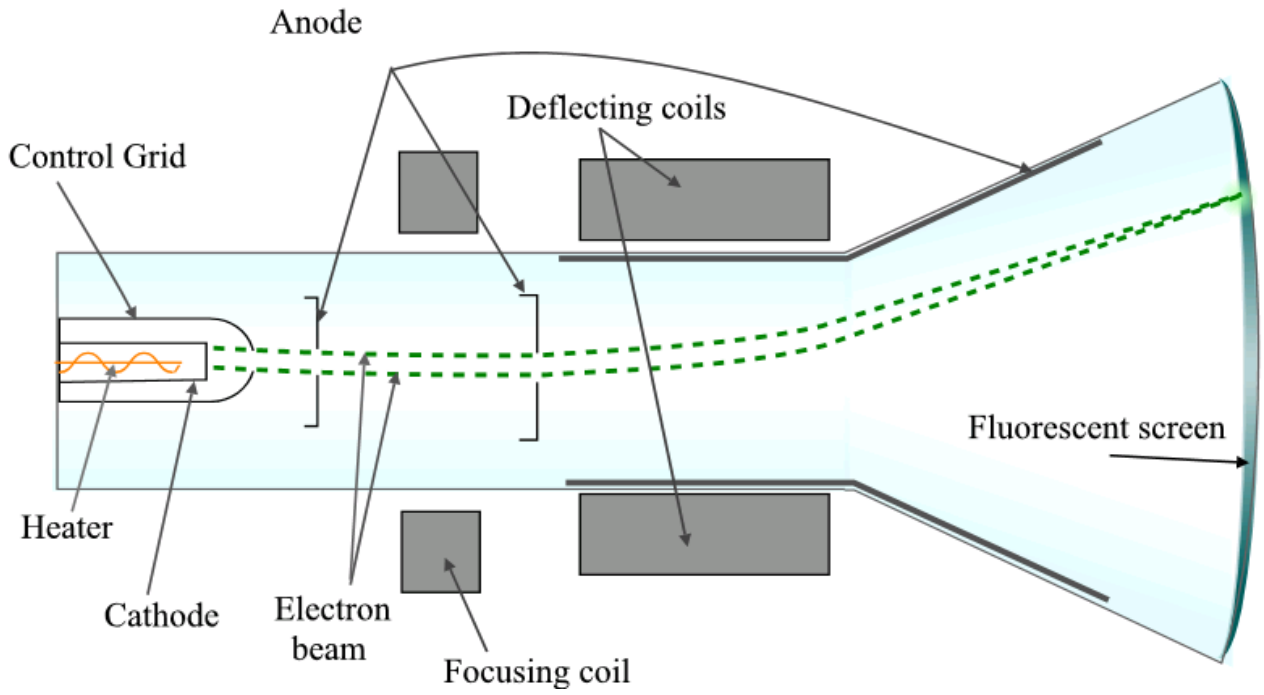
EIPC (NEE-403)
Unit-4
Display Devices & Recorders

Visual Display Devices

- Primary user hardware for displaying visual media such as graphics, text, images.
- Consists of components such as Monitor, Video adapter card, video adapter cable.
- Various such devices are CRT, color CRT, DVST, Flat Panel Displays (LCD & Plasma), LED monitors, etc.

Some Anatomy of the CRT

- Anode- Positively Charged, Ray travels towards this
- Cathode- Negatively Charged, Ray travels away from this



