Crop Monitoring Using Thing Speak

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Abstract- *In every country agriculture is done from ages which are considered to be science and also art of cultivating plants. In day today life, technology is updating, and it is also necessary to trend up agriculture too. IoT plays a key role in smart agriculture. Internet of Things (IoT) and sensors are used to provide necessary information about agriculture fields. The main objective of this project is to monitor the crop by using the wireless sensor networks and collect the data from different sensors which are deployed at various nodes and send by wireless protocol. It consists of raspberry pi, various sensors, a pi camera, and a pump motor. Raspberry pi is the main controlling unit that can control the operation of various sensors and actuators. The sensors are used to sense the temperature, humidity, moisture level. If there is any variation in moisture level, then the sensor will update the observed value and store in the cloud. For the security system, PIR sensor is used to detect the motion in the farmland. The Pi camera captures the pictures and transfers it to the cloud through Raspberry pi and all this sensor data is stored in a Thing Speak cloud. So that we can view it from a remote location using Thing Speak and also the collected data is transferred to farmers mobile using GSM Module.*

Keywords- Internet of Things, Raspberry Pi, Thing Speak, PIR Sensor, Motion detection

I. INTRODUCTION

In India, most people living in rural areas are dependent on agriculture. Water is a scarce resource in agriculture and its optimal management is emerging as key challenges. The role of various technologies in the agriculture sector is becoming more and more visible. Research has been going on to increase the yield on a farm but if the fields and crops are not monitored properly the results may not be as per expectation. The use of modern techniques can help the farmer to not only remotely monitor their crops on a farm but also take corrective action in time. They can improve the quality of productivity of crops without much need for large manpower. In this project, we propose a raspberry pi based crop monitoring system using ThingSpeak to reduce the manpower required in the agriculture field. In this, we can deploy various wireless sensor nodes using IoT for measuring the various variable of interest.

The system utilizes wireless sensor nodes that collect and transmit data about the quality of the water supply, the soil, and other parameters in an agricultural field. While such sensor-based systems have been investigated earlier, one of the key innovations to be explored in this project is the combination of these sensors systems with a service-driven business model to increase their ease of use and to amplify the gains that can be realized via an integrated system. The goal is to give a farmer a more complete picture of the current and historic crop status to foster better informed decision making. It is expected that such decisions will benefit both farming and irrigation by saving time and resources. The basic aim of this project is to reduce the complexity of supervision and manpower required in agriculture.

II. LITERATURE REVIEW

A Sustainable Agriculture System Using IOT developed by Ramya Venkatesan and Anandhi Tamilvanan explains about a Sustainable Agriculture System Using IOT. This work developed a system a system which will automatically monitor the agriculture fields. As well as performing live video streaming for monitoring the agriculture field from the server itself, through raspberry pi camera. The agriculture fields are monitored for environmental temperature, humidity at soil moisture sensor. IOT and wireless sensor node helps to decrease the efforts, for observing the agricultural fields. IOT also avoids the loss of agriculture parameters database and save in the storage device or cloud for long life. It also provides continuous monitoring in all places including the critical areas. Agriculture products rely on environment factory like relative humidity, PH of soil, temperature etc. The proposed system model is developed to get more yields by identifying the causes.

IOT Based Monitoring System in Smart Agriculture S.R. Prathibha, ANupama Hongal, M.P.Jhothi explains about the IOT Based Monitoring System in Smart Agriculture. The farmers are still using traditional methods for Agriculture, which results in low yielding of crops and fruits, so the crop yield can be improved by using automatic machineries. But by using IOT, we can expect the increase in production with low cost by monitoring the efficiency of the soil, temperature, and humidity monitoring. In existing System, they used only the traditional methods for the crop yield. But in the proposed

system, the combination of traditional methods with IOT and wireless sensor networks can lead to agriculture modernization. The developed System is more efficient and beneficial for farmers. The application of such system in the field can help to advance the harvest of the crops and global Production.

Smart Agriculture Monitoring System using IOT P.Lashitha Vishnu Priya, N.Sai Harshith ,Dr. N. V. K. Ramesh explains about the Smart Agriculture Monitoring System using IOT (2022). The implemented framework comprises of different sensors and de-vices, and they are interconnected by means of remote correspondence modules. The sensor data has been sent and received from client end utilizing Internet connectivity which was enabled in the Node MCU at the same time. dule- an open source IOT platform. This system is used to maintain the optimal conditions of the irrigation system effectively. The data can be viewed on the Thing Speak app or any web page. The foremost function is to monitor the crop growth using digital means. This will provide the accurate values of various parameters upon which growth depends. Besides, this model will help the farmer to monitor more than one land at the same time. Monitoring through this system requires less manpower, people with physical disabilities can be employed for monitoring fields.

