ICT WORKSHOP

CABINET:
At and atx

The CPU (central processing unit) is the microprocessor, the heart of the PC. A CPU cabinet is either the PC case or a piece of furniture the PC can be put into.
There are three major case sizes: Full tower, mid-tower, and mini-ITX.
Full-tower and mid-tower cases both fit standard ATX motherboards—by far the most common motherboard size out there
Full-tower and mid-tower cases both fit standard ATX motherboards—by far the most common motherboard size out there. Both can also fit smaller micro-ATX motherboards. Exact sizing varies from case to case, but most mid-towers run up to roughly 18 inches high and 8 or so inches wide.
Mid-tower PCs are probably the most common form factor and have enough room to fit systems with a closed-loop CPU cooler, a couple of graphics cards, and a *lot* of storage

In the olden days, practically everything in a PC case required a Phillips screwdriver. No more. Tool-less design is nearly universal in mid-range and high-end cases, with thumb screws for internal fastening and twist-on, snap-on, or otherwise tool-free mechanisms in drive bays.

Some of the high end cases are:
Lian Li 011 Dynamic XL: Larger than its younger sibling, the XL version of the 011 has tons of room for the most insane hardware setups—and it looks great.

Fractal Design Define 7 XL: Big and filled to the brim with options that will make any PC builder smile. Also check out Fractal's Meshify series if you'd like more airflow.

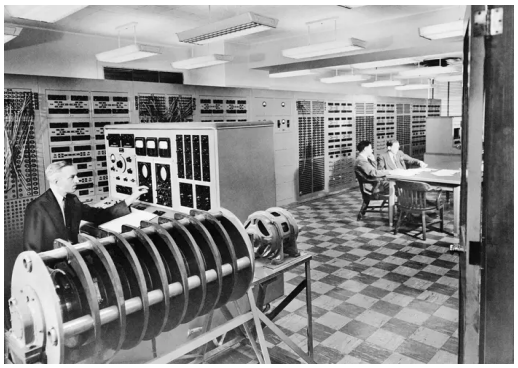
Lian Li DK-04F: There’s an even larger version that can fit two motherboards, the DK-05. Features include automatic height adjustment, opaque glass that reveals your hardware at the touch of a button, and, you know, the fact that it's *both a desk and PC case*. Very expensive but very unique.

Before 20th century:

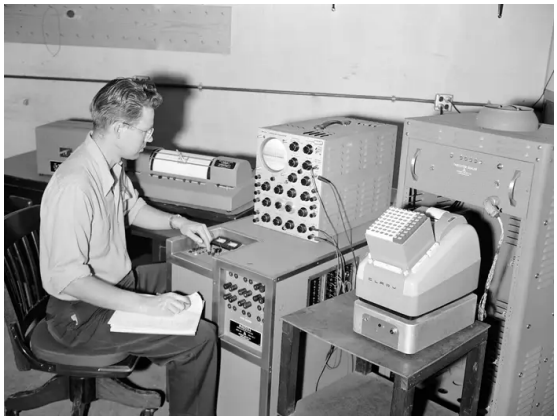
The first modern computer was created in the 1930s and was called the Z1, which was followed by large machinery that took up entire rooms.

The 1930s marked the beginning of calculating machines, which were considered the first programmable computers.

In the 1940s, computers took up entire rooms, like the ENIAC, which was once called a "mathematical robot.



In the 1950s, computers were strictly used for scientific and engineering research, like the JOHNNIAC, which was once described as a "helpful assistant" for mathematicians



In the 1960s, everything changed when the Programma 101 became the first desktop computer sold to the average consumer.

Difference in AT and ATX

AT motherboard stands for Advanced Technology motherboard. ATX motherboard stands for Advanced Technology Extended motherboard. 2. It can only fit in AT casing (it cannot fit in ATX casing).

The ATX motherboard includes advanced control facilities, where the BIOS program continually checks the CPU temperature and voltages, the cooling fans RPM, etc. If overheating occurs, the PC shuts down automatically.

Power connectors differ between AT and ATX motherboards. AT motherboards use two 12-pin plugs to power the motherboard, while an ATX motherboard uses one 20-pin plug for the power supply. When using an ATX form factor motherboard, you must use an ATX power supply. You can use the pin number to identify whether you have the correct power supply for your motherboard.

