

# Arduino Casebook

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Tianyi Zhang, Xuejun Yu, Bin Song

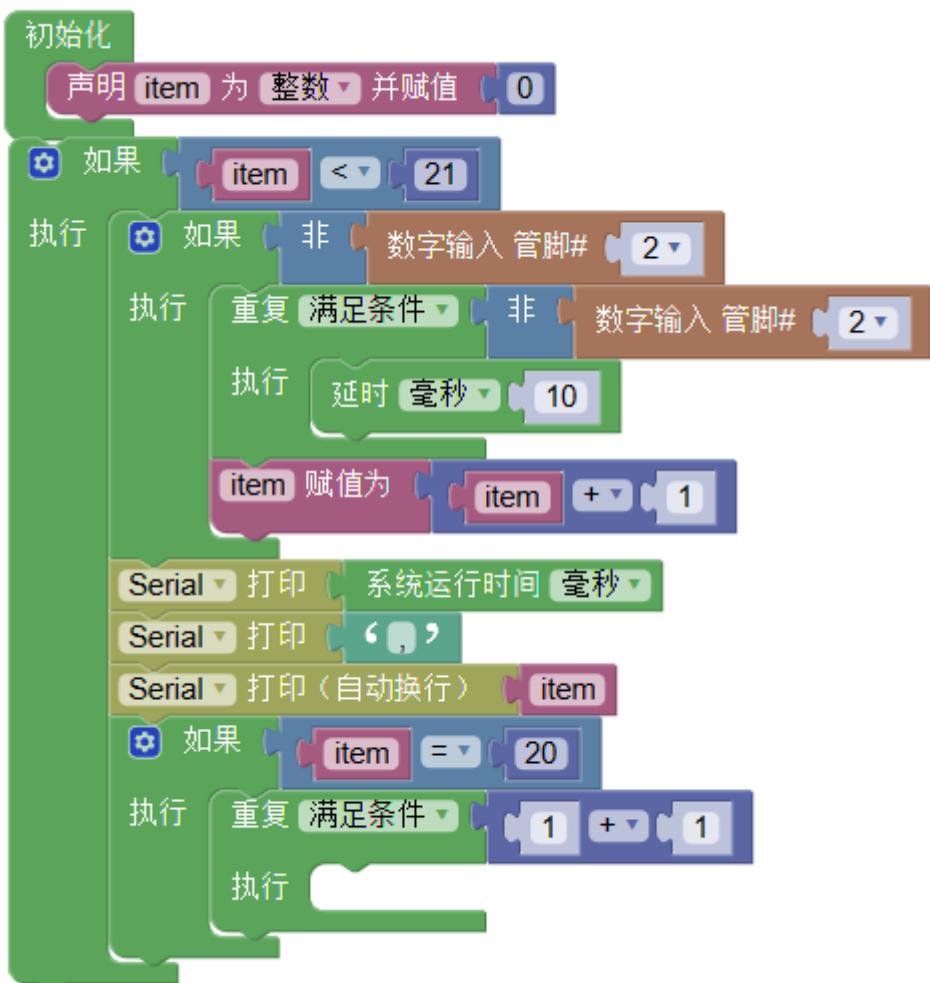
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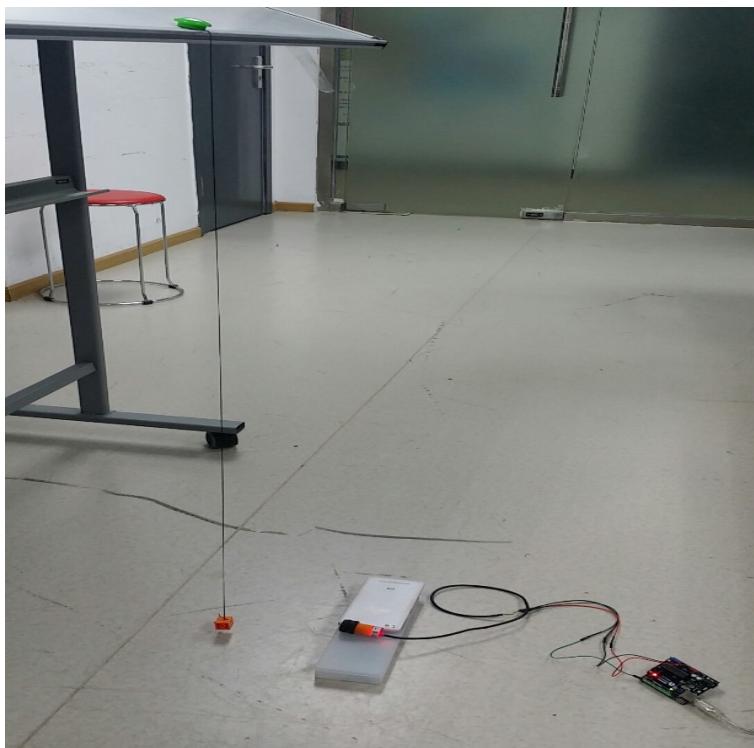
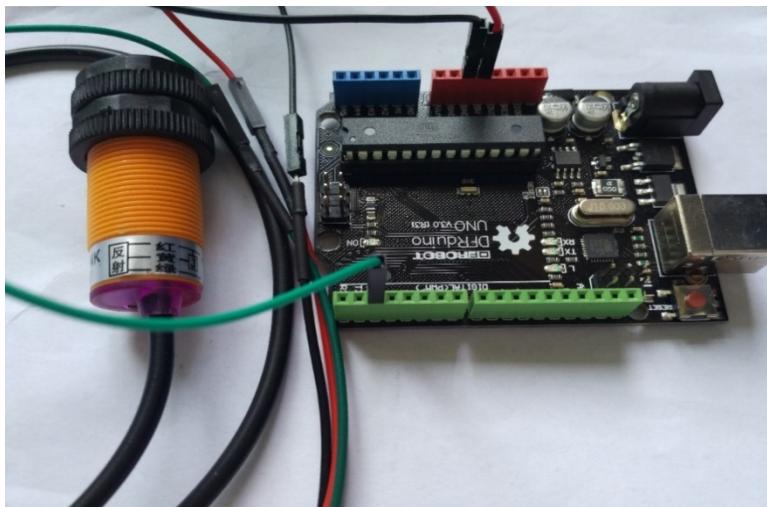
# No.1 – Measuring gravity acceleration with a pendulum

## Arduino Coding and Assembling

Arduino Coding :



