What Does Peripheral Device Mean?

A peripheral device is an internal or external device that connects directly to a computer or other digital device but does not contribute to the computer's primary function, such as computing. It helps end users access and use the functionalities of a computer.

Since it’s not a core device for the system, the computer can still function without the peripheral, which simply provides extra functions. However, some peripherals such as a mouse, keyboard, or monitor tend to be pretty much fundamental to the interaction between the user and the computer itself.

A peripheral device is also called a peripheral, computer peripheral, input-output device, or I/O device.

Explains Peripheral Device

A peripheral device provides input/output (I/O) functions for a computer and serves as an auxiliary computer device without computing-intensive functionality. Peripheral devices connect with a computer through several I/O interfaces, such as communications (COM), Universal Serial Bus (USB) and serial ports such as serial advanced technology attachment (SATA) ones.

Peripheral devices include the following:

- Mouse.
- Keyboard.
- Printer.
- Monitor.
- Webcam.
- Printer.
- Scanner.
- Speakers.
- External Drive.
- USB Flash Drive.
- CD-ROM.

There are several types of peripherals, although they’re commonly divided into three broad categories: input, output, and storage devices.

Input devices convert incoming instructions or actions from the user into viable information that can be interpreted by the computer. For example, a keyboard will convert keystroke into characters that appear on the computer’s display, while a monitor will transform hand

movements into movements of a cursor that can be used to interact with the operating system's programs. Other input peripherals include joysticks, microphones, webcams, optical scanners, etc.

Output peripherals translate digital signals into information that can be interpreted or utilized by the end user. For example, a monitor or display screen will show the operating system's desktop, while a laser printer will translate information saved in a word file into printed material. Other output peripherals include speakers, 3D printers, and projectors.

Some devices can provide both input and output signals, such as network interfaces, modems, routers, and webcams.

Storage peripherals are used to store and record data, and include internal and external hard drives, CD-ROM and DVD drives, and flash memory drives.

Depending on whether the peripheral is located inside or outside the computer system case, it can be further classified as an internal or external peripheral device.

An external peripheral can be connected via many different types of cables and connections. Today, the most common connection for external peripherals is the USB connection, both because most computers have several ports available, and because of the simplicity of the plug-and-play feature.

Internal storage devices such as hard disks are usually connected with a SATA cable, while display port and HDMI are the most popular connections for displays and monitors.

Today, many peripherals are built-in inside smaller computer devices such as tablets, laptops and smartphones. For example, webcam, speakers and microphones are integrated inside most smartphones, although the latter cannot be considered a peripheral since it's a core function of any phone. Similarly, webcams and monitors are integrated into most laptops, although it's still possible to connect the computer to a larger monitor or higher resolution webcam.

WHAT IS INTERFACE?

Hardware interfaces exist in many components, such as the various buses, storage devices, other I/O devices, etc. A hardware interface is described by the mechanical, electrical, and logical signals at the interface and the protocol for sequencing them (sometimes called signalling).[3] A standard interface, such as SCSI, decouples the design and introduction of computing hardware, such as I/O devices, from the design and introduction of other components of a computing system, thereby allowing users and manufacturers great flexibility in the implementation of computing systems.[3] Hardware interfaces can be parallel with several electrical connections carrying parts of the data simultaneously or serial where data are sent one bit at a time.

OR

In computing, an **interface** is a shared boundary across which two or more separate components of a computer system exchange information. The exchange can be between software, computer hardware, peripheral devices, humans, and combinations of

these.[1] Some computer hardware devices, such as a touchscreen, can both send and receive data through the interface, while others such as a mouse or microphone may only provide an interface to send data to a given system.

WHAT IS PERIPHERAL INTERFACE?

Peripheral interface is a medium to receive, sent data or transfer data and information between two or more peripheral devices.

What is a Monitor?

A monitor is an electronic output device that is also known as a **video display terminal** (VDT) or a **video display unit** (VDU). It is used to display images, text, video, and graphics information generated by a connected computer via a computer's video card. Although it is almost like a TV, its resolution is much higher than a TV. The first computer monitor was introduced on **1 March 1973**, which was part of the Xerox Alto computer system.

Older monitors were built by using a fluorescent screen and Cathode Ray Tube (CRT), which made them heavy and large in size and thus causing them to cover more space on the desk. Nowadays, all monitors are made up by using flat-panel display technology, commonly backlit with LEDs. These modern monitors take less space on the desk as compared to older CRT displays.

The advent of display technology has paved the way for the continuous evolution of the monitor, whether it's for computers, television, mobile devices or any device that has a display. The current contenders for top-tier technology being used for display devices includes Super LCD 3 (SLCD3) and Super AMOLED. It should be noted that LED displays are actually just a kind of LCD display that use LED lights as backlight illumination.

The quality of a monitor's performance is assessed using a few key factors:

- Aspect Ratio: This is the relation of the vertical length to the horizontal length of the monitor (e.g., 16:9 or 4:5).
- Dot Pitch: This is the distance between each pixel in every square inch that's displayed. The shorter the distance, the sharper and clearer the images are.
- Display Resolution: Also known as dots per inch (DPI), this determines the number of pixels per linear inch. The maximum number of pixels is determined by the dot pitch. This determines the number of pixels the display screen can accommodate.
- Size: This aspect is determined by the display screen’s diagonal measurement.

Types of Monitors

There are several types of monitors; some are as follows:

Cathode Ray Tube (CRT) Monitors

It is a technology used in early monitors. It uses a beam of electrons to create an image on the screen. It comprises the guns that fire a beam of electrons inside the screen. The electron beams repeatedly hit the surface of the screen. These guns are responsible for generating RGB (Red, Green, Blue) colors, and more other colors can be generated with the help of combining these three colors. Today's Flat Panel Monitors replace the CRT monitors.

