

1) Seven Segment display:

```
#include <1pc2142.h>
#define LED_ON (IODEIRO = 1U<<31);
#define LED_OF (IODETO = 1U<<31);
void delay (unsigned int count);
void fsegdisp( char * buf );
unsigned char alphacode ( unsigned char code );
```

```
int main()
```

```
{
```

```
IODEIRO = 1U<<31 | 1U<<30 | U<<19 | 1U<<20;
```

```
LED_ON;
```

```
while(1){
```

```
fsegdisp( "Zero" );
```

```
delay (500);
```

```
fsegdisp( "help" );
```

```
delay (500);
```

```
33
```

```
unsigned char alphacode( n n n );
```

```
{
```

```
switch (code){
```

```
case 'f': return 0x8e;
```

```
case ';': ~~~~~
```

```
case '8': ~~~~~
```

```
case 'e': ~~~~~
```

```
case 'h': ~~~~~
```

```
case '4':
```

case 'p':

default: return 0xFF;

3 3

```
void 7segolisp( char *buf) {  
    unsigned int i,j;  
    unsigned char segdata,Temp=0;  
    for (i=0; i< 5; i++) {  
        segdata= alphacode[* (buf+i)];  
        for (j= 0; j< 8; j++) {  
            temp = segdata & 0x80;  
            if (temp == 0x80) {  
                I0SET0 |= 1UL<<19;  
            } else {  
                I0CLR0 |= 1UL<<19;  
            }  
        }  
    }  
}
```

```
I0SET0 |= 1UL<<20;  
delay (500);  
I0CLR0 |= 1UL<<20;  
segdata = segdata << 1;  
3 3
```

```
I0SET0 |= 1UL<<30;  
delay (500);  
I0CLR0 |= 1UL<<30;  
3
```

Void delay (unsigned int count)
{

unsigned int i, x;

for (i=0; i < x; i++) {

 for (x=0; x < 10000; x++);

}

3

2) Stepper Motor:

#include <lpc2148x.h>

#define LED_ON (IODERO == IUC<31>);

#define LED_OFF (IODETO == IUC<31>);

void delay(unsigned int count);

int main()

{

 unsigned int no_of_clk = 100;

 unsigned int no_of_ticks = 100;

 IODERO |= IUC<31> | IUC<30>;
 IODETO = 0x00FF0000;
 16 → 23

 LED_ON;

 delay(500);

 LED_OFF;

3

do {

 IODERO = 0x000F0000;

 IODETO = 0x00010000;

 delay(500);

 if (--no_of_clk == 0);

 break;

TOCLR0 = 0x000F0000; 1

TOSETD = 0x00020000; 2

delay(500);

if(--no. of clk == 0) 4

break; 8

TOCLR0 = 0x000F0000;

TOSETD = 0x00040000;

delay(500);

if(-no. of clk == 0)

break;

TOCLR0 = 0x000F0000;

TOSETD = 0x00080000;

delay(500);

if(-no. of clk == 0)

break; 3 while(i);

do {

TOCLR0= 0x000F0000;

TOSETD = 0x00080000;

delay(500);

if(--no. of antclk == 0)

break; 8

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```
IODE = 0x00FF0000;
```

```
while(1);
```

```
3
```

```
void delay( ~ ~ ~ ) {
```

```
    unsigned int i, x;
```

```
    for( i=0; i<x; i++ ) {
```

```
        for( x=0; x<10000; x++ );
```

```
    }
```

```
3
```

3) Matrix keyboard :

```
#include <lp214x.h>
```

```
#define LED_ON ( IODE = 1U<<31 )
```

```
#define LED_OFF( IODE = 1U<<31 )
```

```
#define COL0 ( IOPIN1 & 1 <<19 );
```

```
#define COL1 ( IOPIN1 & 1 <<18 );
```

```
#define COL2 ( IOPIN1 & 1 <<17 );
```

```
#define COL3 ( IOPIN1 & 1 <<16 );
```

```
#define PCLK 0x00000400;
```

```
void delay( unsigned int count );
```

```
void uart_init( void );
```

```
unsigned char lookuptable [4][4] = { '0','1','2','3',
```

```
        { '4','5','6','7' },
```

```
        { '8','9','A','B' },
```

```
        { 'C','D','E','F' } };
```

unsigned char rowsel = 0;

~~~~~ ~ colsel = 0;

int main() {

uart\_init();

IODIR1 = IODIR1 | 0x 00FF0000;

LED = ON;

delay(500);

