電工實驗(四)

數位實驗(四) ADC

班級 : 電機三乙

組別 : 第 12 組

學號 : B103012002

姓名 : 林凡皓

一、 Code 與註解

```
#include "NuMicro.h"
#include "ADCAgent.h"
#include "TempSensor.h"
#include "system_init.h"
#include "display.h"
#include "tmr.h"
#include "GUI.h"
#include "sys.h"
#include "BNCTL.h"
#include "StepMotorAgent.h"

/* define max and mini speed */
#define MaxSpeed    17
#define MinSpeed    1

/* global variable define */
uint32_t timecount = 0;
uint32_t speed;
uint8_t  dir;
uint8_t mode;
uint8_t flag;

/* function define */
void BTN_Speed_CTL(void);
void ADC_Speed_CTL(void);
```

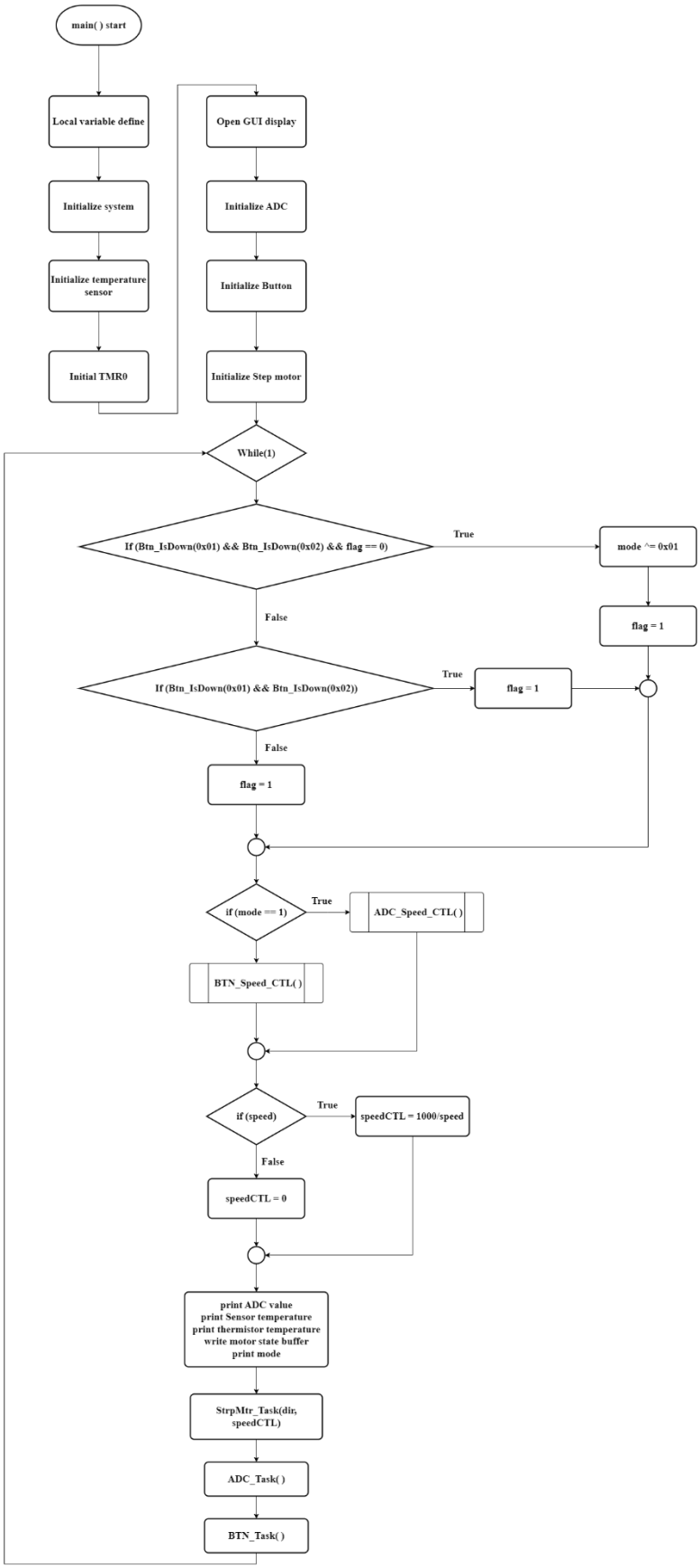
```
int main(void)
{
    /* local variable define */
    char ADC_value_buf[20];
    char M487sensor_temp_value_buf[20];
    char thermistor_temp_value_buf[20];
    char speed_buf[20];
    char mode_buf[20];
  uint32_t  speedCTL;

    /* Init System, peripheral clock */
    SYS_Init();

    /* Init temputer sensor */
    Temp_Sensor_Enable();

    /* Init TMR0 for timecount */
    TMR0_Initial();

    /* Opem GUI display */
    Display_Init();

    /* Init ADC */
    ADC_Initial();

  /* Init Button */
  BTN_init();

  /*Init Step Motor */
  StepMtr_Initial();
    dir = 1;
    speed = 10;
    mode = 0x00;
    flag = 0;
```

