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SMART AGRICULTURE IRRIGATION SYSTEM AND WEATHER ANALYSIS BY USING IOT

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Abstract: An agricultural nation like India depends heavily on agriculture for its growth. Approximately 70% of people in India are farmers. Agriculture has always been done by hand. It is imperative that agriculture follow the global trend toward new technology and innovations. because people are moving from rural to urban areas Agriculture has challenges. Modern technology updates daily, and agriculture must keep up with these changes as well. Smart agriculture can benefit greatly from the use of IoT.

Hence the paper aims at making agriculture smart using automation and IoT technologies. IOT based Agriculture monitoring system makes use of wireless sensor networks that collects data from different sensors deployed at various nodes and sends it through the wireless protocols. It includes the humidity sensor, temperature sensor, soil moisture sensor and water level sensor. The features of this project include an android application which shows the live information about the temperature, humidity, soil moisture, water level. Secondly it includes smart irrigation with smart control and intelligent decision making based on accurate real time field data. Thirdly an automatic weather control system which controls the humidity and temperature of the field (e.g. green house).

Keywords: Internet-of-Things (IoT), Smart Agriculture, Smart Irrigation, Weather Control, Automation

I. INTRODUCTION

As the world is trending into new technologies and implementations it is necessary goal to trend up in agriculture also. Agriculture is considered as the basis of life for the human species as it is the main source of food grains and raw materials. Basically, Agriculture production depends upon the seasonal situations, where the natural conditions like rain, temperature, humidity and plant diseases plays important role in farm yield. By considering and predicting environmental circumstances, farm yield can be increased. Crop quality is based on data collected from field such as soil moisture, ambient temperature and humidity etc. Advanced tools and technology can be used to increase farm production. The paper aims at making agriculture smart using automation and IoT technologies.

The real-time environmental parameters like soil moisture level, temperature, humidity and tank water level have continuous influence on the crop lifecycle. By forming sensor network, good monitoring of water regulation in the agriculture field can be achieved. The proper use of temperature and humidity sensor make operations and monitoring well maintained. This paper presents irrigation monitoring and controlling system. The system should be developed to monitor the environmental conditions such as temperature, soil moisture content, humidity of the air and water level of agriculture land for controlling the irrigation as well as controlled weather. The real time conditions sensed data is send to an android based application for Monitoring and to be stored for future reference.

II. PROBLEM STATEMENT

- To analyse the issue, field parameter monitoring is crucial.
- An automated irrigation system is required to maximize water usage due to high water demand.
- Conventional methods may result in either excessive or insufficient irrigation.
- Unsafe working circumstances have the potential to cause mishaps, waste of resources (money, manpower, time, etc.).

III. OBJECTIVE

- This paper's primary goal is to create an Internet of Things (IoT)-based agricultural monitoring system that can offer convenient access to field data. It is simple to keep an eye on this IOT server from anyplace.
- An intelligent irrigation system's design may maximize water levels by taking into account variables like soil moisture and weather forecasts.
- To create a system that automatically controls the water levels in the fields.
- to offer a sophisticated weather management system to manage humidity and temperature.

IV. LITERATURE SURVAY

Various researches have been carried out on how soil irrigation can be made more efficient. The researchers have used different ideas depending on the condition of the soil and quantity of water Different technologies used and the design of the system was discussed by the researchers.

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 irrigation system 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].

Prof. K.A.Patil and Prof. N.R.Kale propose a wise agricultural model in irrigation with ICT (Information Communication Technology).The complete real-time and historical environment is expected to help to achieve efficient management and utilization of resources [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].

IOT Based Smart Agriculture Monitoring System develops various features like GPS based remote controlled monitoring, moisture and temperature sensing, intruders scaring, security, leaf wetness and proper irrigation facilities.[4]

Mahammad shareefMekala, Dr.P.Viswanathan demonstrated some typical application of Agriculture IOT Sensor Monitoring Network Technologies using Cloud computing as the backbone. [5]

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 [6].

