Lab07

Experiment 1:

1 Please design an audio-data parallel-to-serial module to generate the speaker control signal with 100MHz system clock, 25 MHz master clock, (25/128) MHz Left-Right clock (Fs), and 6.25 MHz (32Fs) sampling clock.

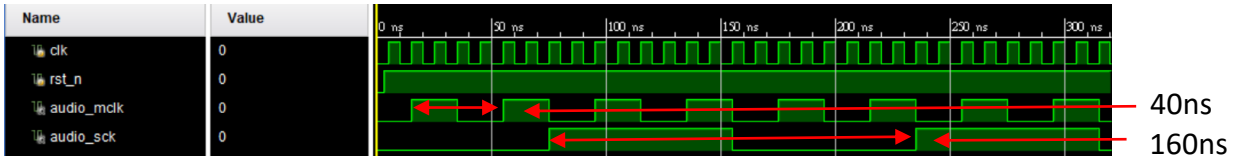
1.1 Design a general frequency divider to generate the required frequencies for speaker clock.

1.2 Design a stereo signal parallel-to-serial processor to generate the speaker control signals. Please use Verilog simulation waveform to verify your control signal.

Result:

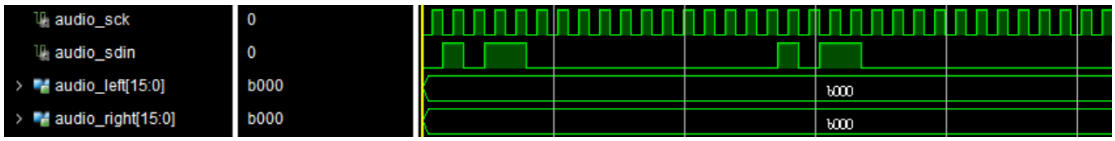
Master clock:1/40*10^9=25MHz

sampling clock:1/160*10^9=6.25MHz

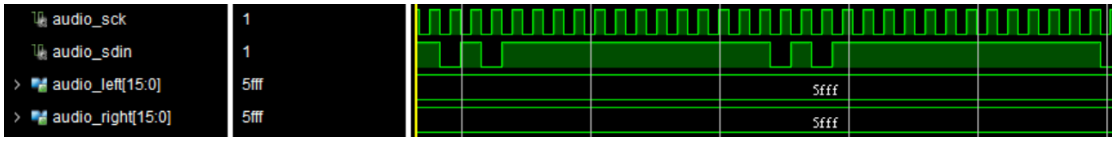


Left-right clock:1/5120*10^9=195312.5Hz

負



正



Experiment 2:

2 Speaker control

2.1 Please produce the buzzer sounds of **Do**, **Re**, and **Mi** by pressing buttons (Left, Center, Right) respectively. When you press down the button, the speaker produces corresponding frequency sound. When you release the switch, the speaker stops the sound.

2.2 Please control the volume of the sound by pressing button (Up) as increase and (Down) and decrease the volume. Please also quantize the audio dynamic range as 16 levels and show the current sound level in the 7-segment display.

Result:

聲音部分沒有 speaker 無法展示

`define Freq_Do 22'd191571

`define Freq_Re 22'd170648

`define Freq_Mi 22'd151515

https://lurl.cc/Pkcvb

Experiment 3:

