International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 11 | Nov 2019 www.irjet.net p-ISSN: 2395-0072

Advanced Irrigation System using Arduino and Raspberry Pi as Centralized Server

N. Kishore [1], K. Ashok kumar[2]

[1]M.Tech student, Dept. of ECE, PBR Visvodaya Institute of Technology & Sciences, Kavali, SPSR Nellore(Dt.), Andhra Pradesh.
[2]Assistant Professor, Dept. of ECE, PBR Visvodaya Institute of Technology & Sciences, Kavali, SPSR Nellore(Dt.), Andhra Pradesh.

Abstract - *Water is essential for upgrading agricultural productivity and therefore expansion of water system has been a key format in improvement of farming in the nation. An Advanced Irrigation System method distributes water to crops/plants by spraying it over the crops/plants like a natural rainfall. In this thesis we will develop an Advanced Irrigation System that will help a farmer/people to know about his field, and the status of his plant at his home or he may be residing in any part of the world. This work will helps the farmers to irrigate the farmland in a very efficient manner with Advanced Irrigation System based on soil, humidity, weather conditions. Whenever there is a change in temperature, humidity and current status of rain of the surroundings these sensors senses the change in temperature and humidity and gives an interrupt signal to the raspberry pi. It not only provides comfort but also reduce energy, efficiency and saves time. So this project is aimed to design a smart irrigation technology based on IOT using Raspberry pi. The proposed Irrigation System will be low in cost and usable by the farmers.*

Key Words: *irrigation technology, IOT, Raspberry pi, spraying System and Sensors.*

1. INTRODUCTION

At the present era, the farmers have been using irrigation technique in India through the manual control in which the farmers irrigate the land from time to time. This process sometimes consumes more water. Automatic irrigation scheduling consistently has shown to be valuable in water use efficiency with respect to manual irrigation based on direct soil water measurements. Irrigation of plants is usually a very time-consuming activity which has to be done in a reasonable amount of time; it requires a large amount of human resources [1]. All the steps were executed by humans traditionally. Nowadays, some systems use technology to reduce the number of workers and to reduce the time required to water the plants [2]. With such systems, the control is very limited and many of the resources are still wasted. Water is one of these resources which is used excessively. Mass irrigation is the method which is used to water the plant. This method represents massive losses since the amount of water given exceeds the plants' needs [4]. The excess water gets discharged by the holes of the pots, or it percolates through the soil in the fields.

2. PROPOSED SYSTEM

The proposed irrigation system makes the efficient use of water. Water is fed to the plant whenever there's need. This irrigation system water plants on the premise of soil wetness, pH value of soil, temperature and light. Wherever these parameters are needed in massive agricultural fields their productivity of the crop matters.

The proposed irrigation system will be very efficient in areas like house gardens, office premises, buildings etc. where watering plants at regular interval matters. This system also presents an smart drip irrigation system to water plants using devices like raspberry pi, Arduino microcontrollers. And also the user gets the status time to time.

3. RELATED WORK

This technology can help in preserving water planning and irrigation timing which is prolonged to other analogous agricultural crops due to which this system is endorsed for efficient automated irrigation systems [3].

To minimize the wastage of water, it is distributed systematically using a servo motor will ensure maximal absorption of the water by plant. Soil moisture and temperature are monitored according to the types of plants and water is delivered to the plants when it is needed.

This process controls the distribution of water and lessens the human work when used in a large agricultural area. Many of the system's features can be customized for the needs of a plant and properly installed by software. The system can be designed by integrating a Web server which can forecast the climate and water the plants systematically.