Flat Panel Monitors

These types of monitors are lightweight and take less space. They consume less power as compared to CRT monitors. These monitors are more effective as they do not provide harmful radiation. These monitors are more expensive than CRTs. The flat-panel monitors are used in PDA, notebook computers, and cellular phones. These monitors are available in various sizes like 15", 17", 18" & 19" and more. The display of a flat-panel monitor is made with the help of two plates of glass. These plates contain a substance, which is activated in many ways.

Flat-panel monitor screens use two types of technologies, which are given below:

- **Liquid Crystal Display:** LCD (Liquid crystal display) screen contains a substance known as liquid crystal. The particles of this substance are aligned in a way that the light located backside on the screens, which allow to generate an image or block. Liquid crystal display offers a clear picture as compared to CRT display and emits less radiation. Furthermore, it consumes less power and takes less space than a CRT display.
- **Gas Plasma Display:** This display uses gas plasma technology, which uses a layer of gas between 2 plates of glass. When voltage is applied, the gas releases ultraviolet light. By this ultraviolet light, the pixels on the screen glow and form an image. These displays are available in different sizes of up to 150 inches. Although it offers effective colors as compared to the LCD monitor, it is more expensive. That's why it is less used.

LED Monitors

It is a flat screen computer monitor, which stands for light-emitting diode display. It is lightweight in terms of weight and has a short depth. As the source of light, it uses a panel of LEDs. Nowadays, a wide number of electronic devices, both large and small devices such as laptop screens, mobile phones, TVs, computer monitors, tablets, and more, use LED displays.

It is believed that James P. Mitchell invented the first LED display. On 18 March 1978, the first prototype of an LED display was published to the market at the SEF (Science and Engineering Fair) in Iowa. On 8 May 1978, it was shown again in Anaheim California, at the SEF. This prototype received awards from NASA and General Motors.

Advantages of LED Monitor:

- It includes a broader dimming range.

- It is a more reliable monitor.
- It is often less expensive.
- It consumes less power (20 watts), and run on a lower temperature.
- It has a more dynamic contrast ratio.

Comparison between LCD and LED monitors:

Resolution 1920 x 1080	LCD Monitors	Led Monitors
Brightness	250 cd / m^2	250 cd / m^2
Energy Star Certified	No	Yes
Weight	2.4 kg	2.4 kg
Contrast Ratio	12,000,000: 1	100,000,000: 1

TFT Monitors

It is a type of LCD flat panel display, which stands for a thin-film transistor. In TFT monitors, all pixels are controlled with the help of one to four transistors. The high-quality flat-panel LCDs use these transistors. Although the TFT-based monitors provide better resolution of all the flat-panel techniques, these are highly expensive. The LCDs, which use thin-film transistor (TFT) technology, are known as active-matrix displays. The active-matrix displays offer higher quality as compared to older passive-matrix displays.

Plasma Screen Monitors

A plasma screen is a thin, flat-panel, and capable of hanging on a wall like LCD and LED televisions. It is a brighter screen as compared to LCD displays and thinner than CRT displays. It can be used to either display modes of digital computer input or analog video signals, and sometimes, it is marketed as 'thin-panel' displays. Plasma displays have wide viewing angles, high contrast ratios, and high refresh rates, which is used to reduce a blur video. Additionally, it provides better quality pictures as it supports high resolutions of up to 1920 x 1080.

The plasma screen also includes some disadvantages such as the chance of screen burn-in, consumes more power, loss of brightness with time, can be heavier in weight.

What Does Cathode Ray Tube (CRT) Mean?

A cathode-ray tube is a display device used in television sets and computer monitors. It is a kind of vacuum tube which contains one or more electron guns, electrostatic deflection plates and a phosphor target which is located at the back of the glass screen. A cathode for which the CRT got its name is a positive terminal at which electrons may enter.

In a computer monitor or in a television set, the entire front of the tube is being scanned systematically and rapidly in a fixed pattern which is called a raster. Images and color are produced by shooting and controlling the electron beams representing each additive color light (red, blue and green) using the video signal as the reference.

Modern CRT monitors use magnetic deflection to bend the electron beams. This is done by varying the magnetic field generated by coils which is driven by electronic circuits located along the neck of the tube.

Explains Cathode Ray Tube (CRT)

A cathode ray tube is a specialized vacuum tube where images can be created by shooting electrons beams at the phosphorescent surface. The CRT also known as the picture tube was the only choice for a display device up until the less bulky and less power-hungry LCD was invented. They usually employ magnetic deflection for changing the orientation of the electron beams but other types use electrostatic deflection. These are usually used in oscilloscopes as magnetic deflection which would lessen the inductive reactance of the magnetic coils and limit the frequency response of the oscilloscope.

The brightness, colour and persistence of the illumination can be varied by using different kinds of phosphor. This is especially useful for making CRTs for different applications.

