EE2016 Micropprocessor Lab & Theory July-Nov

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 ViARM 7238 development board. Due to ongoing pandemic, only emulated version of this experiment is intended here.

1)Code for bitwise disassembly and getting product of two nibbles

```
#include "LPC23xx.h"

int main(void)
```
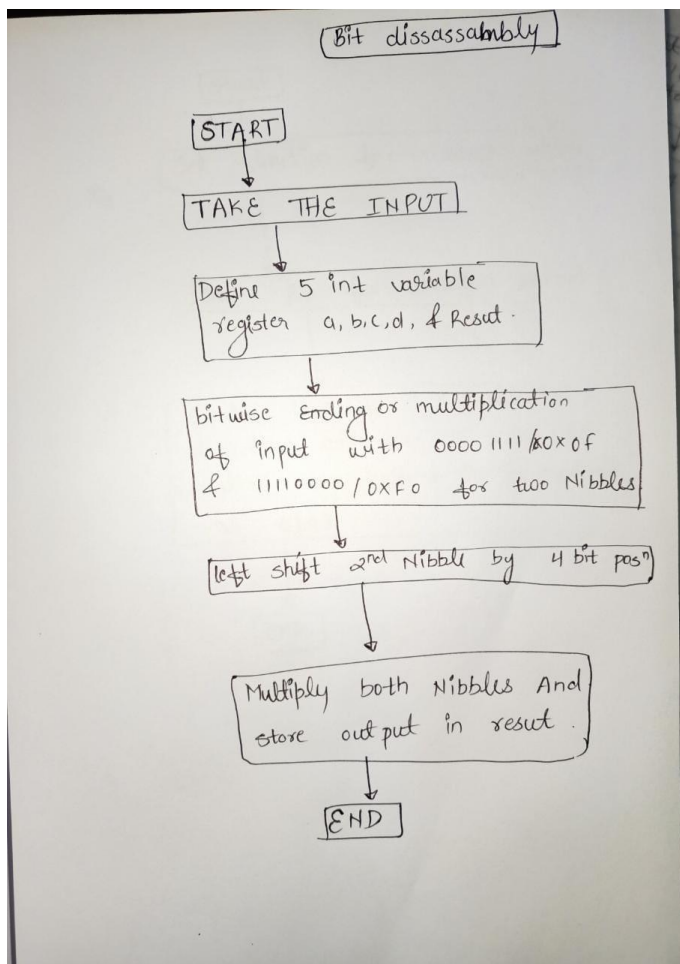
```c
{
FIO3DIR = 0XFF;

FIO4DIR = 0x00;

while(1)

{

int a,b,c,d,Result;


  a = FIO4PIN;

b = 0x0F;

c = a&b;

b = 0XF0;

d = a&b;

d = d>>4;

Result = c*d;

FIO3PIN = Result;
```

}

return 0;

}

FLOWCHART:

Bit dissassambly

START

TAKE THE INPUT

Define 5 int variable register a, b, c, d, & Result.

bitwise Anding or multiplication of input with 0000 1111 / 0x0f & 11110000 / 0XF0 for two Nibbles.

left shift 2nd Nibble by 4 bit posⁿ

Multiply both Nibbles And store output in result.

