



IoT Fundamentals – ECE3501

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Lab Task – 1

To: Prof. Suresh Chavhan

TASK - I

Aim

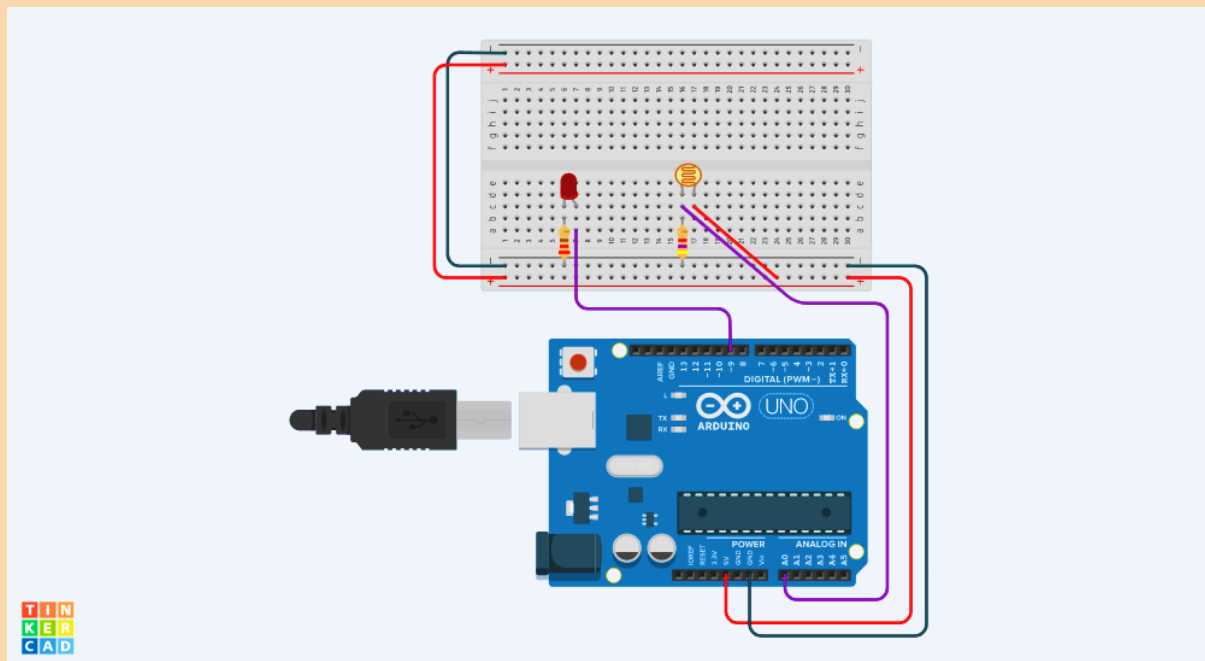
To design a circuit using Arduino for detecting the intensity of light using a photo sensor and plot it with respect to time

Tools Required

Tinkercad – for simulating the connection and coding of the Arduino circuit

ThingSpeak – for plotting the graph

Circuit Diagram

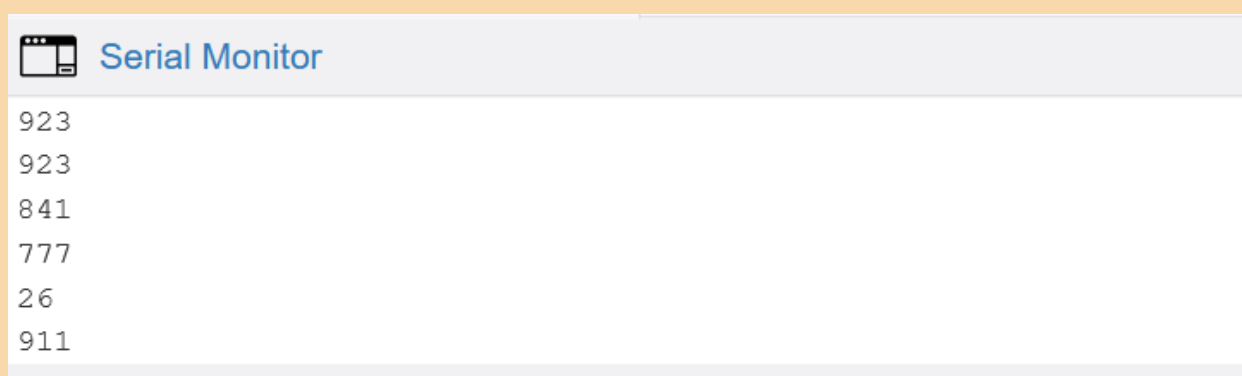


Flow diagram



*Wait seconds was changed from 0.1 to 1 seconds (precision was reduced) for easier representation of plotting

