VISVESVARYA TECHNOLOGICAL UNIVERSITY, BELAGAVI ,590018

A MINI PROJECT REPORT ON:

SMART IRRIGATION SYSTEM USING ARDUINO

Submitted in partial fulfillment of academic session in post graduation degree course of MASTER OF COMPUTER APPLICATION

Submitted by : Vishal Abhinav 1AM20MC103
Manoj K S 1AM20MC052
Sub : Internet Of Thing Lab
Sub Code : 20MCA37

Under the Support and Guidance of :
Mrs. Lovely Saji
Associate Professor
Dept. Of MCA

AMC ENGINEERING COLLEGE

BANNERGATTA ROAD , KALKERE , BANGALORE -83

(Approved by AICTE, New Delhi, Accredited by NAAC, NBA, New Delhi, Affiliated to VTU Belagavi)

2021-2022

PROJECT REPORT

ARDUINO BASED SMART IRRIGATION SYSTEM

AUTHOR :

VISHAL ABHINAV [1AM20MC103]
MANOJ K S [1AM20MC052]

REPORT

ABSTRACT

This report presents a novel approach towards effective irrigation system. The prepared system comprised of an Arduino, moisture sensors, submersible water pump, and relay mechanism. The two moisture sensors sense the condition of dryness of soil at two different places on the field feed the signal to Arduino system will take the inputs from both the sensors and based on that it will decide how much water should be supplied. This system will continue to take the inputs from the sensors until there is sufficient amount of moisture in the soil and then it will automatically turn the pump off. This irrigation system will reduce the hardship of farmers, save the time and enhance accuracy and effectiveness in relatively minimal cost.

Watering is the most important cultural practice and most labor intensive task in daily greenhouse operation. Watering systems ease the burden of getting water to plants when they need it. Knowing when and how much to water is two important aspects of watering process. To make the gardener works easily, the automatic plant watering system is created. There have a various type using automatic watering system that are by using sprinkler system, tube, nozzles and other. This system uses Arduino UNO board, which consists of ATmega328 microcontroller. It is programmed in such a way that it will sense the moisture level of the plants and supply the water if required. This type of system is often used for general plant care, as part of caring for small and large gardens. Normally, the plants need to be watered twice daily, morning and evening. So, the microcontroller has to be coded to water the plants in the greenhouse about two times per day. However for most people it becomes challenging to keep them healthy and alive. This system automation is designed to be assistive for the University Park. This system hopes that through this prototype people will enjoy having plants without the challenges related to absent or forgetfulness.

Keywords : Arduino, irrigation, moisture, sensor, soil

1. INTRODUCTION

Arduino is an open-source electronics electronic platform based on easy-to-use hardware and

software. Arduino boards are able to read inputs- light of sensor, a finger on a button, or a Twitter messages,- and turn it into an output- activating on a motor, turning on an LED, publishing something online. Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of markers has gathered around this open-source platform, their contributions have add to up an incredible amount of accessible knowledge that can be of great help to novices and experts alike. Arduino was born at the Lvrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT application, wearable, 3D printing, and embedded environments. All arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The software too, is open-source, and it is growing through the contributions of users worldwide. In developing countries the economy is highly based on agriculture but we lack in proper utilization of resources available to us. This is mainly because of the unplanned use of water for irrigation. Although there are many modern irrigation techniques like drip irrigation and sprinkler irrigation farmers have to visit the farms in person regularly in order to water their crops. i.e. it is manually controlled. All these problems results in wastage of human and agricultural resources as well as time. Hence, there is a need for making an automatic irrigation system. Literature reports different techniques implemented for automatic irrigation systems

1.1 PURPOSE

The automatic irrigation system shows a well established combination of Arduino Uno, Soil Moisture Sensor,
Water Pump and their interconnection. This system has been designed to achieve the following properties:

- To increase the production by using better irrigation system.
- To manage the water supply for proper cultivation of plants.
- To reduce man power.
- To take proper action regarding the condition of the soil through the proposed system.

