: once the surrounding temperature reach 37* this sensor starts working by providing necessary information to the user and if the fire detects the output would be 1 else 0. In case of forest fires, when the temperature of the surroundings increases its sensed by the flame sensor, through the relay switch the water pump is turned on. When there is no flame, the water pump stops functioning.

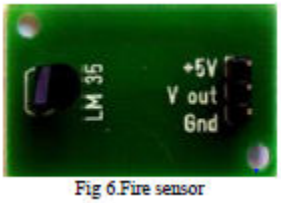

Fig 6.Fire sensor

A. Working of relay switch
Relay Switch activates in following condition
• When tilt sensor activated ie. When tree is fallen.(buzzer gets activated)
• When soil moisture content is < 45* (automation
switching of motor)
• When object passed into the field (Led indication in the field)
Note:-Apart from this indication the same data will be send to think speak server.

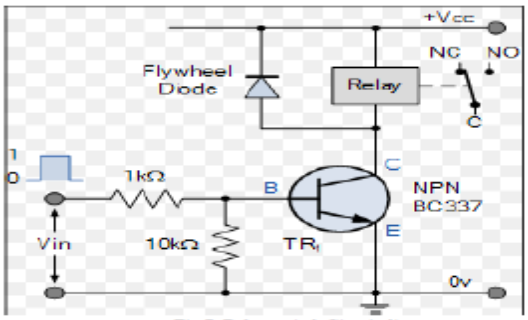

Fig 7. Relay switch Circuit diagram

Step 6: then at last All the sensor data is sent to cloud server through wifi module and the same can also accessed through the ThinkView application. Wifi sends data to a thingspeak server based on the behaviour of sensors from the arduino board Any

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negative behaviour of any sensor will give instant alert to the user.

V. SCREEN SHOTS

All the sensors and hardware components which are interconnected to each other.

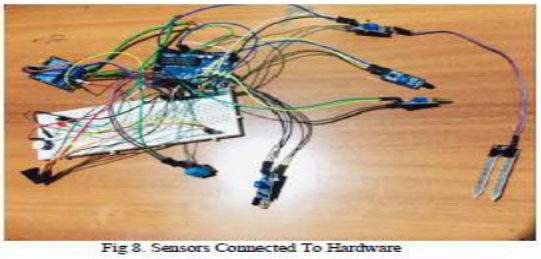

Fig 8. Sensors Connected To Hardware

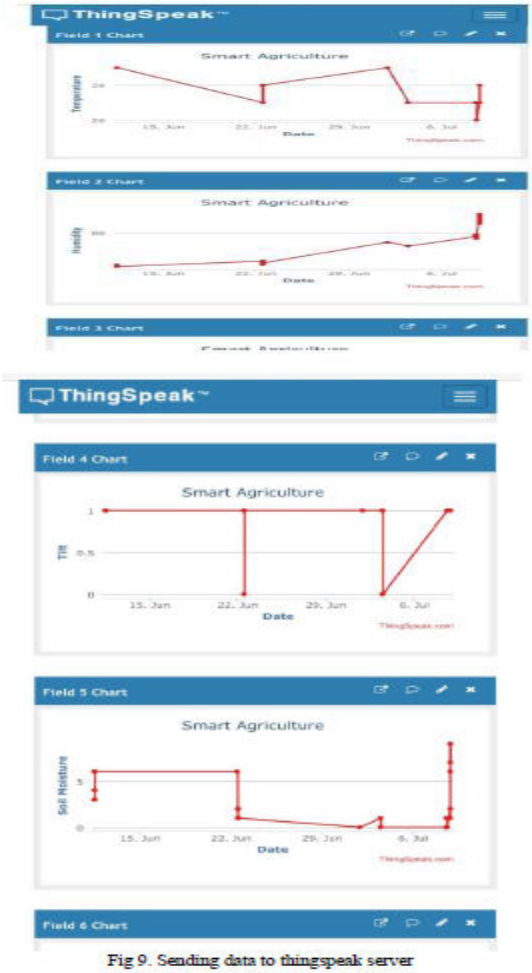

Fig 9. Sending data to thingspeak server

VI. CONCLUSION

In this manner we are increasing the system which able to control the agriculture monitoring in fields where the human being not capable to provide security. Such system we are developing in the field where the crops are costly are monitored and all the climatic conditions are well maintained important. In this area we are provide such kind of system. Thus, this effective and reliable system helps in agriculture monitoring. Apart from the main objective, the system also helps in reducing the global warming to a great extent. The natural habit of plants is prevented indirectly. The plants can also be protected from fire by using this system. This in turn helps in reducing crop destruction. Thereby, the ecological balance is maintained.

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