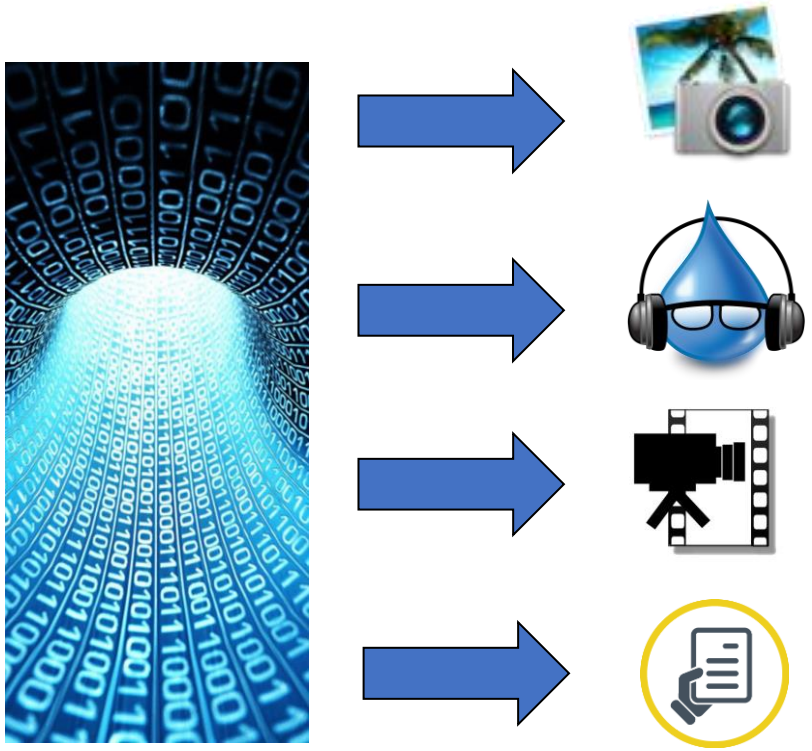
# OUTPUT DEVICE

# OUTPUT DEVICE

- Convert (digital) computer data into something useful for humans in external world:
  - Images
  - Music
  - Movies
  - Documents
- Many different types
- A few general purpose
- Mostly specialised



# COMMONLY USED OUTPUT DEVICES

- Monitors
- Printers
- Plotters
- Screen image projector
- Voice response systems

# MONITOR

- Used to be called a Visual Display Unit (VDU)
- Used to use Cathode Ray Tube (CRT) like old TVs
- Now flat screen like modern TVs
  - Liquid Crystal Display (LCD)
  - Plasma
  - Lower weight and size
  - Use less power
  - Do not flicker (good ergonomic feature)

**CRT**

**LCD**


**LED**

**Plasma**

# MONITOR

- Screen sizes vary enormously:
  - Smartphone
  - Tablet
  - Netbook
  - Laptop
  - Desktop
  - Home TV for PC

# PRINTER

- Device for getting computer-based (digital) information onto paper
- ‘Soft-copy’ to ‘hard-copy’
- Various technology evolutions:
  - **Dot matrix:** An ‘impact’ printer, hitting an inked ribbon on to the paper. Obsolete now.
  - **Inkjet:** Squirts jets of ink onto paper - very fine control available. Multiple ink colours available and cheap to buy. Can be expensive to run (ink cartridges) but good for home use (photo printers) & small offices.
- Different types of printer & working procedure
  - https://www.youtube.com/watch?v=JEVurb1uVFA

# DOT MATRIX PRINTER

- Character printers that form characters and all kinds of images as a pattern of dots
- Print many special characters, different sizes of print and graphics such as charts and graphs
- Impact printers can be used for generating multiple copies by using carbon paper or its equivalent
- Slow, with speeds usually ranging between 30 to 600 characters per second
- Cheap in both initial cost and cost of operation

# DOT MATRIX PRINTER

**Formation of Characters as a pattern of dots**

- ABCDEFGHIJKLMNOPQRSTUVWXYZ
- 0123456789-.,
- &/$*#%@=(+)


https://www.youtube.com/watch?v=I_VBe3OO9dI

# INK JET PRINTER

- Character printers that form characters and all kinds of images by spraying small drops of ink on to the paper
- Print head contains up to 64 tiny nozzles that can be selectively heated up in a few micro seconds by an integrated circuit register
- To print a character, the printer selectively heats the appropriate set of nozzles as the print head moves horizontally
- Can print many special characters, different sizes of print, and graphics such as charts and graphs