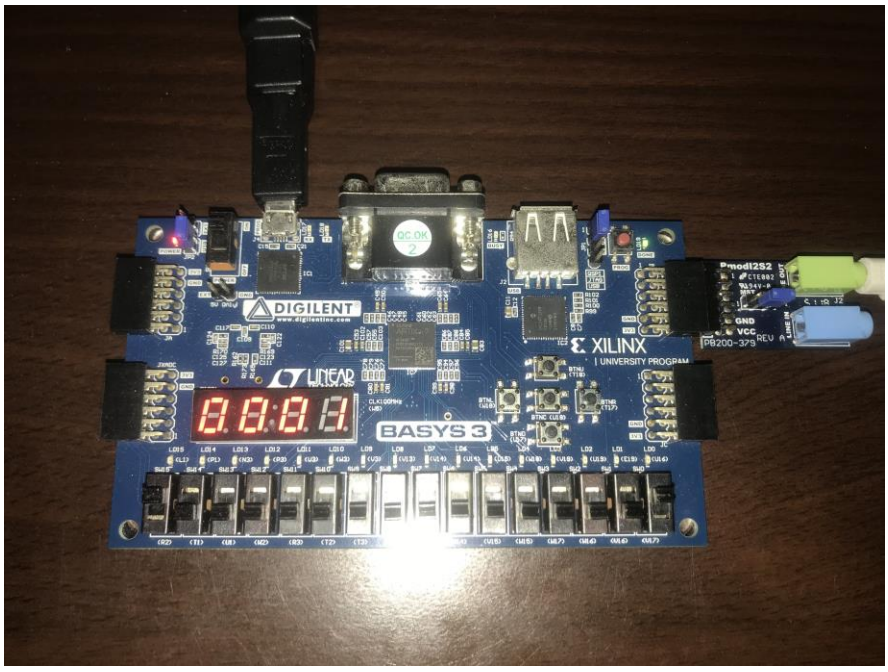
3 Electronic Organ
- 3.1 Use the DIP switch to implement keys c, d, e, f, g, a, b, C, D, E, F, G, A, B (two octaves from mid-Do) control, and demo the sounds from low to high frequencies.
- 3.2 Display the playing sound (Do, Re, Mi, Fa, So, La, Si) in the 7-segment display.

Result:

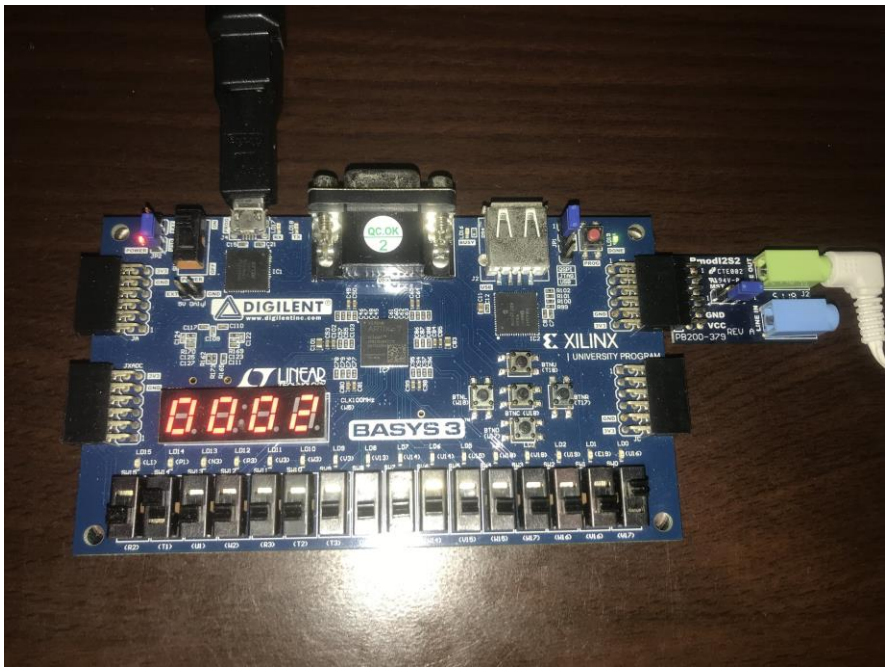
聲音部分沒有 speaker 無法展示

```
`define Freq_c 22'd382234
`define Freq_d 22'd340530
`define Freq_e 22'd303380
`define Freq_f 22'd286352
`define Freq_g 22'd255102
`define Freq_a 22'd227273
`define Freq_b 22'd202478
`define Freq_C 22'd191571
`define Freq_D 22'd170648
`define Freq_E 22'd151515
`define Freq_F 22'd143266
`define Freq_G 22'd127551
`define Freq_A 22'd113636
`define Freq_B 22'd101214
```

