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An IOT Based Automatic Agricultural Monitoring and Irrigation System

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ABSTRACT

Agriculture is the basic source of food supply for all countries in the world. Water is the Essential resources for agriculture. The automated irrigation and crop field monitoring system is used to optimize the use of water resource for agriculture. The system consists of sensor network for humidity, temperature, soil moisture, colour and water level sensors. soil moisture, temperature, water level ,colour sensor are placed in the root zone of the crops. The microcontroller of the controller unit is programmed with threshold values of the temperature and moisture content. The controller unit is used to control the irrigation motor thereby controlling the water flow to the field. In addition to that water level sensor is placed in this field, if it is excess water the motor gets automatically pumps the water into the outer area. Colour sensor provide the appropriate colour of leaf and the user give the pesticide before destroying plants. Field measure data about paddy plants. Raspberry pi is used in the controller mode. Internet of the things(IOT) is an ecosystem of connected physical objects that are accessible through the internet. Real time monitoring data can be utilized and the performance can be tracked. Hence high yield can be achieved. This project is mainly focused on improving the agricultural fields yield by providing a monitoring system with effective and efficient usage of water resource. Thus further development in this project will lead to a greater efficiency in the field of agriculture.

Keywords : Internet of things, water level, temperature, humidity, soil moisture, colour sensor.

1.INTRODUCTION

Agriculture is one of the most important components of our society. Farmers produce a food everyday. Water is the critical part of successful agriculture. Technology has played a big role in developing agriculture. Agriculture sector uses maximum water in world. Indian economy mainly based on agriculture field and water is vanishing day by day due to its immense use. Irrigation is one solution to this problem because in drip irrigation water is supplied to plants. Irrigation saves a large amount of water.

Water feeding to the agricultural field has to be done regularly with continuous monitoring. Manual irrigation is traditional method in the world for water supply in agriculture form. So it is hard to take decision to save water and get maximum profit from field. For sensor based networks are making huge process in agriculture and networks ,varieties of terminologies now in use like Precision Agriculture, crop monitoring, automated irrigation system etc.

Agriculture in India has a significant history. India is ranking second in farm output. monitoring and controlling the agriculture is an important task for the farmers as they have to regularly feed water days and nights. Sensors are used to collect the data from environment like soil moisture, temperature, humidity, water level,colour etc. Different communication technology has been developed for communication between network and element.

Sensor node, base station and sensor are elements of WSN application. . Internet of the things(IOT) is an ecosystem of connected physical objects that are accessible through the internet. Real time monitoring data can be utilized and the performance can be tracked. Hence high yield can be achieved.There is an urgent need to create strategies based on science and technology for efficient use of water, Including technical, managerial agronomic and institutionally improved technology. The implementation involves use of water management system using a microcontroller based board. PC based software is used to interface the board and control the motor on/off timings. It uses high speed of transmission of the data from controller.

2. EXISTING SYSTEM

In an existing automated water management system we cannot take decision at that instance by taking different attribute of agriculture soil. Current automated irrigation system only works on one parameter at one time. Soil have different attribute like soil moisture and temperature, humidity etc. Soil moisture is below threshold value then water valve is open for water supply and after proper water supply if it goes above threshold value water valve is get close. Existing system does not concern about available water in reservoir and requirement of water to particular crop. So system does not have decision power. It only works on one condition at one time. In the system send the information about the growth of paddy plant and sugarcane in the field. The data are send details about the every stage in the plant growth in the field.

3.PROPOSED SYSTEM

In this work, the automated irrigation system based on low power microcontroller was developed and deployed. To overcome the drawbacks of existing system like high cost, difficult in maintenance and wired connection , we introduce a new system which will have wireless connection between server and nodes. We introduce a new design of embedded web server making use of raspberry pi technology and internet of things . The automated irrigation system consists of distributed sensor network built using soil moisture sensor, temperature sensor, humidity sensor and water level sensor and colour sensor. Water level sensor senses the excess water in the field and the motor automatically pumps the water to the outer area.. Irrigation system uses valves to turn irrigation ON and OFF. The colour sensor is is placed in the field is used to know the perfect colour of leaf and provide the pesticide before destroying the plants. Earlier, farmer faced the problem of sending SMS and making calls, overcoming which we are designing an Desired application which does the work by button clicks, here the hardware works in three modes of operation viz.

