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Real Time Automatization of Agriculture Environment for Social Modernization Using ESP32 and Cloud Computing

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ABSTRACT

In this research article gives information that, 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. Internets of Things (IoT) sensors are used to provide necessary information about agriculture fields. The main advantage of IoT is to monitor the agriculture by using the internet and collect the data from different sensors which are deployed at various locations and send by wirelessly. By using IoT system the smart agriculture is powered by ESP32. It includes the humidity sensor, temperature sensor, moisture sensor, rain sensor and DC motor. This system starts to check the humidity and moisture level. The sensors are used to sense the level of water and if the level is below the range then the system automatically stars watering. According to the change in temperature level the sensor does its job. IoT also shows the information of humidity, moisture level by including date and time. The temperature level based on type of crops cultivated can also be adjusted.

Keywords:IOT, ESP32, Agriculture, Google cloud, Environmental parameters

1. INTRODUCTION

Agriculture is the basic source of livelihood of people in India. In the past decade, it is observed that there is not much crop development in agriculture sector. Food prices are continuously increasing because crop rate is declined. Some of the factors which are responsible for this may be wastage of water, low soil fertility, fertilizer abuse, climate change, diseases, etc. There are number of factors which are responsible for this, it may be due to water waste, low soil fertility, fertilizer abuse, climate change or diseases, etc. It is very essential to make effective intervention in agriculture and the solution is better management and regular maintenance and checking of the crops which include the technologiesIOT in integration with Wireless sensor networks, sensing the parameters with sensors and notifying the concerned people by SMS features. It has potential to change the way of development in agriculture and gives great contribution to make it smart agriculture.Monitoring systems are used in the field to collect information on farming conditions (e.g., light intensity, humidity, and temperature) with the aim of enhancing crop productivity. Internet of things (IoT) technology is a recent trend in numerous fields, including monitoring systems for agriculture. In conventional farming, farmers need manual

labour to handle crops and livestock, often leading to inefficient resource use. This downside can be addressed through the concept of smart farming, whereby farmers receive training in the use of IoT, access to the global positioning system (GPS), and data management capabilities to increase the quantity and quality of their products. IoT solutions are focused on helping farmers close the supply demand gap, by ensuring high yields, profitability, and protection of the environment. The approach of using IoT technology to ensure optimum application of resources to achieve high crop yields and reduce operational costs is called precision agriculture. IoT in agriculture technologies comprise specialized equipment,wirelessconnectivity,softwareandITservices. BI Intelligence survey expects that the adoption of IoT devices in the agriculture industry reached85 million in 2022, growing 20% annually. At the same time, the global smart agriculture market size is expected to triple by 2025, reaching $15.3 billion (compared to being slightly over $5 billionback in 2016).

Figure 1IoTbasedsmartagriculture willbethefuture

2. LITERATURE SURVEY

In this research article, the literature survey is playing important role to collect the current scenario in the field of agriculture. The research in agriculture area is enhanced in various aspects to improve the quality and quantity of productivity of agriculture. Researchers have been worked on many different projects on soil attributes, different weather conditions. A few review studies examined the implementation of Artificial Intelligence (AI) and application of IOT for agricultural monitoring. The authors highlighted smart farming system based on acquiring data and utilizing them to make optimized decisions, thereby reducing the costs and enhancing environmentally friendly practices.An IOT Based Crop-field monitoring an irrigation automation system describes how to monitor a crop field. A system is developed by using sensors and according to the decision from a server based on sensed data, the irrigationsystem is automated. Through wireless transmission the sensed data is forwarded to web server database. If the irrigation is automated, then the moisture and temperature fields are decreased below the potential range. The user can monitor and control the system remotely with the help of application which provides a web interface to user [1]. By smart Agriculture monitoring system and one of the oldest ways in agriculture is the manual method of checking the parameters. In this method farmers by themselves verify all the parameter and calculate the reading [2]. The system focuses on developing devices and tool

to manage, display and alert the users using the advantages of a wireless sensor network system. It aims at making agriculture smart using automation and IoT technologies [3]. The cloud computing devices are used at the end of the system that can create a whole computing system from sensors to tools that observe data from agriculture field. It proposes a novel methodology for smart farming by including a smart sensing system and smart irrigator system through wireless communication technology [4]. This system is cheap at cost for installation. Here one can access and also control the agriculture system in laptop, cell phone or a computer [5].

