Smart water Management

OBJECTIVE :

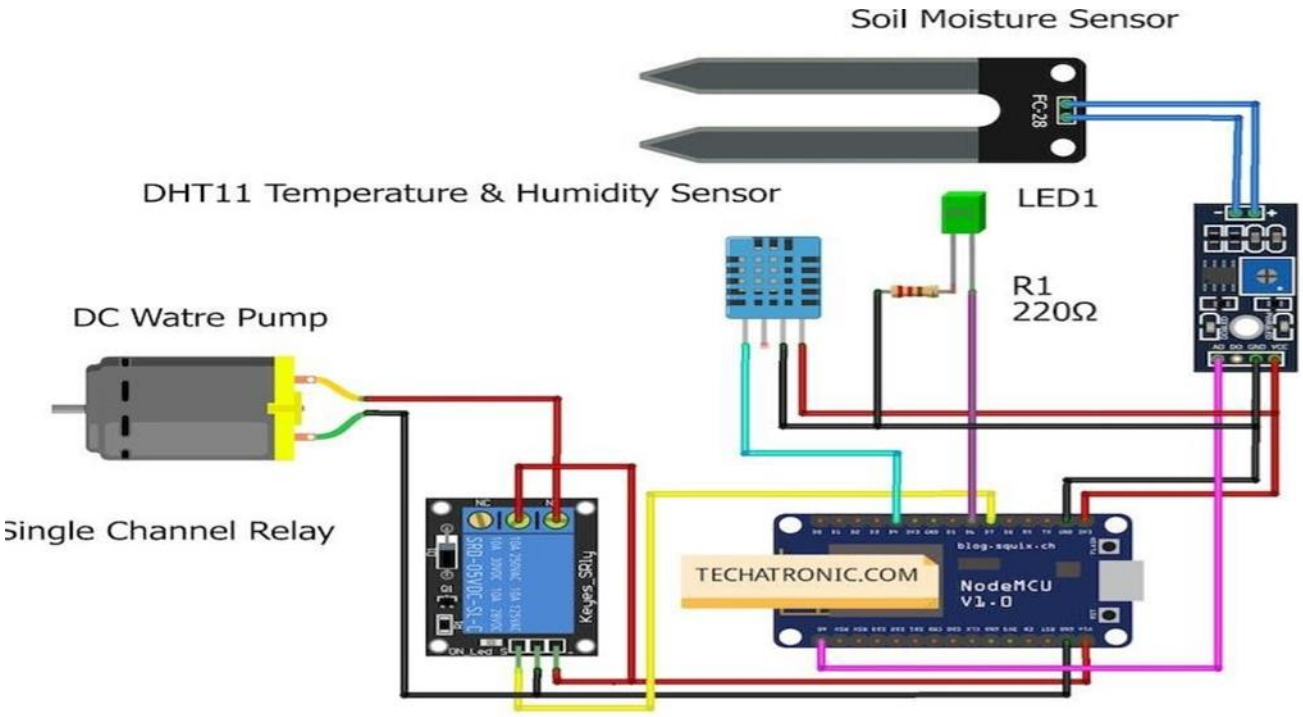
Water is a **valuable resource**, and water shortages are a serious problem in many parts of the world. The problem can be made worse by people who waste water; for example, by watering a garden or using sprinklers on their lawn.

We interfaced the ESP32 with **a moisture sensor, temperature sensor, air humidity sensor, water flow sensor, and solenoid valve**. Using the data from these sensors, the **ESP32** determines when to open the solenoid valve. The solenoid valve controls the flow of water into the pipes of the drip irrigation system. And these informations are displayed on a mobile app developed using the Blynk framework.

COMPONENTS USED:

- ✓ DHT 11 sensor
- ✓ Soil moisture sensor
- ✓ Gsm Modem
- ✓ Ultrasonic Sensor
- ✓ Humidity and Temperature Sensor
- ✓ Adaptor
- ✓ Connecting Jumper
- ✓ Peristalic Pump

CONNECTED COMPONENTS:



ESP32 :Here We just Show the Pin Diagram Of The ESP32 Board On the Right Show All Digital GPIO Pins available.