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 [7].

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 [8].

This paper shows idea of wireless sensors can be used in agriculture. This paper simplifies plant monitoring process and reduced human effort drastically. User can create customized environment for the plants, thus providing them with optimal growth conditions. Also shares idea about the interfacing with android software [9].

The sensors and microcontrollers of all three Nodes are successfully interfaced with raspberry pi and wireless communication is achieved between various Nodes.[10]

This paper provides basic guidelines for deploying Wireless Sensor Networks (WSNs) in Agriculture, and more specifically in applications requiring crop monitoring. Firstly, it reviews the main components that existing WSN applications use, namely node platforms, operating systems (OSs), power supply, etc. Based on these data, a generic guide is proposed discussing basic considerations for deploying WSNs in applications relevant to agriculture. [11]

In this paper, authors have proposed a novel methodology for smart farming by linking a smart sensing system and smart irrigator system through wireless communication technology. System focuses on the measurement of physical parameters such as soil moisture content, nutrient content, and pH of the soil that plays a vital role in farming activities.[12]

The implemented framework comprises of different sensors and de-vices and they are interconnected by means of remote correspondence modules. The sensor data is been sent and received from client end utilizing Internet connectivity which was enabled in the Node MCU module- an open source IOT platform.[13]

This project uses IOT technology in agriculture, gathering crops growth environmental parameters in a fixed place to help farmers find problems in time. [14]

This project shows IoT works in different domains of farming to improve time efficiency, water management, crop monitoring, soil management and control of insecticides and pesticides. [15]

This paper considered all aspects and highlighted the role of various technologies, especially IoT, in order to make the agriculture smarter and more efficient to meet future expectations. For this purpose, wireless sensors, UAVs, Cloud-computing, communication technologies are discussed thoroughly. [16]

