



華東師範大學
EAST CHINA NORMAL
UNIVERSITY



eLearning Forum Asia 2016

Linking learning technologies with learning science

June 13-15, 2016
Shanghai, China



以科技教育为支点 推动STEM课程整合



梁正彦 梅志文
青年会书院





School Background



- ▶ Since 1952
- ▶ Traditional grammar school
- ▶ Good academic standing
- ▶ Teaching Staff: 60+





School Background

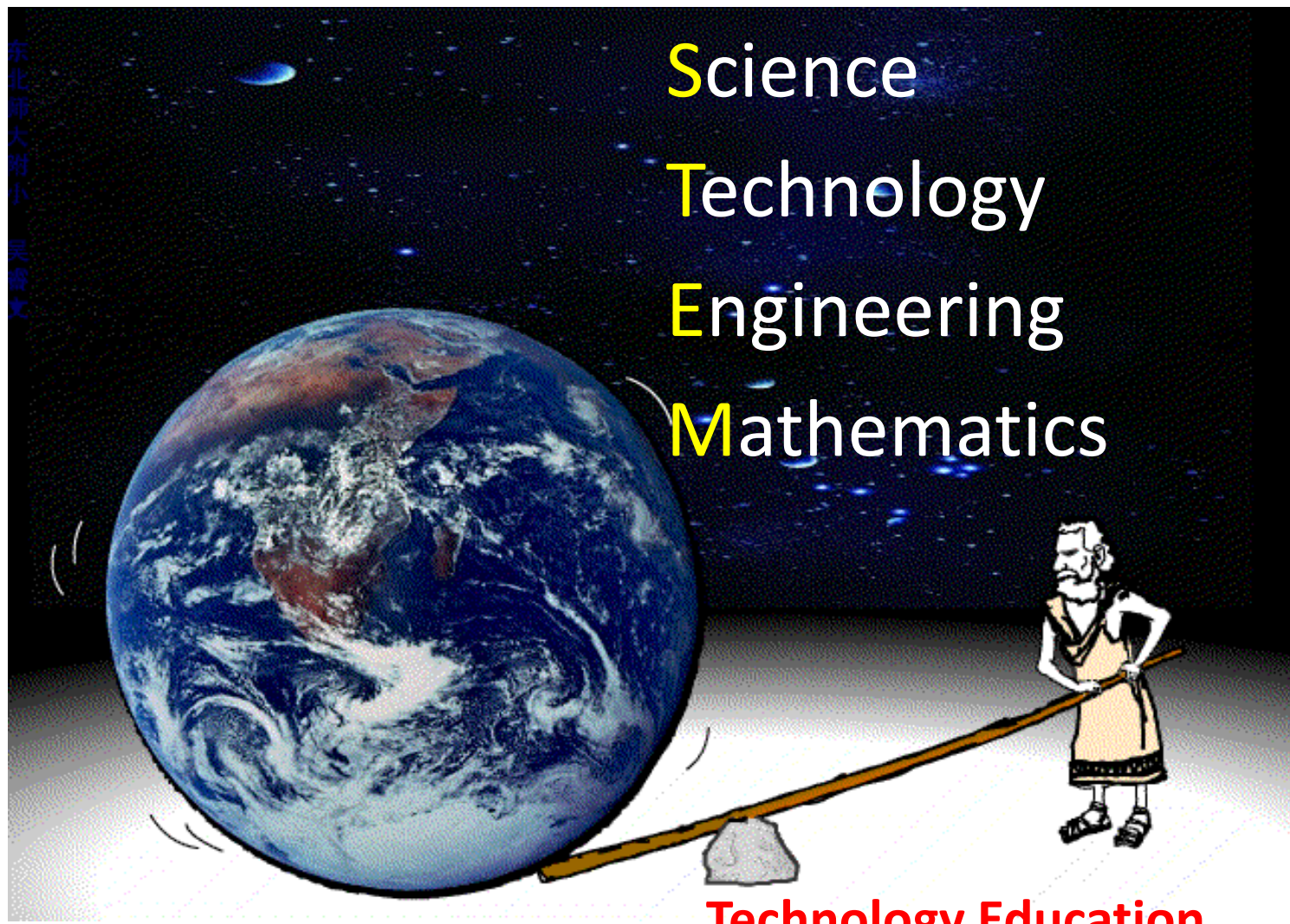


- ▶ Number of lessons in STEM subjects:
 - ▶ 13 or 14 /54 (Junior Forms)
- ▶ In-class STEM activities
 - ▶ 3D Printing (DT + ICT + IS + Maths)
 - ▶ Arduino (ICT + IS)
- ▶ After school STEM activities:
 - ▶ 立體打印
 - ▶ 無人機拍攝
 - ▶ 平行車/機械人原理
 - ▶ Mobile Apps / Arduino 編程
 - ▶ Strawbee / 起飛木的建築結構





