# A
# Project Report
# On
# "SMART PLANT WATERING SYSTEM"

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## CERTIFICATE

This is to certify that the report entitled "**Smart Plant Watering System**" is a bonafied work carried out by **Hetanshi Kothari(18DIT029), Tanushree Kurup(18DIT030),Aditi Patel(18DIT044)** under the guidance and supervision of **Assistant Prof.Chintal Raval** for the subject **IT246 Software Group Project III** (IT) of 4th Semester of Bachelor of Technology in **DEPSTAR** at Faculty of Technology & Engineering – CHARUSAT, Gujarat.

To the best of my knowledge and belief, this work embodies the work of candidate himself, has duly been completed, and fulfills the requirement of the ordinance relating to the B.Tech. Degree of the University and is up to the standard in respect of content, presentation and language for being referred to the examiner.

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# ABSTRACT

In daily operations related to farming or gardening watering is the most important practice and the most labor-intensive task. No matter whichever weather it is, either too hot and dry or too cloudy and wet, you want to be able to control the amount of water that reaches your plants. Modern watering systems could be effectively used to water plants when they need it. But this manual process of watering requires two important aspects to be considered: when and how much to water. In order to replace manual activities and making gardener's work easier, we have created automatic plant watering system. By adding automated plant watering system to the garden or agricultural field, you will help all of the plants reach their fullest potential as well as conserving water.For implementation of automatic plant watering system, we have used combination of motor and pipe.Generally, plants need to be watered twice a day, morning and evening.. All these notifications are made through mobile application. The process starts from the detection of soil moisture by the sensor. If soil moisture value is detected on less than 55%, then the device activates the watering function by turning on the pipe .When the soil moisture is detected more then 55% , the device stops the watering function. We hope that through this prototype we all can enjoy having plants, without being worried about absent or forgetfulness.

# ACKNOWLEDGEMENT

We take this opportunity to express our profound gratitude and deep regards to our guide for their exemplary guidance, monitoring and constant encouragement throughout the course of this thesis. The blessing, help and guidance given by them from time to time shall carry us a long way in the journey of life on which we are about to embark. We also take this opportunity to express a deep sense of gratitude to University for cordial support, valuable information and guidance, which helped us in completing this task through various stages.

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# 1.INTRODUCTION

We all know that plants are very beneficial to all human beings in many aspects. Plants helps in keeping the environment healthy by cleaning air naturally and producing oxygen. Many people love to have plants in their backyard. But due to civilization and insufficiency of place many people used to grow plants in a mold or dirt, pot, and placed on the windowsill. These plants are dependent on conventional breeding - watering, and provide the right amount of sun to sustain life and growth. In busy schedule of day to day life, many time people forget to water their plants and due to these plants suffers many disorders and ultimately died. In addition, the world's biggest problem in modem society is the shortage of water resources, agriculture is a demanding job to consume large amounts of water. It is very essential to utilize the water resources in proper way.

- Thus, a system is required, to handle this task automatically. Automated plant watering system estimate and measure the existing plant and then supplies desired amount of water needed by that plant. It is minimizing the excess water use as well as keeping plants health.

# 1.1 Project Overview

## 1.1.1 Project Definition

The Smart plant watering system is an IoT based device which is capable of automating the watering process by analyzing the moisture of soil.
It will monitor the status of soil through sensors and provide signal for taking necessary actions.

## 1.1.2 Description

Powered by an Arduino UNO, it uses on-board tools along with a moisture sensor to calculate optimum conditions for watering plants in its own environment, and then waters the plant itself at the calculated time.

- We are using such a plant which will require a soil moisture of about 50-55%. So, when the soil loses its moisture to less than 50% then Motor pump will turn on automatically to sprinkle the water and it will continue to sprinkle the water until the moisture goes upto 55% and after that the pump will be turned off.

# 1.2 OBJECTIVE

The purpose of the project is to implement conventional irrigation methods use a lot of water, and needless to say, a lot of it is wasted on a daily basis. With the help of advanced methods of irrigation, which should ideally use just the correct amount of water needed for the plants, we could save a considerable amount of water. With the help of soil moisture sensors, we could use just the right amount of water needed for irrigation.

The main objective is to save water and reduce human intervention in the agriculture field. Continuously Monitoring the status of sensors and provide

signal for taking necessary action and to get output of soil water sensor and provide water to crop.