Output from Tinkercad



Code

```
int S = 0;

void setup()
{
    pinMode(A0, INPUT);
    Serial.begin(9600);
    pinMode(9, OUTPUT);
}

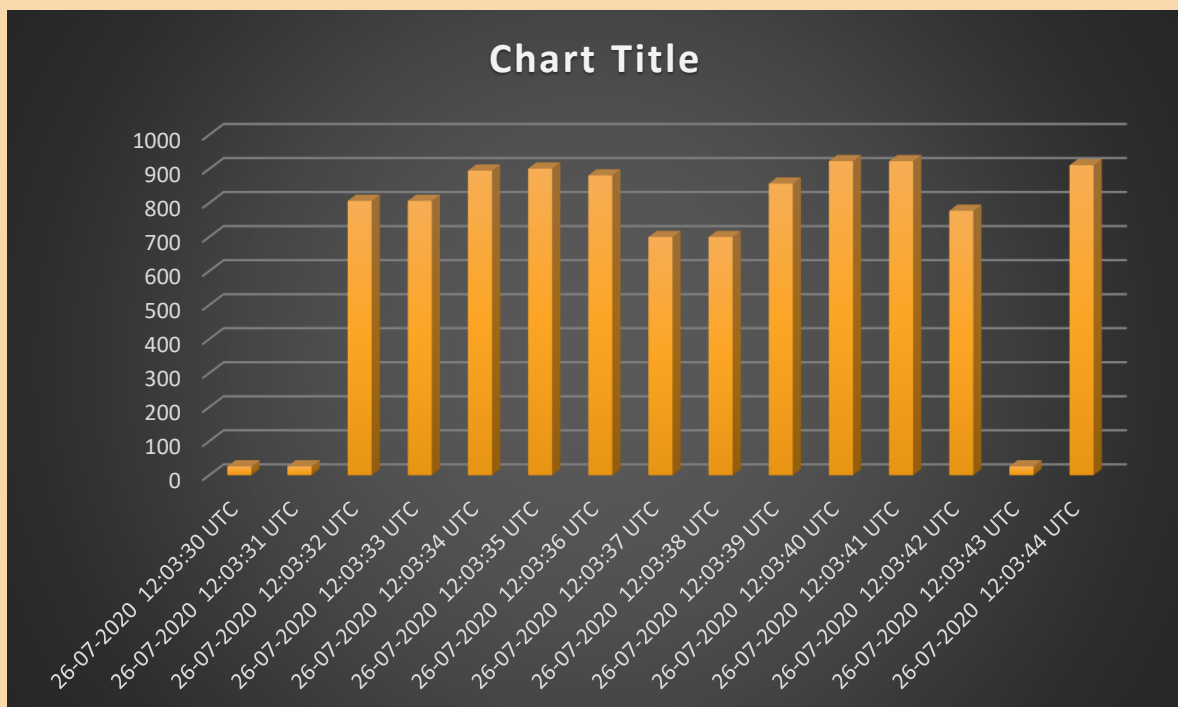
void loop()
{
    // Read the value from Sensor
    S = analogRead(A0);
    // Print the value from Sensor
    Serial.println(S);
    // Map reading to LED
    analogWrite(9, map(S, 0, 1023, 0, 255));
    delay(1000);
    // Wait for 1000 millisecond(s)
}
```