The Pivot Point



Science
Technology
Engineering
Mathematics

Technology Education



Our First STEM Project



RFID and Heart Rate System

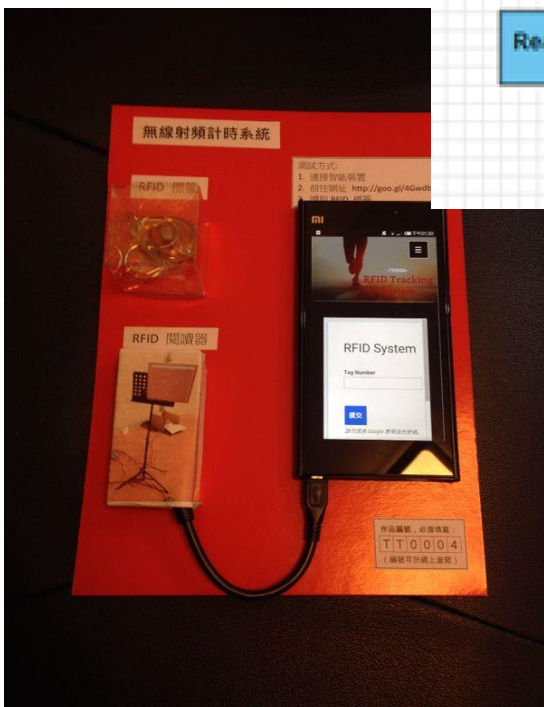
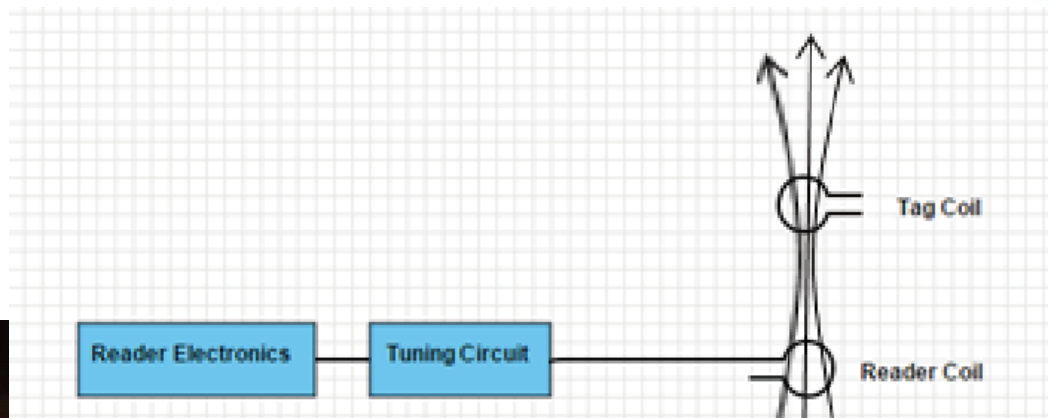


男 00:00:00			女 00:00:00		
Name	Laps	Time	Name	Laps	Time
施蘇洋	完成2圈	00:58	陳穎瑤	完成1圈	01:08
葉康駿	完成1圈	00:58	陳俐婷	完成1圈	01:05
黃煒棋	完成1圈	01:18	蔣珮婷	完	
黃國棟	完成1圈	00:56	陶堯鈴	完	
湯嘉榮	完成1圈	01:05	林穎欣	完	
刁志龍	完成2圈	01:01	關美寶	完	
冼浩南	完成1圈	01:00	張芷穎		
伍斯浩	完成1圈	01:03	李婷昕		
梁洪威	完成1圈	00:58	何宛穎		





How it works? STEM



RFID Tracking System

RFID System

Tag Number

Submit

Never submit passwords through Google Forms.

Tag Number	Timestamp
593626781	2/8/2015 11:30:45
590270877	2/8/2015 11:32:49
590270877	2/8/2015 11:58:33
590270877	2/8/2015 12:03:57
590270877	2/8/2015 12:04:28
593626781	2/8/2015 12:12:39

男 00:00:00			女 00:00:00		
Name	Laps	Time	Name	Laps	Time
施蘇洋	完成2圈	00:58	陳穎瑤	完成1圈	01:08
葉康駿	完成1圈	00:58	陳俐婷	完成1圈	01:05
黃煒棋	完成1圈	01:18	蔣珮婷	完成1圈	01:09
黃國棟	完成1圈	00:56	陶堯鈴	完成1圈	01:08
湯嘉榮	完成1圈	01:05	林穎欣	完成1圈	01:18
刁志龍	完成2圈	01:01	關美寶	完成1圈	01:07
冼浩南	完成1圈	01:00	張芷穎	完成1圈	00:58
伍斯浩	完成1圈	01:03	李婷昕	完成1圈	00:58
梁洪威	完成1圈	00:58	何宛穎	完成1圈	00:58

RFID System (Responses)

https://docs.google.com/a/cmm

fx	Tag Number	Timestamp
1	593626781	2/8/2015 11:30
2	590270877	2/8/2015 11:32
3	590270877	2/8/2015 11:58
4	590270877	2/8/2015 12:03
5	590270877	2/8/2015 12:04
6	590270877	2/8/2015 12:04
7	593626781	2/8/2015 12:12
8	593626781	2/8/2015 12:19
9	593626781	2/8/2015 12:20
10	590270877	2/8/2015 13:18
11		
12		
13		
14		



From ICT to STEM



2014-2015

APRIL							
			1	2	3	4	
			#	H	H	H	1 HKDSE Liberal Studies
5	6	7	8	9	10	11	5 Ching Ming Festival
H	H	H	H	H	H	H	
12	13	14	15	16	17	18	13-14 HKDSE English Language
	D	E	F	22A	B		15 CCA Day (7)
19	20	21	22	23	24	25	23 ICT Day
	C	D	E	F	23A		





STEM week 2016



參觀團



全息影像DIY
(ICT、IS、數學)



考察



水耕活動(生物、家政)



