MPMC-PROJECT

LCD INTERFACING

Details of Group Members			
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AIM:

Interfacing of interfacing with microcontroller (PIC18F4550).

ABSTRACT:

LCD (Liquid Crystal Display) is a type of flat panel display which uses liquid crystals in its primary form of operation. LEDs have a large and varying set of use cases for consumers and businesses, as they can be commonly found in smartphones, televisions, computer monitors and instrument panels.

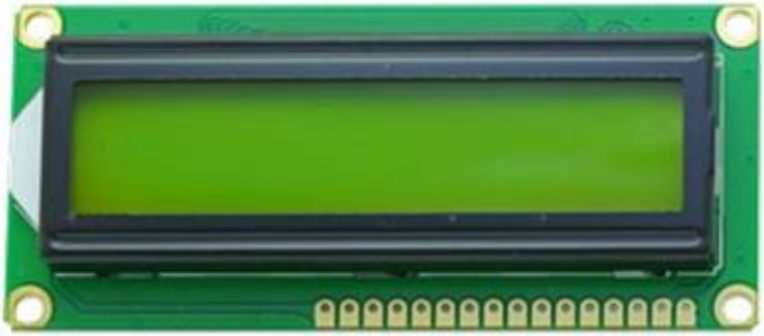
APPARATUS REQUIRED:

1. PIC18F4550 microcontroller
2. 16X2 LCD display
3. Battery Supply
4. Wires
5. Breadboard
6. Resistor 4.7K
7. Push button
8. Pickit 3

THEORY:

The principle behind the LCDs is that when an electrical current is applied to the liquid crystal molecule, the molecule tends to untwist. This causes the angle of light which is passing through the molecule of the polarized glass and also causes a change in the angle of the top polarizing filter. As a result, a little light is allowed to pass the polarized glass through a particular area of the LCD.

Thus that particular area will become dark compared to others. The LCD works on the principle of blocking light. While constructing the LCDs, a reflected mirror is arranged at the back. An electrode plane is made of indium-tin-oxide which is kept on top and a polarized glass with a polarizing film is also added on the bottom of the device. The complete region of the LCD has to be enclosed by a common electrode and above it should be the liquid crystal matter.



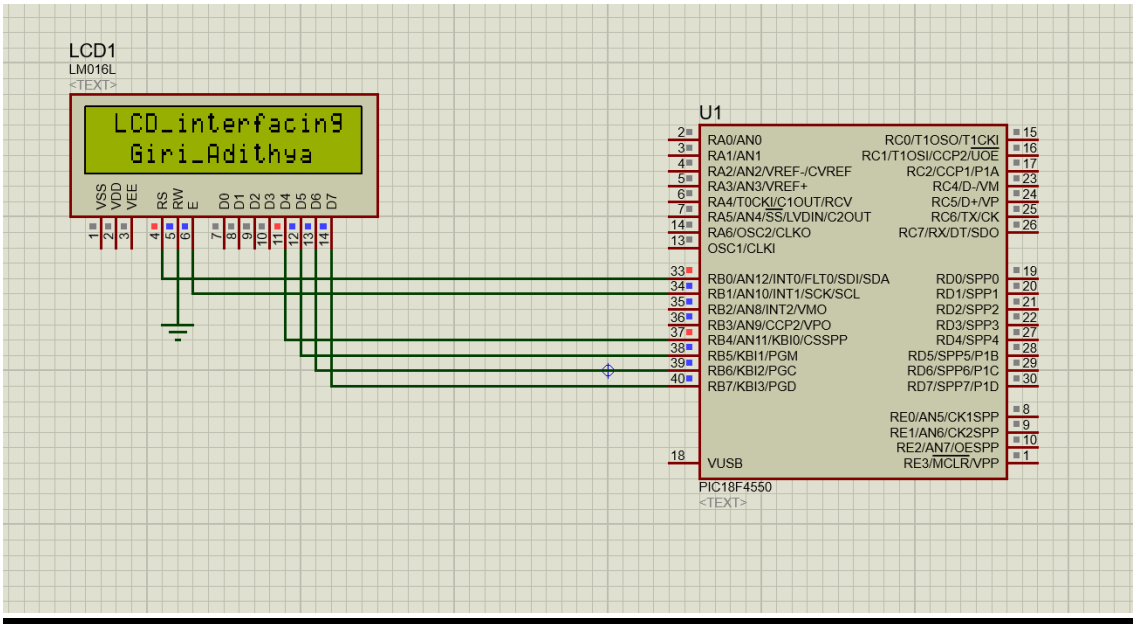
PRINCIPLE OF OPERATION AND WORKING:

An LCD TV monitor utilizes the sunglasses concept to operate its colored pixels. On the flip side of the LCD screen, there is a huge bright light that shines out in the direction of the observer. On the front side of the display, it includes the millions of pixels, where each pixel can be made up of smaller regions known as sub-pixels. These are colored with different colors like green, blue, and red. Each pixel in the display includes a polarizing glass filter at the backside and the front side includes at 90 degrees, so the pixel looks dark normally.