MOTHERBOARD

The chipset is a silicon backbone integrated into the motherboard that works with specific CPU generations. It relays communications between the CPU and the many connected storage and expansion devices

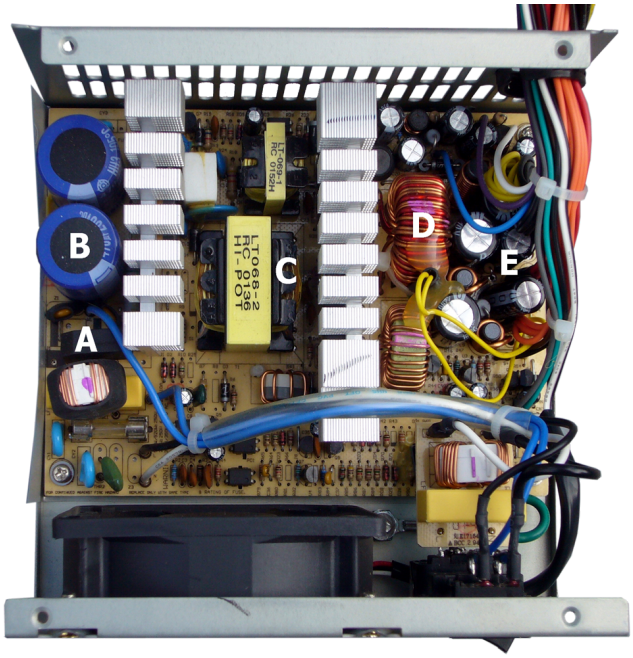
Chipset is on a motherboard is the main deciding factor for compatibility in a modern motherboard. CPU, RAM, and PCI Express lane support are the most important features to consider when selecting a chipset.

PC chipsets are designed by Intel and AMD but are found on motherboards from a variety of third-party vendors, such as MSI, Asus and ASRock. Different chipsets support different CPUs

SMPS-SWITCHED-MODE POWER SUPPLY

A switched-mode power supply (SMPS) is an electronic circuit that converts power using switching devices that are turned on and off at high frequencies, and storage components such as inductors or capacitors to supply power when the switching device is in its non-conduction state.

It can increase or decrease the output voltage to maintain a constant output regardless of changes in load. This dual ability gives it an advantage over linear regulators, which can only regulate the output down (that is, they can only decrease the voltage, not increase it)



Switched-mode power supplies (SMPS), sometimes referred to as switch mode power supplies, have become the workhorse of efficient power conversion, taking a mains voltage AC input and converting it down to a low voltage DC output. AC-DC switched-mode converters are omnipresent; the external desktop power supply for your laptop, inside your set-top box, and the wall plug-in charger for your smartphone.The principles of switched-mode conversion apply for both AC-DC and DC-DC power supplies.

CPU

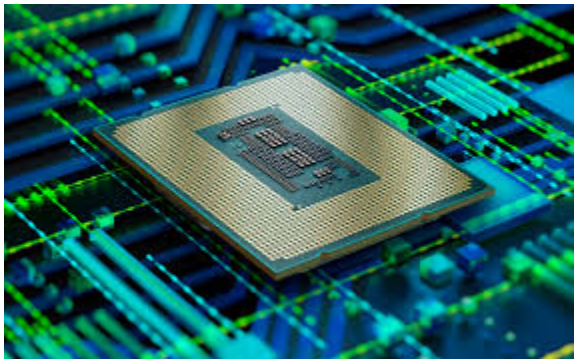
A central processing unit (CPU), also called a central processor, main processor or just processor, is the electronic circuitry that executes instructions comprising a computer program. The CPU performs basic arithmetic, logic, controlling, and input/output (I/O) operations specified by the instructions in the program. This contrasts with external components such as main memory and I/O circuitry, and specialized processors such as graphics processing unit (GPUs).

Functions of CPU in computer:

- Controlling all other parts of the machine and sending timing signals.
- Transferring data between memory and I/O devices.
- Fetching data and instructions from memory.
- Decoding instruction.

- Performing arithmetical and logical operations.
- Executing programs stored in memory.

The major types of CPU are classified as single-core, dual-core, Quad-core, Hexa core, Octa-core, and Deca core processor



RAM:-

- EDO RAM
- SD RAM
- DDR 1,2,3,4,5

1. EDO RAM:- Extended data out random access memory (EDO RAM/DRAM) is an early type of dynamic random access memory (DRAM) chip which was designed to improve the performance of fast page mode DRAM (FPM DRAM) that was used in the 1990s. Its main feature was that it eliminated wait times by allowing a new cycle to start while retaining the data output buffer from the previous cycle active, which allows a degree of pipelining (overlap in operation) that improves performance.
   Extended data out dynamic random access memory was introduced in 1994 and began to replace fast page mode DRAM by 1995 when Intel first introduced the 430FX chipset that supports EDO DRAM. Before that, EDO DRAM could replace FPM DRAM, but if the memory controller was not specifically designed for the EDO, then the performance remained the same as FPM.
   EDO was rated for 40 MHz maximum clock rate, 64 bits of bus bandwidth, 320 MBps peak bandwidth and ran at 5 volts. It was tangibly faster than the older FPM DRAM that had only 25 MHz max clock rate and 200 MBps peak bandwidth. However, it was superseded by the faster SDRAM starting in 1996, after only two years of major use.
2. SD RAM:- *SDRAM or synchronous DRAM is the name for a form of dynamic random access memory DRAM where the operation of the external interface is synchronized by an external clock signal - hence the name synchronous DRAM.*

The use of SDRAM was so effective that it only took about four years after its introduction in 1996/7 before its use had exceeded that of DRAM as the main form of computer memory because of its greater speed of operation.

