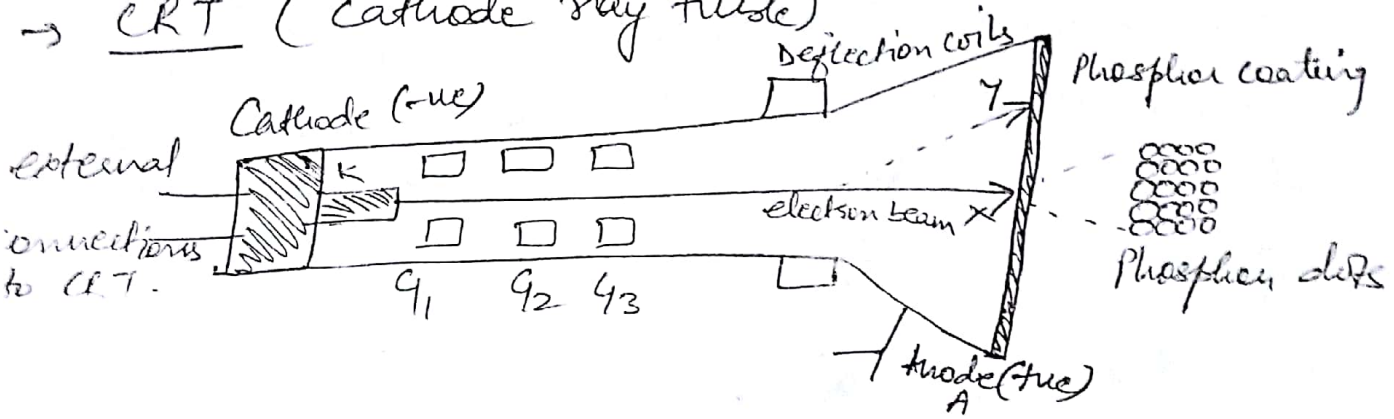
Visual Display Systems

→ Components:
- monitor
- Video adapter card (interface b/w processor & monitor)
- Video adapter cable (transmission of signals).

→ CRT (cathode ray tube)



- vacuum tube sealed glass & electrodes inside (+ve) & (-ve).
- Phosphor has property of emitting glow of light when hit by electrons.
- Phosphor dots are pixels (picture elements).
- Deflection coil → horizontal (horizontally across the screen)
  → Vertical (vertically along height of the screen).
- high voltage order 18 Kv.
- ~~control~~ grids
  - g_1 (control grid): amt. of electrons in the beam & ∴ its strength
  - g_2 (accelerating): acceleration in fwd direction
  - g_3 (focussing): focus to point X, so that diameter of beam = diameter of single spot of phosphor.

↳ Raster Scanning : beam starts from upper left corner of screen & sequentially moves over each pixel row, from left to right (fwd trace).

↳ beam is ON, pixels glow.

↳ end of each horizontal line, beam gets off & retraces diagonally to the beginning of next row (horizontal retrace).

↳ After reaching the lower right corner, beam turns off & moves diagonally to the start point (vertical retrace).

↳ Persistence of vision

↳ electron beam produces a complete frame

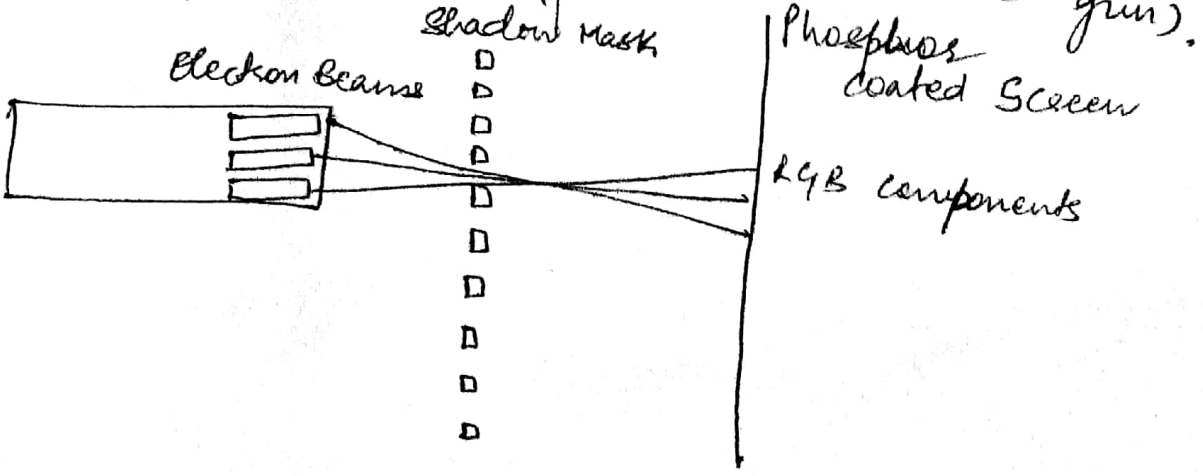
↳ holding on to an image.