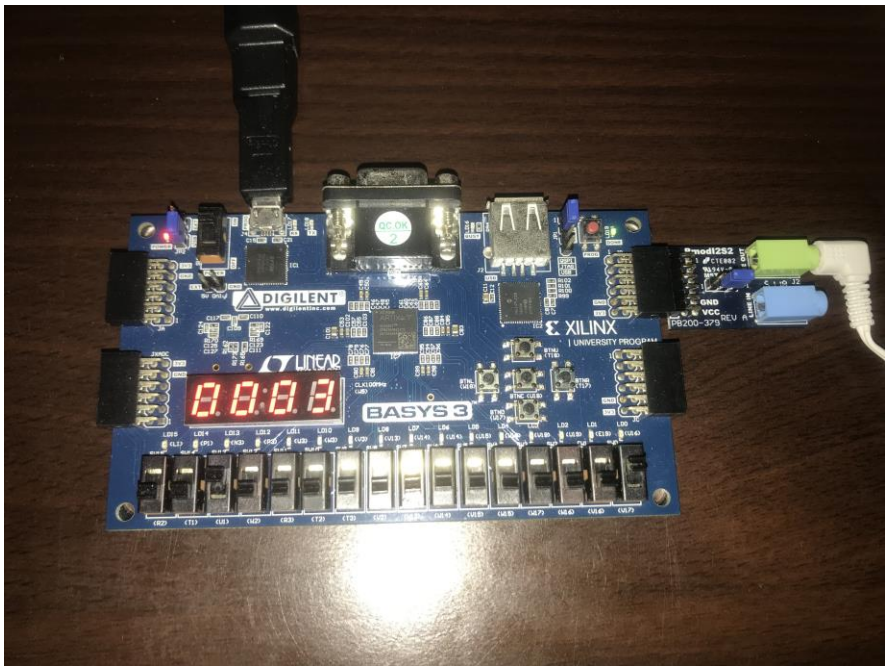
Note:c 唱名:Do(顯示 1)



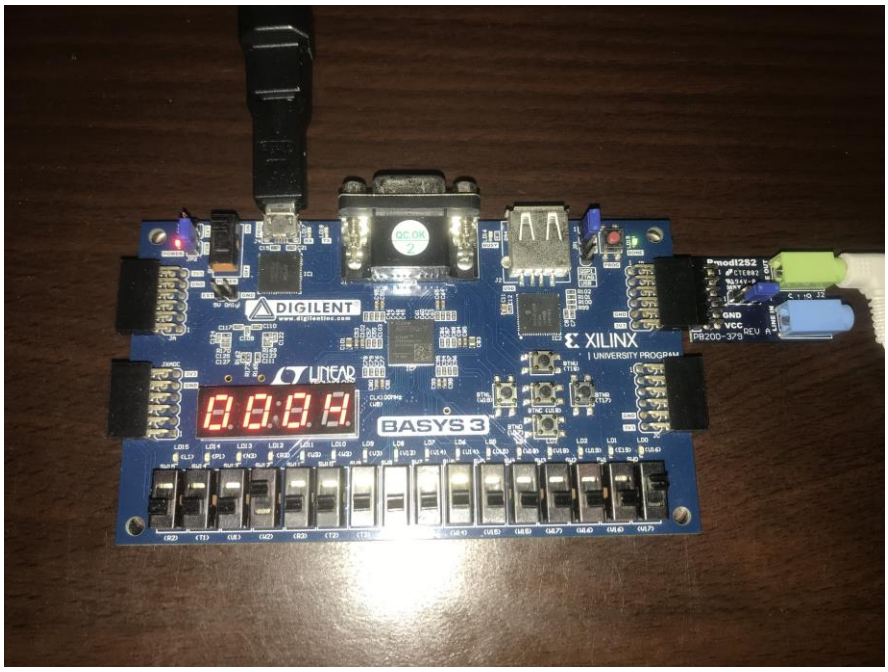
Note:d 唱名:Re(顯示 2)



