
Basic Knowledge of Hardware for Artificial Intelligence

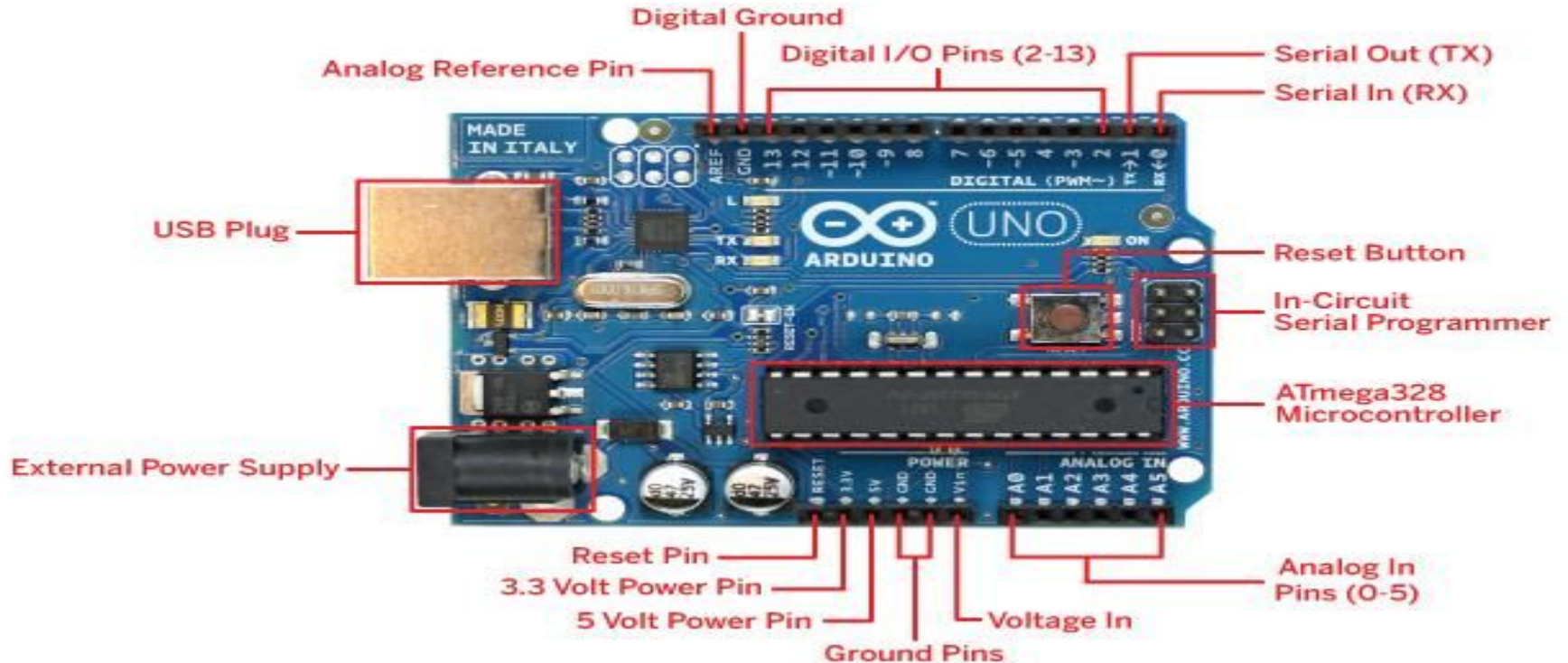
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Arduino

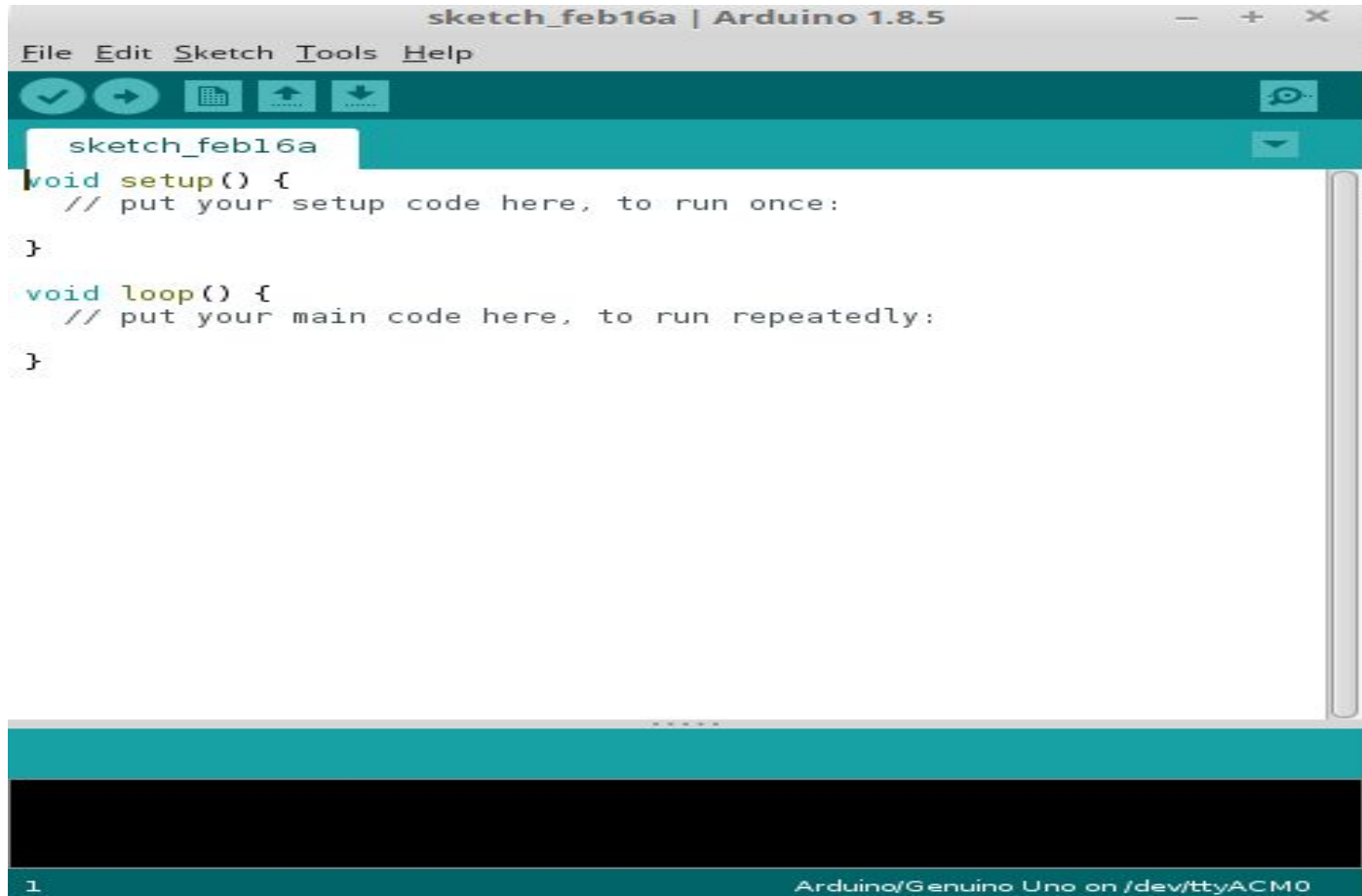
Arduino is a prototype platform (open-source) based on an easy-to-use hardware and software. It consists of a **circuit board**, which can be programmed (referred to as a micro-controller) and a ready-made software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board.



