介面實驗

實驗三

ASA BUS 擴充介面卡開發-

SPI 智慧型 IC

班級：機械 2A

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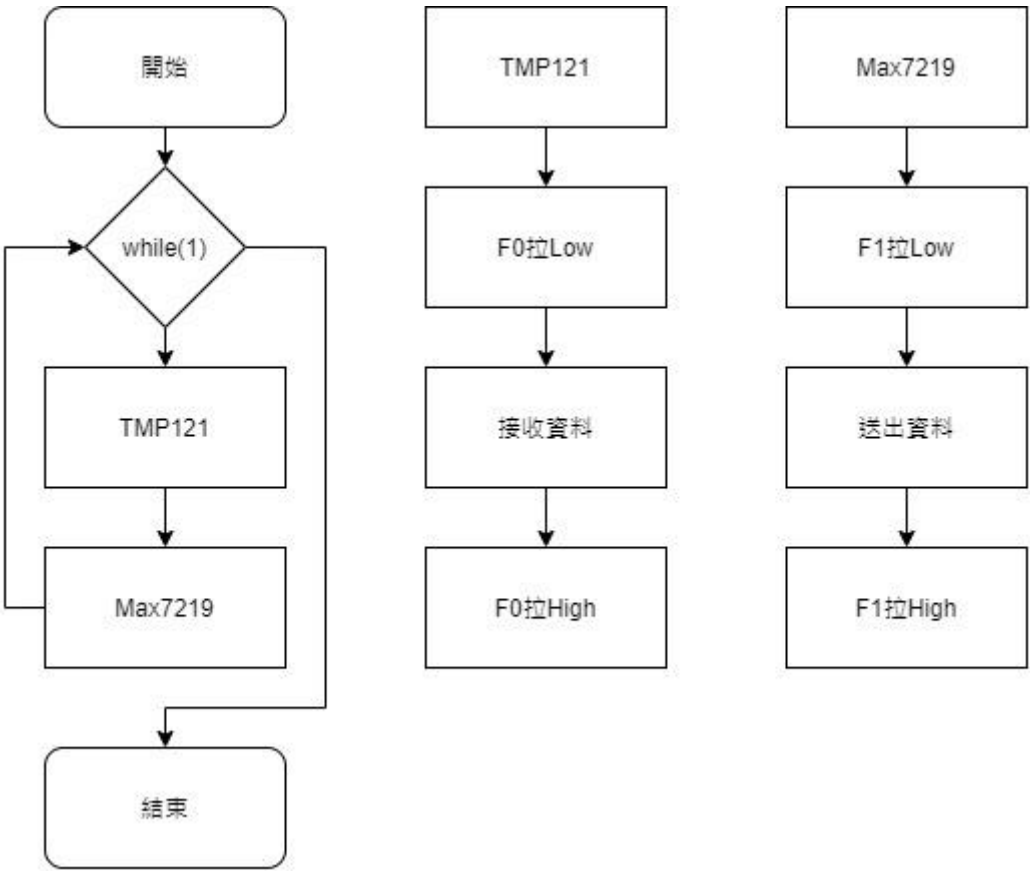
日期：109/9/2

介面實驗工作日誌

實驗三　　109 年 9 月 2 日

組別		姓名	黃鉦淳	學號	108303013
實驗起始時間		109/8/25		費時	8 天
實驗結束時間		109/9/2			
所遭遇問題					
解決方法					
完成項目及心得					
調查	□是否有看課程講解影片 是否實用？有何建議？		□是否有看實驗教學影片 是否實用？有何建議？		

