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AN EFFICIENT LORA SMART AGRICULTURE

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***ABSTRACT*—The objective of this paper is to build up a LoRa-based smart agricultural management and monitoring system using Wireless Sensor Networks (WSNs) in rural areas, in order to replace the current technology of the agricultural monitoring system. A private network server is created and interfaced with a gateway that collects data or signals from end nodes and transmits the data to the cloud without the use of routers. The data can be used for end user application. The network interface is fulfilled by LoRa by solving communication failure problems and energy saving data transmission. This intelligent agriculture platform improves the efficiency of agricultural techniques. The ultimate goal is to collect, monitor, and effectively employ relevant data for agricultural processes, with the purpose of achieving an optimized and more environmentally sustainable agriculture.**

***Keywords*—Agriculture, LoRa techniques, Wireless Sensor Network**

I. INTRODUCTION

LoRa is a new technology having the highest of which the Lora WAN protocol operates. That is the reason for choosing LoRa model. The Internet of Things (IoT) is a technological advancement capable of improving efficiency in the global agricultural landscape, accelerating progress toward the goal of increased production. By IoT we mean an architectural framework for systems where computing devices including sensors and actuators wirelessly exchange data collected from everyday objects to either a final user or other machines, in order to monitor and automate processes .Use the enter key to start a new paragraph. The appropriate spacing and indent are automatically applied. In recent years, a new agricultural information and communication technology, called smart agriculture, which meets the needs of farmers for information collection, signal processing, data analysis and equipment control, has been developed. This work proposes an agricultural service platform that is based on a wireless sensor network and LoRa communication technology. Work uses LoRa as a network transmission interface to solve problem of communication failure and save energy. A smart agriculture service platform is developed to support environmental monitoring and to improve the efficiency of agricultural management. The goal of this work is to integrate IoTs awareness and communication technology into a smart agriculture platform. The accuracies of sensors of various types are measured and these sensors are integrated into multifunction sensor component. Then, multi-functional sensor components are integrated with LoRa wireless network components. In this work, a smart sensor network platform for agricultural applications is designed and constructed.

II. LITERATURE SURVEY

Vaibhavraj S. Roham Kopargaon, Ganesh A. Pawar Kopargaon, Abhijeet S. Patil Kopargaon, Prasad R. Rupnar in 2015, that In farming Temperature, Humidity and CO2 are the most essential parameters. The growth of crops is mainly depending on these three parameters. Currently farmers don't have any system which will show real-time levels of these parameters. Even farmer don't know when humidity is increased or CO2 level increased in his green house, because of it crop production gets affected. The proposed systemis going to monitor these changes periodically and take an action automatically or pretend the required action to the farmer. System will have a provision to visualize the graphical representation of all the streaming data from the green house. Later on farmer can operate the devices from remote location by usingits smart phone.

The author Manikandan .S.V1, Jayapriya represented that the Wireless Sensor Networks (WSNs) have concerned much attention in recent years. In 2016, Deployment of sensor networks still is a problem and subject of wide range researches and developments. Prototype of WSN built in framework of current research shows that small networks are more or less functional while large scale WSNs with long range nodes are issue. Despite of problems our WSN prototypes gave possibility to gather valuable data for field

weather monitoring. The sensor network technology will help the farmers to know the exact values of the requirements that they need to improve the crop productivity. It will help them in taking better decisions atthe right time. This will save their time and labour also. The basic aim here is to transport the Indian farmerfrom prediction to the exact values which are beneficial for their farms.

