**電通二甲微處理器實驗 實驗結報**

|  |  |  |  |
| --- | --- | --- | --- |
| **實驗名稱** | **Lab 06 – 音樂教室** | | |
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1. **實驗目的**

**Checkpoint1 Arduino 演奏一段特定的音樂, 旋律不得是小蜜蜂**

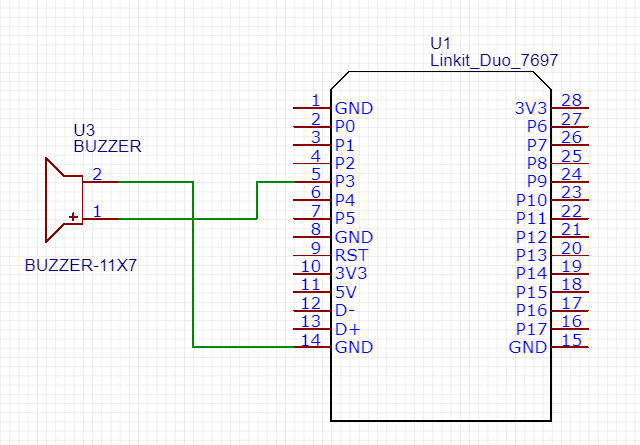
**Checkpoint2 Arduino 利用4x4 keyboard 演奏一段音樂**

**Checkpoint3 Arduino 讀取序列埠的輸入, 並以摩斯電碼發報**

1. **實驗步驟**

**請事先找好樂譜**

1. **電路圖**



1. **程式碼**

**Checkpoint1**

**#define NOTE\_STOP 0**

**#define NOTE\_C5 523**

**#define NOTE\_D5 587**

**#define NOTE\_E5 659**

**#define NOTE\_F5 698**

**#define NOTE\_G5 784**

**#define NOTE\_A5 880**

**#define NOTE\_B5 988**

**#define NOTE\_C6 1047**

**#define NOTE\_D6 1175**

**#define NOTE\_E6 1319**

**#define NOTE\_F6 1397**

**#define NOTE\_G6 1568**

**#define NOTE\_A6 1760**

**#define NOTE\_B6 1976**

**#define NOTE\_C7 2093**

**#define NOTE\_D7 2349**

**#define NOTE\_E7 2637**

**int melody[]={**

**NOTE\_G6, NOTE\_E6, NOTE\_STOP, NOTE\_G6, NOTE\_D6, NOTE\_STOP, NOTE\_E6, NOTE\_D6, NOTE\_STOP,**

**NOTE\_C6, NOTE\_STOP, NOTE\_C6, NOTE\_B5, NOTE\_A5, NOTE\_B5, NOTE\_C6, NOTE\_B5, NOTE\_STOP, NOTE\_C6, NOTE\_D6, NOTE\_E6,**

**NOTE\_STOP, NOTE\_STOP, NOTE\_G6, NOTE\_E6, NOTE\_STOP, NOTE\_G6, NOTE\_D7, NOTE\_STOP, NOTE\_C7, NOTE\_B6,**

**NOTE\_STOP, NOTE\_C7, NOTE\_STOP, NOTE\_C6, NOTE\_B5, NOTE\_A5, NOTE\_B5, NOTE\_C6, NOTE\_B5, NOTE\_STOP, NOTE\_C6, NOTE\_D6, NOTE\_C6,**

**NOTE\_STOP, NOTE\_G6, NOTE\_A6, NOTE\_B6, NOTE\_C7, NOTE\_B6, NOTE\_C7, NOTE\_B6, NOTE\_A6, NOTE\_G6, NOTE\_A6, NOTE\_STOP,**