3. METHODOLOGY

(Real Time Automatization of Agriculture Environment for Social Modernization Using ESP32)

In this research article , the most important objective is to improve the agricultural system by introducing IOT sensors which are capable of providing information about agriculture fields. We have proposed an IOT and smart agriculture system using automation.

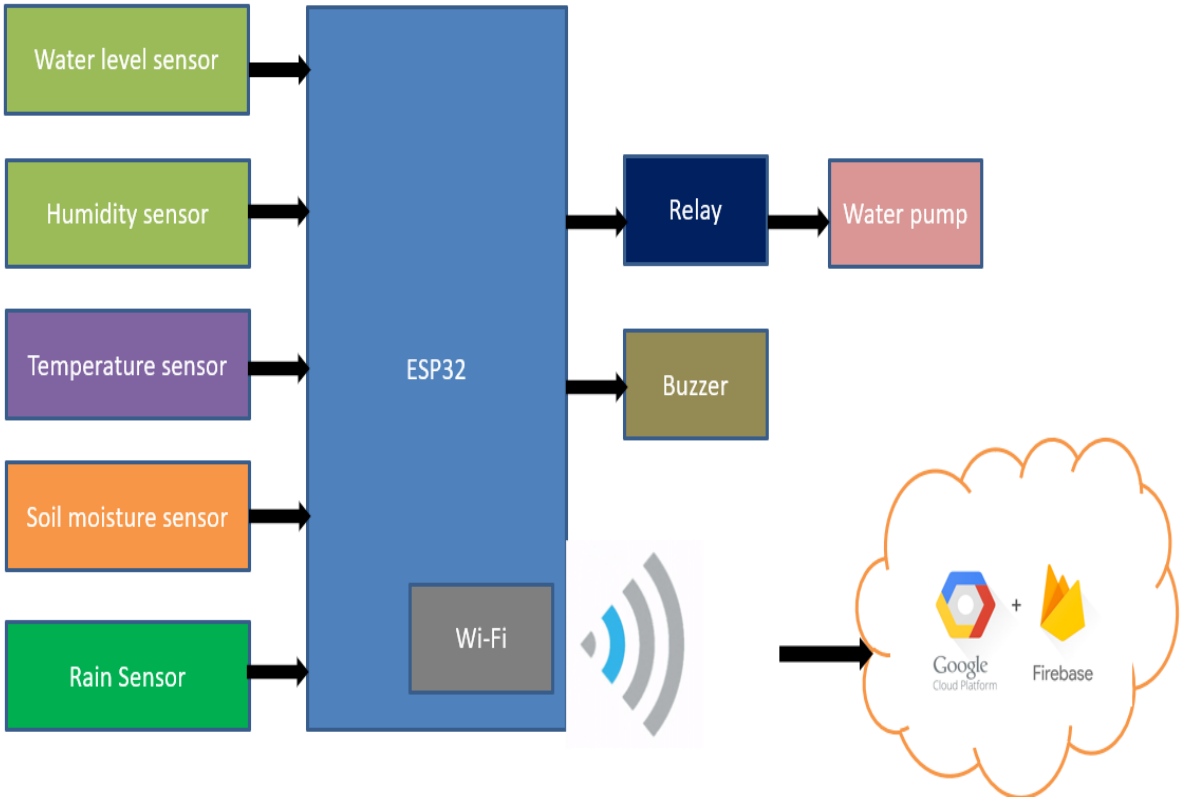


Figure 2 Block diagram of proposed system
(Real Time Automatization of Agriculture Environment for Social Modernization Using ESP32)

