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Implementation of wireless farming using IoT

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ABSTRACT

As we know there are many issues surrounding our agriculture sector today lack of proper technology has caused a decline in production in recent years. As in other countries, we see that there are many technological advancements that have helped in the increase in Production. IoT is one of the technologies that can make a very large impact on the agriculture sector. IoT stands for Internet of things it means that things will be connected to the internet and communicate with each other. In our system we have designed a system that can monitor parameters like temperature, humidity, Gas levels, Light detection, etc. all these parameters will be monitored locally, our system will be connected to the internet via a Wi-Fi module. All the data that has been collected by the system then will be uploaded to the server where it will be displayed using graphs and will be available for analysis.

Keywords— *IoT, WSN*

1. INTRODUCTION

In 1995, "thing to think" was coined by BILL GATES. In 1999, IoT (Internet of Things) was come up by EPC global. IoT interconnects human to a thing, the thing to thing and human to human. The goal of IoT is bring out a huge network by combining different types connected devices. IoT targets three aspects Communication, automation, and cost saving in a system. IoT empowers people to carry out routine activities using the internet and thus saves time and cost making them more productive. IoT enables the objects to be sensed and/or controlled remotely across the existing network model. IoT in environmental monitoring helps to know about the air and water quality, temperature and conditions of the soil, and also monitor the intrusion of animals into the field. IoT can also play a significant role in precision farming to enhance the productivity of the farm. Using IoT and WSN technology we can use to increase productivity and reduce human efforts.

2. LITERATURE SURVEY

Balaji Banu [1] designed a wireless sensor networks to observe the conditions of the farming and increasing the crop yield and quality. Sensors are used to monitor different conditions of environment like water level, humidity, temperature etc., The processors ATMEGA8535 and ICS8817 BS, analog to digital conversion and wireless sensor nodes with wireless transceiver module based on Zig bee protocol are used in the designing the system. Database and web application is used to retrieve and store data. In this experiment, the sensor node failure and energy efficiency are managed.

Liu Dan [2], Joseph Haule, Kisangiri Michael [3] and Wang Weihong, Cao Shuntian [38] carried out experiments on intelligent agriculture greenhouse monitoring system based on ZigBee technology. The system performs data acquisition, processing, transmission and reception functions. The aim of their experiments is to realize the greenhouse environment system, where the of system efficiency to manage the environment area and reduce the money and farming cost and also save energy. IoT technology here is based on the B-S structure and cc2530 used like processing chip to work for wireless sensor node and coordinator. The gateway has a Linux operating system and cortex A8 processor act as the core. Overall the design realizes remote intelligent monitoring and control of greenhouse and also replaces the traditional wired technology to wireless, also reduces manpower cost.

Joseph haule [3], Dragoş Mihai Ofrim, Bogdan Alexandru Ofrim and Dragoş Ioan Săcăleanu [18] have proposed an experiment that explains the use of wsn used in automating irrigation. Irrigation control and rescheduling based on wsn are powerful solutions for optimum water management through automatic communication to know the soil moisture conditions of irrigation design. The process used here is to determine the proper frequency and time of watering are important to ensure the efficient use of water, high quality of crop detection delay throughput and load. Simulation is done for agriculture by OPNET. Another design of WSN is deployed for an irrigation system using Zig bee protocol which will impact battery life. There are some drawbacks as WSN is still

under development stage with unreliable communication times, fragile, power consumption and communication can be lost in the agricultural field. So automate irrigation system and schedule based on wireless sensor networks are used. WSN uses low power and a low data rate and hence energy efficient technology. All the devices and machines controlled with the help of inputs received via sensors which are mixed with soil. Farmers can analyze whether the system performs in normally or some actions are needed to be performed.

Vijay Kumar [4], Lin Zhang, Min Yuan, Deyi Tai, Xia Oweixu, Xiang Zhan, Yuanyuan Zhang [13] studied the work of the rural farming community that replaces some of the traditional techniques. The sensor nodes have several external sensors namely leaf wetness, soil moisture sensor, soil pH, atmospheric pressure sensors attached to it. Based on the soil moisture sensor the mote triggers the water sprinkling during the period of water scarcity and switches off after adequate water is sprinkled. This results in water conservation and soil pH is sent to the base station and in turn, base station intimates the farmer about soil pH via SMS using GSM model. This information helps the farmers to reduce the quantity of fertilizers used. A development of rice crop monitoring using WSN is proposed to provide a helping hand to farmers in real time monitoring and increasing rice production. The automated control of water sprinkling and ultimate supply of information is implemented using a wireless sensor network.

G. Nisha [5], Chun-ling Fan, Yuan Guo [10] proposed a wireless sensor based automated irrigation system to optimize water use for agricultural purpose. The system consists of a distributed wireless sensor network of soil moisture, and temperature sensors mounted in the crop field. Zigbee protocol is used to handle the sensor information and water quantity programming using an algorithm with threshold values of the sensors sent to a micro controller for the irrigation system. Data inspection is done using by using a solar panel and cellular internet interface. A wireless camera is fixed in the crop field to monitor the disease area using an image processing technique.