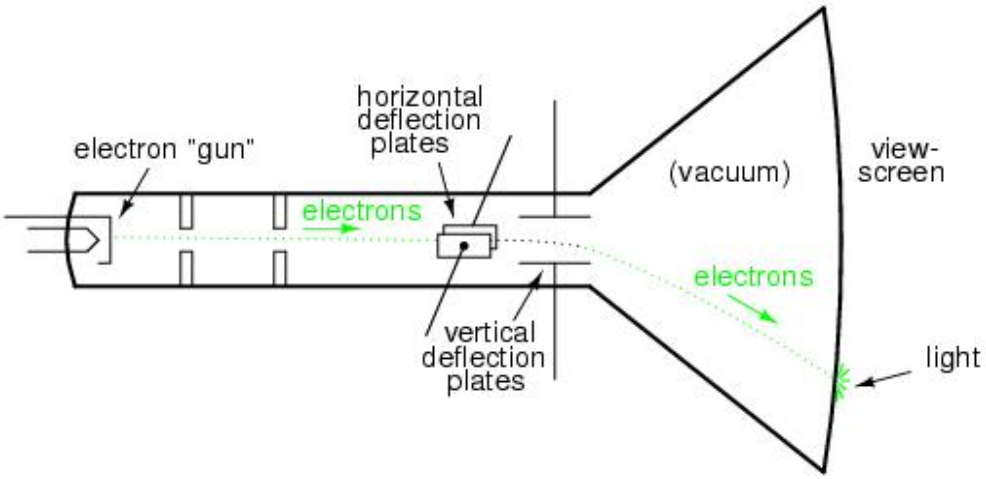
Working Principles

When the two metal plates are connected to a high voltage source, the negatively charged plate called the cathode emits an invisible ray. The cathode ray is drawn to the positively charged plate, called the anode, where it passes through a hole and continues traveling to the other end of the tube. When the ray strikes the specially coated surface, the cathode ray produces a strong fluorescence or bright light. When an electric field is applied across the cathode ray tube, the cathode ray is attracted by the plate bearing positive charges. Therefore, a cathode ray must consist of negatively charged particles. A moving charged body behaves like a tiny magnet, and it can interact with an external magnetic field. The electrons deflected by the magnetic field. And also, when the external magnetic field is reversed, the beam of electronics is deflected in the opposite direction.

In a cathode ray tube, the cathode is a heated filament and it placed in a vacuum. The ray is a stream of electrons that naturally pour off a heated cathode into the vacuum. Electrons are negative. The anode is positive, so it attracts the electrons pouring off the cathode. In a TV's cathode ray tube, the stream of electrons is focused by a focusing anode into a tight beam and then accelerated by an accelerating anode. This tight, high-speed beam of electrons flies through the vacuum in the tube and hits the flat screen at the other end of the tube. This screen is coated with phosphor, which glows when struck by the beam.

Operation of CRT

Cathode Ray Tube (CRT) is a computer display screen, used to display the output in a standard composite video signal. The working of CRT depends on the movement of an electron beam which moves back and forth across the back of the screen. The source of the electron beam is the electron gun; the gun is located in the narrow, cylindrical neck at the extreme rear of a CRT which produces a stream of electrons through thermionic emission. Usually, A CRT has a fluorescent screen to display the output signal. A simple CRT is shown below.



Cathode Ray Tube

The operation of a CRT monitor is very simple. A cathode-ray tube consists of one or more electron guns, possibly internal electrostatic deflection plates, and a phosphor target. CRT has three electron beams – one for each (Red, Green, and Blue) is clearly shown in the figure. The electron beam produces a tiny, bright visible spot when it strikes the phosphor-coated screen. In every monitor device, the entire front area of the tube is scanned repetitively and systematically in a fixed pattern called a raster. An image (raster) is displayed by scanning the electron beam across the screen. The phosphor's targets are beginning to fade after a short time, the image needs to be refreshed continuously. Thus, CRT produces the three-color images which are primary colors. Here we used a 50 Hz rate to eliminate the flicker by refreshing the screen.

The main parts of the cathode ray tube are cathode, control grid, deflecting plates and screen.

Cathode

The heater keeps the cathode at a higher temperature and electrons flow from the heated cathode towards the surface of the cathode. The accelerating anode has a small hole at its center and is maintained at a high potential, which is of positive polarity. The order of this voltage is 1 to 20 kV, relative to the cathode. This potential difference creates an electric field directed from right to left in the region between the accelerating anode and the cathode.

Electrons pass through the hole in the anode travel with constant horizontal velocity from the anode to the fluorescent screen. The electrons strike the screen area and it glows brightly.

The Control Grid

The control grid regulates the brightness of the spot on the screen. By controlling the number of electrons by the anode and hence the focusing anode ensures that electrons leaving the cathode in slightly different directions are focused down to a narrow beam and all arrive at the same spot on the screen. The whole assembly of cathode, control grid, focusing anode, and accelerating electrode are called the electron gun.

Deflecting Plates

Two pairs of deflecting plates allow the beam of electrons. An electric field between the first pair of plates deflects the electrons horizontally, and an electric field between the second pair deflects them vertically, the electrons travel in a straight line from the hole in the accelerating anode to the centre of the screen when no deflecting fields are present, where they produce a bright spot.

Screen

This may be circular or rectangular. The screen is coated with a special type of fluorescent material. Fluorescent material absorbs its energy and re-emits light in the form of photons when the electron beam hits the screen. When it happens some of them bounces back just like bouncing off a cricket ball from a wall. These are called secondary electrons. They must be absorbed and returned to the cathode if it is not so they accumulate near the screen and produce space charge or electrons cloud. To avoid this, aqua day coating is applied on the funnel part of CRT from inside.

Advantages of CRT

1. CRTs are less expensive than other display technologies.
2. They operate at any resolution, geometry and aspect ratio without decreasing the image quality.
3. CRTs produce the very best color and gray-scale for all professional calibrations.
4. Excellent viewing angle.
5. It maintains good brightness and gives long life service.

Features of CRT

The use of CRT technology has quickly declined since the introduction of LCDs but they are still unbeatable in certain ways. CRT monitors are widely used in several electrical devices such as computer screens, television sets, radar screens, and oscilloscopes used for scientific and medical purposes.

Random Scan Display:

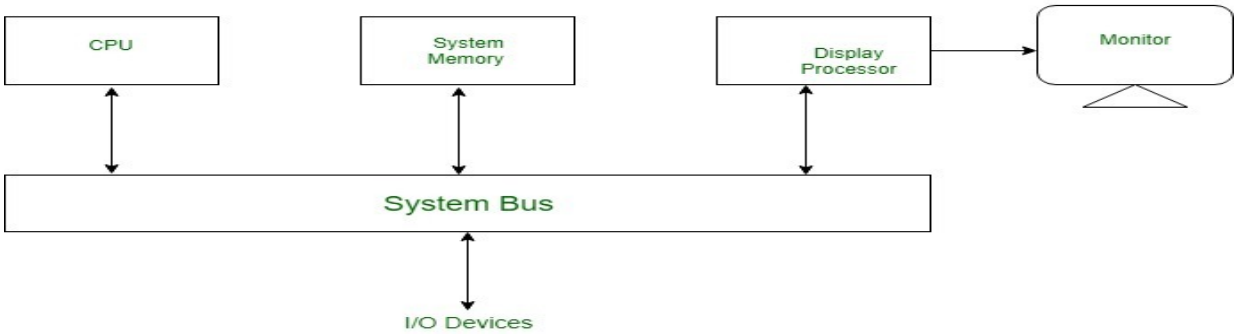
In Random-Scan Display electron beam is directed only to the areas of screen where a picture has to be drawn. It is also called vector display, as it draws picture one line at time. It can draw and refresh component lines of a picture in any specified sequence. Pen plotter is an example of random-scan displays.