The smart agriculture monitoring system is tested under various conditions. The soil moisture sensor is used to test the soil for all climatic conditions and results are interpreted successfully. The moisture output readings at different weather conditions is taken and updated. Wi-Fi is used to achieve the wireless transmission. The values of soil moisture

sensor purely depend on the resistivity of the soil. The value of the sensor at beginning of wet condition is 0. The sensed value is sent to microcontroller through ESP32and motor pump gets OFF in this condition. The maximum threshold value upon dry soil is 4095. When the sensed value by sensor reaches the threshold value, the microcontroller trigger the relay and motor gets ON. When sufficient amount of water is supplied to plants, the motor pump is turned ON and is turned OFF automatically.

The DHT11 temperature and humidity sensor reads the environment temperature and humidity. These will be processed by ESP32 and it will be sent to google sheet automatically. When we open google sheet, we can find the values updated with timestamp. Similarly rain sensor detects the percentage of rain fall. This data also will be updated in google sheet automaticaaly.

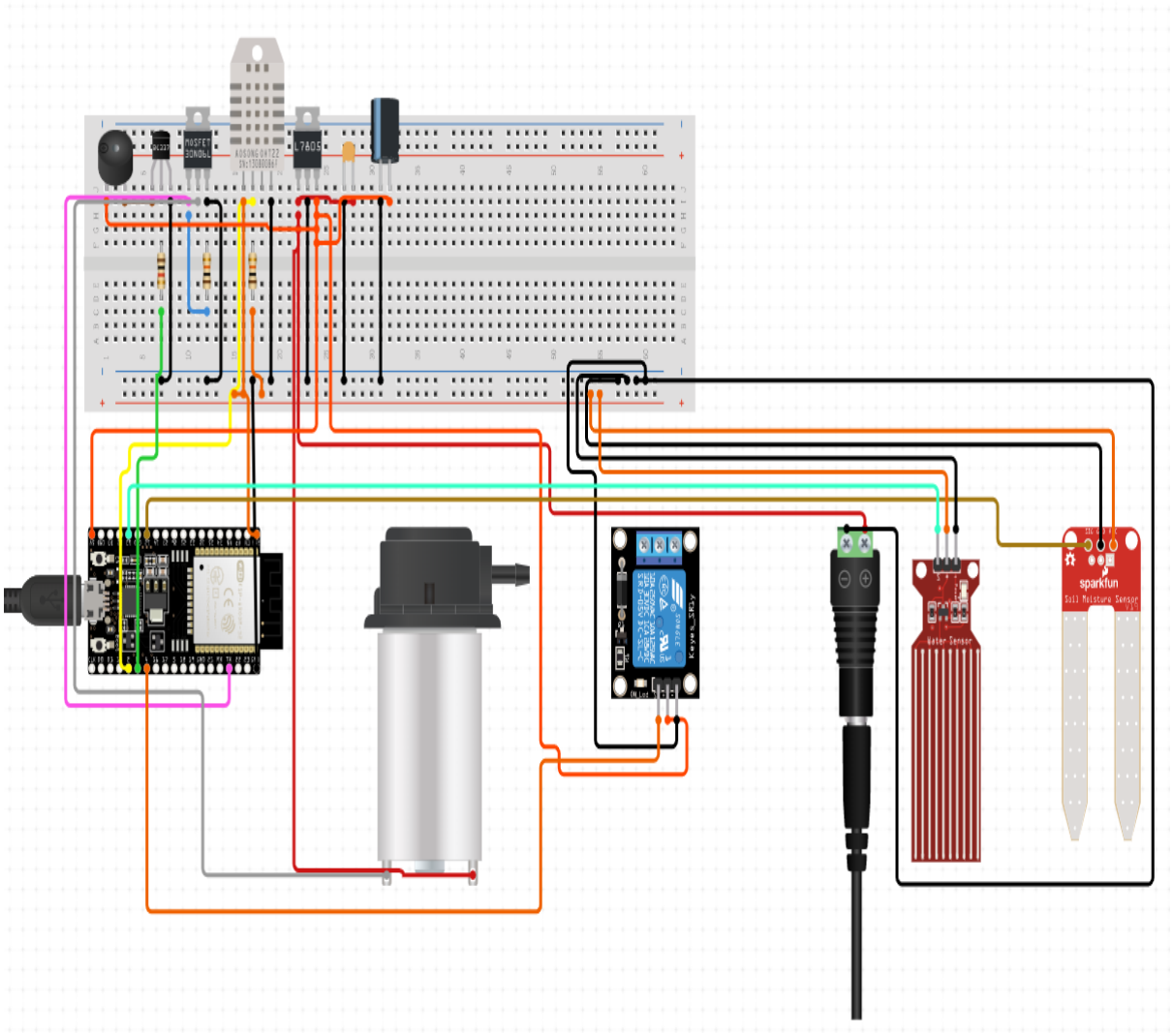


Figure 2 Schematic diagram of the methodology
(Real Time Automatization of Agriculture Environment for Social Modernization Using ESP32

Flowchart:

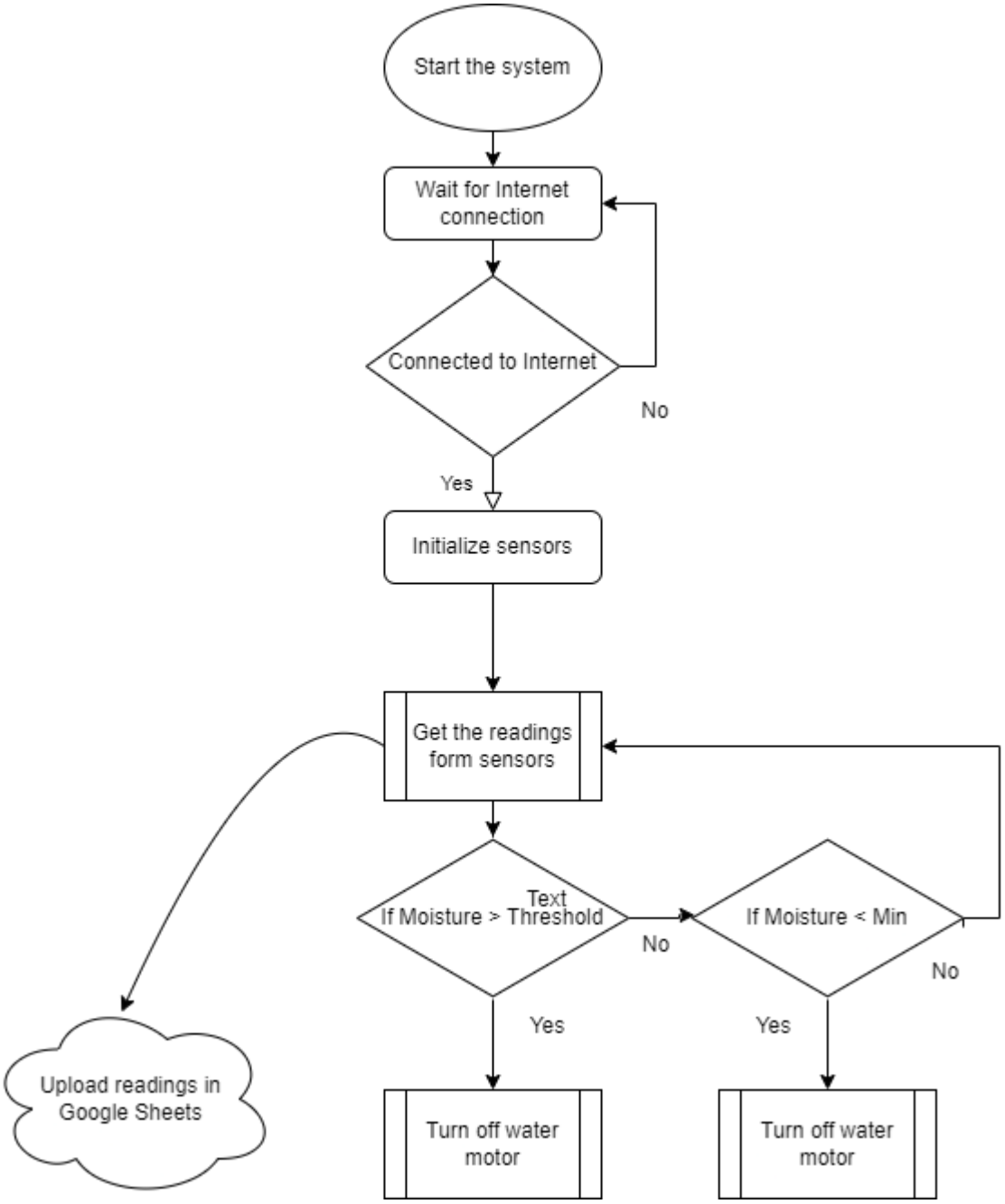


Figure 4 Flow chart (Real Time Automatization of Agriculture Environment for Social Modernization Using ESP32

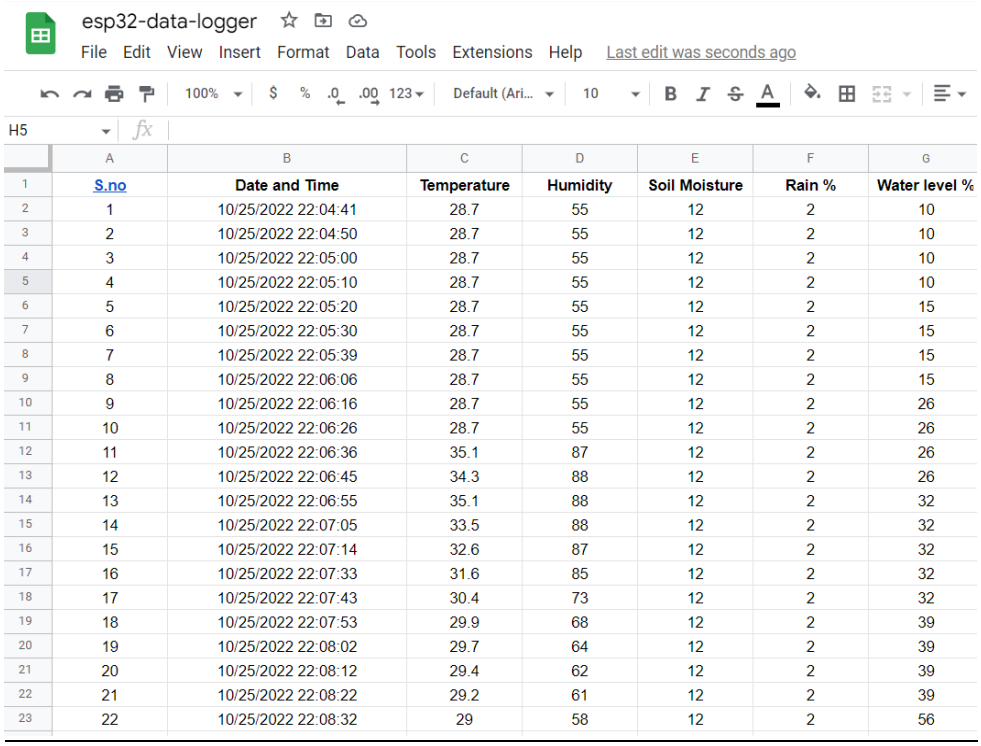
4. RESULTS

Google Sheets is typically used to organize data and perform data analysis. It is used across **all business functions** and at companies from small to large scale.