VI. PROPOSED SYSTEM

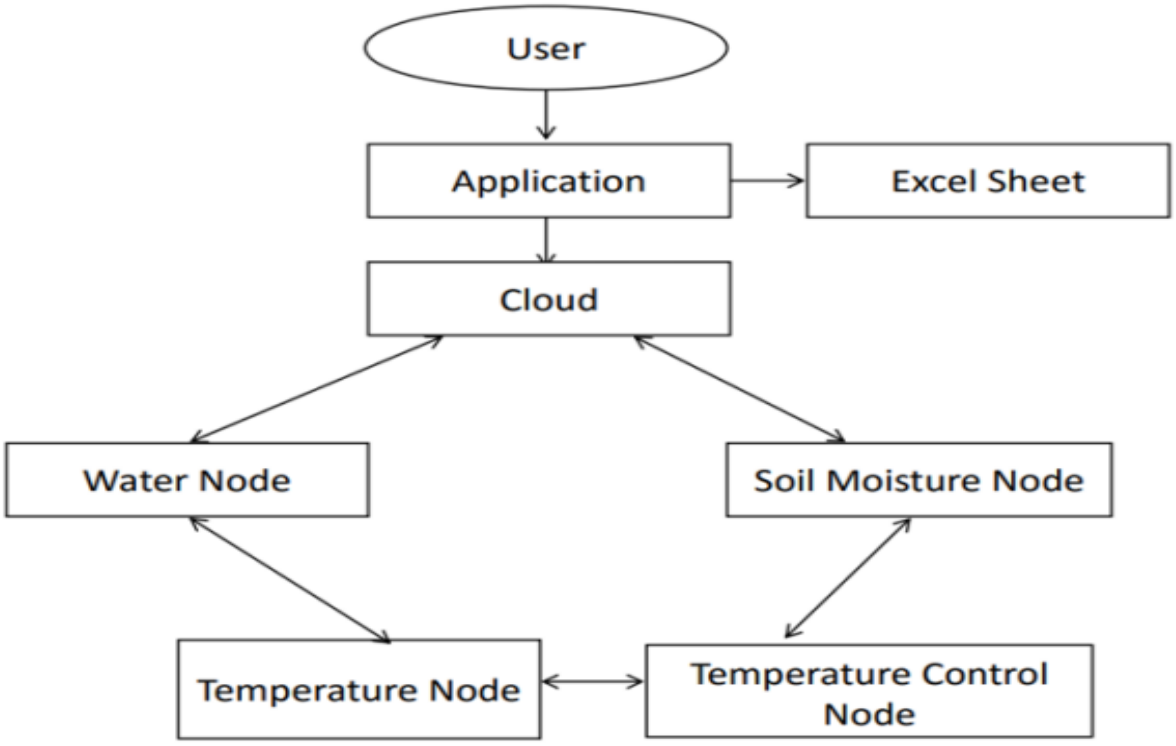

Fig.1 – Block Diagram of Proposed Work

This system consists of both software and hardware parts. The software portion comprises of an Android-based application linked to the bridge ESP (32) board and additional hardware components via the Internet of Things (IOT), while the hardware portion is made up of various sensors such as soil moisture, water level, temperature, and humidity sensors. The
An android application displays sensor readings for temperature, humidity, soil moisture, and water level, along with signals and a database. Water saving and irrigation process optimization may be accomplished by implementing a wireless network in the irrigation system. In the field, the water level may be automatically regulated by employing a water level sensor. Weather regulation can use temperature and humidity data.
The block diagram for each of the materials listed above is displayed in the figure. The primary mechanism of this system consists of linking the soil moisture sensor—which was originally integrated into the plant—

to the soil moisture node (ESP8266), which is further connected to the other electrical parts mentioned above, as seen in Figure 1. The amount of soil moisture is measured. by the sensor, which transmits the parameters and data about the moisture content of the soil to the water node (8266), which regulates the pump, and the bridge (ESP32). The water node (ESP8266) delivers a signal to the relay module, which subsequently operates a pump to provide the plant with a certain amount of water, if the level of soil moisture falls below a predetermined threshold. When there is sufficient water delivered, the pump shuts off. The water level sensors are used to keep the water tank at the proper level. Based on information obtained from the water node (ESP8266), the sensor will transmit data to it if the water level drops below a certain level. When the required water level is reached, the sensor water node provides data to the motor driver instructing it to halt the motor. The motor driver then acts on the signals sent by the water node to start the motor.

In order to regulate temperature, a fan will turn on if the temperature and humidity levels exceed the reference value—which is determined based on the crop—and remain below threshold levels. The heater bulb will begin to maintain the threshold levels if the temperature value is lower than the reference value. A local network is created by connecting the three nodes (ESP8266)—the temperature, soil moisture, and water nodes—to the bridge (ESP32). The bridge will be equipped with Wi-Fi access so that data may be shared online. Every piece of sensor data will be kept in a Google Cloud account as a spread sheet. To track the field data in real time, an Android application is needed.

In order to regulate temperature, a fan will turn on if the temperature and humidity levels exceed the reference value—which is determined based on the crop—and remain below threshold levels. The heater bulb will begin to maintain the threshold levels if the temperature value is lower than the reference value.

Fig.2 – Bridge Device

The Bridge node's device is seen in Fig. 2. Bridge serves as the hub for all device communication; data is sent from one device to another via bridge. The user application provides the user with access to the bridge node and all current dates.

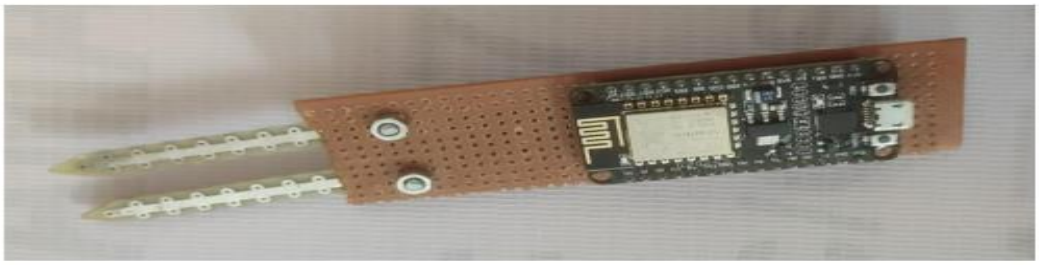

Fig.3 – Soil Moisture Node Device

The sensor to measure soil moisture is shown in Fig. 3, and the ESP8266 is used to send the data across a wireless mesh network.

