

# **EXPERIMENT NO. 01**

## **INTERFACING LCD WITH 8051 AND DISPLAYING HELLO**

**DOP:**

**DOS:**

### **Project Members:**

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|--------------------|----|
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**AIM:** To interface LCD using 8051 microcontroller and displaying characters (AT89C51).

**Tools:** Keil uVision 4, ISIS Proteus 7

**Theory:** It is very important to keep a track of the working of almost all the automated and semi-automated devices, be it a washing machine, an autonomous robot or anything else. This is achieved by displaying their status on a small display module. LCD (Liquid Crystal Display) screen is such a display module and a 16x2 LCD module is very commonly used. These modules are replacing seven segments and other multi segment LEDs for these purposes. The reasons being: LCDs are economical, easily programmable, have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. LCD can be easily interfaced with a microcontroller to display a message or status of a device. This topic explains the basics of a 16x2 LCD and how it can be interfaced with AT89C51 to display a character.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers.

1. **Command/Instruction Register**- stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing, clearing the screen, setting the cursor position, controlling display etc.

2. **Data Register**- stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD

The AT89C51 is a low-power, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high-density non-volatile memory technology and is compatible with the industry-standard MCS-51 instruction set and pin-out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional non-volatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C51 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications.

- Algorithm:
- Firstly, initialize all the ports.
  - Initialize the LCD to turn it ON and to a form that it is ready to accept commands.
  - Now command the LCD to write.
  - Display the contents using the required functions.

Code: **// C Program to interface LCD with 8051 and displaying characters.**

```
#include<reg52.h>
//including sfr registers for ports of the controller

#include<lcd.h>

//LCD Module Connections

sbit RS = P0^0;

sbit EN = P0^1;

sbit D0 = P2^0;

sbit D1 = P2^1;

sbit D2 = P2^2;

sbit D3 = P2^3;

sbit D4 = P2^4;

sbit D5 = P2^5;

sbit D6 = P2^6;

sbit D7 = P2^7;

//End LCD Module Connections

void Delay(int a)
{
    int j;
    int i;
```

```

    for(i=0;i<a;i++)
    {
        for(j=0;j<100;j++)
        {
            }
        }
    }
}

void main()
{
    int i;
    Lcd8_init();
    while(1)
    {
        Lcd8_Set_Cursor(1,1);
        Lcd8_Write_String("ElectroSome Hello");
        for(i=0;i<15;i++)
        {
            Delay(1000);
            Lcd8_Shift_Left();
        }
        for(i=0;i<15;i++)
        {
            Delay(1000);
            Lcd8_Shift_Right();
        }
    }
}

```

```

}

Lcd8_Clear();

Lcd8_Set_Cursor(2,1);

Lcd8_Write_Char('e');

Lcd8_Write_Char('S');

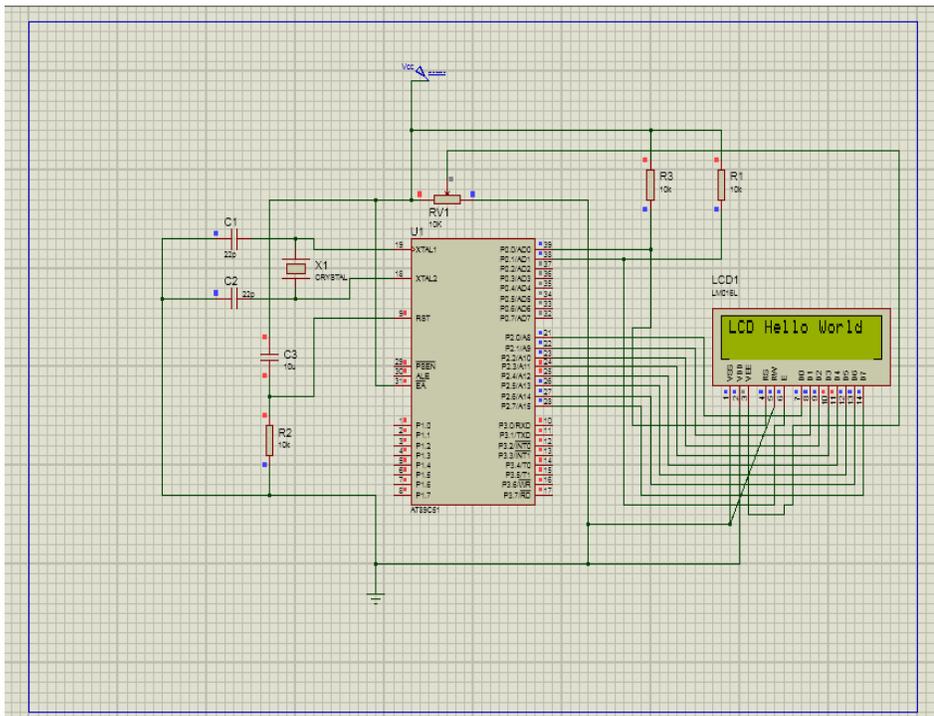
Delay(3000);

}

}

Output :

```



Conclusion: Thus, interfacing LCD with AT89C51 and displaying characters was simulated using proteus with the help of keil. The result were visually verified using Run feature in proteus.