

Fundamentals of Computers and Computing

CSE 1101

(Output Devices)

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The Monitor

- Monitors, commonly called as **Visual Display Unit (VDU)**, are the main output device of a computer. It forms images from tiny dots, called pixels that are arranged in a rectangular form. The sharpness of the image depends upon the number of pixels.
- There are two kinds of viewing screen used for monitors.
 - Cathode-Ray Tube (CRT)
 - Flat-Panel Display

Cathode-Ray Tube (CRT) Monitor

- The CRT display is made up of small picture elements called pixels. The smaller the pixels, the better the image clarity or resolution. It takes more than one illuminated pixel to form a whole character, such as the letter 'e' in the word help.



Disadvantage of CRT Monitor

- Because CRT monitors are big, they take up desktop space and can be difficult to move.
- CRT monitors require a lot of power to run; therefore, they are not practical for use with notebook computers.

Flat-Panel Monitors

The flat-panel display refers to a class of video devices that have reduced volume, weight and power requirement in comparison to the CRT. You can hang them on walls or wear them on your wrists. Current uses of flat-panel displays include calculators, video games, monitors, laptop computer, and graphics display.



The flat-panel display is divided into two categories-

- **Emissive Displays** – Emissive displays are devices that convert electrical energy into light. For example, plasma panel and LED (Light-Emitting Diodes).
- **Non-Emissive Displays** – Non-emissive displays use optical effects to convert sunlight or light from some other source into graphics patterns. For example, LCD (Liquid-Crystal Device).

Disadvantage of LCD monitors

- Their images can be difficult to see in bright light.
- They have limited viewing angle.
- Slow response times
- In high temperature environments there is loss of contrast.
- It consumed a lot of electricity which produce a lot of heat.

Comparing Monitors

- » Size
- » Resolution
- » Refresh rate
- » Dot pitch
- » Contrast ratio

Comparing Monitors

- » Size: A monitor's size affects how well you can see images. With a larger monitor you can make the objects on the screen appear bigger, or you can fit more of them on the screen.
- buy the largest monitor you can afford.

Comparing Monitors

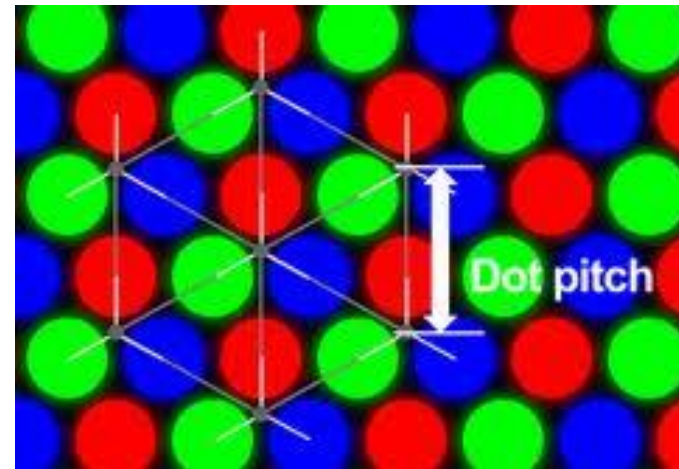
- » Resolution: The term resolution refers to the sharpness or clarity of an image.
- A monitor's resolution is determined by the number of pixels on the screen, expressed as a matrix.
- The more pixels a monitor can display, the higher its resolution and the clearer its images appear.
- 640 X 480

Comparing Monitors

- » Refresh rate: A monitor's refresh rate is the number of times per second that the electron guns scan every pixel on the screen.
- Refresh rate is important because phosphor dots fade quickly after the electron gun charges them with electrons.

Comparing Monitors

- » Dot pitch: the distance between the like-colored phosphor dots of adjacent pixels.
- As a general rule, the smaller the dot pitch, the finer and more detailed images will appear on the monitor.



Comparing Monitors

- » Contrast ratio : The ratio between the darkest and brightest point.