DHT11 Sensor :It Measuring The Temperature And Humidity

Soil Moisture Sensor:Soil Moisture Sensor is measuring the soil water level in the earth and is send data to Blynk App.

Water Pump:Having same use as water pump.

MOBILE APP DEVELOPMENT:

BLYNK:

Blynk is an IoT platform that helps in creating mobile apps for controlling andmonitoring hardware devices. It offers a user-friendly interface, cloud connectivity,and a wide range of compatible hardware.

CODE FOR CONNECTING WOKWI WOTH BLYNK:

```
#define BLYNK_TEMPLATE_ID "TMPL3KFWULFfu"
#define BLYNK_TEMPLATE_NAME "smart irrigation system"
#define BLYNK_AUTH_TOKEN "zP1pJ2Bpp2_qX0IIKeF-zryDpdJA-ZsQ"
#include "RTClib.h"
#include "DHT.h"
#define DHTPIN 8
#define DHTTYPE DHT22
DHT dht(DHTPIN, DHTTYPE);
#include <LiquidCrystal_I2C.h>
#define I2C_ADDR    0x27
#define LCD_COLUMNS 20
#define LCD_LINES   4

LiquidCrystal_I2C lcd(I2C_ADDR, LCD_COLUMNS, LCD_LINES);
String data;
int relay1 = 3;
int relay2 = 4;
int relay3 = 5;
int relay4 = 6;
RTC_DS1307 rtc;
char daysOfTheWeek[7][12] = {"Sunday", "Monday", "Tuesday",
"Wednesday", "Thursday", "Friday", "Saturday"};
void setup()
{ {
    Serial.begin(115200);
    Serial.println(F("DHT22 example!"));
    dht.begin();
```

```
  }
  {
    Serial.begin(115200);
    lcd.init();
    lcd.backlight();
    lcd.setCursor(3, 0);
    lcd.print("welcome to");
    lcd.setCursor(2, 1);
    lcd.print("SMART FARMING");
    delay(4000);
    pinMode(relay1, OUTPUT);
    pinMode(relay2, OUTPUT);
    pinMode(relay3, OUTPUT);
    pinMode(relay4, OUTPUT);
    Serial.println("welcome to my project");
    delay(500);
    if (! rtc.begin()) {
      Serial.println("Couldn't find RTC");
      Serial.flush();
      abort();
    }
    lcd.clear();
  }
}

void loop () {
  {
    float temperature = dht.readTemperature();
    float humidity = dht.readHumidity();
```

```
    // Check if any reads failed and exit early (to try
again).
    if (isnan(temperature) || isnan(humidity)) {
      Serial.println(F("Failed to read from DHT sensor!"));
      return;
    }
    Serial.print(F("Humidity: "));
    Serial.print(humidity);
    Serial.print(F("%  Temperature: "));
    Serial.print(temperature);
    Serial.println(F("°C "));
    lcd.setCursor(0, 3);
    lcd.print("temp:");
    lcd.println(temperature);
    lcd.setCursor(10, 3);
    lcd.print("hum:");
    lcd.println(humidity);
    delay(2000);
  }


  DateTime now = rtc.now();
  Serial.print("Current time: ");
  Serial.print(now.year(), DEC);
  Serial.print('/');
  Serial.print(now.month(), DEC);
  Serial.print('/');
  Serial.print(now.day(), DEC);
  Serial.print(" (");
```

```
Serial.print(daysOfTheWeek[now.dayOfTheWeek()]);
Serial.print(") ");
Serial.print(now.hour(), DEC);
Serial.print(':');
Serial.print(now.minute(), DEC);
Serial.print(':');
Serial.print(now.second(), DEC);
Serial.println();
Serial.println();
delay(3000);
lcd.setCursor(3, 0);
lcd.print("Time:");
lcd.print(now.hour(), DEC);
lcd.print(':');
lcd.print(now.minute(), DEC);
lcd.print(':');
lcd.print(now.second(), DEC);

if ((now.second() > 1) && (now.second() < 15))
{
  lcd.setCursor(0, 1);
  lcd.print("Relay1:ON ");
  Serial.println("relay1 is on");
  digitalWrite(relay1, HIGH);
}
else {
  lcd.setCursor(0, 1);
  lcd.print("Relay1:Off");
  digitalWrite(relay1, LOW);
```

```
}
if ((now.second() > 20) && (now.second() < 30))
{
  lcd.setCursor(10, 1);
  lcd.print("Relay2:ON ");
  Serial.println("relay2 is on");
  digitalWrite(relay2, HIGH);
}
else {
  lcd.setCursor(10, 1);
  lcd.print("Relay2:OFF");
  digitalWrite(relay2, LOW);
}
if ((now.second() > 35) && (now.second() < 45))
{
  lcd.setCursor(0, 2);
  lcd.print("Relay3:ON ");
  Serial.println("relay3 is on");
  digitalWrite(relay3, HIGH);
}
else {
  lcd.setCursor(0, 2);
  lcd.print("Relay3:OFF");
  digitalWrite(relay3, LOW);
}
if ((now.second() > 50) && (now.second() < 59))
{
  lcd.setCursor(10, 2);
  lcd.print("Relay4:ON ");
```

```
    Serial.println("relay4 is on");
    digitalWrite(relay4, HIGH);
  }
  else {
    lcd.setCursor(10, 2);
    lcd.print("Relay4:OFF");
    digitalWrite(relay4, LOW);
  }
}
```

