Name : Vruddhi Tolia

Roll no : 115-S23

Subject : COA

ASSIGNMENT NO . 6

AIM : Interfacing Seven segment display with 8086 microprocessor.

THEORY:

INTRODUCTION TO PROTEUS SIMULATION SOFTWARE:

The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.

It was developed in Yorkshire, England by Labcenter Electronics Ltd and is available in English, French, Spanish and Chinese languages.

The first version of what is now the Proteus Design Suite was called PC-B and was written by the company chairman, John Jameson, for DOS in 1988. Schematic Capture support followed in 1990, with a port to the Windows environment shortly thereafter. Mixed mode SPICE Simulation was first integrated into Proteus in 1996 and microcontroller simulation then arrived in Proteus in 1998. Shape based autorouting was added in 2002 and 2006 saw another major product update with 3D Board Visualisation. More recently, a dedicated IDE for simulation was added in 2011 and MCAD import/export was included in 2015. Support for high speed design was added in 2017. [1]Feature led product releases are typically biannual, while maintenance based service packs are released as it is required.

The Proteus Design Suite is a Windows application for schematic capture, simulation, and PCB (Printed Circuit Board) layout design. It can be purchased in many configurations, depending on the size of designs being produced and the requirements for microcontroller simulation. All PCB Design products include an autorouter and basic mixed mode SPICE simulation capabilities.

Schematic Capture

Schematic capture in the Proteus Design Suite is used for both the simulation of designs and as the design phase of a PCB layout project. It is therefore a core component and is included with all product configurations.

The micro-controller simulation in Proteus works by applying either a hex file or a debug file to the microcontroller part on the schematic. It is then co-simulated along with any analog and digital electronics connected to it. This enables its use in a broad spectrum of project prototyping in areas such as motor control,[2][3] temperature control [4][5] and user interface design.[6] It also finds use in the general hobbyist community[7][8] and, since no hardware is required, is convenient to use as a training[9][10] or teaching tool.[11][12] Support is available for co-simulation of:

1) Microchip Technologies PIC10, PIC12, PIC16,PIC18,PIC24,dsPIC33 Microcontrollers.

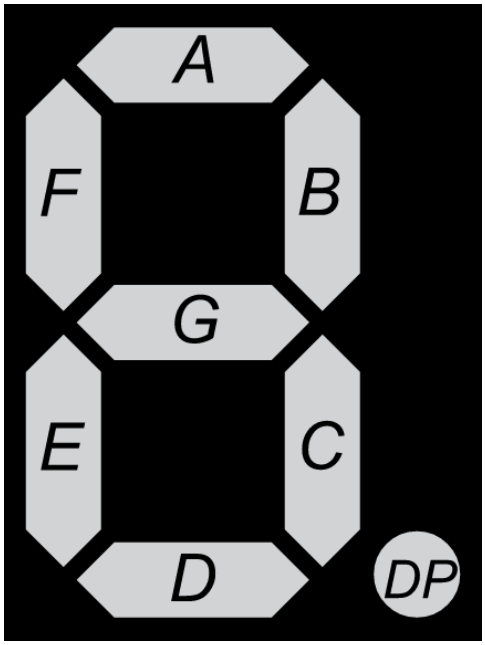
2) Atmel AVR (and Arduino), 8051 and ARM Cortex-M3 Microcontrollers

3) NXP 8051, ARM7, ARM Cortex-M0 and ARM Cortex-M3 Microcontrollers.

4) Texas Instruments MSP430, PICCOLO DSP and ARM Cortex-M3 Microcontrollers.

5) Parallax Basic Stamp, Freescale HC11, 8086 Microcontrollers.

Seven Segment Display:



- The 7-segment display, also written as “seven segment display”, consists of seven LEDs (hence its name) arranged in a rectangular fashion as shown.
- Each of the seven LEDs is called a segment because when illuminated the segment forms part of a numerical digit (both Decimal and Hex) to be displayed.
- An additional 8th LED is sometimes used within the same package thus allowing the indication of a decimal point, (DP) when two or more 7-segment displays are connected together to display numbers greater than ten.
- Each one of the seven LEDs in the display is given a positional segment with one of its connection pins being brought straight out of the rectangular plastic package.
- These individually LED pins are labelled from “a” through to “g” representing each individual LED.
- The other LED pins are connected together and wired to form a common pin.
- As each LED has two connecting pins, one called the “Anode” and the other called the “Cathode”, there are therefore two types of LED 7-segment display called:
    - Common Cathode (CC)
    - Common Anode (CA).
- The difference between the two displays, as their name suggests, is that the common cathode has all the cathodes of the 7-segments connected

directly together and the common anode has all the anodes of the 7-segments connected together and is illuminated as follows.

The Common Cathode (CC):

- In the common cathode display, all the cathode connections of the LED segments are joined together to logic “0” or ground. The individual segments are illuminated by application of a “HIGH”, or logic “1” signal via a current limiting resistor to forward bias the individual Anode terminals (a-g).