4.BLOCK DIAGRAM

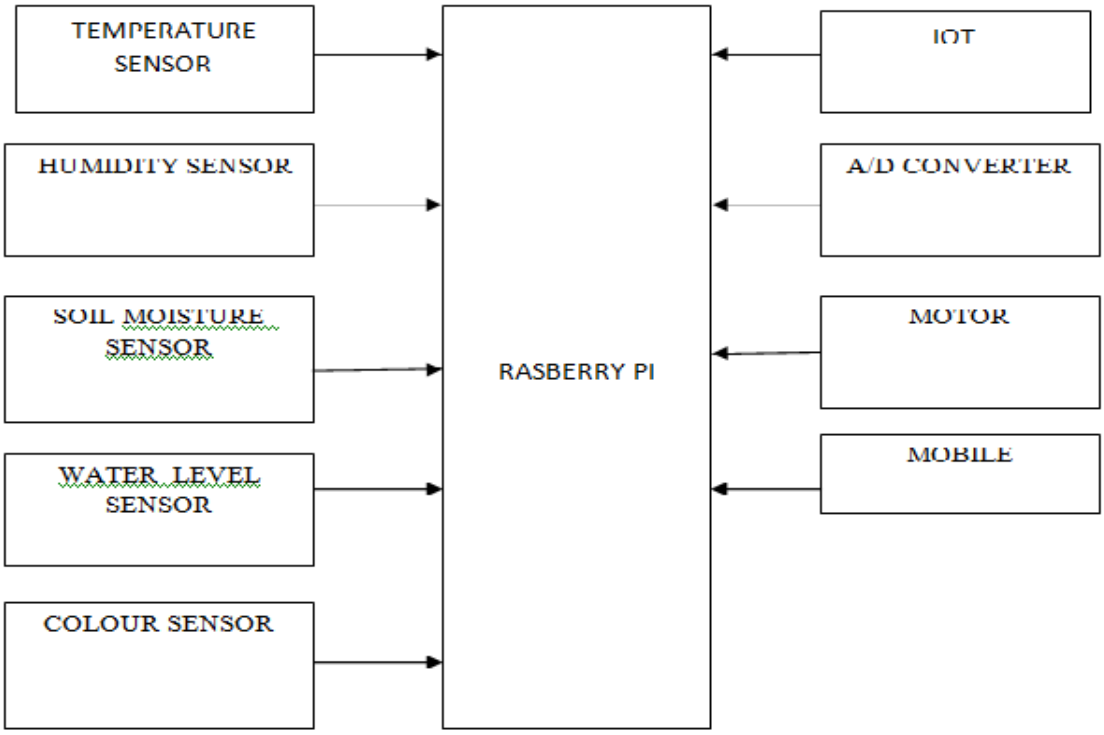

Fig-1 Block Diagram

5.HARDWARE SECTION

5.1 RASPBERRY PI

The Raspberry Pi-3 is used in my model .Raspberry Pi is a single board computer with Linux or other small operating systems. It was developed by Raspberry Pi foundation in UK for the use of computer science education. The second version of the Raspberry Pi is used in my project. This part describes models of Raspberry Pi is available. This report will not attempt to provide full specifications but an overview in order to help in making decision as to which device it is required to accomplish the objectives in question. Currently, five Raspberry Pi model do exists. They are: Model B+, Model A+, Model B, Model A and the Compute Module(currently only available as part of the Compute Module development kit).All these models use the same SoC (Sytem on Chip combined CPU & GPU),the BCM2835,but other hardware features differ.

The raspberry pi board is consists of HDMI port is connected to monitor.usb1 is connected to keyboard and other usb2 is connected to mouse. The board that has power supply port and insert memory card.

5.2 SENSORS

The distributed sensor network that consists of soil moisture sensor, temperature sensor, humidity sensor, colour sensor and water level sensor. There are different types of soil sensor technologies and measurement techniques that have been developed for the measurement of soil moisture content. The commonly used soil sensors are based on frequency domain reflectometry (FDR), which uses capacitance probes to measure the dielectric permittivity of the soil.

In this work however, we used a resistive soil sensor, which was developed using two probes to pass electrical currents into the soil and reads the response or resistance to get the moisture content of the soil. The resistive sensor works on the principle that the more moisture we have in the soil makes the soil to conduct electricity easily due to lower resistance while dry soil conditions makes the soil conducts electricity poorly due to higher resistance. Water level sensors detect the level of water. The colour sensor is used to measure the perfect colour of the leaf.