Arduino uno

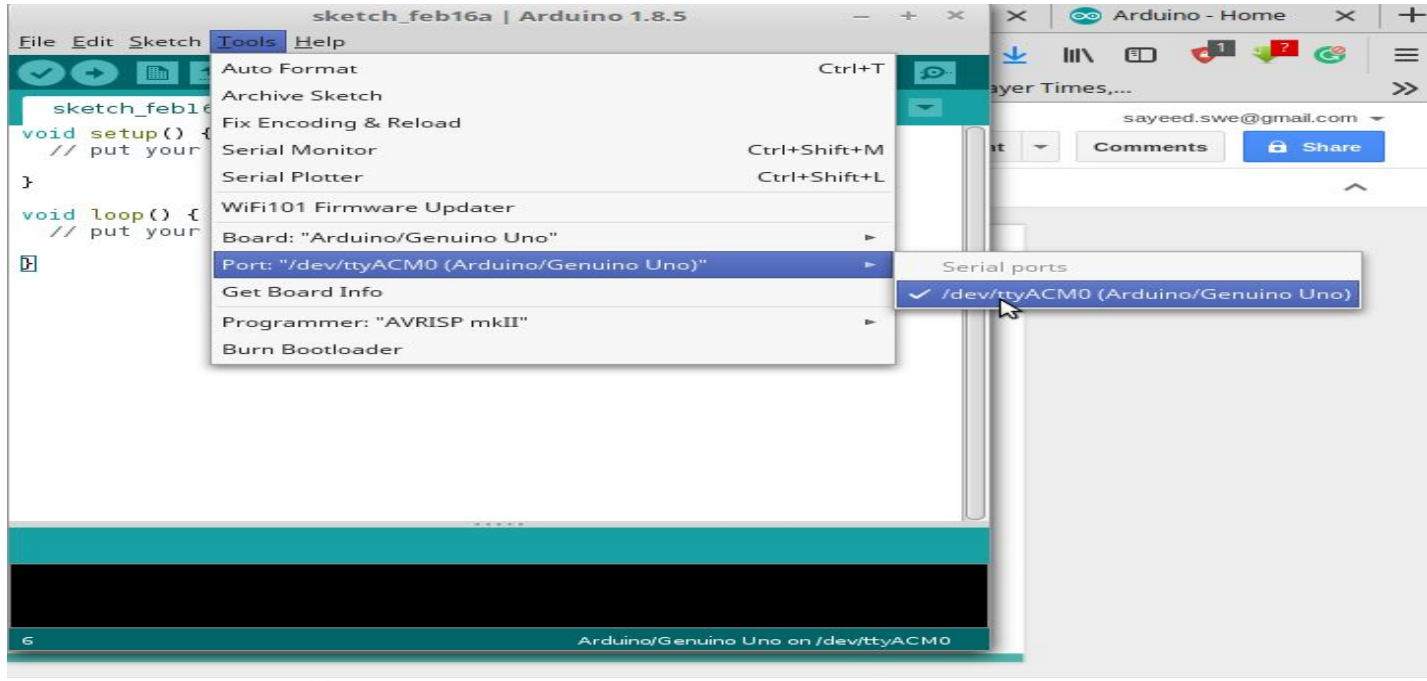


Arduino IDE



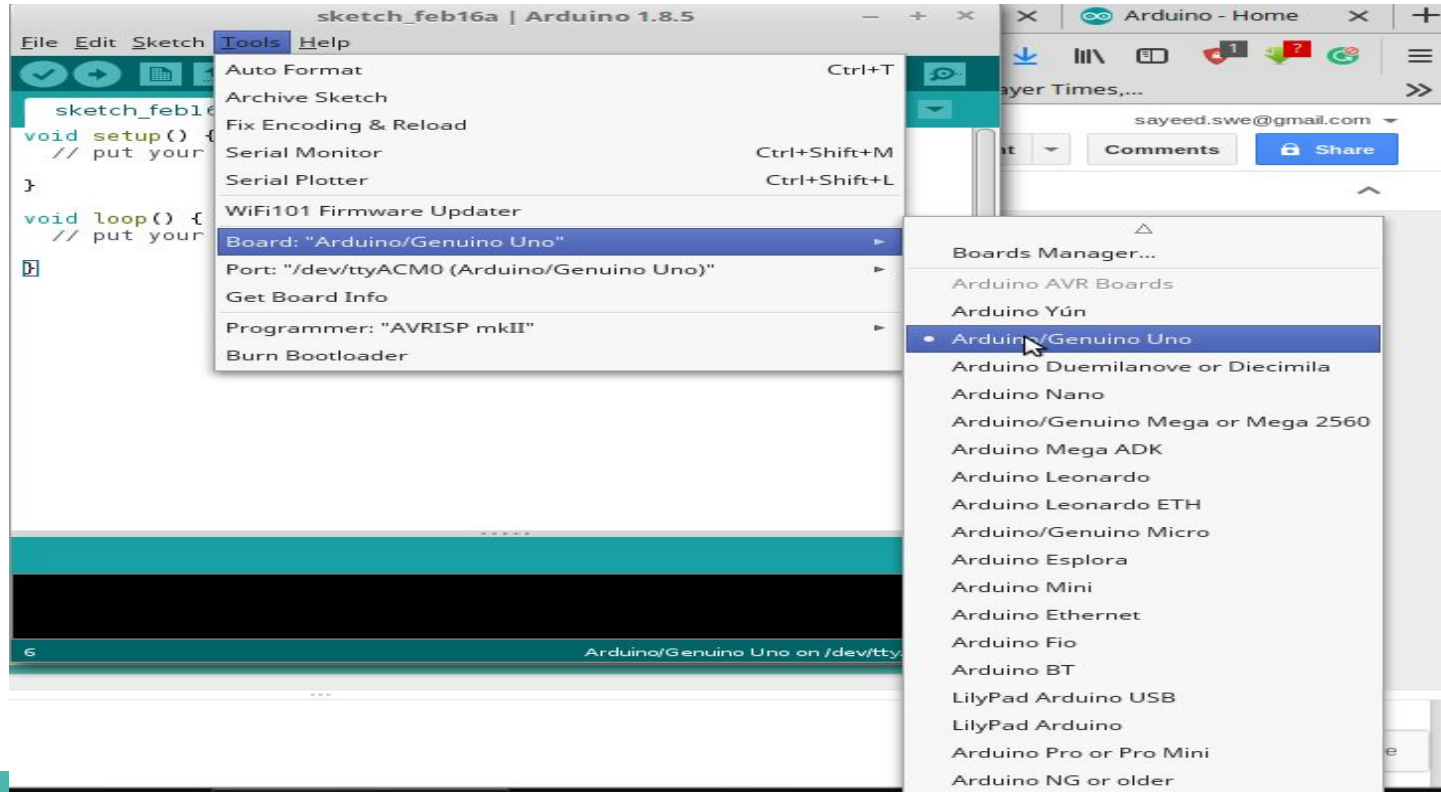
Arduino IDE setting: Check the Serial port

