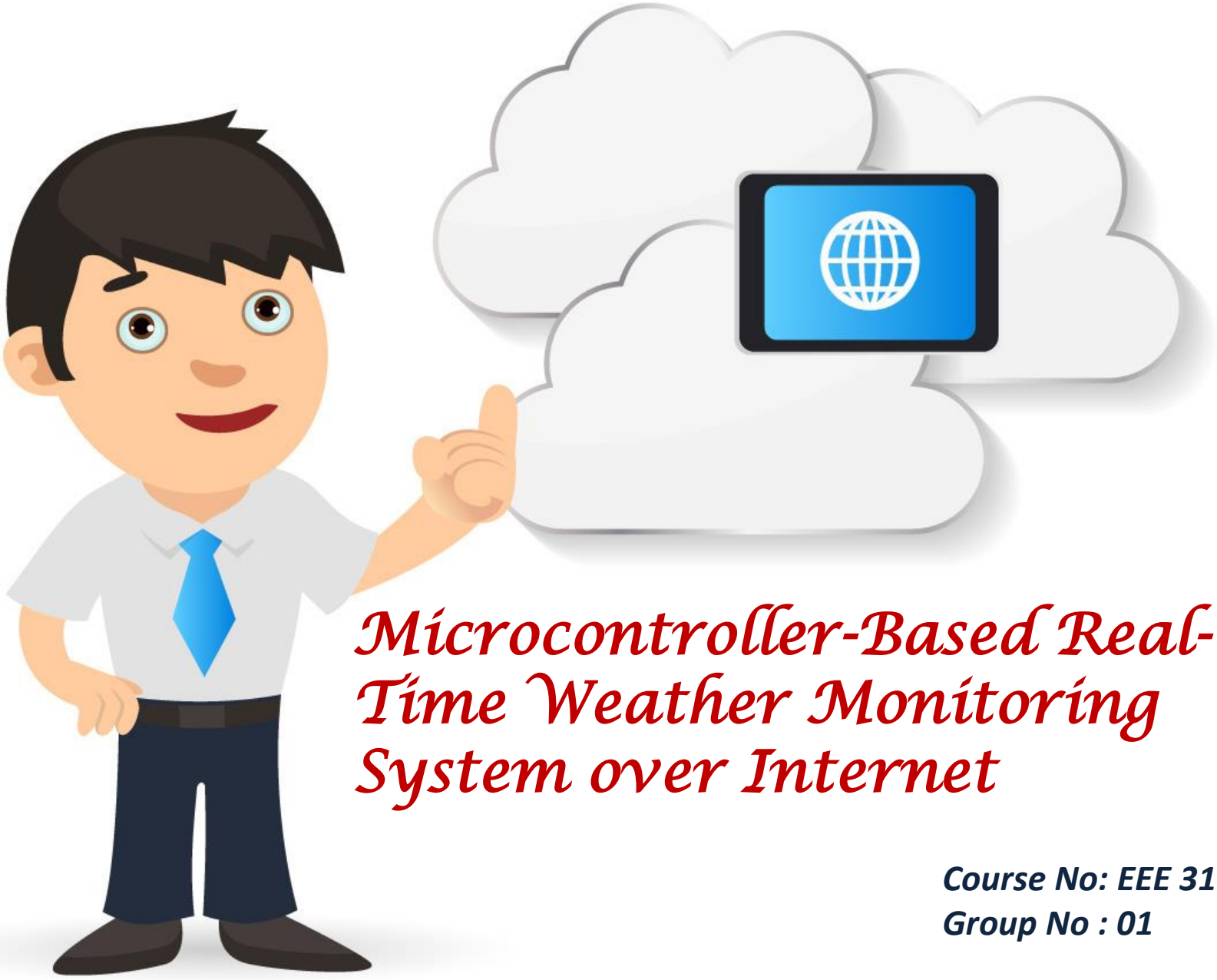


Microcontroller-Based Real-Time Weather Monitoring System over Internet

Course No: EEE 310
Group No : 01

INTRODUCTION

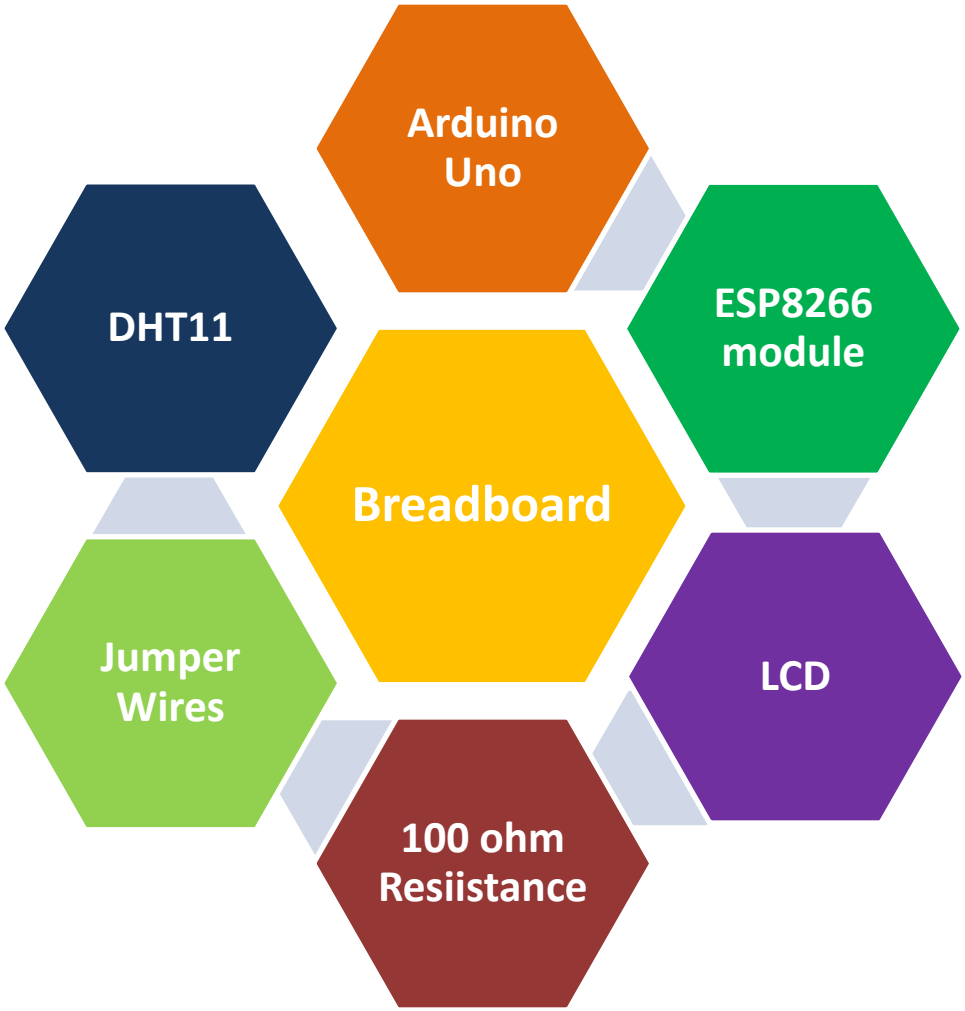
In this IoT project we are going to Monitor Humidity and Temperature over the internet using ThingSpeak where we will show the current Humidity & Temperature data over the Internet using the ThingSpeak Server.

- Data Communication between Arduino, DHT11 Sensor Module, ESP8266 WIFI module and LCD
- Displaying temperature and humidity on the LCD display
- Sending data to ThingSpeak server for live monitoring

PROJECT OBJECTIVES

- Collects data from the sensor ,analyze and visualize the data and acts by triggering a reaction.
- Single wire serial communication for fetching data from DHT11
- Detecting dew point by measuring ambient temperature and humidity.

COMPONENTS



EXPERIMENTAL THEORY

ESP8266

ESP8266 Arduino compatible module has a Micro Controller Unit which gives the possibility to control I/O digital pins via simple code like programming language.

Serial communication :

Serial communication is a communication technique used in telecommunications wherein data transfer occurs by transmitting data one bit at a time in a sequential order over a computer bus or a communication channel.