Nowadays SDRAM based memory is the major type of dynamic RAM used across the computing spectrum, and in particular for computer random access memory.

One of the first commercial SDRAM offerings was the KM48SL2000 which was introduced by Samsung in 1993. Although this did not gain universal acceptance immediately, the uptake was relatively quick once the idea was established. The improved speed of SDRAM meant that by about the turn

of the century, i.e. 2000 SDRAM had virtually replaced the standard DRAM technology in most computer applications.

SDRAM offers a number of significant advantages:

- *Simple design*
- *Low cost*
- *Speed*
- *Complex manufacturing process required*
- *DDR versions of SDRAM double the data rate of basic SDRAM by using both edges of the clock cycle*

In most applications SDRAM has very few disadvantages

- *High power consumption*
- *It is a volatile form of memory, i.e. it loses its data when the power is removE*
- *Data requires refreshing*
- *Slower than SRAM*

In order to ensure that SDRAM technology is interchangeable, JEDEC, the industry body for semiconductor standards, adopted its first SDRAM standard in 1993. This facilitated an open common standard for developing SDRAM. It also enables developers to have the facility of utilizing products from more than one manufacturer and having a viable second source option.

With the basic SDRAM established, further developments took place. A form of SDRAM known as double data rate, DDR SDRAM appeared in 2000 with JEDEC Release 1 of their standard 79C which was updated to Release 2 in May 2002 and then Release C in March 2003.

DDR SDRAM was followed by the next version named DDR2 SDRAM. It was first introduced in mid 2003 when two clock rates were available: 200 MHz (referred to as PC2-3200) and 266 MHz (PC2-4200).

The first offerings of DDR2 SDRAM were inferior to the previous DDR SDRAM, but by the end of 2004 its performance had been improved making its performance exceed that of DDR formats.

Later the next version of SDRAM was launched. Known as DDR3 SDRAM, the first prototypes were announced in early 2005. However it took until mid-2007 before the first computer motherboards using DDR3 became available.

Further developments include the next phase of SDRAM which was DDR4 SDRAM and this was followed by DDR5.

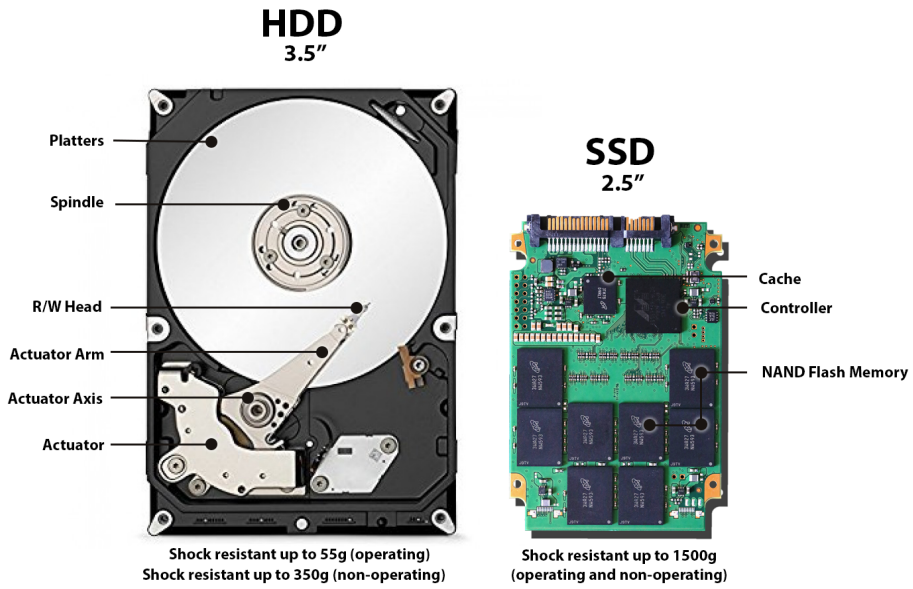
SSD AND HDD

Solid state drives (SSDs) and hard disk drives (HDDs) are the two main storage options to consider.

1. SSD:-An HDD is a data storage device that lives inside the computer. It has spinning disks inside where data is stored magnetically. The HDD has an arm with several "heads" (transducers) that read and write data on the disk. It is similar to how a turntable record player works, with an LP record (hard disk) and a needle on an arm (transducers). The arm moves the heads across the surface of the disk to access different data.HDDs are considered a legacy technology, meaning they've been around longer than SSDs. In general, they are lower in cost and are practical for data that does not need to be accessed frequently, such as backups of photos, videos or business files. They are available in two common form factors: 2.5 inch (commonly used in laptops) and 3.5 inch (desktop computers).

