MICROCONTROLLER

UNIT-IV

Lecture-4

LCD INTERFACING

- LCD is finding widespread use replacing LEDs
- The declining prices of LCD
- The ability to display numbers, characters, and graphics
- Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD
- Ease of programming for characters and graphics

LCD Pin Descriptions

Pin Descriptions for LCD

Pin	Symbol	I/O	Descriptions
1	VSS	--	Ground
2	VCC	--	+5V power supply
3	VEE	--	Power supply to control contrast
4	RS	I	RS=0 to select command register, RS=1 to select data register
5	R/W	I	R/W=0 for write, R/W=1 for read
6	E	I/O	Enable
7	DB0	I/O	The 8-bit data bus
8	DB1	I/O	The 8-bit data bus
9	DB2	I/O	The 8-bit data bus
10	DB3	I/O	The 8-bit data bus
11	DB4	I/O	The 8-bit data bus
12	DB5	I/O	The 8-bit data bus
13	DB6	I/O	The 8-bit data bus
14	DB7	I/O	The 8-bit data bus

- Send displayed information or instruction command codes to the LCD
- Read the contents of the LCD's internal registers

used by the LCD to latch information presented to its data bus

LCD Command Codes

LCD Command Codes

Code (Hex)	Command to LCD Instruction Register
1	Clear display screen
2	Return home
4	Decrement cursor (shift cursor to left)
6	Increment cursor (shift cursor to right)
5	Shift display right
7	Shift display left
8	Display off, cursor off
A	Display off, cursor on
C	Display on, cursor off
E	Display on, cursor blinking
F	Display on, cursor blinking
10	Shift cursor position to left
14	Shift cursor position to right
18	Shift the entire display to the left
1C	Shift the entire display to the right
80	Force cursor to beginning to 1st line
C0	Force cursor to beginning to 2nd line
38	2 lines and 5x7 matrix

LCD INTERFACING

- To send any of the commands to the LCD, make pin RS=0. For data, make RS=1. Then send a high-to-low pulse to the E pin to enable the internal latch of the LCD. This is shown in the code below.

;calls a time delay before sending next data/command

;P1.0-P1.7 are connected to LCD data pins D0-D7

;P2.0 is connected to RS pin of LCD

Contd.

```
;P2.1 is connected to R/W pin of LCD
;P2.2 is connected to E pin of LCD
ORG 0H
MOV A,#38H ;INIT. LCD 2 LINES, 5X7 MATRIX
ACALL COMNWRT ;call command subroutine
ACALL DELAY ;give LCD some time
MOV A,#0EH ;display on, cursor on
ACALL COMNWRT ;call command subroutine
ACALL DELAY ;give LCD some time
```

Contd.

```
MOV A,#01 ;clear LCD
ACALL COMNWRT ;call command subroutine
ACALL DELAY ;give LCD some time
MOV A,#06H ;shift cursor right
ACALL COMNWRT ;call command subroutine
ACALL DELAY ;give LCD some time
MOV A,#84H ;cursor at line 1, pos. 4
ACALL COMNWRT ;call command subroutine
ACALL DELAY ;give LCD some time
MOV A,#'N' ;display letter N
ACALL DATAWRT ;call display subroutine
```

Contd.

```
ACALL DELAY ;give LCD some time
MOV A,#'O' ;display letter O
ACALL DATAWRT ;call display subroutine
AGAIN: SJMP AGAIN ;stay here
COMNWRT: ;send command to LCD
MOV P1,A ;copy reg A to port 1
CLR P2.0 ;RS=0 for command
CLR P2.1 ;R/W=0 for write
SETB P2.2 ;E=1 for high pulse
```

Contd.

```
ACALL DELAY ;give LCD some time
CLR P2.2 ;E=0 for H-to-L pulse
RET
DATAWRT: ;write data to LCD
MOV P1,A ;copy reg A to port 1
SETB P2.0 ;RS=1 for data
CLR P2.1 ;R/W=0 for write
SETB P2.2 ;E=1 for high pulse
```

Contd.

```
ACALL DELAY ;give LCD some time
CLR P2.2 ;E=0 for H-to-L pulse
RET
DELAY:MOV R3,#50 ;50 or higher for fast
  CPUs
HERE2: MOV R4,#255 ;R4 = 255
HERE: DJNZ R4,HERE ;stay until R4 becomes 0
DJNZ R3,HERE2
RET
END
```