END
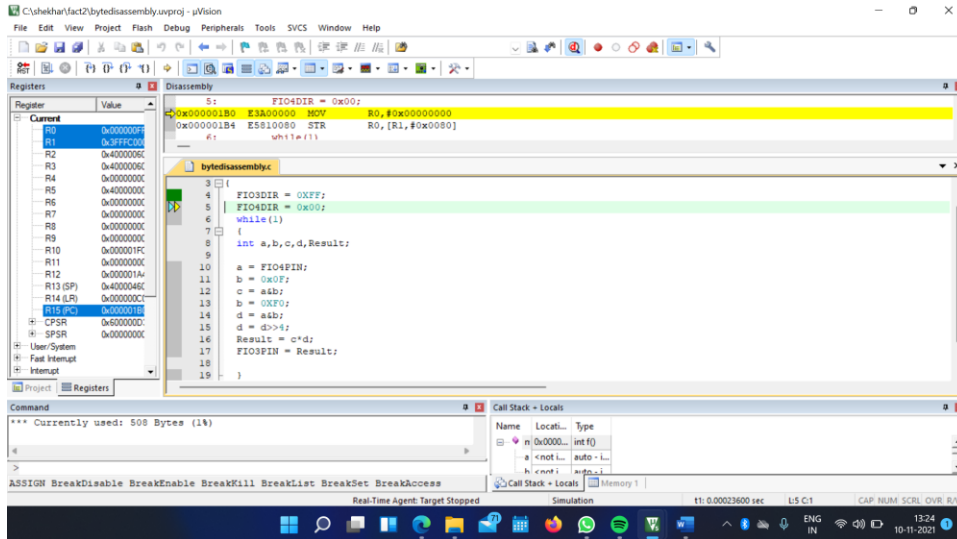
2)Code for rotating stepermotor in anticlockwise.

```
/* ARM C program to run Stepper Motor */
#include "LPC23xx.h"
void delay(void)
{ int i,j;
for(i=0; i<0xff;i++)
for(j=0; j<0XFF;j++);
}
int main(void)
```
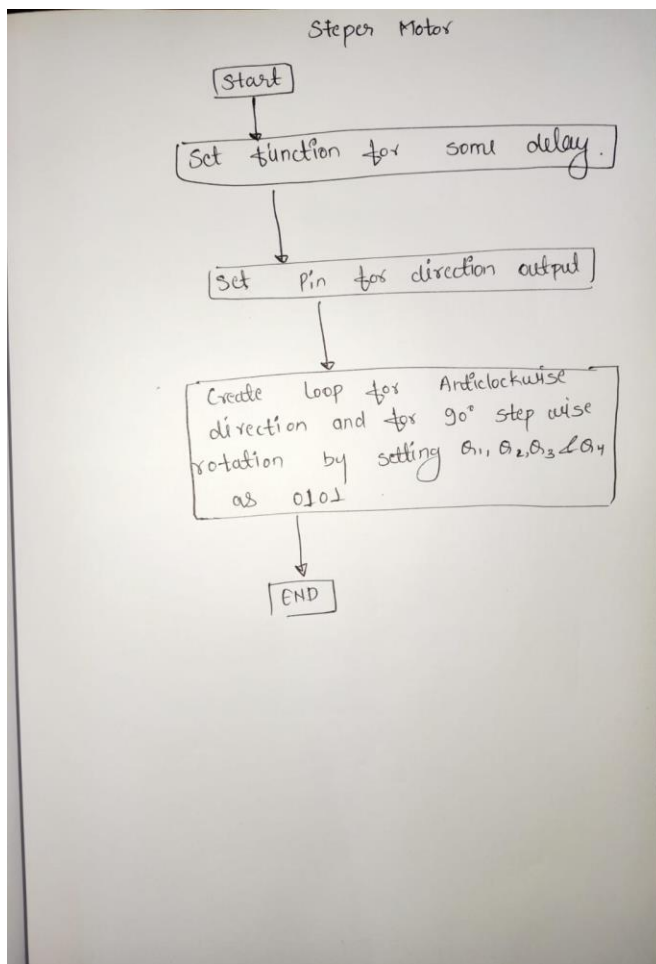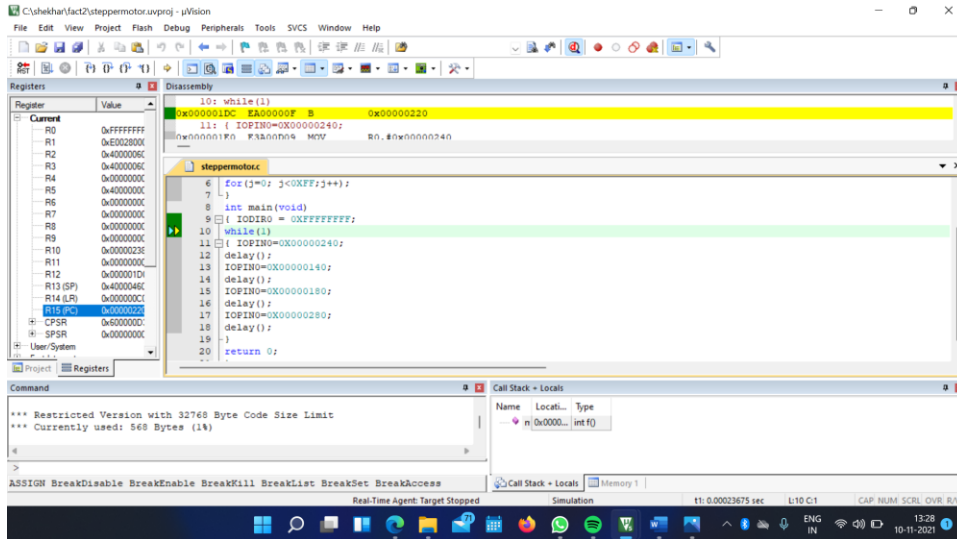
```c
{ IODIR0 = 0XFFFFFFFF;
while(1)
{ IOPIN0=0X00000240;
delay();
IOPIN0=0X00000140;
delay();
IOPIN0=0X00000180;
delay();
IOPIN0=0X00000280;
delay();
}
return 0;
}z
```

