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IoT based Intelligent Monitoring System for Smart City

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Abstract: Agriculture plays vital role in the development of agricultural country like India. In India about 70% of population depends upon farming. Agriculture is done manually from ages. As the world is trending into new technologies and implementations it is a necessary goal to trend up with Agriculture also. due to migration of people from rural to urban there are difficulties in agriculture. In day today life, technology is updating and it is also necessary to trend up agriculture too. IoT can play a key role in smart agriculture. 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.

I.I Problem Statement

- Monitoring of field parameters is important in order to analyse the situation.
- Due to heavy water consumption an automated irrigation system is needed to optimize the water uses.
- The traditional techniques can leads to under or over irrigation.
- Unsafe working conditions can potentially leads to accidents, wastage of man power, money, time etc.

I.II Objectives

- The main objective of this paper is to design an IOT based agriculture monitoring system which can provide comfortable access to field information. This IOT server can be easily monitored from anywhere.
- To design a Smart irrigation system can optimize water levels based on things such as soil moisture and weather predictions.
- To design an automated regulation of water levels in the fields
- To provide a smart weather control on the in order to regulate the temperature and humidity.
- To save man power, time, money etc.

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II. LITERATURE SURVEY

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]

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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]

III. PROPOSED SYSTEM

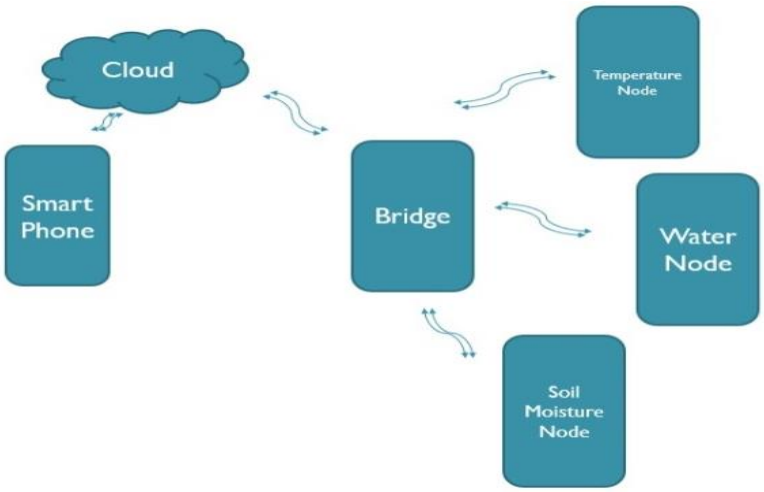

Fig. 1 Block Diagram of the proposed work

This system is a combination of hardware and software components. The hardware part consists of different sensors like soil moisture sensor, water level sensor, temperature& humidity sensor etc. whereas the software part consists of an android based application connected to the bridge ESP(32) board and other hardware components using Internet of Things (IOT). The android based application consists of signals and a database in which readings are displayed from sensors i.e. temperature, humidity, soil moisture & water level. The improvement in irrigation system using wireless network is a solution to achieve water conservation as well as improvement in irrigation process. By using water level sensor an automated regulation of the water level can be achieved in the field. With temperature and humidity data, weather regulation can be done.

Figure shows the block diagram of all above mentioned materials in the system. The main working principle behind this system is in connecting the soil moisture sensor, which was previously embedded into the plant, to the soil moisture node (ESP8266) which is also connected to other electronic components listed above as shown in Figure 1. Measurement of soil moisture is done by the sensor which forwards the information and parameters regarding the soil moisture to the bridge(ESP32) and water node(8266), which controls the pump. If the level of soil moisture drops below a certain value, the water node (ESP8266) sends the signal to the relay module which then runs a pump and certain amount of water is delivered to the plant. Once the enough water is delivered, the pump stops doing its work. To maintain the appropriate water level in the water tank, the water level sensors are used. If the water level falls below the certain level the sensor will send data to the water node(ESP8266), based on data received from sensor water node sends signals to the motor driver and motor will start accordingly and once the desired water level is achieved the water node will send data to motor driver to stop the motor.