一、流程圖



二、程式碼

```
#include "c4mlib.h"
#define TMP121_Mode 3
#define MAX7219_Mode 6
#define TMP121_ID 8
#define MAX7219_ID 9
#define TempRegister 0x00
#define WaitTick 1

#define Decode 0x09       // 9
#define Intensity 0x0a //10
#define Scan 0x0b          //11
#define ShutDown 0x0c    //12
#define Test 0x0f          //15
```

```
void SetUp();
void Display(int, float);
void MAX7219(char, char);
float TempSensor();
int Index(int);
float Bin2Dec(uint8_t, uint8_t, uint8_t);

int main()
{
	C4M_STDIO_init();
	SetUp();

	printf("-----start-----\n");

	int integer;
	float Temp, decimal;

	while (1)
	{
		Temp = TempSensor();
		integer = Temp;
		decimal = Temp - integer;
		Display(integer, decimal);
		_delay_ms(100);
	}
	return 0;
}

void SetUp()
{
	//主板設定
	SPI_fpt(&SPCR, 0x40, 6, 1); //SPI致能
	SPI_fpt(&SPSR, 0x01, 0, 1); //設定雙倍工作時脈
	SPI_fpt(&SPCR, 0x03, 0, 0); //SPI_FreqDivide_4
	SPI_fpt(&SPCR, 0x04, 2, 0); //前收後送
	SPI_fpt(&SPCR, 0x08, 3, 0); //設定前緣為上
	SPI_fpt(&SPCR, 0x10, 4, 1); //設定為主板
	SPI_fpt(&SPCR, 0x20, 5, 0); //高位元先送
```

```
	DDRB = 0x06; //設定MISO為輸入,MOSI為輸出,SCK為輸出
	DDRF = 0x03; //F0為TMP121住址選擇,F1為MAX7219住址選擇

	//MAX7219
	MAX7219(Decode, 0x0);
	MAX7219(Intensity, 0x07);
	MAX7219(ShutDown, 0x01);
}

void Display(int integer, float decimal)
{
	char BCD[10] = {0x7e, 0x30, 0x6d, 0x79, 0x33, 0x5b, 0x5f, 0x70,
0x7f, 0x7b};
	int num[8] = {0};
	int len[2] = {0};
	int j = 0, digits = 0;
	int temp;
	int DecimalPoint;

	//判斷位數

	//整數位數
	temp = integer;
	while (temp)
	{
		temp /= 10;
		digits++;
	}

	len[0] = digits;
	DecimalPoint = digits - 1; //小數點新增位置

	//小數位數
	digits += 4;
	len[1] = 4;

	MAX7219(Scan, digits - 1); //設定掃描位數
```

```
        //輸出數字

        //整數處理
        for (int i = len[0] - 1; i > -1; i--)
        {
            num[j] = (integer / Index(i)) % 10;
            j++;
        }

        //小數處理

        temp = decimal * Index(len[1]);

        for (int i = len[1] - 1; i > -1; i--)
        {
            num[j] = (temp / Index(i)) % 10;
            j++;
        }

        for (int i = 0; i < digits; i++)
        {
            if (i == DecimalPoint)
            {
                MAX7219(i + 1, BCD[num[i]] + 128);
            }
            else
            {
                MAX7219(i + 1, BCD[num[i]]);
            }
            _delay_ms(50);
        }
    }

    void MAX7219(char REG, char data)
    {
        uint8_t temp = data;
        PORTF = 0x01;
        ASA_SPIM_trm(MAX7219_Mode, MAX7219_ID, REG, 1, &temp,
```

```
WaitTick);
	PORTF = 0x03;
}

float TempSensor()
{
	uint16_t Temp = 0;

	PORTF = 0x02;
	ASA_SPIM_rec(TMP121_Mode, TMP121_ID, TempRegister, 2,
&Temp, WaitTick);
	printf("Temperature:%.4f\n", Bin2Dec((Temp & 0x8000) >> 15,
(Temp & 0x7f80) >> 7, (Temp & 0x78) >> 3));
	PORTF = 0x03;
	_delay_ms(300); //讀取溫度運行時間
	return Bin2Dec((Temp & 0x8000) >> 15, (Temp & 0x7f80) >> 7,
(Temp & 0x78) >> 3);
}

int Index(int len)
{
	int sum = 1;
	for (int i = 0; i < len; i++)
	{
		sum *= 10;
	}

	return sum;
}

float Bin2Dec(uint8_t sign, uint8_t num1, uint8_t num2)
{
	int integer = 0;
	float point = 0;

	for (int i = 7; i > -1; i--)
	{
		integer += (num1 >> i) & 1;
```

```
            if (i)
                integer *= 2;
        }

        for (int i = 0; i < 4; i++)
        {
            point += (num2 >> i) & 1;
            point /= 2;
        }

        if (sign)
        {
            return (integer + point) - 256;
        }
        else
        {
            return (integer + point);
        }
    }
```

三、實驗數據

1. 電路圖