

Smart Irrigation System using IOT

Arif Gori¹, Manglesh Singh², Ojas Thanawala³, Anupam Vishwakarma⁴, Prof. Ashfaque Shaikh⁵

Student, Computer Engineering, Rizvi College of Engineering, Mumbai, India^{1,2,3,4}

Guide, Computer Engineering, Rizvi College of Engineering, Mumbai, India⁵

Abstract: As water supply is becoming scarce in today's world there is an urgency of adopting smart ways of irrigation. The project describes how irrigation can be handled smartly using IOT. This project aims at saving time and avoiding problems like constant vigilance. It also helps in conserving water by automatically providing water to the plants/field depending on the water requirements. This system can also prove to be helpful in agriculture, parks and lawns. The objective of this system is to detect the moisture content of the soil and depending on it sprinkle water. This entire information will be sent to the user's mobile phone.

Keywords: Soil moisture sensors, IOT, Arduino, Android, Microcontroller.

I. INTRODUCTION

Agriculture is considered as the basis of life for us as it is the main source of food and other raw materials. It plays vital role in the growth of country's economy. Growth in agricultural sector is necessary for the development of economic condition of the country. Unfortunately, many farmers still use the traditional methods of farming. In India most of the irrigation system are manually operated one's. These outdated techniques are replaced with automated techniques.

This paper focuses primarily on reducing the wastage of water and minimizing the manual labor on field for irrigation [1]. Recent advances in soil water monitoring combined with the growing popularity of Wireless Sensor Networks make the commercial use of such systems applicable for agriculture and Gardening. The system designed is programmed to irrigate at regular time intervals for predefined periods of time. In this technique, soil moisture sensors are placed root zone of plant and near the module and gateway unit handles the sensor information and transmit data to the controller which in turns operates the of control the flow of water through the valves. To give proper attention to the land located far away from the human settlement, supervisory automatic control systems like multi-terminal control systems are used since in many processes, factors like soil, salinity, irrigation, temperature, light intensity, etc. needs repeated tasks and have to work in abnormal environmental conditions of the soil and to overcome the flaws in the existing system here we are irrigating the land based on the soil humidity and at the same time the status of the irrigation is updated wirelessly to the based Android App .

The proposed system will allow farmers to continuously monitor the moisture level in the field, controlling the supply remotely over the internet. When moisture goes below a certain level, sprinklers would be turned on automatically, thus achieving optimal irrigation using Internet of Things.

II. LITERATURE REVIEW

Various researches have been carried out on how soil irrigation can be made more efficient .The researchers have used different ideas depending on the condition of the soil and quantity of water Different technologies used and the design of the system was discussed by the researchers.

This paper aims at reducing the wastage of water and the labor that is used to carry out irrigation manually. The proposed system aims at detecting the moisture content of the soil using sensors that are placed directly into the soil. This sensors sense the water level of the soil and if the water level is not adequate then the user will be notified through a message that will be sent to the application which would be installed on the user's mobile phone.

The Arduino board, a microcontroller, controls the digital connection and interaction between objects in the proposed system, enabling the objects to sense and act [2]. Also, with its powerful on-board processing, various sensors and other application specific devices can be integrated to it. In the system, sensors detect the water and moisture level and send readings to a fixed access point, such as a personal computer, which in turn can access irrigation modules installed in the field or the physical module in the water tank, wirelessly over the internet.

A wireless application of drip irrigation automation supported by soil moisture sensors Irrigation by help of freshwater resources in agricultural areas has a crucial importance. Traditional instrumentation based on discrete and wired solutions, presents many difficulties on measuring and control systems especially over the large geographical areas. If different kinds of sensors (i.e. humidity, and etc.) are involved in such irrigation in future works, it can be said that an internet based remote control of irrigation automation will be possible [3].

An automated irrigation system was developed to optimize water use for agricultural crops. The system has a distributed wireless network of soil-moisture placed in the root zone of the plants. In addition, a gateway unit handles sensor information, triggers actuators, and transmits data to an android application [4].