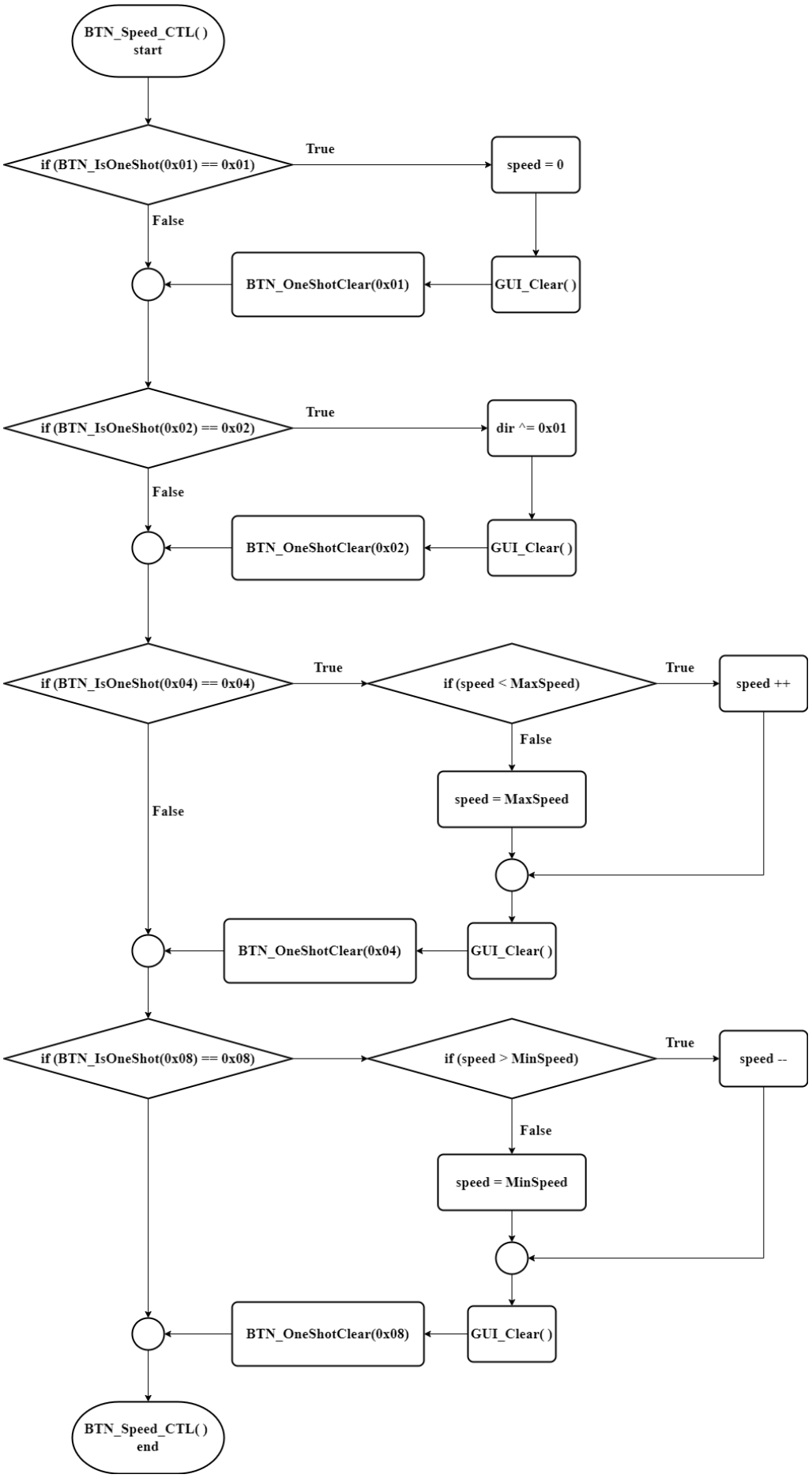
```c
while(1)
{
    /* define how to change mode */
    // change mode when pressing both SW1 and SW2
    if(Btn_IsDown(0x01) && Btn_IsDown(0x02) && flag == 0){
        mode ^= 0x01;
        flag = 1;
    }
    else {
        if(Btn_IsDown(0x01) && Btn_IsDown(0x02)){
            flag = 1;
        }
        else
            flag = 0;
    }

    /* define speed control of different mode */
    if(mode==1)
        ADC_Speed_CTL();
    else
        BTN_Speed_CTL();

    /* Step motor output */
    if(speed)
        speedCTL = 1000/speed;
    else
        speedCTL = 0;


    /* Print ADC value */
    sprintf(ADC_value_buf, "ADC value : %03d", ADC_GetVR());
    Display_buf(ADC_value_buf, 1, 1);
    /* Print Sensor temperature */
    sprintf(M487sensor_temp_value_buf, "M487sensor_temp : %2.1f", ADC_GetM487Temperature());
    Display_buf(M487sensor_temp_value_buf, 1, 40);
    /* Print Thermistor temperature */
    sprintf(thermistor_temp_value_buf, "ThermistorTemp : %d", ADC_ConvThermistorTempToReal());
    Display_buf(thermistor_temp_value_buf, 1, 79);
    /* write motor state buffer */
    sprintf(speed_buf,"Speed : %02d rpm" , speed*6);//6~102
    Display_buf(speed_buf, 1, 118);
    //
    sprintf(mode_buf,"Mode : %d", mode);
    Display_buf(mode_buf, 1,157);

    /* Drivers */
    /* Motor Task */
    StepMtr_Task(dir, speedCTL);
    /* Get ADC value */
    ADC_Task();
    /* Scan button*/
    BTN_task();

}
}
```

