Thirsty Plant

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1.Abstract:

Thirsty plant is a smart Houseplant Monitoring system that monitors and tracks The moisture of the soil, helping the plants thrive. The Soli moisture Sensors gather and analyze data about changing soil moisture conditions and then shows the alerts on a LCD Unit. It continuously monitors the conditions and alerts the user to the changes that require immediate action Via LCD display.

2.Introduction

The Internet of Things (IoT), sometimes referred to as the Internet of Objects, will transform everything—including ourselves. This may appear like a bold statement, but consider the impact the Internet already has had on education, communication, business, science and humanity . Clearly, the Internet is one of the most important and powerful creations in all of human history. Internet of Things (IoT) is an integrated part of Future Internet and could be defined as a dynamic global network infrastructure with self configuring capabilities based on standard and interoperable communication protocols where physical and virtual _things‘ have identities, physical attributes, and virtual personalities and use intelligent interfaces, and are seamlessly integrated into the information network. The term of IoT was first used by Kevin Ashton in 1998, has gained more and more developments today. In the IoT, things‘ are expected to become active participants in business, information and social processes where they are enabled to interact and communicate among themselves and with the environment by exchanging data and information sensed‘ about the environment, while reacting autonomously to the real world events and influencing it by running processes that trigger actions and create services
with or without direct human intervention. Interfaces in the form of services facilitate interactions with these smart things‘ over the Internet, query and change their state and any information associated with them, taking into account security and privacy issues.
Thirsty Plant is a smart Houseplant and Monitoring system that monitors and tracks Moisture conditions, helping the plants thrive. The Garden Sensors gather and analyze data about changing oil moisture conditions and then connects to

Its' own LCD unit with timely alerts. Thirsty Plant continuously monitors the conditions and alerts the user to the changes that require immediate action. This saves water, lowers utility bills, and the user needs never to worry about thirsty plants again.

3.Related Work:

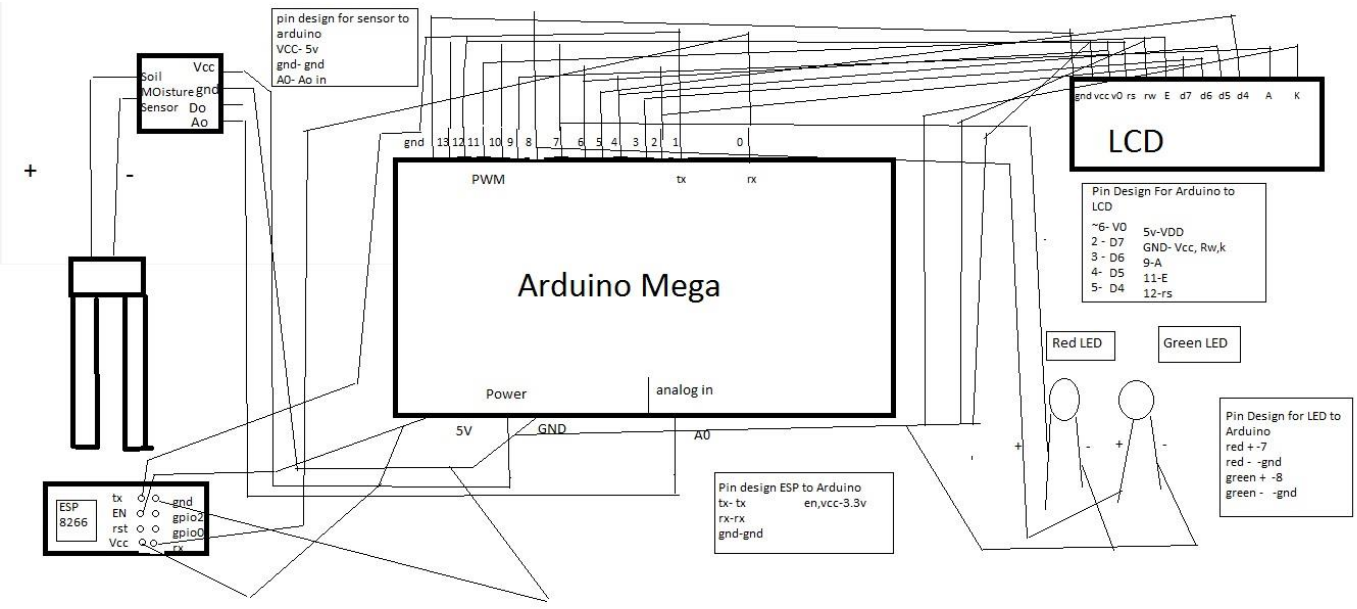
Several approaches have been proposed in the closely related fields of wireless sensor network, ubiquitous and pervasive computing, and software engineering in general to address the above challenges. However, existing approaches only cover limited subsets of the above mentioned challenges when applied to the IoT.
[1] proposes an integrated approach for addressing the above mentioned challenges.
[2] describes the essence of IoT and related issues in the current scenario.
[3] and [4] elaborates the use of web of Things in smart homes and their implementations. The Internet of Things represents a dream in which the Internet extends into the real world embracing everyday objects. Physical items are no longer disconnected from the virtual world, but can be controlled remotely and can act as physical access points to Internet services.
[5] reviewed recent trends and challenges on interoperability, and discuss

