

Mbed Lab 3 Report

Analog Output

109033130 唐振家

一、Lab Description

1、Analog output

```
1  #include "mbed.h"
2
3  AnalogOut Aout(PA_4);
4  int main(){
5      while(1){
6          Aout = 0.25; // 0.25 * 3.3 = 0.825 v
7          ThisThread::sleep_for(2s);
8          Aout = 0.5; // 0.50 * 3.3 = 1.650 v
9          ThisThread::sleep_for(2s);
10         Aout = 0.75; // 0.75 * 3.3 = 2.475 v
11         ThisThread::sleep_for(2s);
12     }
13 }
14
```

說明：

將 PA_4 設置為類比輸出訊號腳位，並且每 2 秒更新一次數字，為 0.25、0.5、0.75 循環變化，由於訊號腳輸出電壓最高為 3.3V，所以 0.25 為 $0.25 * 3.3 = 0.825V$ ，以此類推。



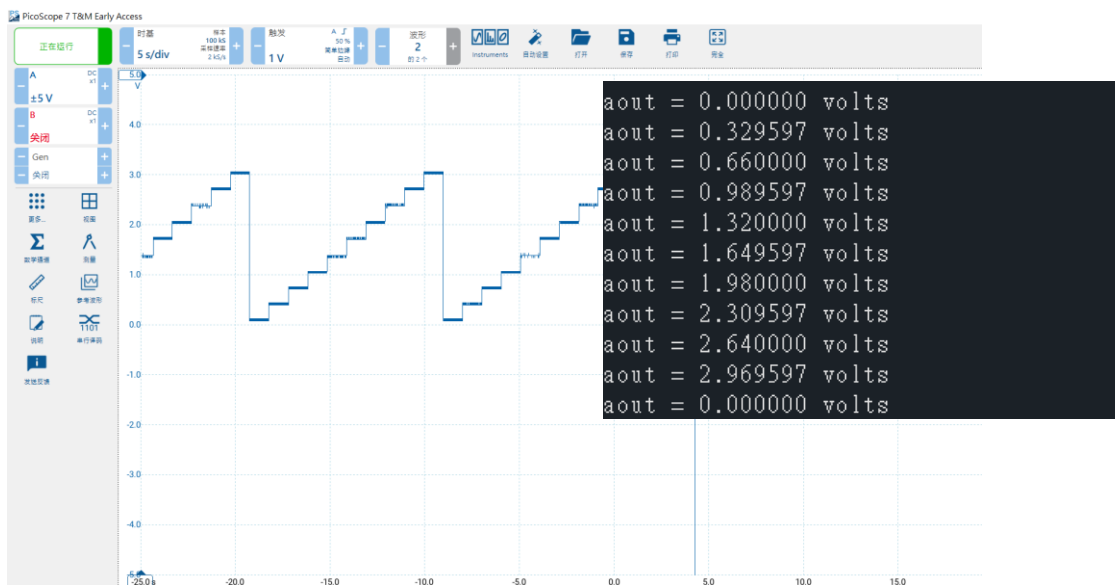
一、Lab Description

2、Generate a sawtooth waveform

```
1  #include "mbed.h"
2
3  // Initialize a pins to perform analog and digital output functions
4  // Adjust analog output pin name to your board spec.
5  AnalogOut aout(PA_4);
6  DigitalOut dout(LED1);
7
8  int main(void)
9  {
10     while (1) {
11         // change the voltage on the digital output pin by 0.1 * VCC
12         // and print what the measured voltage should be (assuming VCC = 3.3v)
13         for (float i = 0.0f; i < 1.0f; i += 0.1f) {
14             aout = i;
15             printf("aout = %f volts\n", aout.read() * 3.3f);
16             // turn on the led if the voltage is greater than 0.5f * VCC
17             dout = (aout > 0.5f) ? 1 : 0;
18             ThisThread::sleep_for(1s);
19         }
20     }
21 }
```

說明：

將 PA_4 設置為類比輸出訊號腳位、LED1 設置成數位訊號輸出，設置一個 for 迴圈，間隔 1 秒、每次加 0.1，並將輸出結果（單位：V）印在 Output Terminal，所以顯示為 $0.0 * 3.3$ 、 $0.1 * 3.3$ ，當結果大於 $0.5 * 3.3$ 時，LED1 便會亮。



