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**190905522 CSE D 62**

**ES Lab 7 (Week 7) – Programs on Multiplexed Seven Segment Display**

**Solved Exercise: Write a program to simulate 4-digit BCD up counter on the multiplexed seven-segment display. (0000-9999)**

**CODE:**

#include<LPC17xx.h>

#include<stdio.h>

unsigned int seg\_select[4] = {0<<23, 1<<23, 2<<23, 3<<23};

unsigned int dig1=0x00, dig2=0x00, dig3=0x00, dig4=0x00;

unsigned int seg\_count=0x00, temp1=0x00;

unsigned char arr\_dec[10]={0x3F,0x06,0x5B,0x4F,0x66,0x6D,0x7D,0x07,0x7F,0x6F};

unsigned long int i=0;

void delay(void);

void display(void);

int main(void){

    SystemInit();

    SystemCoreClockUpdate();

    LPC\_PINCON->PINSEL0 &= 0xFF0000FF;

    LPC\_PINCON->PINSEL3 &= 0xFFC03FFF;

    LPC\_GPIO0->FIODIR |= 0x00000FF0;

    LPC\_GPIO1->FIODIR |= 0x07800000;

    while(1){

        delay();

        display();

        seg\_count +=1;

        if(seg\_count == 0x04){

            seg\_count = 0x00;

            dig1+=1;

            if(dig1 == 0x0A){

                dig1=0;

                dig2+=1;

                if(dig2 == 0x0A){

                    dig2=0;

                    dig3+=1;

                    if(dig3 == 0x0A){

                        dig3=0;

                        dig4+=1;

                        if(dig4 == 0x0A){

                            dig4=0;

                        }*//eod4*

                    }*//eod3*

                }*//eod2*

            }*//eod1*

        }*//eosegcount*

    }*//eowhile*

}*//eomain*

void display(void){

    LPC\_GPIO1->FIOPIN = seg\_select[seg\_count];

    if(seg\_count == 0x00){*//for segment U9*

        temp1=dig1;

    }

    else if(seg\_count == 0x01){*//for segment U10*

        temp1=dig2;

    }

    else if(seg\_count == 0x02){*//for segment U11*

        temp1=dig3;

    }

    else if(seg\_count == 0x03){*//for segment U11*

        temp1=dig4;

    }

    LPC\_GPIO0->FIOPIN = arr\_dec[temp1]<<4;*//Taking Data Lines for 7-Seg*

    for(i=0;i<10;i++);

}

void delay(void){

    unsigned int i;

    for(i=0;i<10000;i++);

}

**OUTPUT:**

In the first iteration of the program the BCD number to be displayed will be 0000 then 0001 and so on and so forth till 9999. So, we can see that for 0000 the bits made 0 will be bits 0, 1, 2 and 3:

In the first position, the 0th bit shown in GPIO1 we can see output of seven segment display of the digit 0 in GPIO0 which is of value 0011 1111 in binary:

A picture containing text, screenshot, indoor

Description automatically generated

In the second position, the 1st bit shown in GPIO1 we can see output of seven segment display of the digit 0 in GPIO0 which is of value 0011 1111 in binary:

Graphical user interface, text, application

Description automatically generated

In the third position, the 2nd bit shown in GPIO1 we can see output of seven segment display of the digit 0 in GPIO0 which is of value 0011 1111 in binary:

Graphical user interface, text, application

Description automatically generated

In the fourth position, the 3rd bit shown in GPIO1 we can see output of seven segment display of the digit 0 in GPIO0 which is of value 0011 1111 in binary:

Graphical user interface, text, application

Description automatically generated

In the second iteration of the program the BCD number to be displayed will be 0001. So, we can see that for 0001 the bits made 0 will be bits 1, 2, and 3 and bit 0 will be made 1:

In the first position, the 0th bit shown in GPIO1 we can see output of seven segment display of the digit 1 in GPIO0 which is of value 0000 0110 in binary:

Graphical user interface, text, application

Description automatically generated

In the second position, the 1st bit shown in GPIO1 we can see output of seven segment display of the digit 0 in GPIO0 which is of value 0011 1111 in binary:

Graphical user interface, text, application

Description automatically generated

In the third position, the 2nd bit shown in GPIO1 we can see output of seven segment display of the digit 0 in GPIO0 which is of value 0011 1111 in binary:

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In the fourth position, the 3rd bit shown in GPIO1 we can see output of seven segment display of the digit 0 in GPIO0 which is of value 0011 1111 in binary:

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1. **Write a C program to display the number “1 2 3 4” serially in the seven-segment display.**

**CODE:**

#include<LPC17xx.h>

unsigned seven\_seg[10] = {0x3F, 0x06, 0x5B, 0x4F, 0x66};

unsigned int dig\_value[4]={4,3,2,1};

unsigned int dig\_select[]={0,1,2,3};

unsigned int i=0;

int main(){

    LPC\_PINCON->PINSEL0 &= 0xFF0000FF; *//0.4 to 0.11*

    LPC\_PINCON->PINSEL3 &= 0xFFC03FFF; *//1.23 to 1.26*

    LPC\_GPIO0->FIODIR |= 0x00000FF0; *//0.4 to 0.11 as output*

    LPC\_GPIO1->FIODIR |= 0x07800000; *//1.23 to 1.26 as output*

    while(1){

        LPC\_GPIO1->FIOPIN = i<<23;

        LPC\_GPIO0->FIOPIN = seven\_seg[dig\_value[i]] << 4;

        i=(i+1)%4;

    }

}

**OUTPUT:**

In the first position, the 0th bit shown in GPIO1 we can see output of seven segment display of the digit 4 in GPIO0 which is of value 0110 0110 in binary:

A picture containing text, screenshot, indoor

Description automatically generated

In the second position, the 1st bit shown in GPIO1 we can see output of seven segment display of the digit 3 in GPIO0 which is of value 0100 1111 in binary:

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Description automatically generated

In the third position, the 2nd bit shown in GPIO1 we can see output of seven segment display of the digit 2 in GPIO0 which is of value 0101 1011 in binary:

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Description automatically generated

In the fourth position, the 3rd bit shown in GPIO1 we can see output of seven segment display of the digit 1 in GPIO0 which is of value 0000 0110 in binary:

A picture containing text, screenshot, indoor

Description automatically generated

**THE END**