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Iot Based Irrigation Monitoring and Water Level Control System

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ABSTRACT

IOT based circuit to monitor and record the value of temperature and soil moisture of the agriculture field that are continuously modified and controlled in order optimize them to achieve maximum plant growth and yield. Nowadays, adopting an optimized irrigation system has become a necessity due to the lack of the world water resource. The system has a distributed wireless network of soil-moisture and temperature sensors. This project focuses on a smart irrigation system which is cost effective. As the technology is growing and changing rapidly, Wireless sensing Network (WSN) helps to upgrade the technology where automation is playing important role in human life. Automation allows us to control various appliances automatically. DC motor based vehicle is designed for irrigation purpose. The objectives of this paper were to control the water supply to each plant automatically depending on values of temperature and soil moisture sensors. Mechanism is done such that soil moisture sensor electrodes are inserted in front of each soil.

Keywords : Internet of things(IoT); Smart Agriculture; Raspberry Pi; Sensors; Web Application.

I. INTRODUCTION

Water plays a important role in the agriculture. Indian economy mainly based on agriculture field and water is vanishing day by day due to its immense use. Irrigation saves a large amount of water. But still in irrigation sometimes water is over supplied or less supplied to crop and irrigation time table should be maintained which is not easy for farmer. Traditional method in the world is manual irrigation for water supply in agriculture farm. So it is hard to take decision to save water and get maximum profit from field. Sensors and sensor networks are making Hugh progress in agriculture field .

Nowadays, the farmers are using irrigation technique in India,the manual control in which the farmers irrigate the land. This process sometimes consumes more water. Theautomatic irrigation schedule,the value in water usage efficiency with respect to manual irrigation based on direct soil-moisture measurements. The aim of the implementation is to demonstrate that the automatic irrigation can be used to reduce water usage. The automated irrigation system that consists of a distributed wireless network which connect to soil moisture and temperature sensors has been implemented.

II. LITERATURE REVIEW

After the research in the agricultural field, researchers found that the yield of agriculture goes on decreasing day by day. Use of technology in the field of agriculture plays important role in increasing

the production as well as in reducing the extra man power efforts, water requirement.

Fan TongKe [10] proposed the smart agriculture based on cloud computing using IoT. The architecture presented by the author for the smart agriculture based upon the concept of the IoT and cloud computing. Agriculture information cloud was combined with Internet of Things to achieve the dynamic distribution of the resources and balance of the load of human.

Ji-Chun Zhao et al. [7] studied the applications of IoT in agriculture. A monitoring system based on internet and wireless sensor networks proposed by author. An information management system was designed to provide the data for research in agriculture. Software for monitoring of the fields like data acquisition , data processing models, and system configuration module has been developed by the author. Accurate control for the monitoring of agriculture field is provided by the application.

Li Li et al. [4] discussed the application of smart and Wi-Fi based Wireless Sensor Network in IoT. The applications of IoT-based upon Wi-Fi, WSN and smart grid was discussed by author. The intelligent data collection application, improving reliability of data collection and providing accurate information is provided by smart grid. The intelligent environment monitoring application based on water data and air data collected through sensors and sent to server for further processing about the data.

Jaichandran et al (2013): A prototype for automatic controlling anda remote access of irrigation motor. Water level has been checked in the field and if the water level is low then the motor is automatically switched ON and the alert SMS is send to the user where user can verify it. The sensing process is done continuously on/off process can be done by the user.

III. PROPOSED SYSTEM

The proposed system is an IoT system which will closely monitor and control the microclimatic parameter of a field on a regular basis. When any of the parameters like temperature,moisture,water flow and water level cross a safety threshold which has to be maintained to protect.

A.HARDWARE DESCRIPTION

Raspberry Pi

The Raspberry Pi is a credit card sized computer which is low cost. Its capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, making spreadsheets, and playing games. There are different models of Raspberry Pi from Raspberry Pi 0 to Raspberry Pi 3. In this project we are using Raspberry Pi 3.

DC motor

DC motor in simple words is a device that converts direct current (electrical energy) into mechanical energy.

Soil moisture Sensor

Soil moisture sensor includes comparator (LM393) which converts analog data to discrete.Soil Mositure Sensor Two soil probes consist of two thin copper wires each of 5 cm length which can be immersed into the soil under test. The circuit gives a voltage output corresponding to the conductivity of soil. The soil between the probes acts as a variable resistance whose value depends upon moisture content in soil. The resistance across soil probes can vary from infinity (for completely dry soil) to a very little resistance (for 100% moisture in soil).