↳ refresh rate

↳ Color CRT

↳ 3 colored dots (triad). RBG.

↳ 3 beams of electrodes from electrode (electron gun).



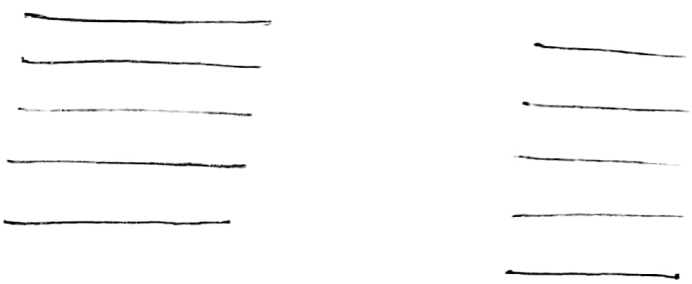
→ Interlacing : technique to lower refresh rates to produce images comparable in quality.

↳ each frame produced by raster scan is split into 2 halves.

↳ each half is called a field.

1st field → odd no. of pixel rows

2nd field → even no. of rows.



→ Aspect Ratio : ratio of horizontal no. of pixels to the vertical no. of pixels.

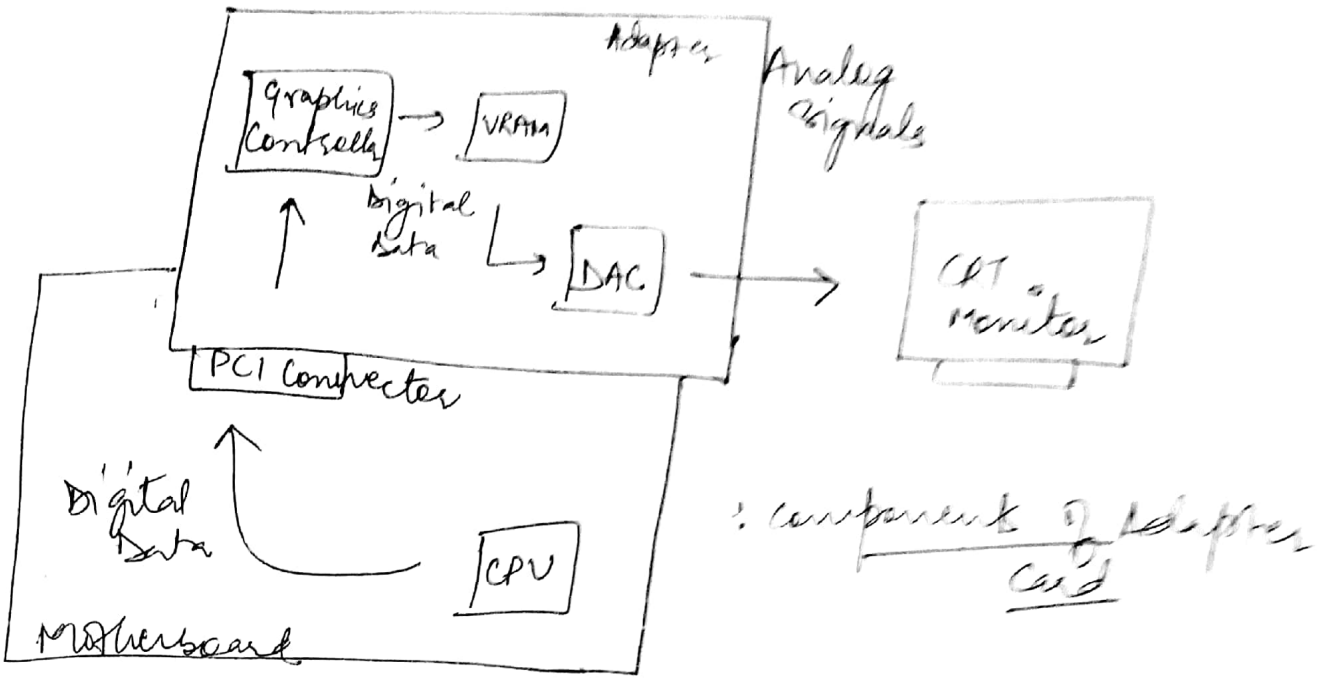
↳ Resolution : total no. of pixels per unit length of the monitor in the horizontal direction. (dots per inch).

