LAB 4

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

1. 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. Due to ongoing pandemic, only emulated version of this experiment is intended here

2. Equipments, Hardwares / Softwares Required

The list of equipments, components required are:

- ARM Vi ARM 2378 development board and accessories
- RS-232 cable
- Keil microvision 5
- USB- serial converter (this is a must when the PC loaded with keil doesnt have a serial port).
- flash magic
- Burn o-mat
- Stepper motor

The hardware components are given here just not to loose the context of the experiment. Otherwise it is a purely emulation based experiment (due to the ongoing pandemic).

3. Problem Definitions

Following are the tasks you need to take up for this lab session:

1. Write a program (in C) to dis-assemble a byte into two nibbles from the DIP switch states, multiply and display the product in the LED.

2. Modify the demo code (StpprMtrCntrl.c) supplied to demonstrate the control of stepper motor to rotate in opposite direction.

(a) Identify the signal to the stepper motor and demonstrate it to your TA.

4. CODES

1.

```
#include "LPC23xx.h"

int main()
```

```
{
     //set up
     int un,ln,k,product;
     int bitmask1=0x0F;
     int bitmask2=0xF0;
     FIO3DIR = 0XFF;
     FIO4DIR = 0X00;
     while(1)
     {
          ln=FIO4PIN&bitmask1;
          k=FIO4PIN&bitmask2;
          un=k>>4;
          product=un*ln;
          FIO3PIN=product;
     }
     return 0;
}
```

2.

```
#include "LPC23xx.h"
int main()
{
     //set up
     int un,ln,k,product;
     int bitmask1=0x0F;
     int bitmask2=0xF0;
     FIO3DIR = 0XFF;
     FIO4DIR = 0X00;
     while(1)
     {
```

```
          ln=FIO4PIN&bitmask1;
          k=FIO4PIN&bitmask2;
          un=k>>4;
          product=un*ln;
          FIO3PIN=product;
     }
     return 0;
}
```

3.

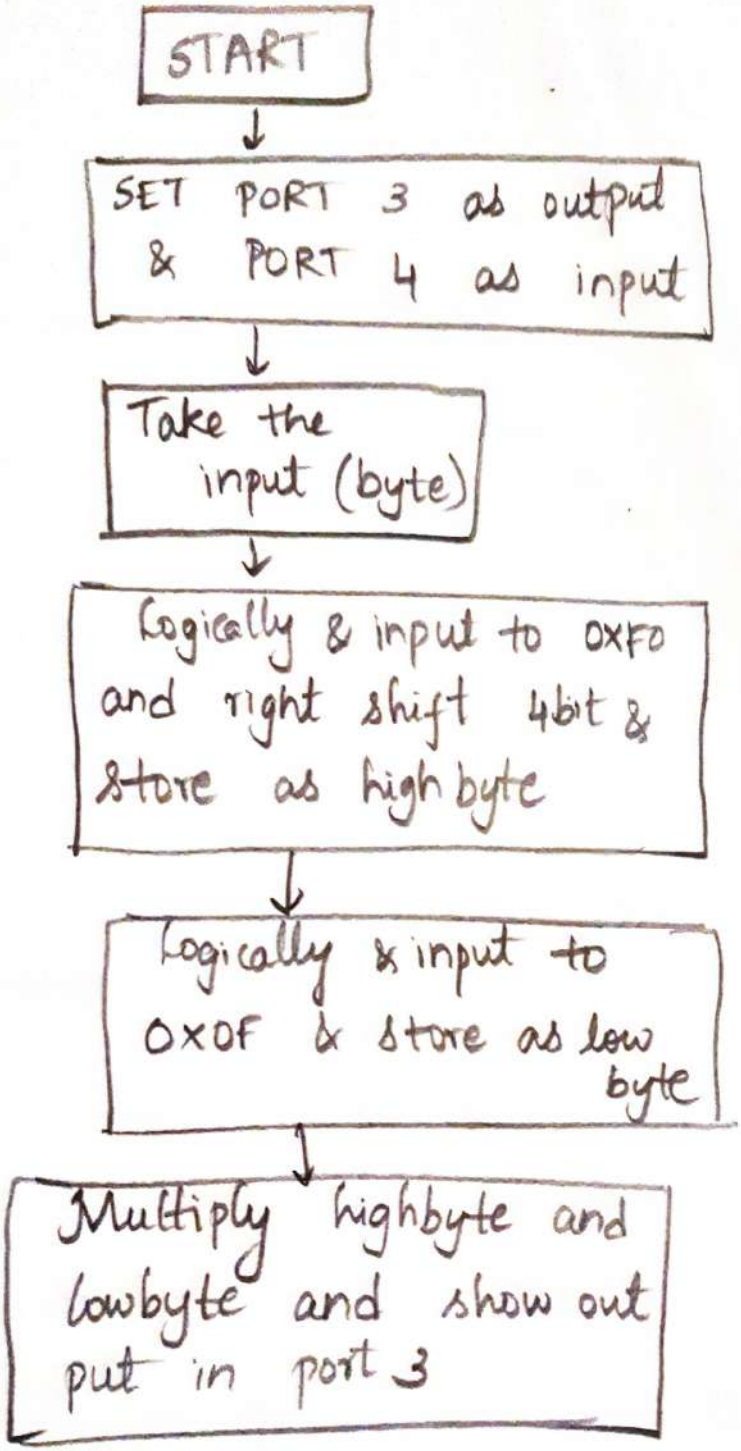
```
#include "LPC23xx.h"
void delay(void)
{
       int i,j;
       for(i=0; i<0xff;i++)
       for(j=0; j<0XFF;j++);
}
int main(void)
{
       IODIR0 = 0XFFFFFFFF;
       for(i=0;i<10;i++)
       {
         IOPIN0=0X00000280;
         delay();
         IOPIN0=0X00000180;
         delay();
         IOPIN0=0X00000140;
         delay();
         IOPIN0=0X00000240;
         delay();
```

```
        }


      return 0;
}
```

