



Tolu Elebute  
100724471

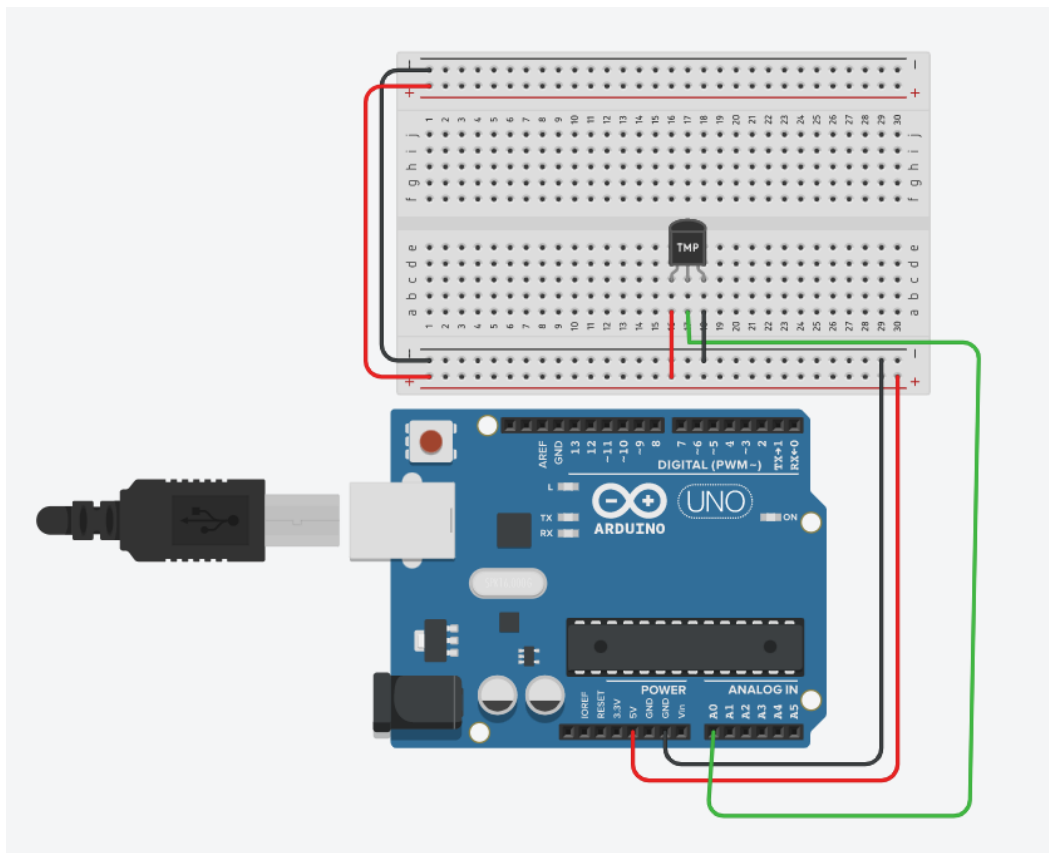
**Presentation Video Link:** <https://vimeo.com/716588307/c5ca3f1b8e>

## Report

For task 2, we were asked to build a complex smart devices that integrates a sensor (DHT11: <https://www.adafruit.com/product/386>) and the microcontroller (ESP32-CAM). Arduino being a microcontroller, I decided to use a virtual arduino that allowed me to do this seeing as I do not have the actual hardware. I used a site called TinkerCad which enables the building of circuits, code and so much more. Below, I will go into the steps I took to make a device that samples input from a temperature and humidity sensor. I will begin with the temperature sensor.

### Temperature Sensor

I used a DHT11 temperature sensor as seen below. Using a breadboard, I connected the ground terminal, the power terminal to the 5V port of the arduino and the Vout terminal to the A0 port of the arduino. The sensor will be outputting its samples in analog form not digital which is why we use the analog inputs.