4.Motivation:

Our college has a very beautiful garden in the middle . It has quite a lot of types of plants. They are well nourished and taken care of by the gardener on a daily basis.
Some plants are also installed in our college corridor. But due to some negligence or some other reason they were not taken care of. As a result of it most of those plants died .
As a Fellow CSE student and also as a plant lover we thought that it would be much more helpful if we give them the thing that they lack most. The reaction. So that, We Started creating an Arduino project which would give them the voice they are missing. Not a single one of them have to die of thirst.

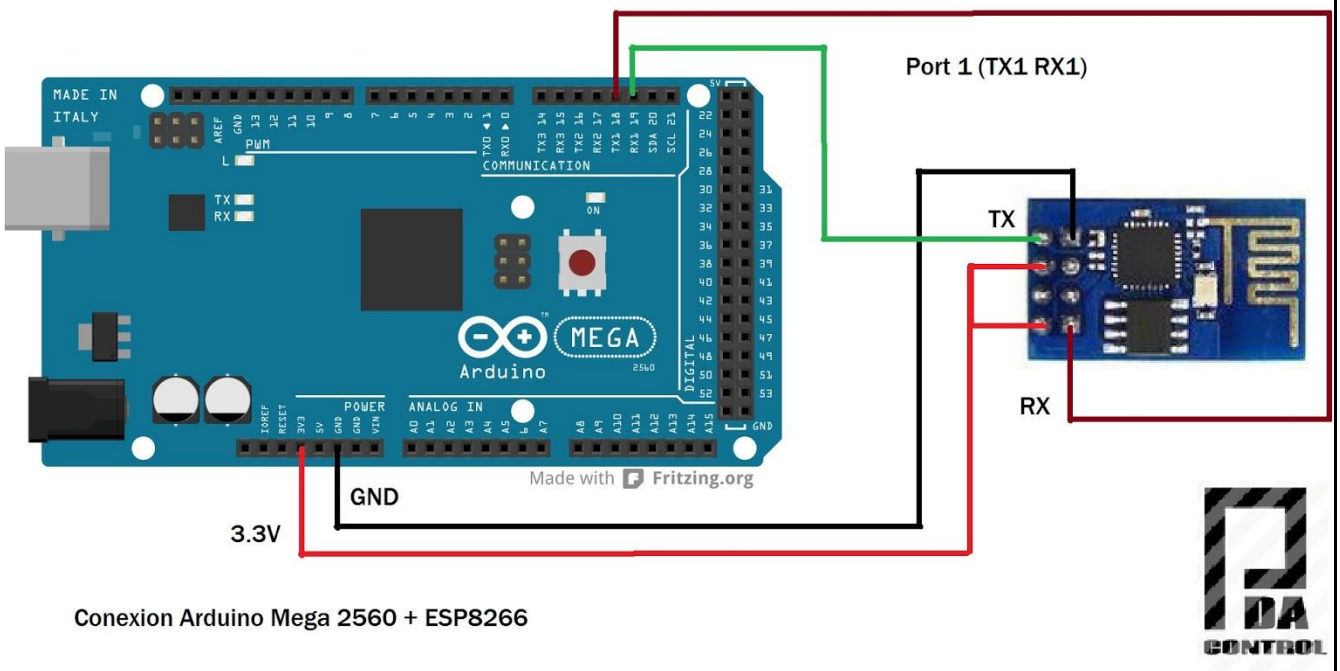
5.Procedure:

- **Circuit Diagram:**



- **Diagram Explanation:**

  - **Arduino to ESP8266 Connection**



Conexion Arduino Mega 2560 + ESP8266

In Order to connect the given esp8266 module to the Arduino mega board. All we need is some male to male connector , Arduino board, and esp8266.

Pin Diagram is as follows:

ESP8266 Arduino

TX----------TXo

EN---------3.3v

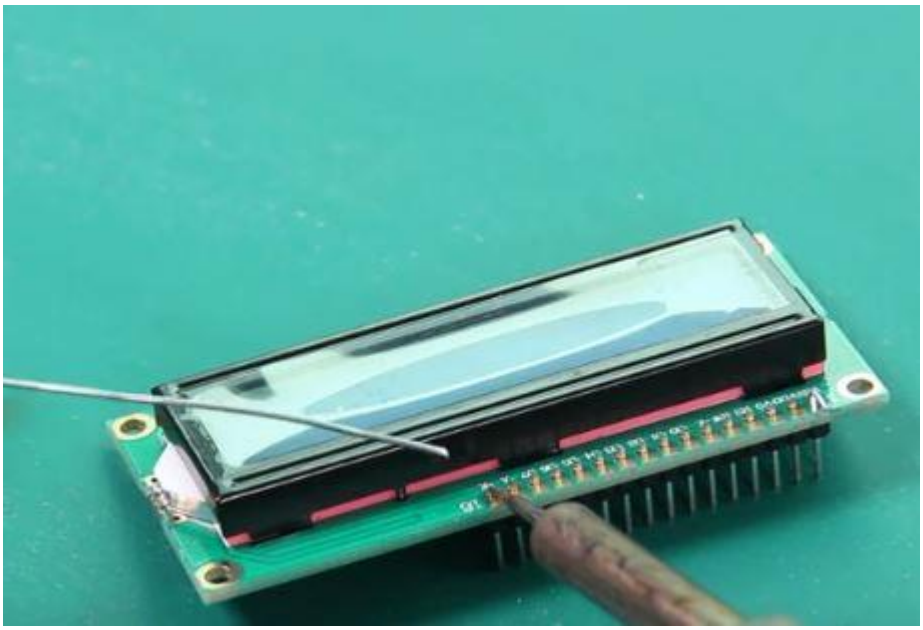
VCC----- 3.3v

GND-------gnd

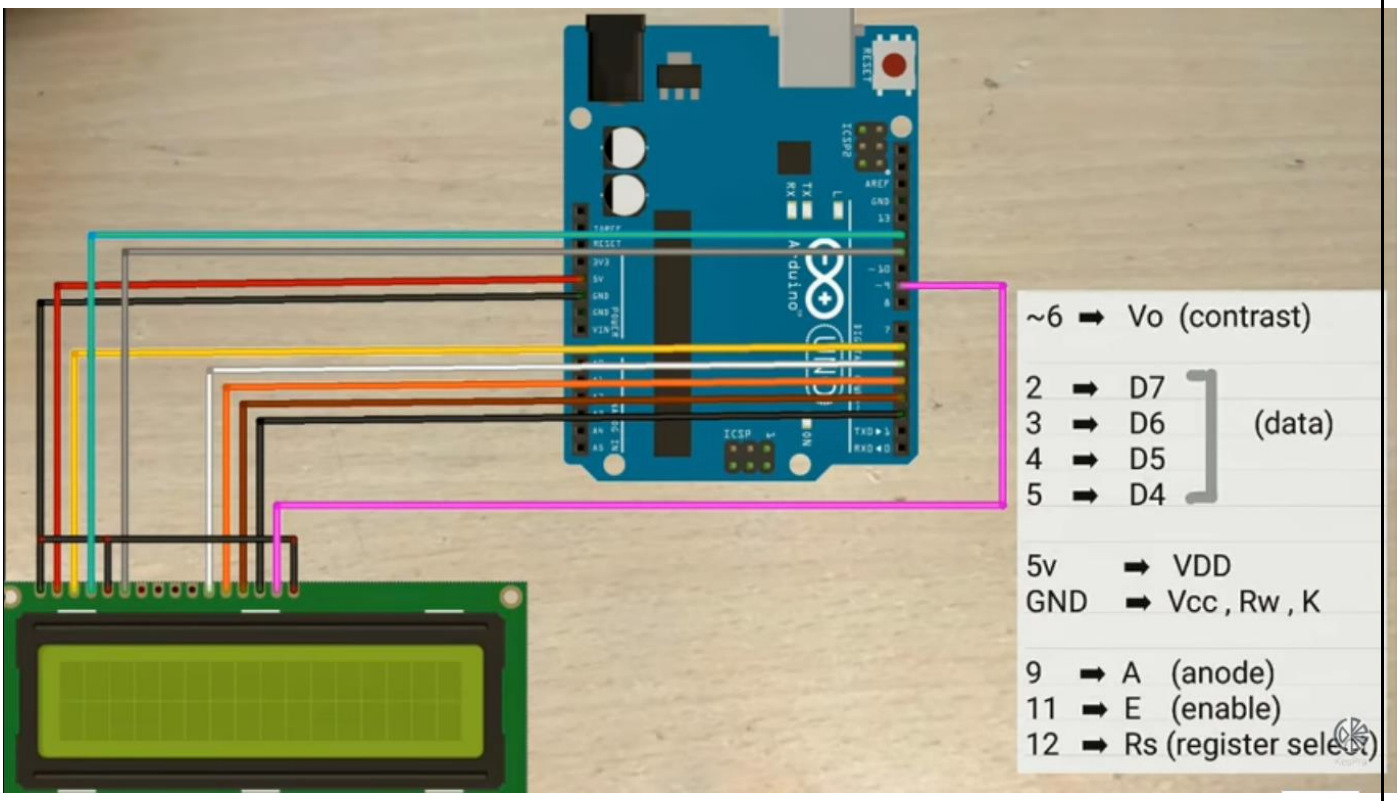
