Embedded Systems LAB 6 12.02.2025

Solved exercise

Write a program to turn on/off the LEDs serially.

Code

```
#include <LPC17xx.h>
unsigned int i,j;
unsigned long LED = 0x00000010;
int main(void)
SystemInit(); //Add these two function for its internal operation
SystemCoreClockUpdate();
LPC_PINCON->PINSEL0 &= 0xFF0000FF;
//Configure Port0 PINS P0.4-P0.11 as GPIO function
LPC\_GPIOO->FIODIR = 0x00000FF0;
//Configure P0.4-P0.11 as output port
while(1)
LED = 0x00000010;
for(i=1;i<9;i++) //On the LED's serially
LPC_GPIO0->FIOSET = LED;
```

```
// Turn ON LED at LSB (LED connected to p0.4) for(j=0;j<100000;j++); LED <<=1; } //loop for 8 times LED = 0x00000010; for(i=1;i<9;i++) //Off the LED's serially \{ LPC\_GPIO0->FIOCLR = LED; //Turn OFF LED at LSB (LED connected to p0.4) for(j=0;j<10000;j++); LED <<=1; } \} }
```

Output

We saw it on LPC1768 on 'General Purpose LED'.

Q1 Write a C program to display an 8 bit binary up counter on the LEDs.

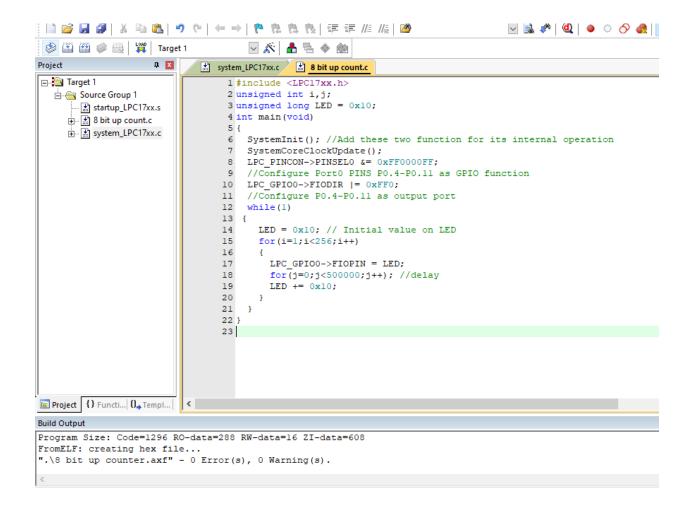
Code

#include <LPC17xx.h>

```
unsigned int i,j;
unsigned long LED = 0x10;
int main(void)
{
     SystemInit(); //Add these two function for its internal operation
     SystemCoreClockUpdate();
     LPC_PINCON->PINSEL0 &= 0xFF0000FF;
     //Configure Port0 PINS P0.4-P0.11 as GPIO function
     LPC\_GPIOO->FIODIR = 0xFFO;
     //Configure P0.4-P0.11 as output port
     while(1)
{
          LED = 0x10; // Initial value on LED
          for(i=1;i<256;i++)
          {
               LPC_GPIO0->FIOPIN = LED;
               for(j=0;j<500000;j++); //delay
               LED += 0x10;
     }
}
```

Output

We saw binary up counter working on LPC1768 'General LED display'.



Q2 Write a C program to read a key and display an 8 bit up/down counter on the LEDs.

