Vehicle Parking Slot Counter

Aim: To implement vehicle parking slot counter system.

Apparatus Used: UET-01(LPC2148)

Software Used: Keil uVision (IDE to write code), Flash Magic (To upload the code in the processor)

Project Description:

Vehicle parking has always been a cumbersome in many sectors like offices, malls, etc. Many people find it difficult to search for the correct place to park their vehicles. Many of these sectors need to appoint a person to assist people where to park their vehicles.

So, our project basically focusses on reducing man effort of parking. Each parking slot should have a kind of a sensor which could indicate whether the slot is empty or full. There will be lights/LEDs which will show where the slot is empty or whether all the slots are completely filled.

We have implemented the counter system using LEDs and set a timer for each parking slot to be filled. After all the parking slots are filled, the LCD shows that the parking area is full.

We have introduced a system to show how many of the slots have been set free using matrix keys. Whenever a matrix key is pressed, it indicates that the certain place has been set free. So it will show that the the certain positions have been set free.

Algorithm:

The algorithm to solve the above problem is quite simple. We have used four components of the UET-01 kit which are as follows: LCD, LEDs, Buzzer, Relay. LEDs will show whether the slot is filled or not while LCD will display if the parking is full or not. Buzzer will be turned on at each slot filling while relay will switch after a row is filled so that it moves to the next row. Matrix(16 bit) is required to show that certain slot has been set free.