III. BLOCK DIAGRAM

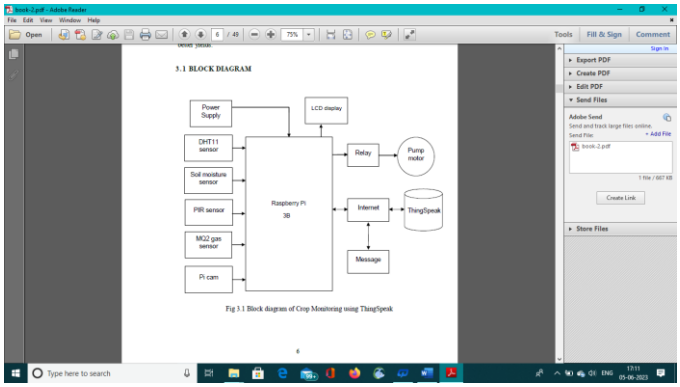

Fig 1 Crop Monitoring System Using ThingSpeak

IV. PROPOSED SYSTEM

The proposed system consists of raspberry pi, various sensors, camera, and a motor driver. Using the sensors, we can measure various environmental parameters such as moisture, humidity, temperature, methane gas level and water level. This sensed data is transmitted to mobile phones through IOT using ThingSpeak cloud service. ThingSpeak is an IoT analytics platform service that allows farmers to aggregate, visualize, and analyze live data streams collected in the cloud. The picam module which captures the pictures and transfer it to the cloud through raspberry pi. The IOT based agricultural monitoring system has been used to maximize the yield of crop by monitoring the environmental parameters and thus providing the required information to farmer remotely. This system can be implemented in any type of agricultural field with varying soils. The use of IOT over the other technology one aides for deploying it in any type of environment for monitoring, making it flexible and robust. The proposed system is developed for the goodwill of farmers. The system greatly reduces the human interaction, labour cost and wastage of water.

- The Crop Monitoring System is a mixture of hardware and software additives. The hardware part includes wireless sensor network and software part includes ThingSpeak.
- The IoT cloud platform (ThingSpeak) displays readings from sensors are inserted using the hardware.
- The facts gathered with the aid of the sensors are sent to the Raspberry Pi module. The gathered information displayed in the ThingSpeak. A GSM module is hooked up with the Raspberry Pi to facilitate messaging service which updates the farmers each 10 seconds approximately the climate conditions of the subject.

IV. WORKING

The block diagram of the proposed system as shown in Fig. 1 consists of different types of sensing unit such as Soil Moisture Sensor to measure water content of soil, DHT11 is the Temperature and Humidity Sensor that detects the temperature and Humidity, MQ2 gas sensor that detects the presence of Methane level, PIR sensor detects the motion in the farm environment and the pi cam module which captures pictures in the farmland. When the sensor value exceeds the calibrated threshold value, then the LED gets ON and if the motion in the farmland detected the buzzer gets ON. The Pi camera captures the pictures and transfers it to the cloud through Raspberry pi and all this sensor data is stored in a ThingSpeak cloud. So that we can view it from a remote location using ThingSpeak and also the collected data is transferred to farmers mobile using GSM Module.

V. TESTS AND RESULTS

The result of this project is to be monitoring the field weather conditions like temperature, humidity, gas level and soil moisture level. So that the crop health can be maintained, and the detected data will be sent to the farmers by using GSM Module, so that the farmer can monitor the crop health from anywhere.

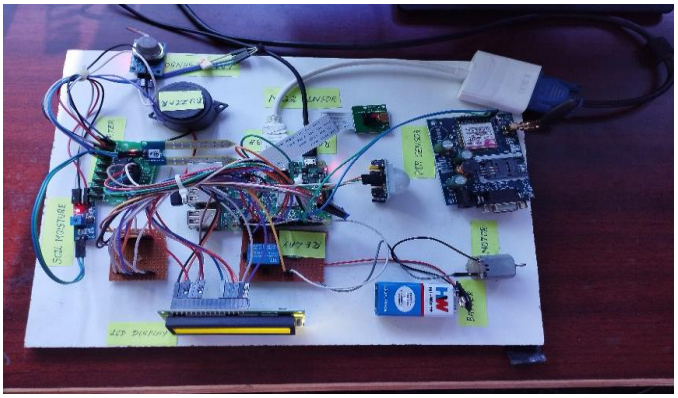

Fig 2 Prototype

The above figure shows the prototype of the Crop Monitoring System in which the sensor values are detected by sensors connected to Raspberry Pi and data are sent by GSM Module.

Fig 3 Hardware output

Fig 4 Software output

The above image shows the detected sensors value, if there any motion in the farmland the buzzer will be activated. The moisture content in the field has been noted down in the below table from 28.04.2023 to 11.05.2023.

Table. 1. Experimental results for Moisture Measurement

Sr no	Date	Output
1.	28.04.2023	1023
2.	30.04.2023	637
3.	04.05.2023	112
4.	07.05.2023	84
5.	11.05.2023	134

All this sensor value is sent to ThinkSpeak cloud. So that we can fetch it using the ThingSpeak tool or ThingView application on the mobile phone.