III. PROPOSED SYSTEM

This system is a combination of hardware and software components. The hardware part consists of different sensors like soil moisture sensor, photocell sensor, etc whereas the software part consists of an android based application connected to the arduino board and other hardware components using Internet of Things (IoT). The android based application consists of signals and a database in which readings are displayed from sensors and are inserted using the hardware. The improvement in irrigation system using wireless network is a solution to achieve water conservation as well as improvement in irrigation process. This research tries to automate the process of irrigation on the farmland by monitoring the soil water level of the soil relative to the plant being cultivated and the adaptively sprinkling water to simulate the effect of rainfall.

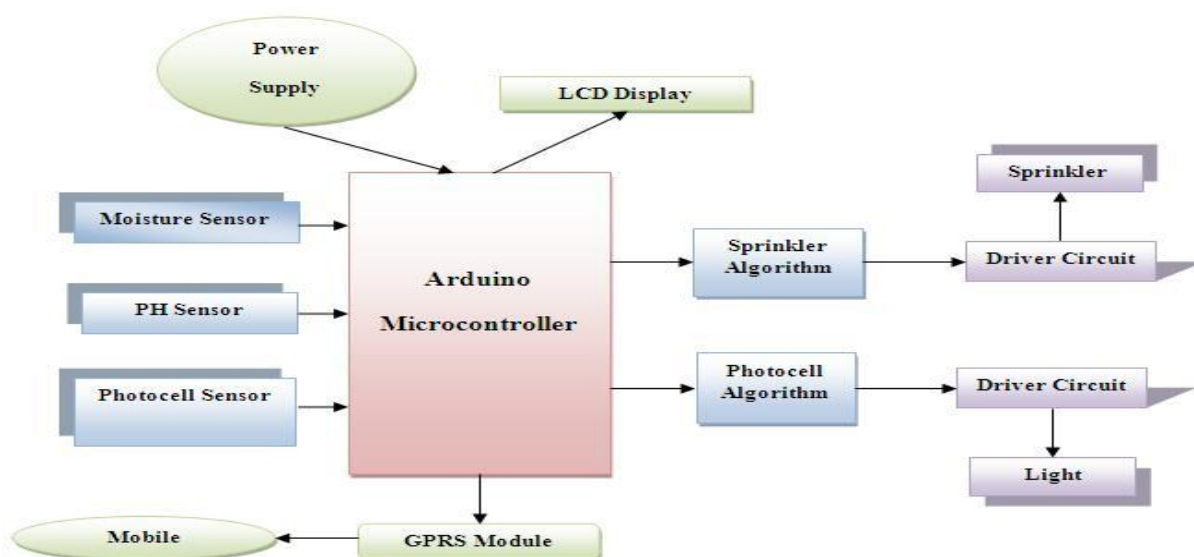


Figure 1. Block Diagram

A. Moisture Sensor

The Soil Moisture Sensor is used to measure the volumetric water content in the soil. This makes it ideal for performing experiments in plants by having constant information about the amount of water currently present in soil and accordingly providing water to the plants for proper nourishment.

This includes constant checking of moisture content in soil and sending the readings to the android application. If the moisture content is less than the threshold value (which is pre-fed into the arduino board), a prompt message is sent to the device and automatically a sprinkler connected to the arduino will start sprinkling water on the affected area.

B. pH Sensor

pH sensor checks alkalinity and acidity of the soil. It is important to maintain a hydroponic nutrient solution at a pH level where the nutrients are consistently available to the plant. If the content of the soil solution is too acidic or too alkaline it can cause lock up – a situation which restricts certain elements essential for growth from being absorbed by the root structure. Deficiencies in the required elements become apparent in the plants growth and can lead to plant death. Additionally the pH of the water we drink is crucial to our health.

C. Photocell Sensor

Photocell sensor picks up the light readings. These readings will be transferred to arduino where they will be compared with the threshold value. If it is less than the threshold value we can provide some artificial light to the plants.

D. Arduino

Arduino is an open source computer hardware and software company, project and user community. It is the best board to get started with electronics and coding.



