



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 5, May 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

ijrset@gmail.com

www.ijrset.com

Smart Agriculture Using IoT

Chethana G S¹, Rahul Yalavatti², R Siva Sai Kundan³, Sai Pratheesh R⁴, Sharaff Dhanvanthiri⁵

Assistant Professor, Department of Electronics and Communication Engineering, Jain University, Bangalore, Karnataka, India^[1].

U.G. Students, Department of Electronics and Communication Engineering, Jain University, Bangalore, Karnataka, India^[2-5].

ABSTRACT: Internet of Things, or IOT, is a promising area of technology that is emerging at a rapid pace in the near future. Agriculture is critical to a country's economic prosperity. Around 80% of India's population is dependent on agriculture, and agriculture accounts for one-third of the country's capital. Agriculture-related issues have consistently hampered the country's progress. Wireless network sensors combine various sensors data and show big-data through Thing talk channel software to execute jobs like as weeding, spraying, moisture detecting, bird and animal frightening, and maintaining vigilance are some of the project's standout characteristics. The development includes Smart irrigation, smart control, and intelligent decision-making based on reliable real-time field data are all part of the evolution. This provides temperature, humidity, and weather reports, among other things. All of the sensor data is saved in a cloud called ThingSpeak. So that we may use the ThingView Free mobile android application to view it from afar. Using the bot API, we can examine all of this sensor data on the Telegram application. This Paperwork represents a smart device that monitors soil, humidity, and temperature in an agricultural field. It takes appropriate action after acquiring sensor readings based on these principles, all without the need for human intervention.

KEYWORDS:- The internet of things (IoT), smart agriculture, ThingSpeak, Application Programming Interface (API)

I. INTRODUCTION

IoT is a modern communication and computing paradigm in which everyday things are connected with microcontrollers, sensors, and transceivers to sense the ambient factors surrounding them. Furthermore, the Web system's interchange of sensed data with each other or with users becomes a necessary component. Anything in our daily lives that has a unique identifier is linked by IoT so that data can be transferred across the network without human intervention. The Home Control System, for example, employs Wi-Fi or Bluetooth to transfer data amongst various home gadgets. In India, agriculture is the primary source of income for the majority of rural residents. In agriculture, water is a finite resource, and its optimal management is becoming a major concern. The importance of numerous technologies in agriculture is becoming increasingly apparent. There has been research to boost farm yields, however if the fields and crops are not carefully monitored, the outcomes may not be as expected. Modern techniques can assist farmers in not just remotely monitoring their crops on a farm, but also in taking corrective action in a timely manner. They can improve the quality of crop yield without requiring a big amount of labour.

In this work, we present a smart agriculture system based on Arduino UNO that uses ThingSpeak to reduce the amount of people required in agriculture. In this case, we can use IoT to deploy numerous wireless sensor nodes for measuring various variables of interest. The Arduino is the main controlling device, capable of sending all sensed data to the Thing Speak cloud and receiving control commands from the Thing Speak service. Thing Speak is an open-source IoT platform that allows farmers to visualize data in real time and from afar. As a result, they can regulate many aspects from afar. A farmer can also read sensor data from a remote location via Telegram. A camera module is also utilized to keep an eye on the farm at all times. The fundamental aim of this paper is to reduce the complexity of supervision and manpower required in agriculture.

II. RELATED WORK

In Li Da Xu et al., the author focused particularly on IoT, including current research and essential tactics for boosting adoption (Identification and tracking, communication, service management, networks involved). It describes several research advancements and obstacles (standardization, design complexity, accessibility, integration, and so on) as well as the industry's significant IoT applications.

The author of Zhao Lijiang et al partnered with IoT for remote field tracking. There's also a picture sensing node that receives the cropped images and infers using various parameters like temperature and humidity. Low power consumption and dependable operation in a high-precision environment make this an excellent choice for crop management.

A large number of research articles relating to IoT-based agriculture systems using diverse strategies have been evaluated in order to identify several approaches to controlling the farm's irrigation system. Furthermore, the various approaches are mentioned in the research paper to have been studied in order to gain ideas on how to model our irrigation system in order to produce healthy plant development on the farm.

