實驗十一 倒數計時器與喇叭控制

實驗目的： Arduino UNO與計時器、按鍵、喇叭發音，達成計時器之應用

實驗步驟：

1. 先將Arduino連接一個四合一七節顯示器、一個喇叭和四個按鍵開關。
2. 使用四合一七節顯示顯示器來顯示現在時刻顯示格式為"分分:秒秒"

程式執行後顯示器顯示"00:00"，

按下操作鍵 K1～K4 動作如下:

開關K1 : 進入設定現在時刻，計時器不動作

開關K2 : 設定分鐘 (按一下加一)

開關K3 : 設定秒數 (按一下加一)

開關K4 : 完成設定，開始倒數計時

當時間到零時後，喇叭會發出聲響10秒鐘提醒

/\*四位元七段顯示器,多工掃描,時鐘功能 \*/

#define Buzzer 2 //蜂鳴器

#include <FlexiTimer2.h>

#include <Time.h>

int pushButtonA = A0,buttonStateA = 0,BeforeStateA = 0;

int pushButtonB = A1,buttonStateB = 0,BeforeStateB = 0;

int pushButtonC = A2,buttonStateC = 0,BeforeStateC = 0;

int pushButtonD = A3,buttonStateD = 0,BeforeStateD = 0;

int delaytime = 1000,mymin=0,mysec=0;

boolean check=true,okstart=false;

const int seg7[]= { 11, 10,9,8,7,6,5};//七段控制腳陣列,對應a〜g段

const int scan[]= {13, 12, 4,3}; //掃描端控制腳陣列,千,百,十,個

char TAB[]={ 0x3F,0x06,0x5B,0x4F,0x66,0x6D,0x7D,0x27,0x7F,0x67,0};//七節顯示器編碼表0〜9

//int delaytime=1000;

//記錄掃描線位置的變數(中斷用)

int a,displayspeed=200;

volatile char scan\_line = 0;

int ii,ans=0;

// the setup routine runs once when you press reset:

void setup() {

  pinMode(Buzzer,OUTPUT);//蜂鳴器

  pinMode(pushButtonA, INPUT);

  pinMode(pushButtonB, INPUT);

  pinMode(pushButtonC, INPUT);

  pinMode(pushButtonD, INPUT);

  for(ii = 0;ii < 7;ii++){

    pinMode(seg7[ii],OUTPUT);

  }

  for(ii = 0;ii < 4;ii++){

    pinMode(scan[ii],OUTPUT);

    digitalWrite(scan[ii],LOW);

  }

  Serial.begin(9600);

FlexiTimer2::set(1000, flash); //每1000ms呼叫一次 flash

FlexiTimer2::start();            //啟動計時中斷

}

// the loop routine runs over and over again forever:

void loop()

{

  buttonStateA = digitalRead(pushButtonA);

  if(buttonStateA==1)

   {

          if(buttonStateA!=BeforeStateA)    //debounce

            delay(50);

      if(buttonStateA==1 and BeforeStateA==0)//Work

      {

          check = false;

          Serial.println("A");

      }

   }

   BeforeStateA=buttonStateA;

  if(check==false)

  {

    buttonStateB = digitalRead(pushButtonB);

    if(buttonStateB==1)

    {

          if(buttonStateB!=BeforeStateB)    //debounce

            delay(50);

          if(buttonStateB==1 and BeforeStateB==0)//Work

          {

              mymin++;

              Serial.println("B");

          }

    }

    BeforeStateB=buttonStateB;

    buttonStateC = digitalRead(pushButtonC);

    if(buttonStateC==1)

    {

          if(buttonStateC!=BeforeStateC)    //debounce

            delay(50);

          if(buttonStateC==1 and BeforeStateC==0)//Work

          {

              mysec++;

              Serial.println("C");

          }

    }

   BeforeStateC=buttonStateC;

    buttonStateD = digitalRead(pushButtonD);

  if(buttonStateD==1)

    {

          if(buttonStateD!=BeforeStateD)    //debounce

            delay(50);

          if(buttonStateD==1 and BeforeStateD==0)//Work

          {

              check = true;

              okstart = true;

              ans = mymin\*60+mysec;

              Serial.println("D");

          }

    }

   BeforeStateD=buttonStateD;

  int num0 = mymin/10;

  int num1 = mymin%10;

  int num2 = mysec/10;

  int num3 = mysec%10;

  OutPort(TAB[num0]);

  digitalWrite(scan[0] , LOW);

  delay(1);

  digitalWrite(scan[0] , HIGH);

  OutPort(TAB[num1]);

  digitalWrite(scan[1] , LOW);

  delay(1);

  digitalWrite(scan[1] , HIGH);

  OutPort(TAB[num2]);

  digitalWrite(scan[2] , LOW);

  delay(1);

  digitalWrite(scan[2] , HIGH);

  OutPort(TAB[num3]);

  digitalWrite(scan[3] , LOW);

  delay(1);

  digitalWrite(scan[3] , HIGH);

}

else if(check==true)

{

  int num0 = ((ans%3600)/60)/10;

  int num1 = ((ans%3600)/60)%10;

  int num2 = (ans%60)/10;

  int num3 = (ans%60)%10;

  OutPort(TAB[num0]);

  digitalWrite(scan[0] , LOW);

  delay(1);

  digitalWrite(scan[0] , HIGH);

  OutPort(TAB[num1]);

  digitalWrite(scan[1] , LOW);

  delay(1);

  digitalWrite(scan[1] , HIGH);

  OutPort(TAB[num2]);

  digitalWrite(scan[2] , LOW);

  delay(1);

  digitalWrite(scan[2] , HIGH);

  OutPort(TAB[num3]);

  digitalWrite(scan[3] , LOW);

  delay(1);

  digitalWrite(scan[3] , HIGH);

}

  }

//計時中斷程式,每次執行時處理1位數

void flash(){

  if(okstart==true&&ans>0)

  {

      ans--;

      Serial.println(ans);

      if(ans==0)

      {

      tone(Buzzer,500,10000);   //蜂鳴器500Hz提示10秒

      }

  }

}

void OutPort(byte dat){

  for( int jj = 0;jj < 7;jj++){

    if(dat % 2 == 1)

      digitalWrite(seg7[jj],HIGH);

     else

      digitalWrite(seg7[jj],LOW);

    dat = dat / 2;

  }

}