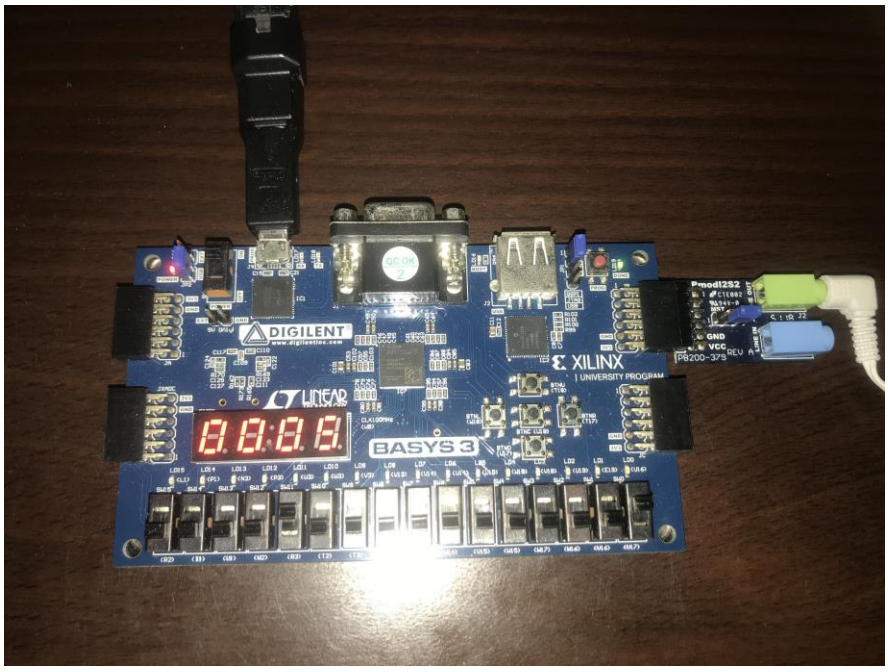
Note:e 唱名:Mi(顯示 3)



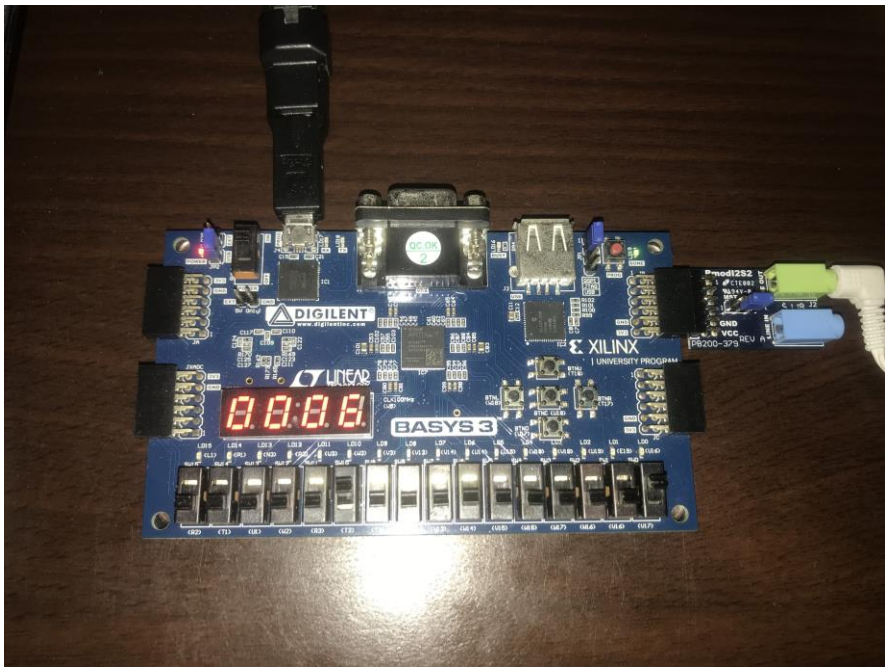
Note:f 唱名:Fa(顯示 4)