Video Cards

- the video controller is an intermediary device between the CPU and the monitor.
- It contains the video-dedicated memory and other circuitry necessary to send information to the monitor for display on the screen.
- In most computers, the video card is a separate device that is plugged into the motherboard.
- In many newer computers, the video circuitry is built directly into the motherboard, eliminating the need for a separate card.

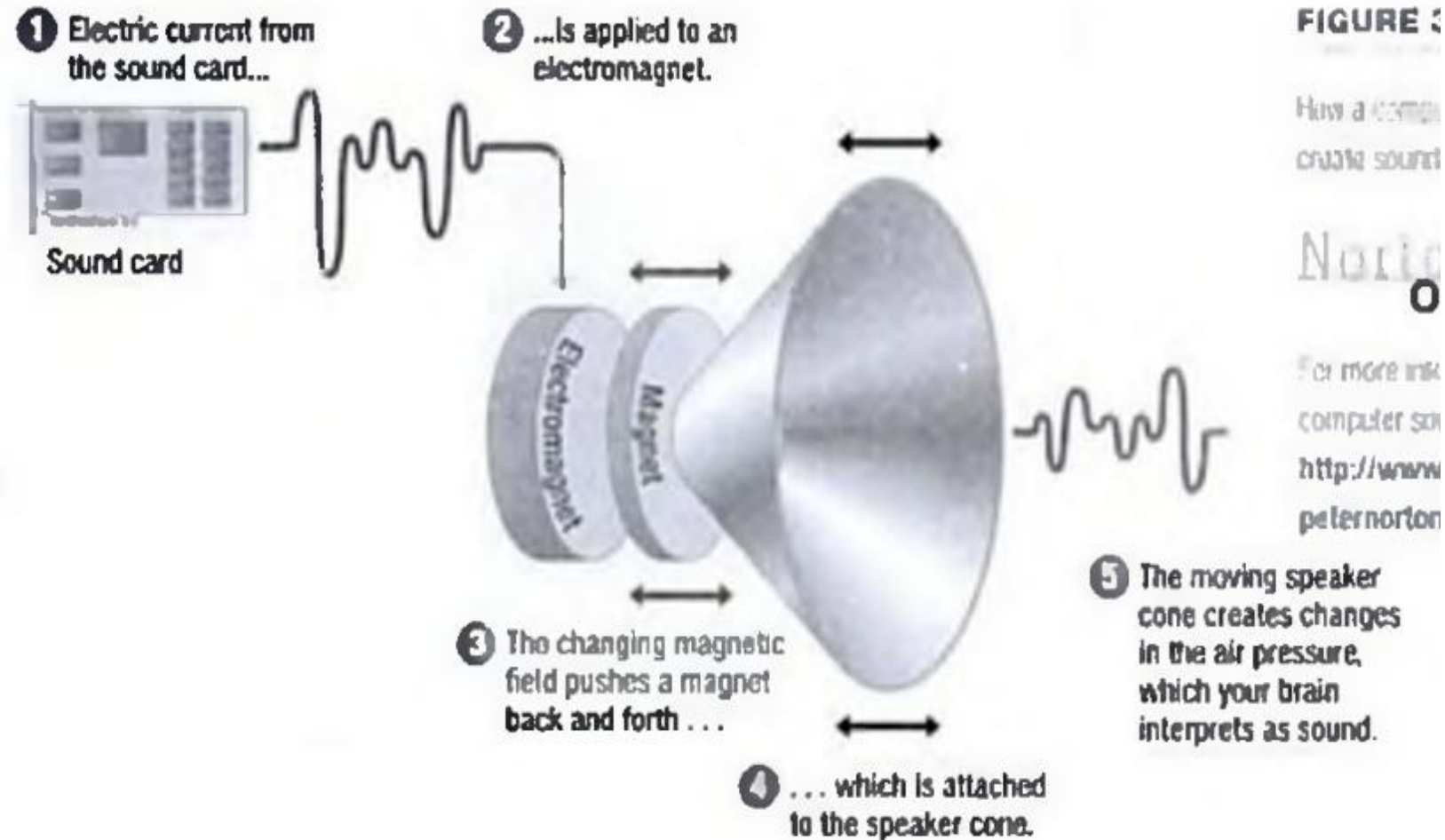
Data Projectors

- A data projector plugs into one of the computer ports and then projects the video output onto an external surface
- Most projectors use LCD technology to create images.
- Newer models use digital light processing (DLP) technology to project brighter, crisper images.
- DLP devices use a special microchip called a digital micro mirror device, which actually uses mirrors to control the image display.
- Unlike LCD-based projectors, DLP units can display clear images in normal lighting conditions.