The paper [1] [8] describes a simple method for agricultural automation that uses an Arduino UNO, a sensor, and . They use Thing Speak as an IoT platform for collecting and storing sensor data in the cloud, as well as developing IoT applications. The smart agricultural system described in article [2] uses a single CC3200 chip to monitor temperature and humidity in the agriculture field. It also has a camera that is connected to the CC3200 and can shoot images and transfer them via MMS to farmers' mobile phones over Wi-Fi. Bluetooth technology for field monitoring

With IoT devices was the subject of the paper [3]. Paper[4] is used to structure agriculture greenhouse production utilizing GSM technology. The greenhouse may be monitored remotely thanks to GSM technology that supports GPRS.

The proposed approach in paper [5][9] is based on Thing Speak platform analysis of several soil characteristics. The system is made up of several parts, including a humidity and temperature sensor, a soil moisture sensor, a microcontroller unit, a Wi- Fi module, a Wi-Fi router, the Thing Speak cloud, and a mobile app. For soil moisture measurement, a YL-69 electrode is utilized.

The goal of paper [6] is to use the Internet of Things in agriculture to create a parallel business. It focuses on using the PATRIOT method to raise the necessary funds for the application of IoT in agriculture. With the internet of things, PATRIOT stands for plant and taste to reap. It demonstrates an IoT implementation in agriculture that is both gradual and viable.

The document [7] presents a cloud-based Internet of Things architecture that can be used in a variety of precision agriculture applications. The architecture is made up of three layers: a frontend layer that connects to the internet, a gateway layer that connects the frontend layer to the internet, and a backend layer that stores and processes data.

The Message Queuing Telemetry Transport (MQTT) protocol is used in the paper[10] to demonstrate the need for cutting-edge technologies in smart farming. Farmers use mobile sensors and mobile devices such as smartphones and tablets to collect data in a variety of forms, mostly concerning crops, soil, and weather, allowing them to readily access and monitor their crop. The data is gathered and transmitted to the heart of the cloud platform. A unique algorithm is being used to process and analyses the data. The results are transmitted back to the farmers, who can use them to better the agricultural process and control the irrigation system remotely.

Different approaches to precision agriculture are defined in the publication [11]. Their main goal is to integrate technology research and educate future generations of students on how to use and creatively adapt modern technology. It goes over the various components that can be taught for precision agriculture.

III. METHODOLOGY

We read a lot of papers that talked about a novel way to control the farm's irrigation system. Figure 1 depicts the majority of the present irrigation system. This merely controls the motor's on and off function in order to give water to the farm. The soil moisture sensor, temperature sensor, PIR sensor, Raspberry Pi, relay, and pump motor are all included. The sensor will detect a variety of environmental data and send it to the smartphone via IoT.

Users can access all of this data and control the actuator from a remote location. There are, however, several instances where farming is not uniform. In that circumstance, a constant flow of water is ineffective for precision farming. There is a chance that an excessive amount of water will be stored in some areas of the farm, lowering crop output. As a result of the extra water retained at the plant's root, we can see that some plant growth is good in some locations and other plant growth is deteriorated in others. To avoid this risk, we suggest a system that not only regulates motor movement but also regulates pipe valves. As a result, we'll be able to provide a consistent flow of water to the farm's uneven surface. By merging the internet of things (IoT), cloud computing, and optimization tools, this study proposes a smart irrigation system that uses multiple sensors, control valves, and pump motors to reduce water usage in agriculture. The smart irrigation system uses a variety of low-cost sensors to measure variables including soil moisture and temperature. For monitoring and data storage, the detected data is stored in the Thing Speak cloud service. The device also has a camera that can be used to monitor plant growth from afar.

The Arduino Uno R3 is at the heart of the system. Analog sensors transform physical values into comparable electrical signals, whereas digital sensors first convert physical quantities into electrical signals before digitizing them. The signals from all of the sensors are sampled by the central controller and stored in local memory. The controller also tries to connect to the server on a regular basis in order to communicate the values stored in memory to the server. In addition, the results of the sensor scanning are used to make judgments on pump operations and fencing supplies