→ Video Adapter Card

↳ sits on a slot on the motherboard.

↳ acts as an interface b/w processor & monitor

↳ digital data req'd for creating an image on the screen is generated by CPU & consists of RGB values for each pixel on the screen (pixel attributes)



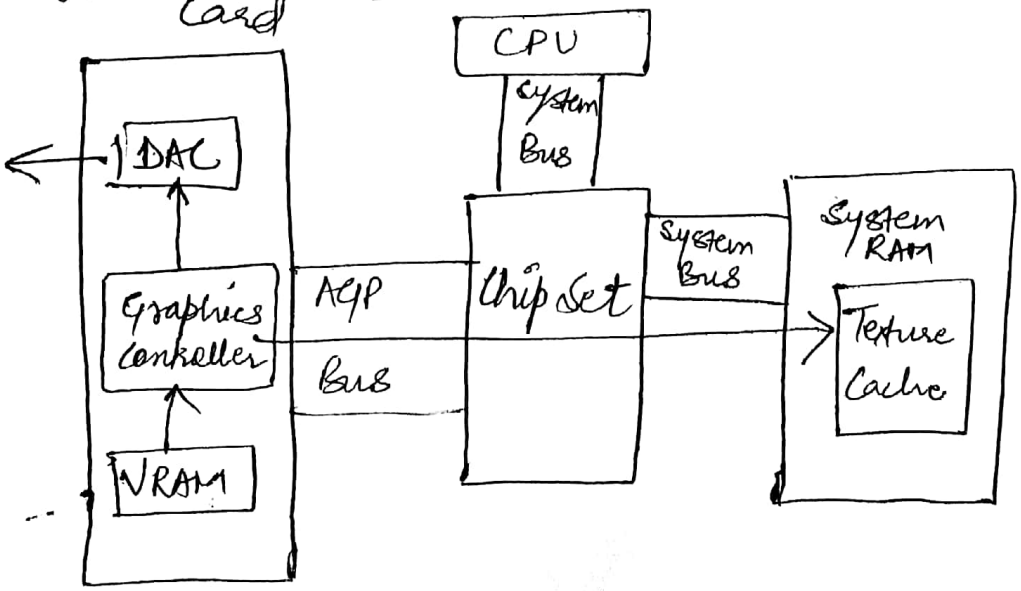
↳ Video Ram (VRAM): display memory

↳ Graphics Controller: chip on adapter card to coordinate activities of other component.
↳ Can manipulate image data independently of central processor.

↳ DAC: takes final digital data from the VRAM & converts into analog signals before sending them outwards to the monitor.
↳ digital data stored in VRAM describes pixel attributes needed to draw an image on the screen.
↳ DAC converts the pixel values into voltage signals & when applied to CRT would produce a varying beam of electrons.

AGP (Accelerated Graphics Port).