Sound Cards

- sound card is a circuit board that converts sound from analog to digital form, and vice versa, for recording or playback.
- A sound card actually has both-
 - input and output functions

How Computer Use Speakers To Create Sound



Commonly Used Printers

- Generally, printers fall into two categories-
 1. **Impact printer:** creates an image by using pins or hammers to press an inked ribbon against the paper. **Ex: Dot matrix printer.**
 1. **Nonimpact printers** use other means to create an image.
Ink jet printers, for example, use tiny nozzles to spray droplets of ink onto the page. **Laser printers** work like photocopiers, using heat to bond microscopic particles of dry toner to specific parts of the page

Dot Matrix Printers

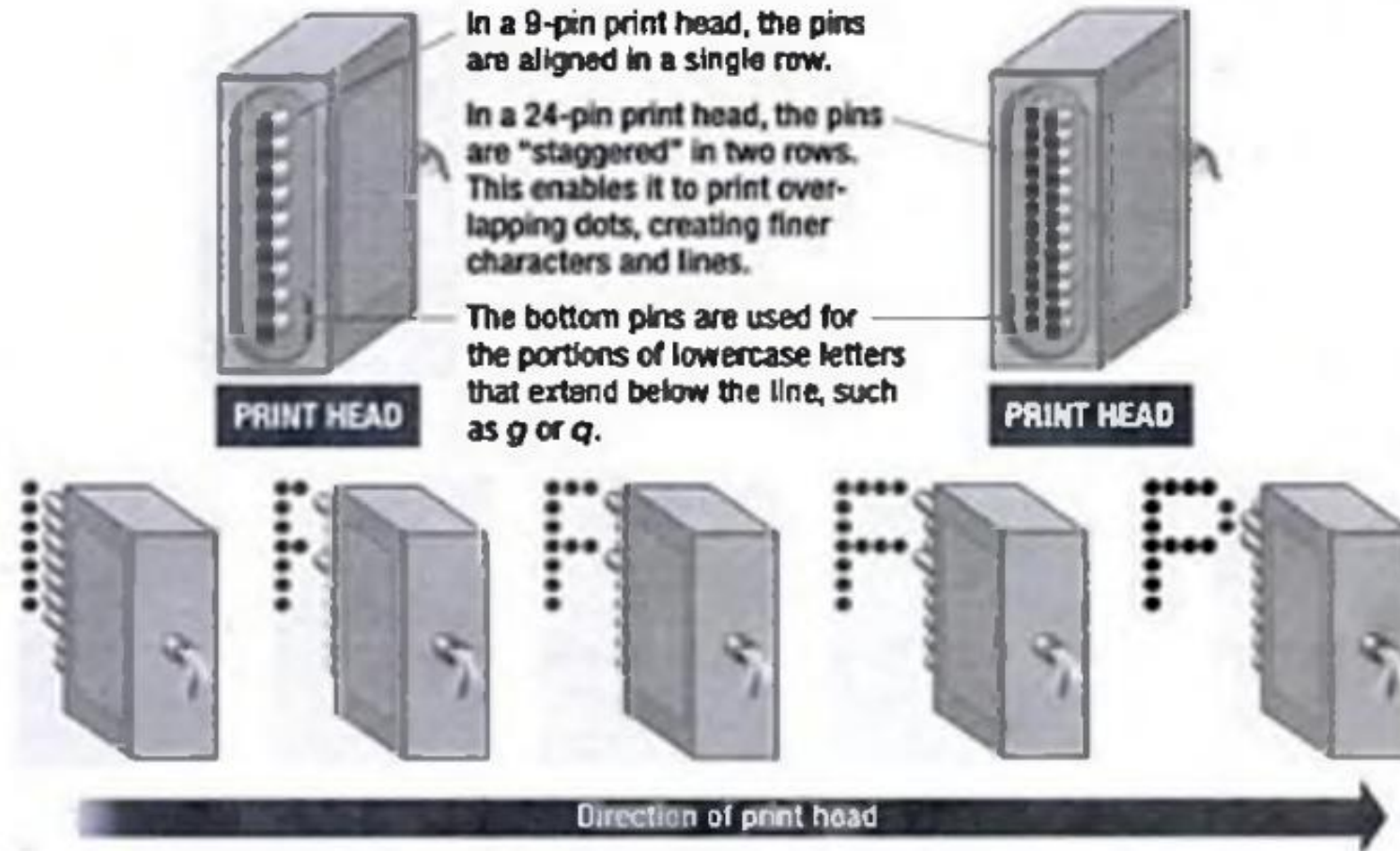
- Dot matrix printers are commonly used in workplaces where physical impact with the paper is important, such as when the user is printing to carbon copy or pressure-sensitive forms.
 - can produce sheets of plain text very quickly.
 - are used to print very wide sheets