For temperature regulation if the temperature and humidity values are above the reference value (calculated according to. the crop) to maintain them to be within threshold levels fan will switched ON. If the temperature value is below the reference value the heater lamp will start to maintain the threshold levels.

All three nodes (ESP8266) water node, temperature node & soil moisture node are connected to the bridge (ESP32) to form a local network. The bridge will have the Wi-Fi connectivity to share the data over internet. All the sensor data will be stored in the form of spread sheet in the Google cloud account. An android based application is required to monitor the real time data from the field.

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III.I BRIDGE DEVICE

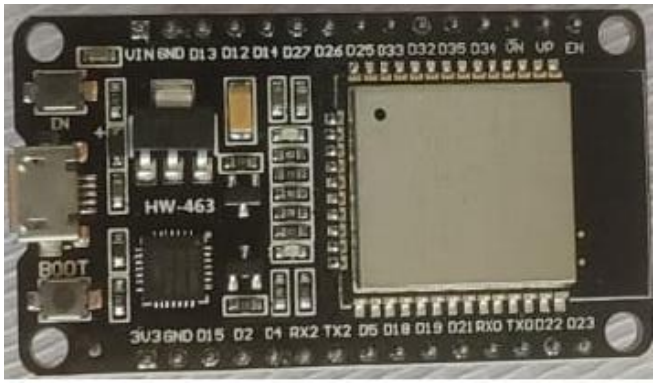

Fig. 2 Bridge Device

Fig 2 shows the device of the Bridge node. Bridge acts as central node for all devices, all the data are transferred from one device to another through bridge. User has access to bridge node and get all the real time date on the user application.

III.II SOIL MOISTURE NODE

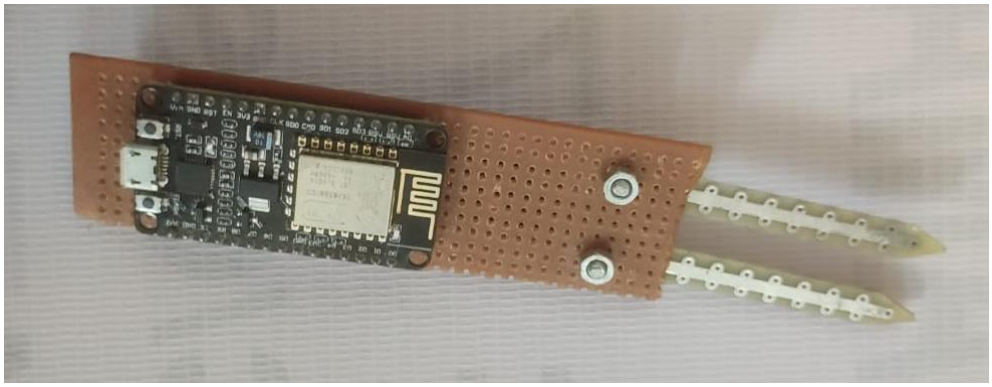

Fig. 3 Soil Moisture Node Device

Fig 3 shows the sensor to read soil moisture and ESP8266 to transmit the data on wireless mesh network.

