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ROLL NO: EE20B100

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

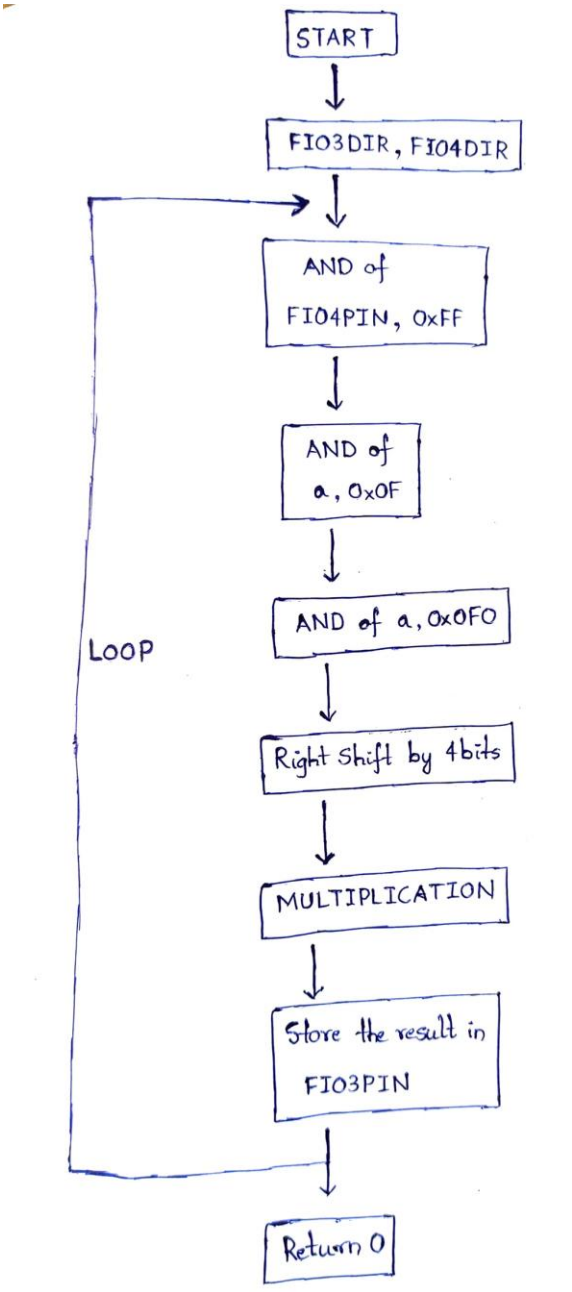
QUESTION – 1:

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

a) Code:

```
#include "LPC23xx.h"

int main()

{

FIO3DIR = 0xFF ; //to make FIO3 as output

FIO4DIR = 0x00 ; //to make FIO4 as input.

while(1) // to run the loop continuously.

{

int c1,c2,mul;

int a = FIO4PIN & 0xFF ; // enable only the last 8 bits.

c1 = a & 0x0F ;

c2 = a & 0xF0 ;

c2 = c2 >> 4 ; // right shift the top 4 bits.

mul = c1*c2 ;

FIO3PIN = mul ;

}

return 0;

}
```

B. FLOW CHART


START
FIO3DIR, FIO4DIR
AND of
FIO4PIN, 0xFF
AND of
a, 0x0F
AND of a, 0x0F0
LOOP
Right shift by 4bits
MULTIPLICATION
Store the result in
FIO3PIN
Return 0

QUESTION – 2:

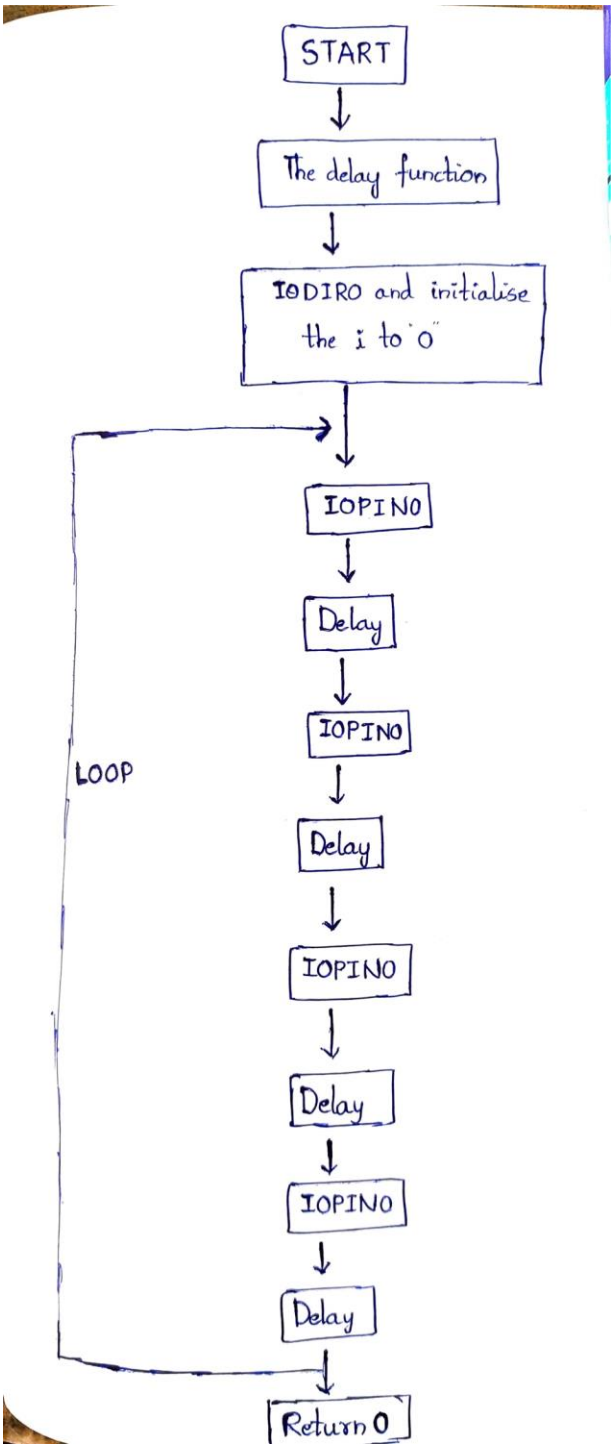
Modify the demo code (StpprMtrCntrl.c) supplied to demonstrate the control of stepper motor to rotate in opposite direction