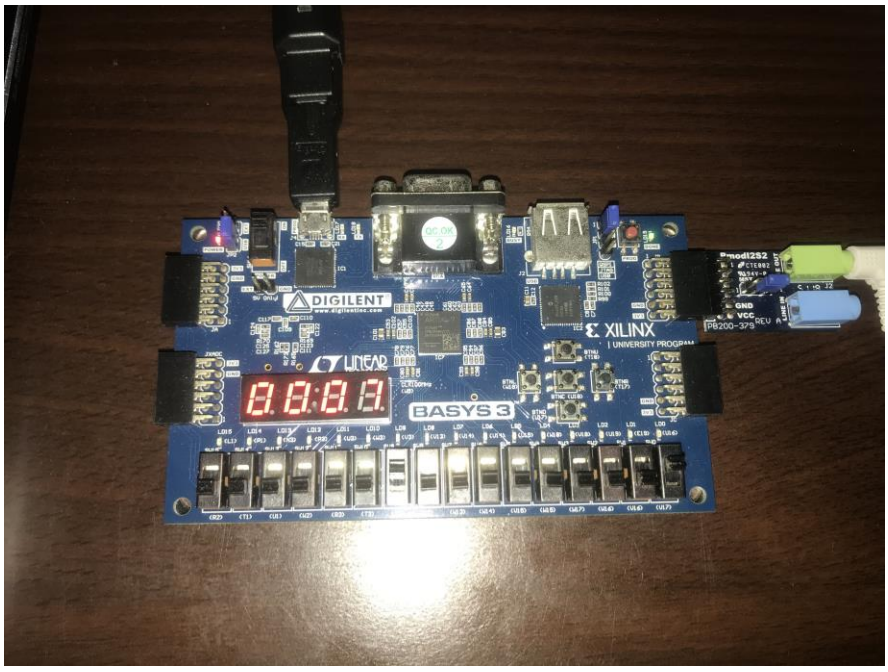
Note:g 唱名:So(顯示 5)



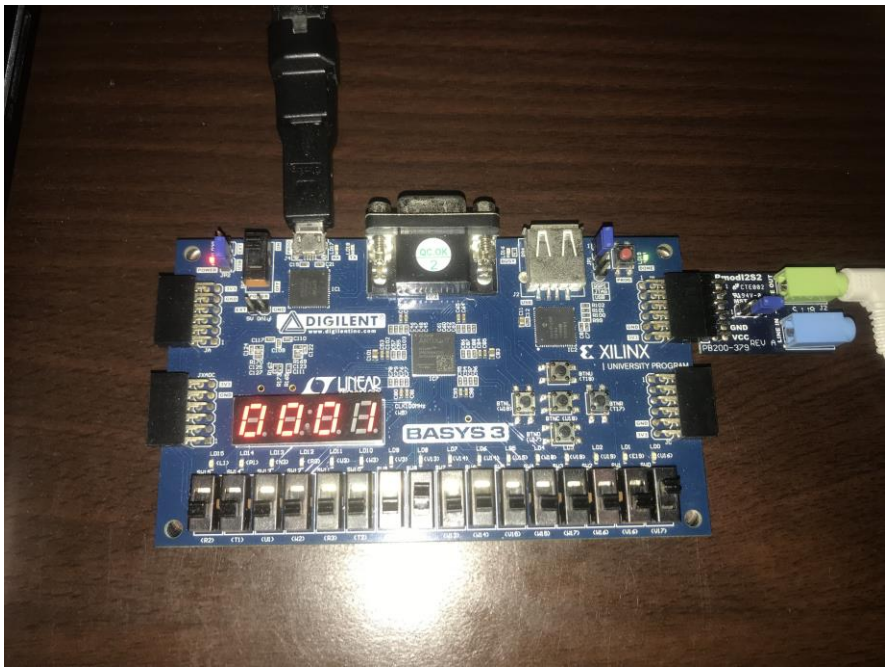
Note:a 唱名:La(顯示 6)