RX- -------RXo

- **Arduino to LCD Connection:**

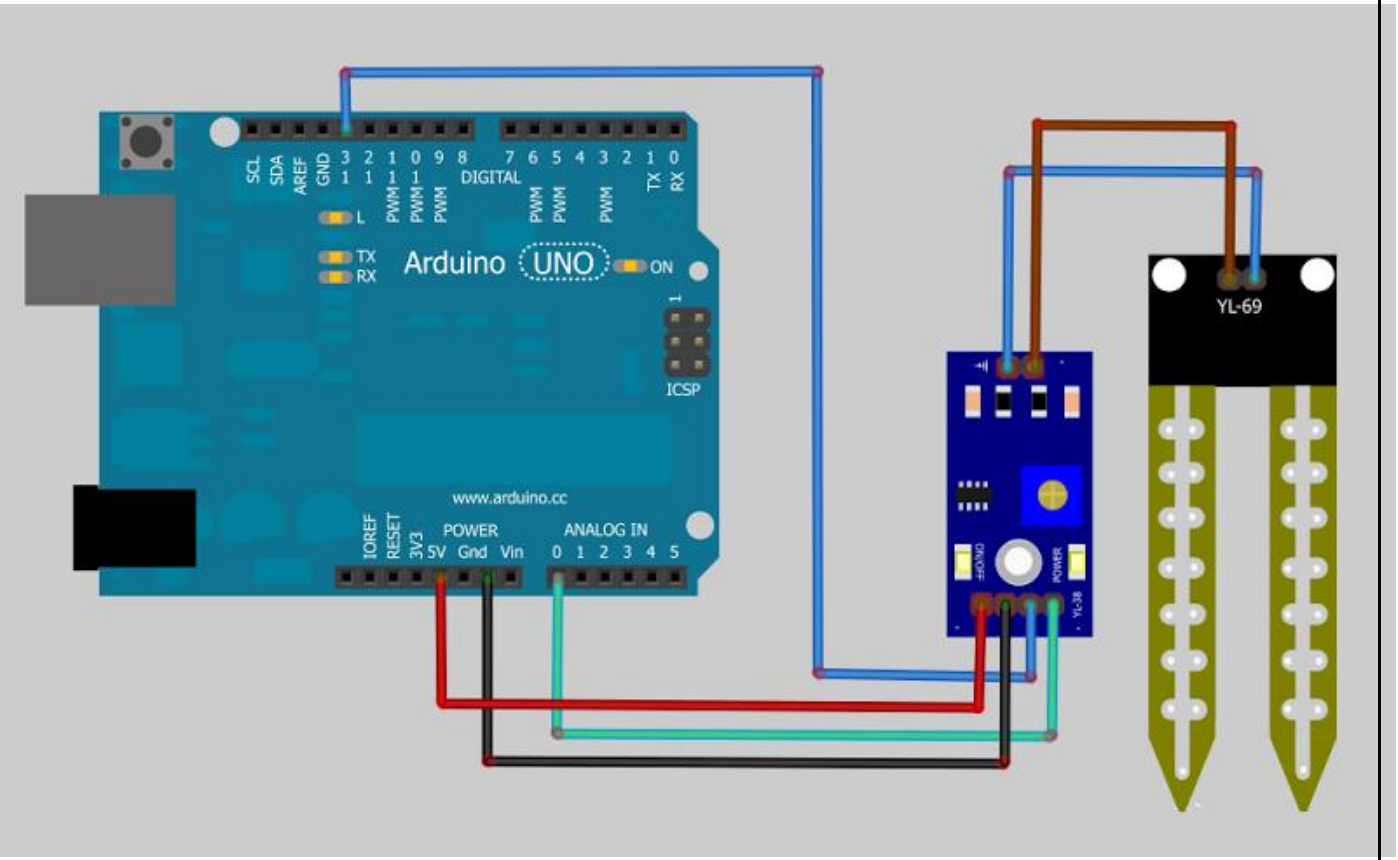
Connection to lcd display is fairly easy. Before connection we have to solder pins to the lcd display.



Then we have to connect the lcd to the Arduino in the following manner shown in the next picture.



- **Arduino to Moisture Sensor Connection:**



In order to connect moisture sensor to the Arduino we have to follow the following pin configuration.

