RESEARCH ARTICLE OPEN ACCESS

Smart Irrigation System using IOT

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ABSTRACT

It is very important for the farmers as agriculture plays a vital role it directly influences the Gross Domestic Product of every favourable country it is main source of food production it is more or less like a backbone of economy of our country. Not only in India but in other countries too many problems have found out in this sector so to put that labour work at equilibrium and to conserve water, it is necessary to take some caution where we all are still at it and with the technologies like IoT, sensors, smart phone tools there are the technologies which helps farmers to know the status of their land, amount of water needed, temperature of soil, humidity, weather conditions, ph level. Thisdocument aims to develop a system which will be a helping hand for farmers. The most prominent part of this document is how intelligently and automatically controls the water supply to the fields not only it does that but also all the information were to send on the Farmer's mobile phone.

I. INTRODUCTION

Agriculture is one major source which plays a key role in human life be it economy or be it providing food. And even majority of people are directly reluctant on agriculture of employment [1]. As per the 2014 FAO world agriculture statistics India is the world's largest producer of many fresh fruits and vegetable, so it is crucial to gradually increase the rate of production of agricultural sector. Every year or every following year requires the ample amount of water for the irrigation so most of the farmers relay on rainfall [2]. It is also difficult for farmers to find a way out to grow crop which need less water. From many surveys, the report is that agriculture uses 85% of the fresh water therefore, the actual consumption/utilization of water needs to be done [3]. So, with effective use of tools and technologies all these things can be put into consideration and can be resolved. IoT is a technology which enables us to adopt the strategies to monitor the usage of water resources in agriculture fields via connecting with android applications [4]. In the today word max of the data communication done using the internet so the internet based devices is the need of the market and security of these devices is also important [5-7]. In the IoT device the soil moisture sensor is placed in the soil with crops, which checks the moisture level of the soil and send signals to Arduino. Arduino takes the decision of whether to switch-on or switch-off the water motor. Using such techniques, the wastage of water in agriculture can be stopped [8-10].

II. PROPOSED DESIGN STRUCTURE

The aim of the project is to show how irrigation can be automated by using sensors, microcontroller, Wi-Fi module, android application. The low-cost soil moisture sensor continuously monitors the field [11]. The sensors are connected to Arduino board. The sensor data obtained are transmitted through the wireless transmission and are reached to the user so that he/she can control irrigation. The mobile application can be designed in such a way to analyse the data received and to check with the threshold values of moisture, humidity and temperature. Figure shows the block diagram of the proposed system.

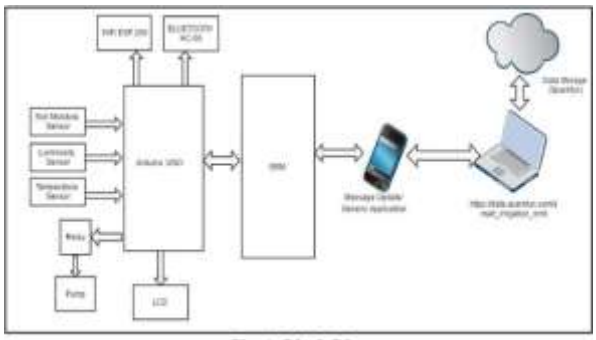

Fig. 1. Block Diagram

III. ALGORITHM

The steps that the system undergoes:

Step 1: Soil moisture sensor senses the moisture level of the soil (less than or more than).

Step 2: If the moisture sensed value is greater than the fixed threshold value than no need to switch on the motor.

Step 3: If the Moisture level is less than the threshold value, then the water motor is switch-on automatically. Step 4: Once moisture level comes equal to the threshold value, it moves to its initial state (switch-off the water motor).

Step 5: End the process

IV. STATE TRANSITION DIAGRAM

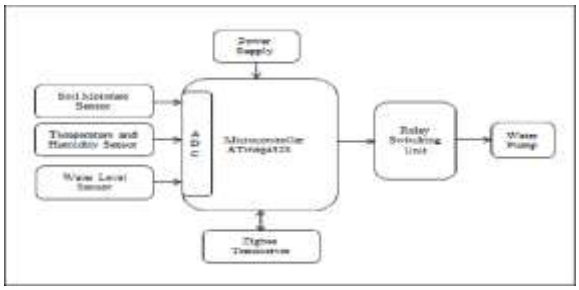

Figure 2 State transition diagram

V. HARDWARE USED

Arduino UNO

The Arduino Uno R3 (also called ATmega328) is a dual-inline package (DIP) microcontroller AVR microcontroller. In total, it has 20 I/O digital pins. Arduino computer programs can be easily loaded on it Arduino Uno R3 is the latest revision of the Arduino Microcontroller [12-14].

Figure 3 Arduino UNO

SOIL MOISTURE SENSOR

It measures the volume of water content in soil. It has two probes which are used to sense the water level of the plants and crops. The current is passed from these two probes them it estimates the resistance value of the moisture level. If the water level of the soil is then the resistance value is less and vice versa [15-16].

Figure 4 Soil moisture sensor

Temperature sensor:

The Temperature Sensor LM35 used to measure temperature in Celsius. The advantage of using the LM35 temperature sensor does not require any extra or external calculation [17].

Figure 5 Temperature sensor

VI. SOFTWARE USED

Arduino IDE 1.8.9 It is the open-source Arduino Software which is used to Arduino based code and upload it to an Arduino board. It can run on any platform like on Windows, Mac OS X, and Linux. Its environment is written in Java and other open-source software.

VII. CONCLUSION

This Smart Irrigation System using IoT is found to be very cost-effective for enhancing the techniques and to preserve water resources on the top of that it optimizes them for agriculture production. This system helps the farmer by working automatically and smartly. With placing multiple sensors in the soil, water can be only provided to the required piece of land. This system requires less maintenance so it is easily affordable by all farmers. This system helps to reduce water consumption. With using this system, the crop production increases to a great extent. As per future perspective, this system can be the more intelligent system which predicts user actions, nutrient level of the plants, time to harvest, etc. With using Machine Learning algorithms more advancements can be done in the future which will help farmer a lot and water consumption can also be reduced in agriculture.

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