VI. THINGSPEAK OUTPUT

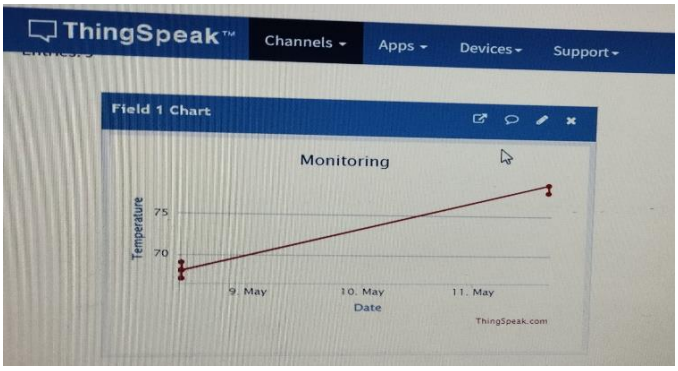

Fig 5 Temperature

Fig 6 Humidity

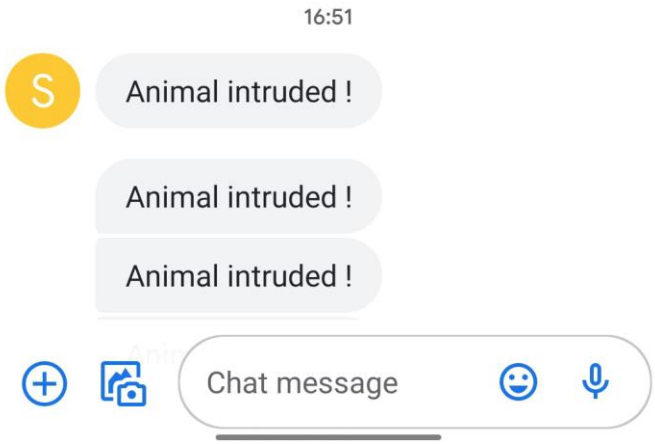

Fig 7 GSM Module Output

If there any intrusion in the farmland, gsm sends the message to the farmers as “Animal intruded!”.

VII. ADVANTAGES

- It allows farmers to maximize yields using minimum resources such as water, fertilizers, seeds etc. Mobile operated pumps save cost of electricity.
- The collected data is updated and the farmer is conscious about the status of the crop.
- It has advantage to observe the status on smartphone or laptop using internet. The information is up to date even in absence of farmer.
- Farmers can make more informed decisions about their farming practices.
- It delivers high quality crop production.

VIII. CONCLUSION

IoT based crop monitoring system using ThingSpeak can prove to be a very helpful system for the farmer since non-uniform and excess irrigation is not good for agriculture. With this suggested approach, we can provide uniform irrigation for the uneven surface of the field. This system uses real-time data from the field to regulate the irrigation system, and we can monitor the entire field from a distance using raspberry pi camera. By using ThingSpeak in smart agriculture can help farmers make data-driven decisions, increase their yields, and reduce costs, thereby making their operations more sustainable and profitable.

Future Enhancements

The project has vast scope in developing the system and making it more users friendly and the additional features of the system like:

- GPS (Global Positioning System) can be integrated to provide specific location of the farmer and more accurate weather reports of agriculture field and garden.
- Regional language feature can be implemented to make it easy for the farmers who are aware of only their regional language.

REFERENCES

[1] Chandankumar Sahu, Pramitee Behera, “A Low Cost Smart Irrigation Control System”, IEEE Sponsored 2nd International Conference on Electronics and Communication System (ICECS2015).

[2] Joaquín Gutiérrez, Juan Francisco Villa-Medina, Alejandra NietoGaribay, and Miguel Ángel Porta-Gándara, “Automated Irrigation System Using a Wireless Sensor Network and GPRS Module”,IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, 0018-9456,2013.

[3] Nikesh Gondchawar, Prof. Dr. R.S.Kawitkar, “IoT Based Smart Agriculture”, International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE), Vol.5, Issue 6, June 2016.

[4] Gayatri,J.Jayasakthi,Dr.G.S.Anandhamala,“Providing Smart Agriculture Solutions to Farmers for Better Yielding Using IOT”, IEEE.

[5] SanketPandharinathTakekar "Plant and Taste to Reap with Internet Of Things Implementation of IoT in Agriculture to make it a parallel Industry" International conference on I-SMAC (IoT in Social, Mobile, Analytics, and Cloud)(I-SMAC 2017).

[6] Boobalan. J, Jacintha. V, J. Nagarajan, K. Thangayogesh and S.Tamilarasu “An IOT based Agriculture Monitoring System”International Conference on Communication and Signal Processing,April 3-5, 2018, India.

[7] Abdul Salam and Syed Shah“Internet of Things in Smart Agriculture: EnablingTechnologies” 2019 IEEE 5th World Forum on the Internet of Things (WF-IoT).

[8] Mrs. VaishaliPuranik, Mrs. Sharmila, Mr. AnkitRanjan and Ms. AnamikaKumari “Automation in Agriculture and IoT” 978-1-7281-1253-4/19/$31.00 © 2019 IEEE.