w8: Microcontroller Experiments

Dates	@November 3, 2022
Topic	Button control

Problem Description

基礎：按數個按鈕顯示不同字母

進階：游標可以上下移動換行

Code and Explanations

```
unsigned int delay_lcd=10000;
void
LCD_Delay (){
  int i;
  for (i=0;i<delay_lcd;i++); // wait for a long enough time...
}
```

修改delay_lcd至10000，才有足夠的停頓時間。

```
int button_detect () {
  int key_hold = 0 ;
  int key_release = 0;
  int N = 100, count = N, key = 0;

  P1 = 0;
  do {
    key_hold = P1;  //assign input port P1 to key_hold
  } while (!key_hold);//if not press,keep waiting until key press

  //Stage 2: wait for key released;
  while (!key_release) { //while key is pressed
    // detect which way
    key_hold = P1;
    if (P1 == 0x01){  //2^0
      key_hold = 1;
      key = 1;
    }
    else if(P1 == 0x02){ //2^1
      key_hold = 1;
      key = 2;
```

```
    }
    else if(P1 == 0x04){ //2^2
      key_hold = 1;
      key = 3;
    }
    else if(P1 == 128){
      key_hold = 1;
      key = 7;
    }

    //detect whether press a period of time
    if (key_hold) {
      count = N;  //set stable time
    }
    else {
      count--;
      if (count==0) {
        key_release = 1;
      }
    }
  }//Stage 2: wait for key released
  return key;
}//end of function button_detect ()
```

此為bonus版本的button_detect()，和basic不同的是多了key=7，此為控制游標上下的部分。button_detect是要當按鈕訊號穩定時才傳遞key值，當訊號在100個clock內都保持相同，表示穩定。

```
void main (){
  int i = 0, key, line = 0;
  char txt[16];
  Shutup_WatchDog ();
  LCD_PortConfig ();
  LCD_Init ();
  LCD_ClearScreen ();


  while(1){
    key = button_detect ();
    if (key == 1){
      LCD_SendData ('A');
      if(line!=0)txt[i] = 'A';
    }
    if (key == 2){
      LCD_SendData ('B');
      if(line!=0)txt[i] = 'B';
    }
    if (key == 3){
      LCD_SendData ('C');
      if(line!=0)txt[i] = 'C';
    }
    if (key == 7){
      if(line == 0){
        LCD_SendCommand (0xc0);
```

```
      }
      else if(line ==   1){
        LCD_ClearScreen ();
        LCD_PrintString(txt);
        for(i=0;txt[i]!=0;i++){
          txt[i] = 0;
        }
      }
      line = (line + 1) % 2;
    }

    if(key != 0){
      i += 1;
      if (i>16)
      {
        LCD_SendCommand (0xc0);
        i = 0;
        line = (line + 1)% 2;
      }
    }
  }
}
```

主程式負責硬體設置和輸入輸出，當LCD已經寫滿第二行且需換行時，會將螢幕全部清除，並將先前儲存的第二行資訊在顯示至第一行（因此只有第二行需要儲存）。

Reference

https://s3-us-west-2.amazonaws.com/secure.notion-static.com/b0fef41a-b364-4859-be0d-a5df85cc8478/Lab05-LCD.pdf