Code:

```
// KeyBoard Matrix

// In run mode keep SW1.1,2,3 bits in ON position. To conect the RS,RW,EN to the
LCD module

// And for providing pull up for Rows and column of keypad matrix
// Keep SW2 in ON position to enable KeyPad H/W Module and

#include "LPC214x.h"                        /* LPC21xx definitions */
#include <stdio.h>
#include <string.h>

#include "Disp_Driver.H"
#include "KeyPad_DD.h"

#include "GPIO.h"
#include "PinConnectBlock.h"
#include <lpc214x.h>
#include "C:\Users\notor\Desktop\finalprojectlast\lcd.h"

const unsigned int keyTable[] =
{
           0x0001,//0b0000000000000001,     //Key1
           0x0002,//0b0000000000000010,     //Key2
           0x0004,//0b0000000000000100,     //Key3
           0x0008,//0b0000000000001000,     //Key4
           0x0010,//0b0000000000010000,     //Key5
           0x0020,//0b0000000000100000,     //Key6
```

```
            0x0040,//0b0000000001000000,     //Key7
            0x0080,//0b0000000010000000,     //Key8
            0x0100,//0b0000000100000000,     //Key9
            0x0200,//0b0000001000000000,     //Key10
            0x0400,//0b0000010000000000,     //Key11
            0x0800,//0b0000100000000000,     //Key12
            0x1000,//0b0001000000000000,     //Key13
            0x2000,//0b0010000000000000,     //Key14
            0x4000,//0b0100000000000000,     //Key15
            0x8000 //0b1000000000000000      //Key16
};

char str[17];

unsigned char MapKeyState(unsigned int kState);
void black(void);
void delay_ms(unsigned int count);

int  main(void)
{
      char validKeyState;
      unsigned int keyState,counter=0;
      unsigned char currKey;
      unsigned char prevKey;

      PINSEL2 = 0x00000000;// Selected for GPIO

      /*Function:     Initialize the LCD
      Input:     void
      Output:    void*/
      black();
      Init_LCD();
      ClearDisplay();

      InitKeyPad();

      strcpy(str,"CAR  PARKING SYS");
      SetCharPosition(1,1);
      WriteString((char*)str);

      strcpy(str,"FREE SLOT PRESS");
      SetCharPosition(2,1);
      WriteString((char*)str);

      Delay_milliSecond(2000);

      ClearDisplay();

      InitKeyPad();

      strcpy(str,"PRESS A KEY ...!");
      SetCharPosition(1,1);
      WriteString((char*)str);

      strcpy(str,"                ");
      SetCharPosition(2,1);
      WriteString((char*)str);

      Delay_milliSecond(100);

      currKey = 0;
      prevKey = 0;



      while(1)   //Infinite loop
      {
```

```
            /*
            Function:  This function must be called in the main loop
                       returns the current key state and key Press down
                       event.
                       LsB => Key1
                       ....
                       MSB => Keyy16
                       Bit H => Currently Key is Pressed Down
                             And Key has Changed the state from released to
            pressed down
            */
            validKeyState = RunKeyPad();

            if(validKeyState)
            {
                  keyState = GetKeyState();

                  currKey = MapKeyState(keyState);

                  if(currKey != prevKey)
                  {
                        prevKey = currKey;
                        ClearDisplay();

                        strcpy(str,"THE  SLOT  NUMBER ");
                        SetCharPosition(1,1);
                        WriteString((char*)str);

                        //foo1(&currKeyState);
                        if( currKey != 0)
                        {
                              counter++;
                              sprintf(str,(const char*)" %-2u ARE FREE ",(unsigned
int)counter);
                        }
                        else
                        {
                              strcpy(str,"IS  =>   ");
                        }
                        SetCharPosition(2,1);
                        WriteString((char*)str);
                  }
            }
      }
}
/* Function : To Map the bit pattern to a key value as required
 * */
unsigned char MapKeyState(unsigned int kState)
{
      unsigned char i;
      unsigned char keyValue;

      keyValue = 0;

      for(i = 0; i <= 15; ++i)
      {
            if(kState == keyTable[i])