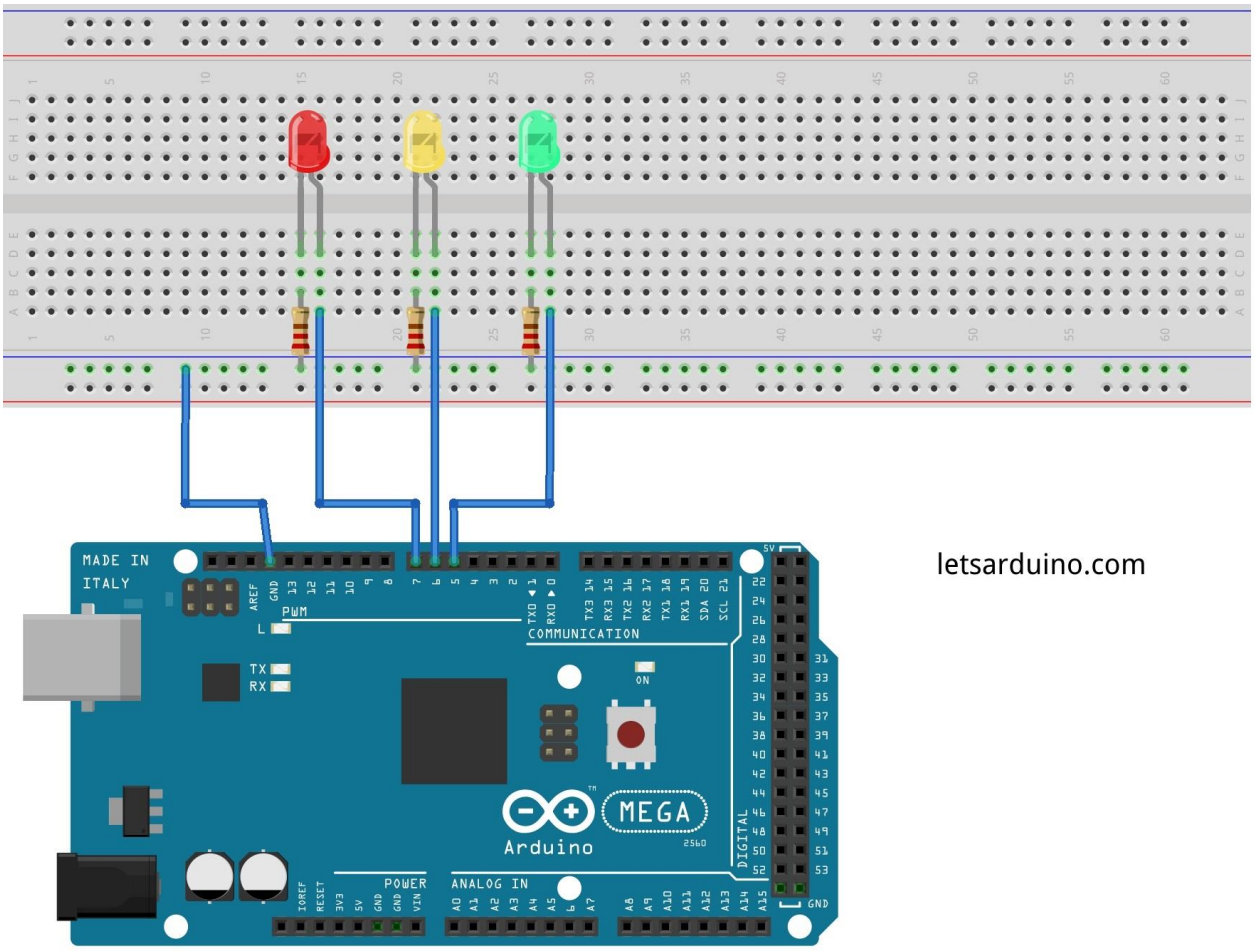
Sensor Arduino

Vcc----------5V

GND---------GND

Ao----------Ao(analog in)

- **Arduino to LED Connection:**



We are only going to use red and green light for the sake of simplicity . The pin configuration for led will be as follows:

Led to Arduino:

Red+ ----------7

Red- ----------gnd

Green+ ---------8

Green- ----------gnd

- **Instrument/Sensor/ Module Details**

Instruments That was used in this project as follows

1. Arduino MEGA 2560
2. LCD unit
3. Pin for LCD unit
4. ESP8266 wifi module
5. LED (2 green and 2 red)
6. Male to Male Connector(30pcs)
7. Male to Female Connector(12 pcs)
8. Soil Moisture Sensor

Brief Details About Instruments:

1. **Arduino MEGA 2560:**

The 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. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega 2560 board is compatible with most shields designed for the Uno and the former boards Duemilanove or Diecimila.