LED = OFF;

delay(500);

while () {

rowsel = 0;

I0SET0 = 0x 000F0000;

I0CLR0 = 1<<16;

if (COL0 == 0) {

colsel = 0;

break;

}

if (COL1 == 0) {

colsel = 1;

break;

}

if (COL2 == 0) {

colsel = 2;

break;

}

if (COL3 == 0) {

colscl = 3; break; }

→ repeat for:

rowsel = 1, 1<<17

rowsel = 2, 1<<18

rowsel = 3, 1<<19

delay(500);

while ( (COL0 == 0) || (COL1 == 0) || (COL2 == 0) || (COL3 == 0) );

delay(500);

I0SET0 = 0x00FF0000;

UOTHR = lookuptable [rowsel][colsel];

3

3

void usart\_int (void) {

PINSEL1 = 0x00000005;

UOLCR = 0x83;

UODLM = 0;

UODLL = 8;

UOLCR = 0x03;

UOECLR = 0x07;

3

void delay ( unsigned ) {

unsigned int i, x;

for ( i = 0; i < x; i++ ) {

    for ( x = 0; x < 10000; x++ );

3

3

## LCD :

```
#include <1pc214x.h>
#define LED-ON (IODER0 = 1UL<<3)
#define LED-OFF(IOSETO = 1UL<<3)
#define RS-ON (IODER0 = 1UL<<20)
#define RS-OFF (IOSETO = 1UL<<20)
#define EN-ON (IODER0 = 1UL<<25)
#define EN-OFF (IOSETO = 1UL<<25)
```

```
void delay( unsigned int count);
void LCD-CmdWrite( unsigned char CmdByte);
void LCD-DataWrite( unsigned char DataByte);
void LED-Display( const char *str);
```

```
int main() {
```

```
IODIR0 |= 1UL<<31 | 0x00FF0000;
```

```
IODIR0 |= 1UL<<25;
```

```
LED-ON;
```

```
delay (500);
```

```
LED-OFF;
```

```
delay (500);
```

```
LCD-CmdWrite(0x80);
```

```
LCD-Display ("RVCE");
```

```
LCD-CmdWrite(0x40);
```

```
LCD-Display ("L.S");
```

```
LCD-CmdWrite(0x94);
```

```
LCD-Display ("Data Science");
```

LCD - Cmd Write ( 0x04 );

LCD - Display ( "4th Sem" );

while ( 1 );

3

void LCD\_SendNibble ( unsigned char dataByte ) {

I0CERO = 0x00FF0000;

I0SET0 = ( ( dataByte >> 4 ) & 0x0F ) << 16;

EN\_ON;

delay ( 500 );

EN\_OFF;

3

void LCD\_CmdWrite ( unsigned char CmdByte ) {

RS\_OFF;

LCD\_SendNibble ( CmdByte );

LCD\_SendNibble ( CmdByte << 4 );

3

void LCD\_DataWrite ( unsigned char DataByte ) {

RS\_ON;

LCD\_SendNibble ( DataByte );

LCD\_SendNibble ( DataByte << 4 );

3

void LCD\_Display ( const char \* str ) {

while ( str ) LCD\_DataWrite ( \*str++ ); 3

delay  
fun  
3 //

## ADC :

```
#include <pc214x.h>
#define LED_ON (IACR0 = 1<<2)
#define LED_OFF (IACR0 = 1<<2)
```

```
int main() {
```

```
    unsigned int i;
```

```
IODIR0 |= (1 << 2);
```

```
PINSEL1 = (1 << 24);
```

```
LED_on;
```

```
do {
```

```
    ADCR0 = (1 << 1) | (1 << 21) | (1 << 24);
```

```
    while ((ADCDR0 & (unsigned long)1<<31) == 0);
```

```
i = (ADCDR0 >> 3) & 0x3FF;
```

```
if (i > 100) {
```

```
    LED_OFF; }
```

```
else {
```

```
    LED_ON; }
```

```
}
```

```
while(1);
```

```
}
```

## features:

- ① high resolution
- ② multiple I/O channels.
- ③ Accuracy.
- ④ Short conversion time
- ⑤ Good interrupt handling.

## Applications :

- ① light intensity measurements
- ② Temp sensing
- ③ Sound processing
- ④ Pressure sensing
- ⑤ Battery monitoring
- ⑥ medical devices.