1.2 CONTRIBUTION

In this project of automatic water irrigation system, we have used two moisture sensors which will read the moisture value of the soil by taking its resistance value. We have used the sensors in analogue mode so it will read the values from 0-1024. Then we have taken mean of the values read by both the sensors, which will be then compared to the threshold value. The threshold values are

decided by testing the sensors several times which are shown in table no.1. if the value read by the sensors satisfies the condition for dryness, the relay will turn on water pump. If the value read by the sensor satisfies the condition for wetness, the relay will turn off the water pump.

2. SYSTEM REQUIREMENT

2.1 ARDUINO

The Arduino uno is a microcontroller which is based on the ATmega328 datasheet. It has 14 digital inputs /output pins. It is an open source microcontroller which is used to control relay, simply connect to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. It is large assortment of included libraries for interfacing to wide range of hardware. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip.

ARDUINO UNO BOARD

2.2 RELAY

One-channel relay board which operates on 5-6V is used here. The relay board consists of three pins which are normally open (NO), normally closed (NC) and common (C). The common pin is connected to NC pin when the relay is off and to the NO pin when the relay is on. The input pin receives logic high from Arduino Uno and in turn switches on the relay, thus common are connected to NO which turns the device on till the relay is on. The “VCC” and “GND” pins of the relay are connected to 5V supply and ground respectively.

Figure: 6 5V Relay Terminal and Pins

RELAY 5V

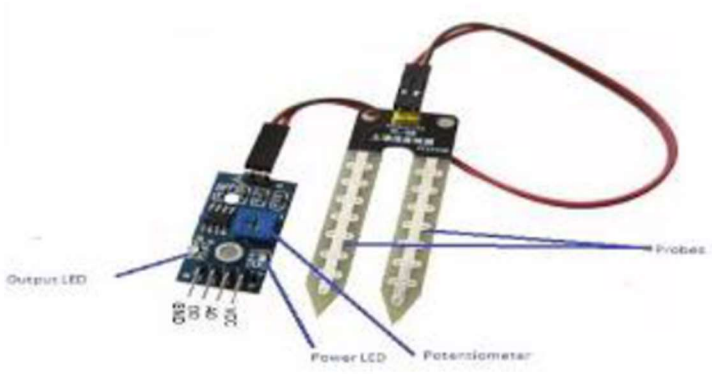
2.3 DC SUMMERSABLE WATER PUMP

The water pump is used to artificially supply water for a particular task. It can be electronically controlled by interfacing it to a microcontroller. It can be triggered ON/OFF by sending signals as required. The process of artificially supplying water is known as pumping. There are many varieties of water pumps used. This project employs the use of a submersible water pump which is connected to power supply through relay.

DC SUMMERSABLE WATER PUMP

2.4 SOIL MOISTURE SENSOR

A soil moisture sensor measures the water content in soil by measuring the dielectric permittivity of the soil as a function of water content. The volumetric water content is measured by the soil moisture sensor indirectly by properties like electrical resistance and dielectric constant. Using this we can reduce manpower, save water to improve production and gravimetric method



