

Smart Agro System

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Abstract- Precision agriculture is a vast field. Many technologies involved in different ways to enhance agriculture field. So applying various types of technologies to increase crop yield, controlling various activities and maintaining smartness in agriculture field day by day population of India increases so in order to keep pace crop yield must be increase.

This paper describes the “Smart Agro System” which Implementation of precision agriculture field using wireless sensor networks. Different sensor nodes sense different environment characteristics and sensed data stored in database for further action. Base station includes arduino Uno with integrated GSM module to take the actions and give the actions to different sensor nodes. Also to pass the sensed data to base station ZigBee sensors use.

As long as user has internet connectivity he can control farm activities by remotely. Since from evolution in the Smartphone field, now days people more rely on mobiles. So to interact with the system android application is provided to end user.

Index Terms- Precision Agriculture, Wireless Sensor Network, Arduino Uno, GSM module, ZigBee, Android application

1. Introduction

Wireless Sensor Networks (WSNs) are intelligent network made by deploying sensors in the desired location which senses the current value. The wireless network makes it possible for wireless transmission of the data. WSNs are used in various applications like military, industry, agriculture and medical. WSNs are easy to implement and are cost-efficient.

As food and water are basic needs of humans, food and water consumption are delicate subjects. Irrigation is an important aspect in modern agriculture. Studies have shown that proper water supply plays vital role in crop yield. Delaying of water supply leads to a substantial loss.

2. WIRELESS SENSOR NETWORK IN: SMART AGRO SYSTEM

WSN is a concept in which the environmental or physical conditions are monitored and this monitored data is passed through wireless channel on a main location. WSN contains various components such as sensors, microcontrollers, electronic board and data obtained from WSN is stored in the database which is further used in analytic process. Main characteristics of WSN are – ease of use, scalability, good recovery mechanism in case of node failure.

WSN uses sensors to obtain the input data from the environment. The obtained input or the sensed value is compared with the preset threshold and then the desired action is taken. Comparison is done by the microcontroller. Microcontroller takes an action through relays as a result of comparison. ZigBee is another module which is used in this system. ZigBee is responsible for wireless transfer of data from microcontroller to the main location and vice a versa.

The main challenges faced by WSN are energy efficiency, robustness and responsiveness. The key issues in WSN– channel loss, bandwidth limitation, computational constraints.

The WSN system works as follows:

- Sense the value using various available sensor in the field.
- Send the sensed values to the controller for further use.
- Controller takes the decision based on the current sensed values and acts through the actuators.

A. ZigBee Technology:

The ZigBee technology is built on standard IEEE 802.15.4 framework. The IEEE 802.15.4 defines Physical and Medium access layers for low rate personal area networks. The physical layer supports three frequency bands with different gross data rates: 2,450 MHz (250 kbs-1), 915 MHz (40 kbs-1) and

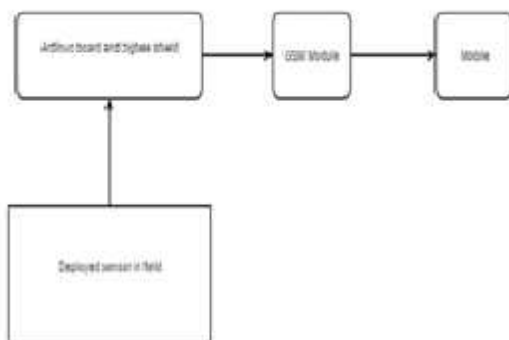
868 MHz (20 kbs-1) It also supports functionalities for channel selection, link quality estimation, energy measurement and clear channel assessment. ZigBee standardizes both the network and the application layer.

The network layers support different types topologies Such as bus, star, ring, mesh,grid, hybrid etc. In every field where network is essential or uses where this type of technology uses. The application layer provides a framework for distributed application development and communication. Aside from the agriculture and food industry, it is widely used in home building control, automation, security, consumer electronics, personal computer peripherals, medical monitoring and toys. These applications require a technology that offers long battery life, reliability, automatic or semiautomatic installation, the ability to easily add or remove network nodes, signals that can pass through walls and ceilings and a low system cost.

3. MOTIVATION FOR CURRENT WORK

In past days farmers have been facing many issues. Crop yields are reduced due to inadequate supply of water. While on the other hand, sometimes due to farmer’s ignorance or illiteracy fields are filled with excess amount of water.

This may result harmful for some of the crop types as the fertilizers are drained away by dissolving in the excess water. Also there are cases where is poor



crop yield and bad crop quality due to above mentioned factors.

This system helps the farmer to supply the crops only the sufficient amount of water resulting is avoiding water wastage and also enhancing the crop yield present in his or her folder and was already compiled at least once without errors.

Arduino microcontroller is used because it is cheaper than raspberry Pi and beaglebone kits and the development on the arduino board is easy, also it save lot of time of development team.

4. THE PROPOSED METHODOLOGY

In this system what we have done the controller takes the input as the current environment values through the sensors. Various sensors are plotted in the field to check the current value of environment. Sensors used are soil moisture, pH scale sensor, Humidity sensor and temperature sensor. Soil moisture sensor senses the current value of the soil moisture. The value that are sensed are in analog form

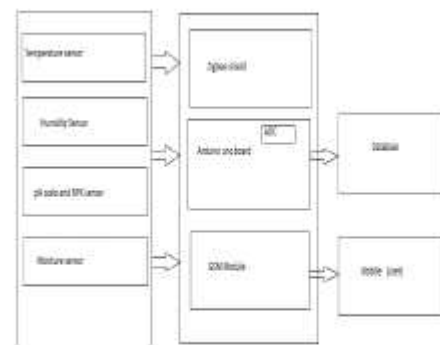


Fig. 2. Proposed system

This analog value is converted into digital form by using ADC which is inbuilt in arduino board .the data that is sensed is transferred through zigbee network

After converting it to digital the microcontroller stores the data the data that is sensed in data base so the data can be used in further by the farmer (i.e client)

5. CONCLUSION

We provide solution to open farm using precision agriculture concept through wireless sensor network and Zigbee which helps to farmers to increase crop yield .They are many techniques involved in now a days, here we deployed wireless sensor network in open farm .Using different sensors such as temperature , humidity ,soil moisture , pH scale etc. we collects data and stored into database To interact with system user can send/receive messages through GSM module to base station. Also we provide user friendly interaction through android application.

So after implementing smart agro system. We will get idea about precision agriculture and its importance.

Also we know the working of wireless sensor network .We get an idea of importance of agriculture field and technology that is evolving in it.

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