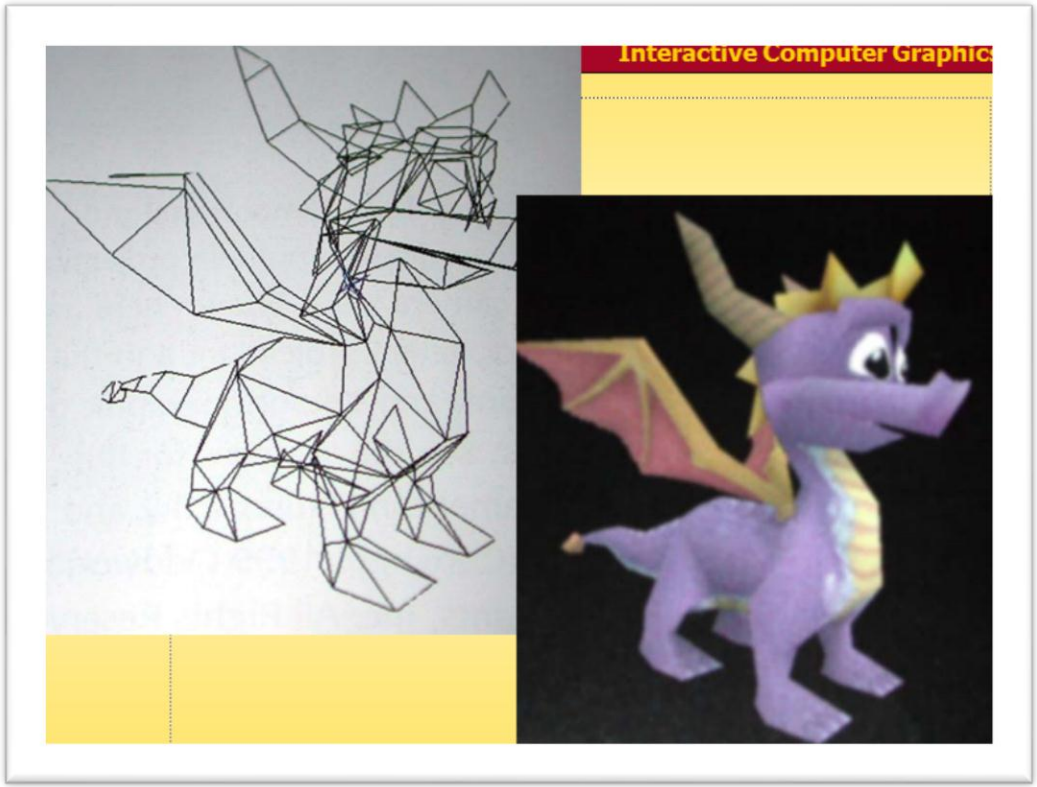
Madhav Institute of Technology & Science, Gwalior
Department of CSE & IT

Computer Graphics



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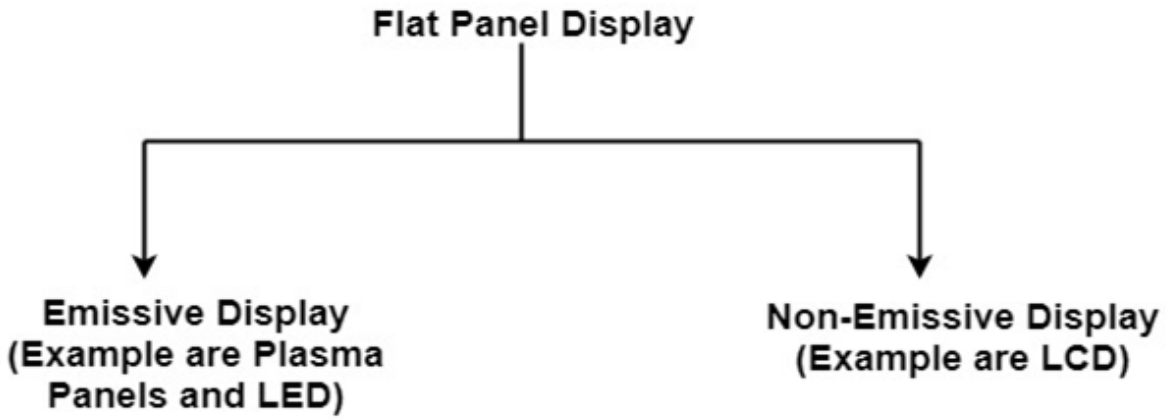
Flat Panel Display

The Flat-Panel display refers to a class of video devices that have reduced volume, weight and power requirement compare to CRT.