## Arduino Assembling :



## Experiment Result

System Operating Time / ms	Passing Times
1340	1
2259	2
3339	3

4251	4
5341	5
6247	6
7345	7
8251	8
9340	9
10238	10
11342	11
12238	12
13341	13
14246	14
15350	15
16235	16
17348	17
18233	18
19346	19
20219	20
21343	21
22216	22
23340	23
24213	24
25347	25
26210	26
27343	27
28206	28
29349	29
30201	30
31209	31

Pendulum Period :  $(31209 - 1340) / 30 * 2 / 1000 = 1.99\text{s}$

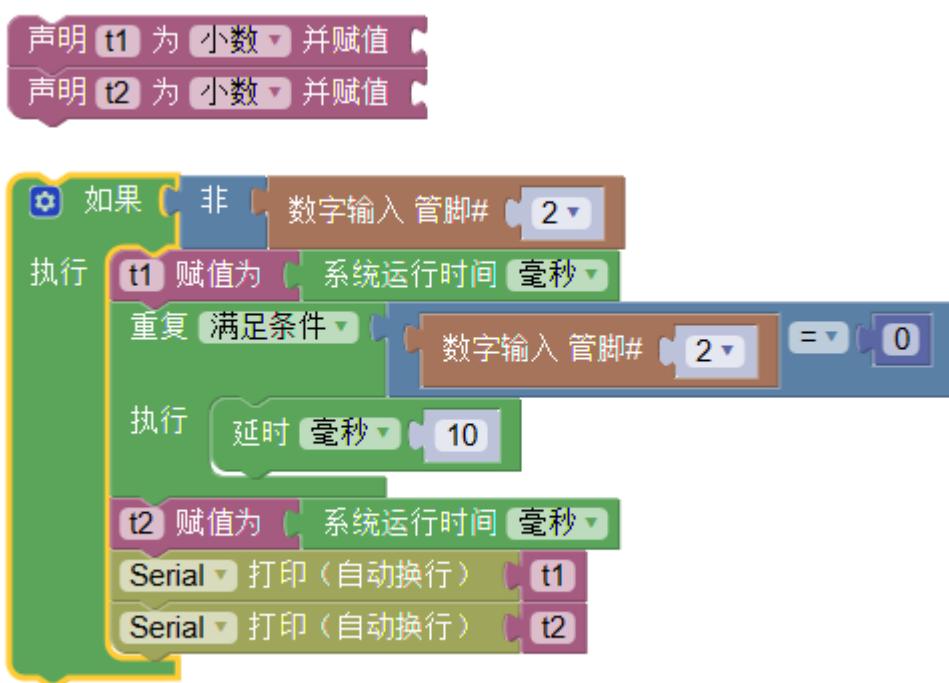
Length : 1.15m

Calculating gravity acceleration :  $g = 4\pi^2 L / T^2 = 9.52\text{m/s}^2$

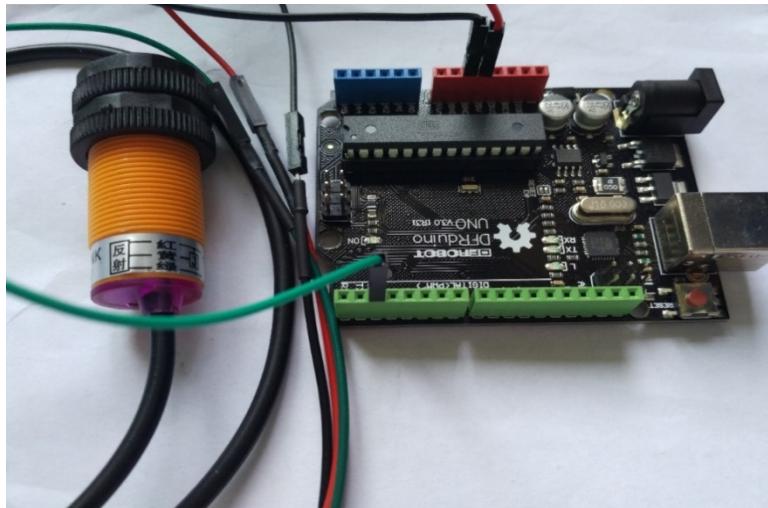
## No.2 – Verification of the law of mechanical energy conservation

### Arduino Coding and Assembling

Arduino Coding :



## Arduino Assembling :



## Experiment Result :

the screen shows (units of measurement : ms) :

27318.20

27323.05

In the experiment,  $h=1m$ , the radius of 3D print ball is 1cm

Using the formula  $mgh=1/2mv^2$ , calculating the  $v \approx 4.43m/s$

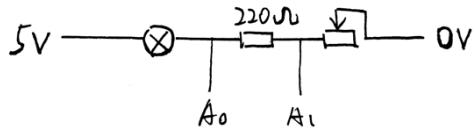
Using the experimental data  $v=2r/t=2*0.01/(27323.05-27318.20)*1000 \approx 4.12m/s$

## Discussion:

As the air friction may disturb the test, the result is reasonable.

# No.3 – Plotting of volt-ampere characteristics of light bulb

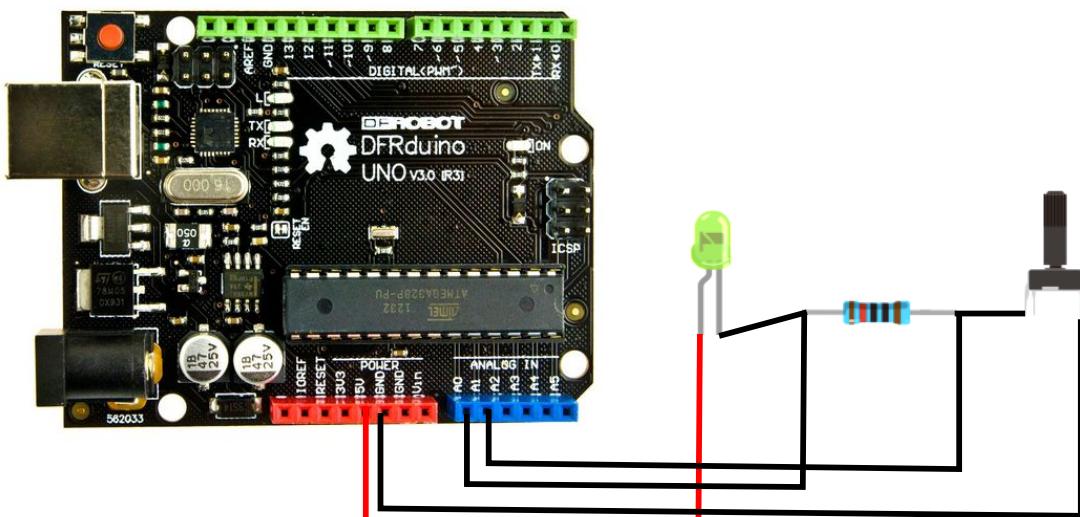
Arduino Coding:

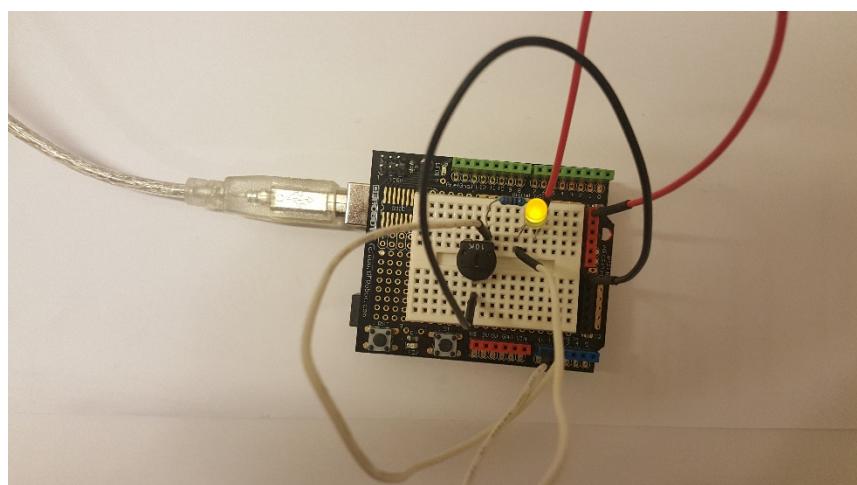


$$U = 5 - A0 * 5 / 1024, \quad I = (A0 - A1) * 5 / 1024 * 220.$$

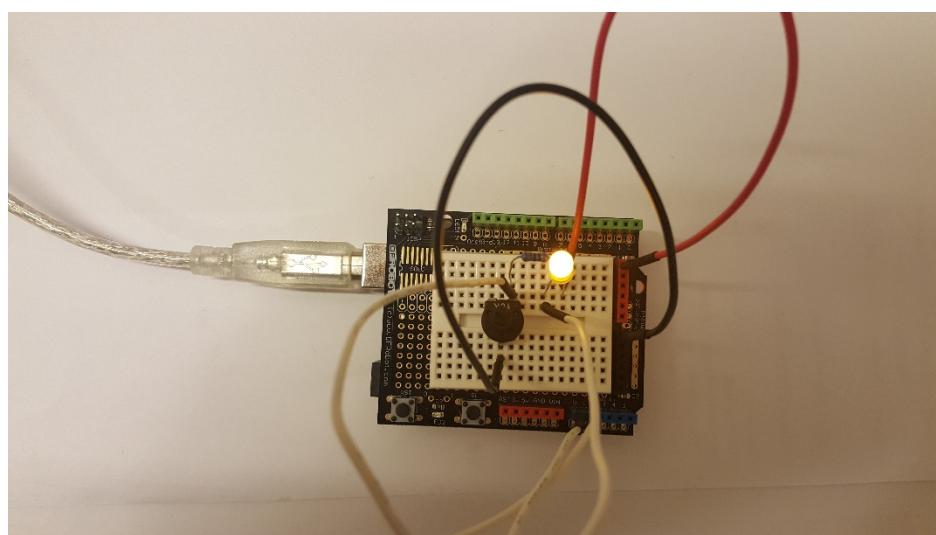
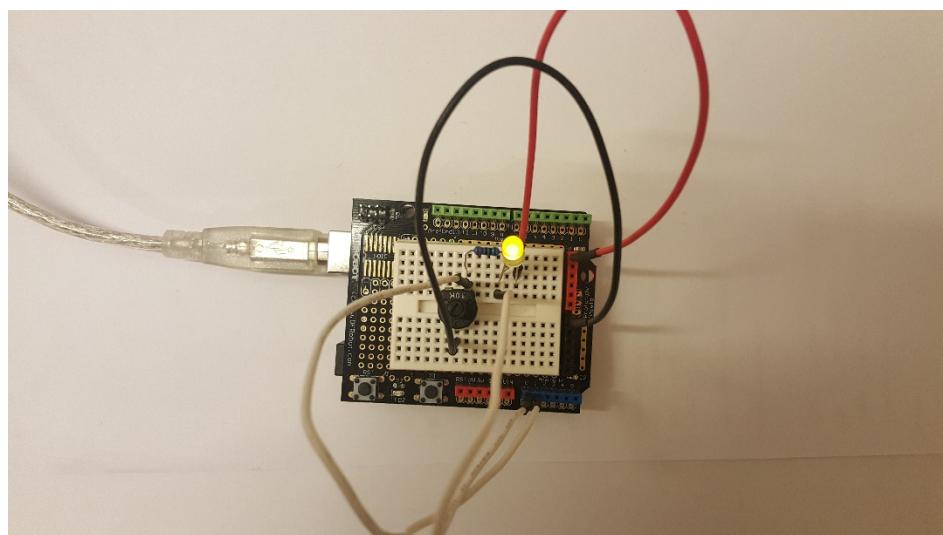


Arduino Assembling:





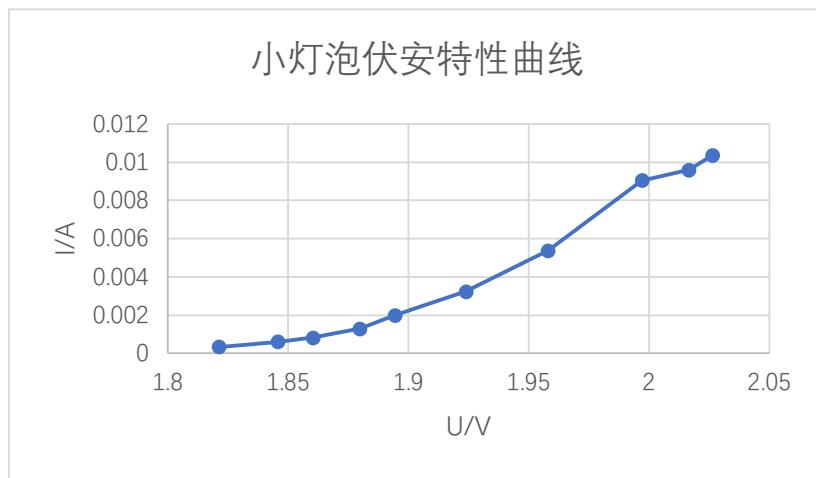
## Experiment Process:



## Experiment Data:

A0	A1	V	I	R
650	635	1.821289	0.000333	5470.667
645	618	1.845703	0.000599	3080
642	605	1.860352	0.000821	2265.405
638	580	1.879883	0.001287	1460.345
635	545	1.894531	0.001998	948.4444
629	483	1.923828	0.00324	593.6986
622	380	1.958008	0.005371	364.5455
614	207	1.99707	0.009033	221.0811
610	178	2.016602	0.009588	210.3241
608	141	2.026367	0.010365	195.5032

## Plotting the U-I curve:



## Experiment Result:

Light bulb is Nonlinear element, which means its voltage is not proportional to current, its resistance changes according to its conditions.

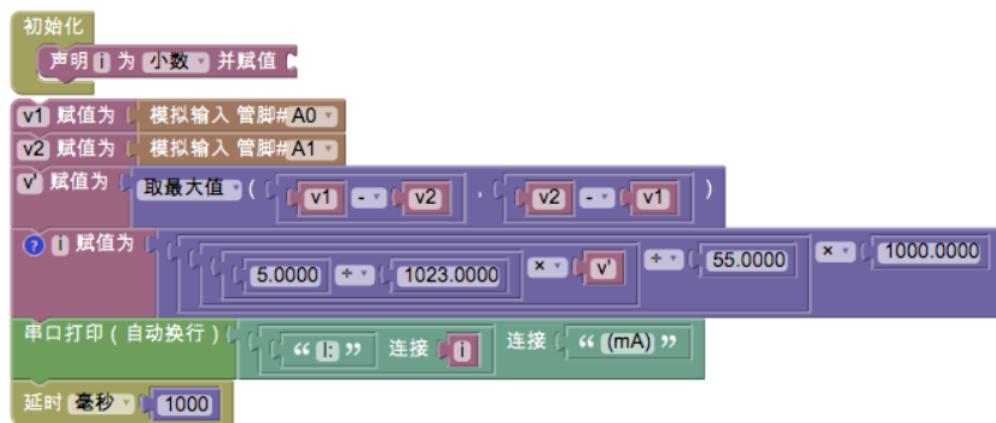
## No.4 – Using multipurpose meter

### Arduino Coding:

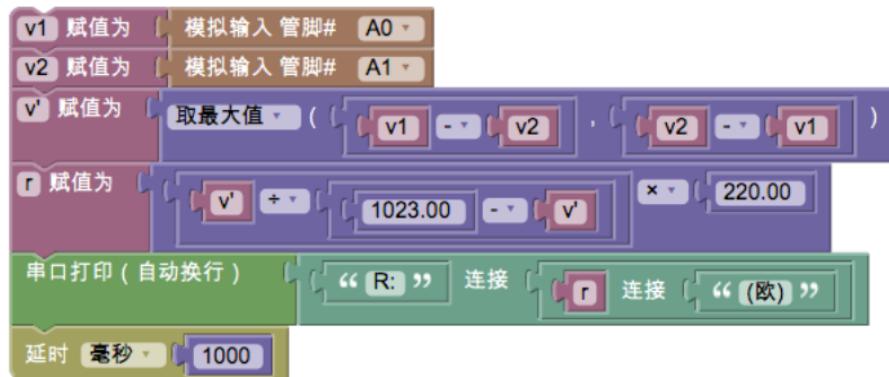
Measuring voltage:



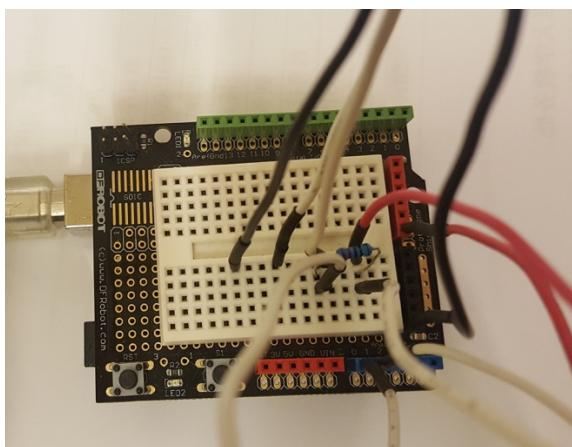
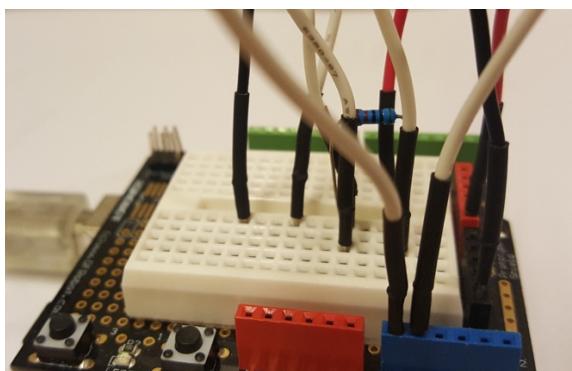
Measuring current:



Measuring resistance:



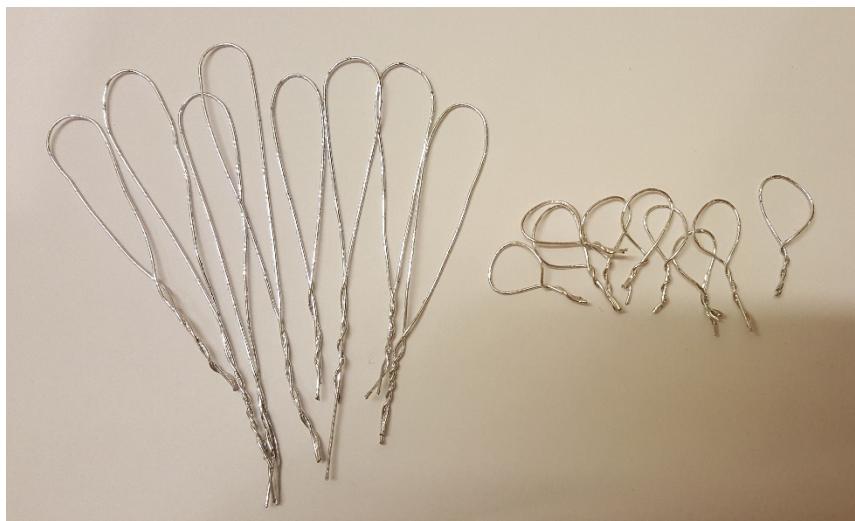
Arduino Assembling:



## No.5 – Golden Rooster Crows the Dawn

### Golden Rooster Assembling:

Step 1:



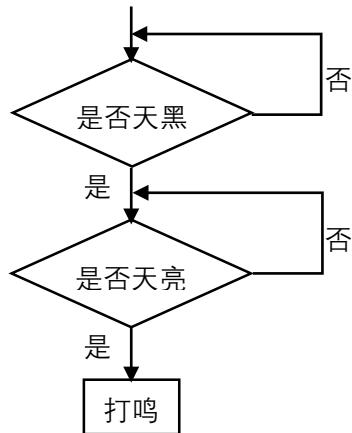
Step 2:



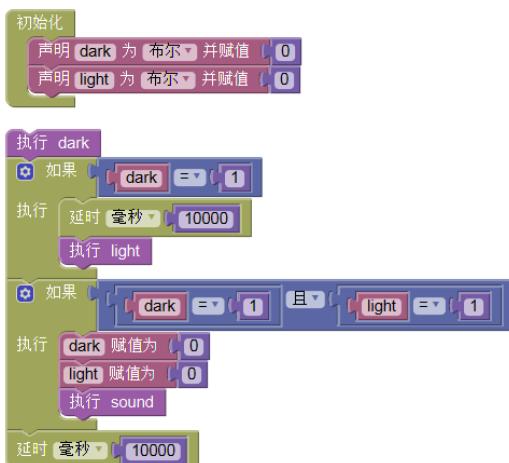
# Arduino Coding and Assembling

Arduino Coding :

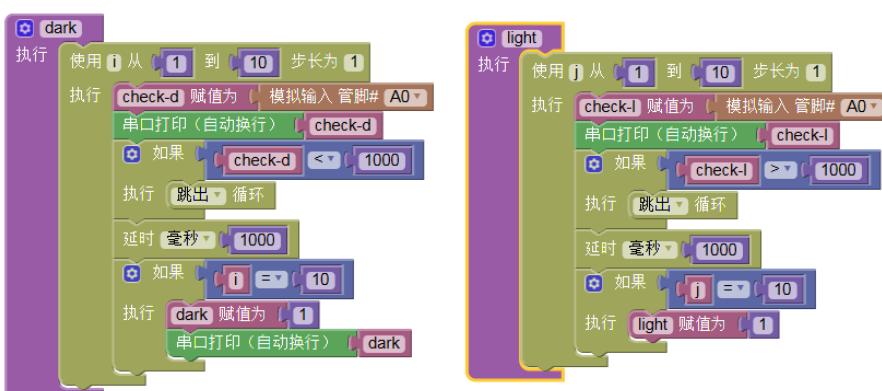
Logic:



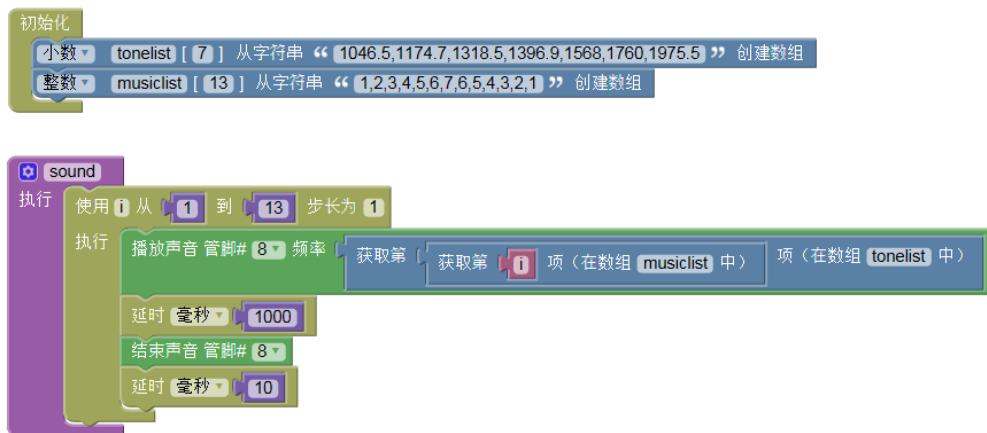
Main :



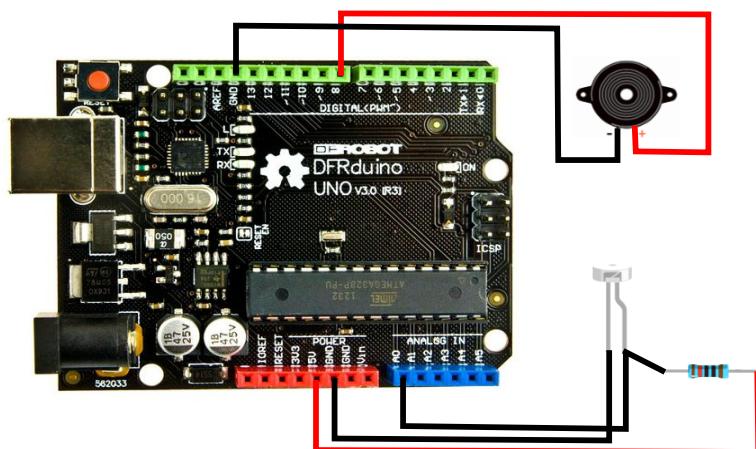
Assess the situation of the dawn :