Observations

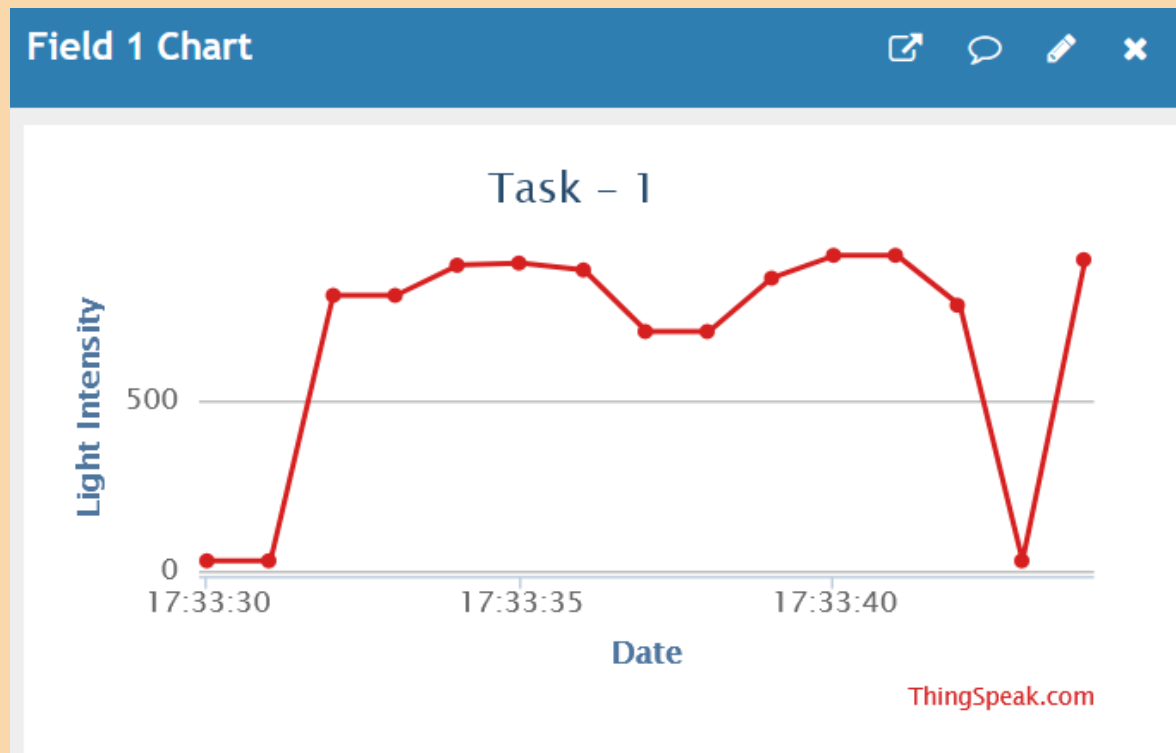
datetime	field1	latitude	longitude	elevation	status
26-07-2020 12:03:30 UTC	26	-89	155.6	22	Awake
26-07-2020 12:03:31 UTC	26	0.5	-170	23	Awake
26-07-2020 12:03:32 UTC	806	90	0	24	Awake
26-07-2020 12:03:33 UTC	806	70	10	25	Awake
26-07-2020 12:03:34 UTC	895	80	20	26	Awake
26-07-2020 12:03:35 UTC	901	40	30	27	Awake
26-07-2020 12:03:36 UTC	881	50	40	28	Awake
26-07-2020 12:03:37 UTC	700	60	50	29	Awake
26-07-2020 12:03:38 UTC	700	20	60	30	Awake
26-07-2020 12:03:39 UTC	857	30	70	31	Awake
26-07-2020 12:03:40 UTC	923	10	80	32	Awake
26-07-2020 12:03:41 UTC	923	30	90	33	Awake
26-07-2020 12:03:42 UTC	777	50	100	34	Awake
26-07-2020 12:03:43 UTC	26	60	110	35	Awake
26-07-2020 12:03:44 UTC	911	70	120	36	Awake

*Only field1 contains observed values, other values are random and do not affect the graph