The number of lines regulates refresh rate on random-scan displays. An area of memory called refresh display files stores picture definition as a set of line drawing commands. The system returns back to first-line command in the list, after all the drawing commands have been processed. High-quality vector systems can handle around 100, 00 short lines at this refresh rate. Faster refreshing can burn phosphor. To avoid this every refresh cycle is delayed to prevent refresh rate greater than 60 frames per second.

Random-Scan Display Processors:

Input in the form of an application program is stored in the system memory along with graphics package. Graphics package translates the graphic commands in application program into a display file stored in system memory. This display file is then accessed by the display processor to refresh the screen. The display processor cycles through each command in the display file program. Sometimes the display processor in a random-scan is referred as Display Processing Unit / Graphics Controller.

The structure of a simple random scan is shown below:



ADVANTAGES:

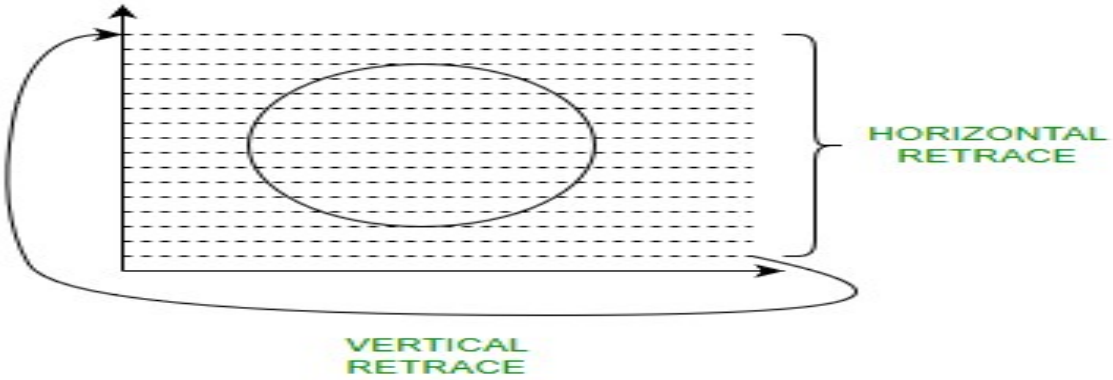
- Higher resolution as compared to raster scan display.
- Produces smooth line drawing.
- Less Memory required.

DISADVANTAGES:

- Realistic images with different shades cannot be drawn.
- Colour limitations.

Raster-Scan Displays

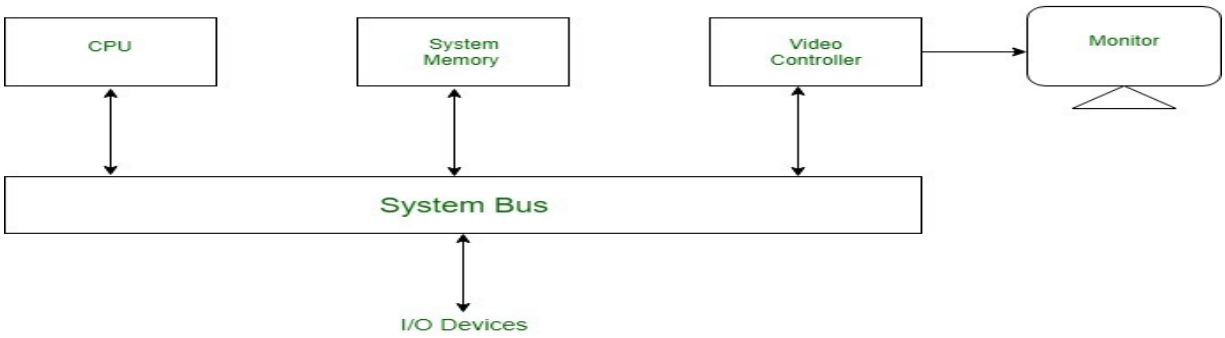
Raster Scan Displays are most common type of graphics monitor which employs CRT. It is based on television technology. In raster scan system electron beam sweeps across the screen, from top to bottom covering one row at a time. A pattern of illuminated pattern of spots is created by turning beam intensity on and off as it moves across each row. A memory area called refresh buffer or frame buffer stores picture definition. This memory area holds intensity values for all screen points. Stored intensity values are restored from frame buffer and painted on screen taking one row at a time. Each screen point is referred to as pixels.



In raster scan systems refreshing is done at done at a rate of 60-80 frames per second. Refresh rates are also sometimes described in units of cycles per second / Hertz (Hz). At the end of each scan line, electron beam begins to display next scan line after returning to left side of screen. The return to the left of screen after refresh of each scan line is known as horizontal retrace of electron beam. At the end of each frame electron beam returns to top left corner and begins the next frame.

Raster-Scan Display Processor:

An important function of display process is to digitize a picture definition given in an application program into a set of pixel-intensity values for storage in refresh buffer. This process is referred to as scan conversion. The purpose of display processors is to relieve the CPU from graphics jobs.



Display processors can perform various other tasks like: creating different line styles, displaying color areas, etc. Typically display processors are utilized to interface input devices, such as mouse, joysticks.

ADVANTAGES:

- Real life images with different shades can be displayed.
- Color range available is bigger than random scan display.

DISADVANTAGES:

- Resolution is lower than random scan display.
- More memory is required.
- Data about the intensities of all pixel has to be stored.

