微處理機系統實習　　Lab6

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一、【實驗目的】：

此次實驗利用程式邏輯的編寫 操作 GPIO 上的 OpenKeyPad, LCD。

二、【遭遇的問題】：

沒有遇到問題。

三、【解決方法】：

1. 畫面捲動

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


unsigned char map[128*8] = { // Nuvoton Logo
    // 太佔版了，省略
};


void scrollTop() {
    unsigned char tmp[150];
    int i = 0, j = 0;

    for( i = 0; i < 127; i++ ) {
        tmp[i] = map[i];
    }

    for( i = 0; i < 8 - 1; i++) {
        for( j = 0; j < 128; j++ ) {
            map[i * 128 + j] = map[(i + 1) * 128 + j];
        }
    }

    for(i = 0; i < 127; i++) {
        map[7 * 128 + i] = tmp[i];
    }

    return;

}
```

```
void scrollDown() {
    unsigned char tmp[150];
    int i = 0, j = 0;

    for( i = 0; i < 127; i++ ) {
        tmp[i] = map[128 * 7 + i];
    }

    for( i = 7; i >= 1; i--) {
        for( j = 0; j < 128; j++ ) {
            map[i * 128 + j] = map[(i - 1) * 128 + j];
        }
    }

    for(i = 0; i < 127; i++) {
        map[i] = tmp[i];
    }
}

void scrollRight() {
    unsigned char tmp[10];
    int i = 0, j = 0;
    for(i = 0, j = 127; i < 8; i++) {
        tmp[i] = map[j];
        j += 128;
    }

    for(i = 127; i >= 1; i--) {
        for(j = 0; j < 8; j++) {
            map[128 * j + i] = map[128 * j + i - 1];
        }
    }

    for(i = 0; i < 8; i++) {
        map[128 * i] = tmp[i];
    }

    return;
}

void scrollLeft() {

    unsigned char tmp[10];
    int i = 0, j = 0;
    for(i = 0; i < 8; i++) {
        tmp[i] = map[128 * i];
    }

    for(i = 0; i < 128 - 1; i++) {
        for(j = 0; j < 8; j++) {
            map[128 * j + i] = map[128 * j + i + 1];
        }
    }

    for(i = 0; i < 8; i++) {
        map[128 * i + 127] = tmp[i];
    }

    return;
}
```

```c
int main(void)
{
    int i = 5, keyPressed = 0;
    int currentStatus = 0;
    SYS_Init();
    OpenKeyPad();
    init_LCD();
    clear_LCD();


    while(1) {
        i=ScanKey();
        draw_LCD(map);

        if( currentStatus == 2 ) {
            scrollTop();
        } else if ( currentStatus == 8 ) {
            scrollDown();
        } else if ( currentStatus == 4 ) {
            scrollLeft();
        } else if ( currentStatus == 6 ) {
            scrollRight();
        }

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

        if(keyPressed) {
            continue;
        }

        if ( i != 5 && currentStatus != 5 ) continue;

        keyPressed = 1;

        currentStatus = i;

    }

}
```

2. 數字累加器

```c
#include <stdio.h>
#include <stdlib.h>
#include "NUC100Series.h"
#include "MCU_init.h"
#include "SYS_init.h"
#include "LCD.h"
#include "Scankey.h"
#define MAXN (int)(1e5 + 10)
#define INF (int)(1e9 + 9)

int list[5];
int listIdx = 0, selectIdx = 0;
int sum = 0;
int seed = 0;
int arrowIdx = 1;
int listStartIdx = 0;

int selected[5];
int amountOfSelected = 0;


void Buzz()
{
    PB11=0; // PB11 = 0 to turn on Buzzer
    CLK_SysTickDelay(10000);     // Delay
    PB11=1; // PB11 = 1 to turn off Buzzer
    CLK_SysTickDelay(10000);     // Delay
}


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;
}

void showResult() {
    char line[128];
    clear_LCD();
    sprintf(line, "SUM = %d", sum);
    print_Line(0, line);
    return;
}

void clearRes() {
    sum = 0;
    PC12 = PC13 = PC14 = PC15 = 1;
    amountOfSelected = 0;
    clear_LCD();
    showResult();
    return;
}

void randomNumList() {
    int i = 0;
    for(i = 0; i < 4; i++) {
        list[i] = rand() % 99 + 1;
        seed = ( seed + 1 ) % INF;
    }

    return;
}


void printSelectRes() {
    char line[4][128];
    int i = 0, j = 0;
    for(i = 1, j = listStartIdx; i < 4; i++, j++) {
        if ( arrowIdx == i ) {
            sprintf(line[i], ">  %d", list[j]);
        } else {
            sprintf(line[i], "   %d", list[j]);
        }
        print_Line(i, line[i]);
    }
    return;
}

void selectUp() {
    if ( selectIdx > 0 ) selectIdx--;
    if ( arrowIdx > 1 ) arrowIdx -= 1;
    if ( selectIdx == 0 ) listStartIdx = 0;
    return;
}

void selectDown() {
    if ( selectIdx < 3 ) selectIdx++;
    if ( arrowIdx < 3 ) arrowIdx += 1;
    if ( selectIdx == 3 ) listStartIdx = 1;
    return;
}
```

```
void select() {
    if ( amountOfSelected >= 4 ) return;
    sum += list[selectIdx];
    selected[amountOfSelected++] = list[selectIdx];
    Buzz();

    if ( amountOfSelected == 4 ) PC12 = PC13 = PC14 = PC15 = 0;
    else if ( amountOfSelected == 3 ) PC13 = PC14 = PC15 = 0;
    else if ( amountOfSelected == 2 ) PC14 = PC15 = 0;
    else if ( amountOfSelected == 1 ) PC15 = 0;

    showResult();
}

void backSpace() {
    if ( amountOfSelected <= 0 ) return;
    amountOfSelected--;
    sum -= selected[amountOfSelected];

    if ( amountOfSelected == 3 ) PC12 = 1;
    else if ( amountOfSelected == 2 ) PC13 = 1;
    else if ( amountOfSelected == 1 ) PC14 = 1;
    else if ( amountOfSelected == 0 ) PC15 = 1;
    showResult();
}


int main(void)
{
    int i = 5, keyPressed = 0;
    SYS_Init();
    OpenKeyPad();
    init_LCD();
    clear_LCD();


    while(1) {
        i=ScanKey();
        showResult();
        seed++;
        seed %= INF;
        srand(seed);

        printSelectRes();

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

        if(keyPressed) {
            continue;
        }

        keyPressed = 1;

        if ( i == 9 ) clearRes();

        else if ( i == 7 && sum == 0 ) randomNumList();

        else if ( i == 4 ) selectUp();

        else if ( i == 6 ) selectDown();

        else if ( i == 5 ) select();

        else if ( i == 8 ) backSpace();
    }

}
```

四、【未能解決的問題】：

沒有未能解決的問題。