The main uses of Google Sheets include:

- Accounting
- Data entry

- Data management
- Customer relationship management (CRM)
- Charting and graphing
- Financial analysis
- Financial modeling



esp32-data-logger

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H5

	A	B	C	D	E	F	G
1	S.no	Date and Time	Temperature	Humidity	Soil Moisture	Rain %	Water level %
2	1	10/25/2022 22:04:41	28.7	55	12	2	10
3	2	10/25/2022 22:04:50	28.7	55	12	2	10
4	3	10/25/2022 22:05:00	28.7	55	12	2	10
5	4	10/25/2022 22:05:10	28.7	55	12	2	10
6	5	10/25/2022 22:05:20	28.7	55	12	2	15
7	6	10/25/2022 22:05:30	28.7	55	12	2	15
8	7	10/25/2022 22:05:39	28.7	55	12	2	15
9	8	10/25/2022 22:06:06	28.7	55	12	2	15
10	9	10/25/2022 22:06:16	28.7	55	12	2	26
11	10	10/25/2022 22:06:26	28.7	55	12	2	26
12	11	10/25/2022 22:06:36	35.1	87	12	2	26
13	12	10/25/2022 22:06:45	34.3	88	12	2	26
14	13	10/25/2022 22:06:55	35.1	88	12	2	32
15	14	10/25/2022 22:07:05	33.5	88	12	2	32
16	15	10/25/2022 22:07:14	32.6	87	12	2	32
17	16	10/25/2022 22:07:33	31.6	85	12	2	32
18	17	10/25/2022 22:07:43	30.4	73	12	2	32
19	18	10/25/2022 22:07:53	29.9	68	12	2	39
20	19	10/25/2022 22:08:02	29.7	64	12	2	39
21	20	10/25/2022 22:08:12	29.4	62	12	2	39
22	21	10/25/2022 22:08:22	29.2	61	12	2	39
23	22	10/25/2022 22:08:32	29	58	12	2	56

Figure 5Displaying sensor values in google sheet

5. CONCLUSION

In this research article, IoT will help to enhance smart farming. Using IoT the system can predict the soil moisture level and humidity so that the irrigation system can be monitored and controlled. IoT works in different domains of farming to improve time efficiency, water management, crop monitoring, soil management and control of insecticides and pesticides. This system also minimizes human efforts, simplifies techniques of farming and helps to gain smart farming. Besides the advantages provided by this system, smart farming can also help to grow the market for farmer with single touch and minimum effort.

6. REFERENCES:

1. Rajalakshmi.P and S. Devi Mahalakshmi, "IOT Based Crop Field Monitoring and Irrigation Automation", 10th International conference on Intelligent systems and control (ISCO), 2016.
2. Joaquin Gutierrez, Juan Francisco Villa-Medina et.al, "Automated Irrigation System Using a Wireless Sensor Network and GPRS Module", IEEE Transactions on Instrumentation and Measurement, 2013.
3. Dr. V. Vidya Devi and G. MeenaKumari, "Real Time Automation and Monitoring System for Modernized Agriculture", International Journal of Review and Research in Applied Sciences and Engineering, Vol3 no.1. pp 7-12, 2013.
4. Basha, Elizabeth, and Daniela Rus, "Design of early warning flood detection systems for developing countries", International Conference on Information and Communication Technologies and Development, 2007.
5. K. JyostsnaVanaja, Aala Suresh et.al, "IOT based Agriculture System Using NodeMCU", International Research Journal of Engineering and Technology, Vol.05.
6. T. Rajesh, Y. Thrinayana and D. Srinivasulu "IoT based smart agriculture monitoring system", International Research Journal of Engineering and Technology, Vol.07.
7. Automated Water Irrigation System using Arduino Uno and Raspberry Pi with Android Interface", International Research Journal of Engineering and Technology (IRJET) 2018.
8. Vaishali. S, Suraj S, Vignesg.G, Divya.S and Udhayakumar.S, "Mobile integrated smart irrigation management and monitoring system using IoT", IEEE International Conference on Communication and signal processing, pp. 21642167, April 2017.
9. K. Jha, A. Doshi, P. Patel, and M. Shah, ''A comprehensive review on automation in agriculture using Agricult. , vol. 2, pp. 1artifificial intelligence,'' 12, Jun. 2019.