Temperature Sensor(LM35)

The sensor will read the temperature of the surrounding environment and relay the temperature in degrees to the user. Linear temperature sensor calibrated in kelvin, sothe subtraction ofthe large constant voltage from the output to obtain centigrade scaling is not requiredis the advantage of the LM35 sensor.

PIR Sensor

The device which is used in some security alarm system to detect the motion of human being by emitting infrared source.

B. SOFWARE DESCRIPTION

Raspbian Operating System

Raspbian is a operating system for the Raspberry Pi. Some of the version of the Raspbian is Raspbian Stretch and Raspbian Jessie. Mike Thompson and Peter Green created Raspbian as independent project. The operating system is still under active development. Raspbian is a high optimized for the Raspberry Pi line's low-performance using ARM CPUs.Raspbian is composed of a modified LXDE desktop environment and the Openbox stacking window manager with a new theme .

Languages Used-Python

Python is programming language which is powerful and easy to read and write. Raspberry pi with Python connect the project to the real world. Python has two version as Python 2 and Python 3. Programming in Python is easier for the beginner also. It is a great way to learn about the Hardware hacking and coding.

C.BLOCK DIAGRAM

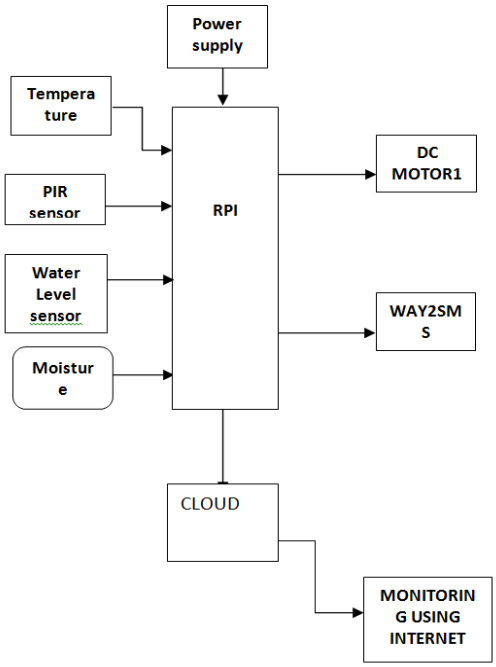

Figure 1

D.SENSORS VALUE UPDATION:

IOT system will shows the updated sensor values to the web page.MSP3008 ADC with SPI connector is used to connect sensors with RPI.Those updated sensor values are written by the Python coding in particular text file.Using php coding the values are read and updates in webpages.

E.PROGRAMMING THE GPIO PINS:

The GPIO pins can be set to HIGH or LOW by using Python programming instructions. Almost any programming language on Linux (including the shell).These pins could be connected to sensor like soil moisture,temperature sensor and PIR sensor and even to the Dc motor .

IV. EXPERIMENTAL RESULT

The proposed system is implemented using Raspbian. Figure 1 shows the output of the dataset .

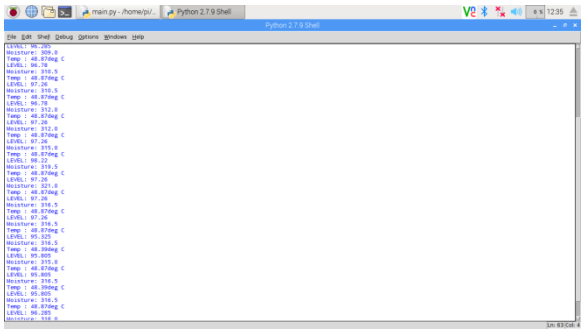

Figure 1. Output for the Dataset

The moisture level in the soil is low the Dc motor will be automatically switched ON and the water supply is given to the field.

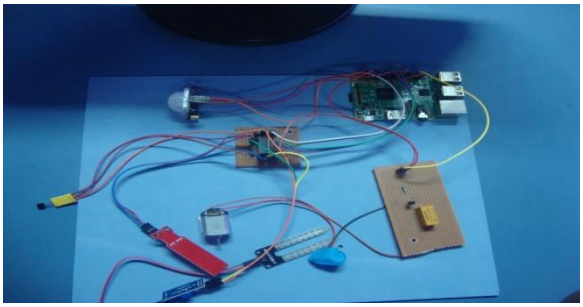

Figure 3. Experimental Setup

Figure 3 shows the experimental setup of the proposed system where the sensor are been connected to the Raspberry Pi .

V. CONCLUSION

Using this system, one can save manpower, water to improve production and ultimately increase profit. The automated irrigation system is feasible and cost effective for optimizing water resources for agricultural production. The system would provide feedback control system which will monitor and control all the activities of plant growth and irrigation system efficiently.

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