Difference between Random scan and Raster scan:

The resolution of random scan is higher than raster scan.	While the resolution of raster scan is lesser or lower than random scan.
It is costlier than raster scan.	While the cost of raster scan is lesser than random scan.
In random scan, any alteration is easy in comparison of raster scan.	While in raster scan, any alteration is not so easy.
In random scan, interlacing is not used.	While in raster scan, interlacing is used.
In random scan, mathematical function is used for image or picture rendering. It is suitable for applications requiring polygon drawings.	While in which, for image or picture rendering, raster scan uses pixels. It is suitable for creating realistic scenes.
Electron Beam is directed to only that part of screen where picture is required to be drawn, one line at a time.	Electron Beam is directed from top to bottom and one row at a time on screen. It is directed to whole screen.
It stores picture definition as a set of line commands in the Refresh buffer.	It stores picture definition as a set of intensity values of the pixels in the frame buffer.
Refresh rate depends on the number of lines to be displayed i.e., 30 to 60 times per second.	Refresh rate is 60 to 80 frames per second and is independent of picture complexity.

LCD (Liquid Crystal Display)

LCD (Liquid Crystal Display) is a type of flat panel display which uses liquid crystals in its primary form of operation. LEDs have a large and varying set of use cases for consumers and businesses,

as they can be commonly found in smartphones, televisions, computer monitors and instrument panels.

LCDs were a big leap in terms of the technology they replaced, which include light-emitting diode (LED) and gas-plasma displays. LCDs allowed displays to be much thinner than cathode ray tube (CRT) technology. LCDs consume much less power than LED and gas-display displays because they work on the principle of blocking light rather than emitting it. Where an LED emits light, the liquid crystals in an LCD produces an image using a backlight.

As LCDs have replaced older display technologies, LCDs have begun being replaced by new display technologies such as OLEDs.

How LCDs work

A display is made up of millions of pixels. The quality of a display commonly refers to the number of pixels; for example, a 4K display is made up of 3840 x2160 or 4096x2160 pixels. A pixel is made up of three subpixels; a red, blue and green—commonly called RGB. When the subpixels in a pixel change color combinations, a different color can be produced. With all the pixels on a display working together, the display can make millions of different colors. When the pixels are rapidly switched on and off, a picture is created.

The way a pixel is controlled is different in each type of display; CRT, LED, LCD and newer types of displays all control pixels differently. In short, LCDs are lit by a backlight, and pixels are switched on and off electronically while using liquid crystals to rotate polarized light. A polarizing glass filter is placed in front and behind all the pixels, the front filter is placed at 90 degrees. In between both filters are the liquid crystals, which can be electronically switched on and off.

LCDs are made with either a passive matrix or an active-matrix display grid. The active-matrix LCD is also known as a thin film transistor (TFT) display. The passive matrix LCD has a grid of conductors with pixels located at each intersection in the grid. A current is sent across two conductors on the grid to control the light for any pixel. An active matrix has a transistor located at each pixel intersection, requiring less current to control the luminance of a pixel. For this reason, the current in an active-matrix display can be switched on and off more frequently, improving the screen refresh time.

Some passive matrix LCD's have dual scanning, meaning that they scan the grid twice with current in the same time that it took for one scan in the original technology. However, active matrix is still a superior technology out of the two.

Types of LCDs

Types of LCDs include:

Twisted Nematic (TN)- which are inexpensive while having high response times. However, TN displays have low contrast ratios, viewing angles and color contrasts.

In Panel Switching displays (IPS Panels)- which boast much better contrast ratios, viewing angles and color contrast when compared to TN LCDs.

Vertical Alignment Panels (VA Panels)- which are seen as a medium quality between TN and IPS displays.

Advanced Fringe Field Switching (AFFS)- which is a top performer compared IPS displays in color reproduction range.

Advantages of LCD

LCD panels are increasingly rapidly and replacing CRT monitors and televisions in many homes and offices. These displays provide multiple benefits while comparing with CRT technology. Some advantages are discussed below:

- **Space:** LCD (Liquid Crystal Display) technology made display screens much thinner as compared to CRT technology, through which they take up much less space. LCD displays do not take space taken up by the cathode ray tube; therefore, they are also called flat panel screens. Thus, there is much space on the table that allows keeping other documents and peripheral computer equipment easily on the desk. Hence, LCD panels have almost replaced the CRT displays.
- **Power Consumption:** One of the best advantages of LCD displays is less energy Consumption. It takes very less energy as compared to CRT technology. If the size increases of LCD monitors, its power consumption is also increased; But it still takes low power while comparing with CRT monitors. On the basis of the size, the power consumption of LCD monitors is around 25 to 50 watts, but the same size of CRT monitor takes 60 to 80 watts. If the size of the CRT monitor is 19-inch, it will consume anything between 70 and 150 watts.
- **Brightness:** As compared to CRT technology, LCD monitors provide output with brighter pictures as they generate the high peak intensity. Due to high-intensity results, LCD panels illuminate the screen through a constant backlight. Thus, LCD monitors are sufficient for use in brightly lit areas.
- **Screen Flicker:** The screen viewing area is scanned as horizontal lines in CRT monitors. And, the rate at which the entire screen is scanned is called refresh rate. Typically, CRT monitors have a flickering effect as they contain a low refresh rate. The flickering effect

can be caused to detrimental health and eye strain, and headaches if anyone is viewing for a long time period. LCD monitors have a very high refresh rate in comparison to CRT monitors. They have a refresh rate of 75 and 85 hertz being common, which means the flickering effect is very low in LCD displays that made them much comfortable to use anywhere.

- **No burn-in:** With the LCD displays, you can end up with a lot of static content (images that don't change or move around) when you watch the stock ticker on MSNBC, play a lot of video games, or do other things. But CRT displays involve those images and content that cannot end up. It is done with LCD because instead of creating its own light with phosphors, it utilizes a separate backlight. Hence, they are sufficient in this problem; however, plasmas are unable to do that.