Go to **Arduino IDE -> Tools -> port ->**



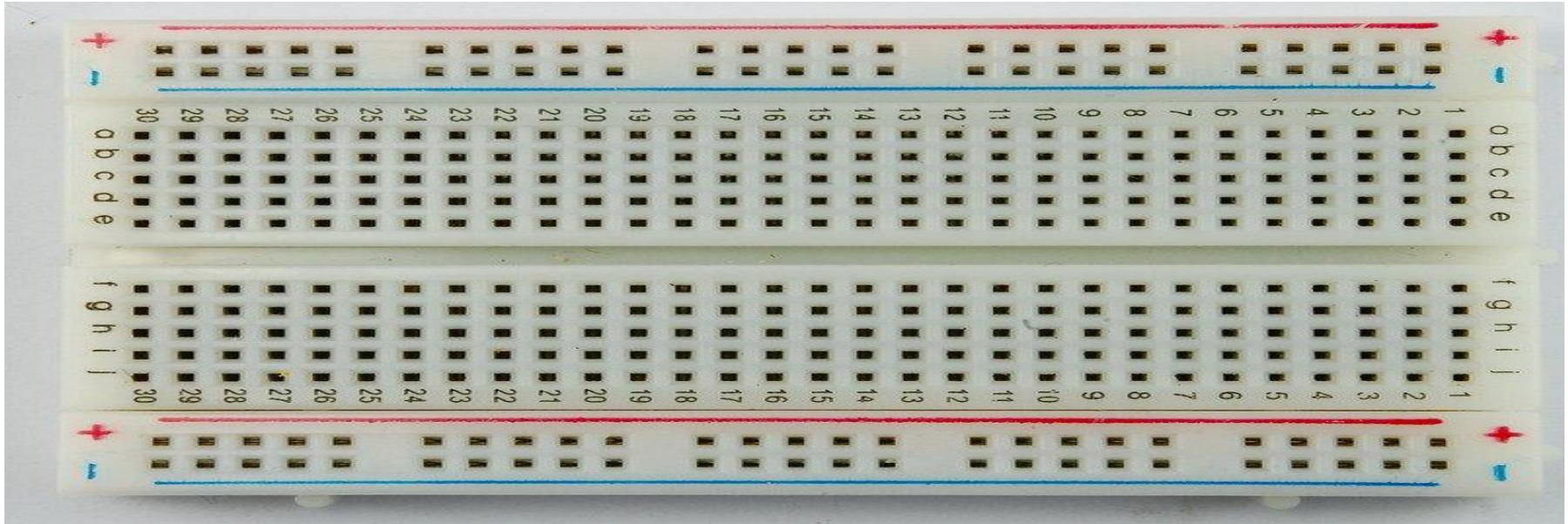
Arduino IDE setting: Check the board

Go to **Arduino IDE -> Tools -> Board ->**



Breadboard

A breadboard is a construction base for prototyping of electronics.