Example: T.V., Computer monitor, calculator, pocket video games, laptop computers, and an advertisement board/screen.



1. Emissive Display:

The emissive displays are devices that convert electrical energy into light. Examples are Plasma Panel, thin film electroluminescent display and LED (Light Emitting Diodes).

2. Non-Emissive Display:

The Non-Emissive displays use optical effects to convert light from some other source into graphics patterns. Examples are LCD (Liquid Crystal Device).

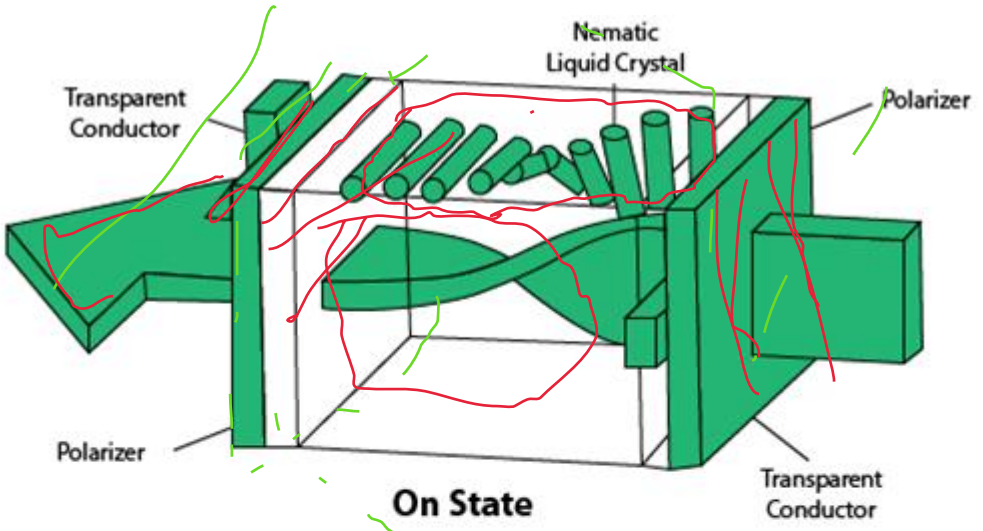
sunlight

LCD (Liquid Crystal Display):

Liquid Crystal Displays are the devices that produce a picture by passing polarized light from the surroundings or from an internal light source through a liquid-crystal material that transmits the light.

LCD uses the liquid-crystal material between two glass plates; each plate is the right angle to each other between plates liquid is filled. One glass plate consists of rows of conductors arranged in vertical direction. Another glass plate is consisting of a row of conductors arranged in horizontal direction. The pixel position is determined by the intersection of the vertical & horizontal conductor. This position is an active part of the screen.

Liquid crystal display is temperature dependent. It is between 0c to 70c degree Celsius. It is flat and requires very little power to operate.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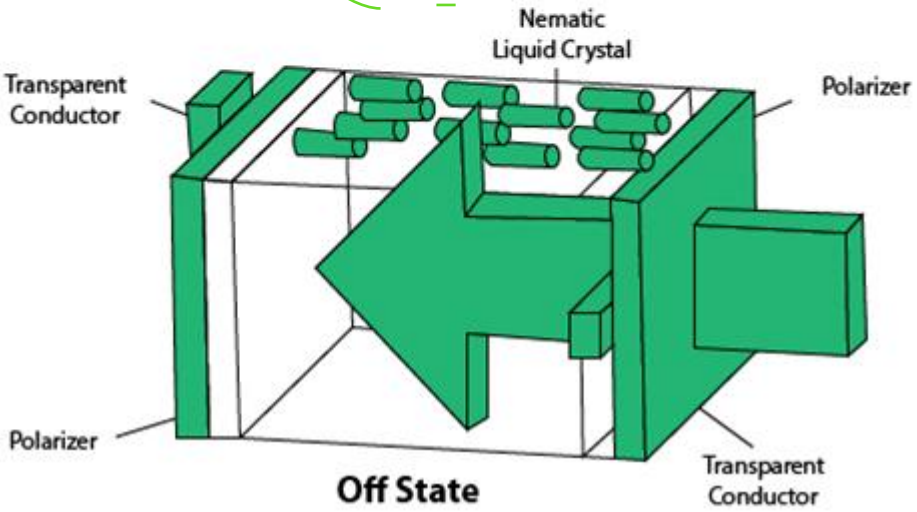
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LCD Advantages:

- Low power consumption.
- Small Size
- Low Cost

LCD Disadvantages:

- LCDs are temperature-dependent (0-70°C)
- LCDs do not emit light; as a result, the image has very little contrast.
- LCDs have no color capability.
- The resolution is not as good as that of a CRT.

Plasma Panel Display:

Plasma-Panels are also called as Gas-Discharge Display. It consists of an array of small lights. Lights are fluorescent in nature. The essential components of the plasma-panel display are:

1. Cathode: It consists of line wires. It delivers negative voltage to gas cells. The voltage is released along with the negative axis.

2. Anode: It also consists of line wires. It delivers positive voltage. The voltage is supplied along positive axis.

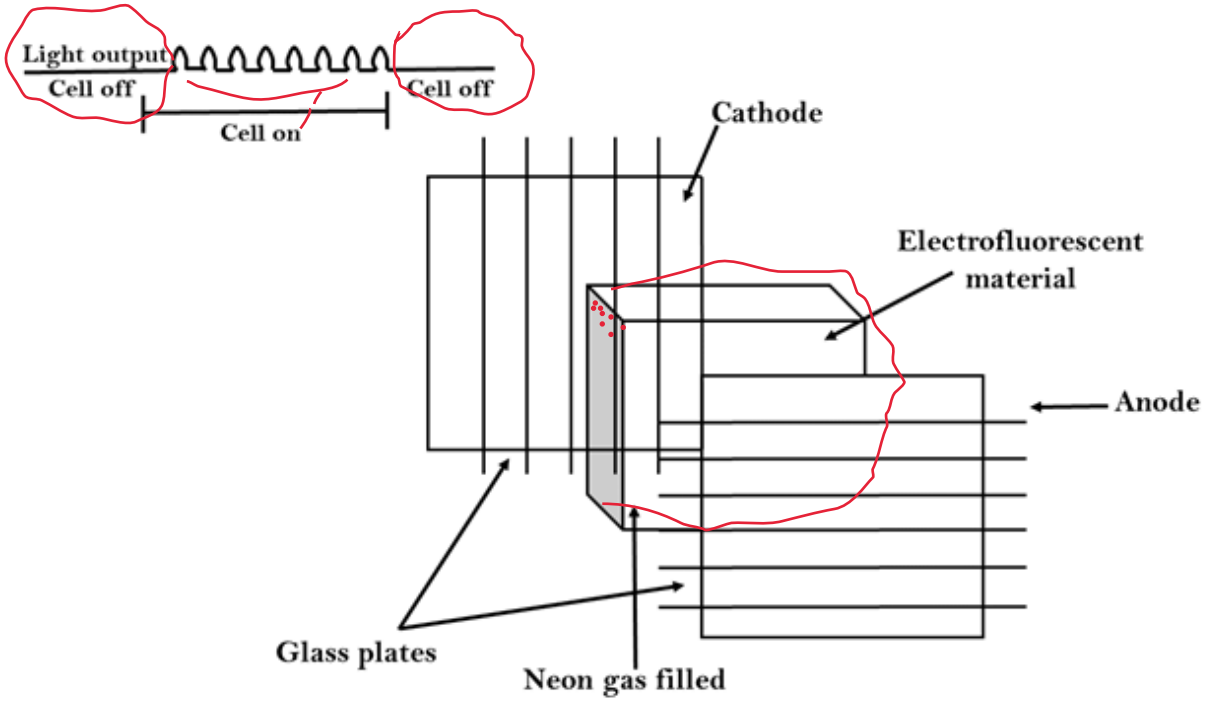
3. Fluorescent cells: It consists of small pockets of gas liquids when the voltage is applied to this liquid (neon gas) it emits light.