A small twisted nematic liquid crystal is there among the two filters which control electronically. Once it is turned OFF, then it turns the light to pass through 90 degrees, efficiently

letting light to supply throughout the two polarizing filters so that pixel seems bright. Once it is activated then it doesn't turn the light because it is blocked through the polarizer & the pixel seems dark. Every pixel can be controlled through a separate transistor by turning ON and OFF several times every second.

CIRCUIT DIAGRAM:



CODE:

```
#include <pic18f4550.h>
```

```
#include "Configuration_header_file.h"
void MSdelay(unsigned int );        /*Generate delay in ms*/
void LCD_Init();                    /*Initialize LCD*/
void LCD_Command(unsigned char );   /*Send command to LCD*/
void LCD_Char(unsigned char x);     /*Send data to LCD*/
void LCD_String(const char *);      /*Display data string on LCD*/
void LCD_String_xy(char, char , const char *);
void LCD_Clear();                   /*Clear LCD Screen*/


int main(void)
{
   OSCCON = 0x72;                   /*Use internal oscillator and
                                     * set frequency to 8 MHz*/
LCD_Init();                         /*Initialize LCD to 5*8 matrix i
LCD_String_xy(1,2,"MPMC Project");
   LCD_String_xy(1,1,"LCD_interfacing");   /*Display string on 1st
row, 5th location*/
LCD_String_xy(2,2,"Presented By");
LCD_String_xy(3,2,"Giri_Adithya");/*Display string on 2nd row,1st
location*/
while(1);
}

void LCD_Init()
{
   LCD_Port = 0;                /*PORT as Output Port*/
   MSdelay(15);                 /*15ms,16x2 LCD Power on delay*/
   LCD_Command(0x02);           /*send for initialization of LCD
                        *for nibble (4-bit) mode */
   LCD_Command(0x28);           /*use 2 line and
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```
                        *initialize 5*8 matrix in (4-bit mode)*/
   LCD_Command(0x01);          /*clear display screen*/
   LCD_Command(0x0c);          /*display on cursor off*/
   LCD_Command(0x06);          /*increment cursor  */
}

void LCD_Command(unsigned char cmd )
{
ldata = (ldata & 0x0f) |(0xF0 & cmd);    /*Send higher nibble of command first to PORT*/
RS = 0;                          /*Command Register is selected i.e.RS=0*/
EN = 1;                          /*High-to-low pulse on Enable pin to latch data*/
NOP();
EN = 0;
MSdelay(1);
ldata = (ldata & 0x0f) | (cmd<<4);     /*Send lower nibble of*/
EN = 1;
NOP();
EN = 0;
MSdelay(3);
}



void LCD_Char(unsigned char dat)
{
ldata = (ldata & 0x0f) | (0xF0 & dat);   /*Send higher nibble of data first to PORT*/
RS = 1;                          /*Data Register is selected*/
```

```
EN = 1;                          /*High-to-low pulse on Enable pin to latch
data*/
NOP();
EN = 0;
MSdelay(100);
ldata = (ldata & 0x0f) | (dat<<4);          /*Send lower nibble of data
to PORT*/
EN = 1;
NOP();
EN = 0;
MSdelay(300);
}
void LCD_String(const char *msg)
{
while((*msg)!=0)
{
  LCD_Char(*msg);
  msg++;
    }
}

void LCD_String_xy(char row,char pos,const char *msg)
{
   char location=0;
   if(row<=1)
   {
      location=(0x80) | ((pos) & 0x0f);      /*Print message on 1st row
and desired location*/
      LCD_Command(location);
   }
   else
```

```
    {
       location=(0xC0) | ((pos) & 0x0f);       /*Print message on 2nd row
and desired location*/
       LCD_Command(location);
    }


   LCD_String(msg);

}
void LCD_Clear()
{
        LCD_Command(0x01);     /*clear display screen*/
}

void MSdelay(unsigned int val)
{
 unsigned int i,j;
 for(i=0;i<=val;i++)
     for(j=0;j<81;j++);
 }
```

CODE EXPLANATION:

The code has a main part and the LCD part. The main part sends the code to the LCD part and then the LCD part commands the LCD display. The text which is to be showed in the display is set in the main code. The code is set such that the text is displayed in 1st row the display is changed bit by bit the 2nd line is set then it is also changed bit by bit. The code also has a delay part where it sets the

delay at which the string is to displayed.

