Evergreen based Agriculture Irrigation System using IoT

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***Abstract*—**The aim of our project is to design and construct an Evergreen based Agriculture Irrigation System using IOT depending on the moisture content. This project is very useful for agriculture purpose. It saves the water also. Depends on atmosphere and soil content. This find useful for agriculture and efficient use of water resources. The project permits the duty cycle of an irrigation period to be adjusted to match the absorption dynamics of the moisture. This maximizes water use efficiency – even for micro-irrigation. The sensor is connected to arudino. The sensor is placing in root zone of the plant. It is possible to maintain crops at optimal hydration and monitor excess irrigation. The only solution is to solve this problem by in the way of using modern agriculture. The operation will be controlled by using internet connection and the performance is interfacing with sensor.

***Keywords*—**Arduino; DH11 (Immunity and Temperature) Sensor; IOT (Internet of Things); Mobile; Motor; Relay; Soil Moisture Sensor.

***Abbreviations*—**Internet of Things (IoT).

I. INTRODUCTION

AGRICULTURE is introduced by the backbone of Indian culture. It is basis of life for the human species. The growth of economy is based on role of agriculture. It gives large employment opportunities to the people to developed economic growth in agriculture sector. Still famous are using traditional method of farming it gives low yield. To improve our yielding of crops automation and man power had replace by machineries by using this automation method to improve our crop yield. Hence its necessary to implement modern science and technology for increasing the yield in agriculture sector. The paper signifies the use of wireless sensor network which collects the data and sends it to the main server. The collected data help to monitor the different environmental factor. To promote the application of modern information technology in agriculture will solve a series of problems facing by farmers. Lack of information and communication leads to the loss of production. Our paper is used to design and to overcome these problems who facing in agriculture field [Wang et al., 1].

II. BLOCK DIAGRAM

The block diagram of automatic irrigation system on sensing soil moisture content project comprise three main component namely an arduino, relay, IOT. This project is an arduino which is programmed in keil software. When the sensor arrangement senses the moisture of the soil, its send the signal to the arduino by use an IOT. Here, IOT acts as an interface between the sensing arrangement and an arduino. Sensing arrangement is made by using two stiff metallic rods placed into the field at a distance. Once an arduino receive the signal it generates the output that drives a relay and prompts the motor to pump water to the plants [Leblanc & Chen, 2].

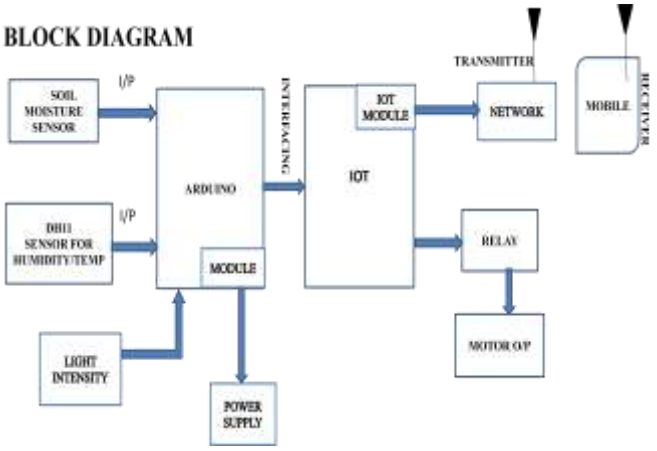

Figure 1: Block Diagram

2.1. Soil Moisture Sensor

The Soil Moisture Sensor is used to measure the volumetric water content of soil. This makes it ideal for performing experiments in courses such as soil science, agricultural science, environmental science, horticulture, botany, and biology. Use the Soil Moisture Sensor to:

- Measure the loss of moisture over time due to evaporation and plant uptake.
- Evaluate optimum soil moisture contents for various species of plants.
- Monitor soil moisture content to control irrigation in greenhouses.
- Enhance your Bottle Biology experiments.

It uses two probes, when inserted into the soil provides the repeated moisture readings used for the irrigation.

