Netaji Subhas University of Technology

Microcontroller for IoT

EIECE20

Mini Project Report File

Interfacing Microcontroller with an LCD

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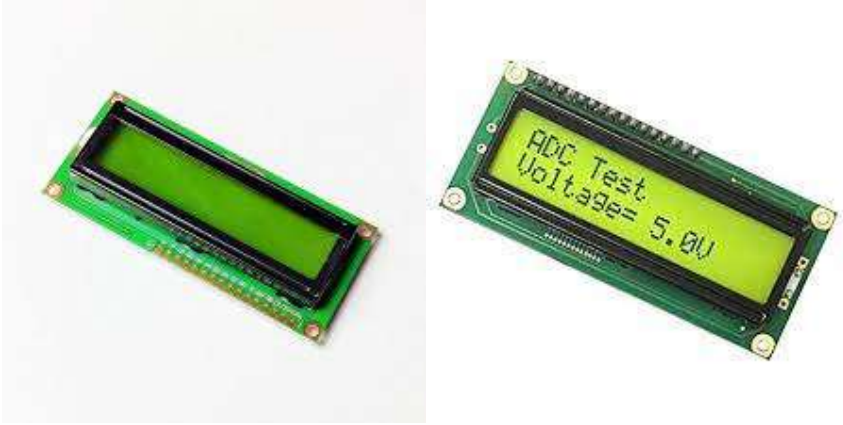
Study and implement parallel data communication by interfacing microcontroller with an LCD.

Components Used:

- Arduino Uno
- 16×2 LCD
- Breadboard
- Jumper Wires

Theory: Frequently, a microcontroller program must interact with the outside world using input and output devices that communicate directly with a human being. One of the most common devices attached to a microcontroller is an LCD display. Some of the most common LCDs are 16x2 and 20x2 displays. This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively



LCD Controller Pins:

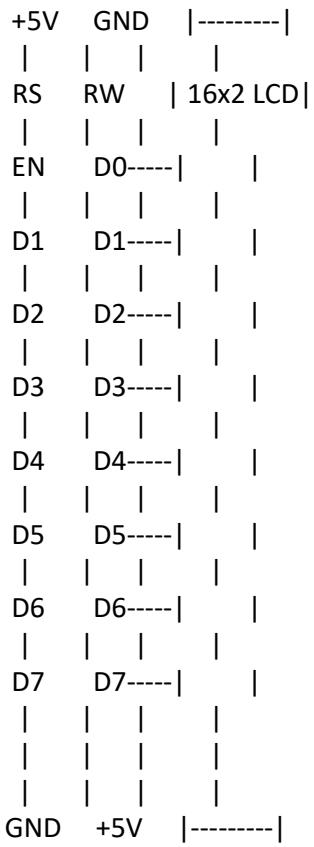
1. **DB0 to DB7 -** the data bus pins. These signals can be used to send 8 bits of data from the microcontroller to the LCD controller or from the LCD controller to the microcontroller. DB7 can be used as busy flag also.

2. **R/W signal -** selects between a Read and Write operation. If R/W is equal to 0, a Write operation will be performed. For a Write operation, DB0 to DB7 will be used to send data from the microcontroller to the LCD controller. If R/W is equal to 1, a Read operation will be performed. For a Read operation, DB0 to DB7 will be used to send data from the LCD controller to the microcontroller.

3. RS signal - selects between instruction and data registers. RS equal to 0 selects theInstruction register for a Write operation. This means that if RS=0 and R/W=0, the data sent over DB0 - DB7 will be put in the Instruction register. RS equal to 0 selects the Busy Flag for Read operation. This means that if RS=0 and R/W=1, the value in the Busy Flag will be sent over DB7. RS equal to 1 selects the Data register for Read and Write operation. This means that if RS=1 and R/W=0, the data sent over DB0 - DB7 will be put in the Data register. If RS=1 and R/W=1, the value in the Data register will be sent over DB0 - DB7 to microcontroller.

4. E signal - used to start data read or write. When the data is sent to the LCD, a high to low pulse must be applied to the E signal so that the LCD latches the data present at its pins. Similarly a high to low pulse must be provided to the E signal during a Read operation.

Circuit diagram:



Required code :

```
#include <LiquidCrystal.h>

// Initialize the LCD with the interface pins
LiquidCrystal lcd(8, 9, 10, 0, 1, 2, 3, 4, 5, 6, 7);

void setup() {
  // Set up the LCD
  lcd.begin(16, 2);
  // Clear the LCD
  lcd.clear();
  // Display the message
  lcd.print("Hello World!");
}

void loop() {
  // Do nothing
}
```

Conclusion: "hello world" message is displayed on LCD screen.