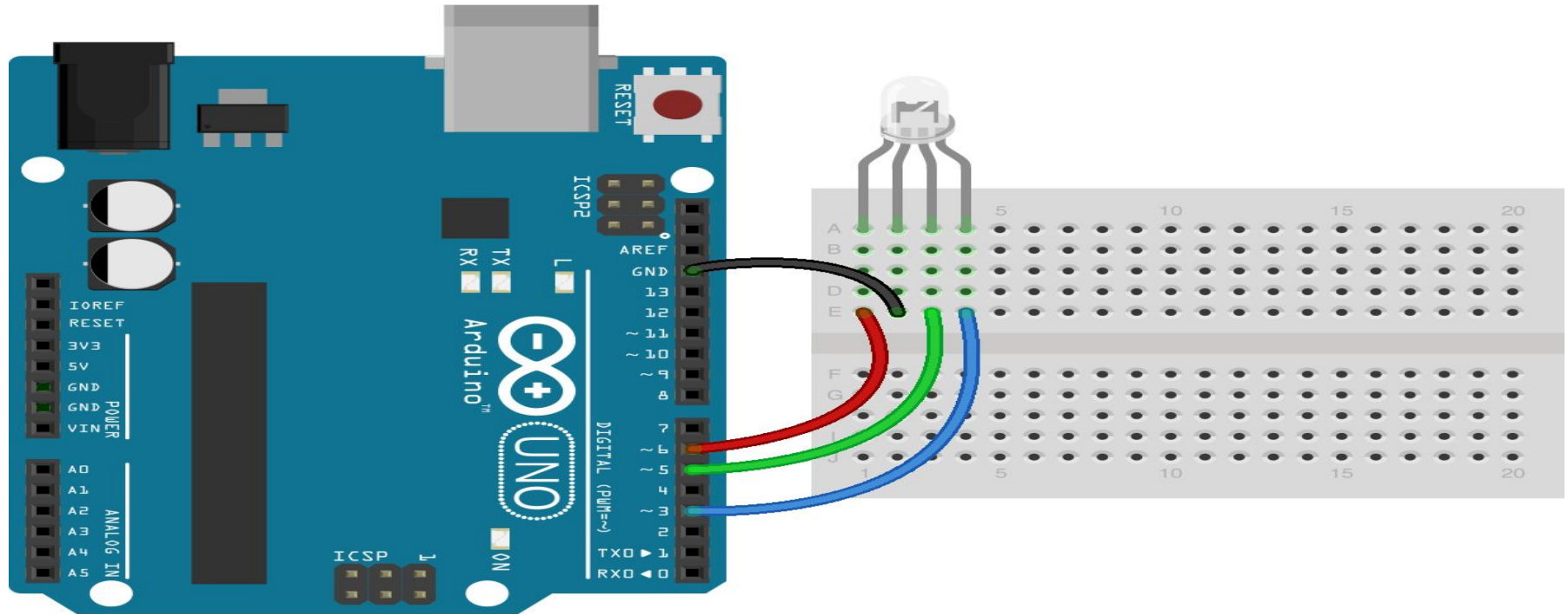


Project-I: Controlling RGB LED with Arduino

Components Required:

- **ARDUINO UNO**
- **RGB LED**
- **Breadboard**
- **Jumper Cables**

Project-I: Controlling RGB LED with Arduino(con..)



Project-I: Controlling RGB LED with Arduino(con..)

```
int ledRed = 6;

int ledBlue = 3;

int ledGreen = 5;

void setup() {

    Serial.begin(9600);

    pinMode(ledRed, OUTPUT);
```

```
    pinMode(ledBlue, OUTPUT);

    pinMode(ledGreen, OUTPUT);

}

void loop() {

    rgbDefault()           // function

};
```

Project-I: Controlling RGB LED with Arduino(con..)

```
void rgbDefault()
{
    digitalWrite(ledRed,HIGH);

    delay(1000);

    digitalWrite(ledRed,LOW);

    delay(1000);

    digitalWrite(ledBlue,HIGH);

    delay(1000);
```

```
    digitalWrite(ledBlue,LOW);

    delay(1000);

    digitalWrite(ledGreen,HIGH);

    delay(1000);

    digitalWrite(ledGreen,LOW);

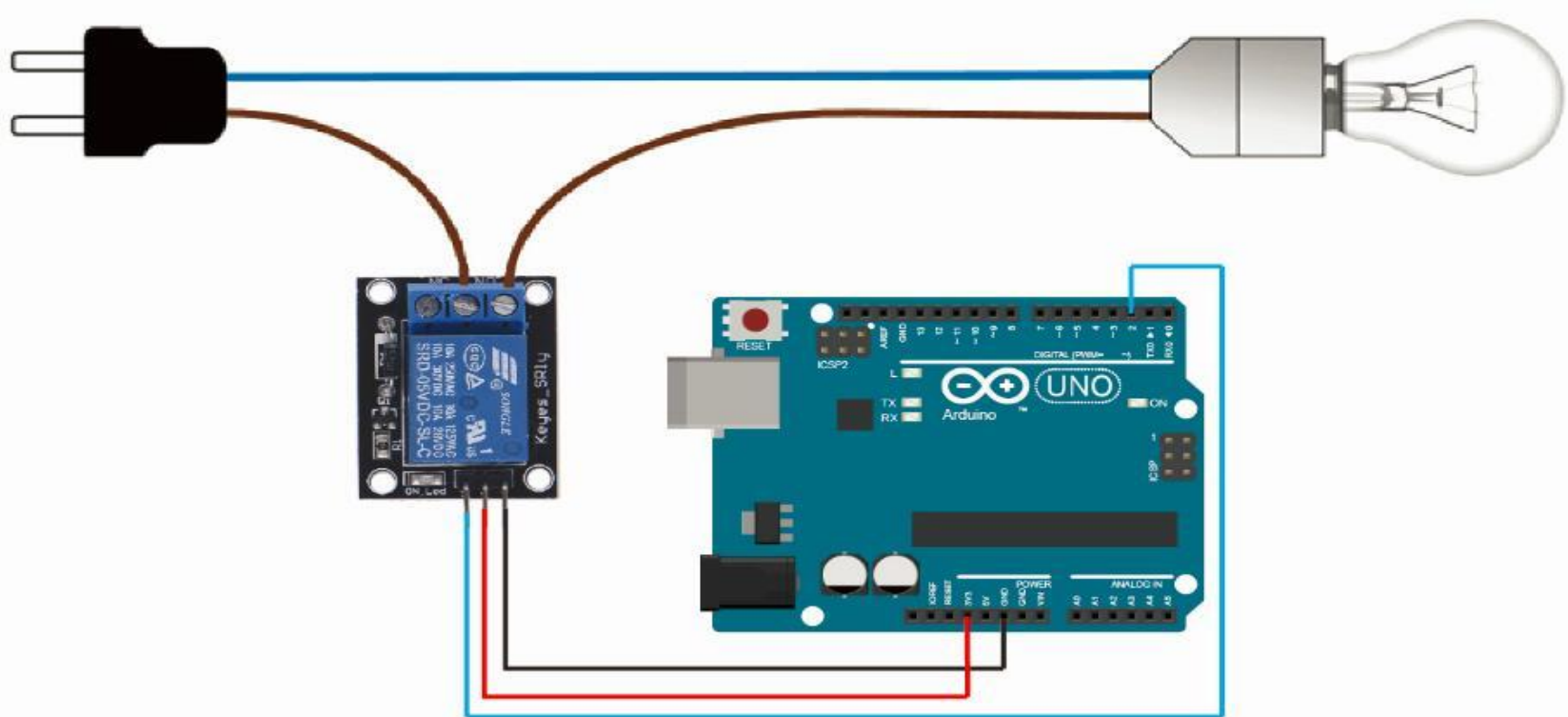
    delay(1000);

}
```

Relay



Project-II: High voltage electrical device Control



Project-II: High voltage electrical device Control(con..)

```
char name;  
  
void setup() {  
    pinMode(2,OUTPUT);  
    digitalWrite(2,HIGH);  
    Serial.begin(9600);  
}
```

```
void loop() {  
    controlElectricalDevice();  
}
```