5.3AUTOMATIC MOTOR CONROLLER

This module is used to control **3**the pump automatically. The maximum soil moisture state reaches it automatically goes minimum soil moisture state. The watering is on when the soil get dry, when the watering will be stop when the soil is wet. The pump will be turned on automatically every day at a particular time for an certain soil , immediately the pump will turns off. led is acts as motor.

The turning on and off of the pump will work regardless of the moisture rate around the field area. This automatic mode can be set by sending an data to monitor and mobile.

6.SOFTWARE REQUIREMENTS

THE ARDUINO IDE

When working with the InduinoR3 Board, select the board as Arduino UNO from the Tools-> Boards List and Select the Appropriate Com Port.

SIMULATION MODEL

The simulation work on the project has been done in PROTEUS PROFESSIONAL software. The following image shows the monitoring and the displaying process in LCD.

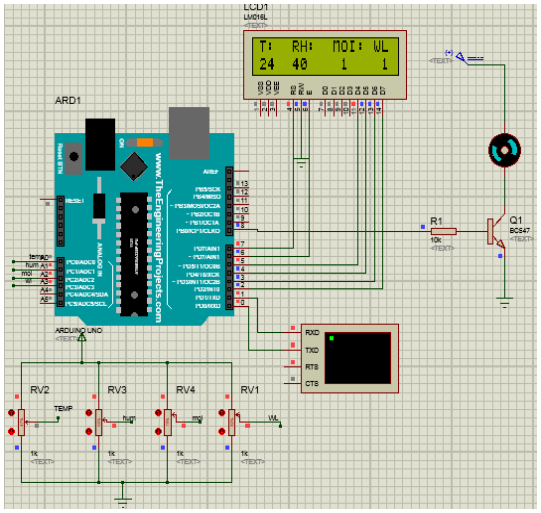

Fig-2 Schematic Diagram

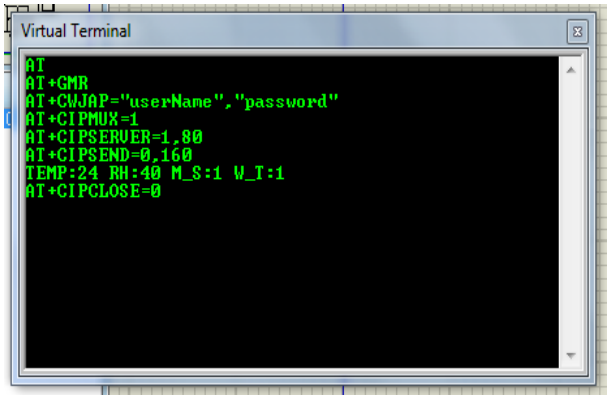

Fig-3 Simulation Output

Fig-3 shows the monitoring condition simulated in Proteus Professional software version 8. The virtual terminal represents the functional status of the sensors connectivity.

