Course Title: Peripherals, Interfacing and Embedded Systems Lab (CSE-4640)

Department of Computer Science and Engineering (CSE)
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Lab # 5

LED and Seven Segment Display Interfacing using EMU8086 and Proteus.

Objective:

To understand LED and Seven Segment Display interfacing by using 8086 Microprocessor and 74HC373 Latch, 8255 PPI and LED-BIRY in Proteus.

Theory:

- **Example Program for LED Interfacing**

```
DATA SEGMENT
PORTA EQU 00H
PORTB EQU 02H
PORTC EQU 04H
PORT_CON EQU 06H
DATA ENDS
CODE SEGMENT
 MOV AX,DATA
 MOV DS, AX

ORG 0000H
START:
MOV DX, PORT_CON
MOV AL, 10000000B; port C (output), port A (output) and port B (OUTPUT) in mode 0
OUT DX, AL

 JMP XX
XX:
MOV AL, 0000H
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
loopy1:loop loopy1
MOV AL, 00FFH
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
loopy2:loop loopy2
JMP XX
CODE ENDS
END
```

Circuit Diagram for LED Interfacing:
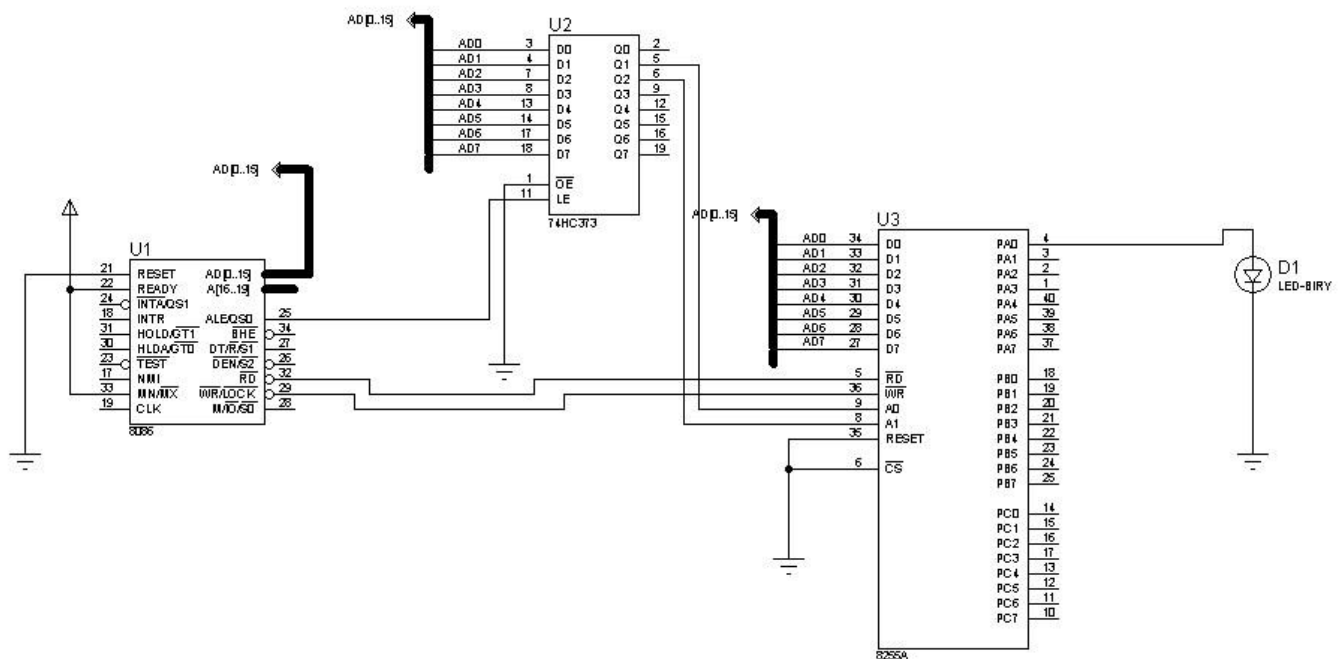
- **Seven Segment Display**

  The 7 segment is used to display numbers. This requires 8255A ports which need to be connected to the 7 segment internally. Through the code we can access the PIO 8255 ports and provide binary or hex value to switch the required segment on and off. In order to turn a segment ON, a logical 1 is required as shown below. Any number from 0 – 9 can be displayed on the 7 segment by providing the actual hex or binary value which turns those segments ON to display the digit.
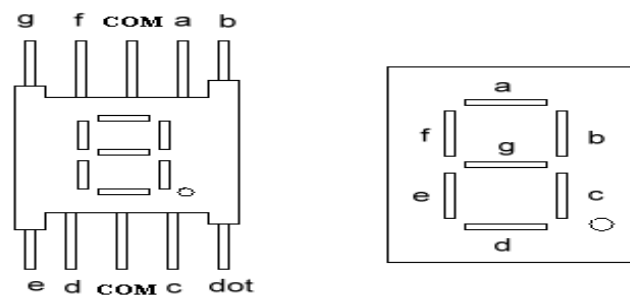
Seven-Segment Display

- **Seven Segment Display Data Generation Rule:**

Digit	BCD	g	f	e	d	c	b	a
0	0000	0	1	1	1	1	1	1
1	0001	0	0	0	0	1	1	0
2	0010	1	0	1	1	0	1	1
3	0011	1	0	0	1	1	1	1
4	0100	1	1	0	0	1	1	0
5	0101	1	1	0	1	1	0	1
6	0110	1	1	1	1	1	0	1
7	0111	0	0	0	0	1	1	1
8	1000	1	1	1	1	1	1	1
9	1001	1	1	0	1	1	1	1

- **Example Program for Seven Segment Display Interfacing**

```
DATA SEGMENT
PORTA EQU 00H
PORTB EQU 02H
PORTC EQU 04H
PORT_CON EQU 06H
DATA ENDS

CODE SEGMENT
MOV AX,DATA
MOV DS, AX

ORG 0000H
START:

MOV DX, PORT_CON
MOV AL, 10000000B
OUT DX, AL

JMP XX

XX:
MOV AL, 00111111B ; displaying 0
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
Delay0:loop Delay0

MOV AL, 00000110B  ; Displaying 1
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
Delay1:loop Delay1
MOV AL, 01011011B  ;Displaying 2
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
Delay2:loop Delay2

MOV AL, 01001111B  ; Displaying 3
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
Delay3:loop Delay3

MOV AL, 01100110B  ; Displaying 4
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
Delay4:loop Delay4

MOV AL, 01101101B    ;Displaying 5
MOV DX, PORTA
OUT DX,AL
```

```
MOV CX,0DF36H; Delay
Delay5:loop Delay5

MOV AL, 01111101B  ;Displaying 6
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
Delay6:loop Delay6

MOV AL, 00000111B  ;Displaying 7
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
Delay7:loop Delay7

MOV AL, 01111111B  ;Displaying 8
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay
Delay8:loop Delay8

MOV AL, 01101111B      ; Displaying 9
MOV DX, PORTA
OUT DX,AL
MOV CX,0DF36H; Delay

Delay9:loop Delay9

JMP XX
JMP START

CODE ENDS
END
```

- **Circuit Diagram for Seven Segment Display Interfacing**