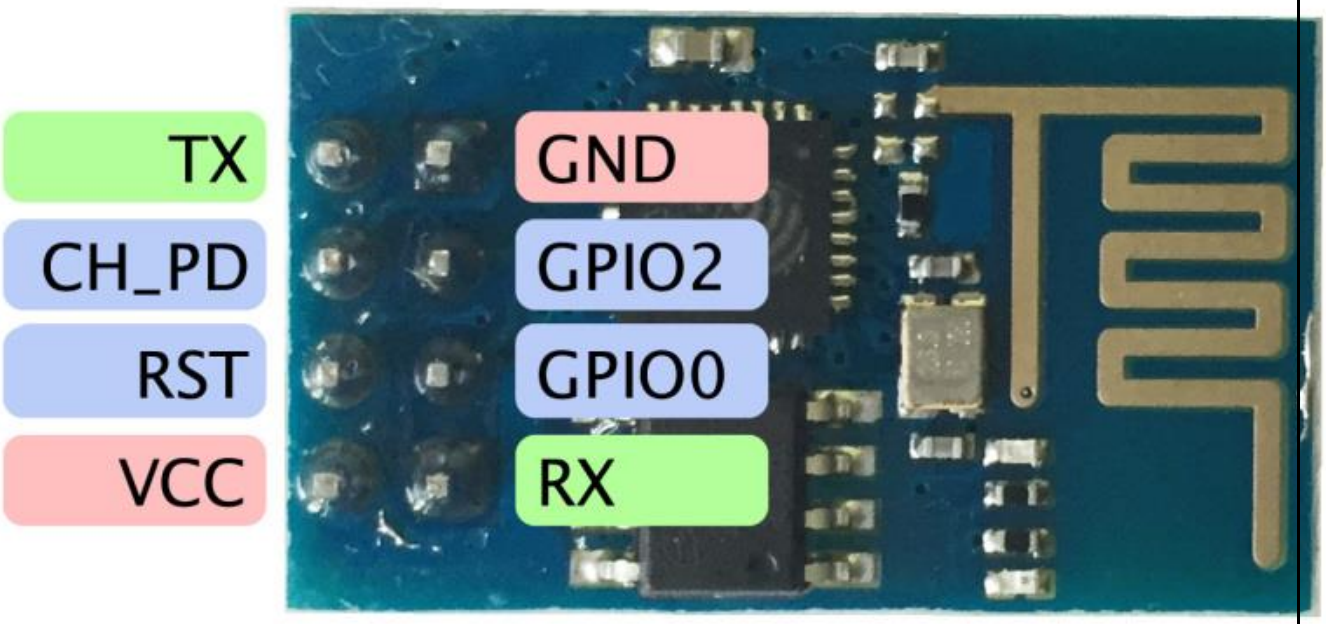
2.LCD unit

16×2 LCD is named so because; it has 16 Columns and 2 Rows. There are a lot of combinations available like, 8×1, 8×2, 10×2, 16×1, etc. But the most used one is the 16*2 LCD, hence we are using it here.

3.Pin for LCD unit

This breakable pin heads are available to buy separately. To solder it to the 16*2 LCD display.

4.ESP8266 wifi module



The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

5.LED (2 green and 2 red)

A **light-emitting diode** (**LED**) is a two-lead semiconductor light source. It is a p–n junction diode that emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons.

8.Soil Moisture Sensor

oil moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighting 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.

- **Clean Code With Proper Comment Thirstyplant.ino**

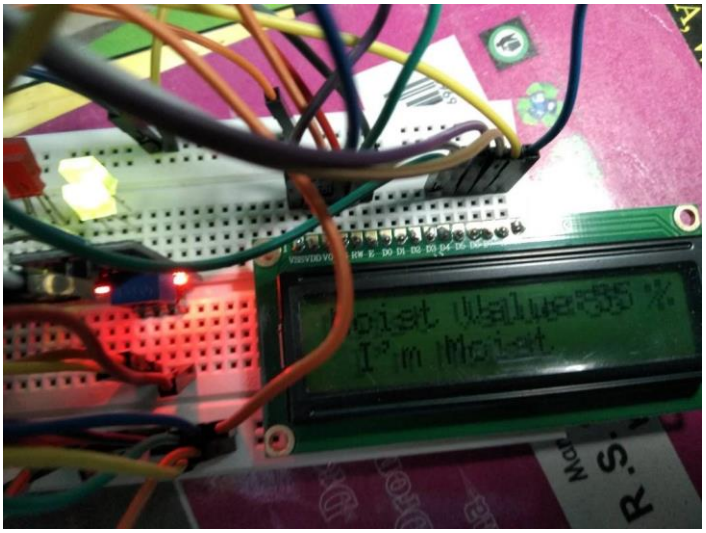
```
#include <LiquidCrystal.h>
#define length 16.0
// The following variables are part of a Moving Average filter that
smooths
// the sensor values over 16 samples.
const int LENBUF = 16;
int sensebuffer[LENBUF];
int senseid = 0;
unsigned char b;
int Contrast=50;
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);
// the setup routine runs once when you press reset:
void setup() {
  // initialize serial communication at 9600 bits per second:
  analogWrite(6,Contrast);
  lcd.begin(16, 2);
  Serial.begin(9600);
   pinMode(7, OUTPUT); //red led
   pinMode(8, OUTPUT); // green led
 }