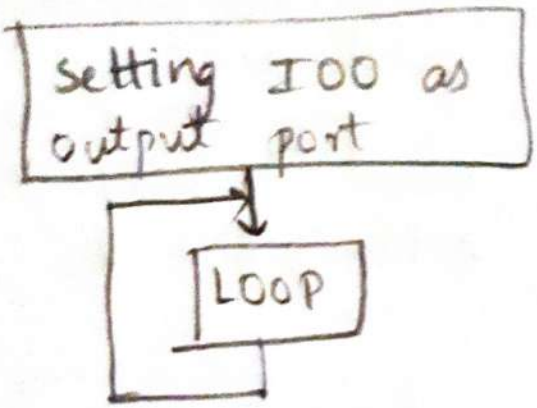
5. INFERENCES

- We learnt about the usage of ARM C-Interfacing for controlling of stepper motor.
- We learnt about the operation of stepper motor.
- The functioning of Stepper Motor Control using ViARM-2378 board and operating it by writing programs.

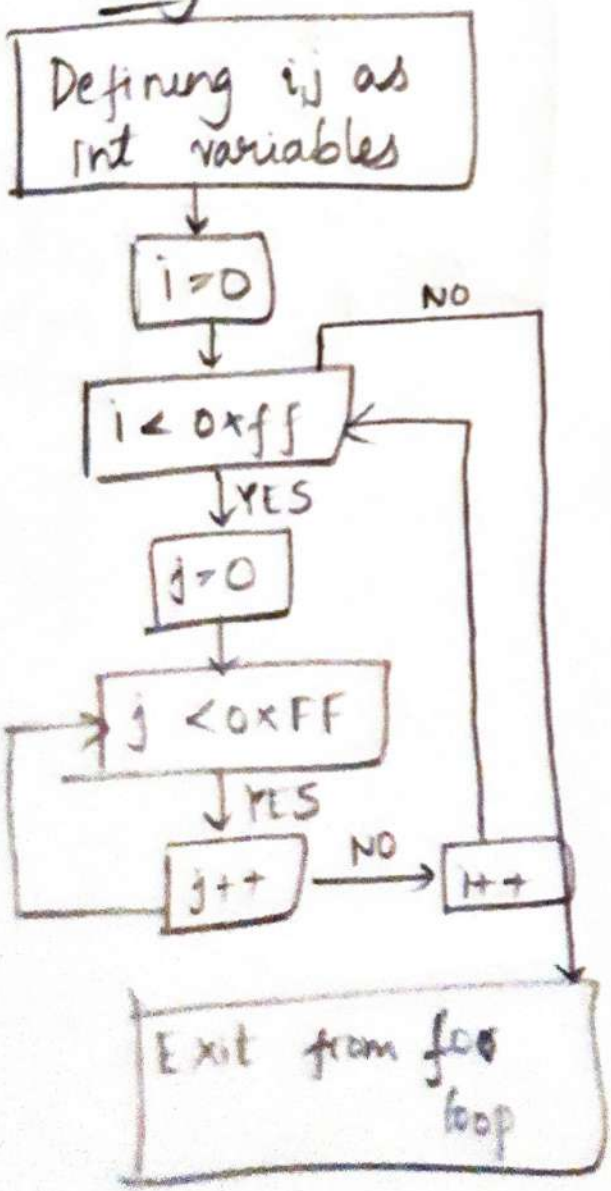

START
SET PORT 3 as output & PORT 4 as input
Take the input (byte)
Logically & input to 0XF0 and right shift 4bit & store as high byte
Logically & input to 0X0F & store as low byte
Multiply highbyte and lowbyte and show out put in port 3

(2)