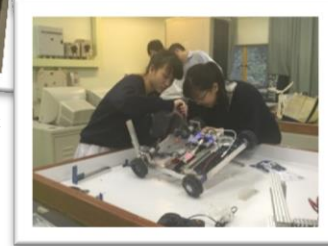
滑翔機大賽
(DT、數學)



分子雪糕製作
(化學、家政、生物)



生物科技流動實驗室



機械人活動



STEM week 2016



名人講座



北京師範大學
計算機科學學系
胡永鴻講師



香港浸會大學
物理系
張迺豪教授

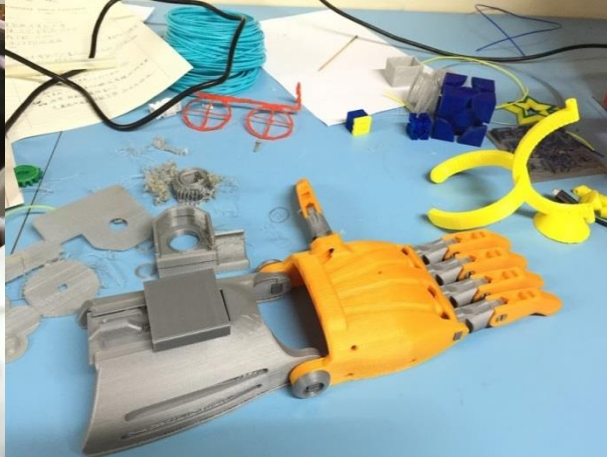
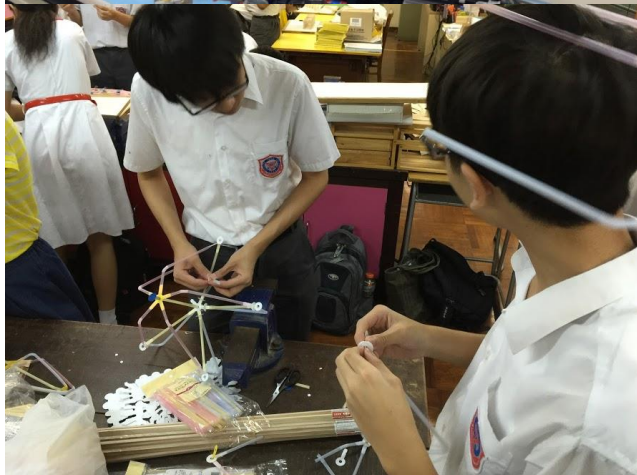
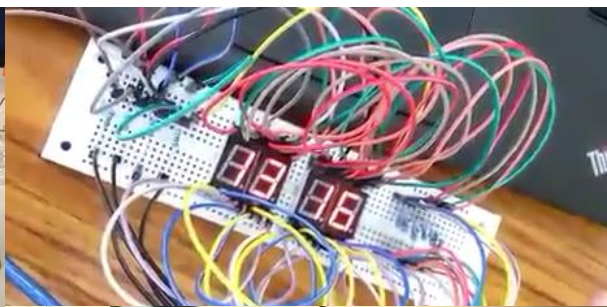
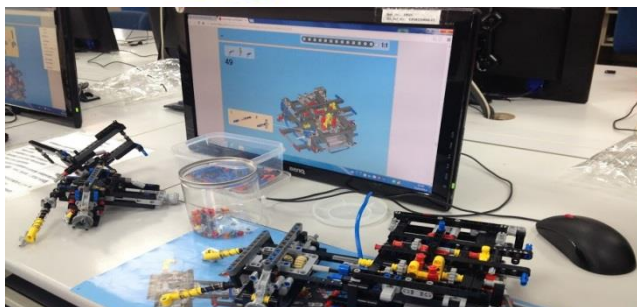


香港浸會大學
數學系
杜啟明 博士





Project-based pedagogy






STEM Project Example: 3D Printing



EDUCATION OF BRAIN
ICT-IN-PE FOUNDATION
STEMNOLOGY
INTEGRATED LEARNING
Professional support by:
3D JOLLY FAB CO. LTD.

ICT-IN-PE FOUNDATION
3D-printing in Education
Pilot School Partner
20th April, 2015
CHINESE YMCA COLLEGE





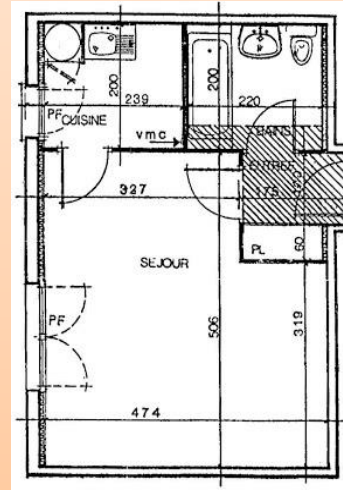
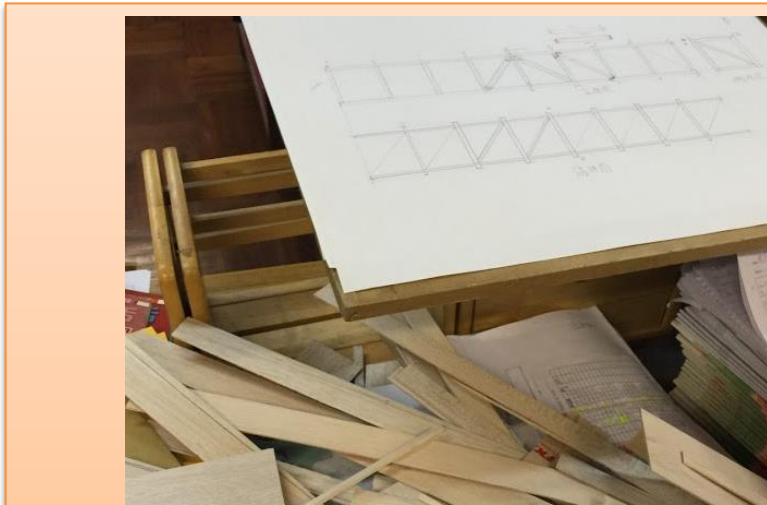
中國、新加坡學者到訪學校 3D列印創客交流會