## 1.3 SCOPE OF SYSTEM

The Smart plant watering system has wide scope to automate the conventional system. Here we are building an IoT based plant watering System using ESP8266 NodeMCU Module and moisture Sensor. It will not only automatically irrigate the water based on the moisture level in the soil but also send the Data to device to keep track of the soil condition.

- The System will consist a water pump which will be used to sprinkle water on the soil depending upon the moisture of the soil.
- As technology is advancing, there is always a chance of reducing risks and making work simpler. Embedded and micro controller systems provide solutions for many problems. This application precisely controls water system for gardens by using a sensor micro controller system. It is achieved by installing sensors in the field to monitor the soil temperature and soil moisture which transmits the data to the microcontroller for estimation of water demands of plants.

# 2. HARDWARE AND SOFTWARE REQUIREMENTS

## 1. HARDWARE:

- Arduino Uno

- NodeMCU ESP8266

- Soil Moisture Sensor

- Relay Module

- 5v DC motor

## 2. SOFTWARE:

- Arduino IDE

## 2.1 Hardware Specifications

### ● Arduino Uno

Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input / output pins (of which 6 can be used as PWM outputs), 6 analog inputs, 16 MHz ceramic resonator, USB connection, power jack, ICSP plug, and a reset button. It contains everything needed to support the microcontroller; simply use the USB cable or power it with a AC-to-DC adapter or battery is connected to a computer begins.



**Fig 1 Arduino Uno**

● **Breadboard Definition**

Breadboard is a plastic board for holding wires and electronic segments such as transistors and resistors
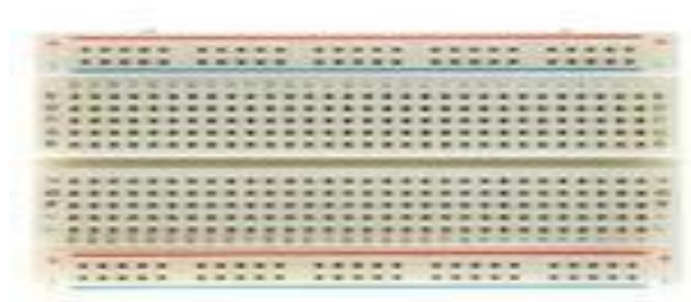


**Fig 2 Breadboard**

• **Soil Moisture Sensor**

The soil moisture sensor comprises of two tests that are utilized to the degree the volumetric substance of water. The two tests permit the current to pass through the soil, which gives the resistance esteem to the degree the dampness esteem. When there is water in the soil there will be less resistance and the soil will handle more power. But if the soil is dry it conduct power weekly and needs less power and more resistance. [21].
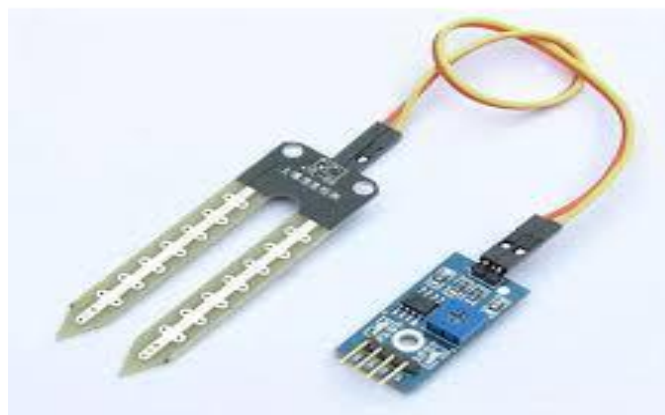


**Fig 3 Soil Moisture Sensor**

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- **Water Motor**

It is used in this project to motor the water needed for irrigation from the main water tank through pipes. This motor can be used for different applications. This motor is selected for this project because it has good advantages. Such as, it has a lightweight. Also, it has a small size, so it is easy to install and replace it. Furthermore, it has an enough efficiency to motor water for irrigation. Since it operates in 5 volts, so it consumes lower power. In addition, this motor has a very Low of noise. Finally, the cost of this motor is very cheap.

**Fig 4 water motor**

- **The Relay Module**

Relay is an electrically operated switch. Many relays for switching solenoid mechanism mechanically operated, but can also be used for other principles of operation. Relays are widely used in early computers to telephones and perform logical operations.

