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VARIOUS DISPLAY TECHNOLOGIESS

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Abstract—A lot has been invented from the past till now in regards with the display technologies. It gives an immense life to electronic device when good display technology are being used. Now a days displays are coming in various sizes for different portable devices like smart phones, tablets, smart watch, televisions, laptops etc. People are expecting better display no matter what device they use. In this paper I have given an overview of some of the past technologies to the technologies till now. Flat-panel displays use Liquid-crystal display (LCD) technology to make them much lighter and thinner when compared with a traditional monitor. A liquid crystal display consists of an array of tiny segments (called pixels) that can be manipulated to present information. Plasma panels, also called gas discharge displays, are constructed by filling the region between two glass plates with a mixture of gases that usually include neon. In LED, A matrix of diodes is arranged to form the pixel positions in the display, and picture definition is stored in refresh buffer. OLED (Organic Light Emitting Diode) technology relies on the organic materials.
Keywords— Display Technology; LCD; LED; Flexible display; Curved display;

I. INTRODUCTION

In today's smart world, people are carrying smart devices all over the places they visit. Wherever people are they are surrounded or accompanied by display devices, such as smart phones, tablets, notebooks and advertising screens. Different devices uses different display technologies to enrich devices facilities. Here in this paper, various popular display technologies has been explain in brief.

II. FLAT PANEL DISPLAY

Sometimes abbreviated as FPD, a flat-panel display is a thin screen display found on all portable computers and it was the new standard for desktop computers few year back. Instead of utilizing the cathode-ray tube technology, flat-panel displays use Liquid-crystal display (LCD) technology to make them much lighter and thinner when compared with a traditional monitor. The picture shows an example of flat-panel display. We can separate flat-panel displays into two categories: **emissive displays** and **nonemissive displays**. The emissive displays (or **emitters**) are devices that displays, and light-emitting diodes (LED) are examples of emissive displays. Nonemissive displays(or **nonemitters**) use optical effects to convert sunlight or light from some other source into graphics patterns. The most important example of a nonemissive flat-panel display is a liquid- crystal device (LCD).

Fig.1 Flat Panel Display

III. LCD DISPLAY

LCDs are commonly used in systems, such as calculators and laptop computers. These non-emissive devices produce a picture by passing polarized light from the surrounding or from an internal light source through a liquid- crystal material that can be aligned to either block or transmit the light. A liquid crystal display consists of an array of tiny segments (called pixels) that can be manipulated to present information. The main advantage of LCD is size. There is no huge picture tube. The drawbacks with LCDs are viewing angle, contrast ratio, and response time.

IV. PLASMA DISPLAY

Plasma panels, also called **gas discharge displays**, are constructed by filling the region between two glass plates with a mixture of gases that usually include neon. A series of vertical conducting ribbons is placed on one glass panel, and a set of horizontal ribbons is built into the other glass panel. Firing voltages applied to a pair of horizontal and vertical conductors cause the gas at the intersection of the two conductors to break down into a glowing plasma of electrons and ions. Picture definition is stored in a refresh buffer, and the firing voltages are applied to refresh the pixel positions (at the intersections of the conductors) 60 times per second.

V. LED DISPLAY

In LED, A matrix of diodes is arranged to form the pixel positions in the display, and picture definition is stored in refresh buffer. As in scan-line refreshing of a CRT, information is read from the refresh buffer and converted to voltage levels that are applied to the diodes to produce the light patterns in the display.

5.1 ADVANTAGES:

- Long Service Life
- Good environmental performance
- Low heat generation
- Low Power
- Many Color Choices

5.2 DISADVANTAGES:

- Sensitive to Voltage Spike
- Heat dissipation in some applications
- Not true full spectrum White LED (unless tri-color)

VI. OLED DISPLAY

OLED means Organic Light Emitting Diode. As the name indicates that it relies on organic materials. Organic Light Emitting Devices (OLED) emit light from active luminescent material in each display pixel. There are various type of OLED like PHOLED (phosphorescent OLED), TOLED (Transparent OLED), FOLED (Flexible OLED), WOLED (White OLED), AMOLED (Active matrix OLED). OLED's basic structure consists of organic materials positioned between the cathode and the anode, which is composed of electric conductive transparent Indium Tin Oxide (ITO). The organic materials compose a multi-layered thin film, which includes the Hole Transporting Layer (HTL), Emission Layer (EML) and the Electron Transporting Layer (ETL). By applying the appropriate electric voltage, holes and electrons are injected into the EML from the anode and the cathode, respectively. The holes and electrons combine inside the EML to form excitons, after which electroluminescence occurs. The transfer material, emission layer material and choice of electrode are the key factors that determine the quality of OLED components.

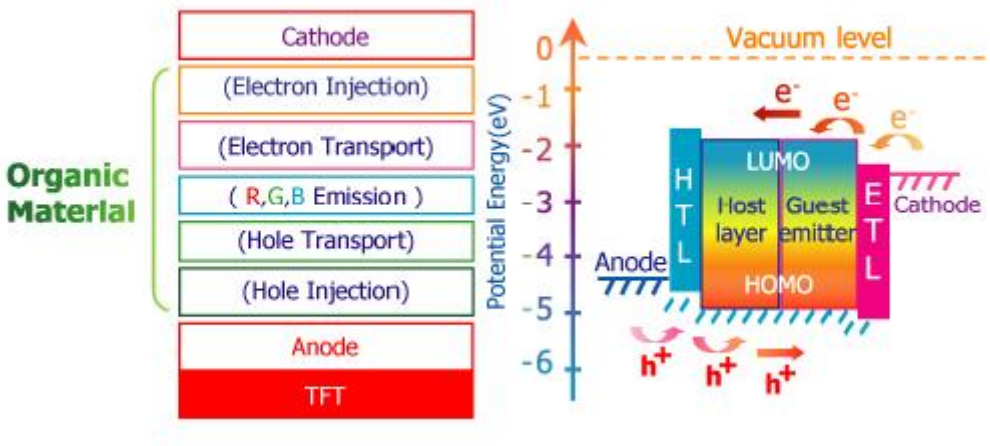

Fig.2 OLED Display Structure

6.1 ADVANTAGES

- Vibrant color
- High Contrast
- High Viewing angle
- Rapid Response Time
- Full motion videos
- Low Cost

