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Smart Agriculture Using Internet of Things

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Abstract-Agriculture is considered as the basis of life for the human species and it is the main source of food grains and other raw materials. It plays vital role in the growth of country's economy and development. It also provides large amount of employment opportunities to the people .The internet of things (iot), the idea of getting real world objects connected with each other, will change the way users organize, obtain and consume information radically. Through sensor networks, agriculture can be connected to the iot, which allows us to create connections among farmers, agronomists and crops regardless of their geographical differences. With the help of this it will provide real time information about the field that will help farmers to monitor the field and make right decisions accordingly.

Keywords- *Soil moisture sensor, humidity sensor, Internet of Things (IoT), Arduino microcontroller, Wi-Fi module, Current Transformer (CT).*

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I. INTRODUCTION

For the development of economic condition of the country, growth in agricultural sector is necessary . It results in low yielding of crops because many farmers still use the traditional methods of farming. But whenever automation had been implemented and human beings had been replaced by automatic machines, the yield has been increased. Hence there is need to implement modern science and technology in the agriculture sector for increasing the yield.

This project signifies the use of sensors which collects various types of data from different types of fields and then sends it to main server using Wireless Fidelity(Wi-Fi). The collected data provides the information about different environmental conditions which in turns helps to monitor the system. This project therefore proposes a system which will be useful in monitoring the field data as well as controlling the field operations which provides the flexibility to the agronomists.

The project aims at making agriculture smart using IoT technologies. The highlighting features of this project include Wi-Fi based system to perform tasks like; soil moisture sensing, humidity sensing and current flow monitoring. Controlling of all these operations will be through any remote smart device or personal computers connected to Wi-Fi module showing connectivity with Hotspot and the operations will be performed by interfacing sensors, Wi-Fi and actuators with micro-controller.

This project aims at improving the current agricultural system. This project shows a prototype which will sense current field condition The main features of this project includes soil moisture sensor which will sense the moisture content of the soil and will start the cooler pump if the moisture is absent, the humidity sensor will sense the humidity present in the environment and will on the heater to minimize humidity content, the CT will be used to check the current load and will cut the power supply if the load is more than the normal load which will prevent the misuse of electricity. Agriculture has been evolving with new technology such as the Internet of Things (IoT). We will try our best to make sure that our prototype works efficiently and will make full use of embedded system

II. RELATED STUDY

The technological development in Wireless Sensor Networks made it easy to use in monitoring, sensing and control the flow of electricity.[3] After the research in the agricultural field, researchers found that the yield of agriculture is reducing day-by-day. However, use of technology in the field of agriculture plays important role in increasing the production as well as in decreasing the extra man power efforts. Some of the research attempts are done for improvement of farmers which provides the systems that use technologies helpful for increasing the agricultural yield.

The system described details about the real time in field sensing and control by using appropriate software. The whole system was developed using two in field sensor stations which collects the data and send it to the base station using Wi-Fi module where necessary action was taken for controlling irrigat provides a promising low cost wireless solution as well as remote controlling forprecision irrigation.

 ISSN: 2321-8169
257 – 260

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In the studies related to wireless sensor network, researchers measured soil related parameters such as moisture and humidity. Sensors were placed below the soil which communicates with relay nodes by the use of effective communication protocol providing very low duty cycle and hence increasing the life time of soil monitoring system. The system was developed using Arduino microcontroller, sensors, cooler pump, CT and Wi-Fi module while the transmission was done by checking the status messages.

III. PAPER DESCRIPTION

A. System Architecture

a. Block Diagram

The features of the proposed system are,

- soil moisture sensor
- Humidity sensor
- current transformer

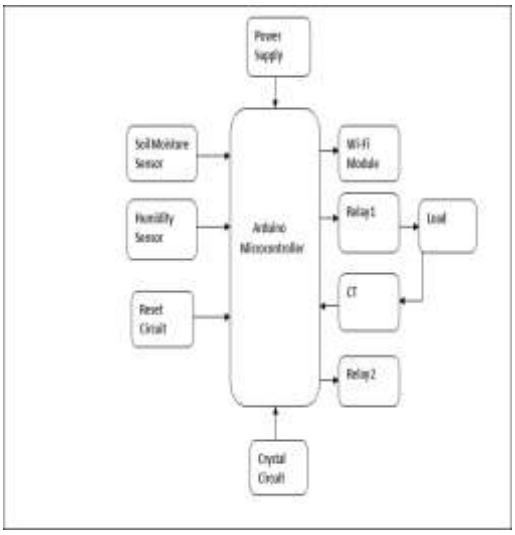

Fig.1 System Architecture

Modules of Block Diagram are explained as follows:

b.Soil moisture sensor

This sensor is used to test the moisture in soil, when the soil is dry, the output is at high level, or the output is at low level. By using this sensor one can automatically water the field. Fig 3 shows soil moisture sensor:

Fig.2Soil moisture sensor

Working

Soil moisture sensors measure the water present in soil.

Soil moisture content is determined via its effect on dielectric constant by measuring the capacitance between two electrodes implanted in the soil. Where soil moisture is in the form of free water (e.g., in sandy soils), the di-electric constant is directly proportional to moisture content. The probe is normally given a frequency increment to permit measurement of the dielectric constant.

c. Humidity Sensor (SYHS220)

Humidity sensor is also called as hygrometer it measures relative humidity in the air, it measures both air temperature and moisture. The warmer the air is, the more moisture it can hold, so relative humidity changes with fluctuations in temperature.

The humidity sensor is composed of two metal plates with a non-conductive polymer film between them. The film collects moisture from the air which causes minute changes in the voltage between the two plates. The changes in voltage are converted into digital readings showing the amount of moisture in the air.

