Amrita Vishwa Vidyapeetham
Amrita School of Computing, Bangalore
Department of Computer Science and Engineering

19CSE303 Embedded Systems
Lab Worksheet - 7
Analog to Digital Convertor

Exercise Problems

1. Write a ARM embedded C program configure the AD0.1 to read analog voltage and record the latest converted digital value in a variable “dig" .

```
#include "lpc_2148.h"
#include "adc.h"

void init_adc0(void)
{

//  PINSEL1 = (PINSEL1 & ~(1 << 24)) | (1 << 24);   //select channel1 of AD0
  PINSEL1 = 0x01000000;
}


int adc_read(void)
{
       int i;
      AD0CR = 0x00200400 | (1<<1) ;    // select channel
       AD0CR |= 0x01000000; // Start A/D Conversion
      while ((AD0STAT & 0x00010002) == 0); // Wait for end of A/D Conversion
      i = AD0DR1; // Read A/D Data Register
       return i;
 }

 main() {
      int dig = 0;
      init_adc0();
      IODIR0 = 0x00FF0000;                    /* P1.16..23 defined as
Outputs */
       while(1)
  {
  dig = adc_read();
  dig &= 0x0000ffff    ;

  }
  }
```

2. Write a ARM embedded C program to control the multi LED array using analog controller. Assume the analog controller is connected to AD0.6 and an 8 array LED is connected to P0.16 to P0.23. The control is based on analog controller voltage level

voltage is 0V to 1V = P0.16 and P0.17 LED's ON

voltage is 1.1V to 2V = P0.16 and P0.19 LED's ON

voltage is 2.1V to 2.5V = P0.16 and P0.21 LED's ON

voltage is 2.6V to 3V = P0.16 and P0.23 LED's ON

```
#include "lpc_2148.h"
#include "adc.h"
void init_adc0(void)
{

  PINSEL0 |= 0x3 << 8;                                          //select channel6 of AD0
}

int adc_read(void)
{
        int i;
      AD0CR = 0x00200400 | (1<<6) ;    // select channel
        AD0CR |= 0x01000000; // Start A/D Conversion
      while ((AD0STAT & 0x00010002) == 0); // Wait for end of A/D Conversion
      i = AD0DR6; // Read A/D Data Register
        return i;
 }
main() {
             int dig = 0;
       init_adc0();
       IODIR0 = 0x00FF0000;                     /* P0.16..23 defined as Outputs */
        while(1)
  {
  dig = adc_read();
  dig &= 0x0000ffff    ;
  if(dig >= 0x00000000 && dig<=0x00004d80)
  {
      IOCLR0 |= 0x00ff0000;
      IOSET0 |= 0x00030000;
      }
  else if(dig >= 0x00004d81 && dig<=0x00009b00)
  {
      IOCLR0 |= 0x00ff0000;
      IOSET0 |= 0x000f0000;
      }
  else if(dig >= 0x00009b01 && dig<=0x0000c1c0)
  {
      IOCLR0 |= 0x00ff0000;
      IOSET0 |= 0x003f0000;
      }
  else if(dig >= 0x0000c1c1 && dig<=0x0000e880)
  {
      IOCLR0 |= 0x00ff0000;
      IOSET0 |= 0x00ff0000;
      }
else
      IOCLR0 |= 0x00ff0000;
  }
  }
```

Assignment Problem

1. Write an ARM embedded C program to control the LED on/off delay time using Analog controller. Assume the LED is connected in P1.16 and analog controller is connected to AD1.1.