DAC :

```
#include < Ipc214x.h>
#define SW2 (IOPIN & 1<<14)
#define SW3 (IOPIN & 1<<15)
#define SW4 (IOPIN & 1<<16)
#define SW5 (IOPIN & 1<<17)
#define SW6 (IOPIN & 1<<18)
```

void delay (an int count);

- applications:

  - ① Signal generation.
  - ② audio systems
  - ③ Control System
  - ④ Communications
  - ⑤ video systems
  - ⑥ Instrumentation
  - ⑦ Medical devices
  - ⑧ Radars

short int sine\_table[] =

$$\{ S12+0, S12+S3, S12+106, \dots, \dots, S12+S03, S12+S10, S12+S11, \\ S12+S10, S12+S03, \dots, \dots, S12+S06, S12+S3, S12+0, \\ S12-S3, S12-106, \dots, \dots, S12-S03, S12-S10, S12-S11, \\ S12-S10, S12-S03, \dots, \dots, S12-106, S12-S3 \};$$

~~short int sine\_rect\_table[] =~~

$$\{ S_{12} + 0, S_{12} + s_3, S_{12} + s_{06}, \dots, S_{12} + s_{03}, S_{12} + s_{10}, S_{12} + s_{11}, \\ S_{12} + s_{10}, S_{12} + s_{03}, \dots, S_{12} + s_{06}, S_{12} + s_3, S_{12} + 0 \}$$

int main () {

short int value, i=0;

PINSEL1 |= 0x 0008 0000;

while loop

if (!sw2) {

while (*i* != 60)

Value = sine - table [i++];

DACR = (1 << 16) | (value << 16);

## Bine wane (table)

delay(10);

3

i=0;

3

elseif (!sw3) {

sine\_rect\_wavne (table)

while (i != 30) {

value = sine\_rect\_table[i++];

DACR = (1<<16) | (value << 6);

delay(10);

3

i = 0;

3

elseif (!sw4) {

Triangle wave

(!=1023, !=0)

value = 0;

while (value != 1023) {

DACR = (1<<16) | (value << 6);

value++;

while (value != 0) {

DACR = (1<<16) | (value << 6);

value--;

3

3

elseif (!sw5) {

sawtooth wavne

(!=1023)

value = 0;

while (value != 1023) {

DACR = (1<<16) | (value << 6);

value++;

3 3

Elseif  $(!SW)$  & square wave ( $= 1023, = 0$ )

value = 1023;

DACR =  $(1 << 16) | (\text{value} << 6)$ ;

delay (10);

value = 0;

DACR =  $(1 << 16) | (\text{value} << 6)$ ;

delay (10);

3

else if no wave ( $= 1023$ )

value = 1023;

DACR =  $(1 << 16) | (\text{value} << 6)$ ;

3

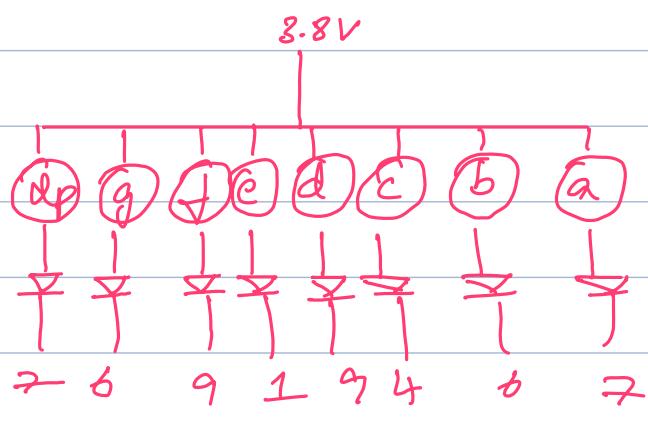
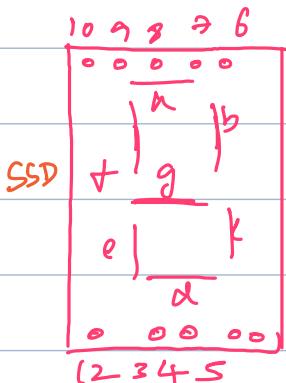
3