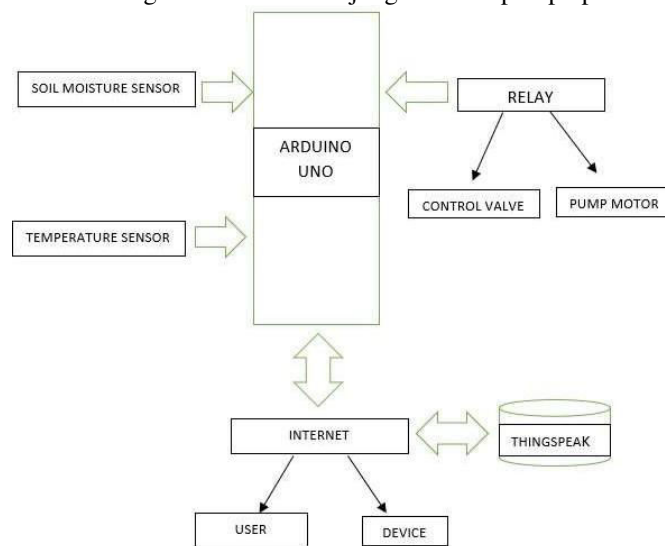


Fig. 1. Block diagram of the proposed system

IV. EXPERIMENTAL RESULTS

This project has resulted in the development of a technology that aids irrigation by measuring the moisture content of the ground. Using IoT technology, this device regulates irrigation work without the need for manual involvement.



SERIAL NO	DATE	OUTPUT FROM SENSOR
1	15-09-2019	530
2	17-09-2019	425
3		150
4	06-10-2019	93
5		44
6		166
7		150
8	27-10-2019	135

The above table shows the continuous measurement of moisture content from the sensor from September 15, 2019 to October 27, 2019. The first three readings show rainy weather, followed by dry weather, and finally, weather that is somewhat winter. Readings were taken and plotted on the graph based on the weather conditions.



Fig. 4. Continuous manual measurement plot of the output of the sensor

The data from all of the sensors is sent to the Thing Speak cloud. So that we may retrieve it using the Thing Speak tool or the free Thing View mobile app.

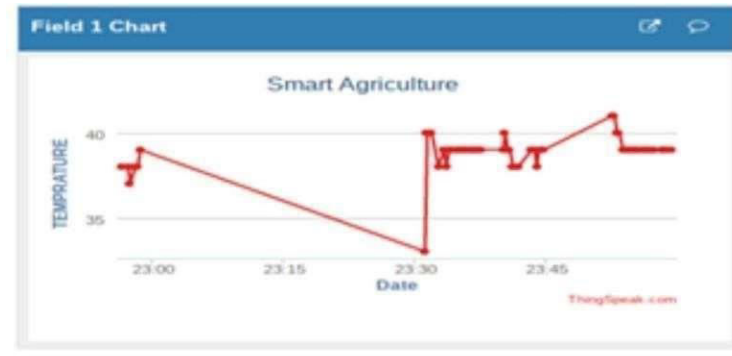


Fig.5(a)



Fig. 5(b)



Fig. 5(c)

Thing Speak data can also be viewed on mobile phones using the free Thing View app from the Google Play store. All we have to do now is install it and enter the channel id that was created during the Thing Speak channel. Figure 12 depicts the sensor output on the Thing View Free application.

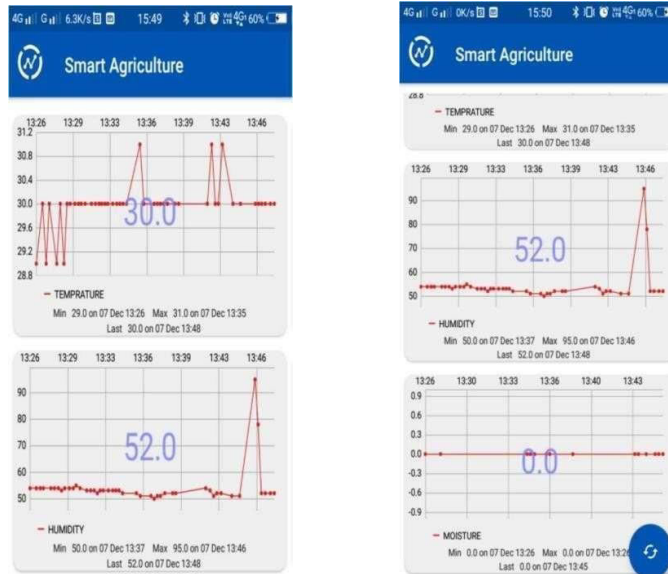


Fig 6. Sensor output on Thing View Free application.

Using the bot API, this sensor data can also be accessed on the Telegram application. Telegram is a chat app similar to WhatsApp, but it also allows you to make bots. It has an API bot that not only allows the human to talk to it but also a machine. Telegram has a Bot father who will assist us in the development of a new bot. Figure 8 depicts the sensor output on the telegram application. We can view all of this sensor data on the mobile phone using Thing View Free and Telegram from a remote location.