Disadvantages of LCD

LCD has many advantages, but it also has some disadvantages, which are discussed below:

- **Expensive for their size:** As compared to plasma flat panels, LCDs can be more costly in order to increase the size. However, while comparing with CRTs, it may be at in low price. Currently, LCD screens are produced by some of the manufacturers in Taiwan, and Japan, which led to the technology is not much popular and has not completely spread. Also, the price can be different in the international market as much as tens to hundreds of dollars.

- **Interfaces:** Although the LCD displays (LCDs) are at the top in the case of digital interface, some of the low-priced LCDs have problems like the inability to upgrade to digital interfaces, vulnerable signal transmission interference, etc. Furthermore, the analog signal, vector, and clock frequency must be consistent in order to avoid the occurrence of the flicker effect. Additionally, the display CARDS with digital output are rare, and the digital interfaces of LCD have not yet been standardized.

- **Small viewing Angle:** Typically, LCDs have poor viewing angle; however, manufacturers are improving by giving some intensive efforts. Poor viewing angle results that you do not get a better image quality if you are watching the screen on some of the left and right sides, but not almost directly in the front of the screen.

- **Limited brightness:** Compared with plasma TVs, LCD displays are harder to view in a brightly lit room and have lower contrast because these displays depend upon external

light sources to assist in emitting light as they are unable to emit light by themselves. In this case, LCD TVs with LED backlights are more appropriate.

- **Poor reproduction of blacks:** The reproduction of black images in LCD displays is poor as compared to direct-view tube displays. That means the darker screen images will look like various shades of gray but not show up as true black. Also, there can be difficult to discern the actions happening in these darker areas.

What Does LED Display Mean?

LED Display (light-emitting diode display) is a screen display technology that uses a panel of LEDs as the light source. Currently, a large number of electronic devices, both small and large, use LED display as a screen and as an interaction medium between the user and the system. Modern electronic devices such as mobile phones, TVs, tablets, computer monitors, laptops screens, etc., use a LED display to display their output.

Explains LED Display

LED Display is one of the main screens displays that are being commercially used. The biggest advantage of the LED display is its efficient and low-energy consumption, which is especially needed for handhelds and chargeable devices such as mobile phones and tablets. An LED display consists of a number of LED panels that, in turn, consist of several LEDs. LEDs have numerous advantages over other light-emitting sources that can be used alternatively. Aside from being power efficient, LEDs produce more brilliance and greater light intensity. LED Display is different from the vacuum fluorescent display used in some consumer electronics such as car stereos, videocassette recorders, etc., and, hence, these two should not be confused with each other.

How Do LED Monitors Work?

An LED (light-emitting diode) monitor is an energy-efficient display that uses LED (light-emitting diode) technology. Compared to CRT monitors (see our CRT guide), LED monitors are more compact, consume less power, and emit less heat.
LED monitors work by use of LEDs for backlight illumination instead of fluorescent tubes or cold cathode fluorescent lamps to produce light.

LEDs are semiconductor devices that change electrical currents into light. The images on an LED monitor are created by red, green, and blue sub-pixels—tiny sub-sections of the whole sub-pixel.

Clearer images, vivid colors, enhanced contrast levels, and a more environmentally friendly design are just a few of the benefits they come with.

What are the Advantages of LED Monitors?

There are many advantages of using an LED monitor instead of an LCD one. Some of these include larger screens, they are thin and light, produce clearer images, better colors, improved viewing angles, and improved energy efficiency.

At first glance, these monitors look no different from a traditional LCD monitor, but in reality, they are not all that similar. The LED monitor uses a different backlighting technology to produce a better picture and other advantages that I have mentioned above.

What are the Disadvantages of LED Monitors?

Many people know the advantages of an LED technology monitor but do they know its disadvantages?

The only main disadvantage of a monitor LED is that it costs a bit more than a traditional display. However, if you try to shop for an LED display and compare its features and the price, you will find out that it's actually worth the price because of all the great benefits you can get from it.

What is a Video Card?

A video card is a PC component that connects to a computer motherboard, also known as a video controller, display adapter, video board, graphics card, or video adapter. It is an expansion card, controls and calculates an image's appearance on the screen and used to improve the picture quality to show on display. Even you cannot see this page without a video card. It accelerates the video throughput as it is an intermediate device. The below picture is an instance of the video card.

CGA ADAPTER

CGA stands for color graphics adapter, the first IBM video *card* to permit graphics on the screen. We're lucky they've come out with better models, because CGA graphics are gawdawful crude. With a CGA, your screen can show up to 640 dots across by 200 dots up and down, with only one color. Even at that maximum *resolution,* pictures look really blocky and out of proportion. Pictures will look even more blocky if you want 4 colors on the screen at once, since you're then limited to 320 dots across and 200 down. If you can tolerate a totally chunky display of 160 by 200 dots, you can get a maximum of 16 colors on a CGA. Wow!

A CGA can display text too, but the characters are fuzzy looking and squished together, so they're hard to read. And you may see an annoying sparkling effect called *snow* when you scroll the text. So don't buy a computer with a CGA. And if someone gives you one, put in a *VGA* instead.

Many other companies besides IBM have produced video cards that work just like a CGA. Some pcs, including most laptops made prior to 1990, come with built-in CGA-Compatible

circuitry. These variations are generically referred to as CGAs or CGA systems, trademarks notwithstanding. And since people don't look at the video circuits too often, they generally end up using the term CGA to refer to their monitor, as in "I have a CGA screen."

VGA ADAPTER

Video Graphics Array (**VGA**) is a video display controller and accompanying de facto graphics standard, first introduced with the IBM PS/2 line of computers in 1987,[1][2][3] which became ubiquitous in the PC industry within three years.[4] The term can now refer to the computer display standard, the 15-pin D-subminiature VGA connector, or the 640×480 resolution characteristic of the VGA hardware.[5]

VGA was the last IBM graphics standard to which the majority of PC clone manufacturers conformed, making it the lowest common denominator that virtually all post-1990 PC graphics hardware can be expected to implement.[6]

IBM intended to supersede VGA with the Extended Graphics Array (XGA) standard, but failed.[7] Instead, VGA was adapted into many extended forms by third parties, collectively known as Super VGA,[8] then gave way to custom graphics processing units which, in addition to their proprietary interfaces and capabilities, continue to implement common VGA graphics modes and interfaces to the present day.