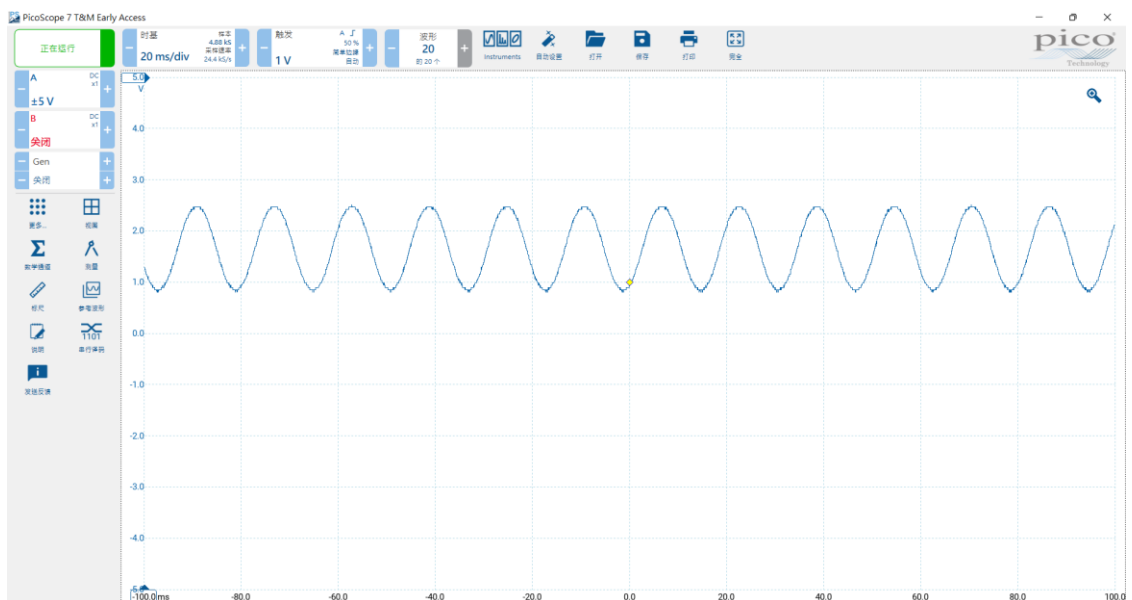
一、Lab Description

3、Generate a sine waveform

```
1 #include "mbed.h"
2
3 const double pi = 3.141592653589793238462;
4 const double amplitude = 0.5f;
5 const double offset = 65535 / 2;
6
7 // The sinewave is created on this pin
8 // Adjust analog output pin name to your board spec.
9 AnalogOut aout(PA_4);
10
11 int main()
12 {
13     double rads = 0.0;
14     uint16_t sample = 0;
15
16     while (1) {
17         // sinewave output
18         for (int i = 0; i < 360; i++) {
19             rads = (pi * i) / 180.0f;
20             sample = (uint16_t)(amplitude * (offset * (cos(rads + pi)))) + offset);
21             aout.write_u16(sample);
22         }
23     }
24 }
```

說明：

定義好需要用的數值，並將 PA_4 設置為類比輸出訊號腳位，設定 rads 為角度 $0 \sim 2\pi$ ，經過 cos 與 sin 角度轉換，以及振幅大小轉換，輸出 sample



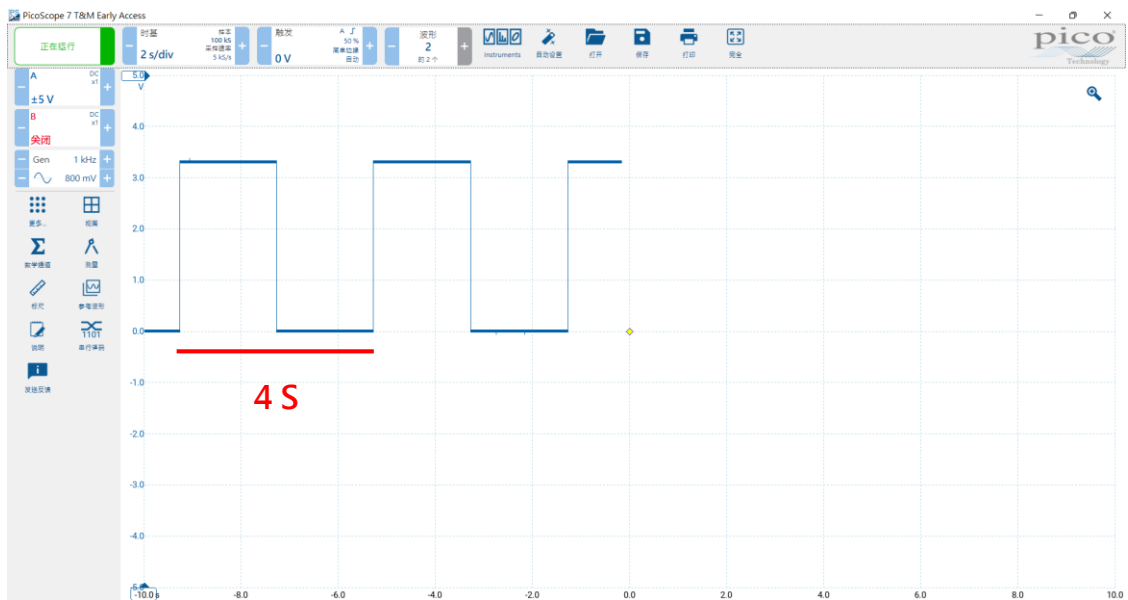
一、Lab Description

4、mbed PWM Output

```
1  #include "mbed.h"
2
3  // Adjust pin name to your board specification.
4  // You can use LED1/LED2/LED3/LED4 if any is connected to PWM capable pin,
5  // or use any PWM capable pin, and see generated signal on logical analyzer.
6  PwmOut led(LED1);
7
8  int main()
9  {
10     // specify period first
11     led.period_ms(4000);           // 4 second period
12     led.write(0.50f);             // 50% duty cycle, relative to period
13     //led = 0.5f;                 // shorthand for led.write()
14     //led.pulsewidth_ms(2000);   // alternative to led.write, set duty cycle time in milliseconds
15     while (1);
16 }
```