2. SSDs got their name—solid state—because they use solidstate devices under the hood. In an SSD, all data is stored in integrated circuits. This difference from HDDs has a lot of implications, especially in size and performance. Without the need for a spinning disk, SSDs can reduce to the shape and size of a stick of gum (what's known as the M.2 form factor) or even as small as a postage stamp. Their capacity—or how much data they can hold—varies, making them flexible for smaller devices, such as slim laptops, convertibles, or 2 in 1s. And SSDs dramatically reduce access time since users don't have to wait for platter rotation to start up.SSDs are more expensive than HDDs per amount of storage (in gigabytes (GB) and terabytes (TB)), but the gap is closing as SSD prices decline at a faster pace that HDD prices year over year.

   SSDs an increasingly popular choice is their speed. Across the board, SSDs outpace HDDs because they use electrical circuitry and have no physical moving parts. This leads to shorter wait times when you're starting up and fewer delays when opening apps or doing heavy computing tasks.When it comes to capacity, SSDs for computers are available in 120GB to 30.72TB capacities, whereas HDDs can go anywhere from 250GB to 20TB. When measuring cost per capacity, HDDs come out on top, but as SSDs drop in price, this will become less of a differentiator for HDDs. However, with SSDs, you get much more work done per server which results in fewer devices deployed to get the same output as an HDD.



CD(COMPACT DISC):-

A compact disc is a portable storage medium that can be used to record, store and play back audio, video and other data in digital form.

A standard compact disc measures 4.7 inches, or 120 millimeters (mm), across, is 1.2 mm thick, weighs between 15 grams and 20 grams, and has a capacity of 80 minutes of audio, or 650 megabytes (MB) to 700 MB of data.

A CD works by focusing a 780 nanometer wavelength semiconductor laser onto a single track of the disc. As the disc rotates, the laser beam measures differences in the way light is reflected off the polycarbonate layer on the bottom of the disc, converting it to sound.

CDs are fragile and prone to scratches; they can be repaired, but disc readability may be affected.

History of compact discs

James Russell, an American inventor, envisioned an alternative to vinyl albums to store and play audio recordings. He was the first person to file a patent for a product resembling a combination of laser, digital recording and optical disc technologies in 1966. Philips Electronics and Sony Corp. then purchased licenses of the technology in the 1980s.

The first commercial compact disc, a recording of a series of Chopin waltzes performed by pianist Claudio Arrau, was released in 1982. Prior to that, test recordings were completed in 1979; and in 1981, the BBC demonstrated a CD playing the Bee Gees' album, Living Eyes.

The first CD player, the CDP-101, was released commercially in 1982, and the format began to be used across the globe. Early compact discs were made at just two factories, owned by Philips and Sony.

Before the process became streamlined, individual discs cost $30, but as manufacturers proliferated, prices dropped. Hitachi also released a CD player in 1982, but the majority of sales belonged to Sony, with 20,000 sold in the first year.

CDs joined tape cartridges in generally replacing the phonograph record for playing music. Initially, CDs were read-only, but later technology allowed users to record on them, as well. As the 1980s came to an end, compact discs became the industry standard for audio recordings.

Compact disc formats

With the rise of personal computers (PCs) and other commercial technologies, various compact disc formats branched off to store data. Sony and Philips created specifications for these CD versions -- called Rainbow Books, due to the various colors on the book bindings -- to define each product format. The Red Book outlined the specifications for a standard CD.

Compact disc variations include:

- **CD-Read-Only Memory.** In 1985, the CD-ROM entered the market and went beyond audio to record optical data storage. CD-ROMs are readable by any computer with a CD-ROM drive. The CD-ROM follows the Yellow Book standard.
- **CD-interactive.** Released in 1993, CD-i could be played on CD players, but not on a CD-ROM drive. The format was later modified to be read by both. The CD-i follows the Green Book standard of specifications.
- **CD-ReWritable.** The CD-RW used a metallic alloy that reflected differently than regular compact discs. This change in reflectivity

made a CD-RW unreadable to many early CD players. The CD-RW follows the Orange Book standard.

- **CD-Recordable.** The CD-R is a compact disc that can be written to once and read many times. Like the CD-RW, it follows the Orange Book, but unlike the CD-RW, the CD-R can be read on CD players released prior to its own introduction.
- **CD-ROM eXtended Architecture.** The CD-ROM XA is an extension of the standard CD-ROM that allows audio, video and computer data to be accessed simultaneously. It follows the Yellow Book standard and was created as a bridge between the CD-ROM and CD-i.
- **Photo CD.** Designed by Kodak, the photo CD was created for the express purpose of storing photographs in a digital format that could be accessed and edited on a computer. It launched in 1992, and was originally designed to hold 100 high-quality images. It followed the Beige Book standard.
- **Video CD.** The VIDEO CD, or VCD, was created in 1993 and followed the White Book standard. VCD quality was intended to have comparable quality to VHS recordings, but has a much lower resolution than a modern digital video disk (DVD).