Authors Aloÿs Augustin1, Jiazi Yi 1,*, Thomas Clausen 1 and William Mark Townsley 2 explained In this techniques to LoRa is a long-range and low-power telecommunication systems for the "Internet of Things". The physical layer uses the LoRa modulation, a proprietary technology with a MAC protocol. LoRaWAN is an open standard with the specification available free of charge. This paper gives a comprehensive analysis of the LoRa modulation, including the data rate, frame format, spreading factor, receiver sensitivity, etc. A testbed has been built, to experimentally study the network performance, documented in this paper . The results show that LoRa modulation, thanks to the chirp spread spectrum modulation and high receiver sensitivity, offers good resistance to interference. Field tests show that LoRa can offer satisfactory network coverage up to 3 km in a suburban area with dense residential dwellings. The spreading factor has significant impact on the network coverage, as does the data rate. LoRa is thus well suited to low-power, low-throughput and long-range networks. This paper has also shown that LoRaWAN is an LPWAN protocol very similar to ALOHA. Its performance thus degrades quickly when the load on the link increases.

III. SYSTEM DESIGN

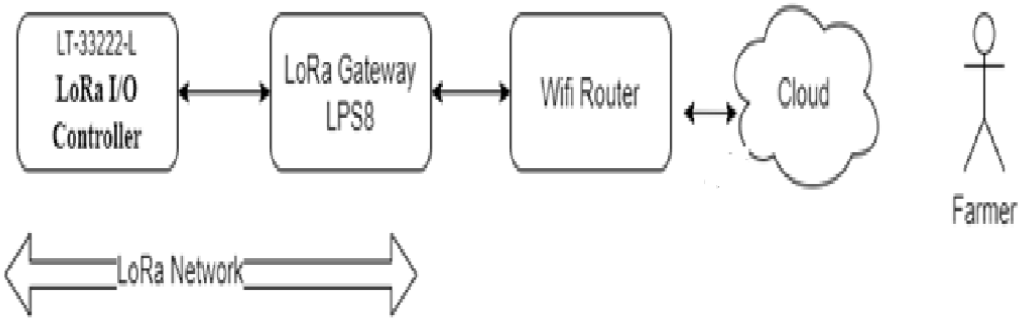

Fig.1 Block Diagram of System

IV. PROPOSED METHODOLOGY

In this paper, the agricultural autonomous system is designed where it will sense the conditions in real time and analyse the field parameters such as temperature, soil moisture and humidity. The soil moisture sensor monitors the moisture level in the field and the temperature sensor monitors the temperature level. These data will be given to the LoRa Gateway. The LoRa Gateway performs the dual function of both receiving and transmitting the data to the cloud server via Wi-fi or Ethernet. At the transmitter side, the soil moisture, temperature and humidity of the soil are measured using sensors and it is processed using Arduino. The processed data are transmitted to the user side via LoRa technology. When any of the parameters falls below the optimum level, the Arduino send the command to motor for the operation to attain the level. The monitoring can provide data about yield and assist in recognizing the cause of the low production of yield. The data has been collected from agricultural land through sensors interfaced with the hardware on the board. The proposed system possesses different components, i.e., LoRa module, and the entire interfaced sensor board that encloses. In this section, a detailed description of hardware and software components given, alongside the specifications of components used in this implementation. The hardware has been divided into three different layers.

• Collecting data through sensors.

• Data transmission.

• Data acquisition and display of data.

V. CONCLUSION

For any farmer, the monitoring of information about soil moisture, temperature, and humidity is very essential for producing superior yield and controlling various components like motor. For that purpose wireless technology is a must. There is much wireless technology available in the market right now, but apart from them, LoRa technology is very suitable in the agriculture sector because it does not require internet connection moreover it operated at a greater distance. One can place the transmitter at the differentplaces in the field whereas the data generated by them will be collected with the help of the receiver. Now farmers will observe the collected data through the website as well as Android application. Experimental work aids remote monitoring of fields to farmers as well as assists to increase in yield. This monitoring setup can be further made headway by analysing the sensor data using an unsupervised clustering algorithm to build an automatic agricultural system for monitoring parameters like temperature, humidity, soil moisture and controlling agriculture automatically with improved sensor nodes to increase the yield and to enhance the efficiency of nodes.

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