EXPERIMENTAL THEORY

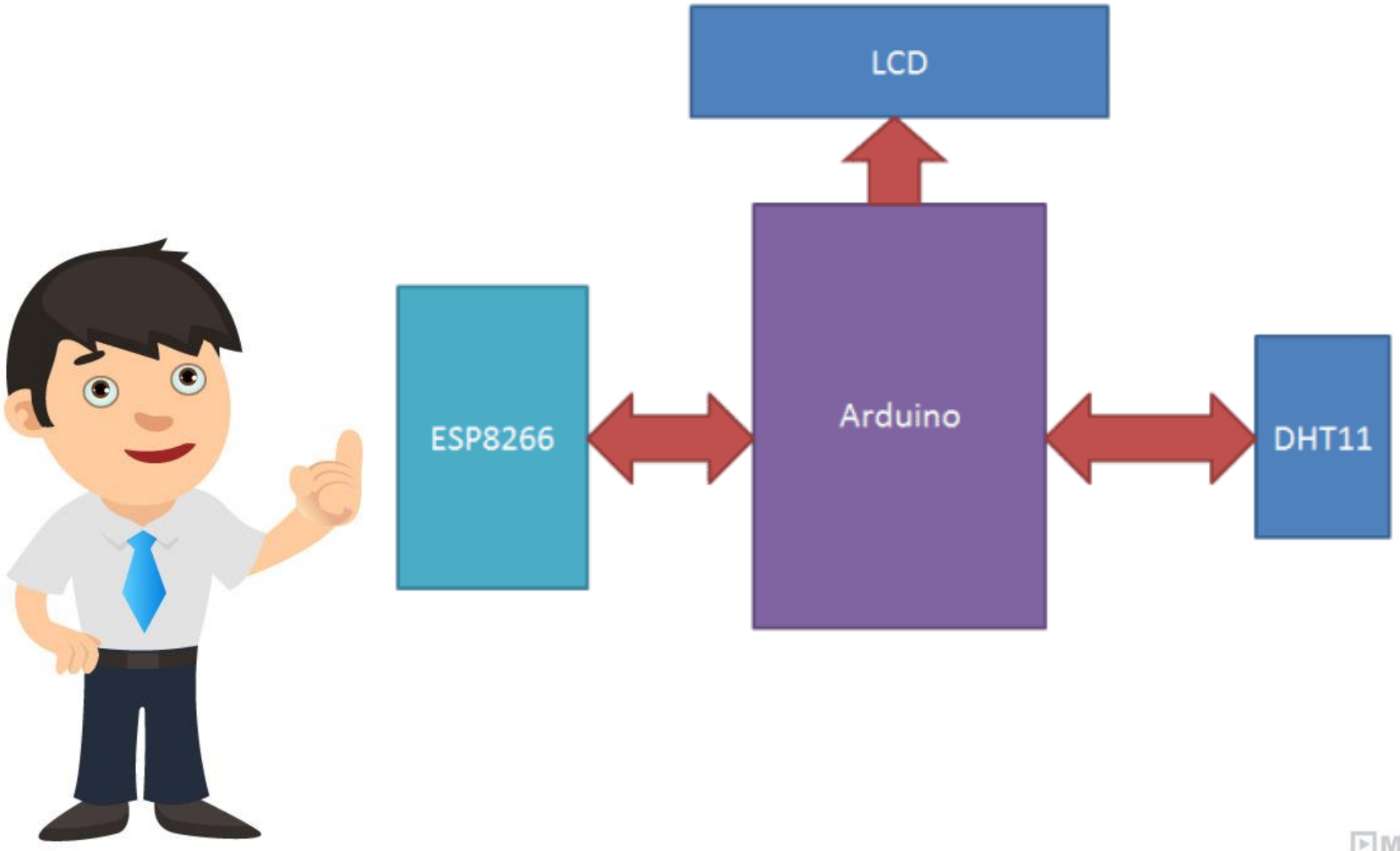
Thingspeak

ThingSpeak is an IoT analytics platform service that allows you to aggregate, visualize, and analyze live data streams in the cloud.

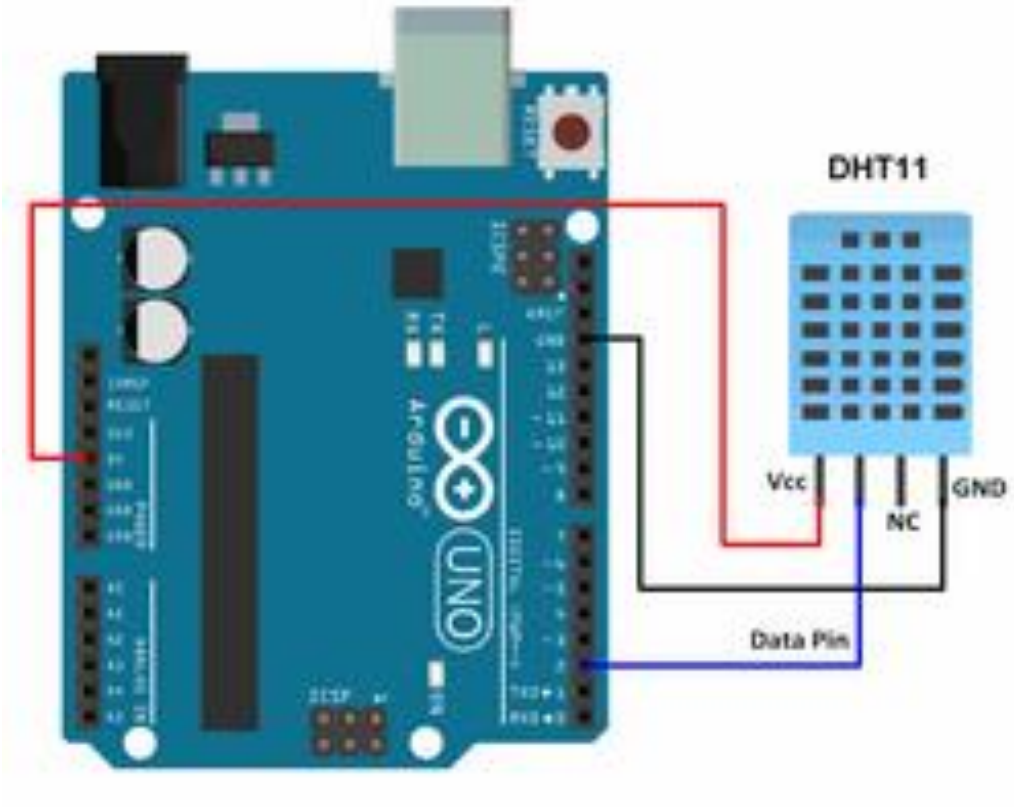
DHT11

DHT11 sensor consists of a capacitive humidity sensing element and a thermistor for sensing temperature.

