Smart Agriculture Monitoring System based on Internet of Things (IoT)

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Abstract: **This paper provides an over all description of the Internet of Things (IoT).The basic idea is to have smart sensors collude directly without the involvement of the human to deliver a new application class. IoT plays a vital role in the development of agriculture. Issues that concerns agriculture have been always the difficult task in the development of the country. The only solution to this problem is to modernize the current traditional methods of agriculture by using IoT .Hence the project aims at making agriculture smart using automation and IoT technologies. The highlighting features of this project include automatic watering of plants depending on the humidity of the soil. Secondly, it includes sending messages and mails to the registered user about the status of the motor. This operation will be performed through any remote smart device or computer connected to internet and the operations will be performed by interfacing sensors , microcontroller and raspberry pi.**

I. INTRODUCTION

Our main focus in this paper is to maintain , automatic control and monitor the trends of agriculture. This makes the system easier for the user to get data at the regular interval about the field. We can use this technology where only one person is not enough to monitor the field status and control the watering of plants. To improve this technology we have to focus on the agriculture monitoring system and to collect information from many areas and transfer to the web server to the registered user. Agriculture is the basis of life for the human species and also the main source for the food grains and other raw materials. It plays an important role in the economic development of the country. The growth in the sector of agriculture is necessary for the economic conditions of the country. Unfortunately, many farmers still use the tradition methods of farming which results in low yielding of fruits and crops. The yield has been improved wherever automation had been implemented and human beings had been replaced by automatic machineries. Hence to increase the yield there is a need to implement modern science and technology in agriculture sector. Most of the tradition methods use the wireless sensor network which collects the data from different types of senses and then sent it to main server using wireless protocol. The data collected provides the information about different environmental factors, that helps to monitor the system. To improve the yield of the crops , monitoring environmental factors is not enough and a complete solution for the growth of the crops. There are number of other factors that affect the productivity to great extent.This paper aims at making agriculture smart using automation and IoT technologies. The highlighting features of this project include automatic watering of plants depending on the humidity of the soil. Secondly , it includes sending messages and mails to the registered user about the status of the motor. This operation will be performed through any remote smart device or computer connected to internet and the operations will be performed by interfacing sensors , microcontroller and raspberry pi.

II. RELATED WORK

The newer scenario of decreasing water tables, drying up of rivers and tanks, unpredictable environment present an urgent need of proper utilization of water. To cope up with this issue use of temperature and moisture sensor at suitable locations for monitoring of crops is implemented. An algorithm developed with threshold values of temperature and soil moisture can be programmed into a microcontroller-based gateway to control water quantity. After the research in the agricultural field, researchers found that the yield of agriculture is decreasing day by day. However, 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. Some of the research attempts are done for betterment of farmers which provides the systems that use technologies helpful for increasing the agricultural yield. In the studies related to wireless sensor network, researchers measured soil related parameters such as temperature 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 microcontroller, universal asynchronous receiver transmit interface and sensors while the transmission was done by hourly sampling and buffering the data, transmit it and then checking the status messages. The drawbacks of the system

were its cost and deployment of sensor under the soil which causes attenuation of radio frequency (RF) signals.

III. PROPOSED SYSTEM

In the proposed system, the field section is deployed with the various sensors like humidity sensor, temperature sensors as shown in figure 2. The collected data from these sensors are connected to the microcontroller. The received value is verified with the threshold values. If the data value exceeds the given threshold value, the motor is switched ON. The message and mails are sent to the user. The values are stored in the cloud and the farmer gets the detail description of the values. The temperature sensor, humidity sensor shows the threshold value and the water level sensor is used to indicate the water level inside the tank or the water resource. The motor is switched ON and OFF automatically if the value exceeds the threshold point. When the motor is switched ON, the user automatically gets the notification about the status of the motor. The data values collected is stored in Raspberry pi and sent to the cloud and can be used whenever required as shown in figure 1.

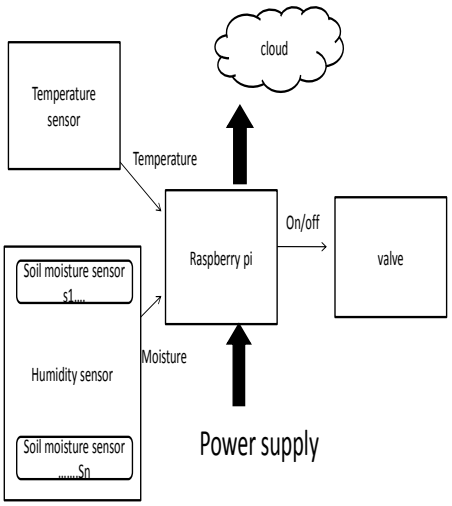


Figure 1:Proposed block diagram of IoT based agriculture system

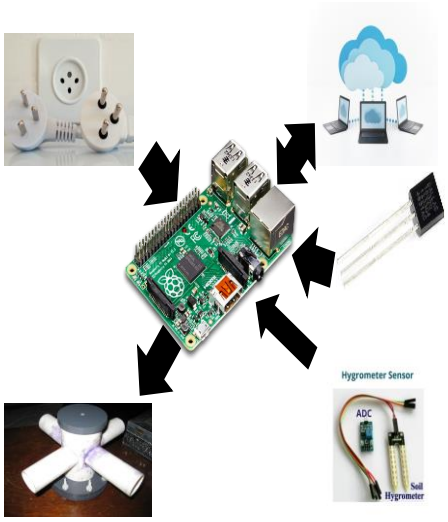


Figure 2: Design of the proposed system

IV. METHODOLOGY

Hardware Description

A)RASPBERRY PI 3

The Raspberry Pi is a series of small single-board computers used to do small computing and networking operation It is the main element in the field of internet of things. The Raspberry Pi 3, with a quad-core Cortex-A53 processor, is described as 10 times the performance of a Raspberry Pi 1.