SOIL MOISTURE SENSOR

2.5 BATTERY

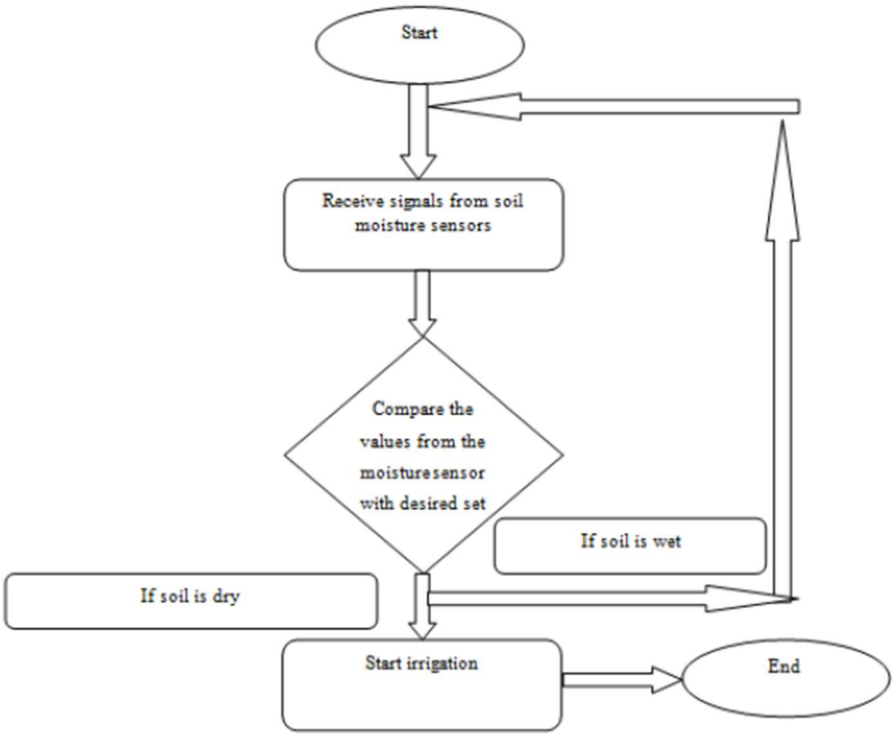
The **nine-volt battery**, or **9-volt battery**, is a common size of battery that was introduced for early transistor radio. It has a rectangular prism shape with rounded edges and a polarized snap connector at the top. This type is commonly used in **smoke detector, gas detector , kid toy , clock** and effect unit. The nine-volt battery format is commonly available in primary carbon-zinc and alkaline chemistry, in primary lithium iron disulfide, and in rechargeable form in nickel-cadmium, nickel-metal hydride and lithium-ion. Mercury-oxide batteries of this format, once common, have not been manufactured in many years due to their mercury content. Designation for this format include *NEDA 1604* and *IEC 6F22* (for zinc-carbon) or MN1604 6LR61 (for alkaline). The size, regardless of chemistry, is commonly designated **PP3**—a designation originally reserved solely for carbon-zinc, or in some countries, E or E-block

BATTERY 9V

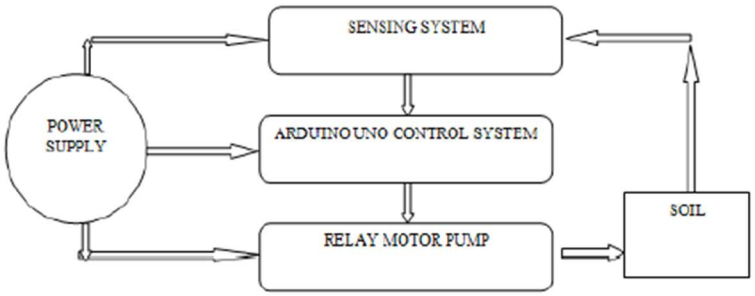
3. FLOW CHART AND WORKING

The Fig depicts the flow chart of automatic water irrigation system. The Arduino Uno is a link between the soil moisture sensor and pumping motor. Arduino is supplied with a power of 7V to 12V. The pump motor is given a separate supply of 9V. The soil moisture sensor is used in this project because it has to check soil moisture to measure the electrical conductivity of soil. The moisture sensor provides an analogue output which can be easily interfaced with Arduino. In this project two sensors are connected to analogue pins A0 and A1 of the Arduino board. The system receives a signal from the soil moisture sensor and compares with the preset threshold value. If the value detected by the sensor is below the threshold value, the Arduino sends a message signal to the motor to fetch water. But when the value detected by the sensor is above the pre set value, the motor doesn't rotate. The Arduino always accepts the signal from the sensor and keeps updating its data [1].