Dot Matrix Printers

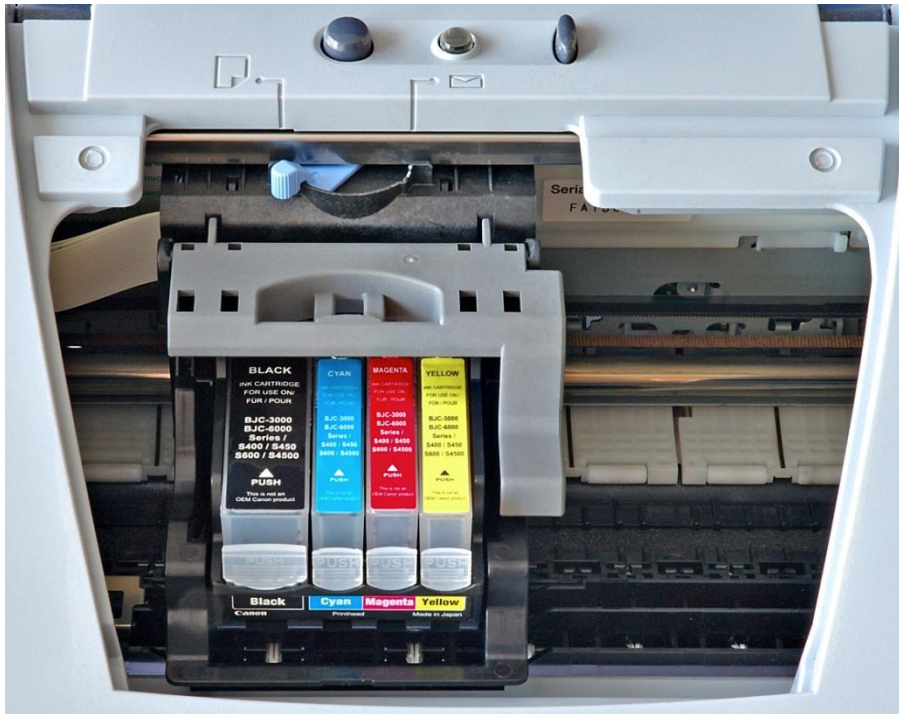
- A dot matrix printer creates an image by using a mechanism called a **print head**, which contains a cluster (or matrix) of short pins arranged in one or more columns.

