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IOT based Smart Agriculture Monitoring System

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ABSTRACT

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 wireless sensor networks and collect the data from different sensors which are deployed at various no des and send by wireless protocol. By using IoT system the smart agriculture is powered by NodeMCU. It includes the humidity sensor, temperature sensor, moisture 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.

Key words: IOT, Soil, Moisture Sensor, Temperature Sensor

INTRODUCTION

One of the largest livelihood providers in India is Agriculture. Agriculture plays an essential role in supporting human life. The rise in population is proportional to the increase in agriculture production. Basically, Agriculture production depends upon the seasonal situations which do not have enough water sources. To get beneficial results in agriculture and to overcome the problems, IoT based smart agriculture system is employed.

Due to the recent advances in sensors for the irrigation systems for agriculture and the evolution of WSN and IoT technologies, these can be applied in the development of automatic irrigation systems. The system will determine the parameters that are monitored in irrigation systems regarding water quantity and quality, soil characteristics, weather conditions, and fertilizer usage and provide an overview of the most utilized nodes and wireless technologies employed to implement WSN and IoT based smart irrigation system.

LITERATURE SURVEY

Authors Raja Lakshmi P and Devi Maha Lakshmi S presented “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].

Authors J Gutierrez and J Francisco presented a paper on "Automated Irrigation System using a Wireless Sensor Network and GPRS Module". 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 parameter and calculate the reading [2].

Authors Vidya Devi and Meena Kumari presented a paper on "Real Time Automation and Monitoring System for Modernized Agriculture". 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].

Authors Basha E and Daniela R presented a paper on "Design of Early Warning Flood Detection Systems for Developing Countries". 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].

Block diagram

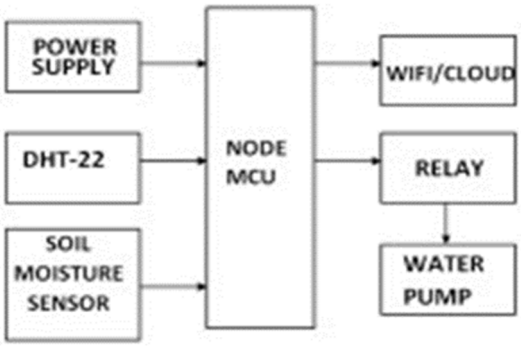

Fig. 1 Block Diagram

The Block diagram of the proposed system is shown in Figure 1. The Block Diagram gives information of the required modules.

SOIL MOISTURE SENSOR

A device which is used to sense the moisture level in the sand is called soil moisture sensor and is shown in Figure 2. When the sensor senses the water shortage in the field, the module output is at high level else the output is at low level. This sensor reminds the user to water their plants and also monitors the moisture content of soil. It has been widely used in agriculture, land irrigation and botanical gardening.

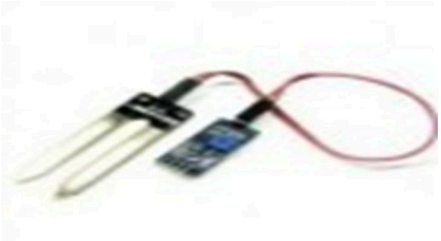

Fig. 2 Soil Moisture Sensor

TEMPERATURE SENSOR

Temperature Sensor **(**DHT-11) is used to monitor the temperature and humidity of the atmosphere. The DHT-11 shown in Figure 3 is a basic ultra-low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air and split out a digital signal on the data pin. The DHT-11 calculates relative humidity by measuring the electrical resistance between two electrodes.

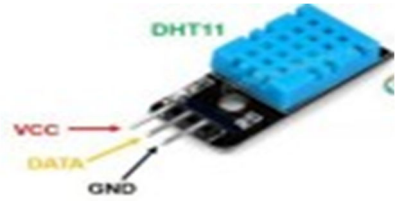

Fig. 3 Temperature Sensor

WORKING

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 Node MCU and motor pump gets OFF in this condition. The maximum threshold value upon dry soil is 1023. 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 automaticall.

CONCLUSION AND FUTURE SCOPE

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.

The project has vast scope in developing the system and making it more user friendly and the additional features of the system by installing a webcam in the system, photos of the crops can be captured and the data can be sent to database.

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