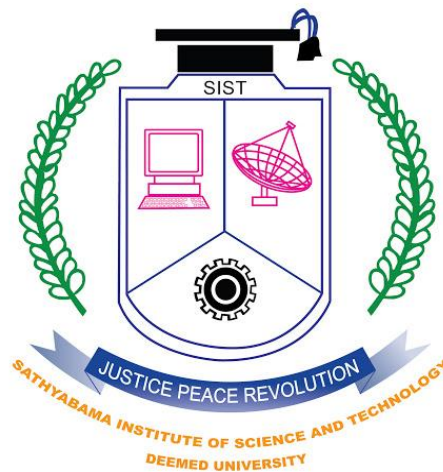


SMART APPLICATION IN AGRICULTURE USING IOT

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering Degree in Computer Science and engineering
by

K. GOWTHAMI (37110376)

J. SRI SAMHITHA (37110296)



**DEPARTMENT OF COMPUTER SCIENCE AND
ENGINEERING SCHOOL OF COMPUTING**

SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

Accredited with Grade “A” by NAAC

JEPPIAAR NAGAR, RAJIV GANDHI SALAI,

CHENNAI - 600119

APRIL-2020



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited with "A" grade by NAAC
Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai –
600119



www.sathyabama.ac.in

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **K. GOWTHAMI (37110376)** and **J.SRI SAMHITHA (37110296)** who carried out the project entitled **"SMART APPLICATION IN AGRICULTURE USING IOT"** under my supervision from November 2019 to April 2020.

Internal Guide

Dr. P. SARDAR MARAN, M.E., Ph.D.,

Head of the Department

Submitted for Viva voce Examination held on _____

Internal Examiner

External Examiner

—

DECLARATION

We **K. GOWTHAMI (37110376)** and **J.SRI SAMHITHA (37110296)** here by declare that the Project Report entitled “**SMART APPLICATION IN AGRICULTURE USING IOT**” done by us under the guidance of Associate Professor. **Dr. P. SARDAR MARAN, M.E., Ph.D.**, is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in **SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY**.

DATE:

PLACE: CHENNAI

SIGNATURE OF THE CANDIDATE

ACKNOWLEDGEMENT

The satisfaction and intense happiness on the successful completion of any task would be incomplete without mentioning the people who made it possible whose constant guidance and encouragement made my effort with success.

I am very grateful to **SATHYABAMA** management for encouraging the students to do the projects after the completion of second year itself.

I convey my thanks to **Dr. T. SASIKALA, M.E., Ph.D.**, Dean, School of Computing, **Dr. S. VIGNESHWARI, M.E., Ph.D.**, and **Dr. L. LAKSHMANAN, M.E., Ph.D.**, Heads of the Computer Science and Engineering for providing me necessary support and details at the right time during the progressive reviews.

I would like to express my sincere and deep sense of gratitude to my Project Guide **Dr. P. SARDAR MARAN, M.E., Ph.D.**, for her valuable guidance, suggestions and constant encouragement paved the way for the successful completion of my project work.

This acknowledgement would not be complete without expressing my sincere gratitude to my parents for their love, patience, encouragement and understanding which are the source of my motivation and inspiration throughout my work.

TABLE OF CONTENTS

CHAPTER No.	TITLE	PAGE No
	ABSTRACT	i
	LIST OF FIGURES	ii
1	INTRODUCTION	1
	1.1 ARDUINO UNO	2
	1.2 SOIL MOISTURE SENSOR	3
	1.3 RAIN SENSOR	4
	1.4 FLOAT SENSOR	5
	1.5 RELAY MODULE	6
2.	AIM AND SCOPE OF THE PRESENT INVESTIGATION	7
	2.1 AIM	7
	2.2 SCOPE	7
3.	EXPERIMENTAL OR MATERIALS AND METHODS, ALGORITHMS USED	8
	3.1 MATERIALS USED	8
	3.2 METHOD USED	8
4.	RESULTS AND DISCUSSION, PERFORMANCE ANALYSIS	9
	4.1 RESULT	9
	4.2 DISCUSSION	9
5	SUMMARY AND CONCLUSIONS	10

REFERENCES	11
	12
APPENDIX	
A.SCREENSHOTS	12
B. SOURCE CODE	13

ABSTRACT

With the advancement of automation technology, life is getting simpler and easier in all aspects. In today's world, Automatic systems are being preferred over manual systems. Automatic systems play an important role in our day to day activities from industrial machines to consumer goods that can complete tasks while you are busy with other activities.

India's population has reached 1.2 billion and the population rate is increasing day by day then after 25-30 years there will be a serious problem of food, so the development of agriculture is necessary.

Today, the main problem to the farmers is caused due to lack of rain and scarcity of water. The main objective of this project is to design a system for automating the process of irrigation which in turn helps in reducing human intervention and also reduces water usage and helps in increasing productivity as well.