The VGA analog interface standard has been extended to support resolutions of up to 2048×1536 and even higher in special applications.

SVGA ADAPTER

What Does Super Video Graphics Array (Super VGA or SVGA) Mean?

Super video graphics array (Super VGA or SVGA) is a high-resolution standard used to channel video data to a compatible visual output device - usually a computer monitor. This is actually a broad umbrella term for other computer display standards. Originally, it was just an extension to the VGA standard, which was a purely IBM-defined standard also known as ultra-video graphics array (UVGA).

Explains Super Video Graphics

The SVGA standards have never truly been defined, and the closest to an official definition was in the VESA BIOS Extensions (VBE) created by the Video Electronics Standards Association (VESA). The VBE stated - only in a footnote - that the term Super VGA was used in the document to refer to a graphics display controller that implements any of the supersets of the IBM-defined VGA display adapter.

As a specification, in contrast to extended graphics array (XGA) or VGA, SVGA refers to a resolution of 800 x 600 pixels. Initially, SVGA was defined as having a resolution of 800 x 600 4-bit pixels (capable of a variety of 16 colors with each pixel). Later, it was lengthened to 1024 x 768 8-bit pixels (having an array of 256 different colors).

With the continuing innovation of technology, the number of colors has become unimportant, as the shades of each color are set by a changeable analog voltage, which theoretically means that the SVGA can display an infinite number of colors. Despite this possibility, digital video cards can only live up to the specifications of the era in which they were manufactured, limiting the amount of displayed screen colors. Another factor that can affect the number of colors is the video interface that connects the adapter and monitor, which changes the signal from digital to analog to give the monitor more color variety. Thus, the color depth largely depends on the structure of the adapter, rather than the monitor itself.

Digital Visual Interface (DVI)

What Does Digital Visual Interface (DVI) Mean?

A digital visual interface (DVI) is a port used to connect display devices, such as LCD monitors or projectors, with the output device. DVI only supports connections between digital-to-digital devices.

Industry group Digital Display Working Group (DDWG) developed DVI, which began as a way to get rid of legacy video display systems based on analog technology. Uncompressed data is sent out over DVI for display on specific display devices.

Explains Digital Visual Interface (DVI)

DVI was designed to transfer digital data from computers to display device such as LCD monitors or projectors. The transmitted data is always in binary form. After transferring, each pixel from the source device is reflected the same way on display side. This is different from analog systems, where noise and electric attenuation affects the resulting image on the output display. DVI also has the ability to reduce overall power consumption.

DVI is compatible with high-definition multimedia interfaces (HDMI). Although DVI does not support audio data directly, some video cards provide audio-visual data and enable a computer to send the audio-visual data from DVI to a high-definition display or television using HDMI. If the DVI or computer hardware doesn't support such data, then an adapter is used to combine the DVI data with digital or analog audio.

HDMI

High-Definition Multimedia Interface (**HDMI**) is a proprietary audio/video interface for transmitting uncompressed video data and compressed or uncompressed digital audio data from an HDMI-compliant source device, such as a display controller, to a compatible computer monitor, video projector, digital television, or digital audio device.[3] HDMI is a digital replacement for analog video standards.

HDMI implements the EIA/CEA-861 standards, which define video formats and waveforms, transport of compressed and uncompressed LPCM audio, auxiliary data, and implementations of the VESA EDID.[4][5]:p. III CEA-861 signals carried by HDMI are electrically compatible with the CEA-861 signals used by the Digital Visual Interface (DVI). No signal conversion is necessary, nor is there a loss of video quality when a DVI-to-HDMI adapter is used.[5]:§C The Consumer

Electronics Control (CEC) capability allows HDMI devices to control each other when necessary and allows the user to operate multiple devices with one handheld remote control device.[5]: §6.3

Several versions of HDMI have been developed and deployed since the initial release of the technology, but all use the same cable and connector. Other than improved audio and video capacity, performance, resolution and color spaces, newer versions have optional advanced features such as 3D, Ethernet data connection, and CEC extensions.

Resolution

What Does Resolution Mean?

Resolution is a measure used to describe the sharpness and clarity of an image or picture. It is often used as a metric for judging the quality of monitors, printers, digital images and various other hardware and software technologies.

The term is popular in the mobile industry for describing a mobile device's display capabilities, and also in the entertainment media to distinguish the visual quality of movies to distinguish between high definition and standard definition movies. It is also used to determine the resolution of a screen, monitor, or TV.

Resolution is also referred to as screen resolution.

Explains Resolution

Resolution is a broad term and may have different meanings when used in different fields of technology. In the computer and media industry, resolution refers mostly to display resolution and the number of picture elements (pixels or simply dots) that can be displayed both horizontally and vertically by a screen.

Resolution in this case will then refer to how many pixels the display can produce horizontally (width) and vertically (height). This measure also applies to digital images.

For audio, resolution refers to the bit depth of a digital recording, or the number of information bits stored in the sample. This also correlates directly to the recording's quality.

For printers, resolution points to the dots per inch (DPI) of the material the printer produces, which also indicates how small and fine the dots are. The higher the DPI, the sharper the printout will be.

For computer images, the resolution is usually described in pixels per inch (PPI), which is a value that determines how many pixels are displayed per inch in a given picture. Note that this is different from display resolution (more on that later), which determines how many pixels are present in a display.

The higher the resolution, the crisper is the image and the higher the PPI value since there’s a higher number of pixels in every inch. If there are too few pixels in an image, they will look too large and “chunky” if the image is stretched, resulting in pixelated images. Non-professional printers usually print images between 200 to 300 PPI, while professional instruments usually have higher values, up to 600 PPI.