4. Glass Plates: These plates act as capacitors. The voltage will be applied, the cell will glow continuously.

The gas will slow when there is a significant voltage difference between horizontal and vertical wires. The voltage level is kept between 90 volts to 120 volts. Plasma level does not require refreshing. Erasing is done by reducing the voltage to 90 volts.

Each cell of plasma has two states, so cell is said to be stable. Displayable point in plasma panel is made by the crossing of the horizontal and vertical grid. The resolution of the plasma panel can be up to 512 * 512 pixels.

Figure shows the state of cell in plasma panel display:



Advantages:

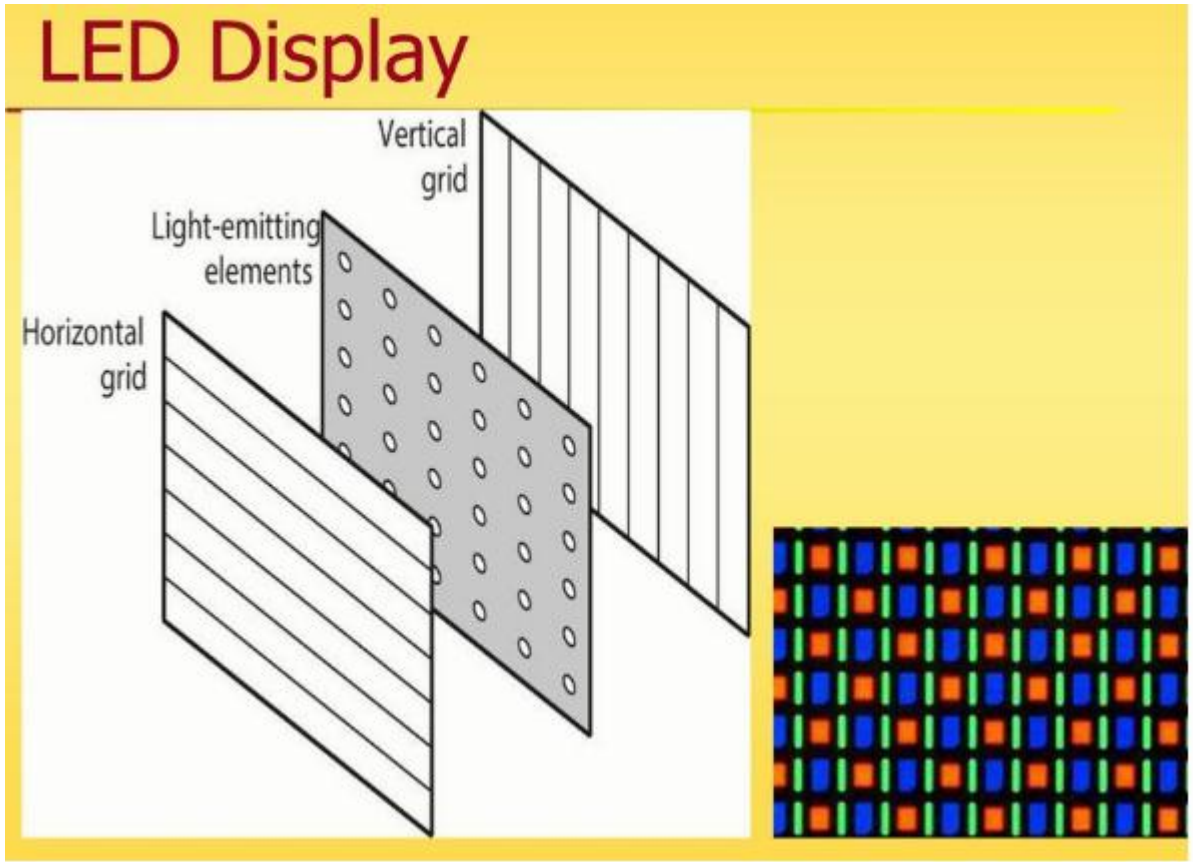
- High Resolution
- Large screen size is also possible.
- Less Volume
- Less weight
- Flicker Free Display