來自國內的Nick Yeung 及新加坡的Mr. Wei-In Tee到訪本校並行交流



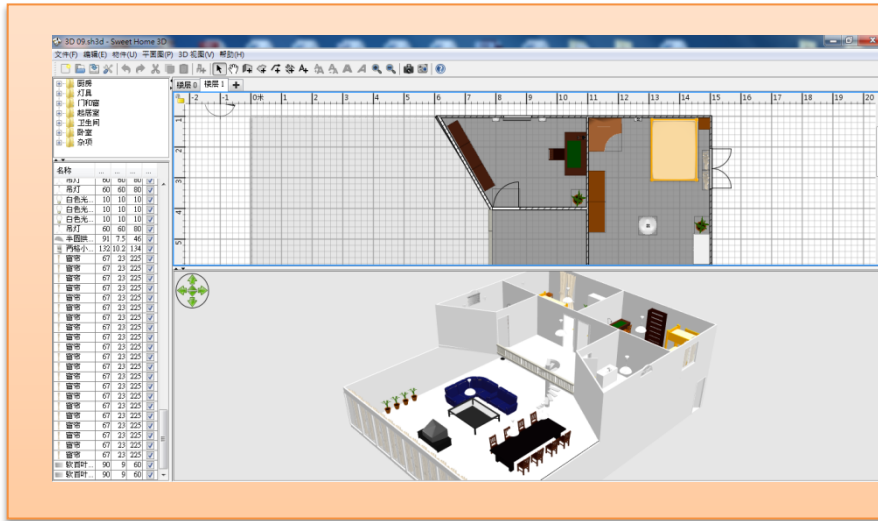
STEM Project Example: 3D Printing



**Phase 1 (in-class):
DT: 2D Drawing**



STEM Project Example: 3D Printing



2D to 3D:

Sweet Home 3D

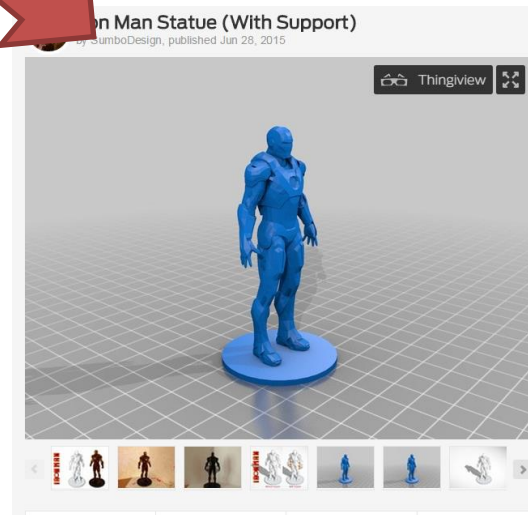
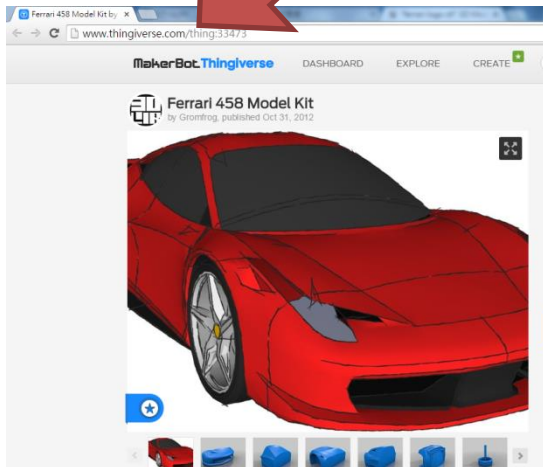
<http://www.sweethome3d.com/zh-tw/>



Phase 2 (in-class): ICT: 3D Drawing



STEM Project Example: 3D Printing (Student's work)