a) Code:

```
/* 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)
{
IODIR0 = 0XFFFFFFFF;
int i=0;
while(i)
{
IOPIN0=0X00000240;
delay();
IOPIN0=0X00000140;
delay();
```

```
IOPIN0=0X00000180;
delay();
IOPIN0=0X00000280;
delay();
}
return 0;
}
```

B. FLOW CHART


START
The delay function
IODIRO and initialise the i to '0'
IOPINO
Delay
IOPINO
LOOP
Delay
IOPINO
Delay
IOPINO
Delay
Return 0

QUESTION – 3:

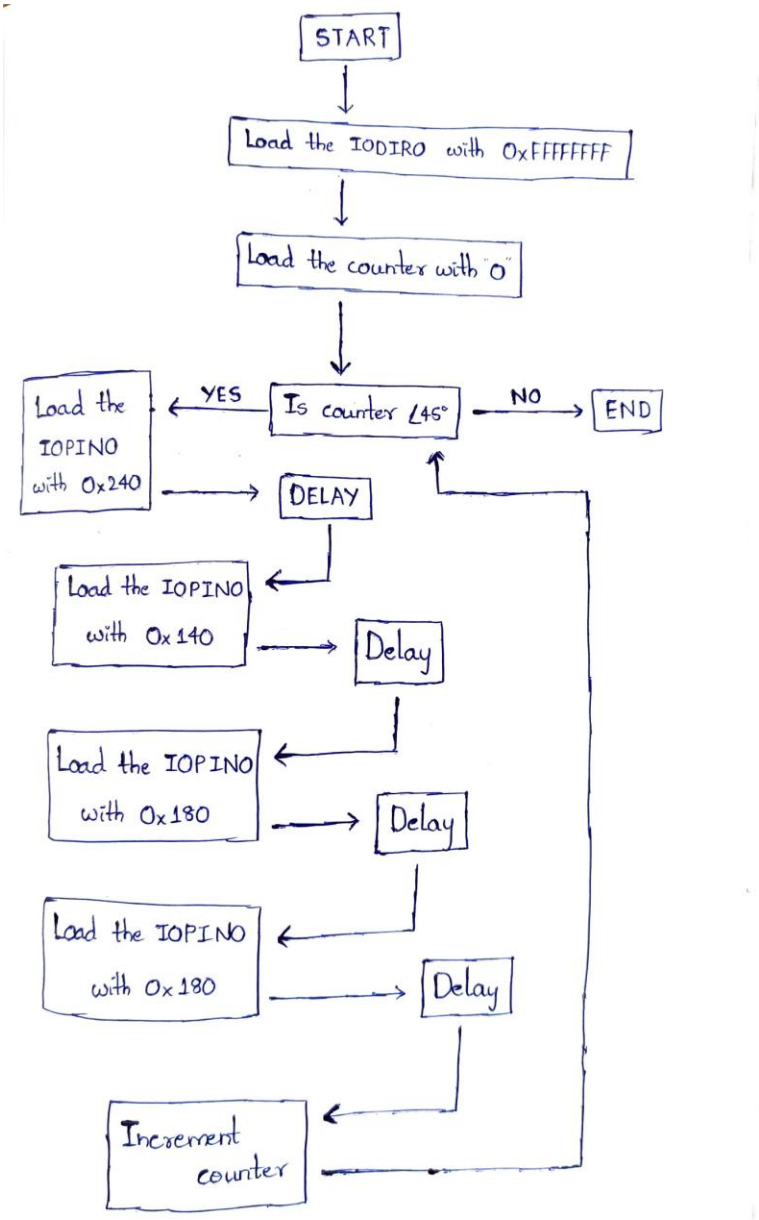
Modify the demo code (StpprMtrCntrl.c) supplied to demonstrate the control of the stepper motor to rotate 80 degrees and stop, assuming the step angle as 2 degrees (motor rotates 2 degrees/step).

a) Code:

```
/*ARM C Programming for stepper motor to stop at certain angle */
#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;
int angle = 180; // stop at 180 degrees
```

```
for (int i = 0; i < 45 ;i++ ) // 45 loops because each value set takes 1 degree and each loop takes 4 degrees.
{
IOPIN0 = 0x00000240 ;
delay();
IOPIN0 = 0x00000140 ;
delay();
IOPIN0 = 0x00000180 ;
delay();
IOPIN0 = 0x00000280 ;
delay();
}
return 0;
}
```

B. FLOW CHART


START
Load the IODIRO with 0xFFFFFFFF
Load the counter with "0"
Is counter <45°
YES
NO
END
Load the IOPINO with 0x240
DELAY
Load the IOPINO with 0x140
Delay
Load the IOPINO with 0x180
Delay
Load the IOPINO with 0x180
Delay
Increment counter