A. HARDWARE REQUIREMENTS:

- Arduino Uno
- Raspberry Pi
- Water Pump
- Jump Wires
- Bread Board
- Motor driver
- Laptop
- Mobile phone

B. SOFTWARE REQUIREMENTS

- HTML, PHP
- Arduino application
- Python for programming Raspberry Pi

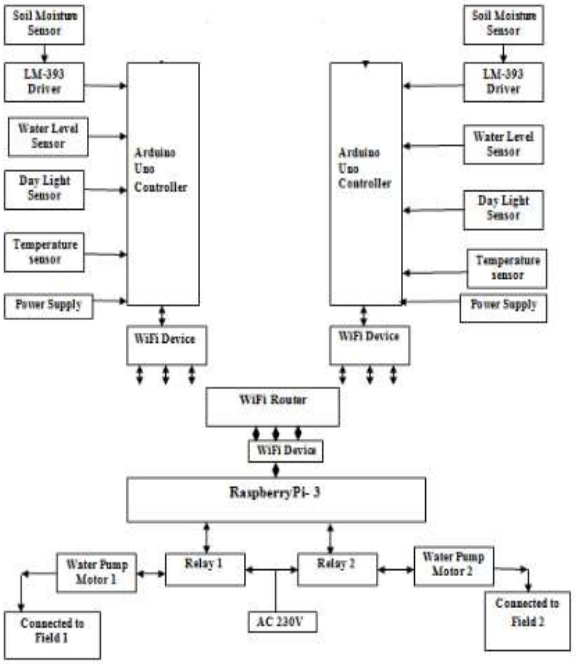
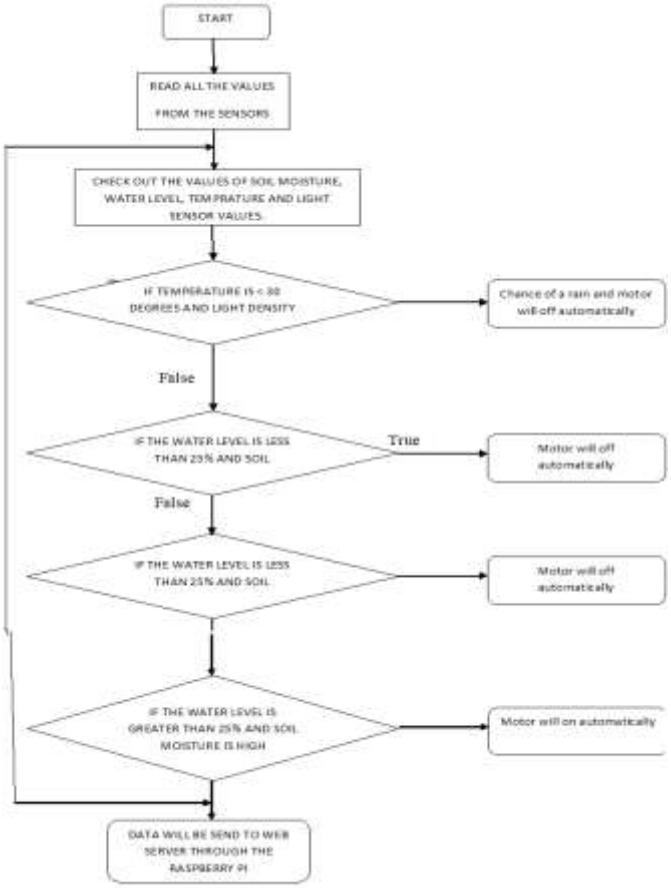


Fig. 1 Block diagram of proposed system

3.1 WORKING ALGORITHM:

Step-1: switch the power and dump the code to the module.
Step-2: check the moisture level in the field.
Step-3: check the water level in tanks or ponds.
Step-4: check the temperature and lighting levels.
Step-5: If the temperature is below 30 and light density is low there will be a chance of rain and then automatically motor will be off.
Step-6: If the moisture level is low and also water level is greater than the 25 percentage (%) the motor will be on and water will pump to the pump.
Step-7: If the moisture level is low and also water level is lower than the 25 percentage (%) the motor will be off.
Step-8: The above steps will be same to another module.
Step-9: The two modules are connected to the raspberry-pi it act as centralized server and the data will be transmitted to the web server.
Step-10: The data will be display in the web site "http://myiot.co.in/smirg.php".

3.2 FLOW CHART:



4. RESULTS

Here the webpage displays the outputs of three sensors. They are moisture level, temperature and the light intensity. Here the moisture level is taken from the moisture sensor, Temperature is taken from the Thermistor and the light intensity is measured with the help of LDR sensor.

