Remote Crop Monitoring System using IOT

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Abstract: The backbone of Indian economy is agriculture and it is the vital for the food security. In conjunction with the population growth over last century, the need for finding new and sustainable methods of agricultural cultivation and food production has become more critical. The remote crop monitoring system consist of soil temperature sensor, soil moisture sensor and PIR sensors leading to increase in productivity. Also with help of the microcontroller and Zigbee module we can send the data to remote areas. Wireless distinct sensor nodes can reduce time and effort required for monitoring an environment. PC data gives graphical representation which allows simplified diagnosis and analysis. Monitoring systems can ensure better quality control, response time is less and labor cost also reduces.

Keywords: Smart irrigation, PIR sensor, ARM-7, Zigbee module

I.INTRODUCTION

The awareness about implementing the technology in the agriculture field has increased. Collection of data manually requires much time to get the response. This leads to barrier in measuring the important factors. Implementing wireless sensor networks for tracking environmental parameters and uploading that information on web may enable farmers to utilize their knowledge in order to bring out the best results from their agricultural farming. The system is based on farmers demands and the resulting collection of information may gives a valuable resource for future use, in addition to real-time decision making. The design of the veracity agriculture system contains a prototype solution regarding the sensor technology and a customizable service that can be utilized in various ways and by several entities. The project attempted to monitor parameters associated with plants and crops such as soil moisture level, humidity, temperature etc and upload the same to a cloud database and gives the update to the owner of the plantation regarding the same. The information obtained was stored and graphically plotted and processed with APIs. The wireless protocol of choice was the internet for its global range. This paper includes various sensors such as temperature sensor, moisture sensor & PIR sensors to monitor the crop in the field. With support of microcontroller and wireless communication technology we can easily monitor the crop efficiently.

II.DESCRIPTION OF CROP MONITORING SYSTEM COMPONENTS:

II.1 Soil temperature sensor:

It monitors the temperature of the soil. Soil temperature sensors come in a variety of designs using thermistors, thermocouples, thermocouple wires, and averaging thermocouples. The electrical signals transmitted from the sensors to our data loggers can be converted to different units of measurement, including °C, °F, and °K. Our data loggers are also capable of measuring most commercially available soil temperature sensors.

II.2 Soil moisture sensor:

It monitors the water content of the soil. Soil moisture sensors qualify the volumetric water content inside the soil. Since the direct gravimetric

Fig. 1: Block diagram of remote crop monitoring system

Fig. 2: Soil temperature sensor
measurement of free soil moisture requires removing, drying, and weighting of a sample, soil moisture sensors evaluate the volumetric water content indirectly by using properties of the soil such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content. Another class of sensors measure another property of moisture inside the soils called water potential; these sensors are usually referred to as soil water potential sensors and include tensiometers and gypsum blocks.

II.3 PIR sensor (Passive Infrared Sensor):

All objects with a temperature higher than absolute zero radiates heat energy in the form of radiation. Generally this radiation is not visible to the human eye since it radiates at infrared wavelengths, but it can be recognised by electronic appliances designed for such a purpose. The term passive in this sensor refers to the fact that PIR devices do not create or radiate any energy for detection purposes. They perform completely by detecting the energy given off by other objects. PIR sensors do not identify or measure “heat”; instead they detect the infrared radiation emitted or reflected from an object.

When warm bodies like a human or animal passes by, it first intercepts one half of the PIR sensor, which results in a positive differential change among the two halves. When the warm body leaves the sensing area, the reverse operation takes place, whereby the sensor cause a negative differential change. These change pulses are what is detected.

II.5 Microcontroller ARM 7 2138:

‘LPC2138’ is an ARMv7 based microcontroller by NXP, ‘STM32’ is from ST-microelectronics company. “The ARM architecture has the best MIPS (Million Instructions per Second) to Watts ratio as well as best MIPS to $ ratio in the industry. The smallest CPU in the size, all the obligatory computing capability incorporate with low power consumption of which a highly flexible and customizable set of processors are accessible with options to choose from, all at a low cost.”
IV. APPLICATIONS

- In the field of vegetation: Crop type categorization, crop condition analysis (crop monitoring, damage assessment), crop yield evaluation.
- Factor Soil: Mapping of soil features, mapping of soil type, erosion of soil, soil moisture level, mapping of soil management practices and compliance supervising (farming practices).
- By using the sensor technology data access time reduces which results in efficient increase in efficiency. So in crop monitoring various parameters measurements can be easily done.
- With the use of microcontroller technology manipulation of the data becomes drastically easily. This will help to manipulate data in the field of the agriculture.
- Wireless technology in the agriculture plays a vital role for the transmission of the data from one node to another.

V. CONCLUSION

Zigbee-based agriculture monitoring system serves as a faithful and efficient system for monitoring agricultural parameters. Wireless monitoring of field allows user to reduce the human power and it also allows user to observe precise changes in it. Cost is less and consumes low power.

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