B) TEMPERATURE SENSOR

This sensor is highly used because its output voltage is linear with the Celsius scaling of temperature. It does not provide any external trimmingThe maximum output is 5V. . It has a wide operating range. The output will increase 10mV for every one degree rise in temperature. It consumes minimum amount of electricity. Thus, it is energy efficient. It is very efficient in horticulture. It is user friendly to use.

C) HUMIDITY SENSOR

Humidity sensor senses the moisture content of the soil. The sensor has both the analog and the digital output. The digital output is fixed and the analog output threshold can be varied. The output is high or low indicated by the LED. When the soil is dry, the current will not pass through it and so it will act as open circuit. Hence the output is said to be maximum. When the soil is wet, the current will pass from one terminal to the other and the circuit is said to be short and the output will be zero. The sensor is platinum coated to make the efficiency high. The range of sensing is also high.

Software Description

A) C PROGRAMMING

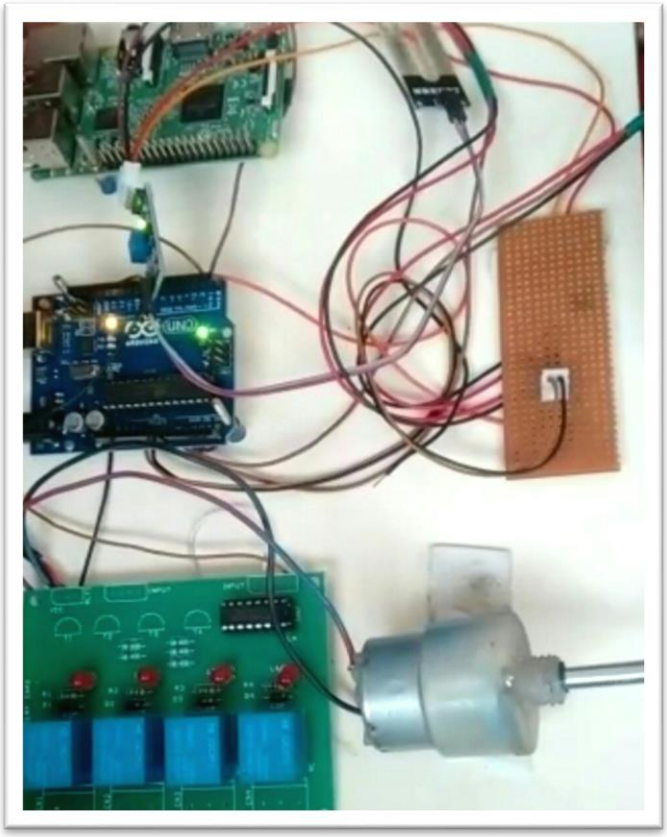
The language here we are using is C program.

B) RASPBIAN OPERATING SYSTEM

Raspbian operating system is the free and open source operating system. It provides the basic set of programs and utilities for operating Raspberry Pi. It has good community of developers which runs the discussion forms and provides solutions to many relevant problems.

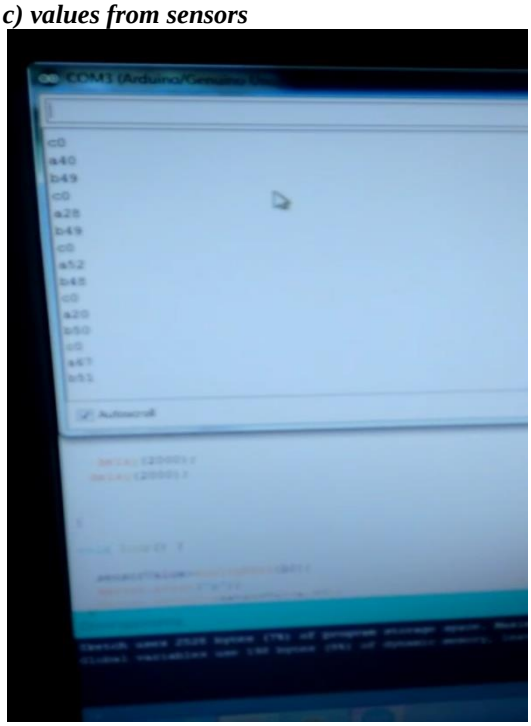
V. RESULTS

a) Design of our approach



b) message to the user

c) values from sensors



The hardware is interfaced with all the sensors in the relay board. The hardware components include the microcontroller, realy board, raspberry pi and the sensors. The board is inserted with a SIM card which is used to communicate with the registered user.

The output shown above denotes different results.

a) Design of the project which consists of the hardware components interfaced in the relay board.

b) Message to the user is sent when the motor is automatically switched ON and OFF. The user gets the notification about the status of the motor.

c) Values from the temperature sensor is given as “a”, humidity sensor is given by “b” and the water level in the water resource or the tank is given by “c”.

Once the threshold value is exceeded the motor will be switched ON automatically and switched OFF when it comes down. The values obtained are stored in the cloud and can be used whenever required.

VI. CONCLUSION

IoT is closely related to cloud computing in a way that obtains powerful computing tools through cloud and it finds the practicing channel based on IoT. The proposed smart agriculture system is beneficial by optimizing agriculture while addressing the issue of water shortage by inducing judicial use of water through IoT based technique. The data can be stored in the cloud , resulting in efficient irrigation and increased harvest. This method avoids over irrigation, under irrigation, top soil erosion and reduced the wastage of water. This technique is efficient and cheaper when compared to other type of automation system. For large areas agricultural lands , high sensitivity sensors can be implemented for large areas of agricultural lands in large scale.

VII. REFERENCES

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