**Fig 5 Relay Module**

## 2.2 Software Specifications
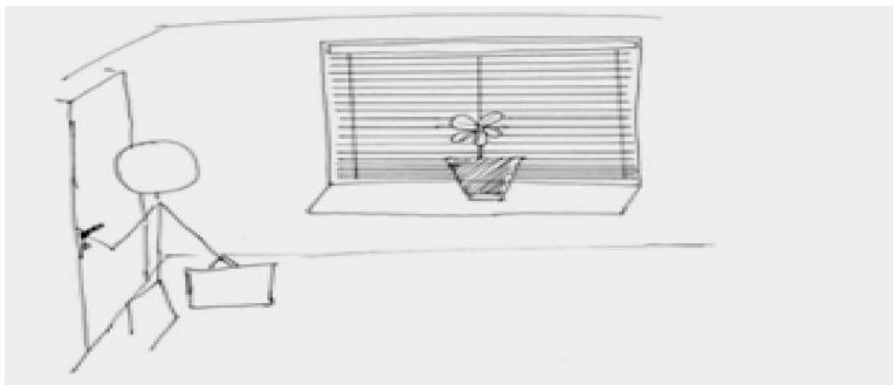
- **Arduino IDE Tool**

Arduino open-source environment, you can easily write code and upload it to the 110 board. It runs on Windows, Mac OS X and Linux. Environment is written in Java, and according to the processing, AVC-GCC, as well as other open source software.

# 3.PROBLEM STATEMENT

During day to day activities many people often forget to water their plants and thus it becomes challenging for them to keep their plants healthy and alive. Also, it is a challenge for farmers to maintain their fields and manage watering of plants during shortage of water. Based on the above background, we thought that it is necessary to implement the automated system which will take care of plants considering all the different aspects of home gardening system as well as larger landscape and helps them to grow healthy. We also believe that technology can help people in cultivating plants, not just by automation but also through digital communications. Therefore, our project aims to implement a simple system, using automatic irrigation, watering a small potted plant or crop with minimal human intervention.
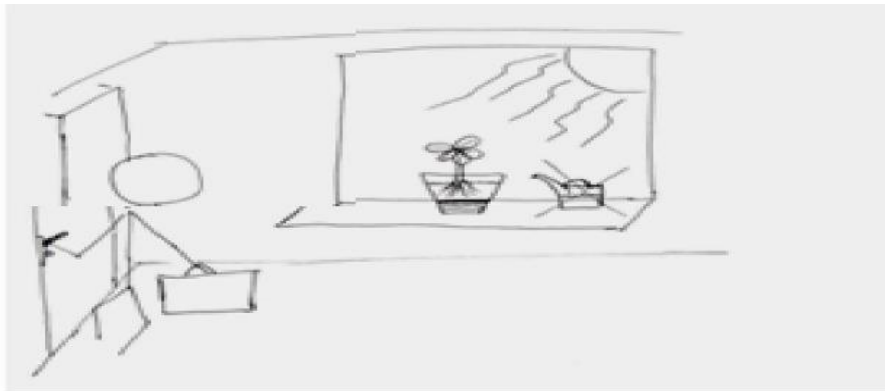


**Fig. 1: Illustrate the scenario when owner negate to water a plant**



**Fig. 2: Illustrating scenario where closed binds the necessary sunlight**

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# 4. **MAJOR FUNCTIONALITY**