IV. PROPOSED ALGORITHM

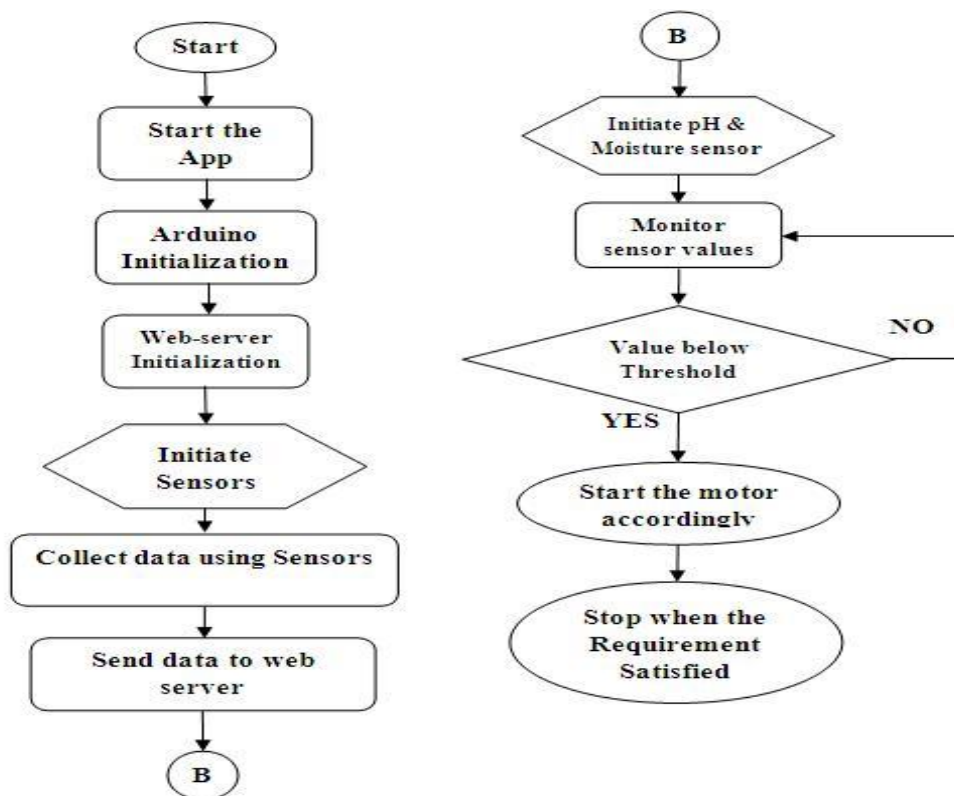


Figure 2. Flow Chart

In this paper, we are using a Mesh topology in which sensor nodes are placed in the farm area. Sensors in our proposed topology are mobile where as the base station is stationary and it collects the data from sensor nodes and process them. This work proposes that how to deploy the sensed data to the base station in Wireless Sensor Networks. For this purpose firstly set the farm area [5].

pH sensor checks whether the soil is alkaline or acidic. Soil should have proper proportion of nutrients which is essential for the plant growth. Also, with help of pH we can determine for what type of plant the soil is feasible. In this project, we have added a pH sensor to check the acidity of the soil and give constant updates to the android application about the same.

Sprinkler Algorithm

The moisture sensor gives the water content level in the soil and sends it to the arduino. It will process this data by comparing it with the threshold value if it is less than the predefined threshold value then start the irrigation.

Reading < Threshold value → Start the irrigation System

Photocell Algorithm

Light is very important for the plants. Plants convert light energy into their own building material. The photocell sensor measures the level of availability of the lights to the plants. Arduino compares the level of light with the predefined threshold value if it is less than the threshold value then we can provide artificial lights for the plants so that the plants can get appropriate level of light.

Reading < Threshold value → Start the artificial light

V. CONCLUSION

The smart irrigation system implemented is cost effective for optimizing water resources for agricultural production. The proposed system can be used to switch on/off the water sprinkler depending on the soil moisture levels thereby making the process simpler to use. Through this project it can be concluded that there can be considerable development in irrigation with those of IOT and automation. Thus this system is a solution to the problems faced in the existing process of irrigation.



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