Student Name:	ZHIJUN ZHAO
Maynooth ID:	20122578

Student Name:	赵智钧
Fuzhou University ID:	832002129

Laboratory 3:
A Simple Light Sensor System

Part 1:Experimental equipment and devices

List

1.Arduino UNO 2. Breadboard 3. Resistors 4. Light-dependent resistor(LDR)

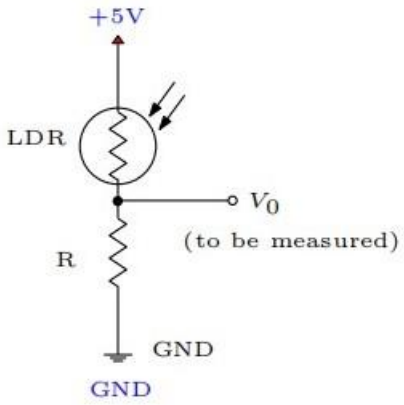
A brief background of the LDR : LDRs are commonly made from cadmium sulphide, but also from selenium, aluminium sulphide, lead sulphide and bismuth sulphide. These materials have the property of rapidly decreasing in resistance when irradiated by light of a specific wavelength. This is due to the light generated by the carriers are involved in the conductivity, in the role of the external electric field for drift movement, electrons run to the positive end of the power supply, holes run to the negative end of the power supply, so that the resistance of the photoresistor quickly drop.

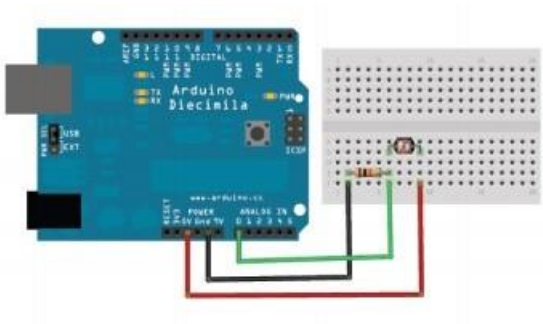
Part 2:Experimental content

the lab is about: *Implementing a circuit to capture a signal from a light sensor to measure ambient light.*

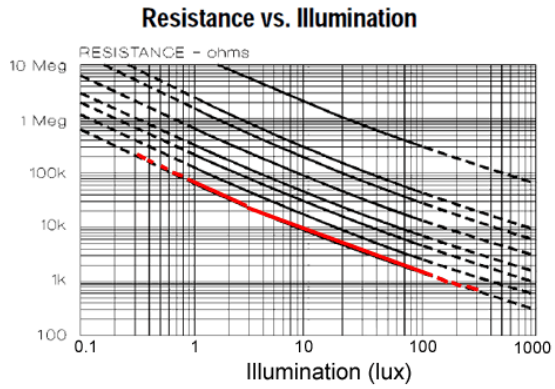
Part 3:Experimental procedure and results

I.





1. Connect the circuit as shown in the diagram above and we get two resistors **4.7kΩ** and **10kΩ**.
2. By measuring the V_0, we can get the voltage of LDR is 5-V_0, and the current I is V_0/R_0, so we can get the resistor of LDR is (5-V_0)/I. By using the following between illumination and resistance of LDR we can get the illuminance.



II.

1. Using oscilloscope to visualize V_0 and covering the LDR properly to have diffrrent light levels.
When the surrounding light is normal(R0 is 4.7kΩ), the V_0 is about 2.22V. When light is dark , the V_0 is about 0.57V. When light is bright, the V_0 is about 4.19V.
2. If the ambient light intensity is stable, the amplitude of V_0 will hardly change, but if the ambient light intensity is suddenly changed, the amplitude of V_0 will change suddenly and at a very fast rate.

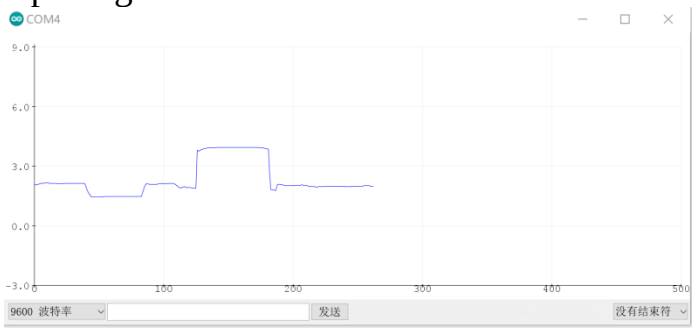
III.