HARDWARE OUTPUT

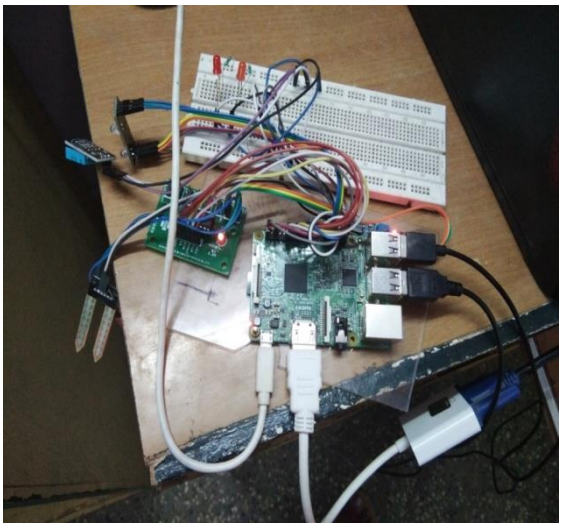

Fig-4 Hardware Module

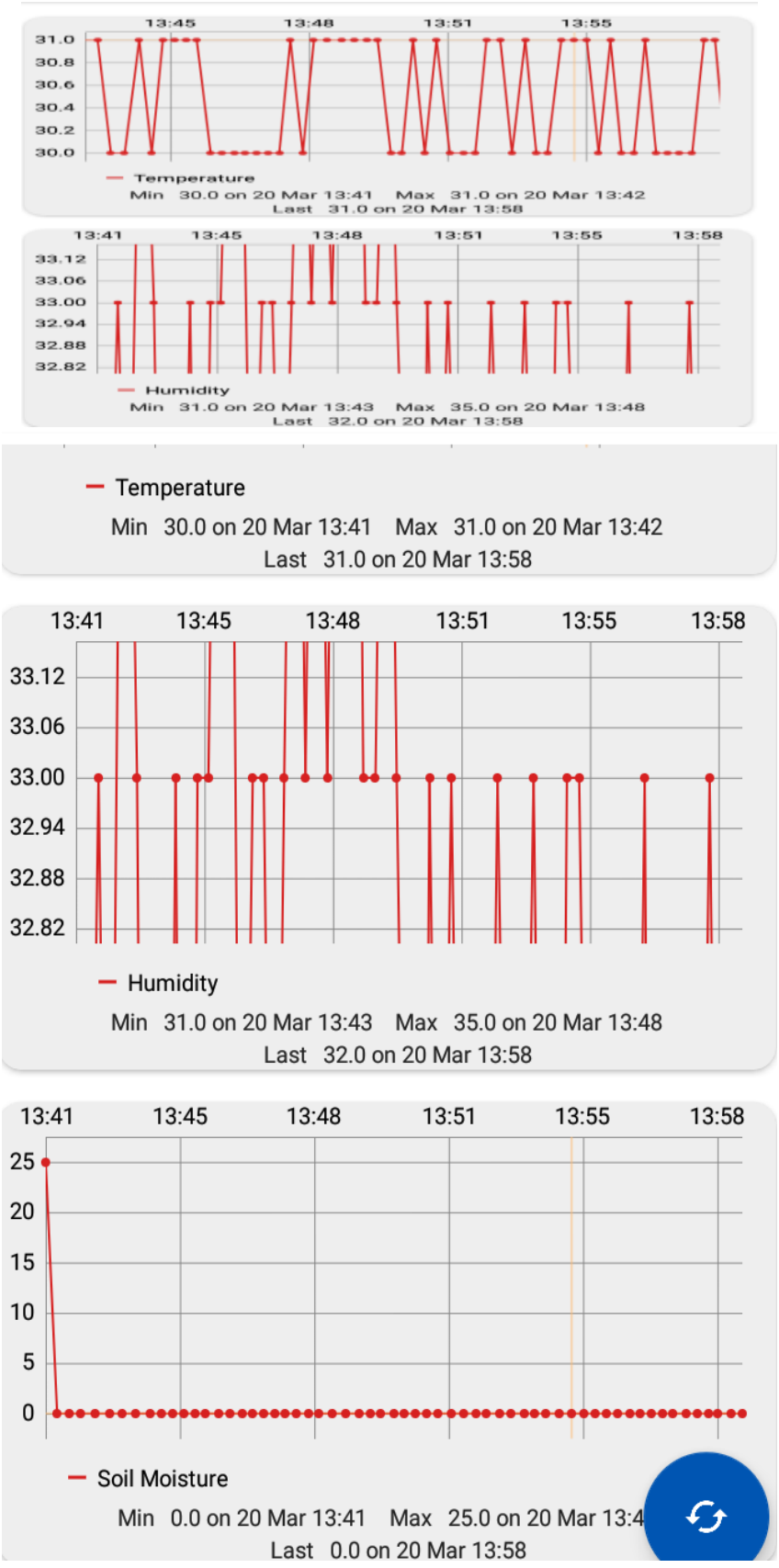

Fig-5 Output Chart

Fig-6 Software Output

CONCLUSION

Thus monitoring process in agricultural fields will be an effective method that will be useful in situations where usage of water resources is limited. By implementing this project, there will be an effective and efficient usage of water resources. It will be an indirect mean for the proper development of agricultural yield. The performance measures obtained can be maintained in database which will be useful for comparing different yields at different climatic conditions.

FUTURE WORK

This Agricultural monitoring process can be developed under the concept of Distributed database. It will enhance the performance measure and will be used for improving the crop quality and health of the plant.

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