EXPLANATION:

Setup:

- In the beginning, we include some libraries which are required in this project.
- Then we assign pins to which both sensors and relays are connected.

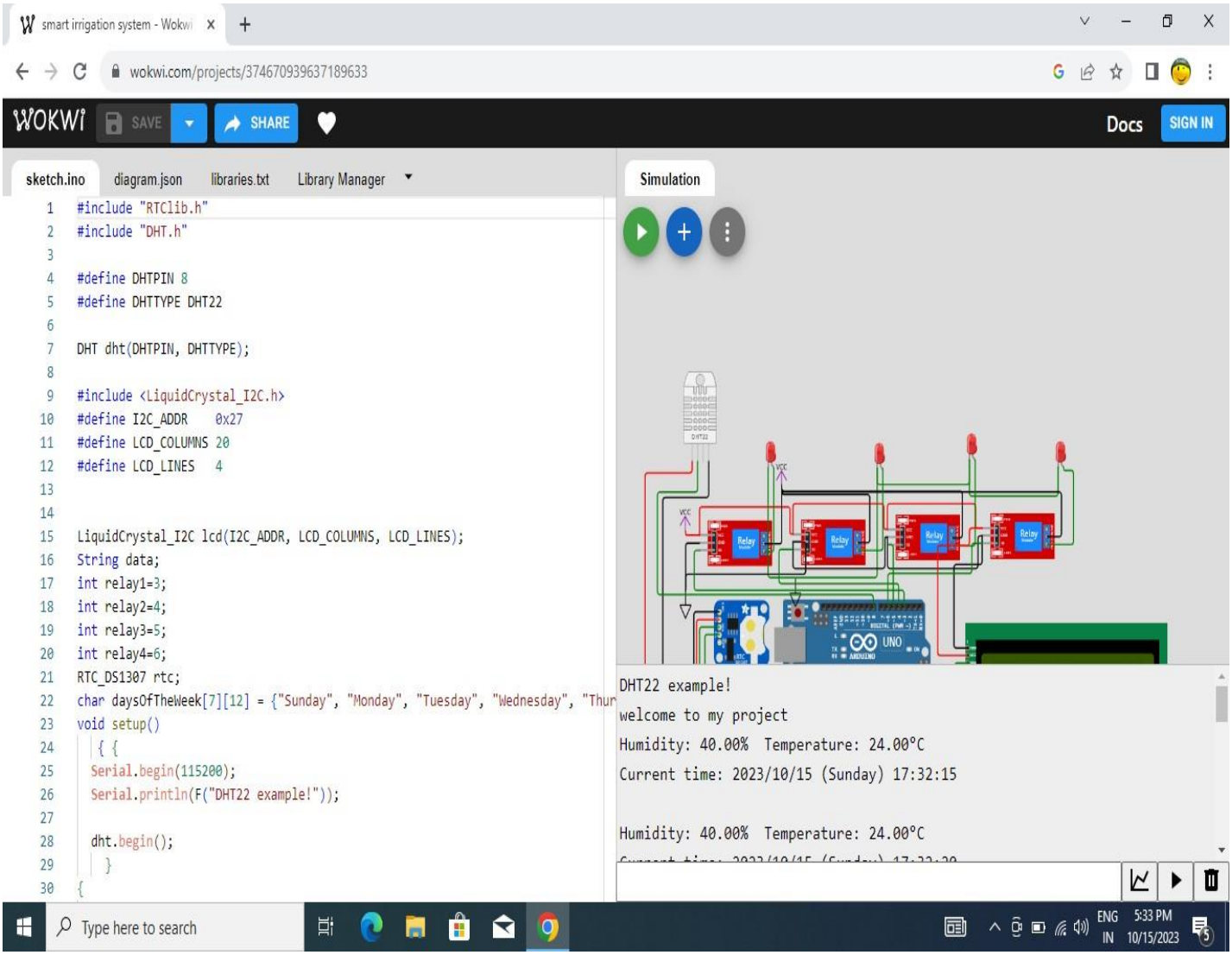
Loop:

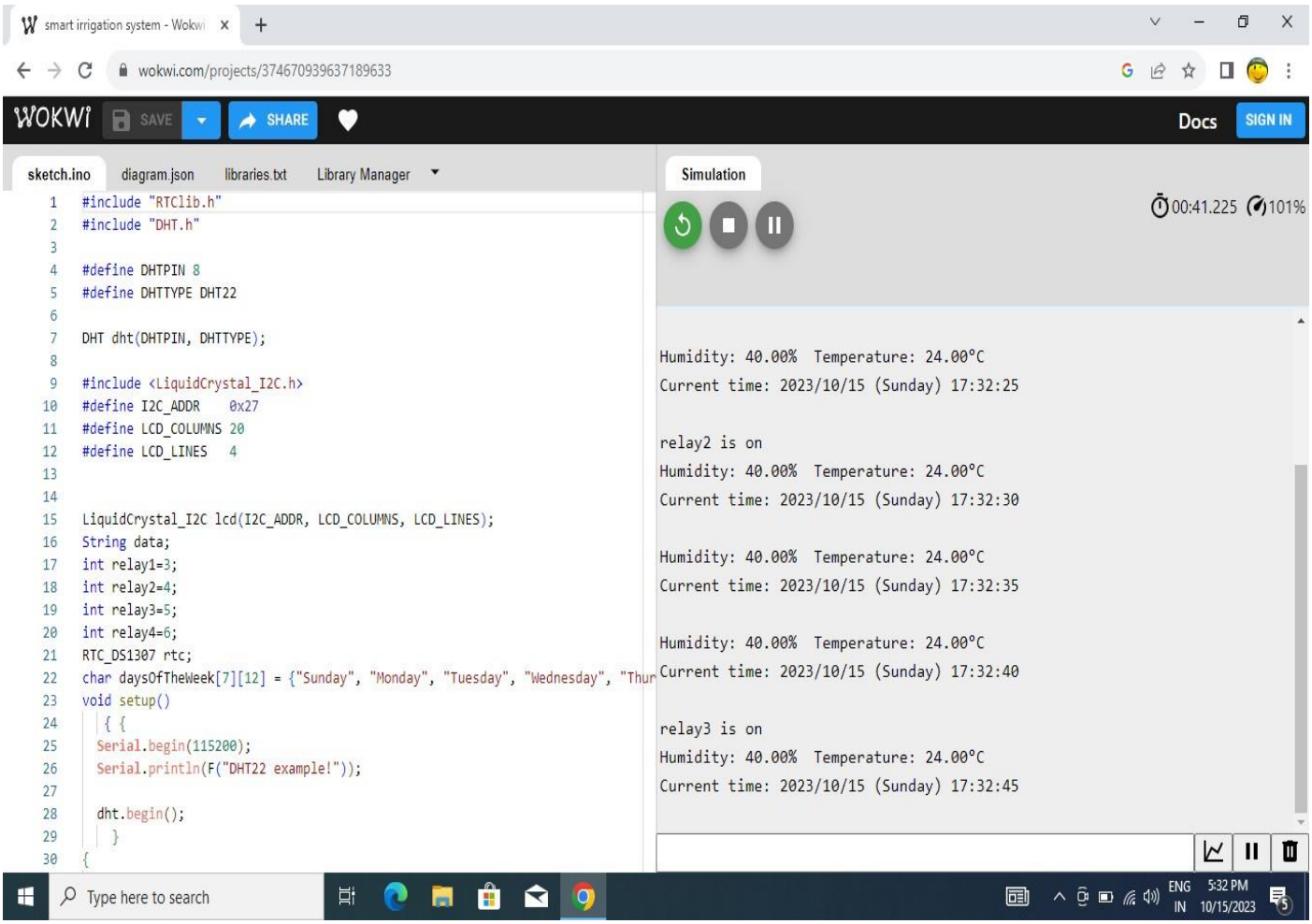
- And in loop we check the DHT11 sensor and read the value of temperature and humidity from it.
- Using Soil moisture sensor we check the moisture level of the soil.
- By using rtc.now(); we display the current time and date.
- The solenoid valve is opened whenever needed.