More water makes the soil to conduct more easily(less resistance) while dry soil conducts poorly (more resistance) [Amardeo & Sarma, 3].

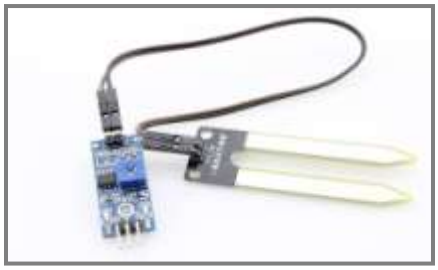

Figure 2: Soil Moisture Sensor

2.1.1. Positioning the Sensor

The proper placement of the Soil Moisture Sensor to the prongs should be oriented horizontally, but rotated onto their side – like a knife poised to cut food – so that water does not pool on the flat surface of the prongs. The horizontal orientation of the sensor ensures the measurement is made at a particular soil depth. The entire sensor can be placed vertically, but because soil moisture often varies by depth, this is not usually the desired orientation. To position the sensor, use a thin implement such as a trenching shovel to make a pilot hole in the soil. Place the sensor into the hole, making sure the entire length of the sensor is covered. Press down on the soil along either side of the sensor with your fingers. Continue to compact the soil around the sensor by pressing down on the soil with your fingers until you have made at least five passes along the sensor. This step is important, as the soil adjacent to the sensor surface has the strongest influence on the sensor reading [Fan TongKe, 4].

2.1.2. Removing the Sensor

When removing the sensor from the soil, do not pull it out of the soil by the cable. Doing so may break internal connections and make the sensor unusable.

2.2. Temperature and Humidity Sensor

The temperature & Humidity sensor is a wired version of the DHT21, in a large plastic body. It is a basic, low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed).It's fairly simple to use, but requires careful timing to grab data. The only real downside of this sensor is you can only get new data from it once every 2 seconds, so when using our library, sensor readings can be up to 2seconds old [Jim Chase, 5].

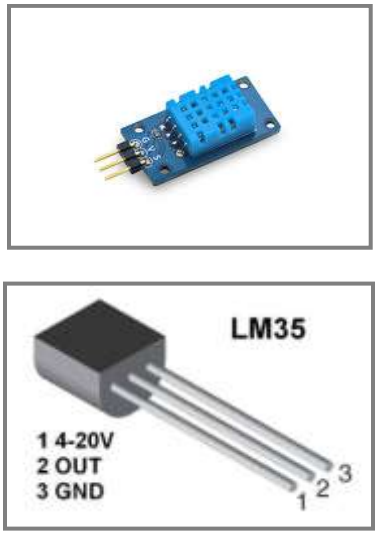

Figure 3: Temperature & Humidity Sensor

2.3. Relay

A relay is an electrically operated switch. Many relay use an electromagnet to mechanically operate a switchbox other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it another circuit. Relays were used extensively in telephone exchanges and early computer to perform logical operations. It is an electric switch that uses an electromagnet to move the switch from OFF to ON position instead of a person moving the switch. SPDT relay is used [Arun & Lakshmi Sudha, 6].

2.4. Arduino

It refers to an open-sources electronic platform or board and the software used to programe it. Arudino is designed to make electronics more accessible to artists, designers, hobbyists and anyone interested in creating interactive objects or environment. An arduino board can be purchased pre-assembled or, because the hardware design is open source, build by hand. The Arduino board exposes most of the microcontroller's I/O pins for use by other circuits. The Diecimila, Duemilanove, and current Uno provide 14digitals I/O pins, six of which can produce pulse-width modulated signals, and six analog inputs, which can also be used as six digital I/O pins. There pins are on the top of the broad, via female 0.1-inch (2.54mm) headers. Several plug-in application shields are also commercially available. The Arduino Nano, and Arduino-compatible Bare Bones Board and Boarduino boards may provide male header pins on the underside of the board that can plug into solder less breadboards [Izzatdin Abdul Aziz et al., 7].