            {
                  keyValue = i+1;
                  break;
            }
      }
      return keyValue;
}
```

```
void delay_ms(unsigned int count)
{
  unsigned int j=0,i=0;
  for(j=0;j<count;j++)
  {
    for(i=0;i<3000;i++);
  }

}
void black(void)
{
     int t=3;
     unsigned int delay11;
     while(t>=1){

           IO0CLR = (1<<19);
           for(delay11=0; delay11<800000; delay11++);
           IO0SET = (1<<19);
           for(delay11=0; delay11<800000; delay11++);
           IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
           IO0CLR = (1<<0);
           delay_ms(200);
           IO0SET=(1<<0);
           delay_ms(200);
           IOSET0 = 0x00f00000;     // Make all the Port pins as high
    delay_ms(100);
           IOCLR0=0x00f00000;
           IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
           IO0CLR = (1<<1);
           delay_ms(200);
           IO0SET=(1<<1);
           delay_ms(200);
           IOSET0 = 0x00f00000;     // Make all the Port pins as high
    delay_ms(100);
           IOCLR0=0x00f00000;
           IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
           IO0CLR = (1<<2);
           delay_ms(200);
           IO0SET=(1<<2);
           delay_ms(200);
           IOSET0 = 0x00f00000;     // Make all the Port pins as high
    delay_ms(100);
           IOCLR0=0x00f00000;
           IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
           IO0CLR = (1<<4);
           delay_ms(200);
           IO0SET=(1<<4);
           delay_ms(200);
           IOSET0 = 0x00f00000;     // Make all the Port pins as high
    delay_ms(100);
           IOCLR0=0x00f00000;
           IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
           IO0CLR = (1<<5);
           delay_ms(200);
           IO0SET=(1<<5);
           delay_ms(200);
           IOSET0 = 0x00f00000;     // Make all the Port pins as high
    delay_ms(100);
           IOCLR0=0x00f00000;
           IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
```

```
        IO0CLR = (1<<6);
        delay_ms(200);
        IO0SET=(1<<6);
        delay_ms(200);
        IOSET0 = 0x00f00000;     // Make all the Port pins as high
delay_ms(100);
        IOCLR0=0x00f00000;
        IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
        IO0CLR = (1<<7);
        delay_ms(200);
        IO0SET=(1<<7);
        delay_ms(200);
        IOSET0 = 0x00f00000;     // Make all the Port pins as high
delay_ms(100);
        IOCLR0=0x00f00000;
        IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
        IO0CLR = (1<<8);
        delay_ms(200);
        IO0SET=(1<<8);
        delay_ms(200);
        IOSET0 = 0x00f00000;     // Make all the Port pins as high
delay_ms(100);
        IOCLR0=0x00f00000;
        IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
        IO0CLR = (1<<9);
        delay_ms(200);
        IO0SET=(1<<9);
        delay_ms(200);
        IOSET0 = 0x00f00000;     // Make all the Port pins as high
delay_ms(100);
        IOCLR0=0x00f00000;
        IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
        IO0CLR = (1<<10);
        delay_ms(200);
        IO0SET=(1<<10);
        delay_ms(200);
        IOSET0 = 0x00f00000;     // Make all the Port pins as high
delay_ms(100);
        IOCLR0=0x00f00000;
        /*IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
        //IO0CLR = (1<<11);
        delay_ms(200);
        IO0SET=(1<<11);
        IOSET0 = 0x00f00000;     // Make all the Port pins as high
delay_ms(100);
        IOCLR0=0x00f00000;
        IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
        IO0CLR = (1<<12);
        delay_ms(200);
        IO0SET=(1<<12);
        delay_ms(200);
        IOSET0 = 0x00f00000;     // Make all the Port pins as high
delay_ms(100);
        IOCLR0=0x00f00000;
        IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
        IO0CLR = (1<<13);
        delay_ms(200);
        IO0SET=(1<<13);
        delay_ms(200);
        IOSET0 = 0x00f00000;     // Make all the Port pins as high
delay_ms(100);
        IOCLR0=0x00f00000;
        IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
        IO0CLR = (1<<14);
        delay_ms(200);
        IO0SET=(1<<14);
        delay_ms(200);
```