3D Models:
Thingiverse
<http://www.thingiverse.com/>



STEM Project Example: 3D Printing

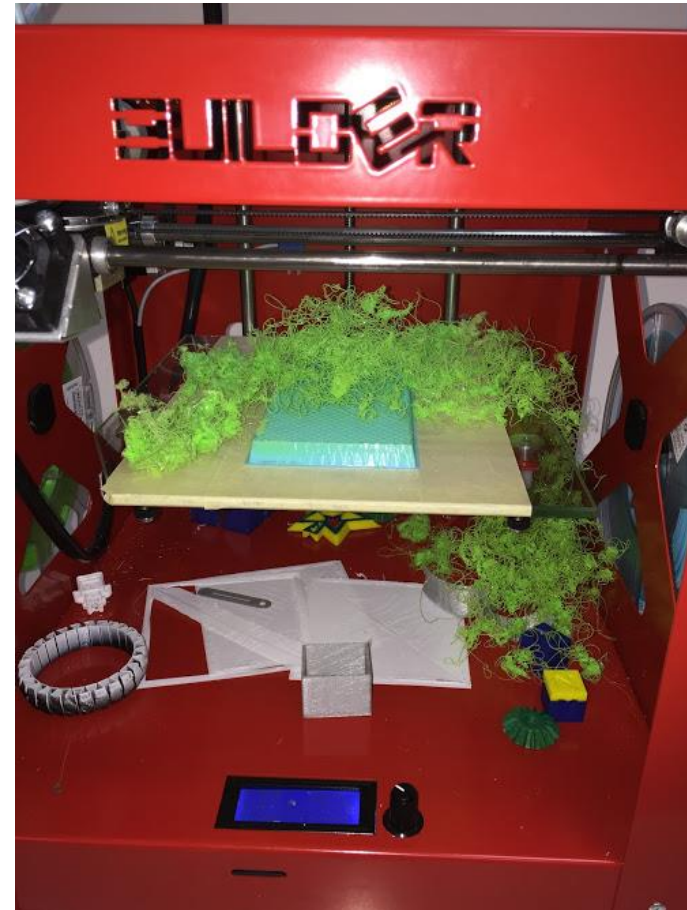


3D Drawing:
123D Design

<http://www.123dapp.com/design>



STEM Project Example: 3D Printing





STEM Project Example: 3D Printing



Phase 3 : Activities



創客獎項



香港區MAKER FAIRE



展覽會及與志願團體合作的教育項目



STEM Project Example: 3D Printing



Phase 4 (In-class):
Maths: Symmetry
IS: electricity

Wind Turbine Design



STEM Project Example: 3D Printing



- Prosthetics



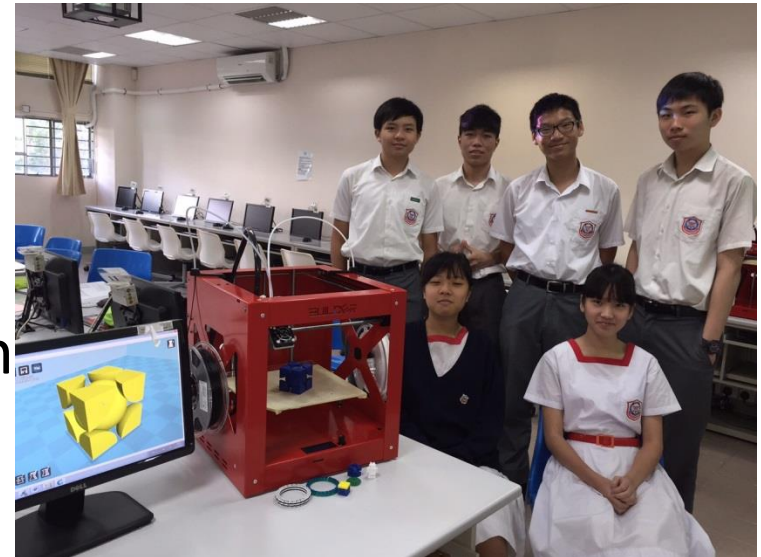
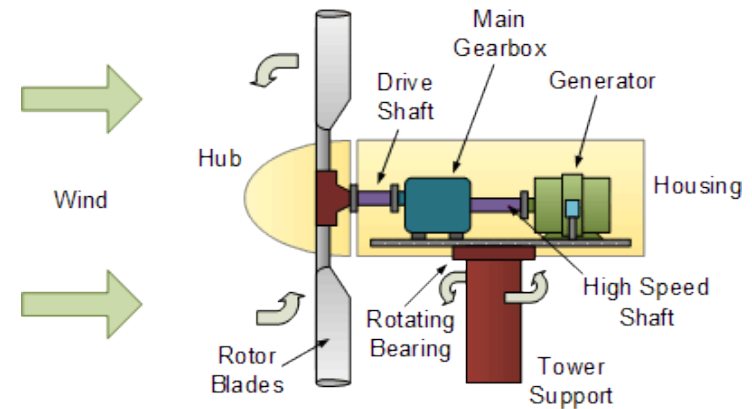
**Phase 4 (In-class):
IS: Melting point /
muscle / pulley system**