Image resolution is the total amount of pixels shown by a digital image expressed as width and height proportions. For example, an image with a resolution of 1920 x 1080, has a total of 2,073,600 pixels – which is usually referred to as a “2 megapixel” picture.

Resolution is often used interchangeably as the “size” of an image, but it also expresses the size of a display, monitor, screen, or TV (display resolution) in relation to its physical ability to focus light. An HD display has a maximum resolution of 1920 x 1080 pixels, half the resolution of a 4K display (3840 x 2160 pixels). Usually, a display with a higher resolution may also support several lesser ones.

The crispness of an image depends on the size of the monitor and its resolution. A 27’’ monitor with a 2560 x 1440 pixels resolution will show a clearer image than a monitor of the same size but with a maximum resolution of 1920 x 1080 pixels since its PPI will be naturally higher. However, the same resolution of 2560 x 1440 pixels may look blocky or blurred in a large 60’’ TV.

Bandwidth Monitor

What Does Bandwidth Monitor Mean?

A bandwidth monitor is a tool for measuring the actual available bandwidth on a local system. End users can use bandwidth monitors to get a true picture of what bandwidth may actually be available due to various factors involved in the provision of high-speed Internet.

Explains Bandwidth Monitor

In general, bandwidth monitoring is a kind of subcategory of the greater technique of bandwidth management, where some IT handlers may be able to increase available bandwidth using different strategies. However, in many cases, bandwidth monitoring is just a popular way to get a better perspective of the actual capacity for network traffic. Experts point out that many different factors may be involved in what an end user can effectively enjoy from a high-speed Internet connection. This includes the level of traffic on a network and the bandwidth from any given access point that may split or otherwise reduce bandwidth.

End users can download simple bandwidth monitor applications or make their own visual models with available hardware. Visual bandwidth monitor tools can convert available bandwidth measurements into a series of signals in order to show a kind of bar graph or other visual display of bandwidth available in real-time. Merging some moderately complex software and mechanical devices, users can create bandwidth monitor appliances for use in homes, internet cafes, or anywhere else they want to see a real-time visualization of their bandwidth access.

Phase Alternating Line (PAL)

What Does Phase Alternating Line (PAL) Mean?

Phase Alternating Line (PAL) is a color encoding system for analog television, and was created in 1961 in the United Kingdom. It features 624 horizontal lines per frame with a rate of 25 frames per second. PAL is used in broadcast television systems in many countries and is one of the three major broadcast standards, along with the NTSC and SECAM systems.

ANSHU PAL

Explains Phase Alternating Line (PAL)

Similar to the NTSC system, Phase Alternating Line makes use of a quadrature amplitude modulated subcarrier which carries the chrominance data added to the video signal. The frequency for PAL is 4.43361875 MHz, while it is 3.579545 MHz for NTSC. PAL scans the cathode ray tube 625 times horizontally to form the video image. This is similar to the SECAM system. PAL makes use of a screen resolution of 720 × 576 pixels. PAL video can be converted to NTSC with the addition of extra frames. This can be done with techniques such as adaptive motion interpolation or inter-field interpolation.

Compared to NTSC, PAL has a more detailed picture due to the higher number of scan lines. Additionally, hues are more stable in PAL than with NTSC. Higher levels of contrast and better color reproduction are also present in PAL. Automated color correction is possible in the PAL system, unlike NTSC, which makes use of manual color correction. In fact, PAL is considered to have better picture quality than NTSC.

However, PAL has a slower frame rate, resulting in motion not being as smooth, and saturation varies at times between frames. The picture itself can appear to flicker at times. NTSC holds an edge over PAL when it comes to smoother pictures, especially with high-speed footage, due to its higher frame rate.

NTSC CONSEPT

The **National Television System Committee** (**NTSC**)[1] developed the analog television format encoding system that was introduced in North America in 1954 and stayed in use until digital conversion. It is one of three major analog format television standards, the others being PAL and SECAM. All the countries using NTSC are currently in the process of conversion, or have already converted to the ATSC standard, or to DVB, ISDB or DTMB.

The analog NTSC color encoding system is usually associated with the broadcast System M. NTSC is analog composite video because the luminance (luma, monochrome image) and chrominance (chroma, color applied to the monochrome image) are transmitted together as one analog signal.

Since the introduction of digital sources (ex: DVD) the term "NTSC" might be used to refer to digital formats, even though they use completely different color encoding systems. For example, 480i (480 interlaced horizontal lines) digital video with color encoded as YCbCr, intended to be backward compatible and easily displayed on legacy NTSC devices, is usually described as "NTSC" (ex: NTSC DVD). Similarly, gaming consoles outputting a 60Hz signal might be labeled as "NTSC", as opposed to 50Hz "PAL" machines. These borrowed terms should not be confused with the analog color system itself.

Comparison between NTSC and PAL:

	NTSC	**PAL**

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Acronym	It stands for 'Nationalized Televisions Standards Committee'.	It stands for 'Phase Alternating Line'.
Countries	It is a standard broadcast format in United States.	It is standard broadcast format in Europe, Australia, and parts of Asia.
Origin	This format was first used in the year 1941.	It was adopted after the introduction of color picture.
Electrical power	It is generated at 60Hz.	It is generated at 50hz.
Standard line resolution	It has a standard 525 line broadcast.	It has a standard 625 line broadcast.
Signal sent	The signal is transmitted at 60 fields per second.	The signal is transmitted at 50 pulses per second.
Images sent	30 images are sent out per second.	25 images per second.
Pixels	720×480	720×576
Speed	It has higher image and frame sending speed.	It has low image and frame sending speed.
Characteristic	It has better resolution quality.	It has better image quality.
Convert into other formats	To convert NTSC to PAL, first rip the DVD into videos and then burn the DVD into PAL format.	To convert PAL into NTSC, an Aimer-soft Video Converter is required.

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