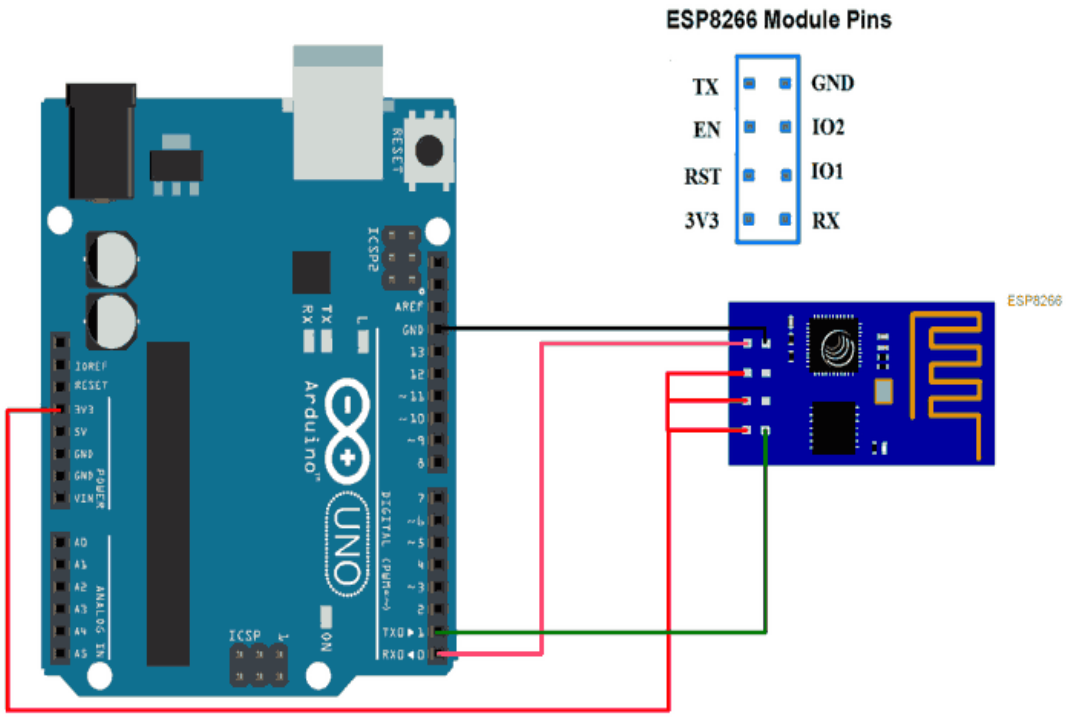
SETUP AND CONNECTION



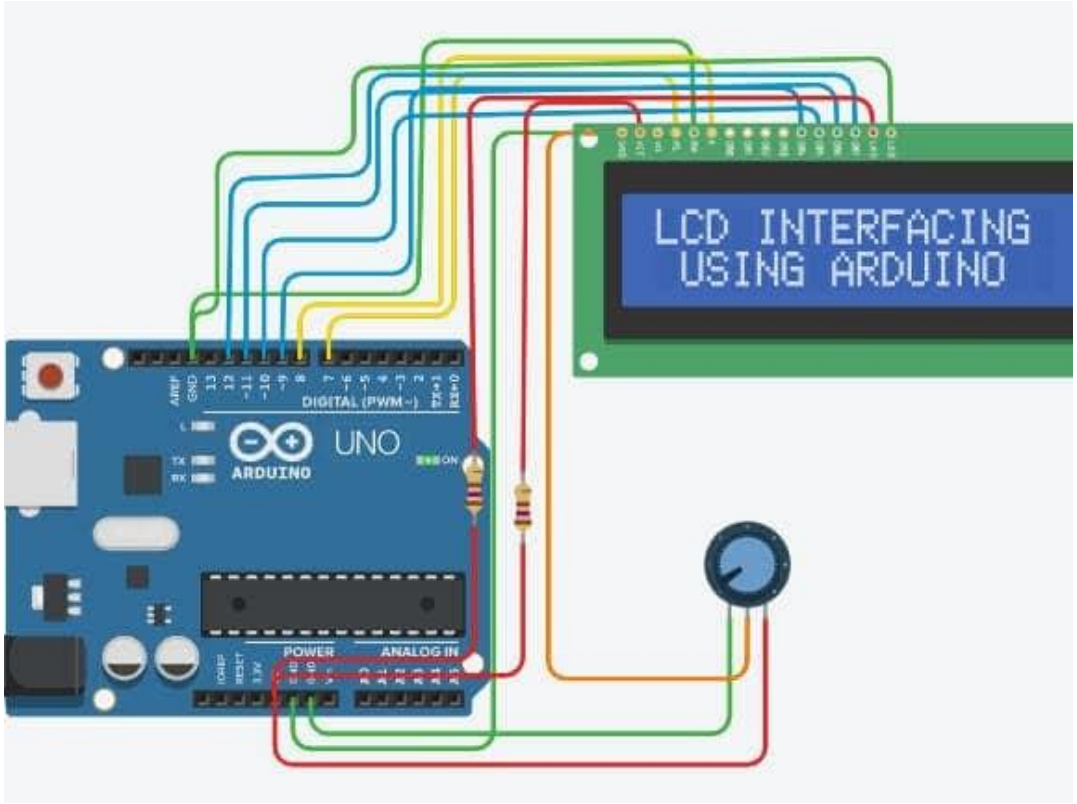
ARDUINO TO DHT11 CONNECTION



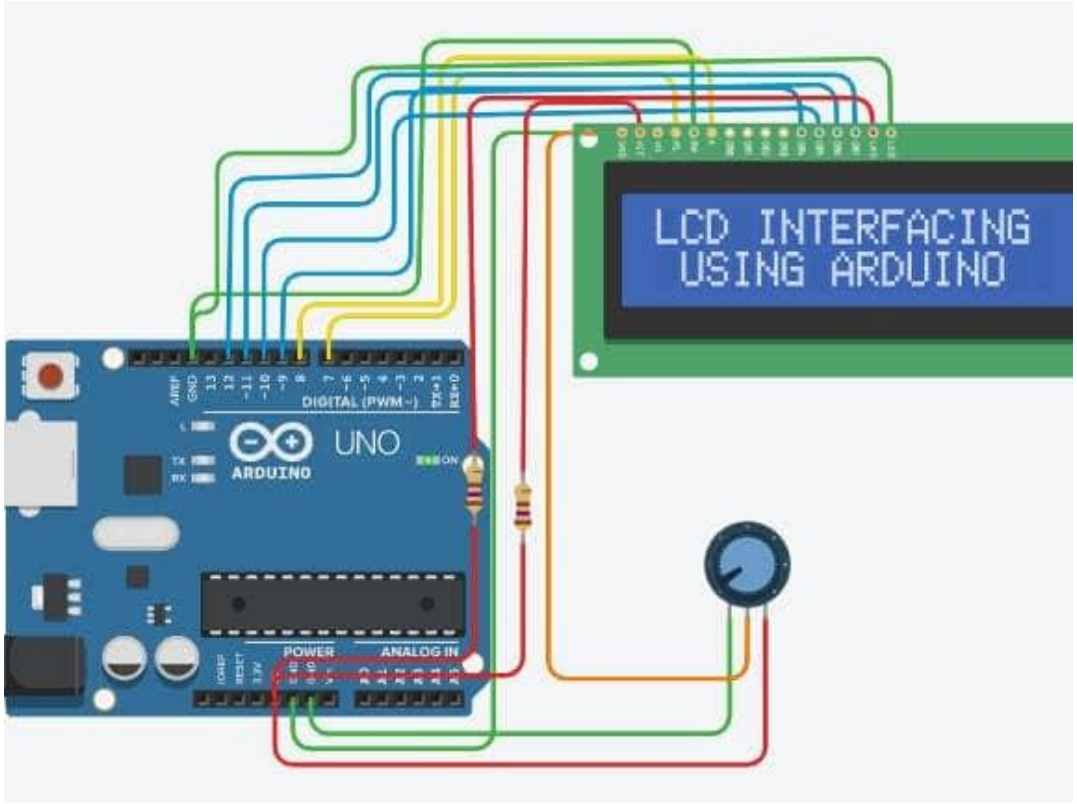
ARDUINO TO ESP8266 CONNECTION

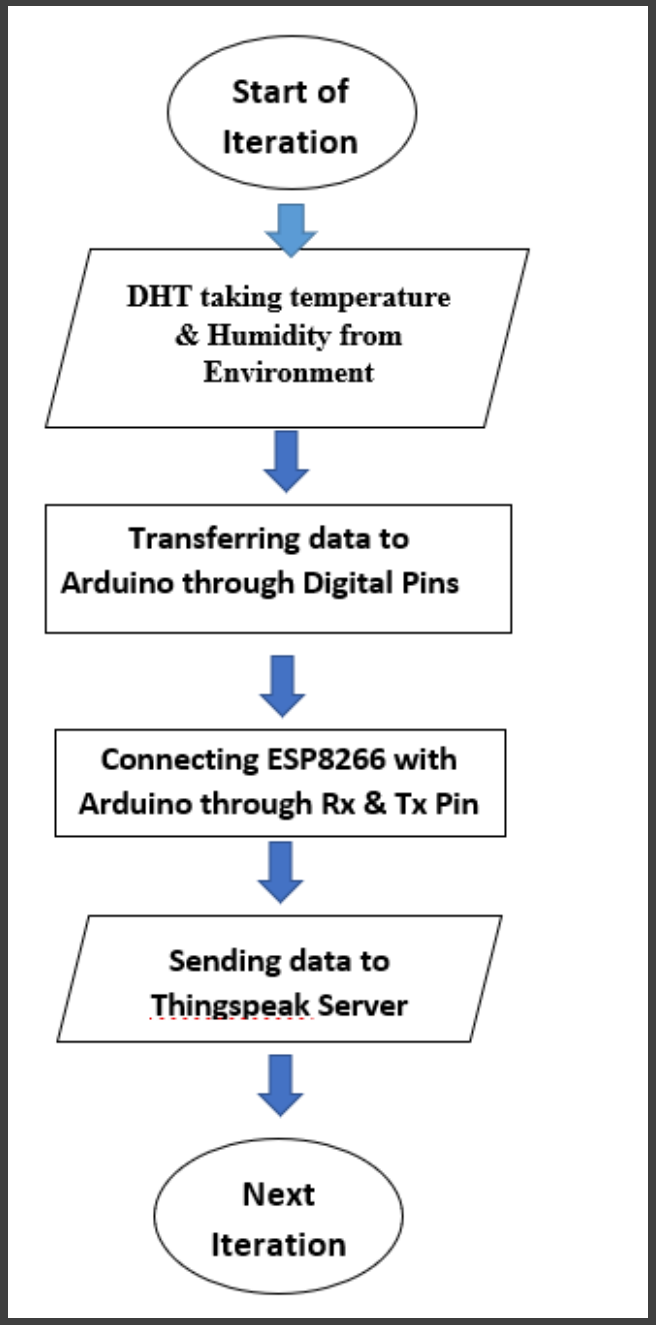


ARDUINO TO LCD DISPLAY CONNECTION



OVERALL CONNECTION




Start of Iteration
DHT taking temperature & Humidity from Environment
Transferring data to Arduino through Digital Pins
Connecting ESP8266 with Arduino through Rx & Tx Pin
Sending data to Thingspeak Server
Next Iteration