Dot Matrix Printers



Ink Jet Printers

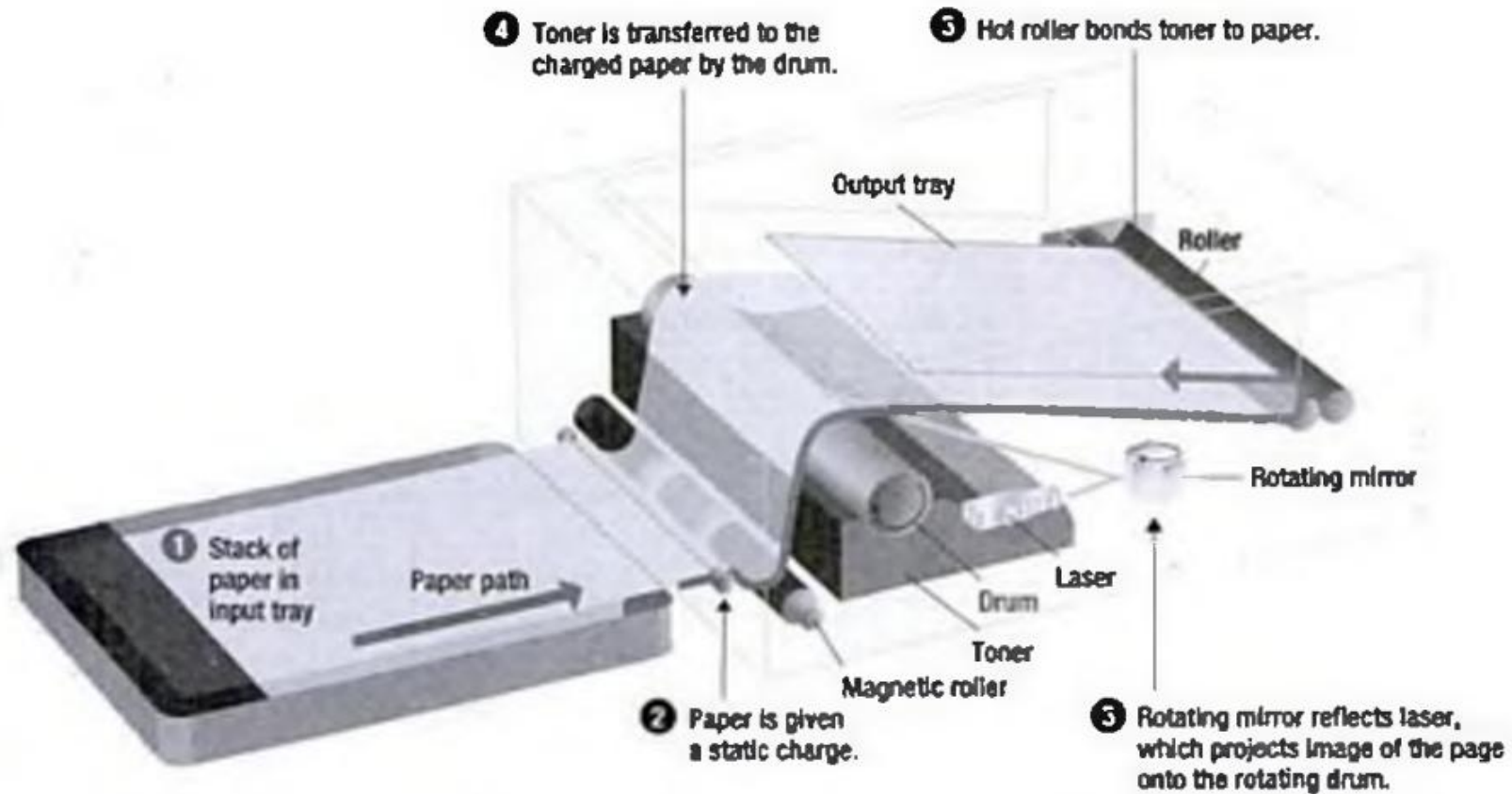
- Ink jet printers create an image directly on the paper by spraying ink through tiny nozzles.