1. As a result, it satisfies all of our smart agriculture system goals.

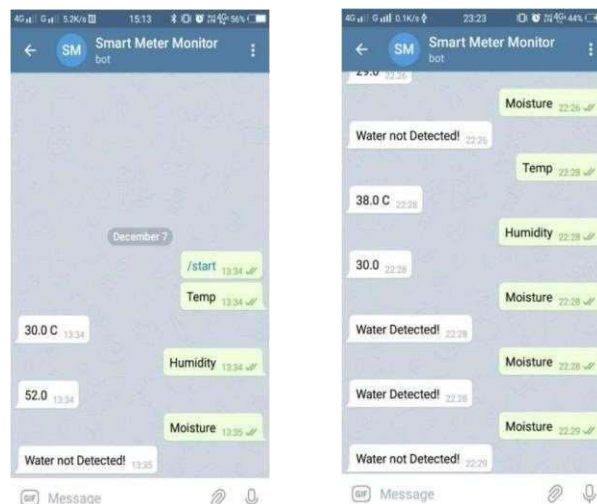


Fig.7 Sensor output on a telegram application

V. CONCLUSION

The system combines both hardware and software interface and delivers a user- friendly mobile device that is easily accessible. Messages on mobile devices provide advice and notifications for practically all of the challenges that farmers confront. As a result, the farmer can respond quickly to any situation.



The measurement results revealed that the system's performance is highly dependable and accurate. This approach in the field can surely aid to boost crop yields and overall productions because the implementation is made easier. Each parameter is monitored by a different sensor. Wi-Fi is a cutting-edge technology that will be important in the future.

REFERENCES

- [1] Boo Balan. J, Jacintha. V, J. Nagarajan, K. Thang Yogesh and S. Tamolarizine "IOT based Agriculture Monitoring System" International Conference on Communication and Signal Processing, April 3-5, 2018, India
- [2] Prathibha S R, Anupama Hongal, Jyothi M P "IOT Based Monitoring System in Smart Agriculture" 2017 International Conference on Recent Advances in Electronics and communication Technology 978-1-5090- 6701-5/17 \$31.00 © 2017 IEEE DOI:10.1109/ICRAECT.2017.5281
- [3] Ram Krishna Jha, Santosh Kumar, Kireet Joshi, Rajneesh Pandey "Field Monitoring Using IoT in Agriculture" 2017 International Conference on Intelligent Computing, Instrumentation and Control Technologies (ICICT)
- [4] Ji-Chun Zhao, Jun-Feng Zhang; Yu Feng; Jian-xinGuo "The Study and Application of the IOT Technology in Agriculture" 978-1-4244-5540- 9/10/\$26.00 ©2010 IEEE
- [5] ManishkumarDholu and Mrs. K. A. Ghodinde "Internet of Things (IoT) for Precision Agriculture Application" Proceedings of the 2nd International Conference on Trends in Electronics and Informatics (ICOEI 2018) IEEE Conference Record: # 42666; IEEE Xplore ISBN:978-1-5386-3570-4.
- [6] SurajPandharinathTakekar and 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).
- [7] Ahmed Khattab, Ahmed Abdelgawad, and Kumar Yelmarthi "Design and Implementation of a Cloud-based IoT Scheme for Precision Agriculture" 978-1- 5090-5721-4/16/\$31.00 ©2016 IEEE.
- [8] MdAshifuddinMondal and ZeenatRehena "IoT Based Intelligent Agriculture Field Monitoring System" 978-1-5386-1719- 9/18/\$31.00_c 2018 IEEE.
- [9] Mrs. VaishaliPuranik, Mrs. Sharmila, Mr. AnkitRanjan and Ms. AnamikaKumari "Automation in Agriculture and IoT" 978-1-7281- 1253- 4/19/\$31.00 © 2019 IEEE.
- [10] George Suciu, Cristiana-IoanaIstrate, Maria-Cristina Dițu "Secure smart agriculture monitoring technique through isolation" 978-1-7281-2171-0/19/\$31.00 ©2019 IEEE.



INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 8.423



ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

9940 572 462 6381 907 438 ijirset@gmail.com



www.ijirset.com

Scan to save the contact details