Project-II High voltage electrical device Control(con..)

```
void controlElectricalDevice(){  
    name = Serial.read();  
    if(name == '5')  
{  
        Serial.println("ON");  
        digitalWrite(2,LOW);  
    }  
}
```

```
    else if(name == '6'){  
        digitalWrite(2,HIGH);  
        Serial.println("OFF");  
    }  
    else{  
        Serial.println("other");  
    }  
    delay(200);  
}
```


Sensors: temperature and humidity (DHT22)

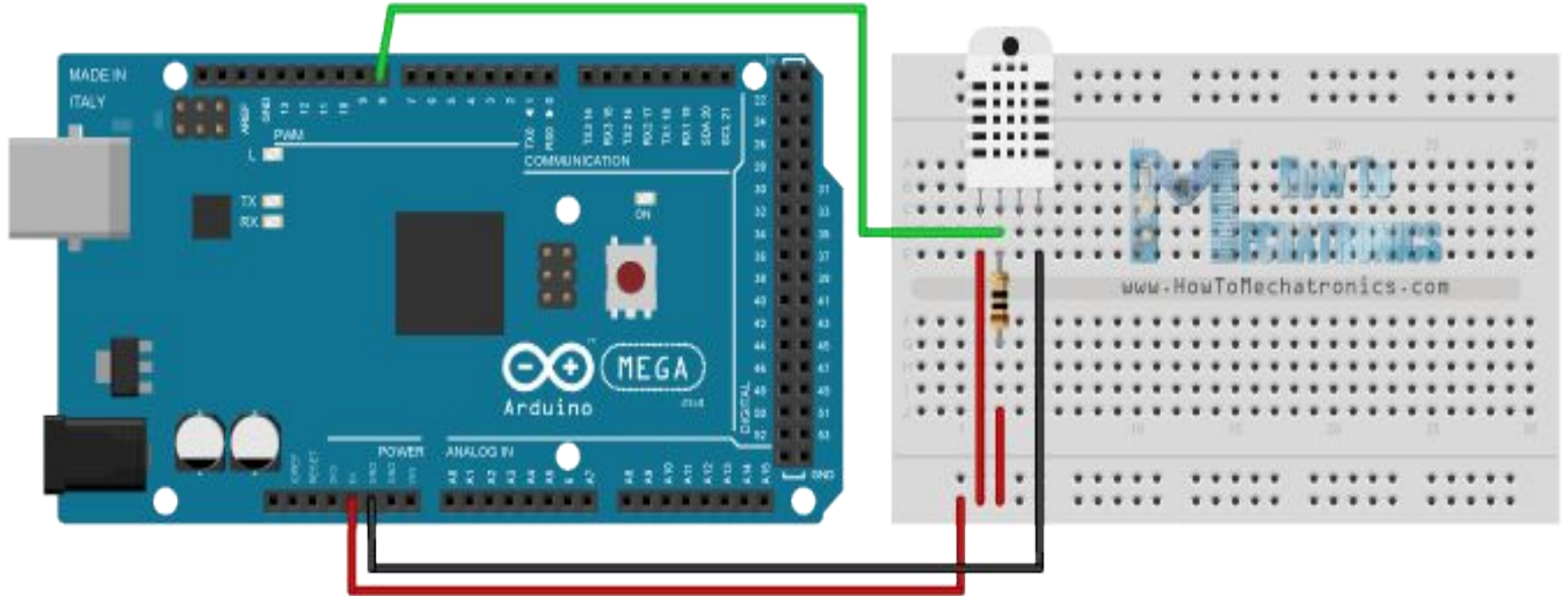


Project-III: Arduino and DHT22

Components Required:

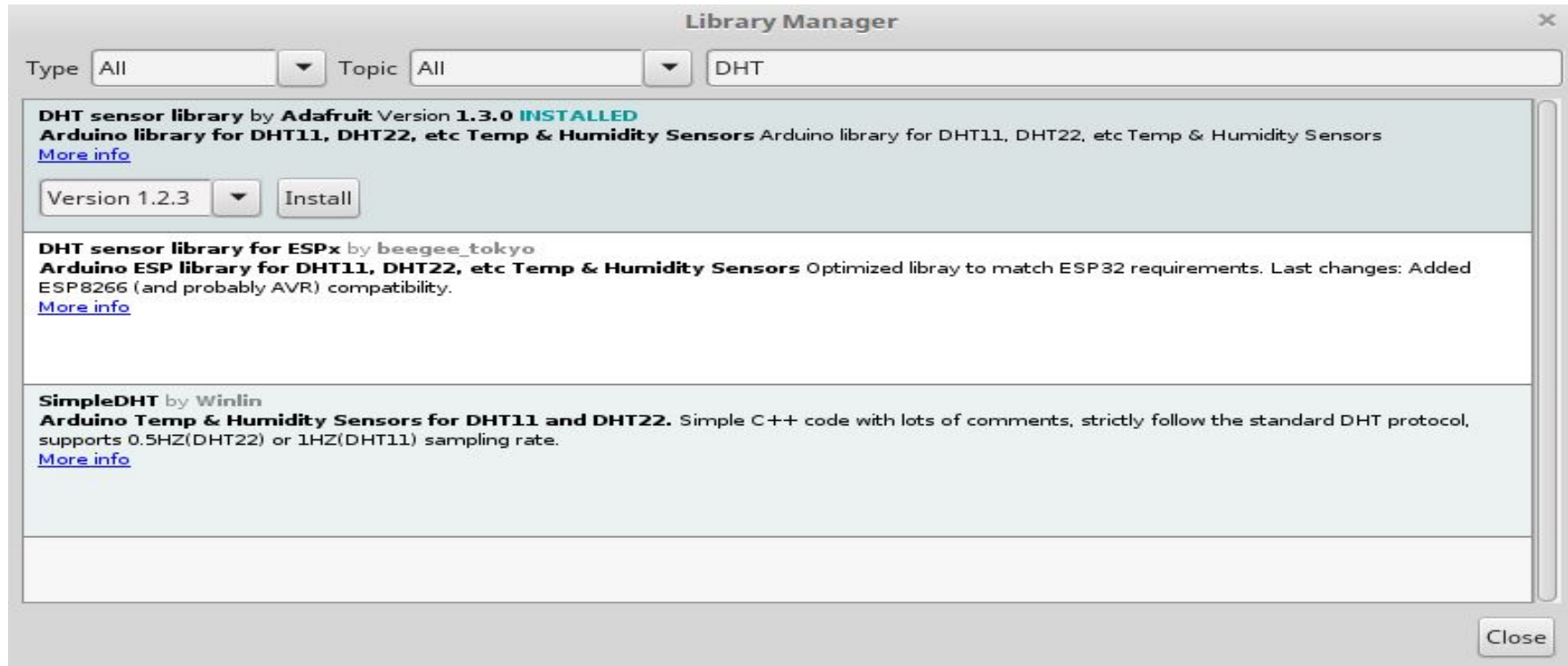
- Arduino uno or Arduino Mega
- Breadboard
- DHT22 sensor
- 10k resistor (10k resistor will connect DHT22 data pin to VCc pin)
- Jumper Wire

Project-III: Arduino and DHT22(con...)