There are two functional components in this report. They are moisture sensor and motor . Arduino board is programmed using the Arduino IDE software. Motor is used to supply water to plants. Soil moisture  predetermined range is set particularly for specific plants requirement, and according to that system is being operated.   In case of soil_moisture value is less than threshold system automatically triggers water pump on till sensor meets threshold and then sets off automatically. The overall activity is reported to the user using mobile application.
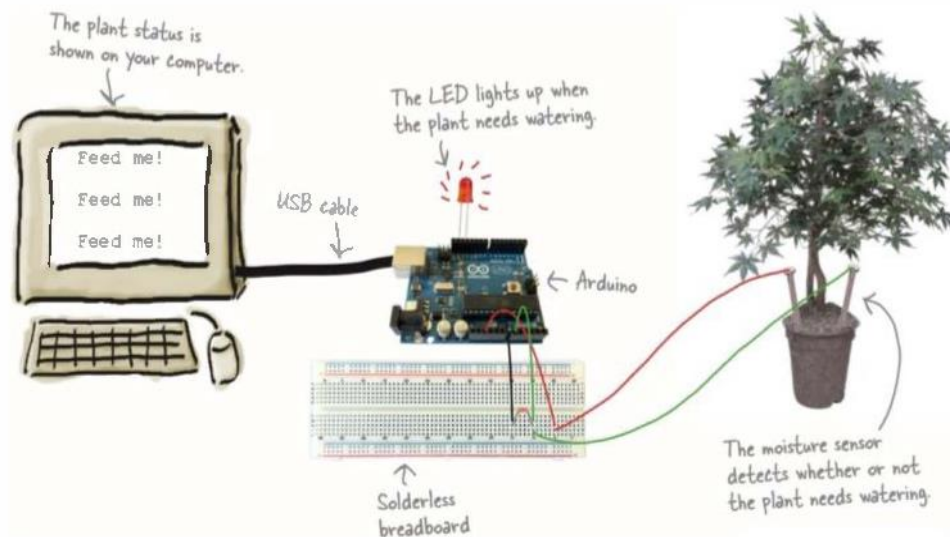
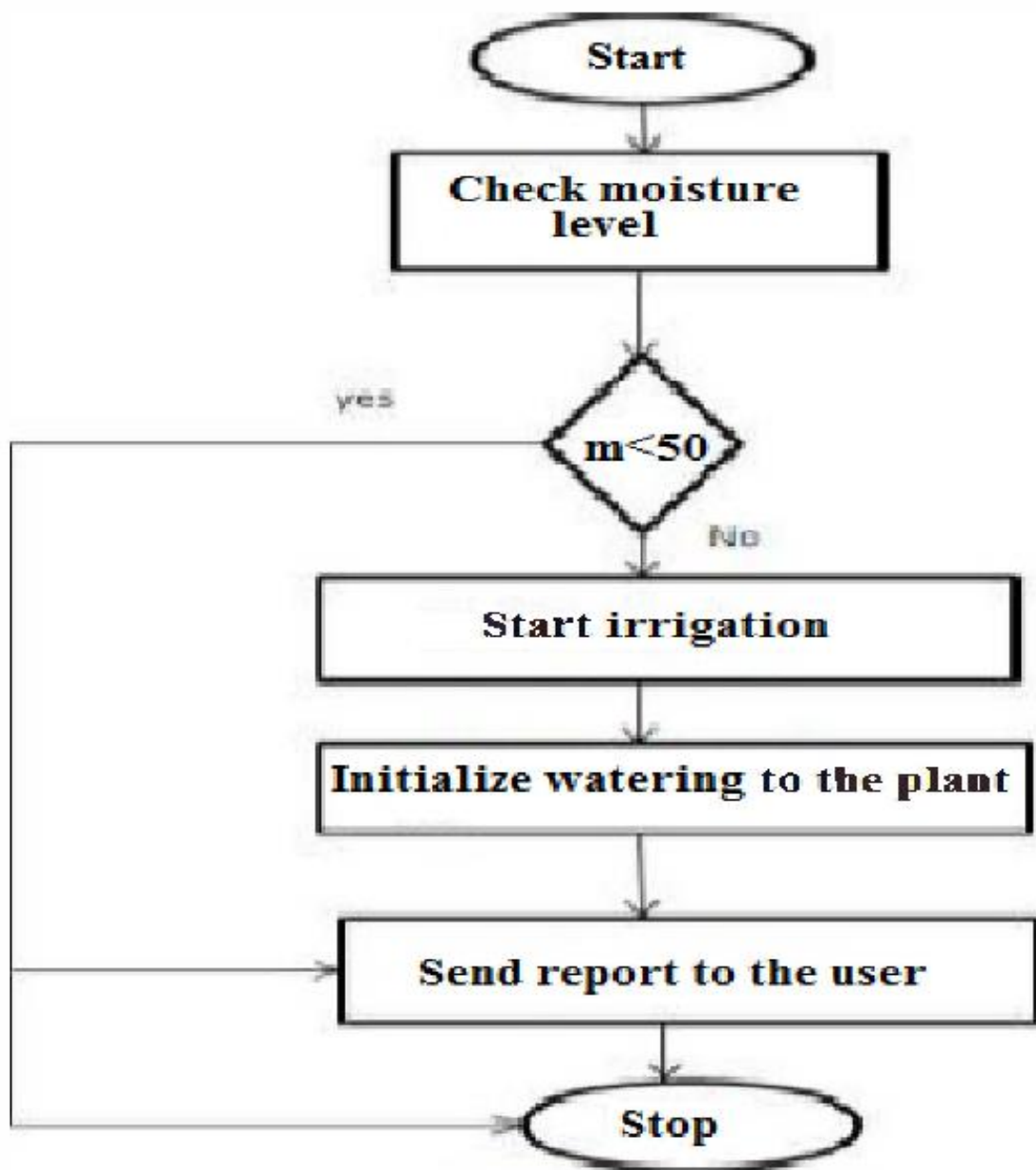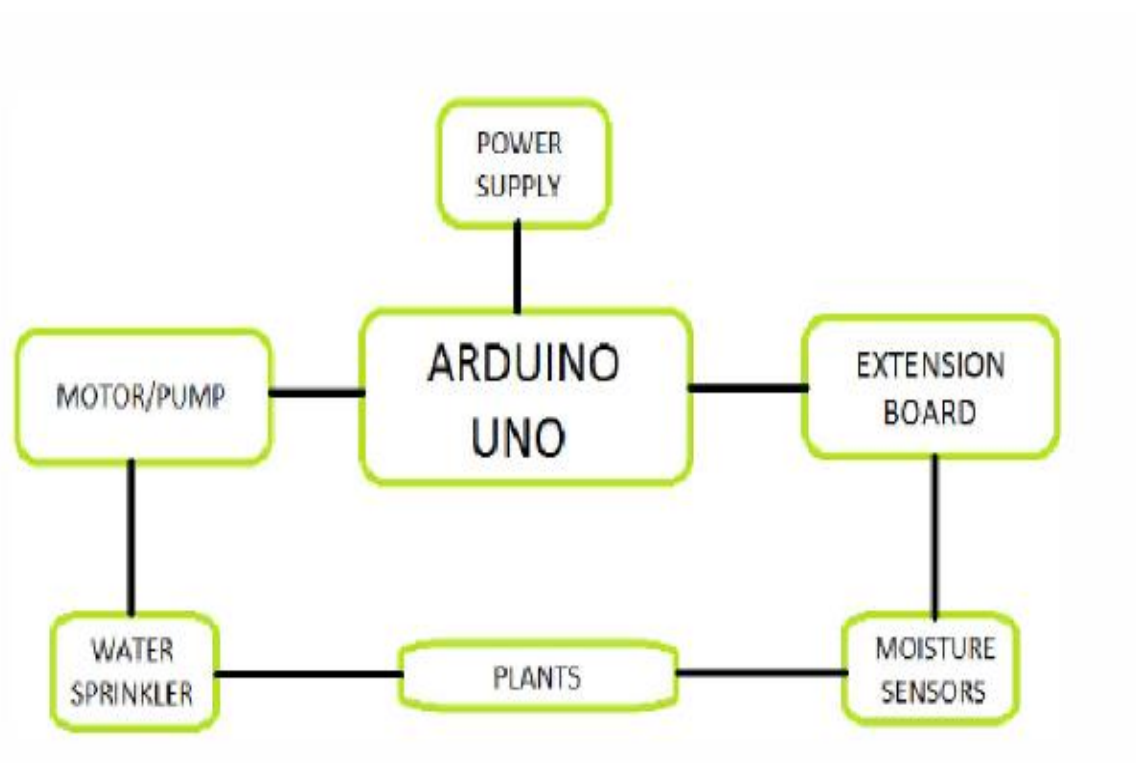**Fig 1 real time view of plant watering system**