3. PROPOSED METHODOLOGY

Our proposed system consists of two parts central node the sensor node. The Sensor node consists of a processing unit that is the Arduino Uno and sensors like Moisture sensor, Temperature sensor and RF module for wireless communication. Also, the sensor node will have relays to control the motor. The Base node will also have a processing unit that will and Rf receiver and a Wi-Fi module. The Tx RF modules on the Transmitter side will be used to communicate the RF module of the central node. The sensors at the sensor node and will be used to sense the moisture and the temperature and will send the signal to the central node that will be controlling the moisture. The central node will be connected to the internet using Wi-Fi Module and upload the data to the Cloud.

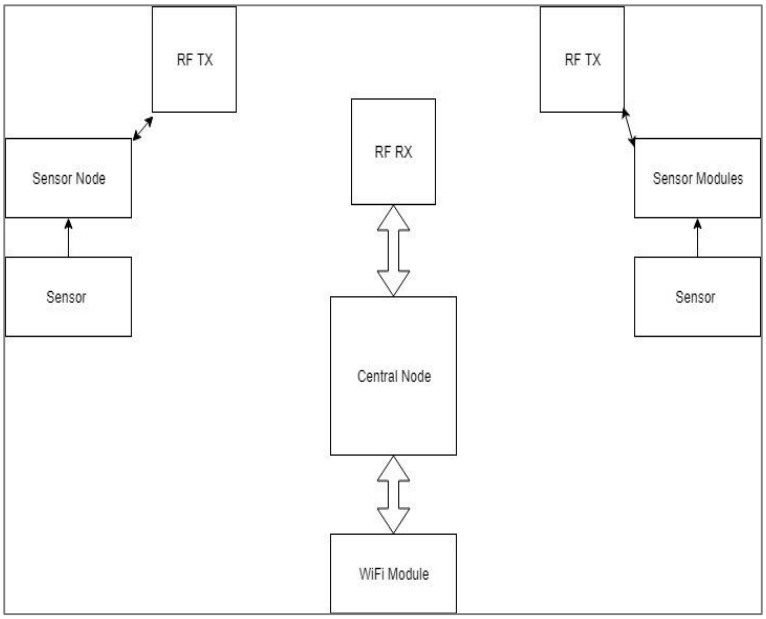

Fig. 1: Architecture

3.1 Arduino Uno

It is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button.

3.2 Humidity

We will use humidity sensor for sensing the humidity of soil. After that this signal is sent to Arduino. In that Arduino a particular set point is given and if it is below or above it take action likewise.

3.3 Temperature

We will use thermocouple as a temperature sensor. Temperature is sensed an after that this signal is sent to Arduino. In that Arduino a particular set point is given and if it is below or above it take action likewise.

3.4 Moisture sensor

The moisture sensor will be used to measure the moisture level.

4. FLOW CHART

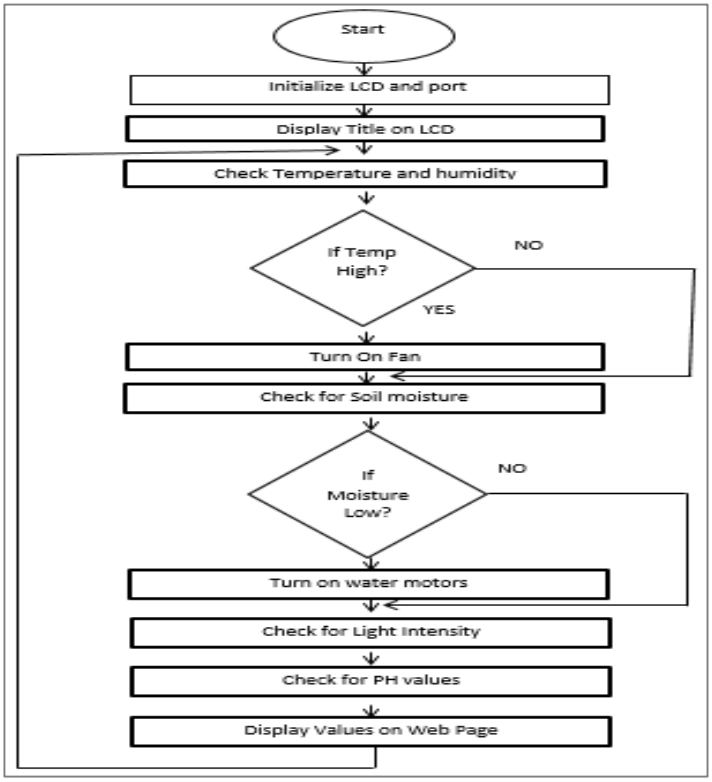

Fig. 2: Flow chart

5. CONCLUSION

Hence we have designed an IoT based system for Wireless Farming system which can be a smart way for monitoring and controlling farming parameters and can help reduce human effort and increase productivity.

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