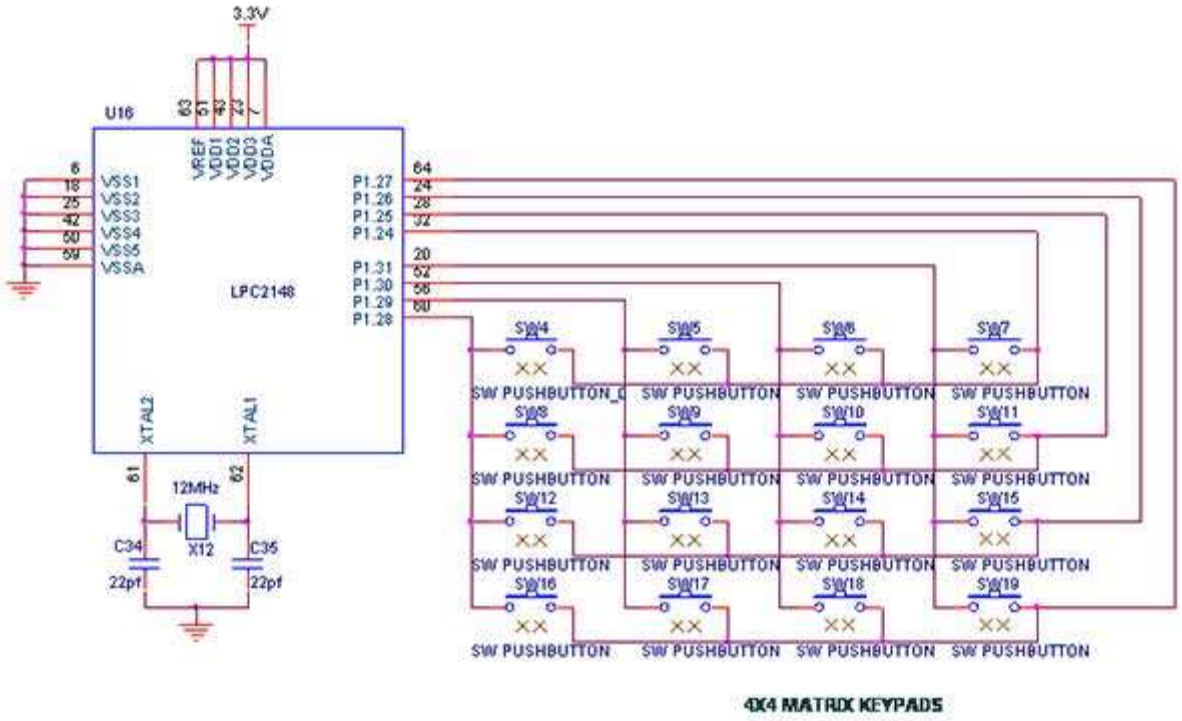
```
	IOSET0 = 0x00f00000;	// Make all the Port pins as high
delay_ms(100);
	IOCLR0=0x00f00000;


	IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
	IO0CLR = (1<<15);
	delay_ms(200);
	IO0SET=(1<<15);
	delay_ms(200);
	IOSET0 = 0x00f00000;	// Make all the Port pins as high
delay_ms(100);
	IOCLR0=0x00f00000;
	IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
	IO0CLR = (1<<16);
	delay_ms(200);
	IO0SET=(1<<16);
	delay_ms(200);
	IOSET0 = 0x00f00000;	// Make all the Port pins as high
delay_ms(100);
	IOCLR0=0x00f00000;*/
	IO0CLR = (1<<19);
	for(delay11=0; delay11<800000; delay11++);
	IO0SET = (1<<19);
	for(delay11=0; delay11<800000; delay11++);
	IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
	IO0CLR = (1<<0);
	delay_ms(400);
	IOSET0 = 0x00f00000;	// Make all the Port pins as high
delay_ms(100);
	IOCLR0=0x00f00000;
	IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
	IO0CLR = (1<<1);
	delay_ms(400);
	IOSET0 = 0x00f00000;	// Make all the Port pins as high
delay_ms(100);
	IOCLR0=0x00f00000;
	IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
	IO0CLR = (1<<2);
	delay_ms(400);
	IOSET0 = 0x00f00000;	// Make all the Port pins as high
delay_ms(100);
	IOCLR0=0x00f00000;
	IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
	IO0CLR = (1<<4);
	delay_ms(400);
	IOSET0 = 0x00f00000;	// Make all the Port pins as high
delay_ms(100);
	IOCLR0=0x00f00000;
	IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
	IO0CLR = (1<<5);
	delay_ms(400);
	IOSET0 = 0x00f00000;	// Make all the Port pins as high
delay_ms(100);
	IOCLR0=0x00f00000;
	IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
	IO0CLR = (1<<6);
	delay_ms(400);
	IOSET0 = 0x00f00000;	// Make all the Port pins as high
delay_ms(100);
	IOCLR0=0x00f00000;
	IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
	IO0CLR = (1<<7);
	delay_ms(400);
	IOSET0 = 0x00f00000;	// Make all the Port pins as high
delay_ms(100);
	IOCLR0=0x00f00000;
```

```
        IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
        IO0CLR = (1<<8);
        delay_ms(400);
        IOSET0 = 0x00f00000;     // Make all the Port pins as high
    delay_ms(100);
        IOCLR0=0x00f00000;
        IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
        IO0CLR = (1<<9);
        delay_ms(400);
        IOSET0 = 0x00f00000;     // Make all the Port pins as high
    delay_ms(100);
        IOCLR0=0x00f00000;
        IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
        IO0CLR = (1<<10);
        delay_ms(400);
        IOSET0 = 0x00f00000;     // Make all the Port pins as high
    delay_ms(100);
        IOCLR0=0x00f00000;
        /*IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
        IO0CLR = (1<<11);
        delay_ms(400);
        IOSET0 = 0x00f00000;     // Make all the Port pins as high
    delay_ms(100);
        IOCLR0=0x00f00000;
        IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
        IO0CLR = (1<<12);
        delay_ms(400);
        IOSET0 = 0x00f00000;     // Make all the Port pins as high
    delay_ms(100);
        IOCLR0=0x00f00000;
        IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
        IO0CLR = (1<<13);
        delay_ms(400);
        IOSET0 = 0x00f00000;     // Make all the Port pins as high
    delay_ms(100);
        IOCLR0=0x00f00000;
        IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
        IO0CLR = (1<<14);
        delay_ms(400);
        IOSET0 = 0x00f00000;     // Make all the Port pins as high
    delay_ms(100);
        IOCLR0=0x00f00000;
        IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
        IO0CLR = (1<<15);
        delay_ms(400);
        IOSET0 = 0x00f00000;     // Make all the Port pins as high
    delay_ms(100);
        IOCLR0=0x00f00000;
        IODIR0 = 0xffffffff; //Configure the P1 pins as OUTPUT;
        IO0CLR = (1<<16);
        delay_ms(400);
        IOSET0 = 0x00f00000;     // Make all the Port pins as high
    delay_ms(100);
        IOCLR0=0x00f00000;*/
        t--;
     }
     strcpy(str,"CAR  PARKING SYS");
     SetCharPosition(1,1);
     WriteString((char*)str);

     strcpy(str,"10 Slots Full");
     SetCharPosition(2,1);
     WriteString((char*)str);
}
```

Pin Diagrams:



4X4 MATRIX KEYPADS