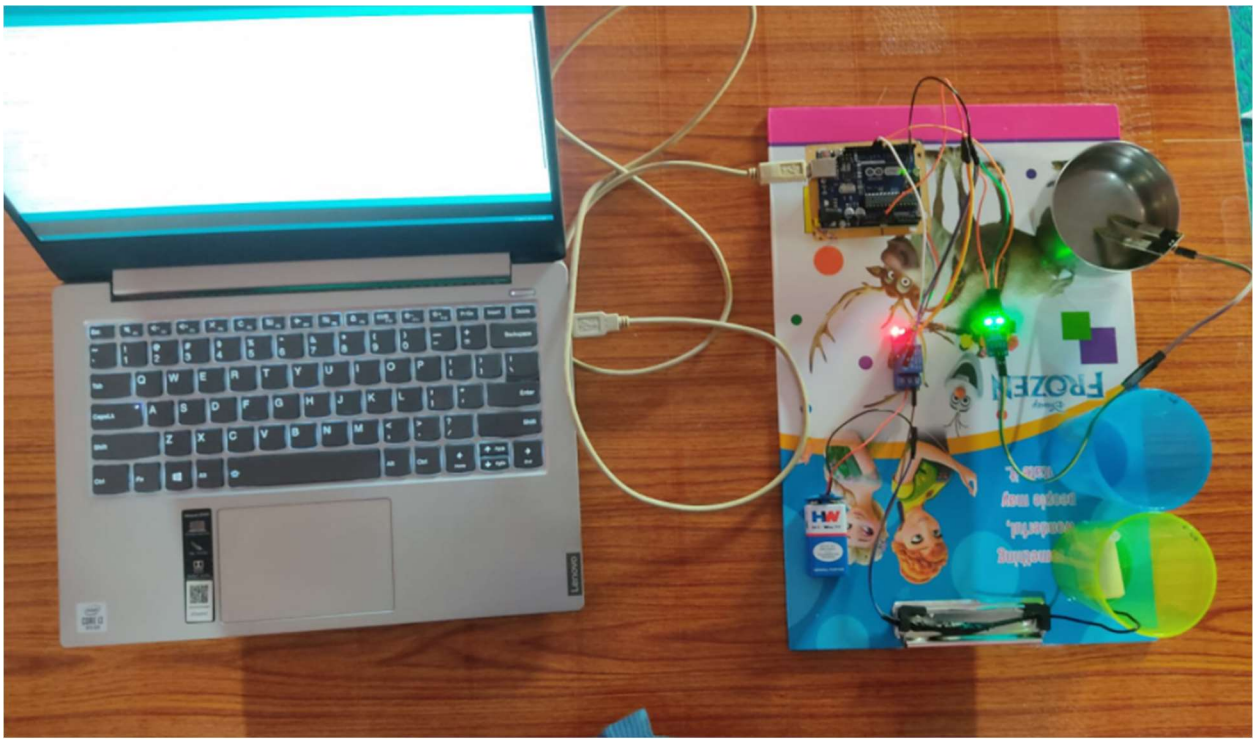
Fig. shows the irrigation system while Fig. shows the circuit diagram of the system.