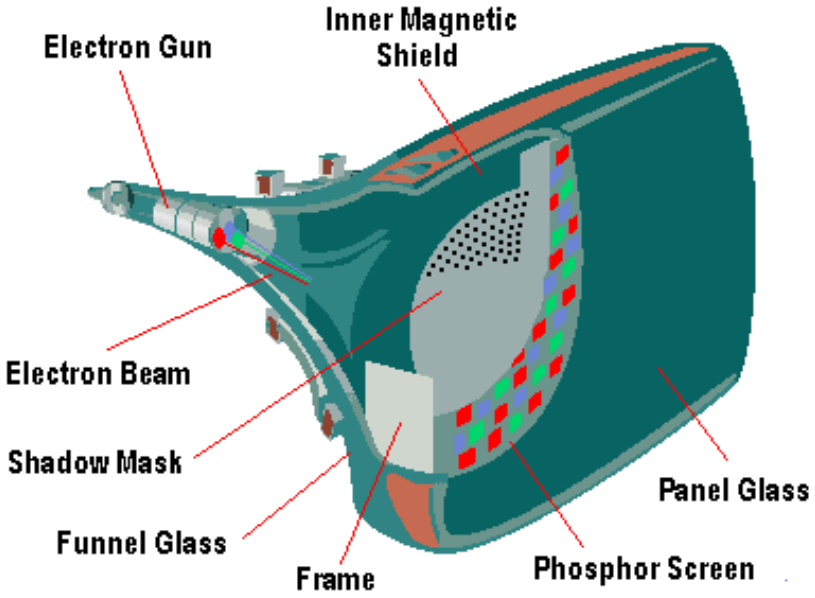
Cathode Ray Tube (CRT) Monitors

- A CRT monitor contains millions of tiny red, green, and blue phosphor dots that glow when struck by an electron beam. Electron beam travels across the screen to create a visible image.

- In a CRT monitor tube, the cathode is a heated filament.

- The heated filament is in a vacuum created inside a glass tube. The electrons are negative and the screen gives a positive charge so the screen glows.

Basic Cathode Ray Tube



- Electrons excite phosphor to glow
- Electrons fired from the back
- Phosphor is arranged in dots called pixels
- Dot mask ensures proper pixel is lit

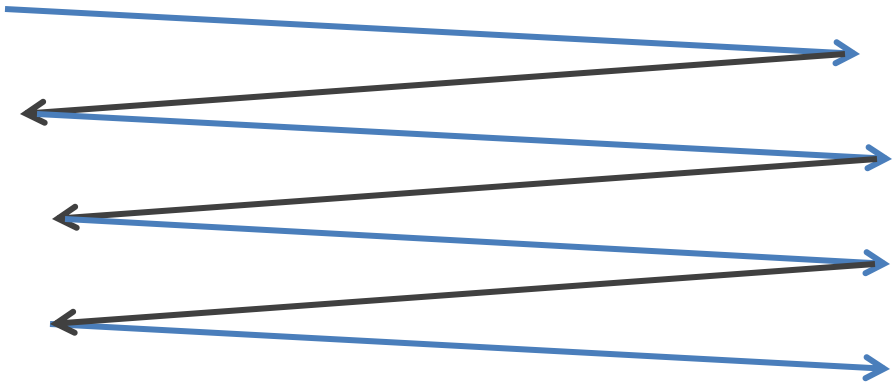
Phosphore

- It is a semi-conducteur material which emits visible radiation in response to the impact of electrons.

  (i.e. when it absorbs energy from some source such as an electron beam, it releases a portion of this energy in the form of light).
- In response to a sudden change in the electron beam(from on to off), the light emission does not fall instantaneously, there is a gradual reduction challed *'fluorescence'* .

Scanning Pattern of CRT Electron Gun

- The electron gun scans from left to right *and*
- From top to bottom.
- Refreshing every phosphor dot in a zig-zag pattern.