Project-III: Arduino and DHT22

Go to **Arduino IDE -> Include Library -> Manage Libraries**



Project-III: Arduino and DHT22

```
#include <DHT_U.h>

#include <DHT.h>

#define DHTPIN 8

#define DHTTYPE DHT22

DHT dht(DHTPIN, DHTTYPE);

int chk;

float hum;

float temp;
```

```
void setup() {

  Serial.begin(9600);

  dht.begin();

}
```

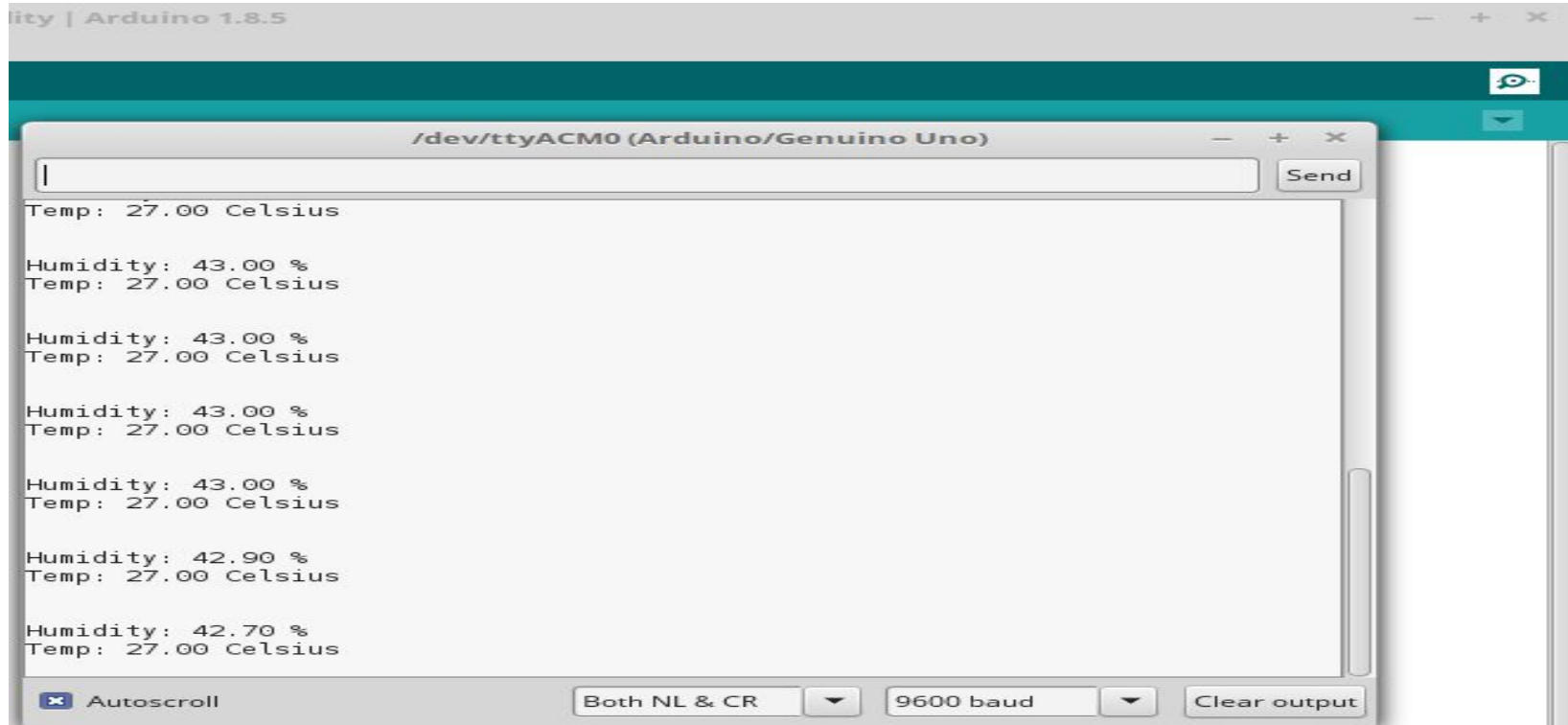
Project-III: Arduino and DHT22

```
void loop() {  
  
  hum = dht.readHumidity();  
  
  temp = dht.readTemperature();  
  
  Serial.print("Humidity: ");  
  
  Serial.print(hum);  
  
  Serial.print(" %");
```

```
    Serial.println();  
  
    Serial.print("Temp: ");  
  
    Serial.print(temp);  
  
    Serial.println(" Celsius");  
  
    delay(2000);  
  
}
```