STEM Project Example: 3D Printing



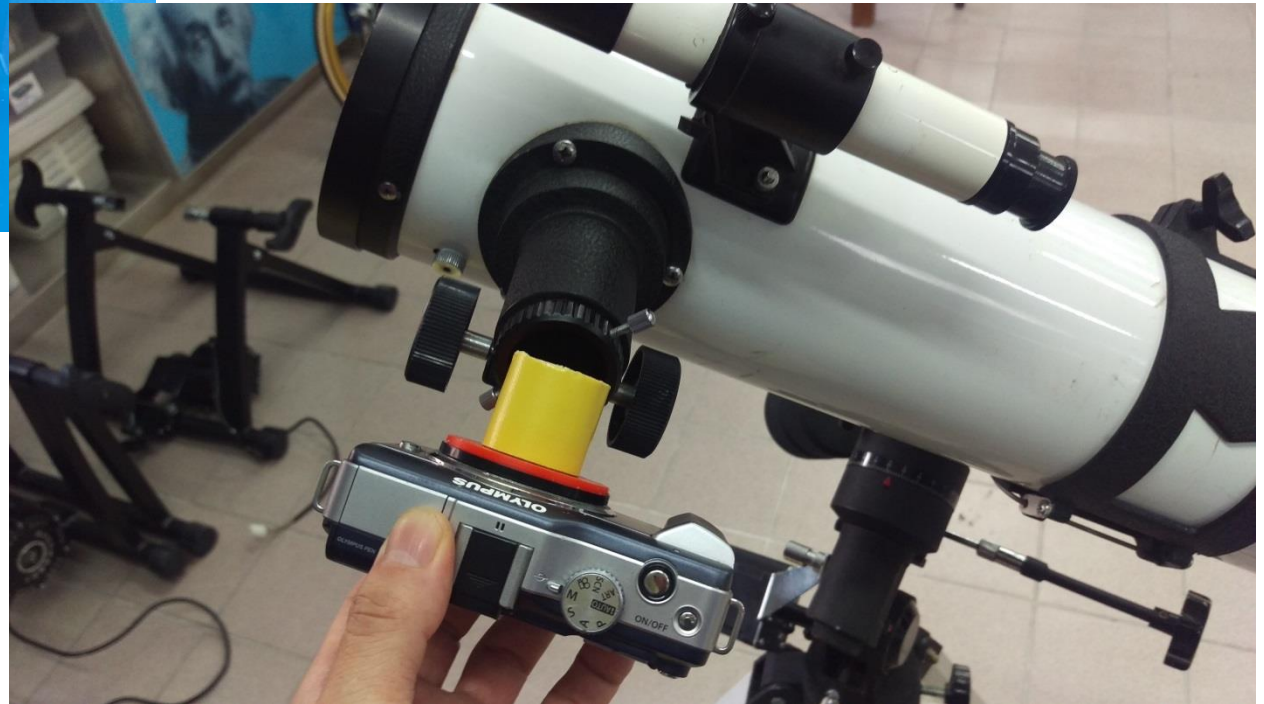
- Science
 - Wind turbine electrical system
 - Fluid Mechanics
- Technology & Engineering
 - 2D and 3D Design
 - 3D Printing
 - Mechanical Engineering
 - Materials Engineering
- Mathematics
 - Symmetry and Transformation



S T

Other collaboration

E M



S
T

STEM Project Example: Arduino Program

E
M

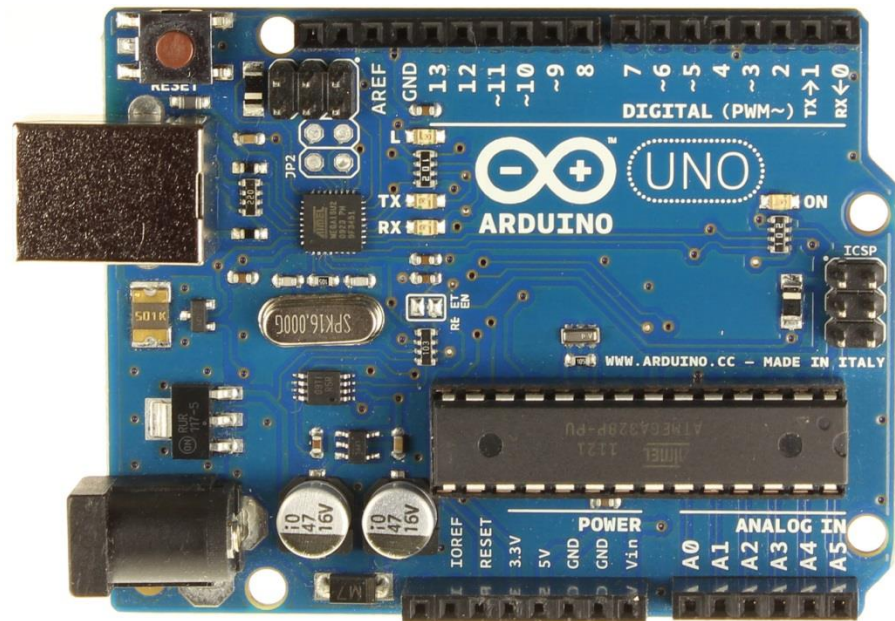
```
int redpin = 11; //select the pin for the red LED
int bluepin =10; // select the pin for the blue LED
int greenpin =9; // select the pin for the green LED
int val;
```

```
void setup()
{
  pinMode(redpin, OUTPUT);
  pinMode(bluepin, OUTPUT);
  pinMode(greenpin, OUTPUT);
  Serial.begin(9600);
}
```

```
void loop()
{
  for(val=255; val>0; val--)
  {
    analogWrite(11, val);
    analogWrite(10, 255-val);
    analogWrite(9, 128-val);
    delay(1);
  }
```

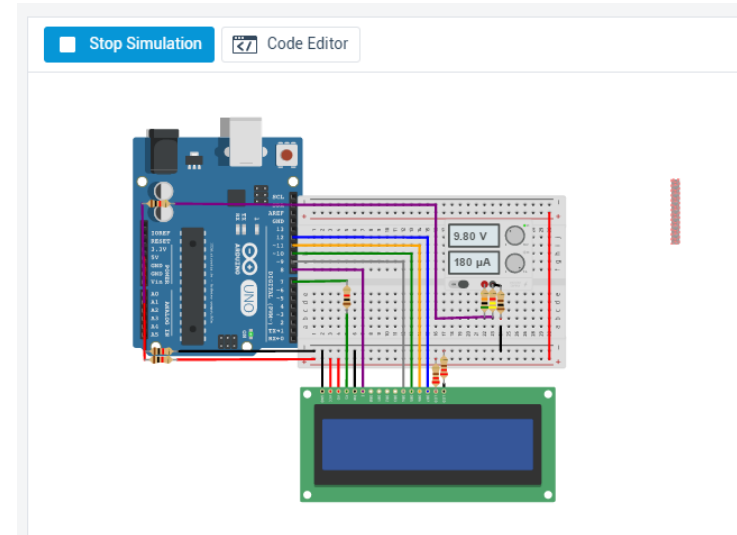
```
for(val=0; val<255; val++)
{
  analogWrite(11, val);
  analogWrite(10, 255-val);
  analogWrite(9, 128-val);
  delay(1);
}
```

```
Serial.println(val, DEC);
}
```





