Concept of Cloud Irrigation with Automatic Irrigation Control System

Avinash Kumar Singh[1], Yashdeep Saini[2] and Sanjeev Kumar[3]

[1,2,3]Graphic Era University D. Dun

E-mail: [1]cool.avinashku@gmail.com, [2]yashdeepsaini600@gmail.com, [3]er.sanjeevkr@gmail.com

Abstract—*In developing nations, agriculture plays an important role for development in food production. In India agriculture, primarily depends on the monsoon, which is not a sufficient source of water. So irrigation is employed in the agriculture area. This paper targets to offer a cloud based automatic system for irrigation to aid the farmers. The proposed system uses a microcontroller, sensors, ethernet shield and a cloud connector to provide a real time network with field over internet. This system reduces distance and range problems via the internet. This system organization is beneficial for the agricultural era to increase productivity and efficient utilization of water resources. The goal of our research is to go through modern engineering with traditional methods for a better yield and hence modernize agriculture.*

Keywords*: microcontroller unit (MCU), cloud connector, sensors, ethernet shield, real time network.*

1. INTRODUCTION

At present farmers has been using irrigation through the labour-intensive control in which the farmers irrigate the land at regular intervals by turning the water-pump on/off when essential. This process sometimes consumes more water and sometimes the water supply to the land is delayed due to which the crops dry off. Developing a system which will irrigate the farms automatically when watering is required and will help farmers to monitor their field from anywhere will eradicate these problems. Also, farmers will get rid of revolving around pumps to turn them on/off. A microcontroller based system will measure the humidity of field with the help of sensors. If the humidity is less than specified amount then microcontroller will initialize driving system and send a message to the farmer about the situation of his field. The farmer then needs to log in with his unique id and password on cloud servers using an internet connection to monitor and control the driving system. If a farmer fails to do so than the automatic driving mode is initialized and that will irrigate the farm till the soil moisture becomes equal to the specified moisture level. As there is no unanticipated waste of water a lot amount of water is saved.

2. LITERATURE REVIEW

In this paper the sensors have been used to measure soil moisture quantity and temperature. The sensors generate analog signals which are fed across ADC [analog digital converter]. The ADC then transmits converted signal to the microcontroller. The microcontroller will process the signal as it has been programmed to control watering [1][5].

For automatic irrigation systems irrigation using cellular phone and for power source used solar power. A real time network was used for monitoring the irrigation system in real time and for irrigation system; system irrigates using GPRS system [2],[9].

This project uses Arduino Uno to controls the motor and drive the pump. The Arduino Board is customized utilizing the Arduino IDE programming. As per the instructions given in program the water pumping system is initiated [3],[8].

In the paper, programmed watering system method inundated utilizing remote sensor system i.e. Zig-bee and internet. The thought was created for enhance watering system framework and diminished expense of watering system water. Sensors are placed in farm and continuously send signals to wireless module frame. The data further transmitted to remote sensor hub. This is how the system was operated. [4],[6]

This system uses an ethernet module to provide the microcontroller an interface for internet connection. The ethernet module has been mapped with a cloud connector Near-Bus [an open source cloud connector] which allows us to integrate our MCU [microcontroller unit] platform with cloud [7],[10].

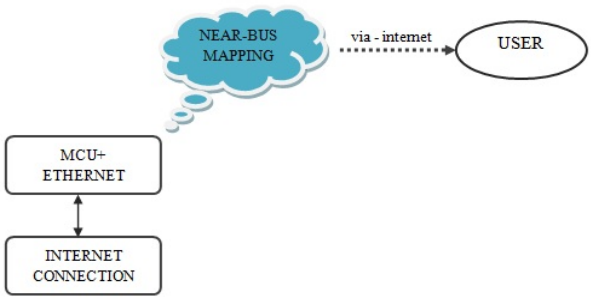

Fig. 1: Block Diagram for cloud Built Connection

3. PROPOSED HARDWARE

The proposed hardware has sensors for detecting the amount of water present in the soil. This Moisture sensor uses the two probes to pass current through the soil, and then it reads that resistance to get the moisture level. More water makes the soil conduct electricity more easily (less resistance), while dry soil conducts electricity poorly (more resistance). The sensors are further connected to Aurdino via ADC. The MCU (Atmega328 built on Aurdino) is mapped with cloud server on internet and user is given a log-in id and password to utilize the framework with the assistance of web. According to the message passed to the microcontroller the Aurdino initializes the pump to water the field. In the event that no message is passed the system will operate automatically.