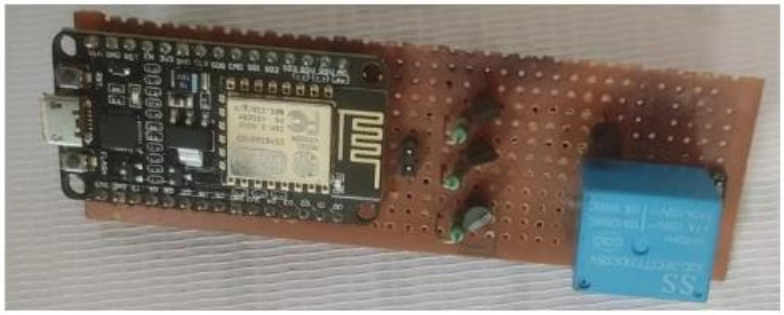

Fig.4 – Water Node Device

The water level sensor in Figure 4 is used to read the water level, and an ESP8266 is used to relay the data across a wireless mesh network. Additionally, the ESP8266 module is linked to the water pump.

Fig.5 – Temperature Node Device

Figure 5 displays the temperature sensor and the ESP8266 module used to send the data across a wireless mesh network. Additionally, the ESP8266 module is linked to the circuits for the cooler and heater.

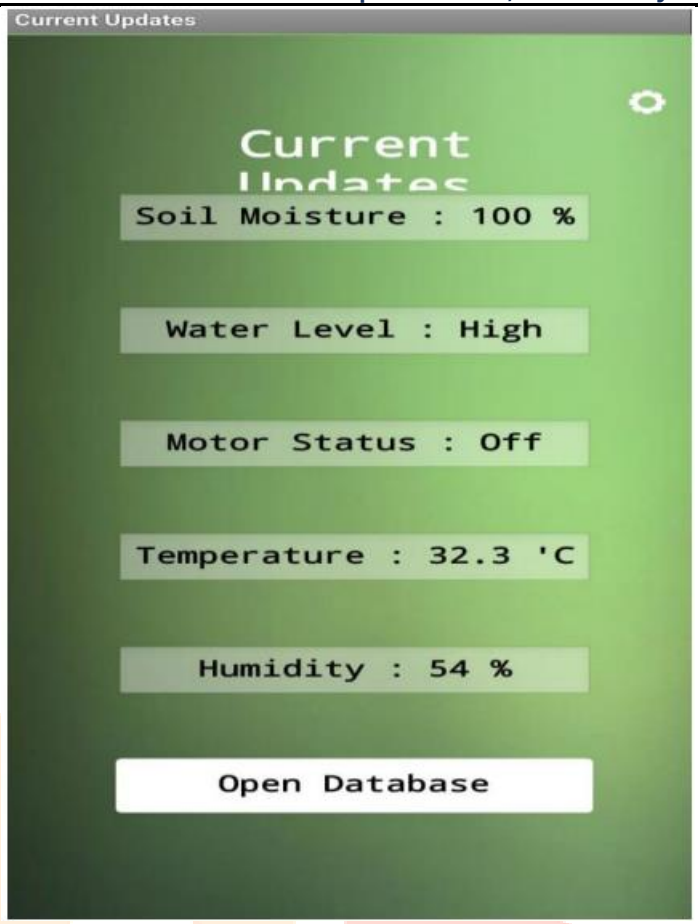

Fig.6 – User Data on The Application

VII. CONCLUSION

Utilizing a variety of technology into agricultural techniques to boost both the number and quality of farm products is known as "smart agriculture." Thus, smart agriculture introduces a revolutionary approach that accelerates the adoption of technology in a sector that was previously devoid of innovation. IoT-enabled sensors are employed to track the expansion and development of crops. These sensors carefully record information on water level, temperature, humidity, and soil moisture, among other things. The information gathered by the sensors may be further analysed to estimate agricultural production, track farm operations and increase efficiency, and anticipate plant life cycles. From its description, it is clear that smart farming is directly related to cloud and IoT. One of the foundations of smart farming is IoT. Its main use is for creating data on environmental conditions from several sources.

