SYLHET ENGINEERING COLLEGE

Dept. of EEE

Microprocessor Interfacing Laboratory

EEE 606

Design of Arduino Based Automatic Agricultural Monitoring System For Optimum Use of Water and Other Elements in Agricultural Fields

Submitted To :
Md. Janibul Alam Soeb
Lecturer , Dept of FPM,
Sylhet Agricultural University

Submitted By :
MD. Soyabbir Abu Hanif
Reg: 2015338535
Shahjahan
Reg: 2015338531
MD. Jubaer Rahman
Reg: 2015338511
MD. Rifat Bhuiyan
Reg: 2015338509

1 ABSTRACT:

The project aim was to the study the intelligent soil moisture , control system in
agricultural green house based on Adruino Mega automation control. And monitoring the temperature and humidity of the environment. This kind of system helps to
control the moisture level of the field and supply the water if required. In this project embedding a control system into an automatic water pump controller depend upon
the moisture of the soil. The intelligent soil moisture control system in agricultural green house designed in the research had wonderful effort of man-machine interface, it is very simple, cheep and convenient high degree of automation system. Not only
that this system helps to prevent wastage of water. This system is a prototype, which makes this self-sufficient, watering itself from a reservoir.

2 INTRODUCTION:

Bangladesh is a country where majority of population are dependable on the agriculture . In this modern technological era farmers of Bangladesh cannot get enough assistance from others to help them with technology and make their work easier. This project made automatic monitoring and controlling system that can be utilize to improve the condition of farmlands . Arduino mega is the main controlling unit of whole system. This system performed the following task:

1. Supply water according to moisture level of soil.

2. Automatic starting ofwater pump to maintain proper moisture level of soil.

3. Monitoring of temperature and humidity of the environment .

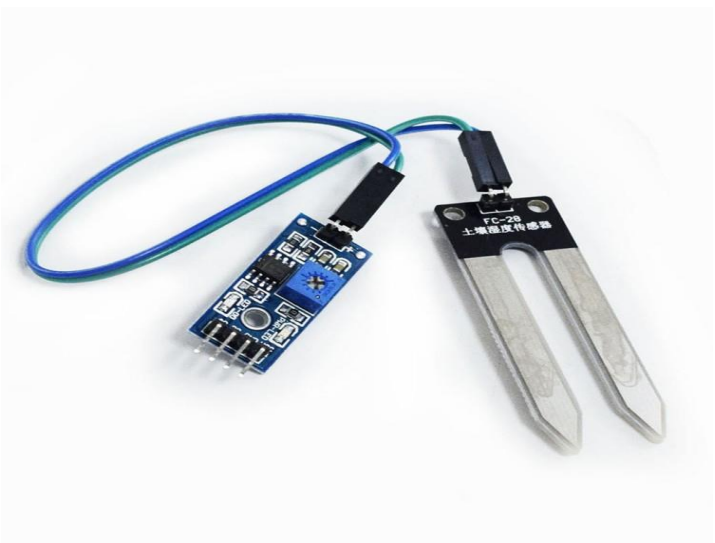
3 Hardware Requirements:

3.1. Arduino Mega 2560:

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

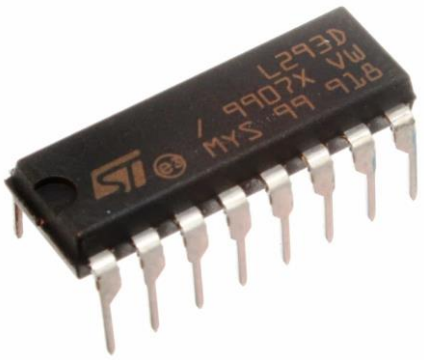
3.2 .Soil Moisture Sensor:

The soil moisture senses the moisture content in the soil and based on the value that
is showed on the display, according to the control circuit motor will be start ant it will pump the water with the help of a pump and the pumping actions will continue till it fulfils the conditions.