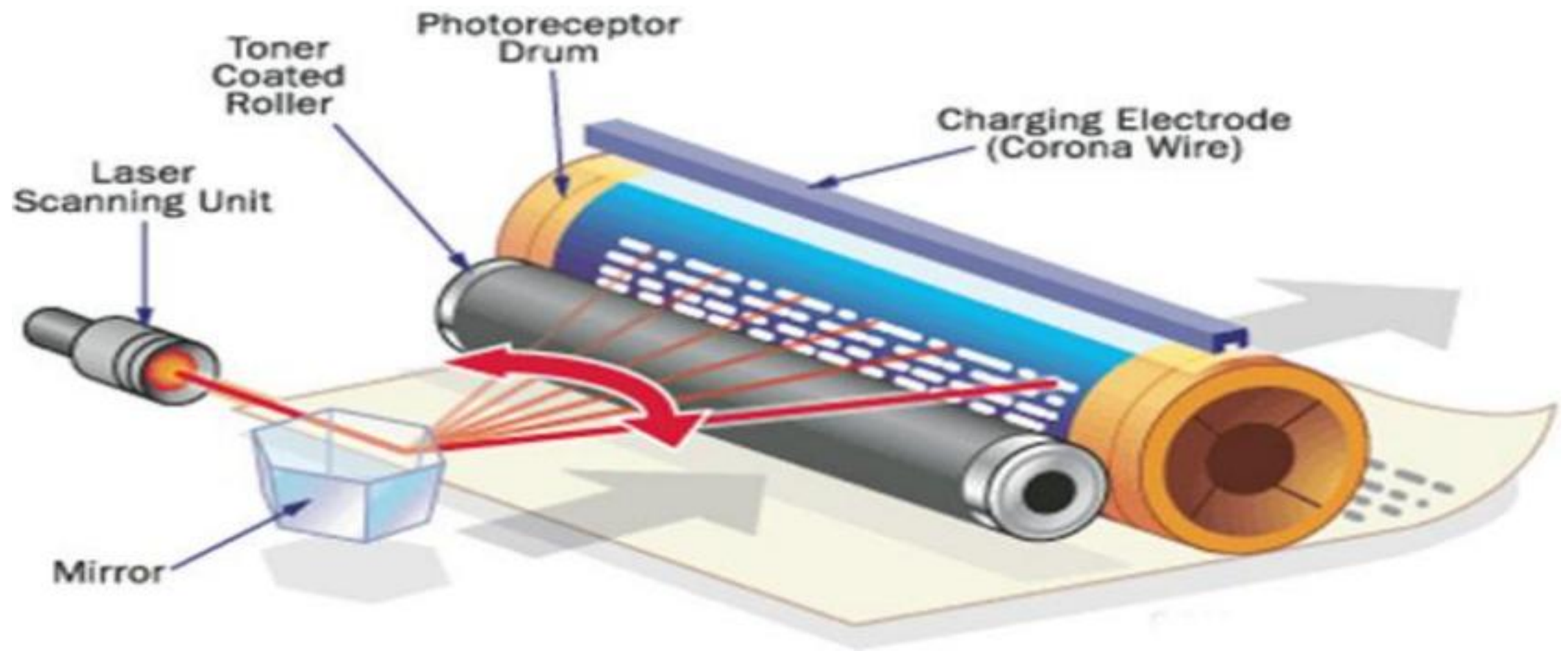
Ink Jet Printers

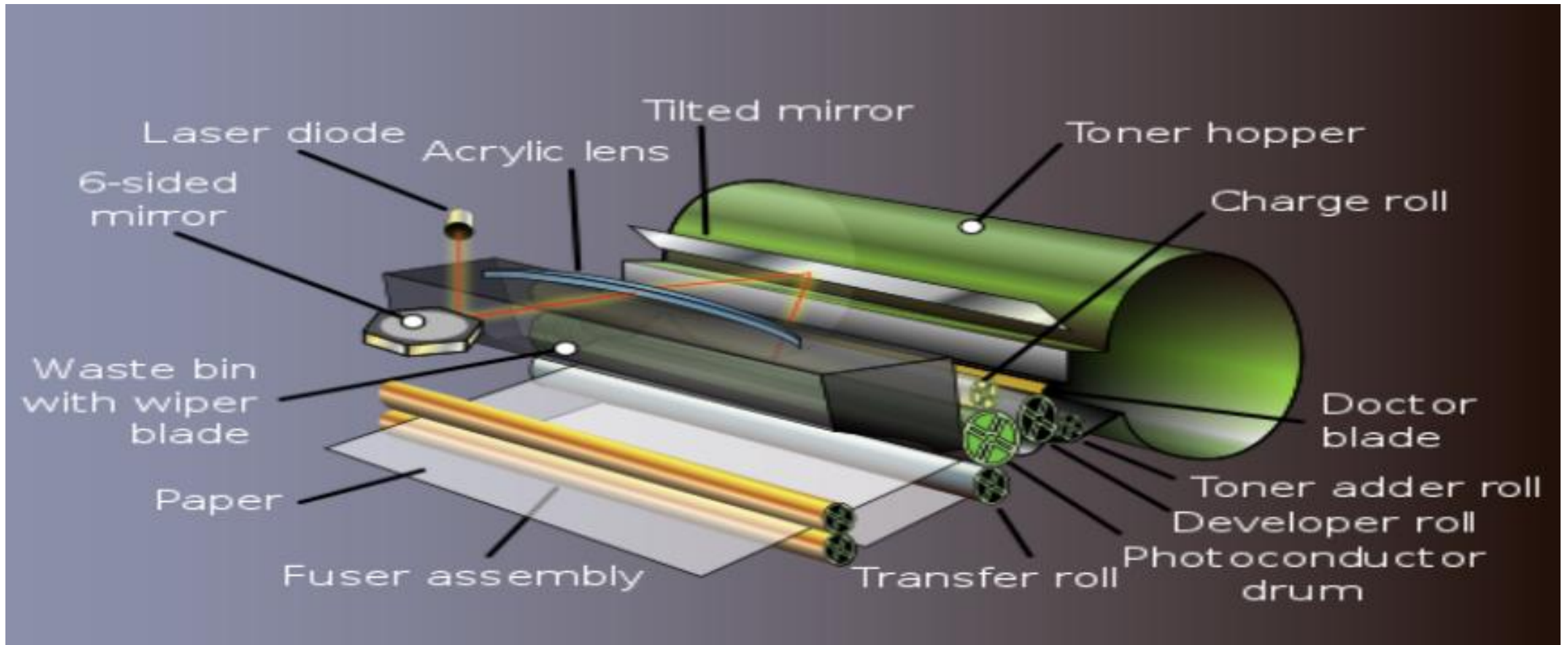
- Color ink jet printers have four ink nozzles:
 - Cyan (blue)
 - Magenta (red)
 - Yellow
 - Black
- These four colors are used in almost all color printing because it is possible to combine them to create any color.

Laser Printer



Seeing, Hearing, and Printing Data





How does laser printer work?

- The electronic circuit activates the **corona wire**. This is a high-voltage wire that gives a static electric charge to anything nearby.
- The corona wire charges up the **photoreceptor drum** so the drum gains a positive charge spread uniformly across its surface.
- At the same time, the circuit activates the **laser** to make it draw the image of the page onto the drum. The laser beam doesn't actually move: it bounces off a moving [mirror](#) that scans it over the drum. Where the laser beam hits the drum, it erases the positive charge that was there and creates an area of negative charge instead.

- An **ink roller** touching the photoreceptor drum coats it with tiny particles of powdered ink (toner). The toner has been given a positive electrical charge, so it sticks to the parts of the photoreceptor drum that have a negative charge (remember that opposite electrical charges attract in the same way that opposite poles of a magnet attract). No ink is attracted to the parts of the drum that have a positive charge. An inked image of the page builds up on the drum.
- A sheet of **paper** from a hopper on the other side of the printer feeds up toward the drum. As it moves along, the paper is given a strong negative electrical charge by another corona wire.
- When the paper moves near the drum, its negative charge attracts the positively charged toner particles away from the drum. The image is transferred from the drum onto the paper but, for the moment, the toner particles are just resting lightly on the paper's surface.
- The inked paper passes through two hot rollers (the **fuser unit**). The heat and pressure from the rollers fuse the toner particles permanently into the fibers of the paper.
- The **printout** emerges from the side of the copier. Thanks to the fuser unit, the paper is still warm. It's literally hot off the press!

Comparing Printers

- Image Quality.
- Speed.
- Initial Cost.
- Cost of Operation.