A humidity sensor (or hygrometer) senses the relative humidity present in the air. It therefore measures both moisture and air temperature. Relative humidity is the ratio of actual moisture in the air to the highest amount of moisture that can be held at that air temperature.

Fig.3 Humidity Sensor

When humidity is present the sensor will turn on the heater to reduce humidity content. The warmer the air temperature is, the more moisture it can hold. The sensor is composed of two metal plates and contains a non-conductive polymer film between them.

d. Current Transformer

CT core has to be saturated after the limit since the unnecessary electrical stresses due to system is over current. It can be avoided from the metering instrument connected to the secondary of the CT as secondary current does not go above a specific limit even primary current of the CT increases to a very high value than its regularratings. So accuracy within working range is important criteria of a CT used for metering purpose.

 ISSN: 2321-8169
257 – 260

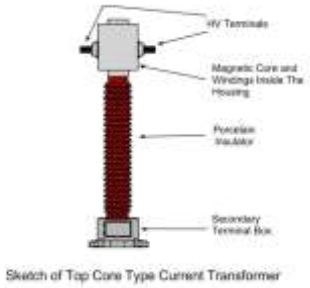

Fig.4Sketch of Top Core Type CT

e. Theory of Current Transformer or CT

A CT performs same basic working principle of electrical power transformer. If an electrical power transformerprimary current varies with load or secondary current. In case of CT, primary current is the system current and this primary current transforms to the CT secondary, hence secondary current depends upon primary current of the current transformer.

In a power transformer, if load is not given, there will be only magnetizing current flows in the primary. The primary of the power transformer recieves current from the source proportional to the load connected with secondary. But in case of CT, the primary is connected in the series with power line. The primary current of the CT, hence does not depend upon whether the load is connected to the secondary or not or what is the impedance value of load.

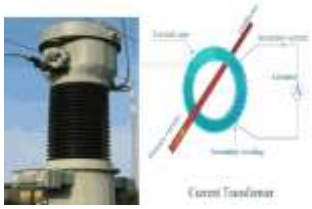

Fig.5Internal structure of CT

f. Microcontroller (Atmega 328)

The ATmega48P/88P/168P/328P is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega48P/88P/168P/328P achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed.

g. Wi-Fi Module (ESP8266)

ESP8266 Wi-Fi module is Wi-Fi_33 serial transceiver module, based on ESP8266.It have Small size and low cost that makes it suitable for sensor nodes. It operates on 3.3V and consumes current up to 250mA. Current consumption is quite large so it's usually not powered on battery.ESP8266 has 8 pins, 4 in the row of 2. The first pin on the top left is theGND. The two pins right from the GND are theGPIO 2 and 0. The pin on the top right side is the RX pin and the pin on lower left is TX. These are the pins forthe communication. The middle pins on the bottom are CH_PD (chip power-down) and RST (reset). ESP8266 offers a complete and self-contained Wi-Fi networking solution and allows it to either host the application or to offload all the Wi-Fi networking functions from another application processor.

When ESP8266 hosts the any application and when it is the only application processor in the device, then it is able to boot up directly from an external flash. It hasan integrated cache to improve the performance of the system in such applications, and to optimize the memory requirements.

h. Relay

Relay is an electromagnetic device and it is used to separate two circuits electrically and connect them magnetically. These are very useful devices and allow one circuit to switch the another one while they are completely isolated. They are often used to interface an electronic circuit (working at a low voltage) to an electrical circuit which operates at very high voltage. Thus a small sensor circuit can drive, like, a fan or electric bulb.

Relay is one of the most important electromechanical devices largely used in industrial applications perticularly in automation. A relay is mostly used for electronic to electrical interfacing means it is used to switch on or off electrical circuits which are operating at high AC voltage by using a low DC control voltage.

Relay circuit

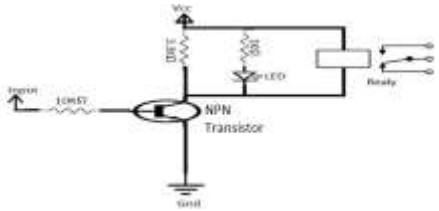

Fig.6. Relay circuit

B. System Overview

The system overview of the proposed smart agriculture using IoT is shown in Fig 8

Fig.7. System Overview

IV. CONCLUSION

The continuous monitoring of the agriculture is designed and developed using various microcontrollers by using Wi-Fi. Hence by incorporating this method, the water and electricity will be used efficiently. Compared with the existing method it will give better performance. So we can avoid the problems in a very efficient and innovative manner with the help of micro-controller (Arduino) and various sensors.

V.REFERENCES

[1] S. R. Nandurkar, V. R. Thool, R. C. ThooAgriculture System UsingIEEE InternationalWirelessConferenceSensor on Automation, Control, Energy and Systems(ACES), 2014.

[2] JoaquínGutiérrez, Juan Francisco Villa-Medina, Alejandra Nieto-Garibay, and Miguel Ángel Porta-Gándara, ―AutomatedSystemUsing a WirelessIrrigationSensor Network and GPRSIEEETRANSACTIONSModule‖,ONINSTRUMENTATION AND MEASUREMENT,0018-9456,2013

[3] Dr. V. VidyaDevi, G. MeenaKu-TimeAutomationari,and Monitoring―Real System for Modernized Agriculture‖ofReviewandResearchin ,Inter Applied Sciences and Engineering (IJRRASE) Vol3 No.1. PP 7-12, 2013.

[4] Y.Kim, R. Evans and W. Iversen, ―Remot System Using a Distributed TransactionsWirelesson Sen Instrumentation and Measurement, pp. 1379–1387, 2008.

[5] Hayes, J.; Crowley, K.; Diamond, D. Simultaneous web-based real-time temperature monitoring using multiple wireless sensor networks Sensors IEEE, October 30-November 3, 2005, p. 4.