The future of compact discs

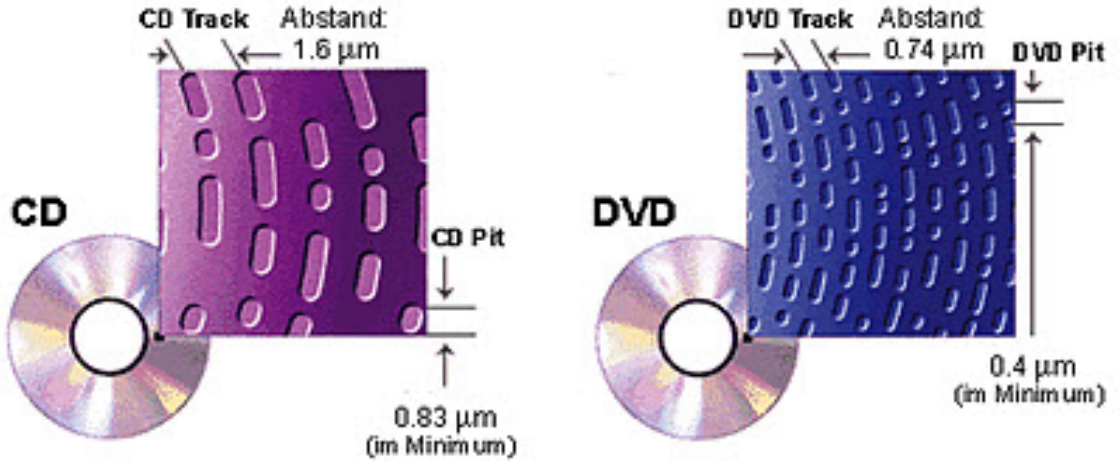
As other technologies flourish, the CD has seen a steady decline in use, particularly during the early 2010s.

Digital formats have overtaken CDs in the music world, which has seen a huge shift away from physical mediums with the rise of streaming audio and digital downloads. While compact disc sales were more profitable for those in the music industry, convenience and low costs have fewer consumers turning to the physical medium.

When compact discs were initially on the rise, PCs could only store approximately 10 MB of data, which had many turning to the CD for storage. That is no longer the case. With higher capacity hard drives and online storage options consistently entering the market, compact discs and tape cartridges are no longer the top choice for many consumers.

In 1995, Panasonic, Philips, Sony and Toshiba created the DVD format as a possible media replacement for compact discs. A DVD has the same dimensions as a CD, but a much higher storage capacity of 4.7 gigabytes (GB). The format is probably most known for video entertainment storage, but is also used for software and other digital data. DVDs can be played on a DVD player, as well as in a DVD-ROM on a computer.

In 2003, Blu-ray was introduced as a replacement for DVD. Blu-ray has a capacity of 25 GB, which allows for higher quality video and audio with higher resolution.



There are two system in an computer:-

- Input system
- Output system

Input system consists of a mouse and keyboard. Output system consists of a monitor and printer.

MOUSE:- A mouse is a small handheld input device that controls a computer screen's cursor or pointer in conjunction with the way it is moved on a flat surface. The mouse term name originates from its likeness to a small, corded and elliptical shaped device that looks like a mouse tail. Some mouse devices

have integrated features, such as extra buttons that may be programmed and assigned with different commands.

Because the mouse reduces the use of a keyboard, its invention and continuous innovation is considered one of the most important breakthroughs in computer ergonomics.The mouse was invented in 1963 by Douglas C. Engelbart from Stanford and later pioneered in 1981 by the Xerox Corporation. Computer users were generally skeptical about the mouse invention until approximately 1984, when the original Apple Macintosh (Macintosh 128K) was released.

Early mouse devices connected to computers through a cable or cord and were characterized by a roller ball integrated as a movement sensor underneath the device. Modern mouse devices use optical technology, where cursor movements are controlled by a visible or invisible light beam. Many models feature wireless connectivity through various wireless technologies, including radio frequency (RF) and Bluetooth.

The three main mouse device types are:

- Mechanical: Built with a trackball underneath the mouse and mechanical sensors, allowing easy movement in all directions

- Optomechanical: Similar to the mechanical type but uses optical, rather than mechanical, sensors to detect trackball movement
- Optical: The most expensive. Uses a laser to detect mouse movement, has no mechanical parts and reacts more precisely than other types.

Mouse:

We all are familiar with computer **monitors**. We spend time sitting in front of them for hours working, gaming or watching movies. A monitor is used to display the output of any computer system. A good display makes all the difference and no doubt enhances the user experience. The innovation in the display technologies has improved the

quality of the display devices including monitors. Now the desktop computers are available with a variety of displays ranging from technologically obsolete **CRT monitors** to latest slim **LCD, LED or OLED monitors**.

The major parameters that measure the performance of a monitor are luminance, contrast ratio, resolution, dot pitch, response time, refresh rate and power consumption. The common problem that arises in monitors is dead pixels, blurred screen, phosphor-burn, etc.

History

The first monitor dates long back in history. In the early stages of its evolution they were known as Terminals,

which were the boxy Video Display Terminals (VDTs). VDTs were monochrome monitors which used CRT (Cathode Ray Tube) technology. They were capable of working with any type of computer by connecting through a serial interface.