Flow CHART

sketch_jul04a | Arduino 1.8.19

File Edit Sketch Tools Help

sketch_jul04a

```
#include <Adafruit_Sensor.h>
#include <DHT.h>
#include <DHT_U.h>
#include <LiquidCrystal.h>
LiquidCrystal lcd(14,15,16,17,18,19);


#define DHTPIN 12     // Digital pin connected to the DHT sensor


#define DHTTYPE    DHT11

DHT_Unified dht(DHTPIN, DHTTYPE);

uint32_t delayMS;

void setup() {
  Serial.begin(9600);
  // Initialize device.
  dht.begin();
  Serial.println(F("DHTxx Unified Sensor Example"));
  // Print temperature sensor details.
  sensor_t sensor;
  dht.temperature().getSensor(&sensor);
  Serial.println(F("------------------------------------"));
  Serial.println(F("Temperature Sensor"));
  Serial.print  (F("Sensor Type: ")); Serial.println(sensor.name);
  Serial.print  (F("Driver Ver:  ")); Serial.println(sensor.version);
  Serial.print  (F("Unique ID:   ")); Serial.println(sensor.sensor_id);
  Serial.print  (F("Max Value:   ")); Serial.print(sensor.max_value); Serial.println(F("°C"));
  Serial.print  (F("Min Value:   ")); Serial.print(sensor.min_value); Serial.println(F("°C"));
  Serial.print  (F("Resolution:  ")); Serial.print(sensor.resolution); Serial.println(F("°C"));
  Serial.println(F("------------------------------------"));
  // Print humidity sensor details.
  dht.humidity().getSensor(&sensor);
```

Programming Part

Programming Part

sketch_jul04a | Arduino 1.8.19

File Edit Sketch Tools Help

sketch_jul04a

```
  // Print humidity sensor details.
  dht.humidity().getSensor(&sensor);
  Serial.println(F("Humidity Sensor"));
  Serial.print  (F("Sensor Type: ")); Serial.println(sensor.name);
  Serial.print  (F("Driver Ver:  ")); Serial.println(sensor.version);
  Serial.print  (F("Unique ID:   ")); Serial.println(sensor.sensor_id);
  Serial.print  (F("Max Value:   ")); Serial.print(sensor.max_value); Serial.println(F("%"));
  Serial.print  (F("Min Value:   ")); Serial.print(sensor.min_value); Serial.println(F("%"));
  Serial.print  (F("Resolution:  ")); Serial.print(sensor.resolution); Serial.println(F("%"));
  Serial.println(F("------------------------------------"));
  // Set delay between sensor readings based on sensor details.
  delayMS = sensor.min_delay / 500;
}

void loop() {
  // Delay between measurements.
  delay(delayMS);
  // Get temperature event and print its value.
  sensors_event_t event;
  dht.temperature().getEvent(&event);
  if (isnan(event.temperature)) {
    Serial.println(F("Error reading temperature!"));
  }
  else {
    lcd.begin(16, 1);
    //lcd.clear();
    lcd.setCursor(0,0);
    lcd.print("T=");
    lcd.print(event.temperature);
    lcd.print("C");
    Serial.print(F("Temperature: "));
    Serial.print(event.temperature);
    Serial.println(F("°C"));
  }
  // Get humidity event and print its value.
```