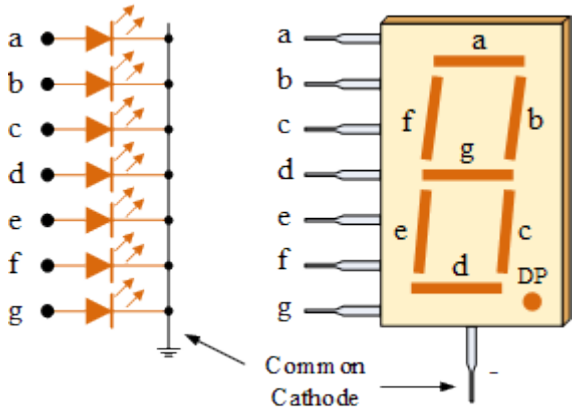


Figure 1 Common Cathode

The Common Anode (CA)

- In the common anode display, all the anode connections of the LED segments are joined together to logic “1”. The individual segments are illuminated by applying a ground, logic “0” or “LOW” signal via a suitable current limiting resistor to the Cathode of the particular segment (a-g).

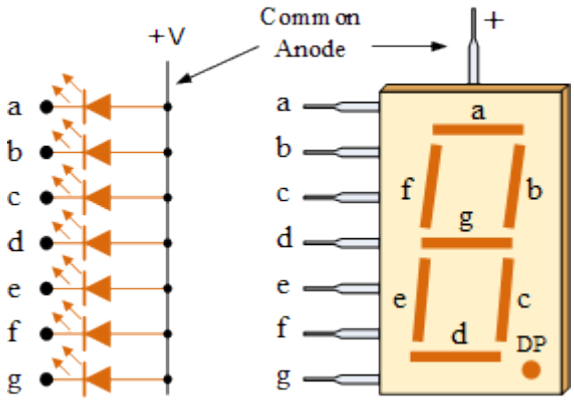


Figure 2 Common Anode

- Also note that a common cathode display is not a direct replacement in a circuit for a common anode display and vice versa, as it is the same as connecting the LEDs in reverse, and hence light emission will not take place.

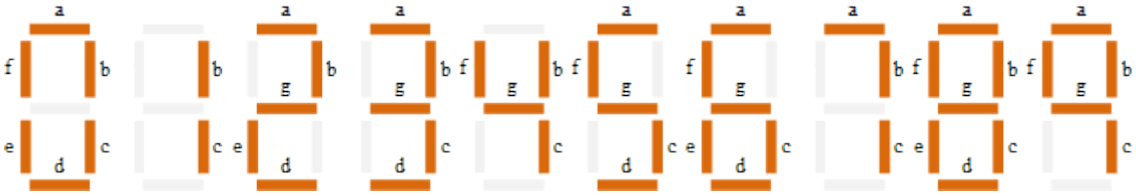


Figure 3 - 7 Segment Display for all the numbers

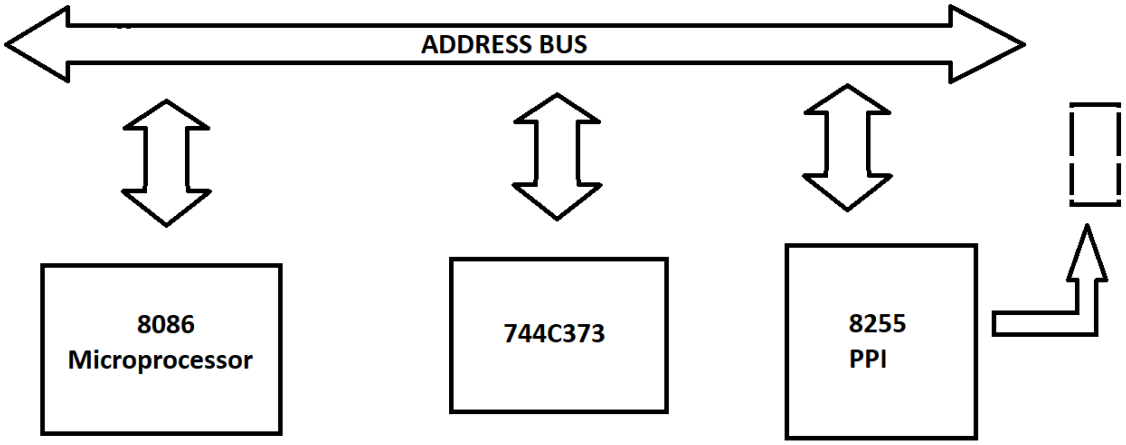
Segments Inputs							7 Segment Display Output
a	b	c	d	e	f	g	
0	0	0	0	0	0	1	0
1	0	0	1	1	1	1	1
0	0	1	0	0	1	0	2
0	0	0	0	1	1	0	3
1	0	0	1	1	0	0	4
0	1	0	0	1	0	0	5
0	1	0	0	0	0	0	6
0	0	0	1	1	1	1	7
0	0	0	0	0	0	0	8
0	0	0	0	1	1	0	9

Figure 4 Truth table for Common Anode

Applications of Seven Segment Displays:

- The applications of seven segments are mostly in digital calculators, electronic meters, digital clocks, odometers, digital clocks, clock radios, etc.
- Today most of the 7 segment applications are using LCDs, because of low current consumption.

BLOCK DIAGRAM :



CONCLUSION: Thus understood the 7 segment display and also implemented the interface with it.