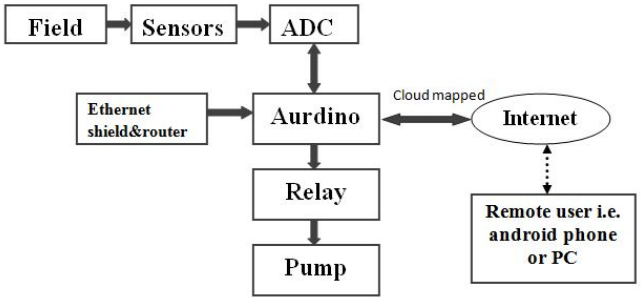

Fig. 2: Block Diagram for proposed system.

4. IMPLEMENTATION

The sensors are set at sufficient depth inside the soil. The sensors are always in active state but if client (farmer) wishes it can be put in passive state. Whenever sensors are on active state they keep on communicating with the microcontroller. The microcontroller straight forwardly speaks with the driving framework (water pump) and in a roundabout way impart data to the client over the cloud stage. The MCU uses two modes for watering. One mode is self programmed mode which is started if client doesn't give response within 60 minutes. Other mode is client driven mode which is initiated if user reacts to microcontroller's message. User can control the rate of watering and can monitor his field. For the power supply of the model solar cells were utilized which were discovered to be productive as microcontrollers devour less power. The framework was introduced in the garden of Graphic Era and was tried for four days.

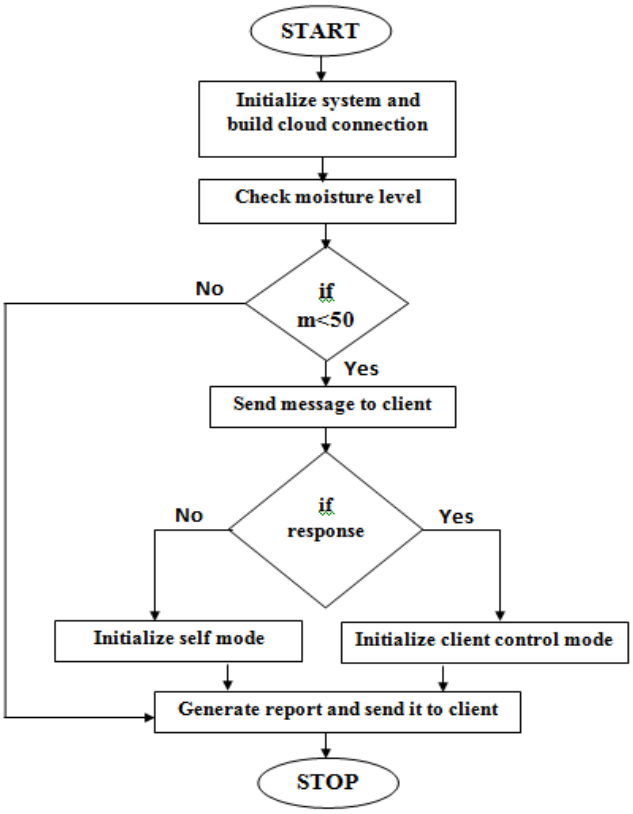

Fig. 3: Flow chart

5. CONCLUSION

The paper puts forward a way to control irrigation remotely. It also identifies a system architecture that supports water management for farming land. The proposed system combines current and next generation microcontroller to limit wastage of water. Microcontroller used for the system promises long system life by reducing power usage.

6. FUTURE SCOPE

With the advancement of technology and cloud computing it is very easy to use a system with the help of remote server. Thus integrating technology and agriculture will aid farmers to a vast degree. The era of automation and microcontrollers components will help the farmers to manage their resources efficiently. This will not only increase the food production but also saves a large amount of water being wasted. Moreover implementation of microcontrollers system will be economical for the farmers as the power consumption by them is very low.

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