C:\shekhar\fact2\steppermotor.uvproj - µVision

File   Edit   View   Project   Flash   Debug   Peripherals   Tools   SVCS   Window   Help

Registers

Register	Value
Current	
R0	0xFFFFFFFF
R1	0xE0028000
R2	0x4000006C
R3	0x4000006C
R4	0x00000000
R5	0x4000000C
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x0000023E
R11	0x00000000
R12	0x000001D0
R13 (SP)	0x4000046C
R14 (LR)	0x000000C0
R15 (PC)	0x00000220
CPSR	0x600000D0
SPSR	0x00000000
User/System	

Project   Registers

Disassembly

```
   10: while(1)
0x000001DC  EA00000F  B       0x00000220
   11: { IOPIN0=0X00000240;
0x000001E0  E3A00D09  MOV     R0,#0x00000240
```

steppermotor.c

```
 6    for(j=0; j<0XFF;j++);
 7    }
 8    int main(void)
 9  ⊟ { IODIR0 = 0XFFFFFFFF;
10    while(1)
11  ⊟ { IOPIN0=0X00000240;
12    delay();
13    IOPIN0=0X00000140;
14    delay();
15    IOPIN0=0X00000180;
16    delay();
17    IOPIN0=0X00000280;
18    delay();
19    }
20    return 0;
```

Command

*** Restricted Version with 32768 Byte Code Size Limit
*** Currently used: 568 Bytes (1%)

>

ASSIGN BreakDisable BreakEnable BreakKill BreakList BreakSet BreakAccess

Call Stack + Locals

Name	Locati...	Type
n	0x0000...	int f()

Call Stack + Locals   Memory 1

Real-Time Agent: Target Stopped   Simulation   t1: 0.00023675 sec   L:10 C:1   CAP NUM SCRL OVR R/W

Steper Motor

Start

Set function for some delay.

Set Pin for direction output

Create loop for Anticlockwise direction and for 90° step wise rotation by setting $\theta_1, \theta_2, \theta_3$ & θ_4 as 0101

END

Inferences

A steper motor rotates by a fixed angle when voltage is supplied, loops can be used to creat delay .

Bitmasks can be used to dis assemble the bits in word