sketch_jul04a | Arduino 1.8.19

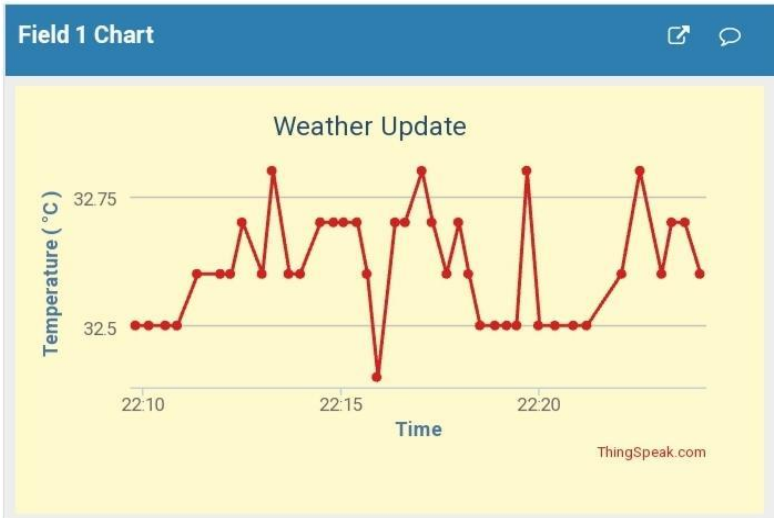
File Edit Sketch Tools Help

sketch_jul04a

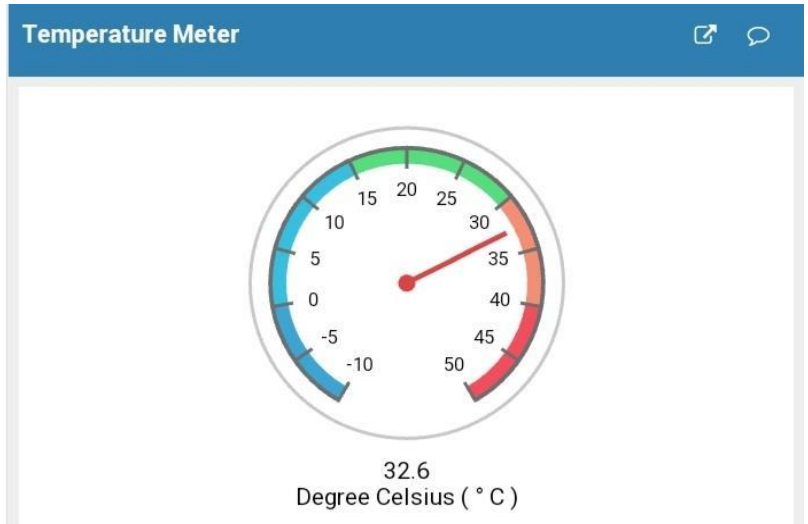
```
  // Delay between measurements.
  delay(delayMS);
  // Get temperature event and print its value.
  sensors_event_t event;
  dht.temperature().getEvent(&event);
  if (isnan(event.temperature)) {
    Serial.println(F("Error reading temperature!"));
  }
  else {
    lcd.begin(16, 1);
    //lcd.clear();
    lcd.setCursor(0,0);
    lcd.print("T=");
    lcd.print(event.temperature);
    lcd.print("C");
    Serial.print(F("Temperature: "));
    Serial.print(event.temperature);
    Serial.println(F("°C"));
  }
  // Get humidity event and print its value.
  dht.humidity().getEvent(&event);
  if (isnan(event.relative_humidity)) {
    Serial.println(F("Error reading humidity!"));
  }
  else {
    Serial.print(F("Humidity: "));
    Serial.print(event.relative_humidity);
    Serial.println(F("%"));
    lcd.setCursor(9,0);
    lcd.print("H=");
    lcd.print(event.relative_humidity);
    lcd.print("%");
  }

}
```