IBM's CRT – IBM launched its first computer also known as a 'three piece computer' in 1981. It had three different units – CPU, monitor and keyboard separately. By 1984, IBM introduced the new CRT monitor with enhanced Color Graphics Adapter (CGA) with 16 colors and a resolution of 640 x 350 pixels. In 1987 IBM started offering the Video Graphics Array as part of its new PCs which allowed 256 different colors and a resolution of 640 x 480 pixels.

XGA and UXGA – A new technology named Enhanced Graphics Array or XGA was introduced in 1990 which allowed 16.8 million colors with a resolution of 800 x 600 pixels. The new monitors were now offering true colors that matched the human eye (human eye can detect 10 million different colors). Later the technology was extended as UXGA, Ultra Extended Graphics Array which allowed 1600 x 1200 pixels.

In the 90s the LCD monitors came into the scene and gradually started competing with the CRT monitors. By the end of the 20th century, the CRT era was declining with the increasing popularity of Liquid Crystal Technology (LCD). This technology produces sharper images than the CRT monitors and the LCD monitors are significantly thinner having lower radiation emissions.

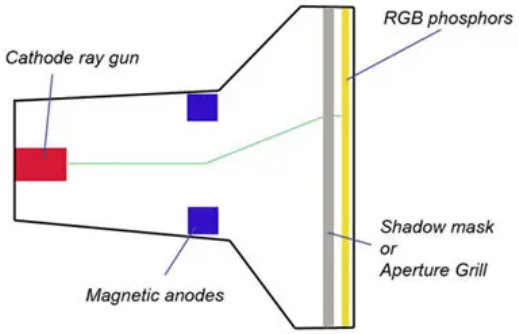
Few years' back, LED displays came into the scene and they are gradually making its space in the market. LED technology has various advantages over LCD technology like better image quality, low power consumption, etc.

Display Technologies

Since the beginning of the computer era, there have been a number of technologies used for the display of output. The major technologies are CRT, LCD, Plasma, LED and OLED displays.

1. Cathode Ray Tube (CRT) Monitors

These monitors employ the CRT technology to create a display. The CRT (also known as picture tube) receives the signals through a cable and the signal is decoded by the display controller which finally appears on a phosphor screen.



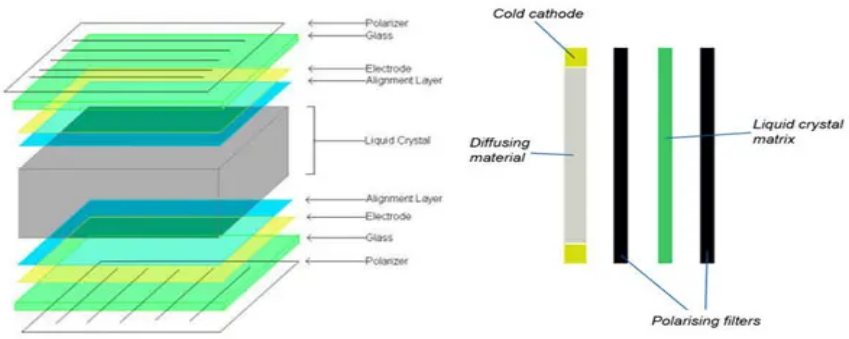
Resolution of a monitor tells how densely pixels are arranged on the screen. A combination of dot pitch and the viewable image area defines the maximum resolution of the screen. For example if a 21 inch monitor screen with a viewable area of 401mm x 298mm has a dot pitch of 0.26 mm, then its resolution is 1843 x 1370 pixels derived from a formula.

LCD Monitor

LCD Monitors

LCD, Liquid Crystal Display or also known as Liquid Crystal Diode is one of the most popular display technologies currently. LCD monitors are lightweight, compact, occupy less space,

consume low power and are available at a reasonable price. Currently there are two types of LCD technology in use – Active matrix LCD technology or TFT and Passive matrix technology. The TFT technology is more reliable with better image quality while the passive matrix technology has a slower response and gradually becomes outdated. As the name indicates, liquid crystals are the key elements of the display screen. By manipulating the crystal we can change the way they interact with the light. There is a display controller in the monitor which receives the display signals from the video adapter in the motherboard. The display controller controls two things – the electric signals to the liquid crystals and the back light. Structure of an LCD is shown in the below images (Also see how LCD works).



The liquid crystals used in the LCD are Twisted Nematic (TN), a type of liquid crystals that are twisted at 90o with the surface. In this state, crystals allow the light to pass through the polarizer but on applying a voltage, they get untwisted and block the light from passing through the polarizer. The display controller starts the backlight that passes through the first piece of the glass. At the same time the display controller also sends the electrical currents to the liquid crystal molecules to align and allows the varying level of light to pass through the second piece of glass, forming the desired picture on the screen. In color monitors, each pixel is made of three liquid crystal cells fronted with red, green and blue filters. The light passing through the

filtered screen forms the color of what you see on the monitor. A wide range of colors are formed by varying the intensity of colored pixels.