LIST OF FIGURES

FIGURE NO.	FIGURE NAME	PAGE NO.
1	ARDUINO UNO	2
2	SOIL MOISTURE SENSOR	3
3	RAIN SENSOR	4
4	FLOAT SENSOR	5
5	RELAY MODULE	6

1.INTRODUCTION

India is the country of villages and agriculture plays an important role for the development of country. In our country, agriculture depends on the monsoons which has insufficient source of water. So the irrigation system is used to water the agricultural field. In Irrigation system, depending upon the soil type, water is provided to the plants. In agriculture, two things are very important, first to get the information about the fertility of soil and second to measure humidity content in air. Nowadays, for irrigation, different techniques are available which are used to reduce the dependency of rain. And mostly this technique is driven by electrical power and on/off scheduling. In this technique, a soil moisture sensor is placed near the plant and the gateway unit handles the sensor information and transmit data to the controller which in turns the control the flow of water through the pump.

1.1 ARDUINO UNO

The Arduino Uno is an open-source microcontroller board based on the Microchip microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.



Fig 1 : ARDUINO UNO

1.2 SOIL MOISTURE SENSOR

Soil moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighing of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content.

The relation between the measured property and soil moisture must be calibrated and may vary depending on environmental factors such as soil type, temperature, or electric conductivity. Reflected microwave radiation is affected by the soil moisture and is used for remote sensing in hydrology and agriculture. Portable probe instruments can be used by farmers or gardeners.

Soil moisture sensors typically refer to sensors that estimate volumetric water content. Another class of sensors measure another property of moisture in soils called water potentials, these sensors are usually referred to as soil water potential sensors and include tensiometers and gypsum blocks.



Fig 2 : SOIL MOISTURE SENSOR

1.3 RAIN SENSOR

A **rain sensor** or *rain switch* is a switching device activated by rainfall. There are two main applications for rain sensors. The first is a water conservation device connected to an automatic irrigation system that causes the system to shut down in the event of rainfall. The second is a device used to protect the interior of an automobile from rain and to support the automatic mode of windscreen wipers.

Rain sensors for irrigation systems are available in both wireless and hard-wired versions, most employing hygroscopic disks that swell in the presence of rain and shrink back down again as they dry out — an electrical switch is in turn depressed or released by the hygroscopic disk stack, and the rate of drying is typically adjusted by controlling the ventilation reaching the stack. However, some electrical type sensors are also marketed that use tipping bucket or conductance type probes to measure rainfall. Wireless and wired versions both use similar mechanisms to temporarily suspend watering by the irrigation controller — specifically they are connected to the irrigation controller's sensor terminals, or are installed in series with the solenoid valve common circuit such that they prevent the opening of any valves when rain has been sensed.



Fig 3 : RAIN SENSOR

1.4 FLOAT SENSOR

A **float switch** is a type of level sensor, a device used to detect the level of liquid within a tank. The switch may be used to control a pump, as an indicator, an alarm, or to control other devices.

One type of float switch uses a mercury switch inside a hinged float. Another common type is a float that raises a rod to actuate a microswitch. One pattern uses a reed switch mounted in a tube; a float, containing a magnet, surrounds the tube and is guided by it. When the float raises the magnet to the reed switch, it closes. Several reeds can be mounted in the tube for different level indications by one assembly.



Fig 4 : FLOAT SENSOR

1.5 RELAY MODULE

A **relay** is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof.

Relays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal. Relays were first used in long-distance telegraph circuits as signal repeaters: they refresh the signal coming in from one circuit by transmitting it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.



Fig 5 : RELAY MODULE

2. AIM AND SCOPE OF THE PRESENT INVESTIGATION

2.1 AIM :

To design a system to automate the process of irrigation.

2.2 SCOPE :

It can provide high accuracy water supply and avoid water from wastage. Due to automatically handling, user requires less man power. With the help of the sensors, it can accurately determine the soil moisture levels. It can easily detect and control the temperature, humidity, using sensors. It can also help in increasing crop production.

3. EXPERIMENTAL OR MATERIALS AND METHODS, ALGORITHMS USED

3.1 MATERIALS USED :

3.1.1 HARDWARE USED :

Arduino Uno, Soil Moisture Sensor, Rain Sensor, Float Sensor, Relay Module, DC 3-6V Submersible Water Pump, 9V Battery, Jumpers, Breadboard.

3.1.2 SOFTWARE USED :

Arduino IDE 1.8.16

3.2 METHOD USED :

The first step is to collect the data from various Sensors (Soil Moisture, Rain, Float Sensor).

The second step includes the processing of data received from various sensors.

The third step helps in deciding whether to start the motor or not based on the various conditions given such as if soil is wet or dry, etc.

4. RESULTS AND DISCUSSION, PERFORMANCE ANALYSIS

4.1 RESULT :

The data received from the sensors is processed using the Arduino Uno board and based on the data processed it is decided whether to start the irrigation process or not.

4.2 DISCUSSION :

Further discussion can be carried out on this topic as I have implemented this system only for one plant of a particular type and for a small area. We can implement it for a large area and for a variety of plants by using a number of Soil Moisture Sensors and Solenoid Valves to start irrigation only for a particular area in a large farm. Further we could also design a mobile application to control the System from anywhere.