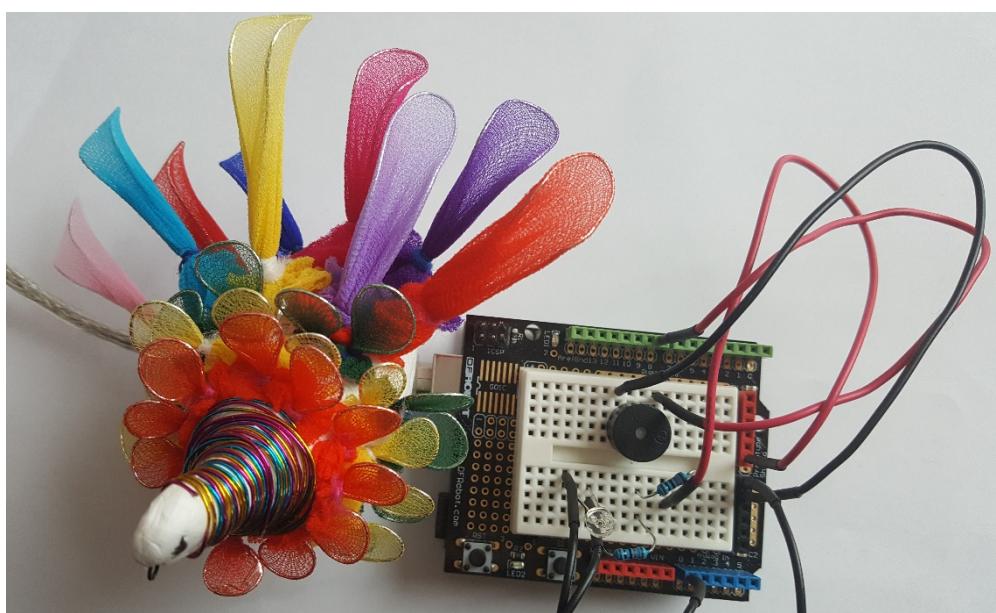
Crowing:



Arduino Assembling :



Final Work :



## No.6 – Trotting Horse Lamp

### Trotting Horse Lamp Assembling:

Step 1 :



Step 2 :





Step 3 :

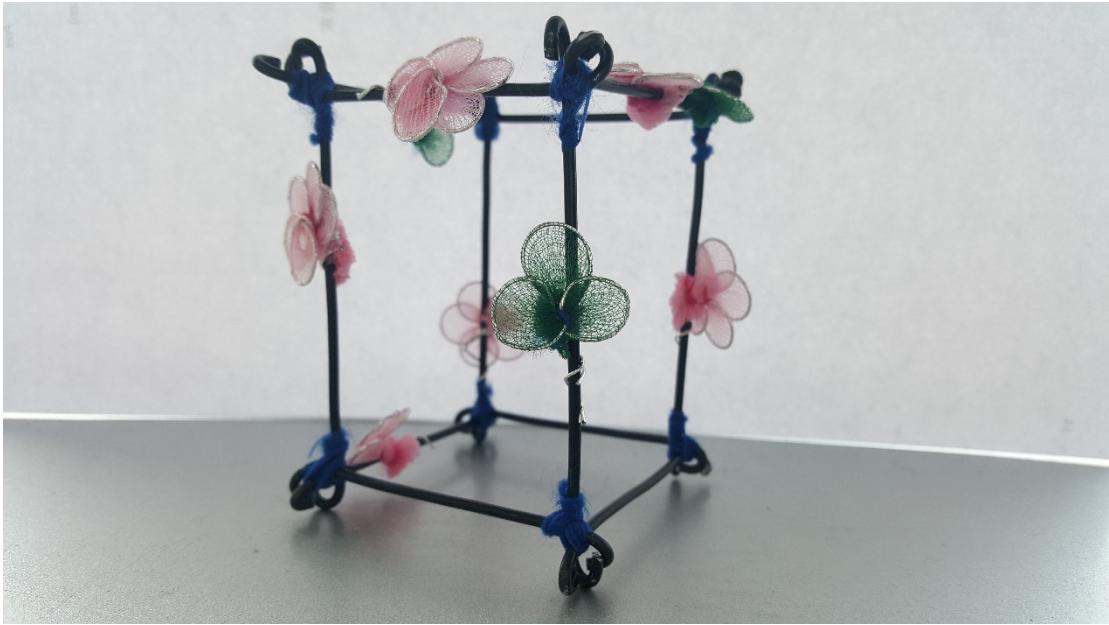


Step 4 :



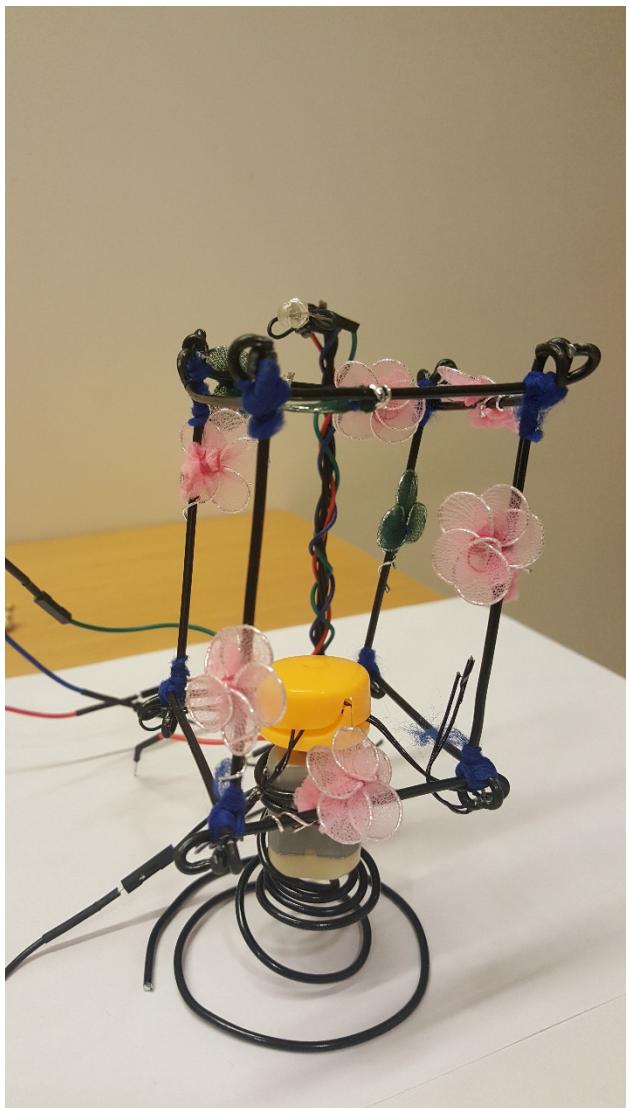
Step 5 :