// the loop routine runs over and over again forever:
void loop() {
   String TweetWords;
   //taking the value from sensor to a variable
   int sensorValue= analogRead(A0);
   //converting the variable to the percentage
   sensorValue=sensorValue-23;
   sensorValue=(sensorValue/10);
   sensorValue=100-sensorValue;
```

```
    unsigned char b;
    //for maintaining gap problem in the lcd occured at the time of
production of the code

  for (int i =0;i<(length-b);i++)
  {
    lcd.print(" ");
  }
  //printing the sensor value to the monitor
   Serial.println(sensorValue);
   delay(100);
   //printing the first line of the lcd
   lcd.setCursor(0, 0);
   lcd.print("Moist Value:");
   lcd.print(sensorValue);
   lcd.print(" %");
   //putting delay to show it more brightly and changeing the value
more frequently
   delay(100);
    //printing the Second line of the lcd
   lcd.setCursor(0, 1);
   //checking to see if the sensor value is greater than 48%
   if(sensorValue>=48 )
   {
    lcd.print(" I'm Moist");
    //8 is wired to green light. it will light up
    digitalWrite(8, HIGH);
    //7 is wired to red light. it will stay dim.
    digitalWrite(7, LOW);
    }
    else
    {
         //checking to see if the sensor value is less than 48% it
will print thirsty message
```

```
        lcd.print("I'm thirsty");
        //red light will light up
        digitalWrite(7, HIGH);
        //green will dim down.
        digitalWrite(8, LOW);
      }

//end of the code
}
```