Display messages:

- It displays the current time and date,temperature(in °C),Humidity(in %) and Soil moisture level.

OUTPUT:

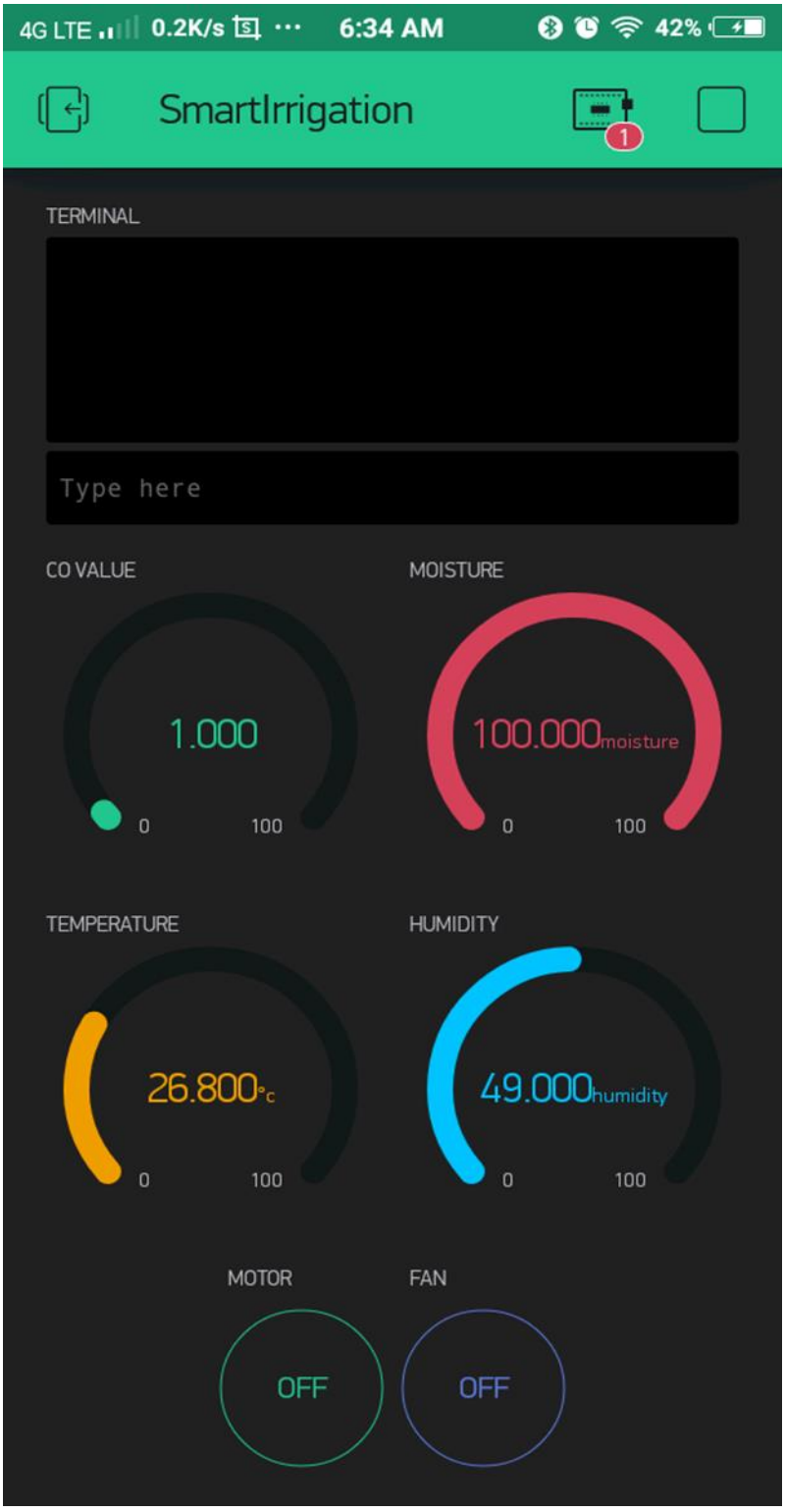

smart irrigation system - Wokwi
wokwi.com/projects/374670939637189633
WOKWI
SAVE
SHARE
Docs
SIGN IN
sketch.ino
diagram.json
libraries.txt
Library Manager
Simulation
#include "RTClib.h"
#include "DHT.h"
#define DHTPIN 8
#define DHTTYPE DHT22
DHT dht(DHTPIN, DHTTYPE);
#include <LiquidCrystal_I2C.h>
#define I2C_ADDR 0x27
#define LCD_COLUMNS 20
#define LCD_LINES 4
LiquidCrystal_I2C lcd(I2C_ADDR, LCD_COLUMNS, LCD_LINES);
String data;
int relay1=3;
int relay2=4;
int relay3=5;
int relay4=6;
RTC_DS1307 rtc;
char daysOfTheWeek[7][12] = {"Sunday", "Monday", "Tuesday", "Wednesday", "Thur
void setup()
{ {
Serial.begin(115200);
Serial.println(F("DHT22 example!"));
dht.begin();
}
{
DHT22 example!
welcome to my project
Humidity: 40.00% Temperature: 24.00°C
Current time: 2023/10/15 (Sunday) 17:32:15
Humidity: 40.00% Temperature: 24.00°C
Type here to search
ENG
IN
5:33 PM
10/15/2023



MOBILE APPLICATION:

- We've developed a mobile application that is designed to be user-friendly and accessible via smartphones, providing a simple interface for users.
- The ESP32 microcontroller is equipped with sensors to collect real-time data about Humidity,Temperature and soil moisture.
- Then connects to the mobile app through the Blynk platform, enabling real-time data communication.
- Users can easily get real-time data through their mobile app.

BLYNK OUTPUT:



BENEFITS OF SMART IRRIGATION SYSTEM:

- It helps in collecting information regarding the quality of soil, predicting weather conditions, and helping in the progress of the plantation.
- Smart devices help the user identify the irregularity in the crop more accurately and precisely.
- Hence the drip irrigation pump will pump outlimited water to the plants. It will pour the limited water for limited period of time .
- In the period of Drought this drip system will pour water that is sufficient toplants to grow.
- Hence, by installing this drip system we can conserve water as well asplants.