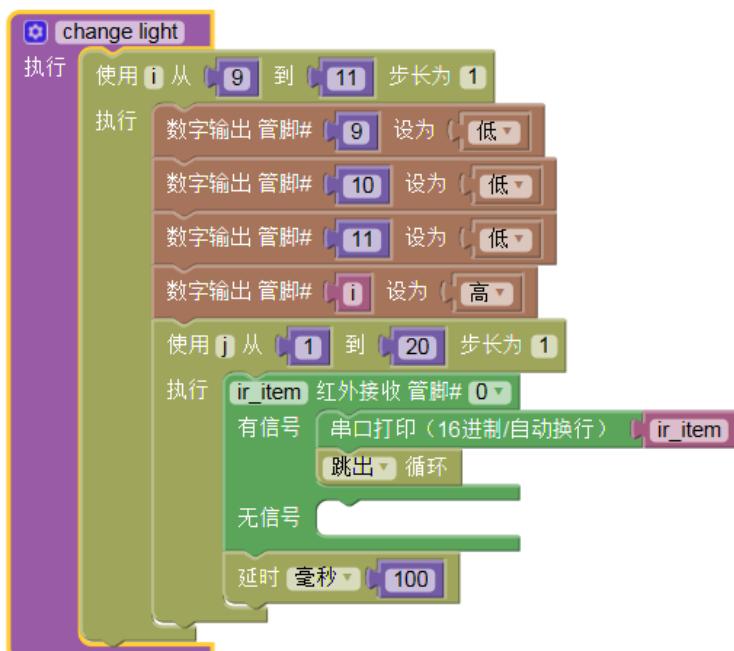
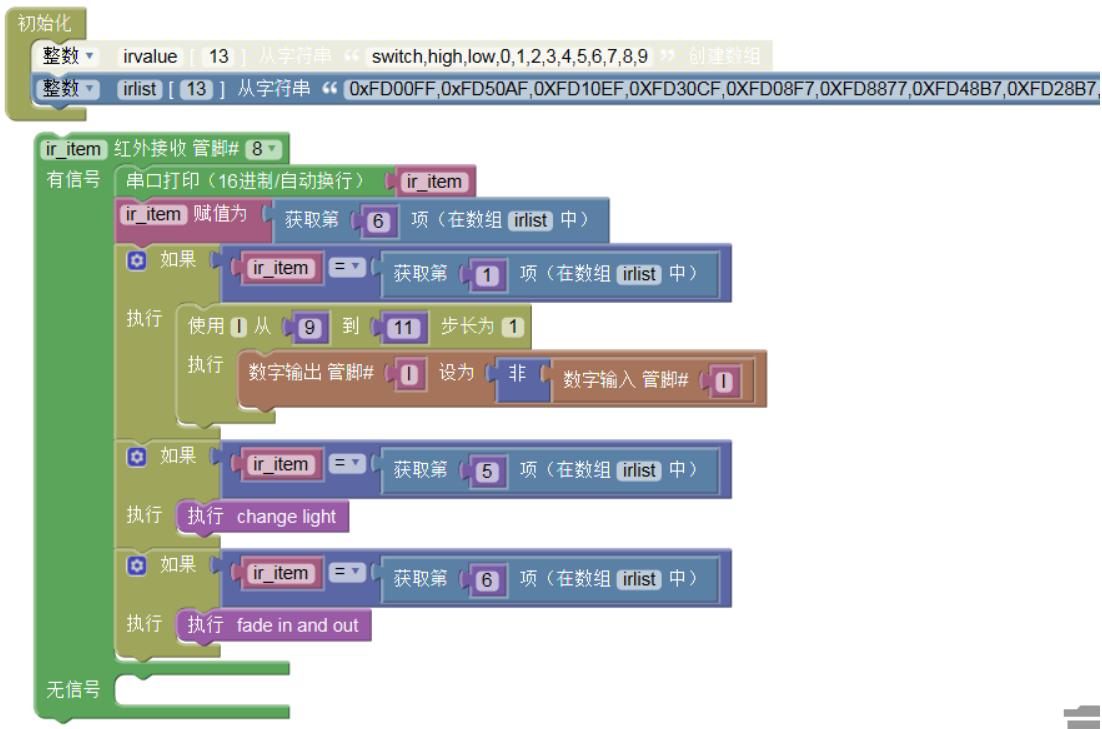
Finish :