III.III WATER NODE

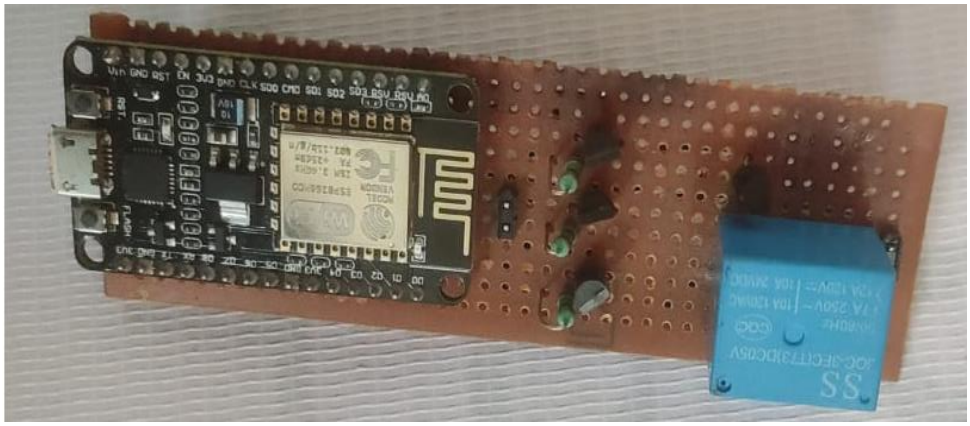

Fig. 4 Water Node Device

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Fig 4 shows the water level sensor to read water level and ESP8266 to transmit the data on wireless mesh network. Also the water pump is connected with ESP8266 module.

III.IV TEMPERATURE NODE

Fig. 5 Temperature Node Device

Fig 5 shows the sensor to read temperature and ESP8266 module to transmit the data on wireless mesh network. Also the heater and cooler circuits are connected with ESP8266 module.

IV. RESULT

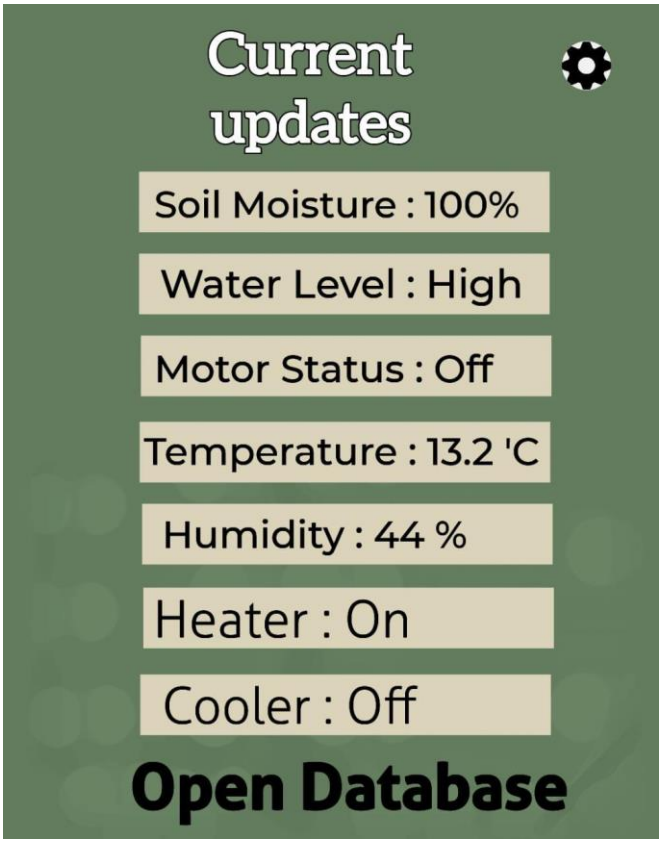

Fig. 6 User data on the application

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V. CONCLUSION

Smart agriculture is a means of farm management that involves the integration of various technologies in agricultural practices to increase the quality and quantity of farm products. Smart Agriculture thus, brings a transformational methodology that intensifies the penetration of technology into an erstwhile innovation deprived sector. IoT-enabled sensors are used to monitor the growth and development of crops. These sensors meticulously report data about temperature, humidity, soil moisture, water level etc. The data obtained by the sensors can be further analyze to monitor the farm processes & improve efficiency, for crop yield forecast and predict the life cycle of the plant. As is evident from its very definition, Smart Farming is closely interlinked with IoT, cloud. IoT is one of the pillars of smart farming. Primarily, it's utility lies in generating data from various sources pertaining to environmental conditions

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] 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. Economide, "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: RESEARCHCHALLENGES AND OPPORTUNITIES August 1, 2019.