Project-III: Arduino and DHT22

Output

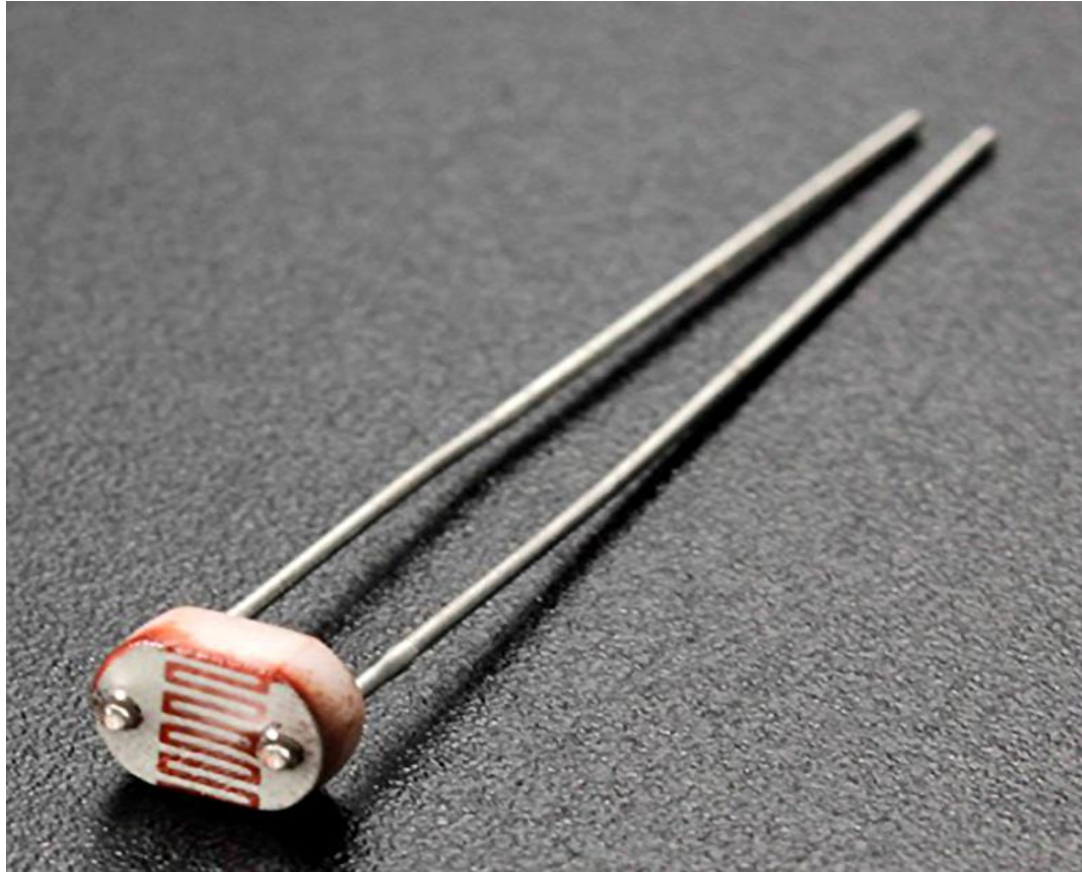


The screenshot shows the Arduino IDE interface with the serial monitor open. The title bar of the serial monitor window reads "/dev/ttyACM0 (Arduino/Genuino Uno)". The output text in the monitor is as follows:

```
Temp: 27.00 Celsius  
Humidity: 43.00 %  
Temp: 27.00 Celsius  
Humidity: 43.00 %  
Temp: 27.00 Celsius  
Humidity: 43.00 %  
Temp: 27.00 Celsius  
Humidity: 42.90 %  
Temp: 27.00 Celsius  
Humidity: 42.70 %  
Temp: 27.00 Celsius
```

At the bottom of the serial monitor window, there are several controls: a checkbox for "Autoscroll" (which is checked), a dropdown menu set to "Both NL & CR", a dropdown menu set to "9600 baud", and a "Clear output" button. A "Send" button is also visible at the top right of the serial monitor window.

Sensor: LDR 5mm PhotoResistor

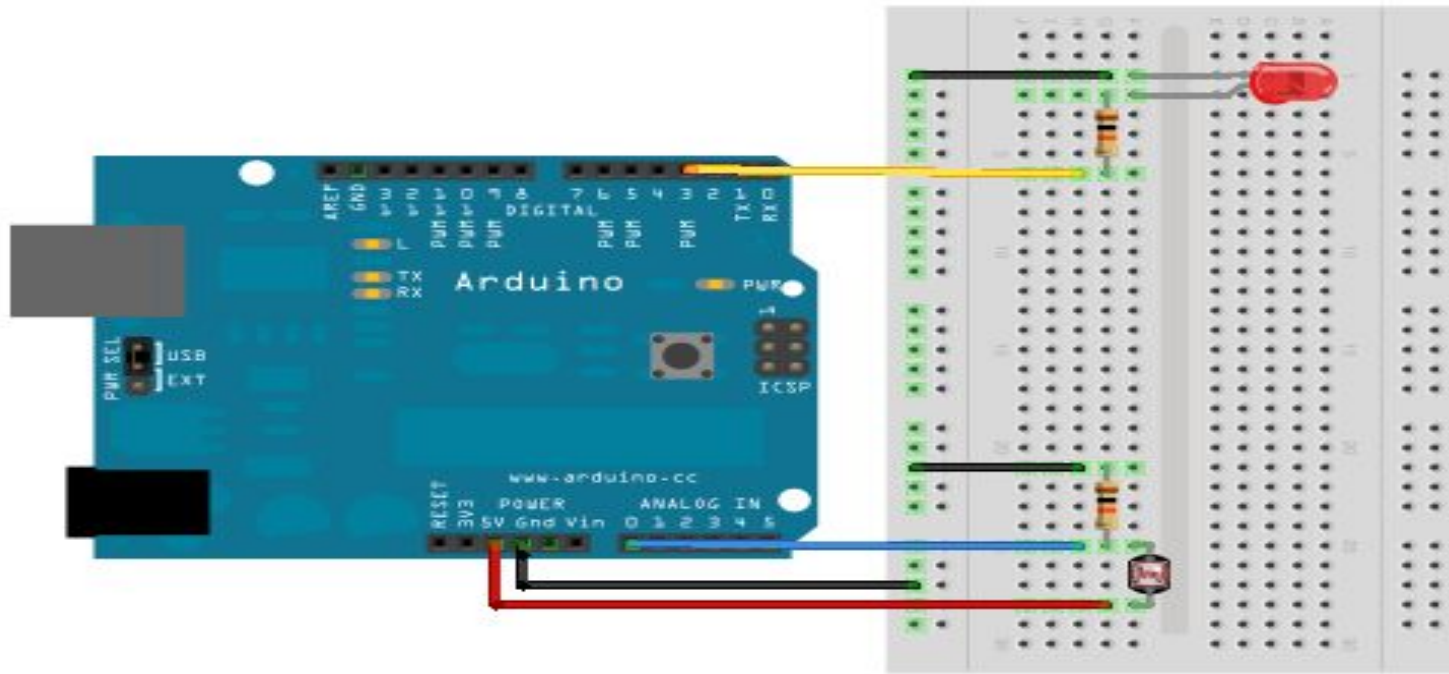


Project-IV: Arduino and PhotoResistor

Components Required:

- Arduino uno or Arduino Mega
- Breadboard
- LED Light
- LDR 5mm Photoresistor
- 220 ohm resistor (220 Ω will connect LED pin to serial pin)
- 10K resistor (10k resistor will connect LDR pin to GND)

Project-IV: Arduino and PhotoResistor(con...)



