

Wireless Sensor Networking for Environment Monitoring in Agriculture

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Abstract: Agriculture has an important role in the development of country. It is the backbone of the civilization today. Proper environment conditions (mainly water) are needed for the growth of wide variety crops. A single sensor node can only collect information from a small area in the given field. Here the need for wireless sensor networking arises. A Wireless sensor network (WSN) contains more than two sensor nodes. A sensor node contains a microcontroller, various sensors and a Wi-Fi module. The communication between the sensor nodes is carried out through the Wi-Fi module. NodeMCU is a microcontroller which has inbuilt Wi-Fi module makes it suitable for this purpose. The information collected from each node is communicated with the nearby node and finally these information is send to the cloud.

Index Terms: WSN, NodeMCU, DHT22, Wi-Fi, IoT

I. INTRODUCTION

Agriculture is an important sector which needs development. There are many systems for the development in the field of agriculture. People do not have much awareness about the proper environment needed for the growth of crops in the field. Drought, climate change and pollution subject our water resources to big changes, and as the situation gets worse with time, more people experience its negative effects [6]. The advent of Wireless Sensor Networks (WSNs) brings a new direction of research in agricultural domain [7]. Proper environment monitoring helps to improve the productivity in the field of agriculture. Perfect measure of temperature, moistness and water content are required for the proper development of a harvest. A single sensor node can collect information from a small area in the field. So when coming to a large area, more number of sensor nodes are needed. A WSN is one which contains more than two sensor nodes. Communication between these sensor nodes is an important stage.

II. MATERIALS AND METHODS

Figure 1. Shows the overall system. In this paper, three sensor nodes are considered. Each sensor node contains one or more sensors and a microcontroller. Data from one sensor node is send to the nearby sensor node. The whole data is continuously monitored in the cloud.

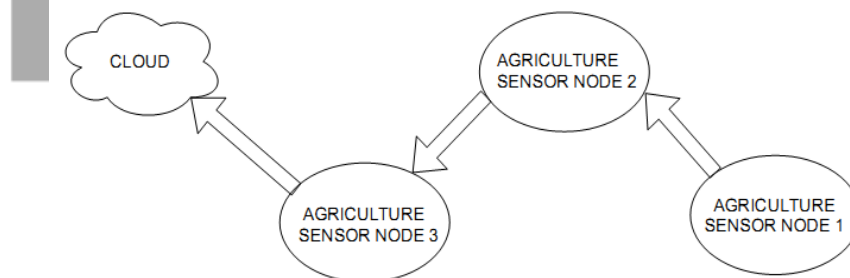


Fig.1. Overall System

Figure 2. Shows the detailed block diagram of the system. Each sensor node contains a DHT22 sensor, soil moisture sensor and a NodeMCU. DHT22 sensor measures both temperature and humidity. It contains a humidity sensing component and a NTC temperature sensor and an IC on the back side of the sensor. Soil moisture sensor measures the moisture content in the soil. These information is given to the NodeMCU. NodeMCU is an open source Internet of Things (IoT) platform and it includes both hardware and firmware. It is a low cost device which makes it suitable for this application. It has inbuilt Wi-Fi module. The coding of NodeMCU can be done in Arduino IDE. For the communication between the nodes, one node is taken as client and the nearby node is taken as server. Thus the data collected from one node is send to the nearby node over Wi-Fi. NodeMCU makes wireless sensor networking more easy and since it uses Wi-Fi, more range is possible when compared with Bluetooth. The collected data can be given to the cloud via Wi-Fi. Thus real time monitoring of environment is possible.

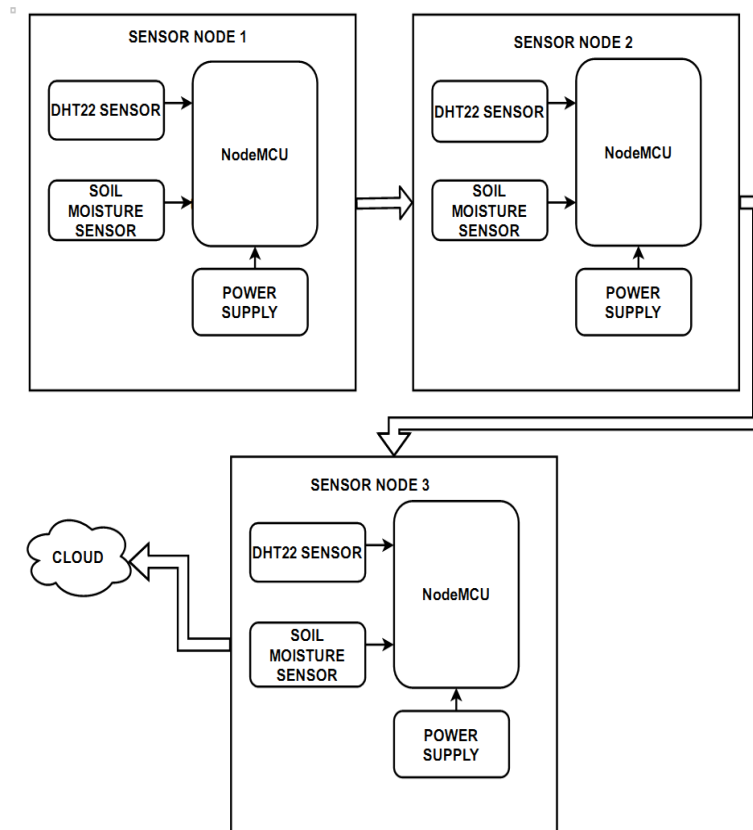


Fig.2. Block Diagram of the Entire System

III. RESULTS AND DISCUSSION

A WSN for environment monitoring is designed. The environment conditions in the field can be easily monitored. The data collected in the third node has to send to the cloud and various aspects for IoT has studied.

The values from the sensor nodes are processed using fuzzy logic and it classifies a range of values to specific conditions. After considering all the sensor information, fuzzy takes a decision about the amount of water to be supplied on each area in the field. All these information are send to the cloud. These ideas can be implemented in future.

IV. CONCLUSION AND FUTURE SCOPE

Development in the field of agriculture is needed. A WSN for environment monitoring in agriculture is proposed. Multiple sensor nodes are used to form a WSN. Each sensor node consists of a NodeMCU and various sensors. The communication between each sensor nodes are done over the inbuilt Wi-Fi module in the NodeMCU..Environment monitoring using WSN enhances the yield of crops in agriculture. In future, the work can be extended by introducing fuzzy logic and supplying the controlled amount of water as per the need. Rain fall prediction can also be added as a future work.

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