說明：

因為LED1(D13)腳位是一個 PWM Pin，所以利用PwmOut物件中的指令，使週期為4000ms，且平均值為50%，如此可形成以下結果。

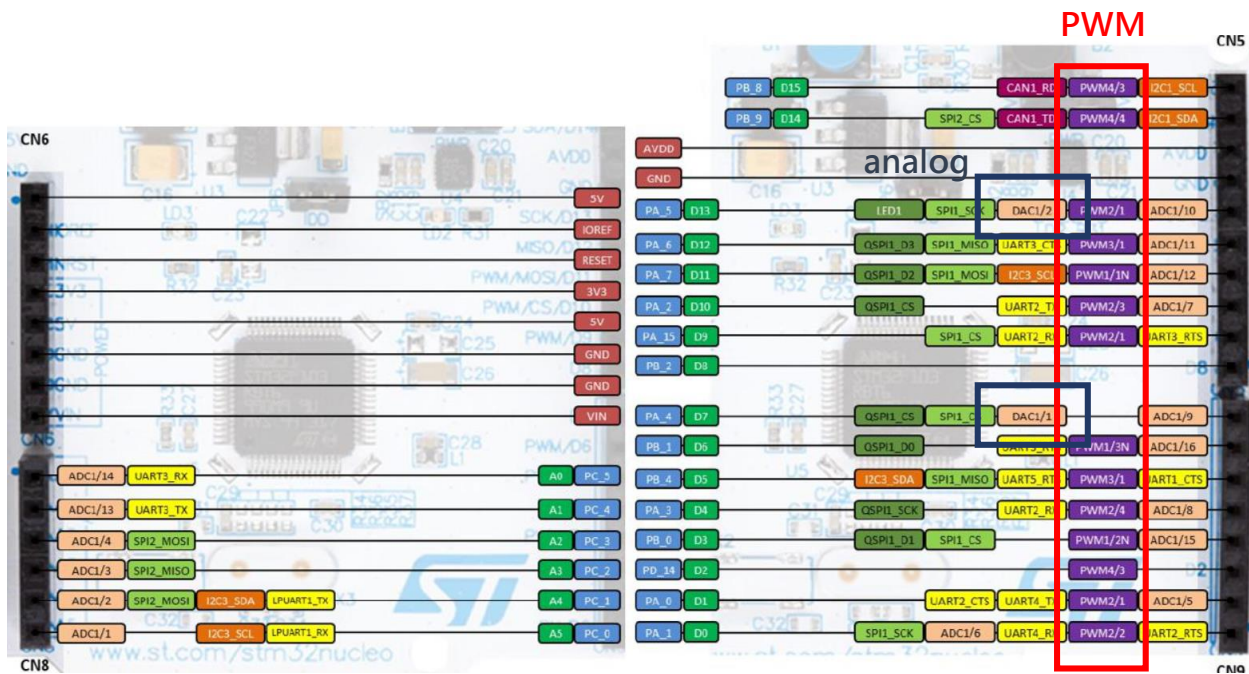


二、Demo and Checkpoints

How to find analog output pins and PWM pins from Pinmap?

有DAC功能的，為 analog output pins

註記PWM的為PWM pins




三、遇到的問題

PicoScope6.14偵測不到2200A

嘗試借用其他同學的 Pico，卻同樣只出現 Demo 選項，並寫在電腦端沒有發現其連接上 USB 序列埠，之後在討論區搜尋，發現有同學也遇到類似問題，於是下載第 7 版，就能成功連上了。

之後重新試看看第六版，發現也能正常連接，所以之後改回使用第六版。

 **劉靖家** 5 小時前 1 樓

The reason is that the driver of Picoscope is not installed properly. This is perhaps caused by Windows driver signing issue. Please follow the instruction to disable Windows driver signing: <https://www.technipages.com/enable-disable-device-driver-signing>

After disable the driver signing, you may try to install the driver manually by executing DPInst.exe in C:/Program Files (x86)/Pico Technology/PicoScope6/system/ (I did not try to disable Windows signing. So, in my system, this will report "Installation Failed". If it somehow it also fails, please install version 7 as follows.)

The issue could be solved by installing Beta version of Picoscope 7. You can find it here: <https://oem.picotech.com/p7beta/download> After the installation of verion 7, version 6 can also be used (at least I started Picoscope and found the device).

👍 0 +1
» 引用

PicoScope 7 Beta test group
<https://oem.picotech.com/p7beta/download>