Programming Part

THINGSPEAK OUTPUT



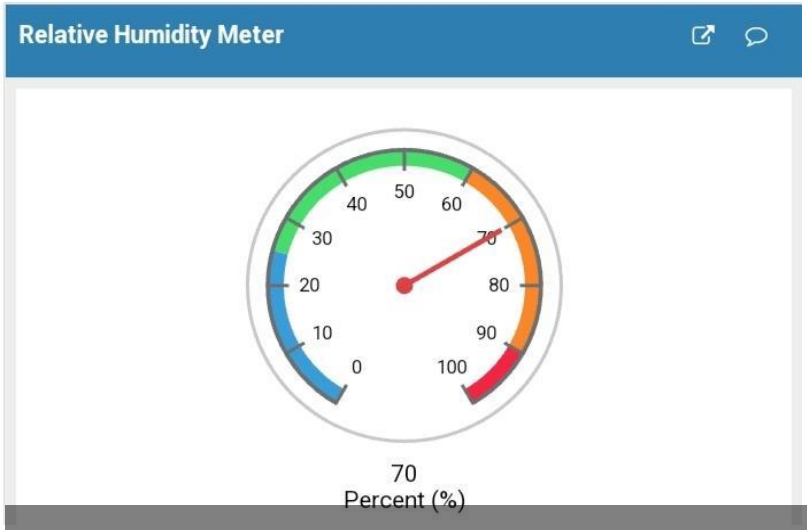
▪Temperature vs time



▪Temperature Meter

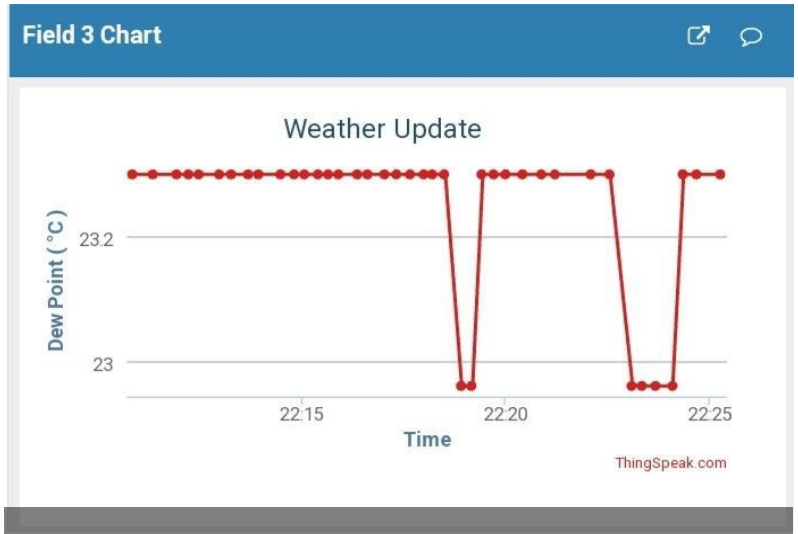
THINGSPEAK OUTPUTS

Relative Humidity vs Time

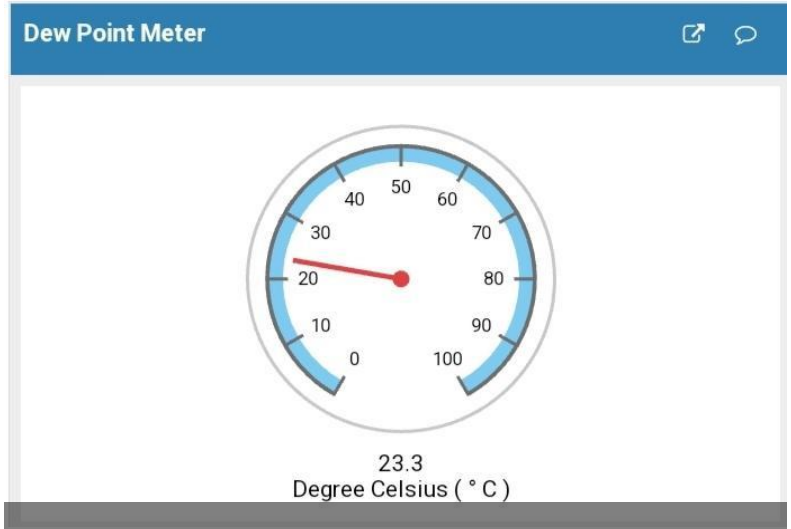