**NOTE\_G6, NOTE\_STOP, NOTE\_C6, NOTE\_D6, NOTE\_E6, NOTE\_F6, NOTE\_E6, NOTE\_F6, NOTE\_G6, NOTE\_C6,**

**NOTE\_D6, NOTE\_E6, NOTE\_STOP, NOTE\_E6, NOTE\_STOP, NOTE\_G6, NOTE\_A6, NOTE\_B6, NOTE\_C7, NOTE\_B6,**

**NOTE\_C7, NOTE\_D7, NOTE\_C7, NOTE\_D7, NOTE\_E7, NOTE\_STOP, NOTE\_G6, NOTE\_STOP, NOTE\_C6, NOTE\_D6,**

**NOTE\_E6, NOTE\_F6, NOTE\_E6, NOTE\_F6, NOTE\_E6, NOTE\_D6, NOTE\_C6, NOTE\_B5, NOTE\_C6, NOTE\_STOP**

**};**

**double noteDurations[] = {**

**0.5,0.5,1,0.5,0.5,1,0.5,0.5,0.5,**

**2,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,**

**2,1,0.5,0.5,1,0.5,0.5,1,0.5,0.5,**

**0.5,2,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,2,**

**0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,0.5,**

**1.5,0.5,0.5,0.5,0.5,1,0.5,0.5,0.5,0.5,**

**0.5,0.5,0.5,1.5,0.5,0.5,0.5,0.5,0.5,0.5,**

**0.5,0.5,0.5,0.5,0.5,0.5,1.5,0.5,0.5,0.5,**

**0.5,1,0.5,0.5,0.5,1,0.5,0.5,1.5,2**

**};**

**int speakerPin = 5;**

**int length = sizeof(melody);**

**int tempo = 800;**

**void setup() {**

**pinMode(speakerPin,OUTPUT);**

**}**

**void loop() {**

**int i;**

**for (i = 0; i < length; i++) {**

**tone(speakerPin,melody[i],noteDurations[i]\*tempo);**

**delay(noteDurations[i]\*tempo);**

**noTone(speakerPin);**

**}**

**i=0;**

**}**

**Checkpoint2**

**#define NOTE\_STOP 0**

**#define NOTE\_F4 349**

**#define NOTE\_G4 392**

**#define NOTE\_A4 440**

**#define NOTE\_B4 494**

**#define NOTE\_C5 523**

**#define NOTE\_D5 587**

**#define NOTE\_E5 659**

**#define NOTE\_F5 698**

**#define NOTE\_G5 784**

**#define NOTE\_A5 880**

**#define NOTE\_B5 988**

**#define NOTE\_C6 1047**

**#define NOTE\_D6 1175**

**#define NOTE\_E6 1319**

**#define NOTE\_F6 1397**

**#define NOTE\_G6 1568**

**#include <Keypad.h>**

**const byte ROWS = 4;**

**const byte COLS = 4;**

**char keys[ROWS][COLS] = {{'F', 'B', 'A', '0'}, {'E','3','2', '1'},**

**{'D', '6', '5', '4'}, {'C', '9', '8', '7'}};**

**byte rowPins[ROWS] = {8,9,10,11};**

**byte colPins[COLS] = {12,13,14,15};**

**Keypad keypad = Keypad( makeKeymap(keys), rowPins,colPins, ROWS, COLS );**

**int speakerPin = 5;**

**int tempo = 300;**

**void setup() {**

**pinMode(speakerPin,OUTPUT);**

**}**

**int melody=0;**

**void loop() {**

**char key=keypad.getKey();**

**if(key != NO\_KEY) {**

**if(key == '0')**

**melody = NOTE\_F4;**

**else if(key == '1')**

**melody = NOTE\_G4;**

**else if(key == '4')**

**melody = NOTE\_A4;**

**else if(key == '7')**

**melody = NOTE\_B4;**

**else if(key == 'A')**

**melody = NOTE\_C5;**

**else if(key == '2')**

**melody = NOTE\_D5;**

**else if(key == '5')**

**melody = NOTE\_E5;**

**else if(key == '8')**

**melody = NOTE\_F5;**

**else if(key == 'B')**

**melody = NOTE\_G5;**

**else if(key == '3')**

**melody = NOTE\_A5;**

**else if(key == '6')**

**melody = NOTE\_B5;**

**else if(key == '9')**

**melody = NOTE\_C6;**

**else if(key == 'F')**

**melody = NOTE\_D6;**

**else if(key == 'E')**

**melody = NOTE\_E6;**

**else if(key == 'D')**

**melody = NOTE\_F6;**

**else if(key == 'C')**

**melody = NOTE\_G6;**

**tone(speakerPin,melody,300);**

**}**

**}**

**Checkpoint3**

**int Frequency = 440;**

**int speakerPin = 5;**

**char \*morse[] = {**

**"01","1000","1010","100",**

**"0","0010","110","0000",**

**"00","0111","101","0100",**

**"11","10","111","0110",**

**"1101","010","000","1",**

**"001","0001","11","1001",**

**"1011","1100"**

**};**

**void setup() {**

**Serial.begin(9600);**

**pinMode(speakerPin,OUTPUT);**

**}**

**char chr;**

**char \*ptr;**

**int index;**

**void loop() {**

**if(Serial.available()) {**

**chr = Serial.read();**

**Serial.println(chr);**

**if((chr>='A' && chr <= 'Z')||(chr>='a' && chr <= 'z')) {**

**(chr>='A' && chr <= 'Z')?index=chr-'A':index=chr-'a';**

**ptr=morse[index];**

**while(\*ptr!='\0') {**

**if(\*ptr=='0') {**

**tone(speakerPin,Frequency,100);**

**delay(100);**

**}**

**else if(\*ptr=='1') {**

**tone(speakerPin,Frequency,300);**

**delay(100);**

**}**

**ptr++;**

**delay(100);**

**}**

**delay(300);**

**}**

**}**

**}**

1. **心得討論**

**今天的說簡單很簡單，但她好麻煩阿。把樂譜輸進去時有點混亂，幸好沒有打錯。我的是<孫燕姿-遇見>。**

**雖然3堂課都是蜂鳴器的噪音，但能播自己選的音樂真的很有成就感**