VII. AMOLED DISPLAY

The full form of AMOLED is Active Matrix OLED. It has better display quality, thin form factor, and lower power consumption. In this display technology a very thin film has been used which was coated with several organic electroluminescent compounds. The whole technology is too dealt with the pixel quality of the displays. As of now this display technology has been implanted very successfully in small screens like in smart phones. This technology is not only very affordable, but also available with improved quality picture. In very near future AMOLED will be used for bigger screens. The active matrix OLED in AMOLED technology produces a light after it is properly electrically activated. It requires a continuous flow of electricity and that is controlled by two TFTs. The benefit of this technology over others is immense. AMOLED technology consumes lesser power and also the refresh rate is very high than other counterparts. The response time of touch displays developed using this technology is far better compared to others. In future it is going to be used not

only in portable electronics devices, but also in large screens such as more than 50 inches. Already several big names in the electronics world have started using an AMOLED including Samsung.

7.1 ADVANTAGE

- Wide Temperature operation
- Fast Response
- High and constant Gamut color
- Wide viewing angle
- Peak brightness
- Low power consumption
- Very slim design

VIII. FLEXIBLE DISPLAY

OLED is an emerging display technology that enables beautiful and efficient displays and lighting panels. Thin OLEDs are already being used in many mobile devices and TVs, and the next generation of these panels will be flexible and bendable. When we talk about flexible OLEDs, it's important to understand what that means exactly. A flexible OLED is based on a flexible substrate which can be either plastic, metal or flexible glass. The plastic and metal panels will be light, thin and very durable - in fact they will be virtually shatter-proof.

IX. IPS DISPLAY

The full form IPS is In-Plane Switching. It is a technology that addresses the two main issues of a standard twisted nematic (TN) TFT display: color and viewing angle. With IPS, the crystals are aligned horizontally to the screen rather than vertically, and the electrical field is applied between each end of the crystal molecules –termed a lateral electric field. In this way, the crystals are kept parallel to the electrode pair, and thus the glass substrate of the screen. The liquid crystal molecules are not anchored to the lower glass substrate, so move more freely into the desired alignment.

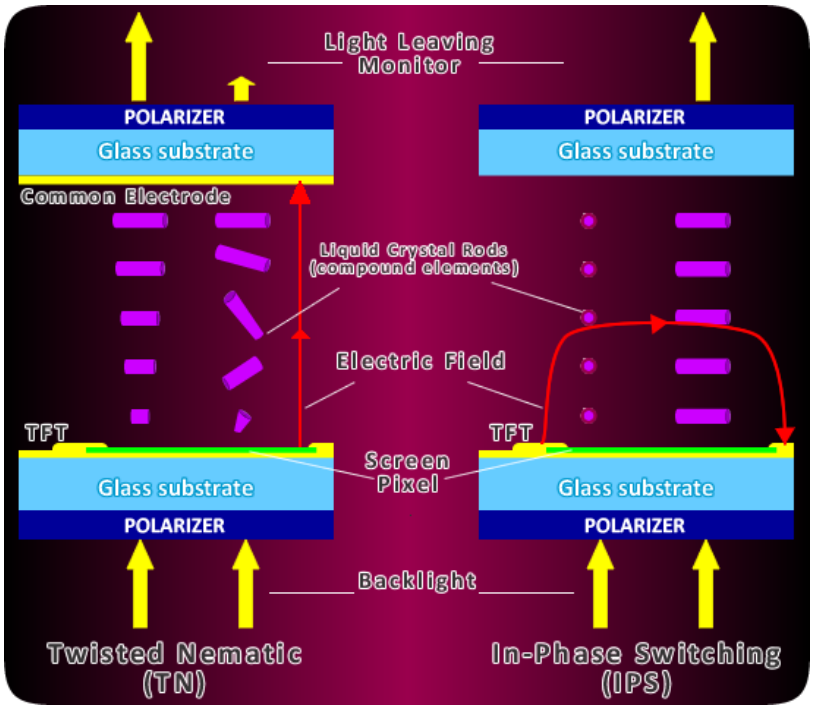

Fig.3 IPS Display Structure

X. CURVED DISPLAY

Curved screens theoretically provide a larger field of view and a more "immersive" experience. To really get those benefits, you'd need a massive 100-inch screen, and you'd need to be sitting close to it. That might give you a more "cinematic" experience. But you probably don't want a TV that huge, and you probably don't want to sit that close. If you have a smaller TV like most people do, a curved display really doesn't make sense.

XI. CONCLUSIONS

In this paper various display technologies has been discussed from the past to till now. Each technology has some disadvantage and advantage which are discussed briefly. One can use the technology based on the necessity.

REFERENCES

[1] http://nptel.ac.in
[2] http://www.udcoled.com
[3] http://www.samsung.com
[4] J. Zmija, M.J. Malachowski, "Organic Light Emitting Diodes operation and application in displays", International Scientific Journal, 2009, Vol. 40.
[5] Ramesh Raskar, Jeroen van Baar, Thomas Willwacher, Srinivas Rao, "Quadric Transfer for Immersive Curved Screen Displays", Eurographics, 2004, Vol. 2004