The backlight is made of cathodes, and depending on the quality of the monitor, there may be a single cathode at the top or one at the top and one at the bottom, or two at the top and two at the bottom to improve the brightness and clarity of the monitor. These cathodes are diffused through a layer of plastic and diffusing materials.

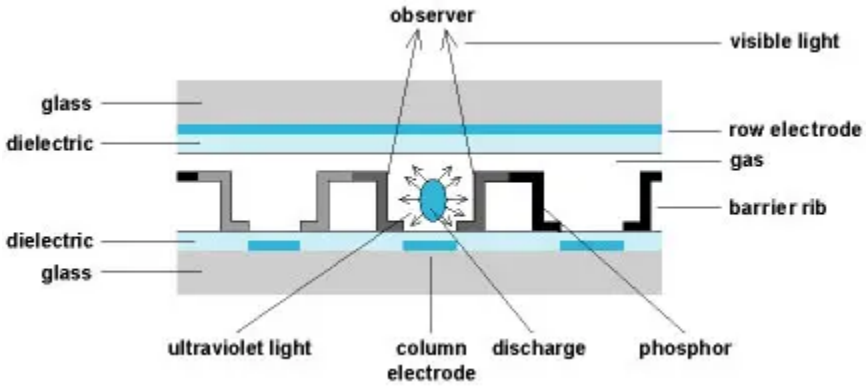
LED Monitors

LED Monitors

In the previous decade, display technology has changed significantly. LED displays are one of the latest developments.In this field. LED monitors use light emitting diodes that acts as a performance booster in the monitors. Basically LED monitors are the LCD monitors with a LED backlight to power up the LCD panel. It means that LEDs are placed behind or around the LCD panel to enhance the luminosity and video definition of the monitor screen.

As we have seen in the above section of LCD monitors, they use a cold cathode light as backlight. In the LED monitors all the concepts are the same except this backlight, which is replaced by LEDs.

There are three different types of LED monitors available based on the manner how the diodes are arranges in the monitor. These are – Direct LEDs, Edge LEDs and RGB LEDs. Both Edge and Direct LED display monitors use white diodes that are used to illuminate the LCD panel to produce the improved picture quality. The arrangement of LEDs in the monitor is shown in the below image:



Plasma Monitors

Plasma Monitors

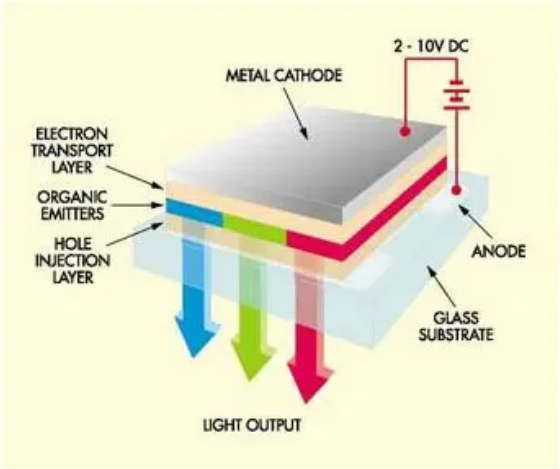
Plasma technology is another technology used in display devices. The basic idea behind the plasma technology is to illuminate tiny colored fluorescent lights to create image pixels. Each pixel is made of three such fluorescent lights – red, green and blue lights. To create a wide range of colors, intensity of these lights is varied accordingly.

The heart of plasma displays is plasma which is basically a gas (generally Xenon and Neon) made up of free flowing electrons and ions. When the electrical current flows through the plasma, negatively charged particles move towards the positively charged area of the plasma and vice versa. This makes collisions which resultantly excite the gas atoms in the plasma and then release the energy as photons of light.

OLED Monitors

OLED Monitors

OLED, short for Organic Light Emitting Diode, is the latest technology for display devices. As the name suggests there are some organic materials (containing carbon, like wood, plastic or polymers.) that are used to convert the electric current into light. Since the LEDs are capable of producing different colored light, they are directly used to produce the correct color and there is no need for a backlight which saves power and space. With fast response time, wide viewing angles, outstanding contrast levels and perfect brightness, OLED displays are surely better than the existing other display technologies.

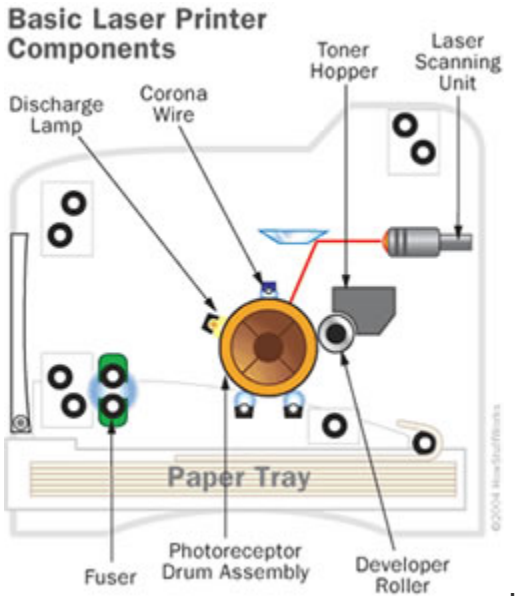


PRINTER:

Laser printer is a type of printer that produces high quality text and graphics by passing a laser beam on plain paper. This process uses a xerographic printing process, which uses a cylindrical drum coated with selenium to print an image. Inkjet is a type of printer that prints images by propelling droplets of ink onto the paper. These printers are the most common type of printers that are available in households. Dot Matrix printers is a type of printer that produces documents by having a printhead run back and forth and strike against an ink soaked ribbon to produce characters.