Now that I had the terminals of the sensor and the arduino correctly connected, I went into the coding part of the task to sample the temperature being read by the sensor. Arduino code is

written in C++. There are typically 2 methods used in setting up and running code for Arduino: `setup()` and `loop()`. `loop()` has the main code.

```
void setup()
{
  //setup
  Serial.begin(9600);
}
```

//9600 is default

I declared all my required variables. `sensePin` variable is declared as the port A0 where we will be receiving input from the sensor. `analogRead()` is a built-in method in Arduino to read this value as seen in the code below and stored in `sensorInput`. Now, I needed a way to convert our value from analog input to temperature output of Celsius. To do this, I did some calculations of multiplying by 5V to get voltage then dividing by 1023. Finally, we subtract an offset of 0.5V and multiply by 100 to get our value to Celsius output. I then printed this value and had this process of printing to be delayed by 1000 milliseconds.

```
// C++ code
//
|
int sensePin = A0;
int sensorInput;
int humidityOutput = 0;

void setup()
{
  //setup
  Serial.begin(9600);
}

void loop()
{
  sensorInput = analogRead(sensePin); //analogRead() is a method for Arduino
  float voltage = sensorInput * 4.68; //multiply by approx 5V to get voltage
  voltage /= 1023.0;
  float temp = (voltage - 0.5) * 100; //Subtract the offset

  Serial.print("Current Temperature: ");
  Serial.println(temp);

  delay(1000);
}
```

## Output in Serial Monitor

Because this is not an actual hardware sensor as it is virtual, the value does not vary. Below is the output.

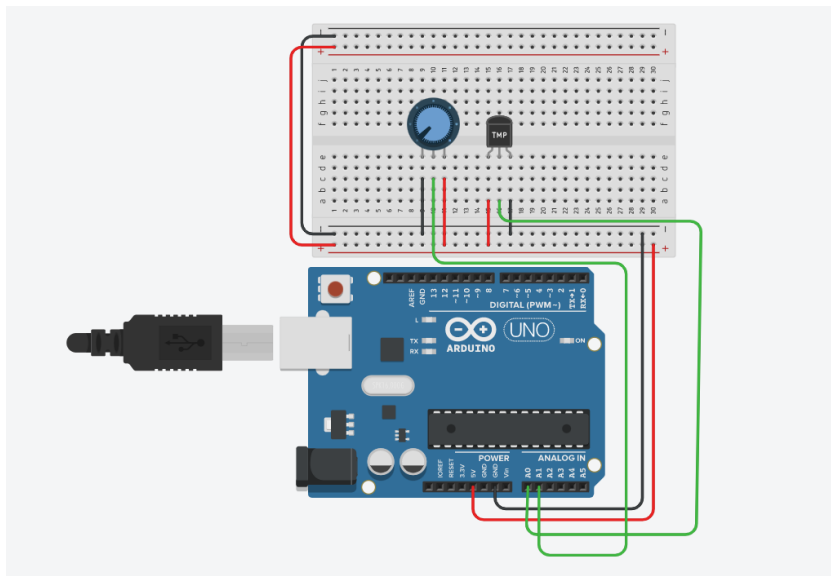


### Serial Monitor

```
Current Temperature: 19.99  
Current Temperature: 19.99  
Current Temperature: 19.99  
Current Temperature: 19.99  
Current Temperature: 19.99  
Current Temperature: 19.99  
Current Temperature: 19.99  
Current Temperature: 19.99
```

## Humidity Sensor

Now, TinkerCad does not have a humidity sensor therefore, I instead used a potentiometer to stimulate values by altering resistance, determining the presence of humidity or not. Low resistance would mean dry soil and higher resistance would mean wetter soil. I connected the corresponding terminals from the potentiometer to the arduino: Ground, 5V Power and A1 Port of the Arduino. Everything is connected, so I moved to the code part.



humidityOutput is the variable I created to store the values being read from the A1 port. The output is to be printed in percentage. I printed the values to range between a certain limit which is what the method map() is for.

```
humidityOutput = analogRead(A1);  
Serial.print("Humidity: ");  
Serial.print(map(humidityOutput, 0, 1023, 10, 70));  
Serial.println("%");
```

## Output