5. SUMMARY AND CONCLUSIONS

5.1 CONCLUSION :

The automatic irrigation system designed using Arduino Uno and various Sensors for watering the plants is successfully implemented. Analyzing the soil moisture condition, the motor will automatically maintain water supply making it possible to maintain greenery without human intervention and thus reducing water wastage.

5.2 FUTURE WORK :

Using this system as a framework model, the system can be expanded to include various other options such as controlling the system using mobile application, as well as expanding the system to implement it for a larger area and for different types of crops.

REFERENCES

1. For various Arduino Uno Functions :

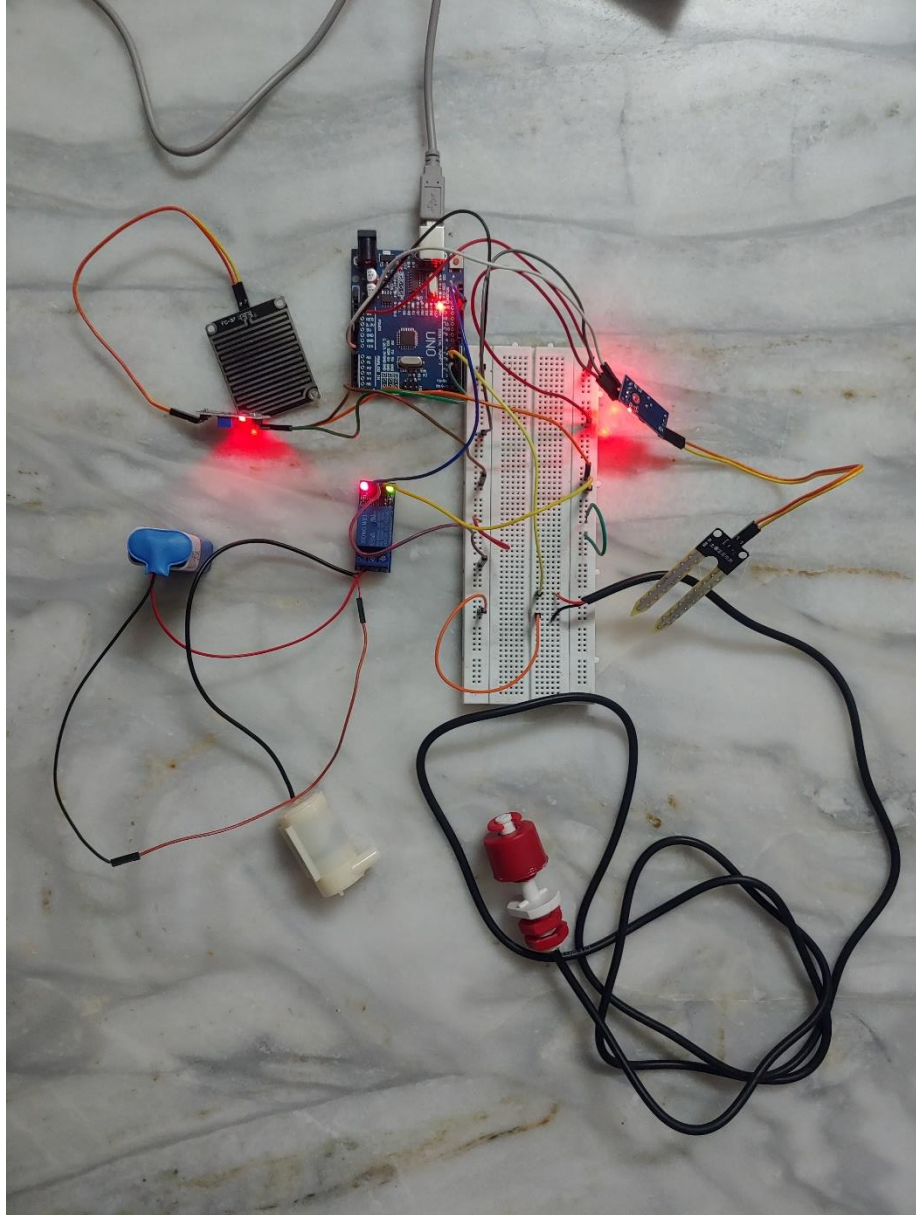
<https://www.arduino.cc/en/Reference/FunctionDeclaration>

2. For Digital and Analogy I/O Functions :

<https://www.arduino.cc/reference/en/>

APPENDIX

A.SCREENSHOTS :



B. SOURCE CODE :

```
int pump=13;
int soil=0;
int rain=2;
int level=3;
int value=0;
void setup() {
    // put your setup code here, to run once:
    pinMode(pump,OUTPUT);
    pinMode(soil,INPUT);
    pinMode(rain,INPUT);
    pinMode(level,INPUT);
}

void loop() {
    // put your main code here, to run repeatedly:
    value=analogRead(soil);
    value=(value/10);
    if(value>50)
    {
        if(digitalRead(rain)==HIGH && digitalRead(level)==HIGH)
        {
            digitalWrite(pump,HIGH);
        }
    }
    delay(1000);
    digitalWrite(pump,LOW);
}
```