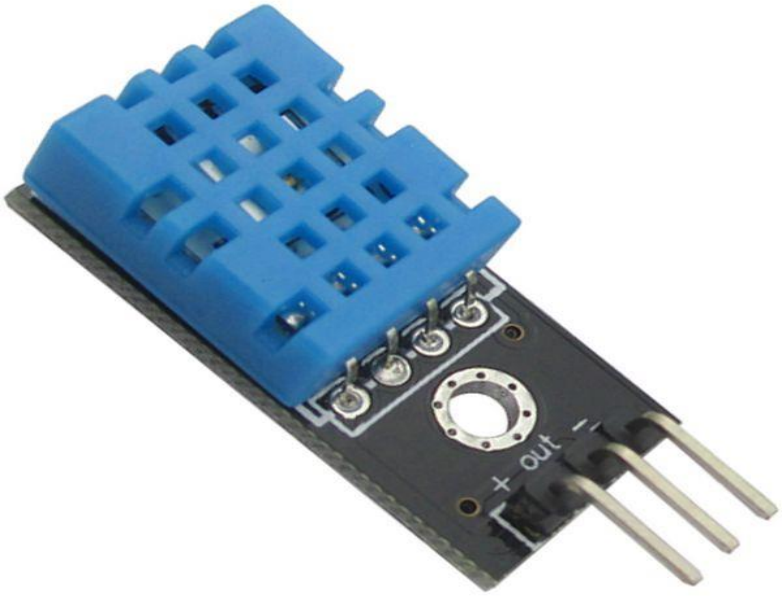
3.3. DC Motor & Driver IC:

There are a dc motor used in this project. It works only to help the pump to pump water into the soil when the moisture level of the soil shown in the monitor is below the rated level that has been set in microcontroller program. In this project L293D IC used for controlling the motor.



3.4.DHT11 Sensor:

The DHT11 sensor is used to sense the humidity and temperature of the environment of the area.

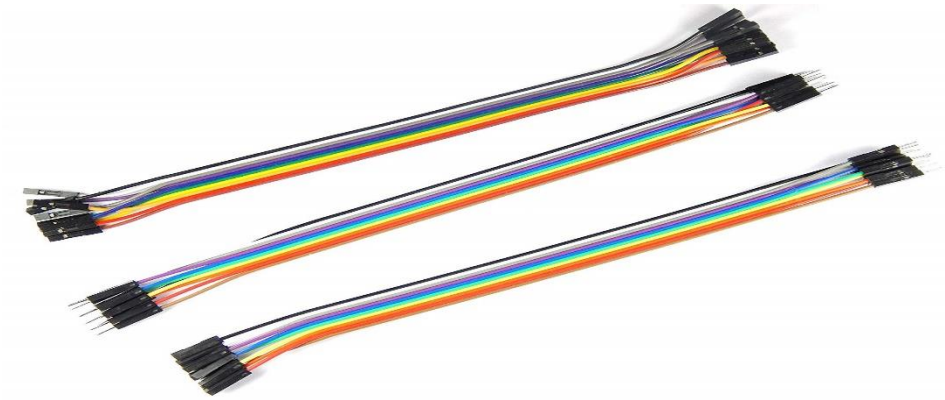


3.5.16*2 LCD display:

An LCD is an electronic display module which uses liquid crystal to produce a visible image. The 162 LCD display is a very basic module commonly used in DIYs and circuits. The 162 translates a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 57 pixel matrix

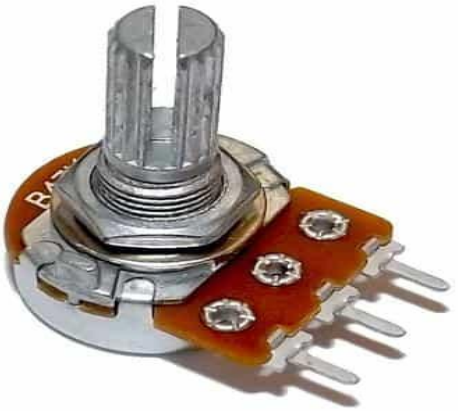
3.6.Jumper Wires:

A jump wire (also known as jumper wire, or jumper) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them { simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering