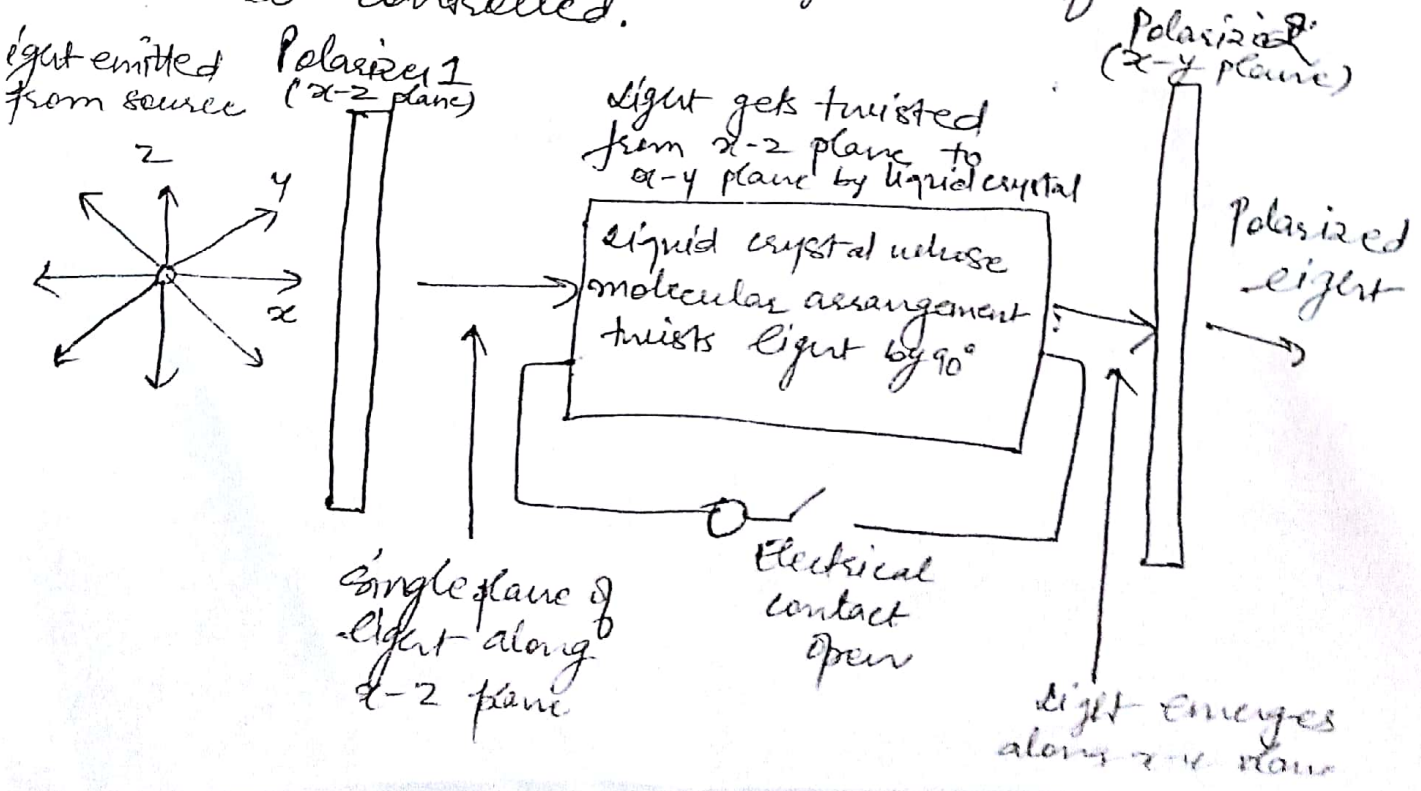
- removed pressure from existing PCI bus to transfer large amount of data
- AGP slot
- allows part of main memory to be used for storing video data.
- ideal for transferring huge amt of data req'd for displaying 3D graphics, animation.



Data flow using AGP.

→ LCD (Liquid Crystal Display)

- Liquid crystal is a transparent organic substance consisting of long rod like molecules.
- Helps of manipulating direction of light rays flowing thru it.
- Low power consumption & less expensive.
- LCD monitor is collection of LCD elements generating pixel on the screen.
- Liquid crystal layer sandwiched b/w 2 finely grooved surfaces ⊥ to each other & 2 optical polarizing filters ⊥ to each other.
- By flowing the liquid crystal over a finely grooved surface, the alignment of molecules can be controlled.



A filter / polariser can isolate a single plane of light from the collection.
A second polariser whose lines are ⊥ to the first would block all the polarised light.

Types of LCD devices

- Passive Matrix
- Active Matrix

Plasma Display Panel (PDP).

- Plasma is an energetic gas-phase state of matter.
- Collection of ions & electrons, & are ionized or charged.
- Emissive flat panel display where light is created by phosphors excited by a plasma discharge b/w 2 flat panels of glass.