Relative Humidity Meter:

THINGSPEAK OUTPUTS

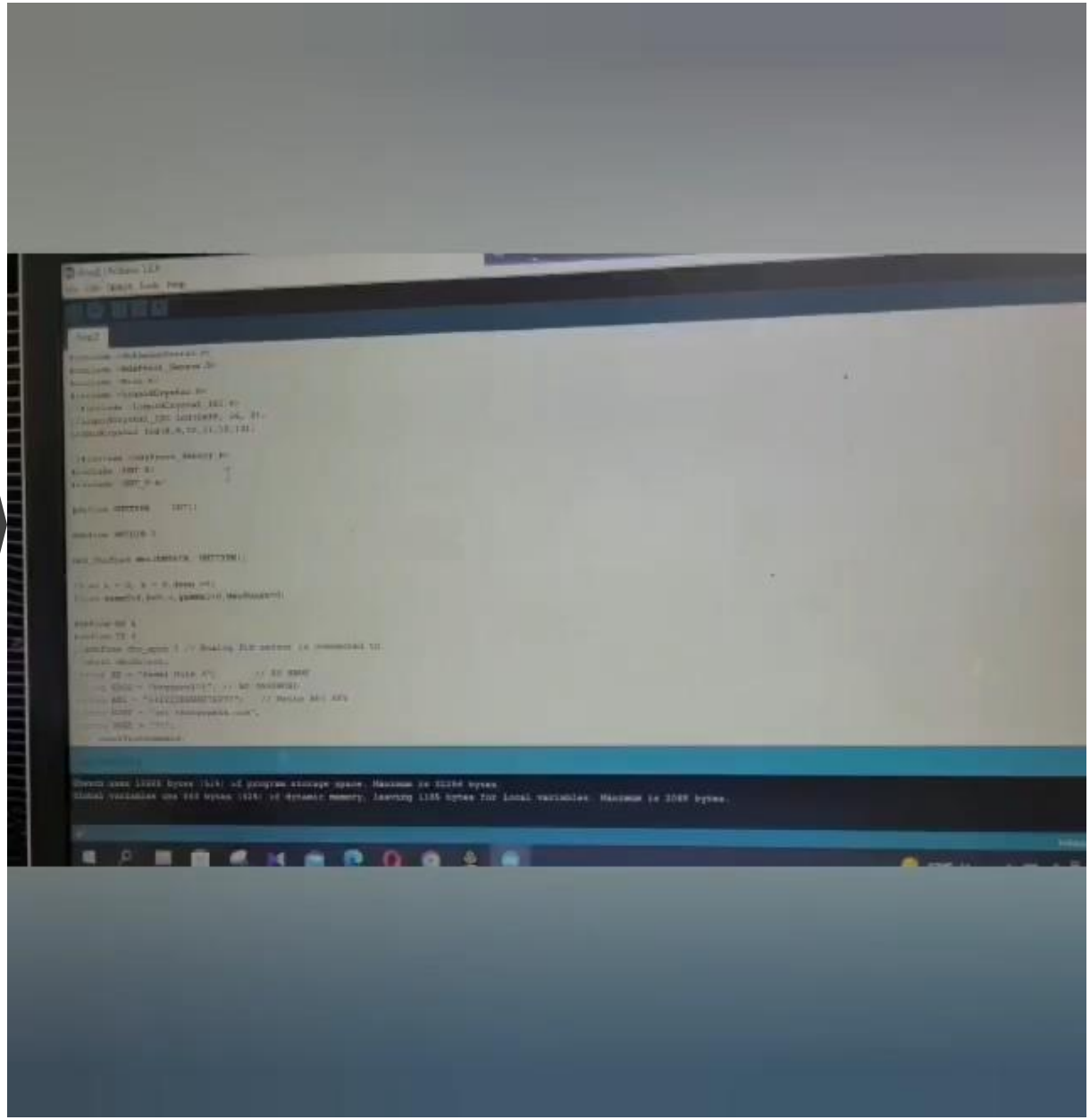


Dew point vs Time



Dew Point Meter:

VIDEO DEMONSTRATION



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THANK YOU