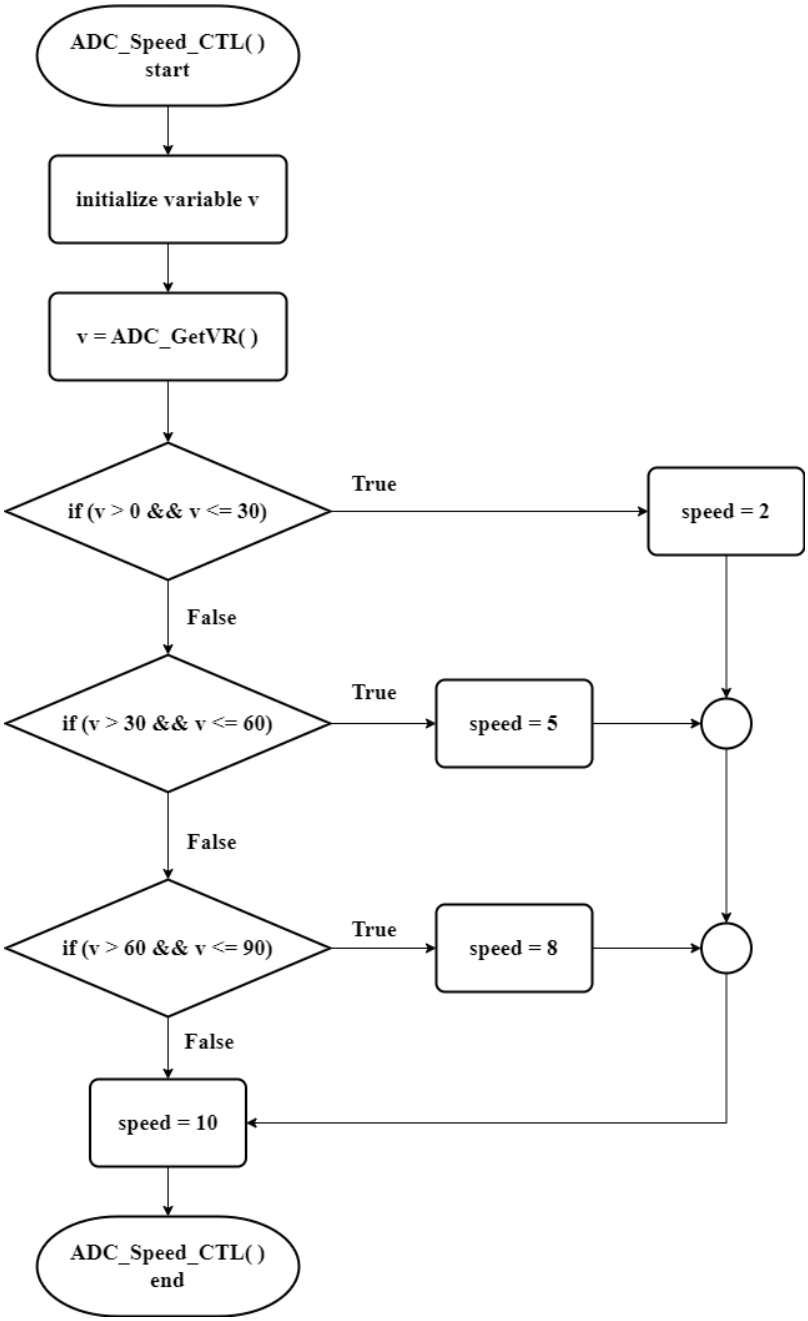
```c
/* BTN_Speed_CTL define */
void BTN_Speed_CTL(void) {
    if(Btn_IsOneShot(0x01) == 0x01){
        //speed control
        speed = 0;
        //clear the GUI display
        GUI_Clear();
        //clear one-shot flag
        Btn_OneShotClear(0x01);
    }
    if(Btn_IsOneShot(0x02) == 0x02){
        dir ^= 0x01;
        //clear the GUI display
        GUI_Clear();
        Btn_OneShotClear(0x02);
    }
    if(Btn_IsOneShot(0x04) == 0x04){
        // speed up when the speed does not exceed maximum speed
        if(speed < MaxSpeed)
            speed ++;
        else
            speed = MaxSpeed;
        GUI_Clear();
        Btn_OneShotClear(0x04);
    }
    if(Btn_IsOneShot(0x08) == 0x08){
        //speed down when the speed is larger than minimum speed
        if(speed > MinSpeed)
            speed --;
        else
            speed = MinSpeed;

        GUI_Clear();
        Btn_OneShotClear(0x08);
    }
}
```

```c
/* ADC_Speed_CTL define */
void ADC_Speed_CTL(void) {
    uint8_t v;
    v = ADC_GetVR() ;
    // define four different speed due to different value of v
    if(v >= 0 && v <= 30)
        speed = 2;
    else if (v > 30 && v <= 60)
        speed = 5;
    else if (v > 60 && v <= 90)
        speed = 8;
    else
        speed = 10;
}
```