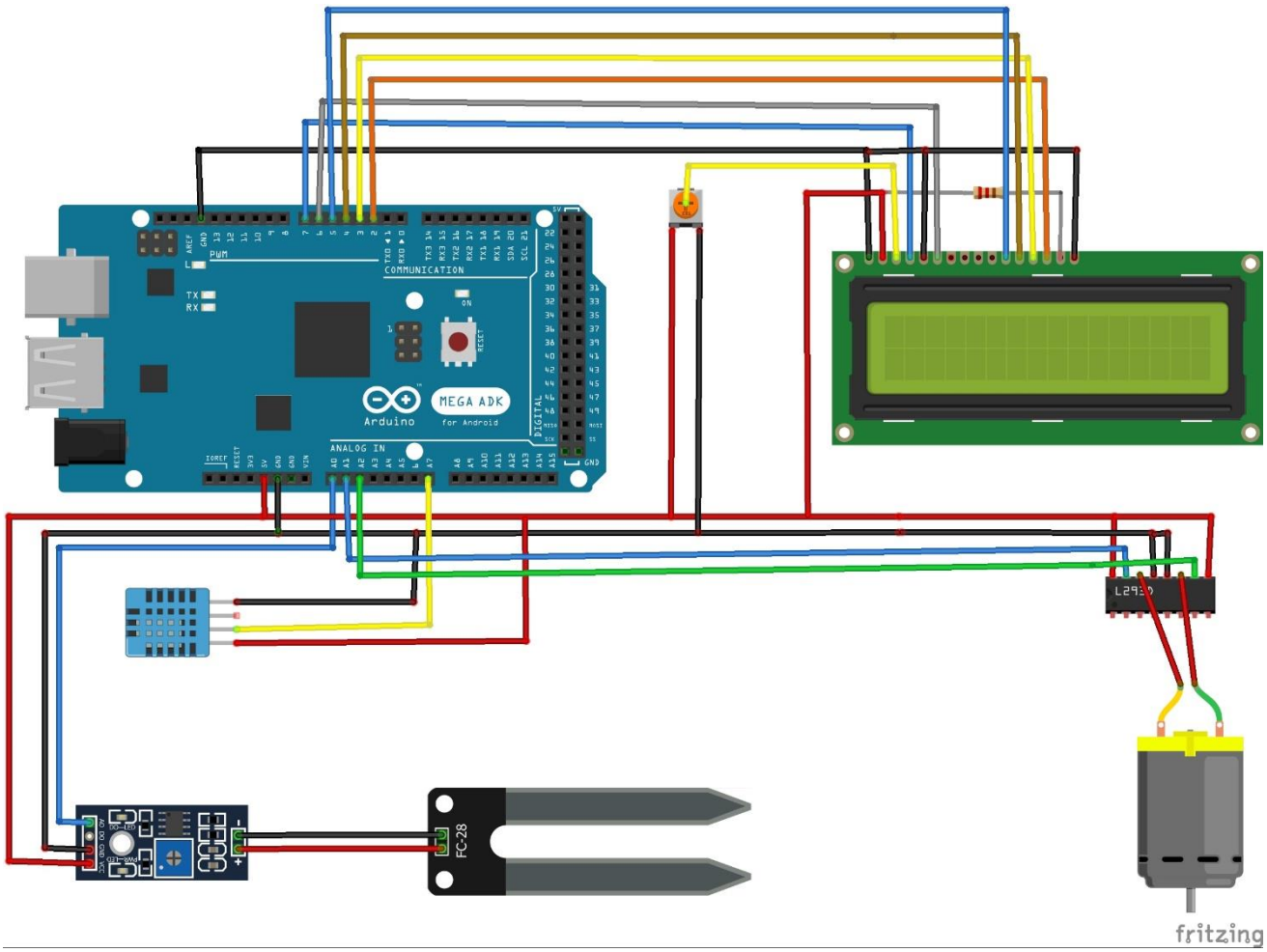


3.7.10k potentiometer:

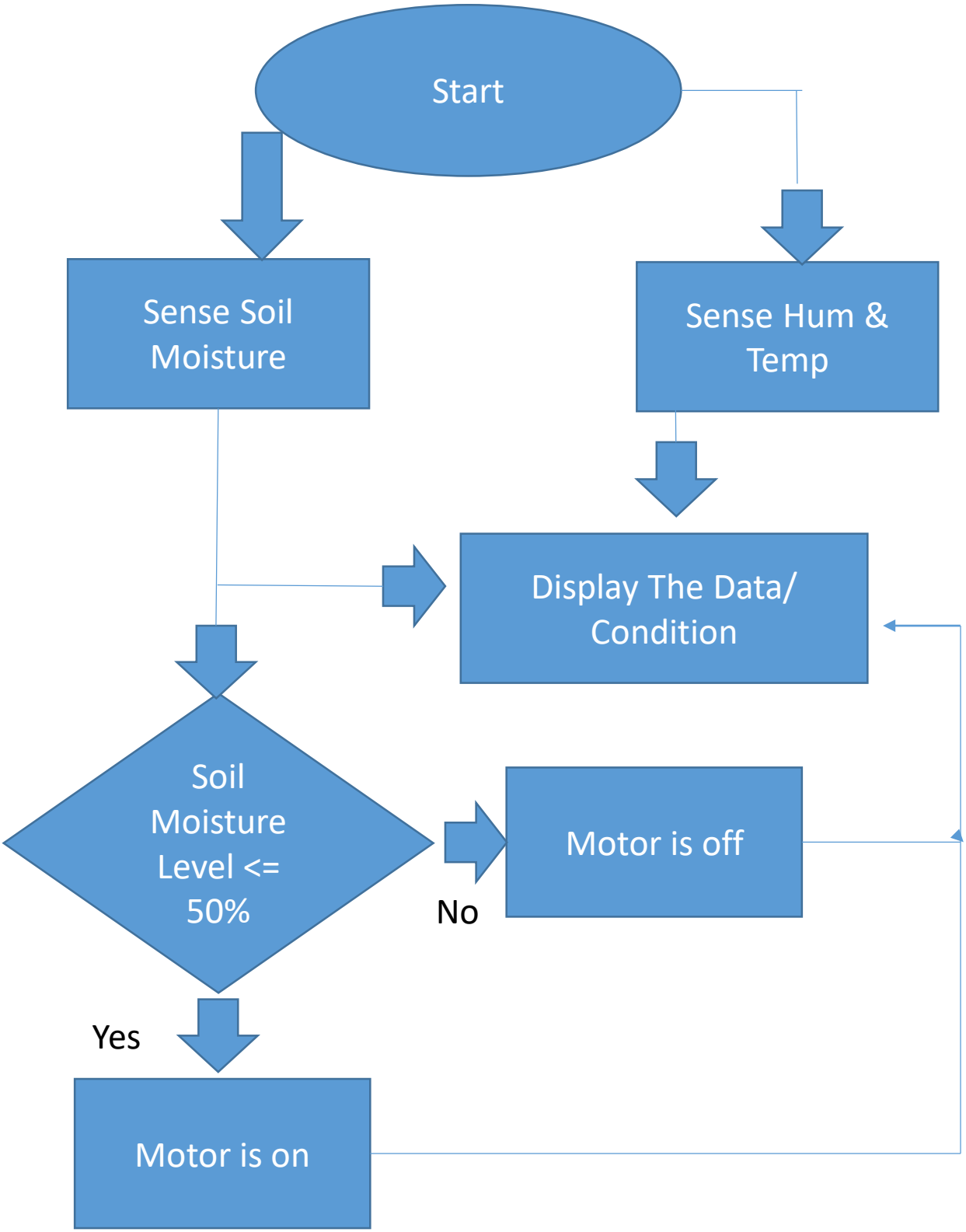
Potentiometers also known as **POT**, are nothing but variable resistors. It is used to control the brightness of the display



4. Circuit Diagram:



5. Flow Chart:


Start
Sense Soil Moisture
Sense Hum & Temp
Display The Data/ Condition
Soil Moisture Level <= 50%
No
Motor is off
Yes
Motor is on

