

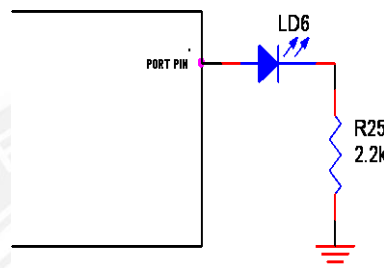
**SNS COLLEGE OF TECHNOLOGY**  
**19ECT211- MICROPROCESSOR AND MICROCONTROLLER**  
**UNIT-2**

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**AP-ECE**

**LED DISPLAY AND LCD DISPLAY**

**INTERFACING LIGHT EMITTING DIODE (LED) WITH 8086**

Anode is connected through a resistor to GND & the Cathode is connected to the Microprocessor pin as shown in Fig.9.1. When the Port Pin is HIGH, the LED is OFF & when the Port Pin is LOW the LED is turned ON.



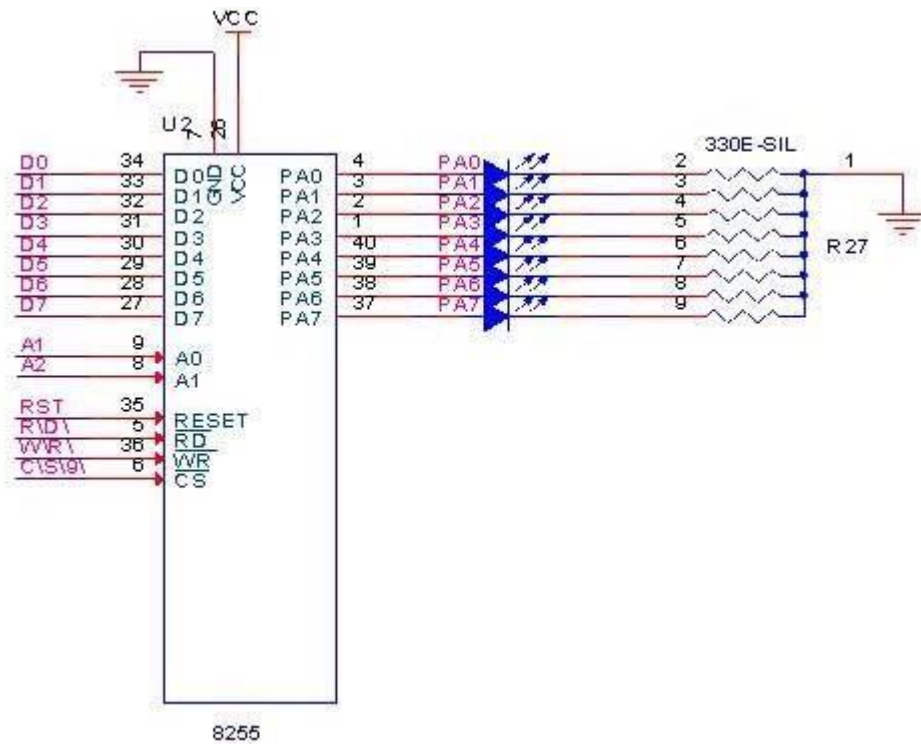
**Figure 3.10.1 LED interfacing diagram**

We now want to flash a LED. It works by turning ON a LED & then turning it OFF & then looping back to START. A delay is generated between the flashing of LEDs.

	Point	8255 Lines	LED Selection
<b>DIGITAL OUTPUTS</b>	LD1	PA.0	
	LD2	PA.1	
	LD3	PA.2	
	LD4	PA.3	
	LD5	PA.4	
	LD6	PA.5	

	LD7	PA.6
	LD8	PA.7

**Table 3.10.1 Port Pin Assignment for LEDs**



**Figure 3.10.2 LEDs connected to port pins of 8255**

[Source: [www.slideshare.net](http://www.slideshare.net)]

### ASSEMBLY PROGRAM TO TURN ON AND OFF LEDS USING 8086

```

MOV AL, 80
MOV DX, Ctrl Reg
OUT DX, AL

BEGIN: MOV AL, 00
MOV DX, Port addr
OUT DX, AL
CALL DELAY
MOV AL, FF
OUT DX, AL
CALL DELAY
JMP BEGIN

```

DELAY: MOV CX, FFFF

P0: DEC CX

JNZ PO

RET

## **INTERFACING LIQUID CRYSTAL DISPLAY (LCD) WITH 8086**

Liquid Crystal displays (LCD) are created by sandwiching a thin 10-12  $\mu\text{m}$  layer of a liquid-crystal fluid between two glass plates. A transparent, electrically conductive film or backplane is put on the rear glass sheet. Transparent sections of conductive film in the shape of the desired characters are coated on the front glass plate. When a voltage is applied between a segment and the backplane, an electric field is created in the region under the segment. This electric field changes the transmission of light through the region under the segment film.

There are two commonly available types of LCD: dynamic scattering and field-effect. The Dynamic scattering types of LCD: It scrambles the molecules where the field is present. This produces an etched-glass-looking light character on a dark background. Field-effect types use polarization to absorb light where the electric field is present. This produces dark characters on a silver- gray background.