Output from Excel



Output from ThingSpeak

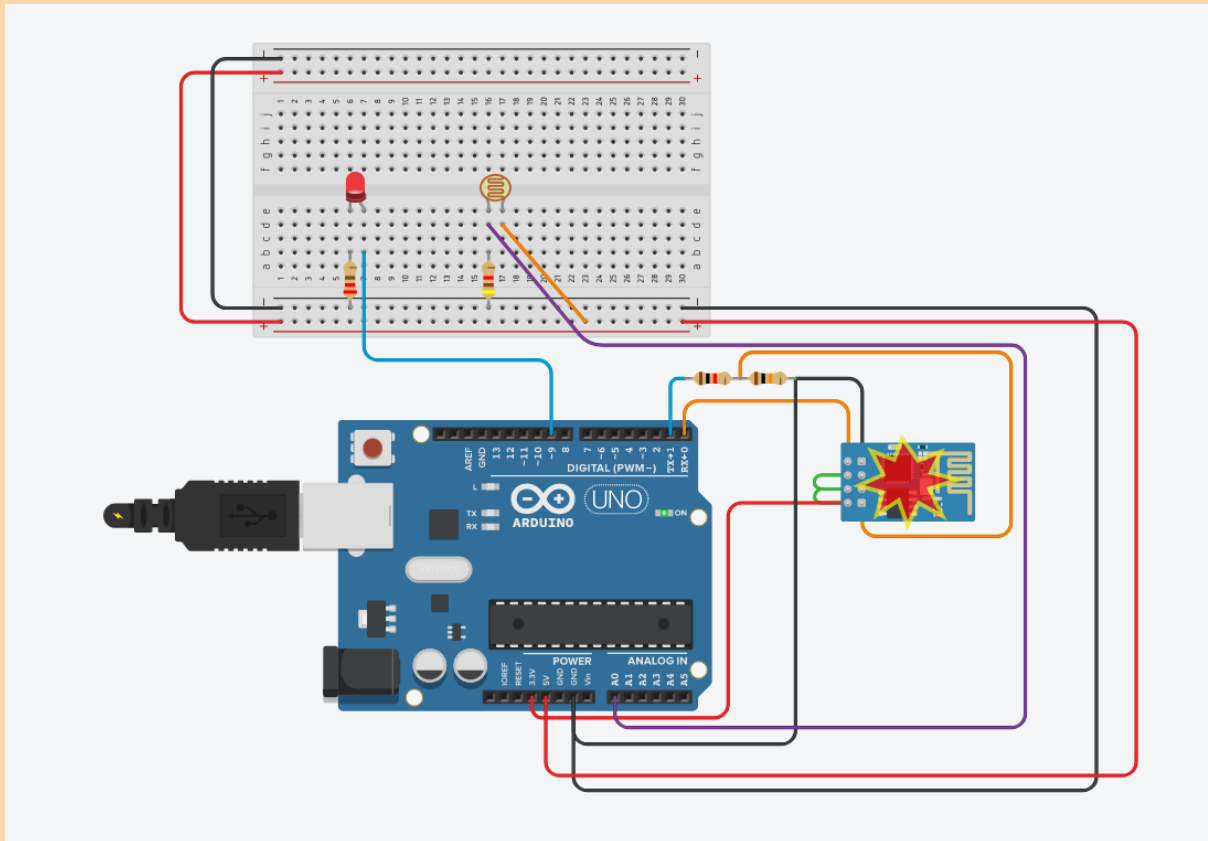


Conclusion

Therefore, by using Tinkercad, we simulated a circuit for measuring the light intensity and by recording the output in a csv file, we can plot it using ThingSpeak.

TASK – I: WITH WIFI MODULE

Modified Circuit Diagram



Code

```
String ssid      = "Simulator Wifi"; // SSID to  
connect to
```

```
String password = ""; // Our virtual wifi has no  
password
```

```
String host      = "api.thingspeak.com"; // Open
Weather Map API

const int httpPort  = 80;

String          uri                               =
"/update?api_key=3Q88GUPEY53X3DNH&field1=";

int setupESP8266(void) {
    // Start our ESP8266 Serial Communication

    Serial.begin(115200);    // Serial connection
over USB to computer

    Serial.println("AT");    // Serial connection
on Tx / Rx port to ESP8266

    delay(10);              // Wait a little for the ESP
to respond

    if (!Serial.find("OK")) return 1;

    // Connect to 123D Circuits Simulator Wifi

    Serial.println("AT+CWJAP=\"" + ssid + "\",\""
+ password + "\"");

    delay(10);              // Wait a little for the ESP
to respond

    if (!Serial.find("OK")) return 2;
```



```
// Open TCP connection to the host:

Serial.println("AT+CIPSTART=\"TCP\", \" " +
host + "\", \" " + httpPort);

delay(50);          // Wait a little for the ESP
to respond

if (!Serial.find("OK")) return 3;

return 0;

}

void anydata(void) {

    int temp = analogRead(A0);
    analogWrite(9, map(temp, 0, 1023, 0, 255));
    // Construct our HTTP call
    String httpPacket = "GET " + uri + String(temp)
+ " HTTP/1.1\r\nHost: " + host + "\r\n\r\n";
    int length = httpPacket.length();

    // Send our message length
    Serial.print("AT+CIPSEND=");
    Serial.println(length);
```

```
    delay(10); // Wait a little for the ESP to  
    respond if (!Serial.find(">")) return -1;
```

```
    // Send our http request
```

```
    Serial.print(httpPacket);
```

```
    delay(10); // Wait a little for the ESP to  
    respond
```

```
    if (!Serial.find("SEND OK\r\n")) return;
```

```
}
```

```
void setup() {  
    setupESP8266();
```

```
}
```

```
void loop() {  
    anydata();  
    delay(1000);  
}
```

Output from TinkerCad



Serial Monitor

```
AT+CIPSEND=86
GET /update?api_key=3Q88GUPEY53X3DNH&field1=911 HTTP/1.1
Host: api.thingspeak.com

AT+CIPSEND=86
GET /update?api_key=3Q88GUPEY53X3DNH&field1=822 HTTP/1.1
Host: api.thingspeak.com

AT+CIPSEND=86
GET /update?api_key=3Q88GUPEY53X3DNH&field1=822 HTTP/1.1
Host: api.thingspeak.com

AT+CIPSEND=85
GET /update?api_key=3Q88GUPEY53X3DNH&field1=23 HTTP/1.1
Host: api.thingspeak.com

AT+CIPSEND=85
GET /update?api_key=3Q88GUPEY53X3DNH&field1=23 HTTP/1.1
Host: api.thingspeak.com
```

Output from ThinkSpeak

