

Experiment 4 : ARM C-Interfacing - Emulation of Switch LED and Stepper Motor Control

Aim:

Using C-interfacing, use C-programming, to implement the following tasks:

- (i) Read the status (binary position) of the switch and use the LEDs (8 LEDs are provided) to display the status of each of the 8-bit DIP switch
- (ii) Stepper motor control using Vi Microsystem's Vi ARM 7238 development board.

Code 1:

```
#include "LPC23xx.h"

int main()
{
    int a;
    int highbyte;
    int lowbyte;
    FIO3DIR = 0xFF;
    FIO4DIR = 0x00;

    while(1)
    {
        a = FIO4PIN;
        highbyte = a & 0xF0;
        highbyte = highbyte >> 4;
        lowbyte = a & 0x0F;
        FIO3PIN = highbyte * lowbyte;
    }
    return 0;
}
```

Define Variable 'a'

Define Variable 'highByte'

Define Variable 'lowByte'

Make FIO3 an Output port

Make FIO4 an Input port

Make while loop

Assign the value on the FIO4PIN to Variable 'a'

AND 'a' with 0xF0 and Right Shift it by 4-bits and store it to Variable 'highByte'

AND 'a' with 0xDF and store it to Variable 'lowByte'

Multiply the values in 'highByte' and 'lowByte' and place the result on FIO3PIN

Code 2:

```
#include "LPC23xx.h"

void delay()
{
    int i,j;

    for(i = 0;i < 0xFF; i++)
        for(j = 0;j < 0xFF; j++);
}

int main()
{
    IODIR0 = 0xFFFFFFFF;

    while(1)
    {
        IOPIN0 = 0x00000280;
        delay();
        IOPIN0 = 0x00000240;
        delay();
        IOPIN0 = 0x00000140;
        delay();
        IOPIN0 = 0x00000180;
        delay();
    }
    return 0;
}
```

Logic:

- As per the given sample code we just reversed the loop to rotate stepper motor in anti-clockwise order.
- This is an infinite loop which keeps on rotating.

Code 3:

```
#include "LPC23xx.h"

void delay()
{
    int i,j,a=1;

    for(i = 0;i < 0xFF; i++)
        for(j = 0;j < 0xFF; j++);

}

int main()
{
    IODIR0 = 0xFFFFFFFF;

    while(a<=10)
    {
        IOPIN0 = 0x00000280;
        delay();
        IOPIN0 = 0x00000240;
        delay();
        IOPIN0 = 0x00000140;
        delay();
        IOPIN0 = 0x00000180;
        delay();
        a++;
    }
    return 0;
}
```

Logic:

- If the stepper angle is 2 degrees then for rotating stepper motor 80 degrees while loop should be applied for 10 times as $4 \times 10 = 40$
- 40 steps rotated means $40 \times 2 = 80$ degrees.

Learnings from this experiment:

- Learnt to write basic c programs in keil for showing the result using LED's.

- Basic programs on stepper motor to rotate it for a specific angle and specific direction.