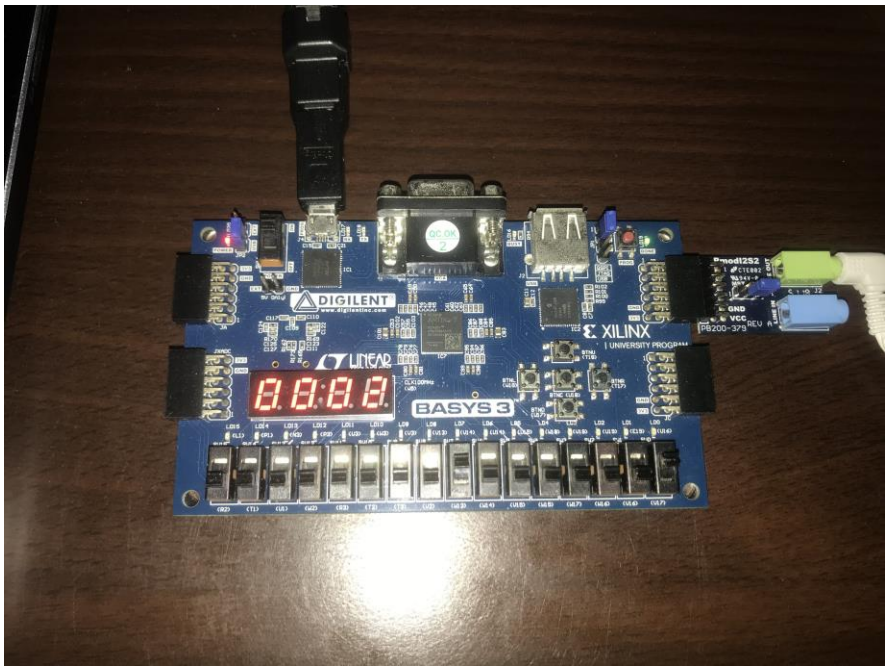
Note:b 唱名:Si(顯示 7)



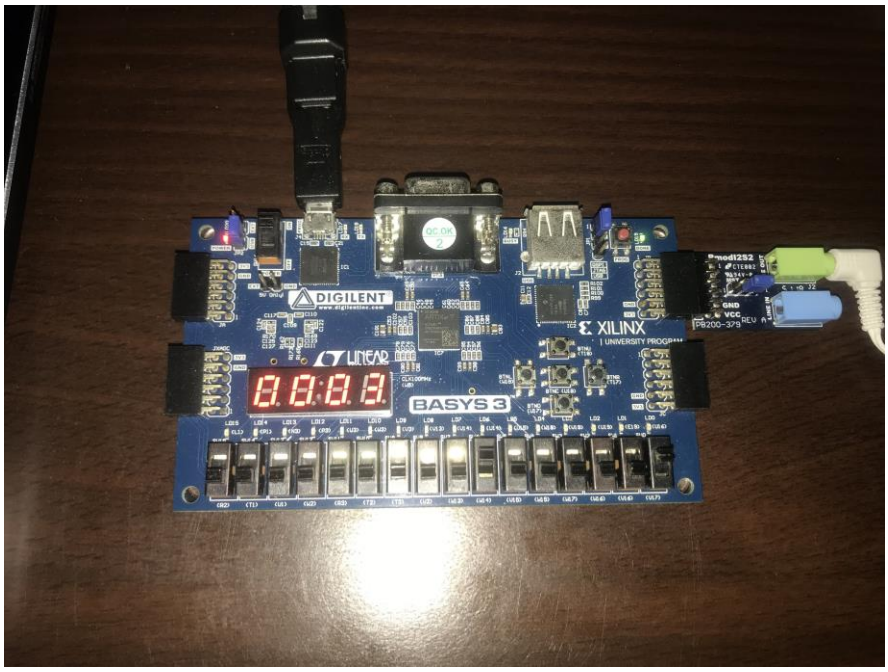
Note:C 唱名:Do(顯示 1)