The code is build successfully and then flashed into the PIC using Pickit3 and then the circuit is assembled properly. The 4 data pins (D7-D4) required is a connected to the PIC(40-37) and the RS and E pins are connected to the PIC pins (33-34) the R/W is grounded the Vss pin is grounded and Vdd is supplied to the power then the PIC is supplied with power. Then the LCD is displaying the Text which is set in the code is displayed and then the bits are changed one by one then the new text which is set on code is displayed.

CIRCUIT SIMULATION:

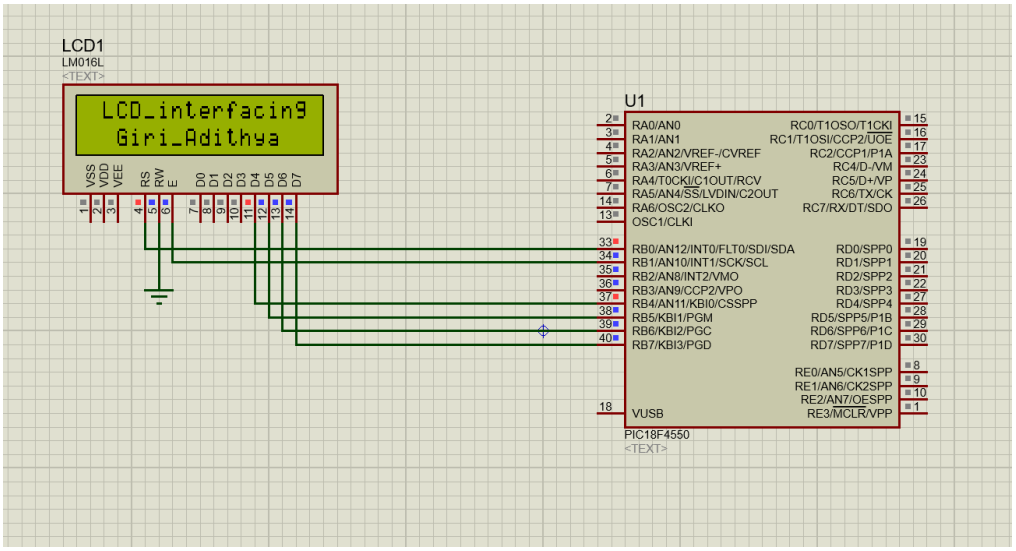
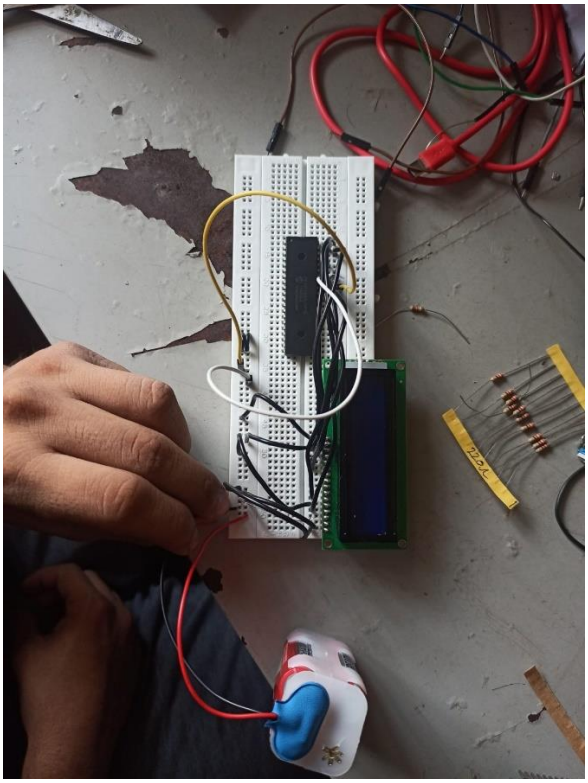


PHOTO OF PROJECT:



LCD INTERFACING

LCD INTERFACING APPLICATIONS:

This system is a modern way of taking students attendance in the classroom and it will avoid conventional time consuming manual attendance system. In this project, every student data is stored in a card that is used as identification for taking attendance of students.

RESULT:

Interfacing of LCD with PIC18F4550 has been studied and designed.

INFERENCE:

1. Change the DELAY to set the delay in LCD display.
2. From this we can infer that the rolling display can be used in several applications.
3. This can be used to display texts in places like Railway stations and places where displaying text is useful.