Laser, Inkjet and Dot Matrix are three different types of printers that are available on the market. These printers differ from each other in various ways, including cost, technology used and maintenance. Laser printers are more commonly found in office settings, while inkjet can be used in office and home settings. Dot Matrix is only found in certain applications. Each of these printers has its own advantages and disadvantages and a person should ensure their need before purchasing a printer.Laser printer is a type of printer that produces high quality text and graphics by passing a laser beam on plain paper. This process uses a xerographic printing process, which uses a cylindrical drum

coated with selenium to print an image. Laser printers are quite huge and bulky and require fast paper feeders. These are most found in offices and commercial places that require high quality papers, printed fast. Laser printers are expensive units and require a dedicated place. Maintenance level is high for the device and is also expensive. Laser printers are more common in black and white, while colors printers cause extra



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Inkjet is a type of printer that produces images by propelling droplets of ink onto the paper. These printers are the most common type of printers that are available in households. They are usually small in size and can range in prices, depending on the company and the functions it can perform. More expensive models might also come with copy, fax and scan functions. The concept of inkjet printing was developed in the 19th century, with the printer technology being developed in the late 1950s. Printers that could render digital images generated by computers were developed in the 1970s by Epson, Hewlett-Packard and Canon.

The inkjet printer works in a complicated way. It has a series of microscopic nozzles that spray a stream of ink directly onto the paper. The nozzles either have a high pressure pump or tiny heating elements behind them that helps deposit ink on the paper. There are two main technologies that are used in an inkjet printer: continuous (CIJ) and Drop-on-demand (DOD). In continuous technology, a high-pressure pump directs liquid ink from the cartridge through a gunbody and a microscopic nozzle, creating a continuous stream of ink droplets that are deposited on the paper. Extra unwanted ink is dropped into a gutter, which is recycled when the printer is active again. Drop-On-Demand is divided into thermal DOD and piezoelectric DOD. The thermal DOD uses a heating element to heat the ink in a chamber, which cools when applied to the paper. The piezoelectric DOD uses a piezoelectric material behind each nozzle instead of a heating element. In DOD, the printer cartridges fire ink only at special points on the surface that is required for creating an image.

Inkjet printers produce cheaper copies but print slower compared to laser printers. These are also small and compact, with the printer fitting right on the desk or workstation. The initial cost of these printers is quite cheap, but Officejet is usually more expensive than the basic model as it incorporates other features. Inkjet printers are honed for their ability to print good quality and sharp text and images and to print on almost any kind of paper.

Dot Matrix printers is a type of printer that produces documents by having a printhead run back and forth and strike against an ink soaked ribbon to produce characters. The name Dot Matrix comes from the image of a font which comes in dotted style. Dot matrix printers use similar technology to typewriters. Originally, Dot Matrix printers were quite popular printers used; they have now been replaced by inkjet or laser printers in today's world. This is mainly due to cheaper cost in production for inkjet and laser technology. However, they have not completely become obsolete. These printers are still produced for niche markets such as cash registers, banks, fire alarm systems and ATMs.

Dot Matrix works similar to a typewriter, but a little more complex. Dot Matrix produces documents by pushing small pins, known as 'wire' or 'rod' against a ribbon dipped in ink to the surface of a paper, and creates the text. This rod is controlled by tiny electromagnets or solenoids. Between the ribbon and the surface there is a plate with holes that guide the pins and separate the rest of the ribbon from the paper. The pins are a part of the printer head. The printer prints one line of text at a time. There are two different types of printers: serial dot matrix printers and line dot matrix printers. Serial dot matrix uses a horizontally moving print head. However, the Line dot matrix uses a

fixed printer head that is almost as wide as the paper. Serial dot matrix printers can produce 50-550 characters per second (cps), while line dots can produce 1000 cps.

Dot Matrix printers were introduced by Digital Equipment Corporation in 1970 and became one of the popular printers at that time for use in applications such as receipts, ATM machines, data logging, aviation or other point-of-sales terminals. Though the printer is slow, loud and expensive in printing each page, it is popular because of its carbon and carbonless copy capability, which allows it to create copies in a single print. After initial purchase, the printer uses a ribbon dipped in ink, which is fairly cheap and easy to replace. It isn't the widely used printer today, but it still has a presence in a niche market.