28 December 2019
Input device and serial communication
输入设备和串行通讯

Week 5 assignments:
- Publish and modify the input device page using git workflow

  使用 Git 工作流程发布、修改、反复发布你的网页

- Measure something using a microcontroller board

  使用 Arduino 主板测量某物的数值

- Trying out Pulse Width Modulation signal (analogWrite)
- Trying out to fade an LED In and Out, like on a sleeping apple computer
- Trying out using serial communication
- Document and create your own algorithm using serial communication, at least one Analog input device and at least one output device.
- Create a page to document your progress of week 5
    o What did you do and learn?
    o What are your experiences? (problems, solution, etc.).
    o Upload a picture and the programming code to your website.

Please bring with you:
- Your personal laptop
- A mouse

And please install the following software:
- Solidworks
- Cura
  https://ultimaker.com/software/ultimaker-cura

Do not hesitate to contact us if you have any question.

Reference:
https://wiki.dfrobot.com/
https://wiki.dfrobot.com/Gravity__DS18B20_Temperature_Sensor__Arduino_Compatible__V2_SKU__DFR0024
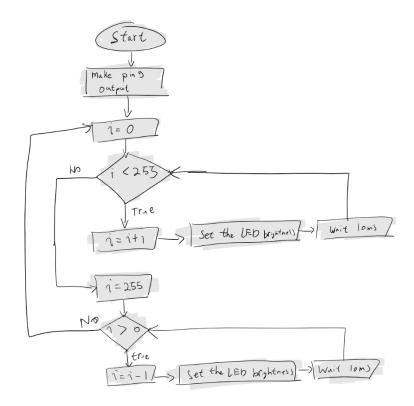https://wiki.dfrobot.com/DFRobot_Ambient_Light_Sensor_SKU_DFR0026

核心概念：
serial communication 串行通信：指计算机主机与外设之间以及主机系统与主机系统之间数据的串行传送。使用一条数据线，将数据一位一位地依次传输，每一位数据占

据一个固定的时间长度。其只需要少数几条线就可以在系统间交换信息，特别适用于计算机与计算机、计算机与外设之间的远距离通信。

Fade an LED In and Out, Like on a Sleeping Apple Computer

```
const int LED = 9; // the pin for the LED
int i = 0; // We'll use this to count up and down

void setup() {
 pinMode(LED, OUTPUT); // tell Arduino LED is an output
}
void loop(){
 for (i = 0; i < 255; i++) { // loop from 0 to 254 (fade in)
 analogWrite(LED, i); // set the LED brightness
 delay(10); // Wait 10ms because analogWrite
 // is instantaneous and we would
 // not see any change
 }
 for (i = 255; i > 0; i--) { // loop from 255 to 1 (fade out)
 analogWrite(LED, i); // set the LED brightness
 delay(10); // Wait 10ms
 }
}
```

Serial Communication With Analog Input

```
int SENSOR =A0; // select the input pin for the sensor
int val = 0; // variable to store the value coming from the sensor

void setup() {
  // put your setup code here, to run once:
  Serial.begin(9600); // opent the serial port to send
                      // data back the computer at
                      // 9600 bits per second
}

void loop() {
  // put your main code here, to run repeatedly:
  val = analogRead(SENSOR); // read the value from the sensor

  Serial.println(val);  // print the value to the serial port
                        // the serial port
  delay(100); // wait 100ms between each send
}
```

Note
- pinMode() sets up a pin for use as a digital input, not analog input.
- When calling analogRead, it reconfigures the Analog Pin for "input".

Analog Output (PWM)
Unlike digitalRead(), which can be used on both INPUT and OUTPUT, analogWrite() only works for OUTPUT. analogWrite() works on pins which support Pulse-Width Modulation (PWM), so it only makes sense to use it as an OUTPUT. That being case, like analogRead(), analogWrite() automatically sets the pin to OUTPUT called.