3

→ (delay func) //

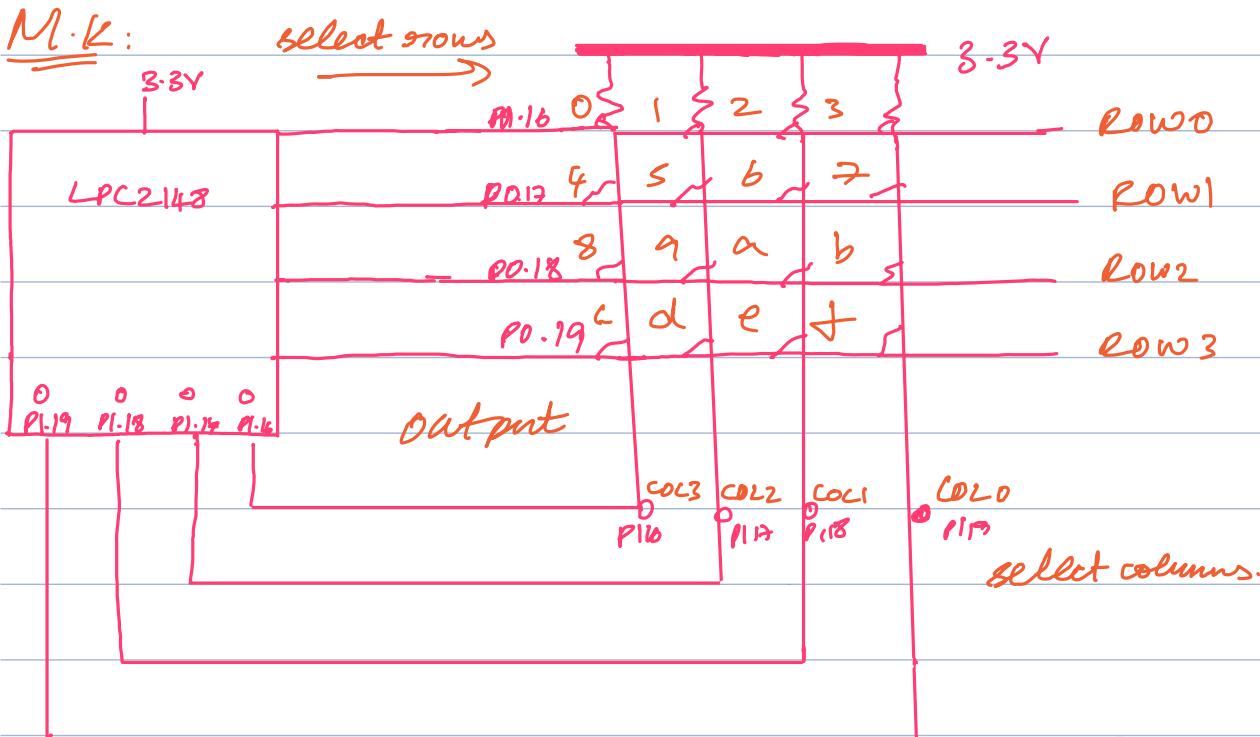
Interfacing diagrams:

SSD:



S.M.:



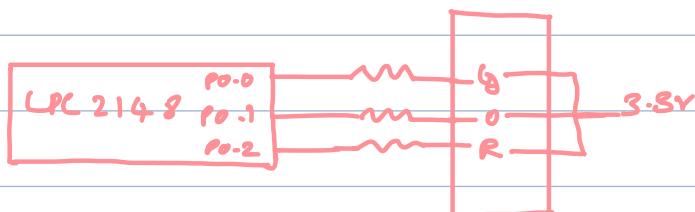


Ex: Interface 3 LEDs (Red, Yellow, green) to LPC2148 & write embedded C Program to simulate traffic light system.

$\Rightarrow$  P0.0  $\Rightarrow$  O/P for red LED.

P0.1  $\Rightarrow$  O/P for yellow LED.

P0.2  $\Rightarrow$  O/P for green LED.



```
#include <lpc2148.h>
```

```
void delay (unsigned int count)
```

```
int main (void)
```

```
{
```

```
IODIR0 |= (1<<0); // P0.0 O/P for RED
```

```
IODIR0 |= (1<<1); // P0.1 O/P for YELLOW
```

```
IODIR0 |= (1<<2); // P0.2 O/P for GREEN.
```

```
while(1)
```

```
{
```

```
IOSET0 = (1<<2); // green on, others off
```

```
IOCLR0 = (1<<1);
```

```
IOCLR0 = (1<<0);
```

```
delay (300000);
```

```
IOCLR0 = (1<<2); // yellow on, others off
```

```
IOSET0 = (1<<1);
```

```
IOCLR0 = (1<<0);
```

```
delay (100000);
```

IOLR0 = (1<<2);

// red on, others off.

IOSETO = (1<<1);

IOLR0 = (1<<0);

delay (300000);

3

3

Void delay(unsigned int count)

{

unsigned int i; x;

for(i=0; i < count; i++)

{

for (x=0; x < count; x++)

3

3