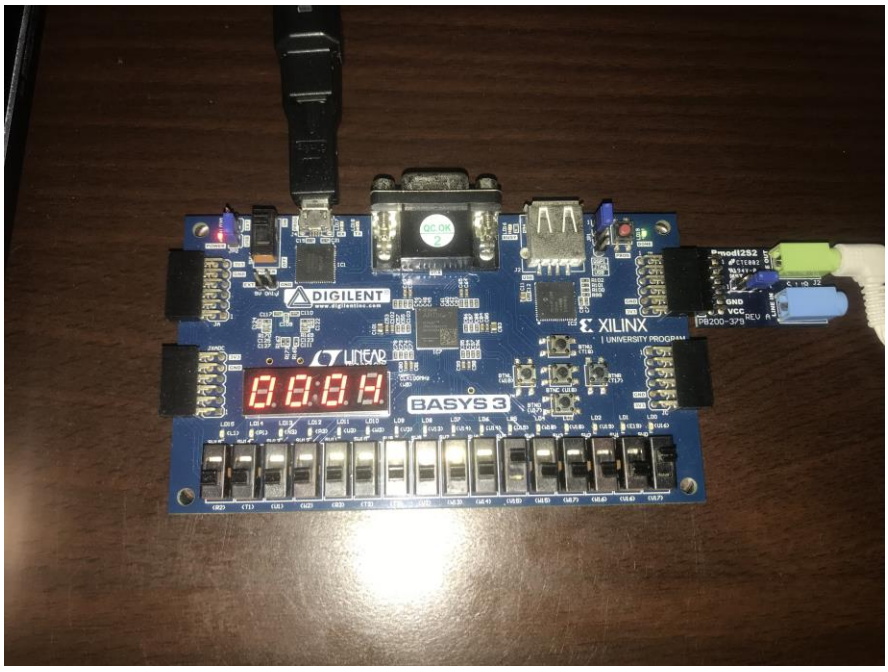
Note:D 唱名:Re(顯示 2)



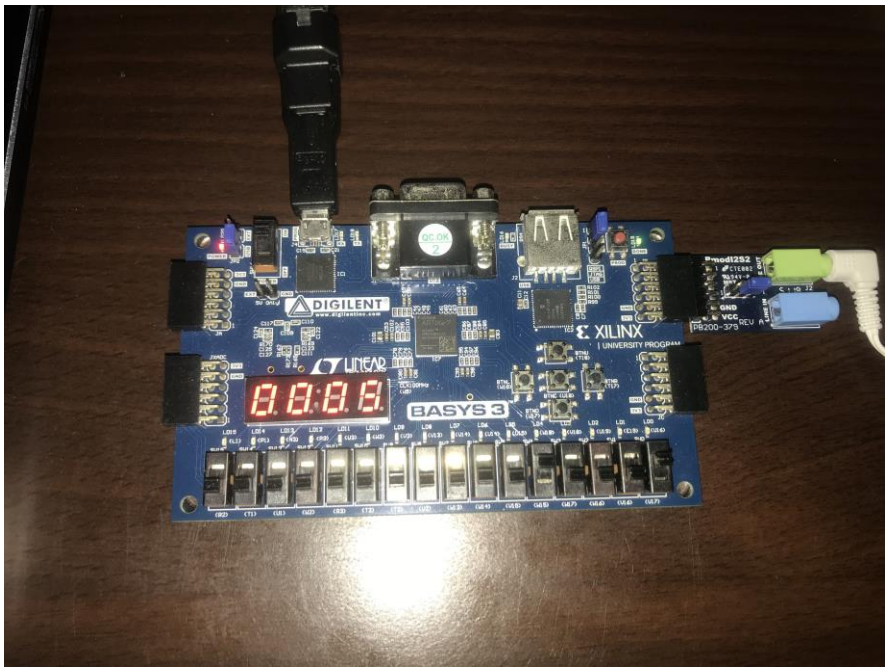
Note:E 唱名:Mi(顯示 3)