6. Arduino Code:

```
#include <LiquidCrystal.h>
#include <SimpleDHT.h>
#define  DHT_PIN A7
SimpleDHT11 dht11(DHT_PIN);
LiquidCrystal lcd(7, 6, 5, 4, 3, 2);

int sensorPin = A0;
int motorPin1 = A1;
int motorPin2 = A2;
int T;
int H ;
int sensorValue = 0;
int percentValue = 0;

void setup() {
  Serial.begin(9600);
  lcd.begin(16, 2);
  pinMode(motorPin1, OUTPUT);
    pinMode(motorPin2, OUTPUT);
}
 void loop() {
   delay(1000);
  sensorValue = analogRead(sensorPin);
  Serial.print("\n\nAnalog Value: ");
  Serial.print(sensorValue);

  percentValue = map(sensorValue, 1023, 200, 0, 100);
  Serial.print("\nPercentValue: ");
  Serial.print(percentValue);
  Serial.print("%");
```

```
byte temperature=0  ;
  byte humidity=0;

  dht11.read(&temperature, &humidity, 0);
  T = ((int)temperature);
  H = ((int)humidity);

  Serial.print("  Temperature = ");
  Serial.println(T);
  Serial.print("Humidity = ");
  Serial.println(H);
if( percentValue <= 50 ){
     analogWrite(motorPin1, 255);
     analogWrite(motorPin2, 0);
   lcd.setCursor(0, 0);
  lcd.print("Soil Moisture");

  lcd.setCursor(0, 1);
  lcd.print("Percent: ");
  lcd.print(percentValue);
  lcd.print("%");
  delay(2000);
  lcd.clear();
  lcd.print("motor is on");
  delay(2000);
 lcd.clear();
  lcd.setCursor(0,0);
  lcd.print("Temp: ");
  lcd.print(T);
  lcd.print("'C");
  lcd.setCursor(0,1);
```

```
lcd.print("Humid: ");
  lcd.print(H);
  lcd.print("%");
  delay(2000);
    }
else
    {
        analogWrite(motorPin1, 0);
     analogWrite(motorPin2, 0);
       lcd.setCursor(0, 0);
  lcd.print("Soil Moisture");

  lcd.setCursor(0, 1);
  lcd.print("Percent: ");
  lcd.print(percentValue);
  lcd.print("%");
  delay(2000);
  lcd.clear();
  lcd.print("motor is off");
delay(2000);
  lcd.clear();
  lcd.setCursor(0,0);
  lcd.print("Temp: ");
  lcd.print(T);
  lcd.print("'C");

  lcd.setCursor(0,1);
  lcd.print("Humid: ");
  lcd.print(H);
  lcd.print("%");
  delay(2000);
    }
}
```

7. Result:

All Sensors determined the soil moisture level, Humidity and Temperature.

Arduino Micro controller should get sensor data. Micro controller should record & analyze all the data and take correct action. Soil moisture sensor takes an important role to start the water pump . Soil moisture level can be set as per based on plant specification, soil type, seasonal rainfall. Arduino microcontroller should supply water flow as per requirements.

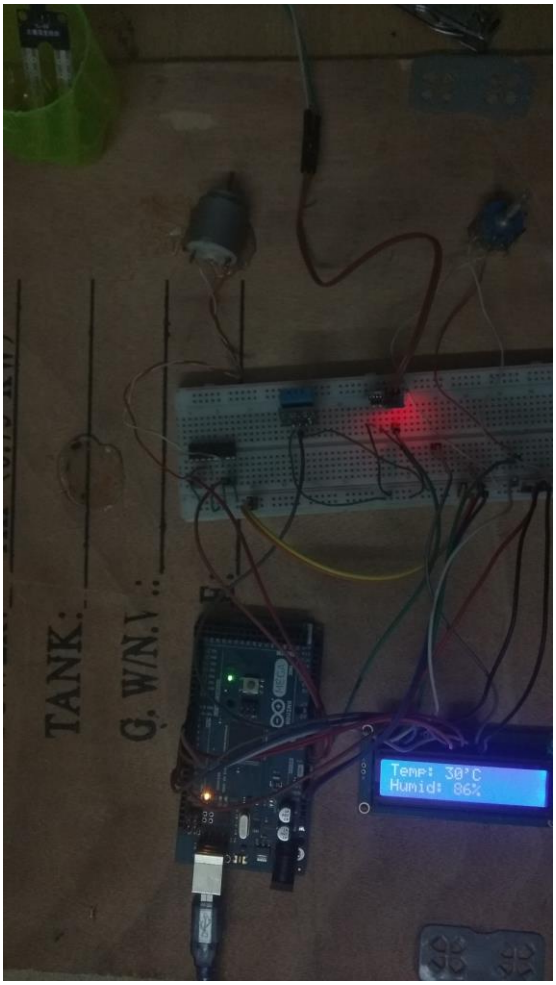
8. Application and future scope:

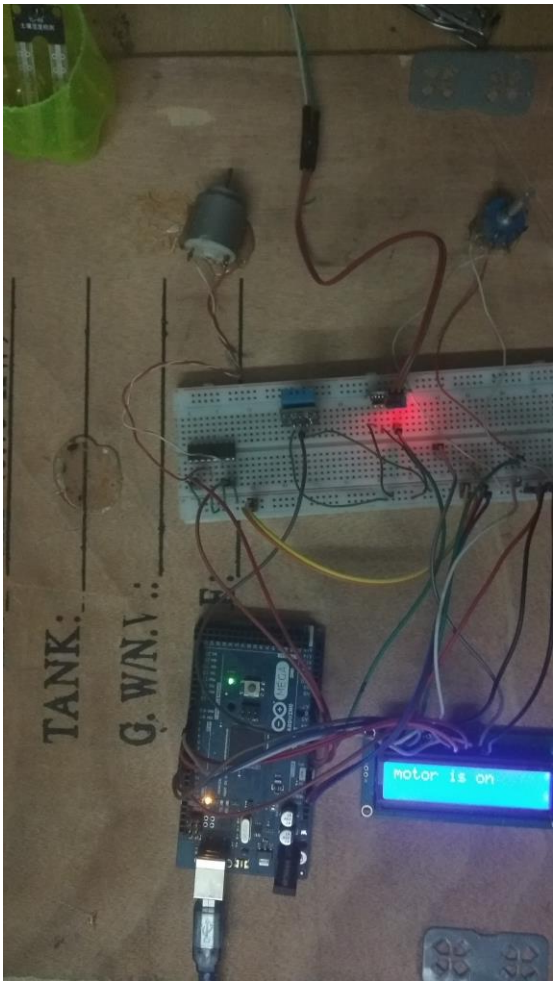
The application of monitoring system in agricultural aspect is immense. The automated monitoring system will help to reduce the efforts and workloads of human and will be helping to produce plants at the absolute parameters they want them to plant and it will reduce the error.

The future plan this project is to make **IOT** based so that it can be controlled and monitored from anywhere .

9.Conclusion:

This project has been developed based on the arduino Mega. The microcontroller circuit has been developed with less number of components and is highly reliable. After verifying the data, assured about the success of the project. Presence of each module has been systematic and placed carefully, thus contributing to the best working of the every unit. Thus, the Arduino Based Automatic soil moisture monitoring system has been designed and tested successfully. Project snapshots are shown in figure.





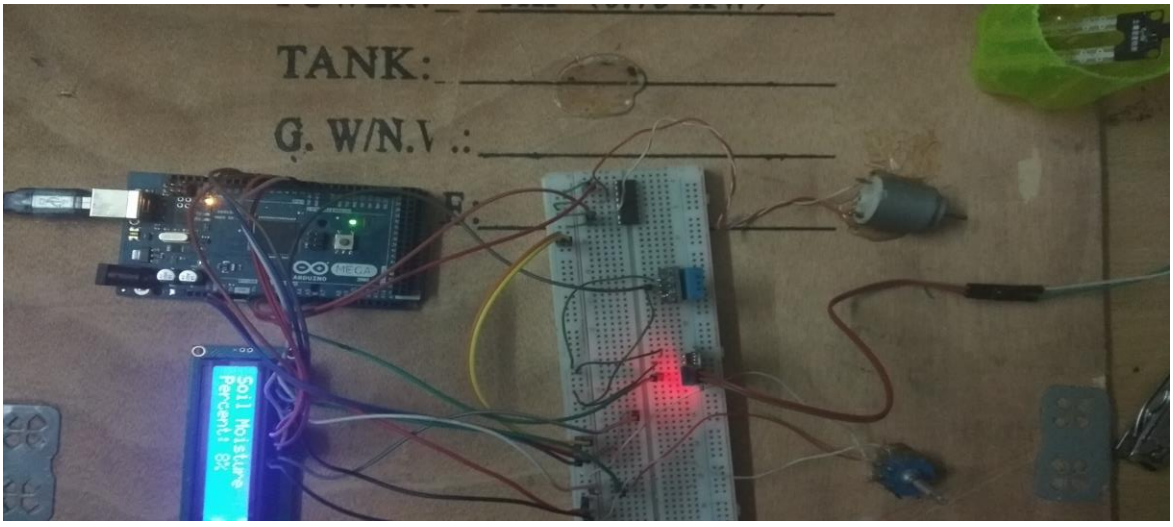


Figure: some snapshots of the project

10. Reference:

1. https://www.youtube.com/watch?v=xV5McpOG2wU
2. https://www.arduino.cc/en/Tutorial/HomePage?from=Main.Tutorials
3. https://fritzing.org