REFERENCES:

[1] Rajalakshmi and S. Devi Mahalakshmi, “IOT Based Crop Field Monitoring and Irrigation Automation”, 10th International conference on Intelligent systems and control (ISCO), 2016.

[2] Prof. K. A. Patil And Prof N. R. Kale proposes “A Model For Smart Agriculture Using IOT” 2016 International Conference on Global Trends in signal Processing, Information Computing And Communication.

[3] Dr. V. Vidya Devi and G. Meena Kumari, “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] Dr.N.Suma, Sandra Rhea Samson, S. Saranya, G.Shanmugapriya, R.Subhashri „IOT Based Smart Agriculture Monitoring System“ 2017 International Journal on Recent and Innovation Trends in Computing and Communication.

[5] Mahammad shareef Mekala, Dr.P.Viswanathan „A Survey: Smart agriculture IoT with cloud Computing " 978-1-5386-1716-8/17/$31.00 ©2017 IEEE [6]

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.

[7] K. Jyostsna Vanaja, Aala Suresh et.al, "IOT based Agriculture System Using NodeMCU", International Research Journal of Engineering and Technology, Vol.05.

[8] T. Rajesh, Y. Thrinayana and D. Srinivasulu "IOT based smart agriculture monitoring system", International Research Journal of Engineering and Technology, Vol.07.

[9] K. Lakshmisudha, Swathi Hegde, Neha Kale, Shruti Iyer, "Smart Precision Based Agriculture Using Sensors", International Journal of Computer Applications (0975-8887), Volume 146-No.11, July 2011.

[10] Nikesh Gondchawar, 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.

[11] I. Mampentzidou, E. Karapistoli, A.A. Economides, "Basic Guidelines for Deploying Wireless Sensor Networks in Agriculture", Fourth International Workshop on Mobile Computing and Networking Technologies, pp. 864-869, 2012.

[12] Chetan Dwarkani M, Ganesh Ram R, Jagannathan S, R.Priyatharshini, "Smart Farming System Using Sensors for Agricultural Task Automation", IEEE International Conference on Technological Innovations in ICT for Agriculture and Rural Development (TIAR 2015).

[13] P Lashitha VishnuPriya,N Sai Harshith, Dr.N V K Ramesh ,"Smart Agriculture Monitoring System using IOT", International Journal of Engineering and Technology,2018

[14] Dr.Sanjay N Patil, Madhuri B Jadhav,"Smart Agriculture Monitoring System using IOT" ,International Journal of Advances Research in Computer and Communication Engineering,April-4,2019

[15] Harika Pendyala ,Ganesh Kumar Rodda, AnoojaMamidi, Madhavi Vangala,SathyamBonala, Keerti Kumar Korlapati "IoT Based Smart Agriculture Monitoring System", International Journal of Scientific Engineering and Research (IJSER),2020

[16] MUHAMMAD AYAZ 1, (Senior Member, IEEE), MOHAMMAD AMMAD-UDDIN 1, (Senior Member, IEEE), ZUBAIR SHARIF2, ALI MANSOUR3, (Senior Member, IEEE), AND EL-HADI M. AGGOUNE1, (Senior Member, IEEE), "Internet-of-Things (IoT)-Based Smart Agriculture:

[17] Toward Making the Fields Talk", SPECIAL SECTION ON NEW TECHNOLOGIES FOR SMART FARMING 4.0: RESEARCH CHALLENGES AND OPPORTUNITIES August 1, 2019.