# 5. System Flow Chart



**Fig 1: flowchart of plant watering system**
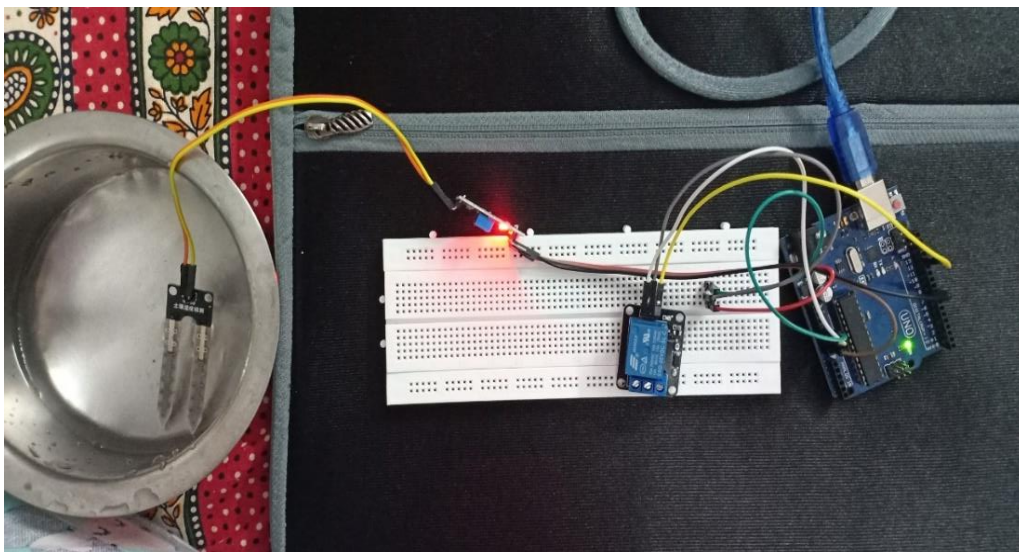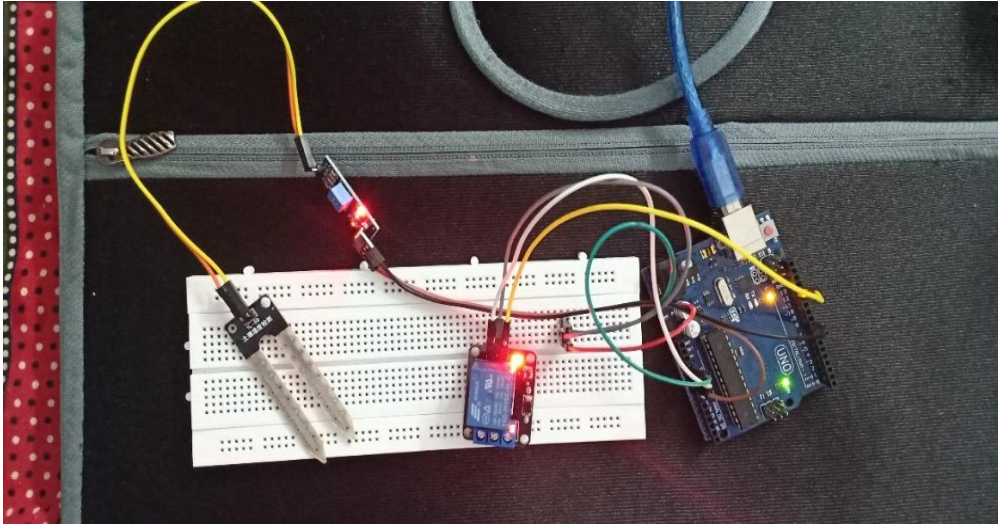
## 5.1 Block Diagram:

This section elaborates the assessing and controlling of the moisture content in the soil. The hardware and software implementation are discussed here below. The block diagram shows the flow of how the complete process is carried out



**Fig 1:block diagram of plant watering system**

# 6. IMPLEMENTATION

# 7. LIMITATION

Some of the limitations of smart plant watering system are:

- Lack of accuracy in sandy soil due to their large particles.
- Need of water for different soil are different, so it should be calibrated each time
- Depends on Internet connectivity.

# 8. FUTURE ENHANCEMENT

With the result of the project first step in the future will be to transfer this project to large scale. Also, to control system via Zig Bee instead of wire connection. Moreover, to create more responsive mobile application which have more controlled data. We can develop this system by using renewable energy which is solar power instead of batteries using solar energy will help to reduce future cost.

# 9. PROJECT OUTCOMES

- This project has a high social impact, in moderating the use of water.
- Over-watering and under-watering affect the crop so proper amount of water should be supplied. By analyzing the soil parameters system waters, the soil. So, by this wastage of water reduced.
- We can keep a track of the water requirements of our plants.
- We can water their plants from anywhere in the world just by a single click on your device

# 10. REFERENCE

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