Figure 4: Arduino

2.5. Motor

An electric motor is an electrical machine that converts electrical energy into mechanical energy. Motor is the main process in this project. The reverse of this is the conversion of mechanical energy into electrical energy and is done by an electric generator. If the soil is dry condition the motor will be automatically switched on and it flow the water to the soil. On the other hand if the soil is wet condition the motor goes to off likewise the process will be repeated [Jeonghwan Hwang et al., 8].

For dry condition the soil moisture is above 90% output will be shown in mobile.

For wet condition the soil moisture is below 50% output will be shown in mobile.

III. LITERATURE SURVEY

In this paper, soil moisturing sensor, temperature sensor placed in root zone of plant and gateway unit handles the sensor information and transmit data to a web application. One algorithm was developed for measure threshold values of temperature sensor and soil moisture sensor that was programmed into microcontroller to control water quantity level. Irrigation system provides foe adequate irrigation in particular area which is real time. Soil moisture sensor placed in root zone in paddy field and sense water level. The system was setup with up using GSM.GSM is an important part of this system to operate through a link of centralized unit. This system detect climate and field condition in real time. this information is send to the user in form of SMS. This idea was developed to improve the irrigation system and reduce the cost of irrigation water. In WSN, crop monitoring application is useful to former for precision agriculture. It monitors the whole farm from remote location using GSM. It works on sensor network and two types of nodes. Energy saving algorithm is used in node to save energy. First node collects all environmental and parameters value soil moisture, temperature, air, humidity etc., second node consist of cam to capture the images and monitor crops [Ning Wang et al., 9].

IV. ARCHITECTURE

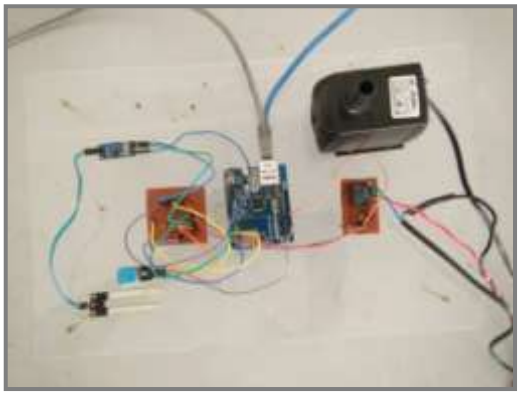

Figure 5: Architecture

V. CONSTRUCTION AND WORKING

In present days in the field of agriculture farmers are facing major problems in watering their crops. It's because they don't have proper idea about the availability of the power. Even if it is available, they need to pump water and wait until the field is properly watered, which compels them to stop doing other activities –which are also important for them, and thus they loss their precious time and efforts. But, there is a solution –on automatic plant irrigation system not only helps farmers but also others for watering their gardens as well.

The automatic irrigation system senses the moisture content of the soil and automatically switches the pump when the power is on. A proper usage of irrigation system is very important because the main reason is the shortage of land reserved water due to lack of rain, unplanned use of water as a result large amounts of water. For this reason, we use this automatic plant watering system, and this system is very useful in all climatic conditions.

5.1. Output (Dry Condition)

For dry condition the soil moisture is above 90% output will be shown in mobile.

Figure 6: Output (Dry Condition)

5.2. Output (Wet Condition)

For wet condition the soil moisture is below 50% output will be shown in mobile.

Figure 7: Output (Wet Condition)

VI. CONCLUSION & FUTURE WORK

The internet of things is closer to being implemented than the average person would think. Most of the necessary technological advances needed for it have already been made, and some manufactures and agency have already begin implementing a small-scale version of it. To use the concept of the internet of things to its extends and improve the functioning of the device. By using this device, the farms, field will be monitored continuously through sensor and necessary measure will be taken without human power. Thus agriculture percentage will increase without any loss of grain by water. The design of project is very useful for future development of modern agriculture and it is very useful purpose for farmers.

For future purpose it has been implemented in large farming area in modern agriculture.

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