Most LCDs require a voltage of 2 or 3 V between the backplane and a segment to turn on the segment. We cannot just connect the backplane to ground and drive the segment with the outputs of a TTL decoder. The reason for this is a steady dc voltage of more than about 50mV is applied between a segment and the backplane. To prevent a dc buildup on the segments, the segment drive signals for LCD must be square waves with a frequency of 30 to 150 Hz.

Intersil ICM7211M can be connected to drive a 4-digit, nonmultiplexed, 7- segment LCD display through port pins or directly to microcomputer bus. Here, the CS inputs are connected to the Y2 output of the 74LS138 port decoder. The device can be addressed as ports say with a base address of FF10H. 8086 system address lines A2 is connected to the digit-select input (DS2) and system address lines A1 is connected to the DS1 input.

This gives digit 4 a system address of FF10H. Digit 3 will be addressed at FF12H, digit 2 at FF14H and digit 1 at FF16H. The data inputs are connected to the lower four lines of the 8086 system data bus. The oscillator input is left open.

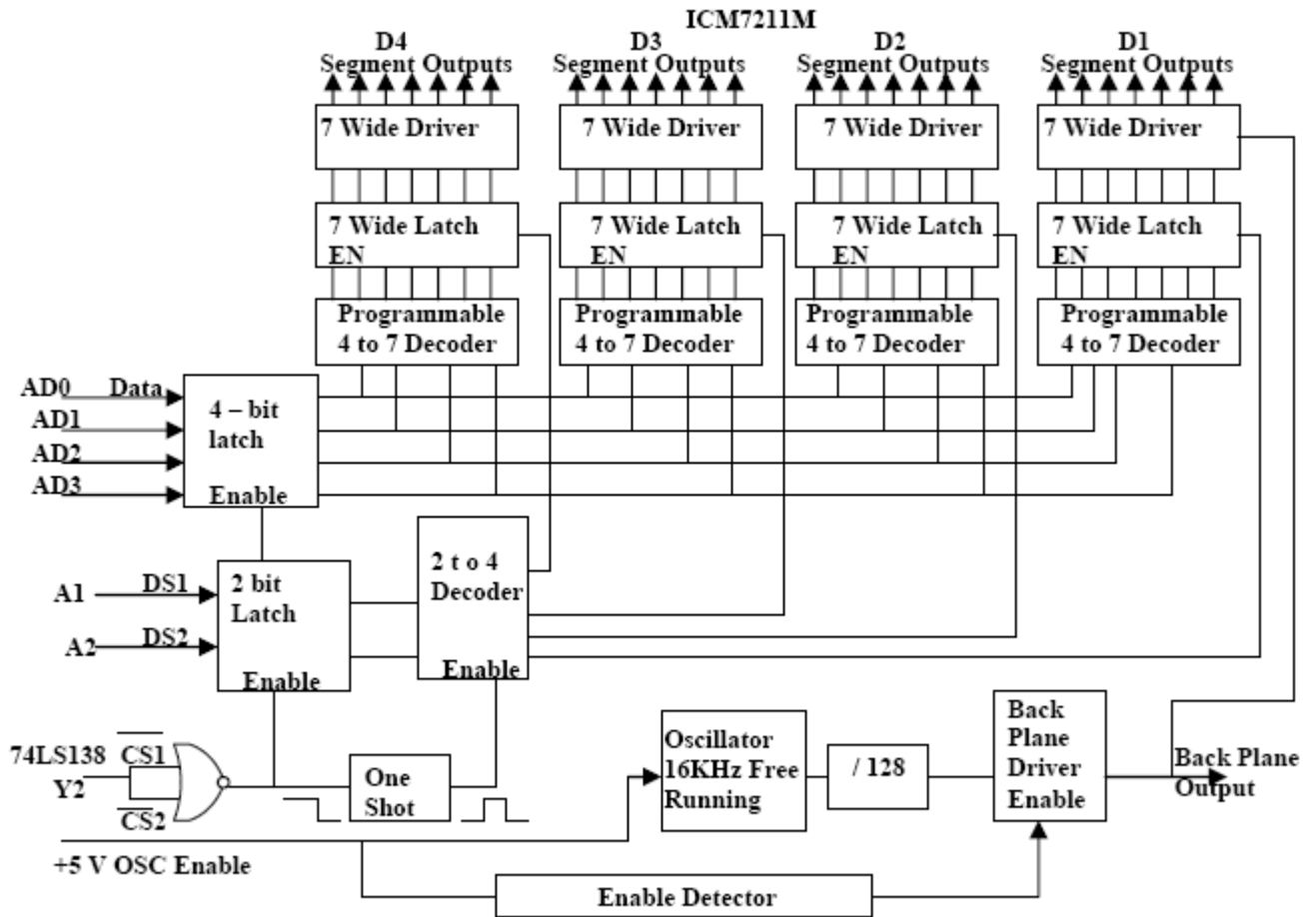


Fig.9.3 Circuit for interfacing four LCD digits to an SDK-86 bus using ICM7211M

[Source Douglas V.Hall, —Microprocessors and Interfacing, Programming and Hardware:,TMH, 2012]

To display a character on one of the digits, the 4-bit hex code for that digit is in the lower 4 bits of the AL register and output it to the system address for that digit. The ICM7211M converts the 4-bit hex code to the required 7-segment code. The rising edge of the CS input signal causes the 7-segment code to be latched in the output latches for the address digit. An internal oscillator automatically generates the segment and backplane drive waveforms.