微處理機系統實習　　Lab2

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一、【實驗目的】：

透過設計 C 語言程式設計，控制七段顯示器的邏輯以及 keyboard 的輸入。

二、【遭遇的問題】：

沒有問題。

三、【解決方法】：

1. 按下 R 鍵, random產生一組四位數字(每個數字範圍 1~9), 並顯示在 7-segment 上。

```c
#include <stdio.h>
#include <stdlib.h>
#include "NUC100Series.h"
#include "MCU_init.h"
#include "SYS_init.h"
#include "Seven_Segment.h"
#include "Scankey.h"

int arr[4];
int bin[5][5];

void Display_7seg()
{
  int i = 0;
  for(i = 0; i < 4; i++) {
  CloseSevenSegment();
  ShowSevenSegment(3 - i, arr[i]);
  CLK_SysTickDelay(5000);
  }
  return;
}

void Init_GPIO() {
  GPIO_SetMode(PC, BIT12, GPIO_MODE_OUTPUT);
  GPIO_SetMode(PC, BIT13, GPIO_MODE_OUTPUT);
  GPIO_SetMode(PC, BIT14, GPIO_MODE_OUTPUT);
  GPIO_SetMode(PC, BIT15, GPIO_MODE_OUTPUT);
  PC12 = PC13 = PC14 = PC15 = 1;
  return;
}
```

```c
void showBin(int dig) {
  if(dig < 0) return;
  PC12 = bin[dig][0] ^ 1;
  PC13 = bin[dig][1] ^ 1;
  PC14 = bin[dig][2] ^ 1;
  PC15 = bin[dig][3] ^ 1;
  return;
}

void storeBin() {
  int i = 0, currentDigit = 0, idx = 0, idx2 = 3, j = 0;
  for(i = 0; i < 4; i++) {
  currentDigit = arr[i];
  idx2 = 3;
  for (j = 0; j < 4; j++) {
  bin[idx][j] = 0;
  }
  while (currentDigit) {
  bin[idx][idx2--] = currentDigit & 1;
  currentDigit >>= 1;
  }
  idx++;
  }
  return;
}


int main(void)
{
  uint16_t i, j;
  long long seed = 0, currentNumber = 0, segNumber = 0;
  int showDig = -1;
  int keyPressed = 0;

  SYS_Init();

  OpenSevenSegment();
  OpenKeyPad();
  Init_GPIO();

   while(1) {
    Display_7seg(segNumber);
    showBin(showDig);
    seed++;
    seed %= (long long)1e18;
    srand(seed);

    i=ScanKey();

    if (i == 9 && !keyPressed) {
      for(j = 0; j < 4; j++) {
        arr[j] = rand() % 9 + 1;
      }
      storeBin();
      keyPressed = 1;
    } else if (i == 0) {
        keyPressed = 0;
    }else if( i > 4) {
        PC12 = PC13 = PC14 = PC15 = 1;
    } else {
      showDig = 4 - i;
    }
  }
}
```

2. 鍵盤輸入一組三位數 (輸入超過三個數字的話只顯示最新的三位數)

```c
#include <stdio.h>
#include <stdlib.h>
#include "NUC100Series.h"
#include "MCU_init.h"
#include "SYS_init.h"
#include "Seven_Segment.h"
#include "Scankey.h"

int arr[3] = {-1, -1, -1};

void Display_7seg()
{
    int i = 0;
    for(i = 0; i < 3; i++) {
        CloseSevenSegment();
        if(arr[i] != -1) {
            ShowSevenSegment(2 - i, arr[i]);
        }
        CLK_SysTickDelay(5000);
    }

    return;
}

void del() {
    int i = 0;
    for(i = 2; i >= 1; i--) {
        arr[i] = arr[i - 1];
    }
    arr[0] = -1;
    return;
}

void cls() {
    int i;
    for(i = 0; i < 3; i++) {
        arr[i] = -1;
    }
    return;
}

void input(int num) {
    int i = 0;
    for(i = 0; i < 2; i++) {
        arr[i] = arr[i + 1];
    }
    arr[2] = num;
}
```

```c
int main(void)
{
    uint16_t i;
    int currentNumber = 0;
    int keyPressed = -1;

    SYS_Init();

    OpenSevenSegment();
      OpenKeyPad();

       while(1) {
            Display_7seg();
            i=ScanKey();

            if( i == 0 ) {
                keyPressed = 0;
                continue;
            }

            if(keyPressed) {
                continue;
            }

            keyPressed = 1;

            if( i == 7 ) {
                del();
            } else if( i == 8 ) {
                cls();
            } else {
                input(i);
            }
      }
}
```

四、【未能解決的問題】：

沒有未能解決的問題。