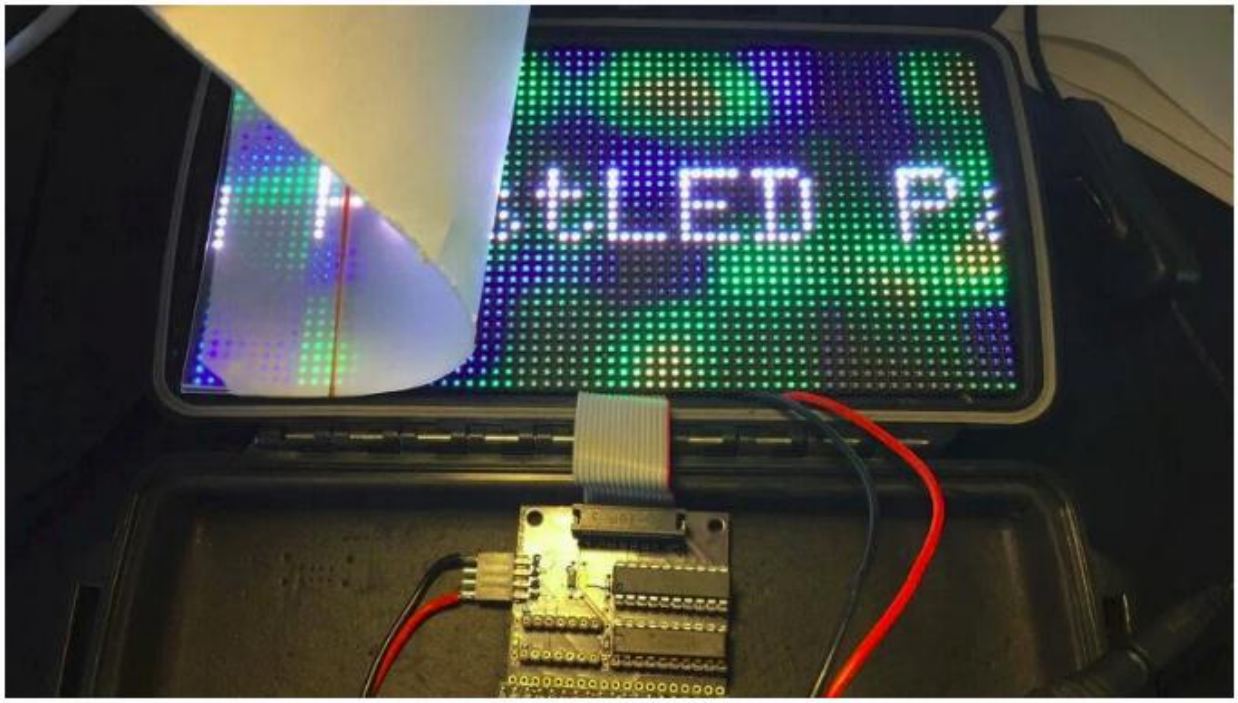
Disadvantages:

- Poor Resolution
- Wiring requirement anode and the cathode is complex.
- Its addressing is also complex.

LED (Light Emitting Diode):

In an LED, a matrix of diodes is organized to form the pixel positions in the display and picture definition is stored in a refresh buffer. Data is read from the refresh buffer and converted to voltage levels that are applied to the diodes to produce the light pattern in the display.




LED

Advantages:

- Lifetime-As solid-state light sources, LEDs have very long lifetimes

- Low maintenance
- The long lifetime of LEDs reduces the need to replace failed lamps, and this can lead to significant savings, particularly in the cost of sending out maintenance crews.

- Efficiency-LEDs are high-efficiency light sources.
- Low power consumption.
- LEDs don't produce heat.
- LEDs are available in a broad range of brilliant, saturated colors.

Disadvantages

- Standardization-The general lack of standardization in the LED field is an ongoing issue. Various standards relating to LEDs exist in areas such as automotive lighting and traffic signals. Other efforts are being conducted by bodies such as CIE, NEMA and IES.
- Brightness-LEDs are required to produce the same amount of light as the incandescent bulb.
- Cost-high

OLED (Organic light-emitting diode)

OLED (Organic Light Emitting Diodes) is a flat light emitting technology, made by placing a series of organic thin films between two conductors. When electrical current is applied, a bright light is emitted. OLEDs are emissive displays that do not require a backlight and so are thinner and more efficient than LCD displays (which do require a white backlight). OLED displays are not just thin and efficient - they provide the best image quality ever and they can also be made transparent, flexible, foldable and even rollable and stretchable in the future. OLEDs represent the future of display technology!