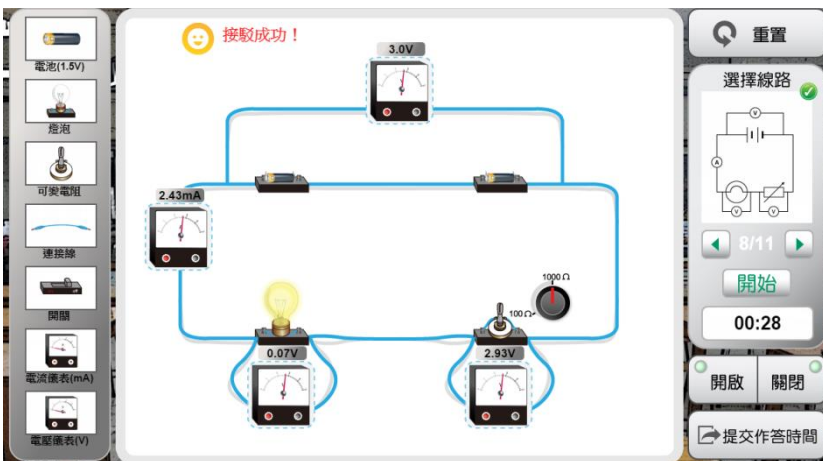
STEM Project Example: Arduino Program



```
int redpin = 11; //select the pin for the red LED
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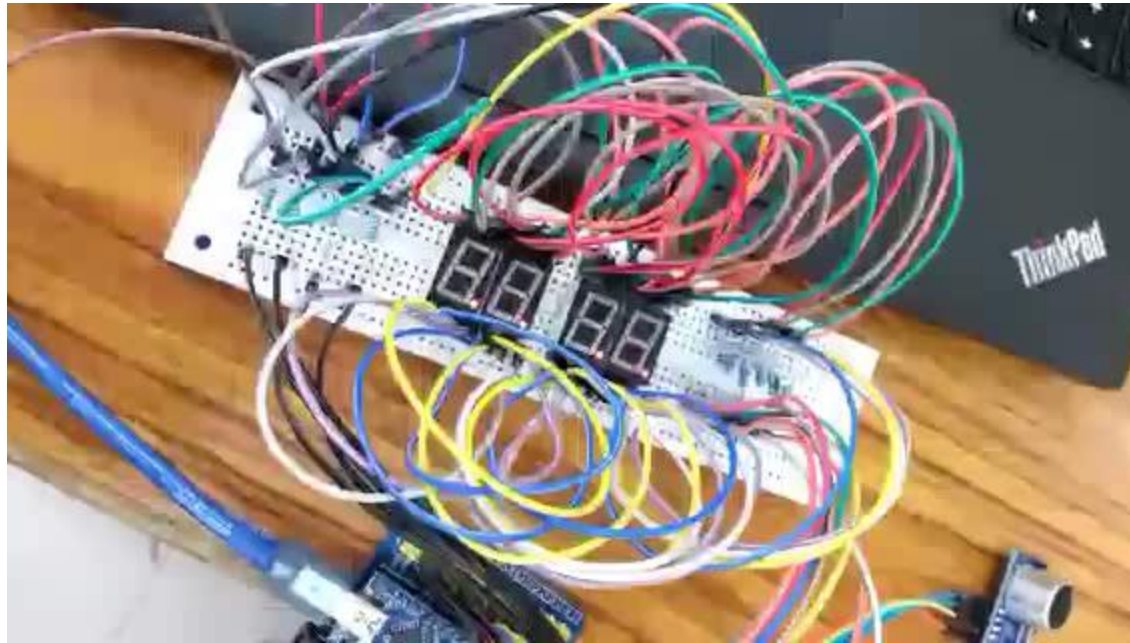
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STEM Project Example: Arduino Program





STEM Project Example: Arduino Program

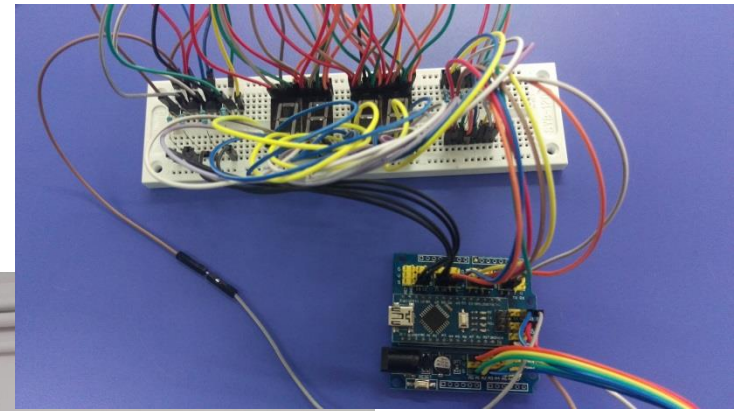
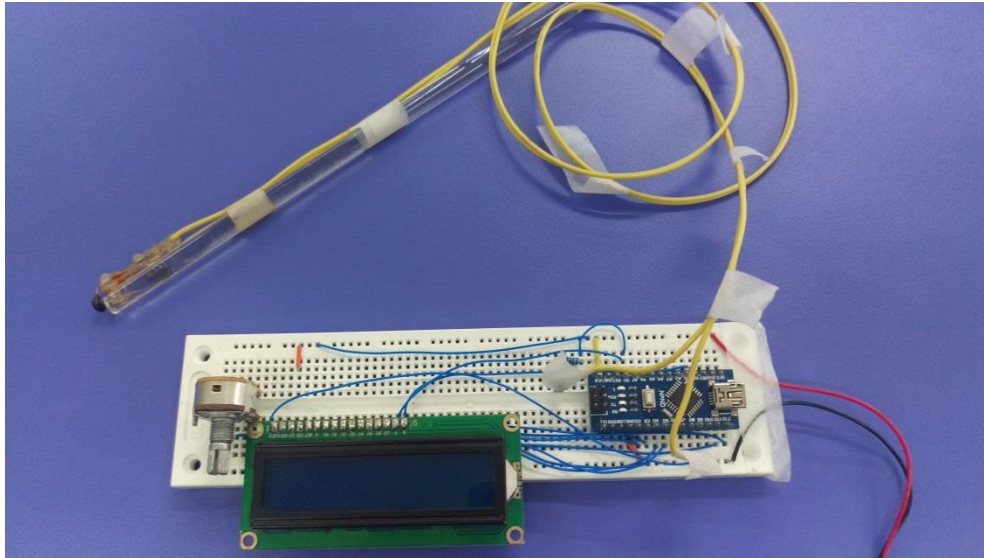


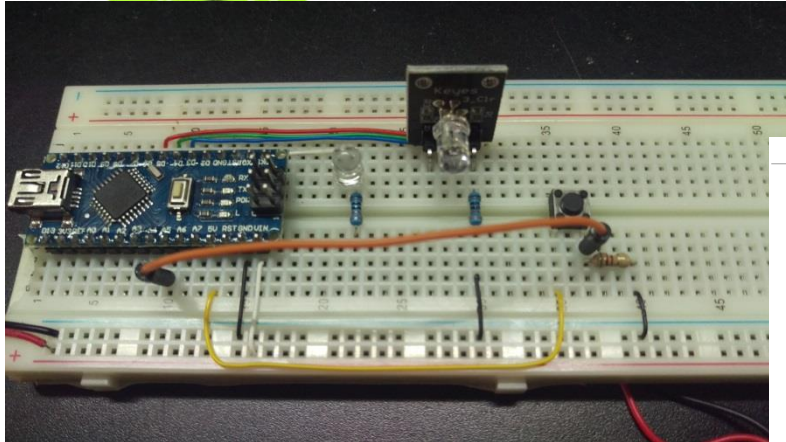
- Science
 - Simple Circuits
 - Basic Electronics
- Technology & Engineering
 - eLearning
 - eCommerce
 - Programming
 - Soldering
- Mathematics
 - Number systems





Other collaboration

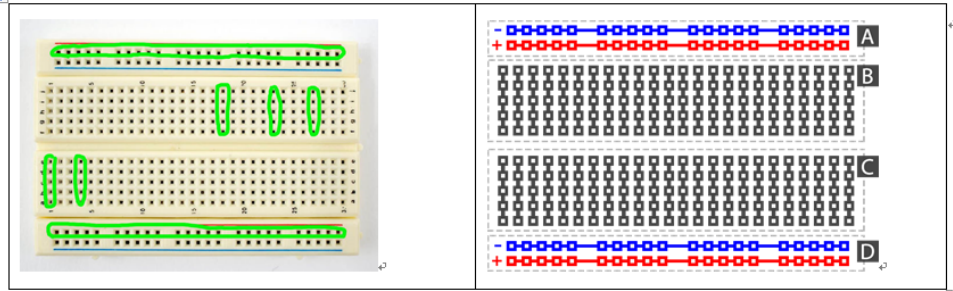




Basic electronic and Micro-controller

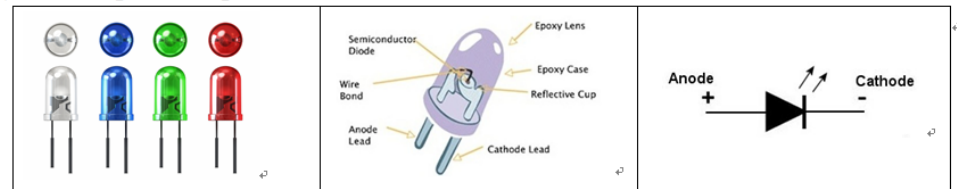
A) Breadboard

Breadboards are one of the most fundamental pieces when learning how to build circuits.



The positive and negative terminals of the power will be connected to “+ve” and “-ve” side.

B) LED – Light emitting diode



- > The operating voltage of LED is about 3 V in general.
- > Uni-direction : current can flow from “+ve” to “-ve” only, which is called forward biased.
- > As the resistance of diode (in forward biased) is very low as well as operating current (about few

3. Varying the rheostat, record the reading of ammeter and voltage and fill in the table.

Voltage (V) / V						
Current (I) / mA						
Resistance (R) / Ω						

4. Calculate the resistance of the light bulb for different voltage by the following equation :

$$R = V/I.$$

5. Plot a graph of “Voltage against Current”.