- If the moisture sensor value lies between 500 - 1020 .Then the soil is in dry state. So the submersible pump has to be in on condition.
- If the moisture content level is below 500. Then the soil is in wet state. So the submersible pump has to be in off condition.
- If the moisture sensor value is high, then the webpage displays that "No moisture, switch on your motor and No Chance of Rain".
- If the moisture level is low, then the webpage displays that "sufficient moisture, switch off your motor and Chance of Rain".

Even the moisture sensor value is high, based on the temperature and the light intensity levels; it shows the messages on web page.

The webpage URL is "http://myiot.co.in/smirg.php". This URL can be opened in any mobile or pc which contains the browsing application.

This technology can help in preserving water planning and irrigation timing which is prolonged to other analogous agricultural crops due to which this system is endorsed for efficient automated irrigation systems.

To minimize the wastage of water, it is distributed systematically using a servo motor will ensure maximal absorption of the water by plant. Soil moisture and temperature are monitored according to the types of plants and water is delivered to the plants when it is needed.

Fig. 2 Outlook of webpage for Chance of Rain

Fig. 3 Outlook of webpage for No Chance of Rain

5. CONCLUSIONS

The "Advanced Irrigation System using Arduino and Raspberry Pi as Centralized Server" has been designed and tested successfully. It has been developed by integrated features of all the hardware components used. The system has been tested to function automatically. The moisture sensors measure the moisture level (water content) of the different plants.

If the moisture level goes below the desired and limited level, the moisture sensor sends the signal to the Arduino board which triggers the Water Pump to turn ON and supply the water to respective plant. When the desired moisture level is reached, the system halts on its own and the water Pump is turned OFF. Thus, the functionality of the entire system has been tested thoroughly and it is said to function successfully.

Whenever there is a change in temperature, humidity and current status of rain of the surroundings these sensors senses the change in temperature and humidity and gives an interrupt signal to the raspberry pi. It not only provides comfort but also reduce energy, efficiency and time saving. So in this work we will design a smart irrigation technology based on IOT using Raspberry pi. The proposed Advanced Irrigation System will be low in cost and usable by the farmers.

REFERENCES

[1] ChandankumarSahu, PramiteeBehera. 2015 A Low Cost Smart Irrigation Control System IEEE Sponsored 2nd International Conference on Electronics and Communication System (ICECS).

[2] Krishna S. Nemali, Marc W. van Iersel. Nov. 2006 An automated system for controlling drought stress and irrigation in potted plants, ScientiaHorticulturae, pp: 292-297, Vol. 110, no. 3, pp. 292–297

[3] SuprabhaJadhav,ShaileshHambarde. 2013 Automated Irrigation System using Wireless Sensor Network and Raspberry pi, International Journal of science and research(IJSR).

[4] Hentzelt1, S., Klingler, A. and Graichen, K. 2014. Experimental results for distributed model predictive control applied to a water distribution system In: IEEE International Symposium on Intelligent Control (ISIC) IEEE Multi-conference on Systems and Control.

[5] Gutierrez, J., Francisco, J. Villa-Medina Nieto-Garibay, A., and Angel, P.G. 2013. Automated Irrigation System Using a Wireless Sensor Network and GPRS Module. In: IEEE Transactions on Instrumentation and measurement.

[6] Rane, D., Indurkar, P., and Khatri, D.M.. 2015 REVIEW PAPER BASED ON AUTOMATIC IRRIGATION SYSTEM BASED ON RF MODULE In IJAICT Volume 1, Issue 9.

BIOGRAPHIES

N Kishore is currently pursuing Master of Technology in the Digital Systems and Computer Electronics at the PBR Visvodaya Institute of Technology & Science. He completed a graduation with a B.Tech in Electronics and Communication Engineering. He's current research concentrates on computers and digital electronics.

K. Ashok Kumar is an Assistant Professor in the Visvodaya Engineering College at JNTUA in Kavali, A.P. He teaches in the Department of Electronics and Communication in the areas of Digital Electronics, VLSI and Computer Data Networks.