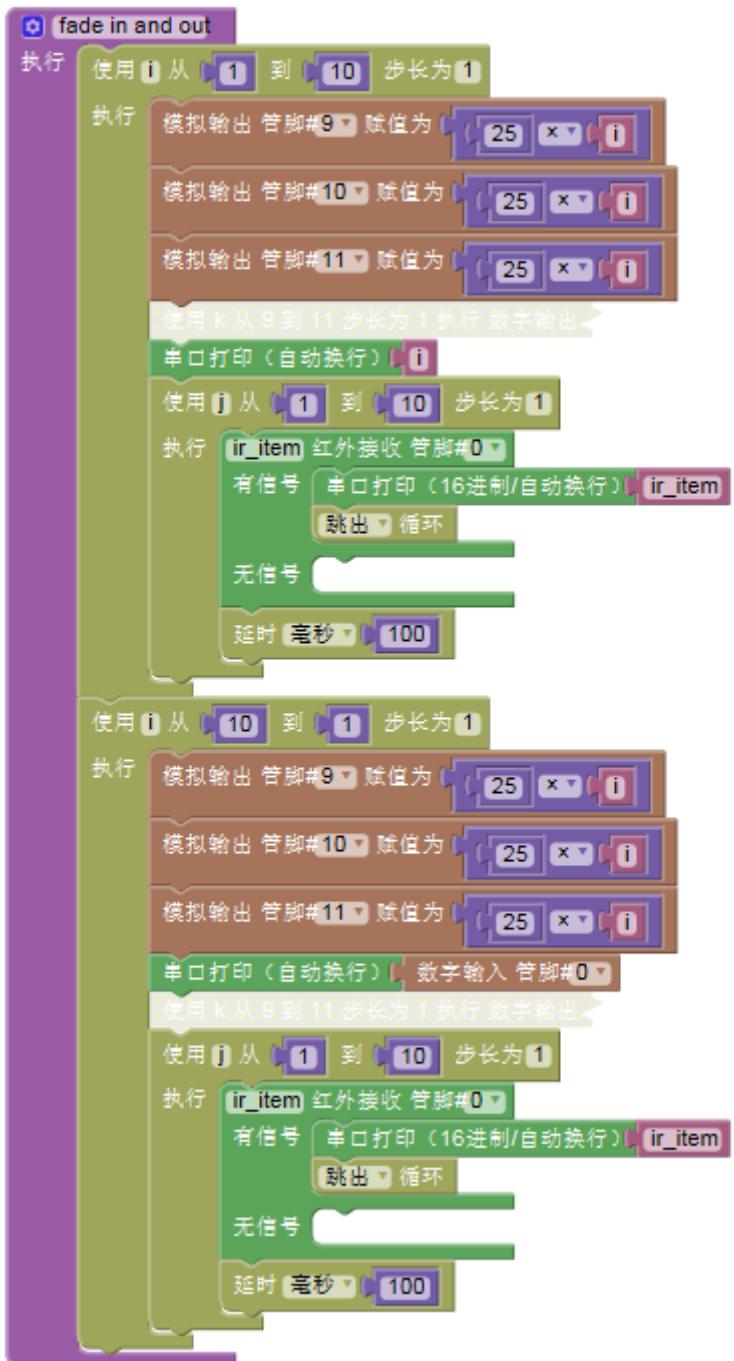




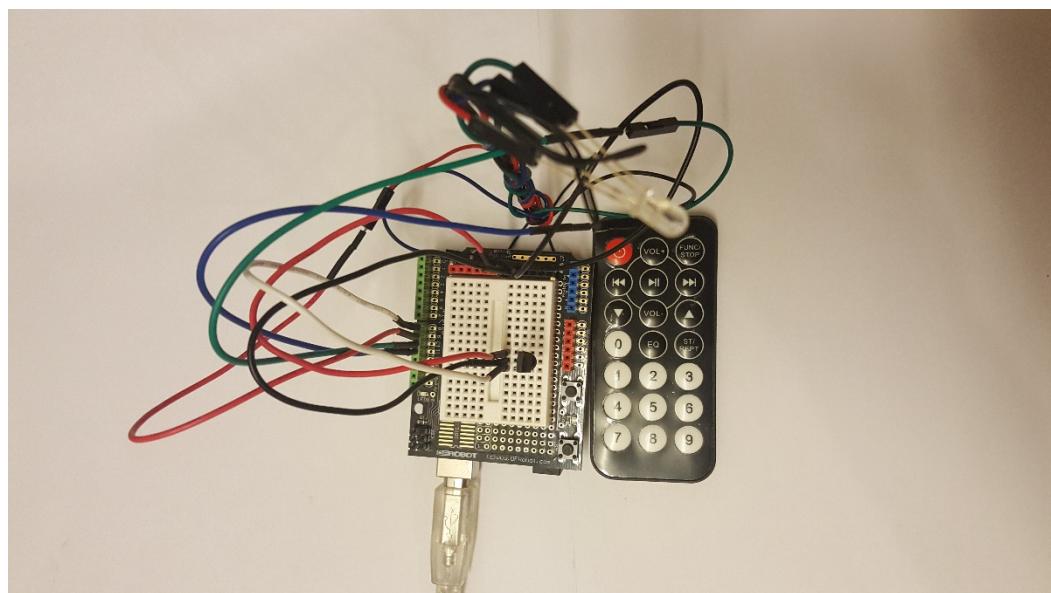
# Arduino Coding and Assembling:

Arduino Coding :

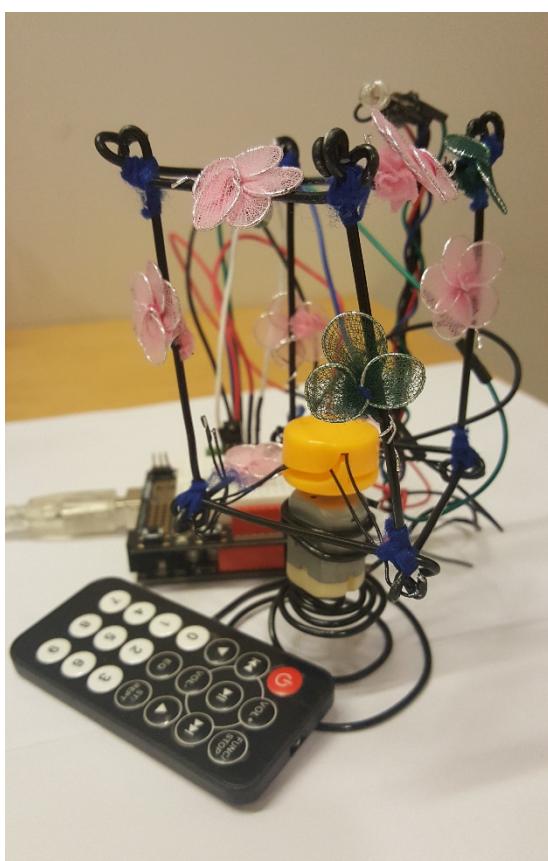




## Arduino Assembling :



Finish:



# No.7 – The Butterfly Lovers

## Butterfly Assembling:

Step 1:



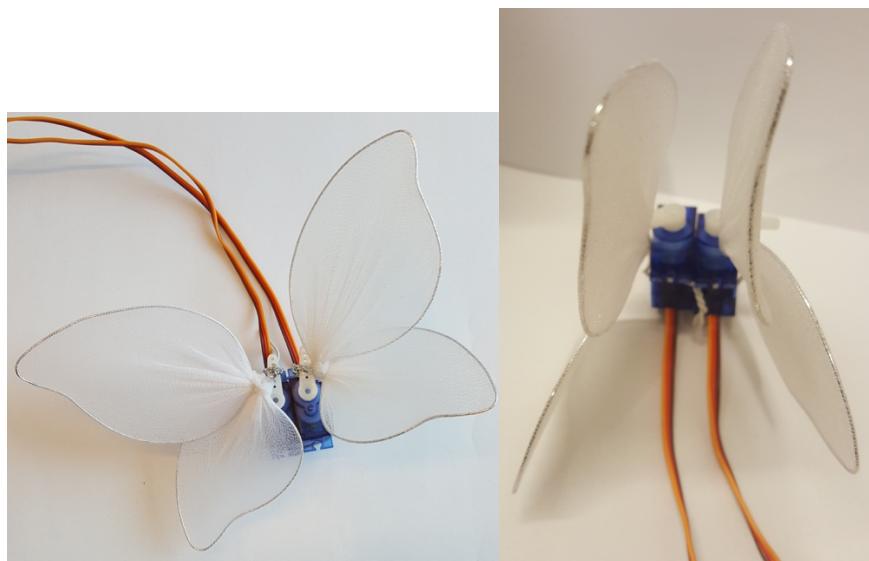
Step 2:



Step 3:



Step 4:



## Arduino Coding and Assembling

Arduino Coding :



Arduino Assembling :