6.Result And Analysis

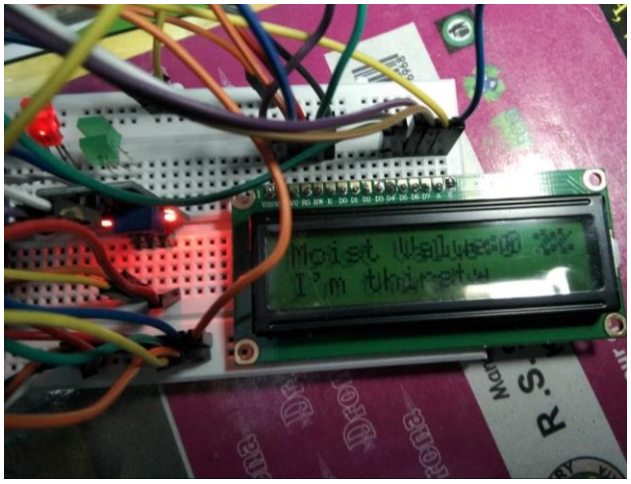
When the sensor is held deep down into the water like the image above we get the output like this below .



We can see green light . Also in the LCD display It is showing that
“Moist Value:55%”
I’m Moist

The sensor data is printed in percentage form in order to understand better.

Now we will see what happens when we pull up the moisture sensor from the water.



As we disconnect the sensor from the watery surface we can see green light getting turned off and red LED getting turned on. The LCD is also showing

“Moist Value: 0%”
“I ‘m thirsty”

From the Results we can see. If the Value gets lower than48% it would show that it’s thirsty. And then the owner of the plant will know that the plant is in need of water. At the same time If it gets more than 48% moisture , it will show that “I’m moist”. By that we can get to the conclusion that, using this project the user of the plant will know when and how much water should be given to the particular plant.

7.Conclusion:

Thirsty Plant, a smart houseplant monitoring system eases the tedious job of maintaining plants in time of rush for plant lovers. It monitors plant levels and informs the user with the details on the LCD given below. Which will help user to understand when the plant is gonna need some water.It is also able to overcome many of the issues faced in the existing watering systems. This system helps to reduce the amount of water wasted during over pouring of water. It proves to be an efficient system to reduce the issue of overwatering the plants which leads to diseases and make plants more prone to pests .

8.Future Scope

In Future it can be modified in several ways:

1. Sending Message, Email, Notification to the user whenever it feels thirsty.
2. Sending Twitter messages to the other people nearby for water.
3. The data can also be sent to the cloud to get it analyzed to find the pattern of the need of water for any plants at any given season.
4. Water can be sprayed automatically whenever the moisture becomes low.
5. Automatic Water-Spraying System with automatic bucket filling.

9.References:

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