Main program

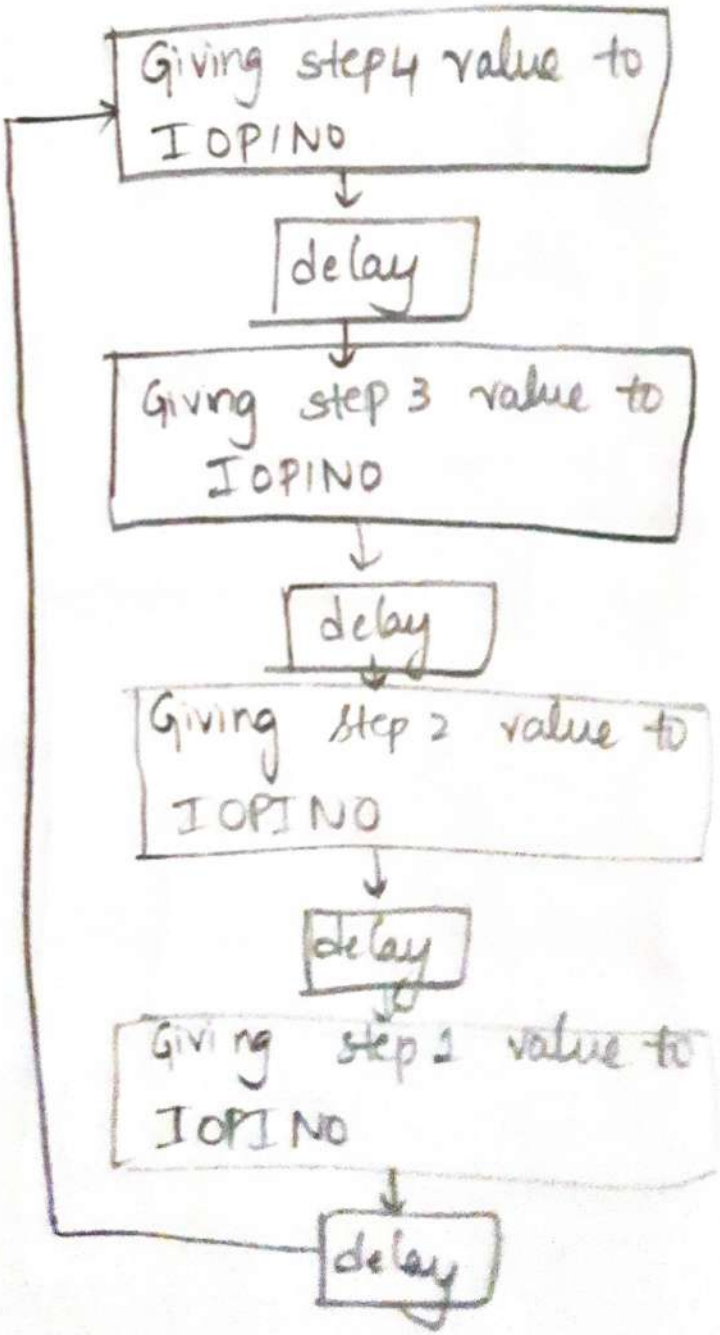


Delay

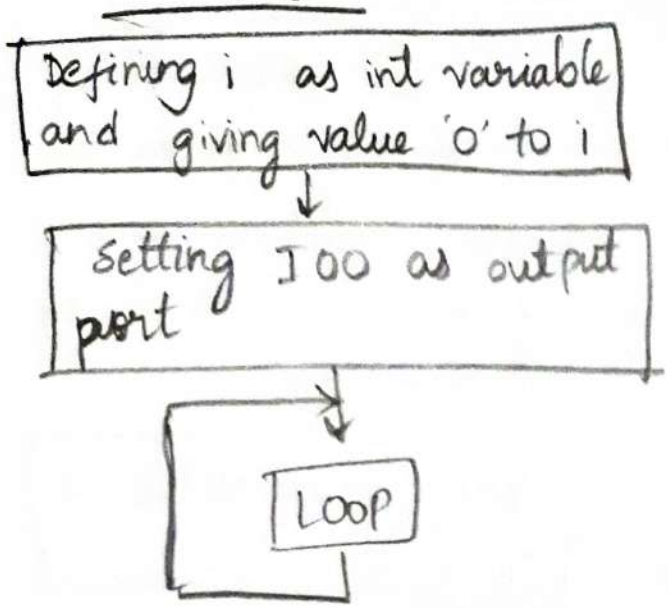


Loop

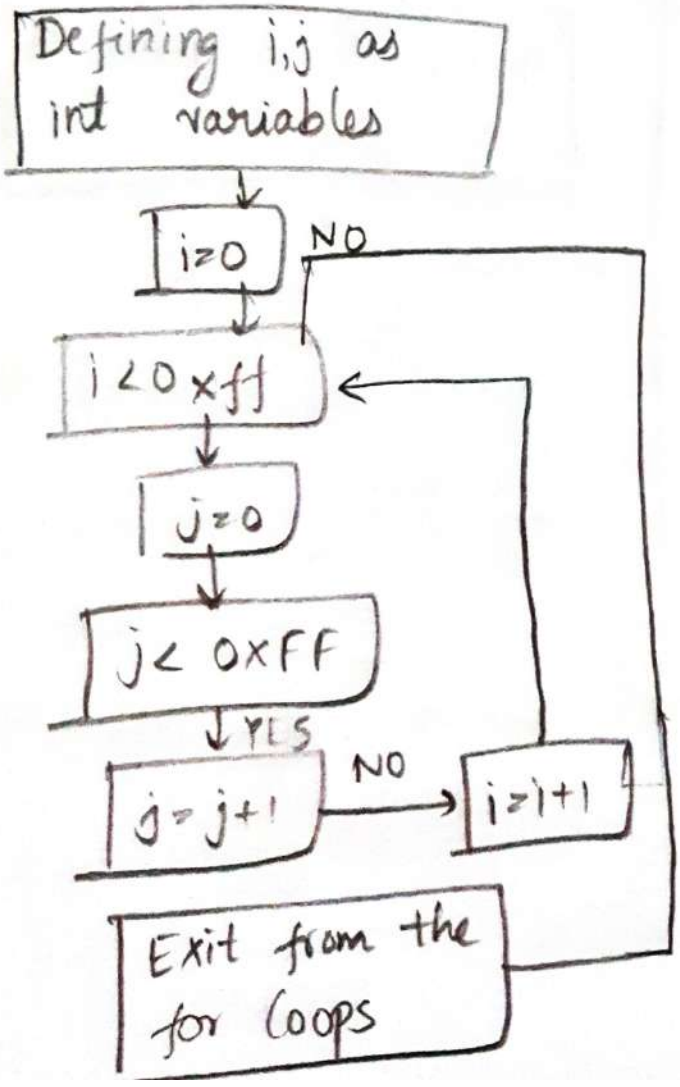
Let steps in loop function given in lab material are step 1, 2, 3, 4 respectively



③ Main program



Delay



Loop

Take step angle = 2°
So, for each step, motor rotates 2°
To stop after 40°, motor should run 1 steps for 2 times (4×2×2 = 16)