FLOW CHART OF WORKING OF IRRIGATION SYSTEM



BLOCK DIAGRAM OF IRRIGATION SYSTEM



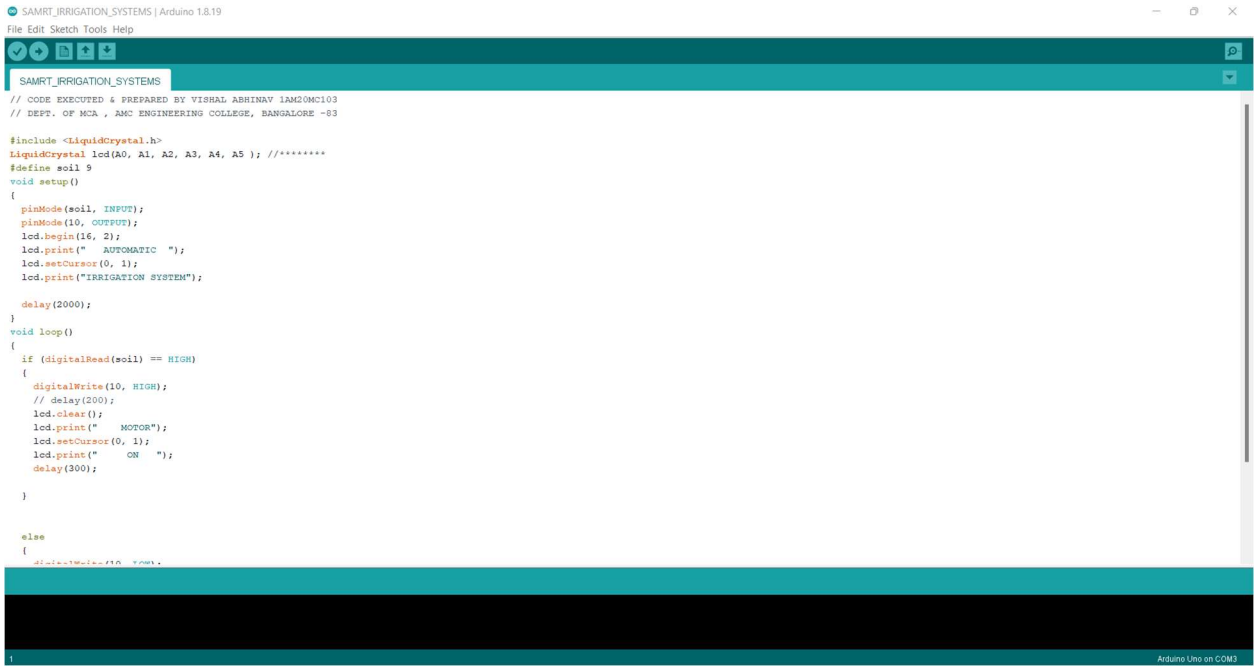
CIRCUIT DIAGRAM

4. RESULTS AND DISCUSSIONS

The system was tested for black and red soil under the dry and wet conditions. Using these results a maximum value for the dryness of the soil is set that is 1023 and minimum value is 300. Maximum value is taken as 1023 since the soil moisture sensor can measure value up to this. So, if the measured value by the sensor is between 1023 to 300 the motor will turn on automatically and initiates supply of water to the crops. However, if the measured value is less than 300 it implies that the soil is wet and hence the motor remains off and no water is supplied to the crops. The Fig.

provides readings obtained on computer screen by for wet red soil while Fig: Readings obtained for dry red and black soil whereas Fig.7 gives obtained readings for wet black soil.

5. CODE & TEST EXECUTION



6. CONCLUSIONS AND FUTURE SCOPE

The Arduino based automatic irrigation system is simple and precise way of irrigation. Hence, this system is very useful as it reduces manual work of the farmers and also helps in the proper utilization of resources. It eliminates the manual switching mechanism used by the farmers to ON/OFF the irrigation system. This project can be extended to greenhouses where manual supervision is less. Fully automated gardens and farm lands can be created using this principle in the right manner on large scale.

7. ACKNOWLEDGMENT

I [VISHAL ABHINAV] express my heartfelt gratitude towards my mentor Mrs. LOVELY SAJI MA'AM for guiding me to accomplish such a great work. I offer my sincere appreciation towards the Head of Department, AMC ENGINEERING COLLEGE [DEPT. OF MCA] AFFLIATED FROM VISHVESVARYA TECHNOLOGICAL UNIVERSITY for giving me such a chance to gain a wider view of knowledge.

8. REFERENCES

[1] G. Dearib, Cooperative Automatic Irrigation System using Arduino. *International Journal of Science and Research 6(3)* 2017, 1781-1787.

[2] S. Rakshak , Prof. R. W. Deshpande, Automated Irrigation System Based on Arduino Controller Using Sensors. ***International Journal of Innovative Research in Computer and Communication Engineering 5(7)***, 2017, 13394-13400.

[3] H.T Ingale, N. Kasat, Automated Irrigation System", *Proceedings of the International Journal of Engineering Research and Development*, *4(11),* 2012.