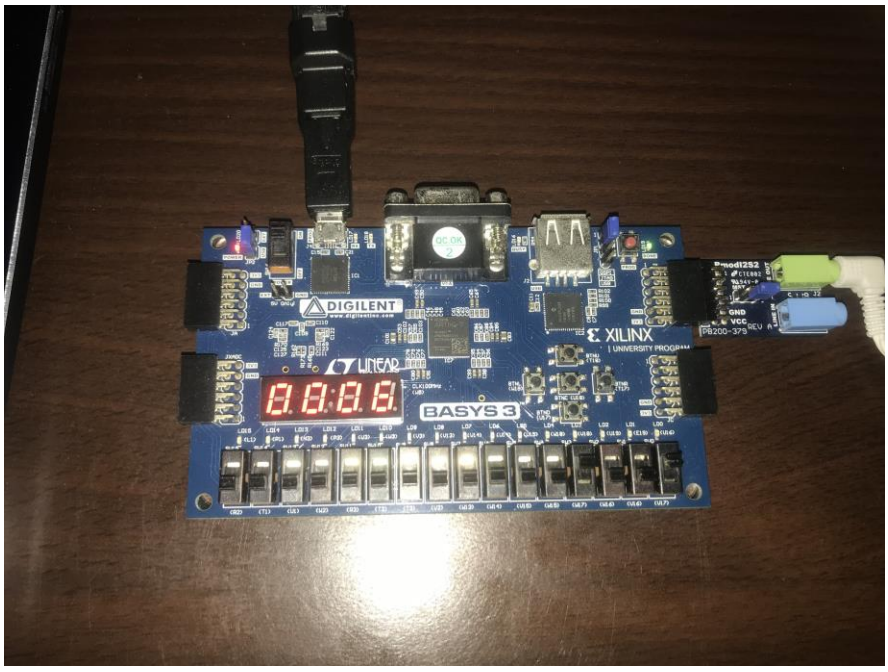
Note:F 唱名:Fa(顯示 4)



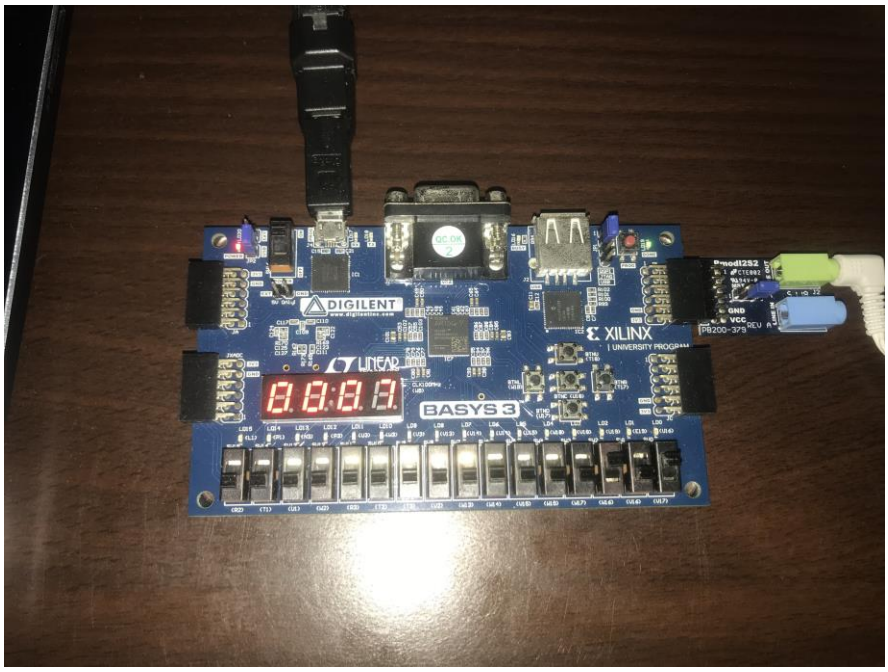
Note:G 唱名:So(顯示 5)



Note:A 唱名:La(顯示 6)



Note:B 唱名:Si(顯示 7)



Experiment 4:

4 Playback double tones by separate left and right channels. If you turn one DIP switch off, the electronic organ playback single tone when you press push button. If you turn DIP switch on, left (right) channels play Do(Mi), Re(Fa), Mi(So), Fa(La), So(Si) when you press the five push buttons, respectively.

Result:

聲音部分沒有 speaker 無法展示