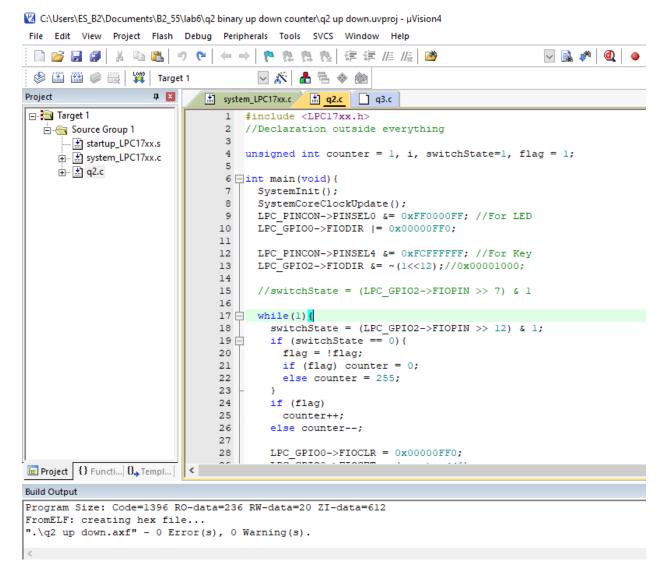
Code

#include <LPC17xx.h>

//Declaration outside everything

```
unsigned int counter = 1, i, switchState=1, flag = 1;
int main(void){
     SystemInit();
     SystemCoreClockUpdate();
     LPC_PINCON->PINSEL0 &= 0xFF0000FF; //For LED
     LPC\_GPIOO->FIODIR = 0x000000FF0;
     LPC_PINCON->PINSEL4 &= 0xFCFFFFFF; //For Key
     LPC_GPIO2->FIODIR &= \sim(1<<12);//0x00001000;
     //switchState = (LPC_GPIO2->FIOPIN >> 7) & 1
     while(1){
          switchState = (LPC_GPIO2->FIOPIN >> 12) & 1;
          if (switchState == 0){
               flag = !flag;
               if (flag) counter = 0;
               else counter = 255;
          if (flag)
               counter++;
          else counter--;
```

Output



Here we observe that we press 'SW2' key two times then it starts decrementing, if we press it again then it starts upcount.

Code

```
#include <LPC17xx.h>
//Declaration outside everything
unsigned int counter = 1, i, switchState=1, flag = 1;
int main(void){
     SystemInit();
     SystemCoreClockUpdate();
    LPC_PINCON->PINSEL0 &= 0xFF0000FF; //For LED
    LPC\_GPIOO->FIODIR = 0x000000FF0;
    LPC_PINCON->PINSEL4 &= 0xFCFFFFFF; //For Key
    LPC_GPIO2->FIODIR &= \sim(1<<12);//0x00001000;
    //switchState = (LPC GPIO2->FIOPIN >> 7) & 1
     while(1){
          switchState = (LPC GPIO2->FIOPIN >> 12) & 1;
          if (switchState == 0)
               counter <<= 1;
```

```
LPC GPIO0->FIOCLR = 0x000000FF0;
                LPC_GPIO0->FIOSET = (counter << 4);
                for (i=0; i<12000; i++); //delay
                if (counter >= (1 << 8))
                         counter = 1;
Output

    C:\Users\ES_B2\Documents\B2_55\lab6\q3 ring counter\q3ring.uvproj - µVision4

 File Edit View Project Flash Debug Peripherals Tools SVCS Window Help
                                                                              | □ 🚰 🖼 🗿 🐰 🗈 选 🕑 (*) ← → 🥀 株 株 株 (集) 準 準 准 接 🝱
 😂 🔛 🛗 🧼 🔜 LOAD Target 1
                                   ₫ q3.c
⊟ 🛅 Target 1
   ⊟ · ⊜ Source Group 1
                              4 unsigned int counter = 1, i, switchState=1, flag = 1;
      --- 🕍 startup_LPC17xx.s
                              6 int main(void) {
     system_LPC17xx.c
                                 SystemInit();
     ⊕...<u></u> # q3.c
                                 SystemCoreClockUpdate();
                                 LPC_PINCON->PINSELO &= 0xFF0000FF; //For LED
                                LPC_GPIOO->FIODIR |= 0x00000FF0;
                                LPC PINCON->PINSEL4 &= 0xFCFFFFFF; //For Key
                                 LPC GPIO2->FIODIR &= ~(1<<12);//0x00001000;
                             14
                             15
                                 //switchState = (LPC GPIO2->FIOPIN >> 7) & 1
                             16
                             17 while(1){
                                   switchState = (LPC_GPIO2->FIOPIN >> 12) & 1;
                             18
                                   if (switchState == 0)
                             19
                             20
                                     counter <<= 1;
                             21
                             22
                                  LPC_GPIOO->FIOCLR = 0x00000FF0;
                             23
                                   LPC_GPIOO->FIOSET = (counter<<4);
                             24
                                   for (i=0; i<12000; i++); //delay
                             25
                             26
                             27
                                   if (counter >= (1<<8))
                             28
                                      counter = 1;
                             29
                             30 }
 E Project {} Functi... 0→ Templ...
Program Size: Code=1324 RO-data=260 RW-data=20 ZI-data=612
FromELF: creating hex file...
".\q3ring.axf" - 0 Error(s), 0 Warning(s).
Translate the currently active file
                                                                                                    Simulation
```

Here we observed that when 'SW2' key is pressed, the LED light moves to the next position, just like ring counter, hence simulating ring counter.