Regular LEDs often form the digits on digital clocks and other electronic devices. OLEDs offer many advantages over both LCDs and LEDs:

Advantages:

- The plastic, organic layers of an OLED are thinner, lighter and more flexible than the crystalline layers in an LED or LCD.
- Because the light-emitting layers of an OLED are lighter, the substrate of an OLED can be flexible instead of rigid. OLED substrates can be plastic rather than the glass used for LEDs and LCDs.

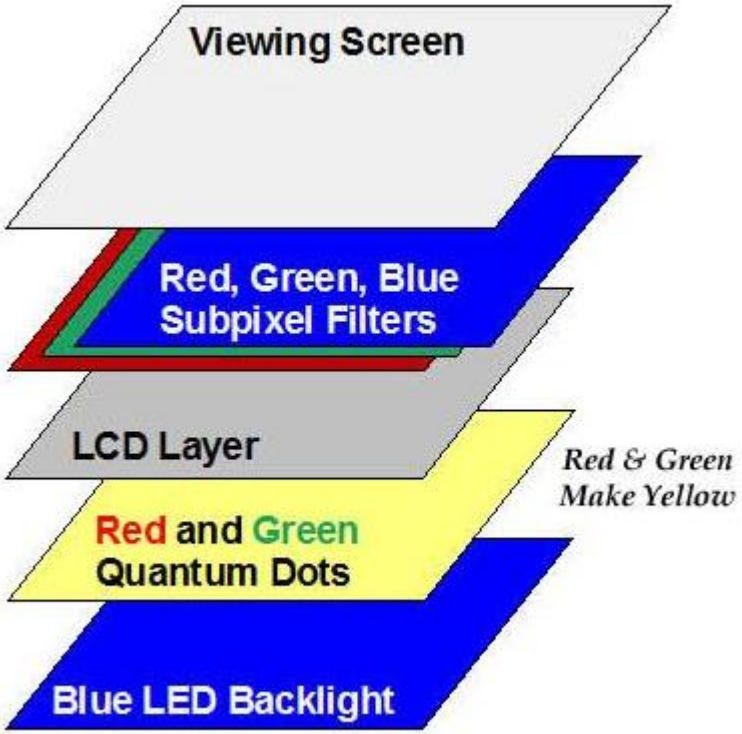
- OLEDs are brighter than LEDs. Because the organic layers of an OLED are much thinner than the corresponding inorganic crystal layers of an LED, the conductive and emissive layers of an OLED can be multi-layered. Also, LEDs and LCDs require glass for support, and glass absorbs some light. OLEDs do not require glass.
- OLEDs do not require backlighting like LCDs. LCDs work by selectively blocking areas of the backlight to make the images, while OLEDs generate light themselves. Because OLEDs do not require backlighting, they consume much less power than LCDs (most of the LCD power goes to the backlighting). This is especially important for battery-operated devices such as cell phones.
- OLEDs are easier to produce and can be made to larger sizes. Because OLEDs are essentially plastics, they can be made into large, thin sheets. It is much more difficult to grow and lay down so many liquid crystals.
- OLEDs have large fields of view, about 170 degrees. Because LCDs work by blocking light, they have an inherent viewing obstacle from certain angles. OLEDs produce their own light, so they have a much wider viewing range.

Disadvantages:

- Manufacturing - Manufacturing processes are expensive right now.
- Water - Water can easily damage OLEDs.

QLED (Quantum Dot Light emitting diode)

A display technology that uses phosphorescent crystals to improve the LED backlight on an LCD TV. QLED line of 4K or 8K TVs, which are LCD-based TVs augmented with quantum dot nanocrystals. QLED TVs, which come in sizes up to 98 inches, are highly praised for their viewing quality and are the only LCD technology that gives OLED a run for its money. However, OLEDs have the best viewing angle and are lighter, thinner and use less power than QLED.



QLED Layer - Red and Green Quantum Dots

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