Code:

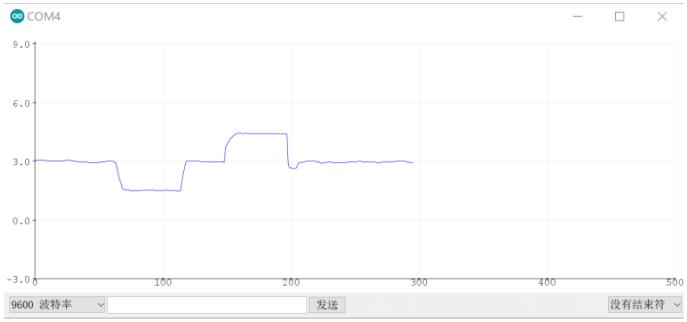
```
void setup() {
  Serial.begin(9600);
}
void loop() {
  float sensorValue = analogRead(A0);
  sensorValue=sensorValue*5/1024;
  Serial.println(sensorValue);
  delay(100);
}
```

IV.

Opening the serial monitor to see the value of V_0.



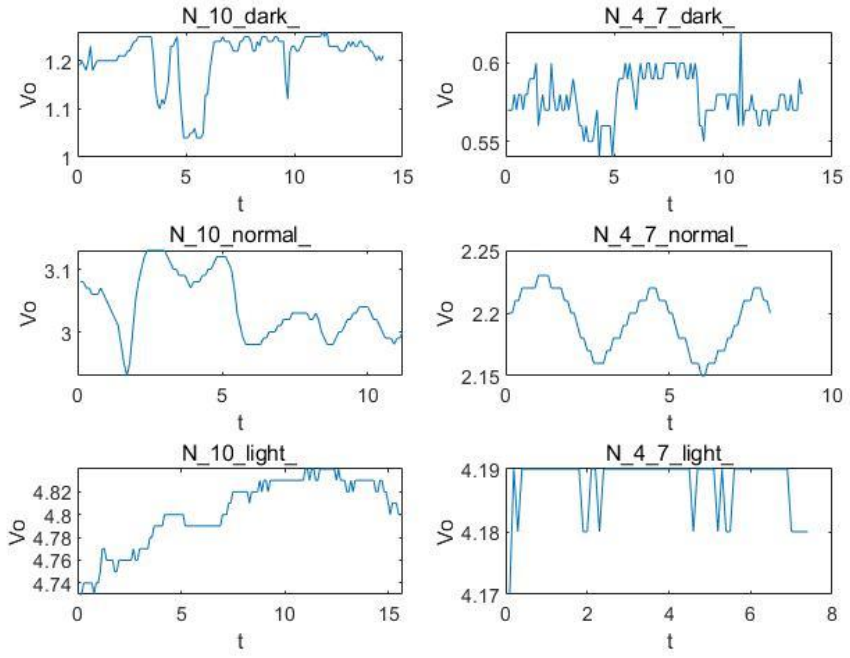
R_0=4.7kΩ



R_0=10kΩ

V.

Using matlab to plot V_0.



VI.

Using matlab to caculate the resistors of LDR(the code is as follows).

	Dark	Normal	Bright
R_0=4.7KΩ	$3.6 \times 10^4\Omega$	$6.4 \times 10^3\Omega$	$9.1 \times 10^2\ \Omega$
R_0=10kΩ	$3.1 \times 10^4\Omega$	$6.0 \times 10^3\Omega$	$4.1 \times 10^2\Omega$

Taking the R_0=4.7kΩ and the light is normal as an example, by refering the "Reistance VS. Illumination" we can get the illumination is about 15lux.

Code：

```
delay=0.1;
R=4700;
aVo=mean(N_4_7_normal_);
I=aVo/R;
LDR=(5-aVo)/I;
```

VII.

See IV,V,VI for specific data .When R=10kΩ. By comparing the dates , we can get a result that as the value of R0 is bigger, the value of V_0 and RLDR is small in the same surrounding light.

Part 4: A summary of what you gained in the lab.

Summary :Through this experiment, we learned about the operating characteristics of the LDR and how to collect the voltage signal when the circuit is operating through the arduino and deduce the illuminance from the "Resistance VS. Illuminance", and we also learned about the effect of different external resistor conditions on the operation of the LDR.