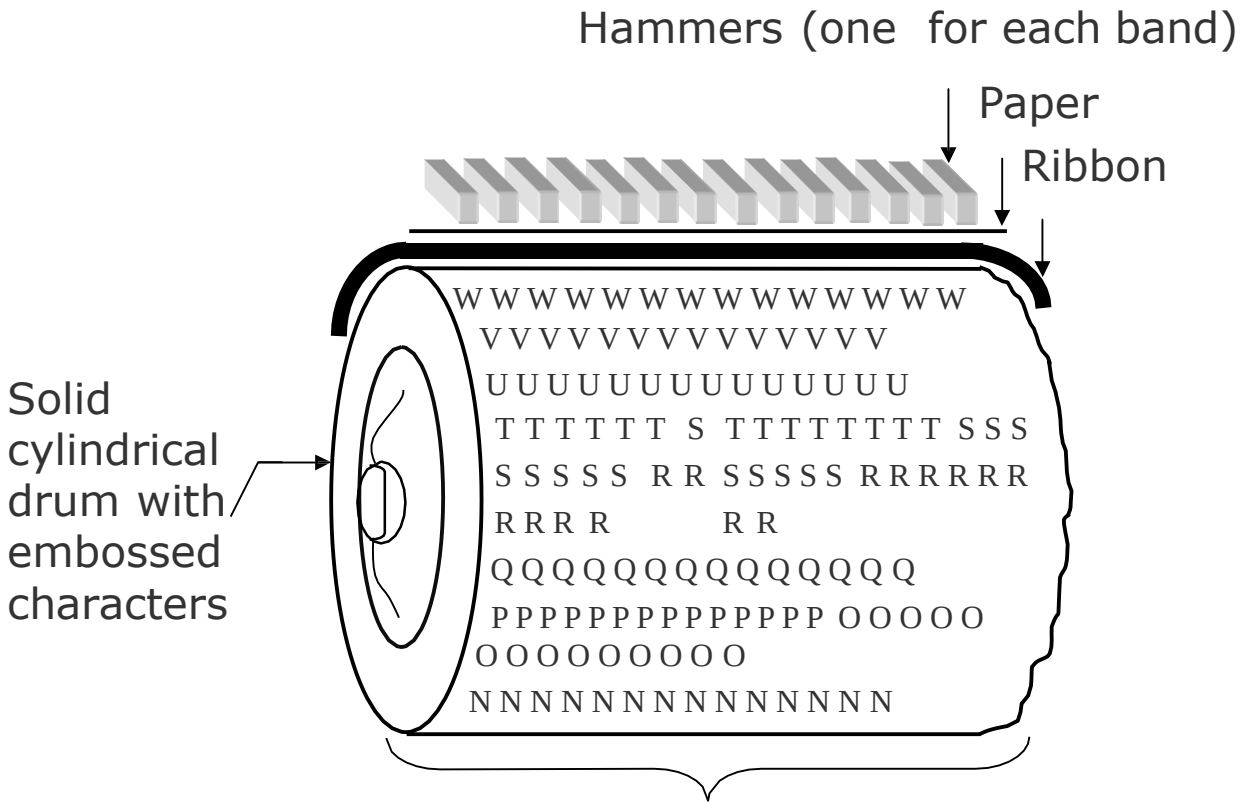
# INK JET PRINTER

- Non-impact printers. Hence, they cannot produce multiple copies of a document in a single printing
- Can be both monochrome and color
- Slower than dot-matrix printers with speeds usually ranging between 40 to 300 characters per second
- More expensive than a dot-matrix printer
- How ink jet printer works
  - https://www.youtube.com/watch?v=9yeZSaigBj4

# DRUM PRINTER

- Line printers that print one line at a time
- Have a solid cylindrical drum with characters embossed on its surface in the form of circular bands
- Set of hammers mounted in front of the drum in such a manner that an inked ribbon and paper can be placed between the hammers and the drum
- Can only print a pre-defined set of characters in a pre- defined style that is embossed on the drum
- Impact printers and usually monochrome
- Typical speeds are in the range of 300 to 2000 lines per minute
- https://www.youtube.com/watch?v=wlL8zMhxyes

# PRINTING MECHANISAM OF DRUM PRINTER



# LASER PRINTER

- Page printers that print one page at a time
- Consist of a laser beam source, a multi-sided mirror, a photoconductive drum and toner (tiny particles of oppositely charged ink)
- To print a page, the laser beam is focused on the electro statically charged drum by the spinning multi-sided mirror
- Toner sticks to the drum in the places the laser beam has charged the drum's surface.
- Toner is then permanently fused on the paper with heat and pressure to generate the printer output
- Laser printers produce very high quality output having resolutions in the range of 600 to 1200 dpi
- How it works - https://www.youtube.com/watch?v=WB0HnXcW8qQ

# LASER PRINTER

# PLOTTER

- Uses vector or co-ordinate (x-y) graphics to drive pens over paper or uses inkjet technology over much larger than standard paper
- Excellent for detailed drawings and plans
- Good for very large sheets
- Specialist applications like:
  - Architectural drawings
  - Digital mapping
  - Engineering drawings

# PLOTTER

- Two commonly used types of plotters are:
  - ***Drum plotter***, in which the paper on which the design has to be made is placed over a drum that can rotate in both clockwise and anti-clockwise directions
  - ***Flatbed plotter***, in which the paper on which the design has to be made is spread and fixed over a rectangular flatbed table

Drum Plotter

Flatbed Plotter

# SCREEN IMAGE PROTECTOR

- An output device that can be directly plugged to a computer system for projecting information from a computer on to a large screen
- Useful for making presentations to a group of people with direct use of a computer
- Full-fledged multimedia presentation with audio, video, image, and animation can be prepared and made using this facility

# VOICE RESPONSE SYSTEM

- Voice response system enables a computer to talk to a user
- Has an audio-response device that produces audio output
- Such systems are of two types:
  - Voice reproduction systems
  - Speech synthesizers

# QUICK BRAIN – Sample Question 1

- What is Output device?
- Which device can perform both input & output operations in a computer system? Briefly explain