Project-IV: Arduino and PhotoResistor

```
int ledPin = 3;

int sensorPin= A0;

void setup() {

    // put your setup code here, to run once:

    Serial.begin(9600);

    pinMode(ledPin,OUTPUT);

    pinMode(sensorPin,INPUT);

}
```

```
void loop() {

    int sensorValue = analogRead(sensorPin);

    if (sensorValue <= 300){

        digitalWrite(ledPin,HIGH);

        Serial.println("LED is ON");

    }else{

        digitalWrite(ledPin,LOW);

        Serial.println("LED is OFF");

    }

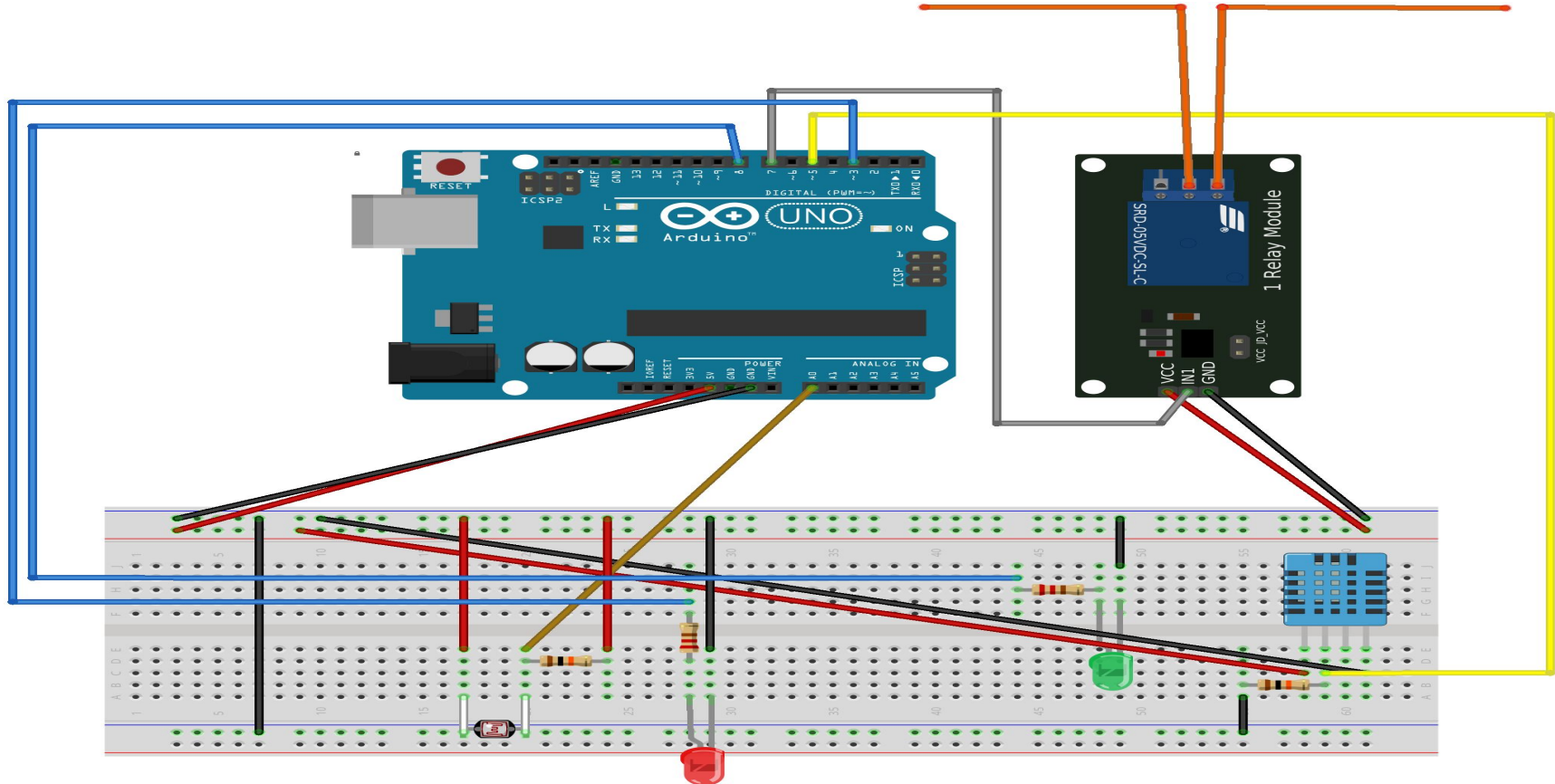
}
```


Artificial Intelligence Project

Now, we will create an agent. It will have a range and will find the wet thing in its range and will dry if it gets. Such as



Project: False Towel



Project: False Towel - Agent Function

```
int falseTowelFunction(int ldrValue, float  
humidity, float temperature){
```

```
    if((ldrValue <= 300) and (humidity>65.00)){
```

```
        return 1;
```

```
// '1' means PhotoResister dark value is under  
300 and human's hand humidity upper 65.00.  
So,dry machine and red light will be ON.
```

```
    }
```

```
else if((ldrValue <= 300) and  
(humidity<65.00)){
```

```
    return 2;
```

```
// '2' means PhotoResister dark value is under  
300 and human's hand humidity under 65.00.  
So,dry machine will OFF but green light will be  
ON.
```

```
    }
```

Project: False Towel - Agent Function(con...)

```
else{  
  
    return 0;  
  
    // '0' means PhotoResister dark value is upper  
    300 and human's hand humidity under 65.00.  
    So,dry machine and light are OFF.  
  
    }  
  
}  
  
//Note: We have assumed that 65 value is  
ideal humidity value for the human hand.
```

Supported Links

1. <https://www.arduino.cc/>
2. <http://www.instructables.com/id/Multiple-Blinking-LED-on-the-Arduino/>
3. <https://learn.adafruit.com/adafruit-arduino-lesson-3-rgb-leds/arduino-sketch>
4. <http://www.instructables.com/id/DIY-Relay-switch-motor-controller-Arduino/>
5. <http://howtomechatronics.com/tutorials/arduino/control-high-voltage-devices-arduino-relay-tutorial/>
6. <http://howtomechatronics.com/tutorials/arduino/dht11-dht22-sensors-temperature-and-humidity-tutorial-using-arduino/>
7. <https://www.youtube.com/watch?v=4fN1aJMH9mM>

Supported Links

1. <https://blog.udemy.com/arduino-ldr/>
2. <http://arduino.sundh.com/2013/02/photoresistor-controlling-led/>

Thank You