二、 流程圖


main( ) start
Local variable define
Initialize system
Initialize temperature sensor
Initial TMR0
Open GUI display
Initialize ADC
Initialize Button
Initialize Step motor
While(1)
If (Btn_IsDown(0x01) && Btn_IsDown(0x02) && flag == 0)
True
mode ^= 0x01
flag = 1
False
If (Btn_IsDown(0x01) && Btn_IsDown(0x02))
True
flag = 1
False
flag = 1
if (mode == 1)
True
ADC_Speed_CTL( )
BTN_Speed_CTL( )
if (speed)
True
speedCTL = 1000/speed
False
speedCTL = 0
print ADC value
print Sensor temperature
print thermistor temperature
write motor state buffer
print mode
StrpMtr_Task(dir, speedCTL)
ADC_Task( )
BTN_Task( )


BTN_Speed_CTL( )
start
if (BTN_IsOneShot(0x01) == 0x01)
True
speed = 0
False
GUI_Clear( )
BTN_OneShotClear(0x01)
if (BTN_IsOneShot(0x02) == 0x02)
True
dir ^= 0x01
False
GUI_Clear( )
BTN_OneShotClear(0x02)
if (BTN_IsOneShot(0x04) == 0x04)
True
if (speed < MaxSpeed)
True
speed ++
False
speed = MaxSpeed
False
GUI_Clear( )
BTN_OneShotClear(0x04)
if (BTN_IsOneShot(0x08) == 0x08)
if (speed > MinSpeed)
True
speed --
False
speed = MinSpeed
GUI_Clear( )
BTN_OneShotClear(0x08)
BTN_Speed_CTL( )
end


ADC_Speed_CTL( )
start
initialize variable v
v = ADC_GetVR( )
if (v > 0 && v <= 30)
True
speed = 2
False
if (v > 30 && v <= 60)
True
speed = 5
False
if (v > 60 && v <= 90)
True
speed = 8
False
speed = 10
ADC_Speed_CTL( )
end

三、 心得

這次實驗除了像之前一樣透過按鈕來控制馬達轉速之外，我們還透過可變電阻來控制馬達轉速，並將可變電阻值以及目前控制轉速的模式顯示在板子上，來幫助我們確認 code 以及焊接電路板是否功能正確。這次的 code 算是比較容易的，主要就是判斷什麼情況要改變模式，以及兩個模式分別要由按鈕或是可變電阻來控制轉速。但是這次實驗焊接電路板發生了一些問題，主要是在接往 3.3V 的那一根腳位沒有焊接好，導致在可變電阻模式下，ADC 數值會一直跳來跳去。