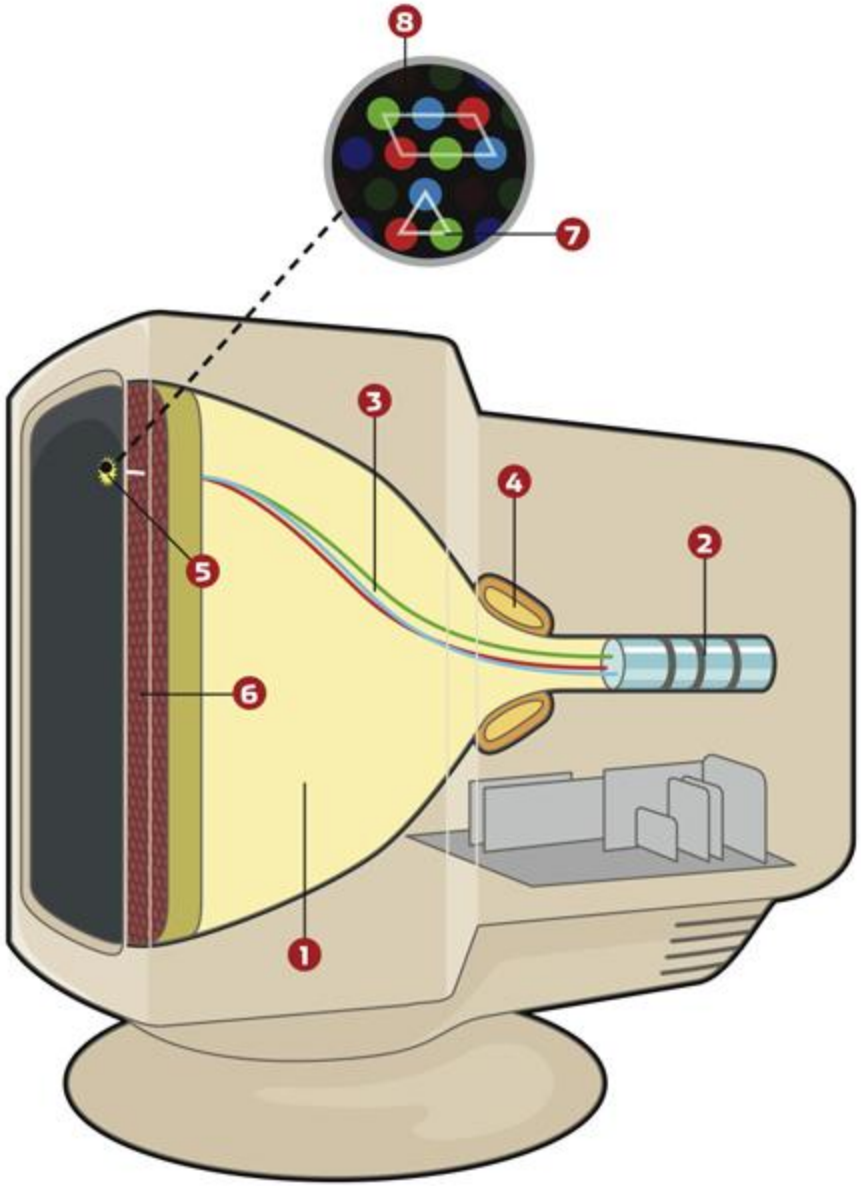
Advantages of CRT

- The cathode rayed tube can easily increase the monitor's brightness by reflecting the light.
- They produce more colours
- The Cathode Ray Tube monitors have lower price rate than the LCD display or Plasma display.
- The quality of the image displayed on a Cathode Ray Tube is superior to the LCD and Plasma monitors.
- The contrast features of the cathode ray tube monitor are considered highly excellent.

Disadvantages of CRT

- They have a big back and take up space on desk.
- The electromagnetic fields emitted by CRT monitors constitute a health hazard to the functioning of living cells.
- CRTs emit a small amount of X-ray band radiation which can result in a health hazard.
- Constant refreshing of CRT monitors can result in headache.
- CRTs operate at very high voltage which can overheat system or result in an implosion
- Within a CRT a strong vacuum exists in it and can also result in a implosion
- They are heavy to pick up and carry around

CRT



Liquid Crystal Display

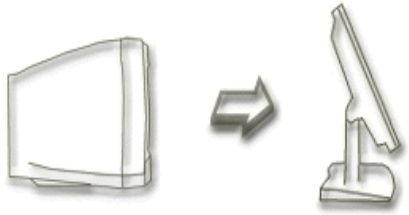
- It is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals (LCs).
- LCs do not emit light directly .

LCD History

- Liquid crystals were first discovered in 1888 by Austrian botanist Friedrich Reinitzer.
- RCA, an American Laboratory made the first experimental LCD in (1968).
- Manufacturers have been developing creative variations and improvements since on LCDs.
- In 1997, manufactures began to offer full size LCD monitors as alternatives to CRT monitors.
- Until recently, was only used on notebook computers and other portable devices.

From CRT to LCD

- CRT
  - Bulky, heavy, use vacuum tube technology.
  - Using technology that was developed in the 19th century.
- LCD
  - First LCD laptop monitors were very small due to manufacturing costs but now are available in a variety of sizes.
  - Light, sleek, energy-efficient, have sharp picture.



Liquid Crystal Display

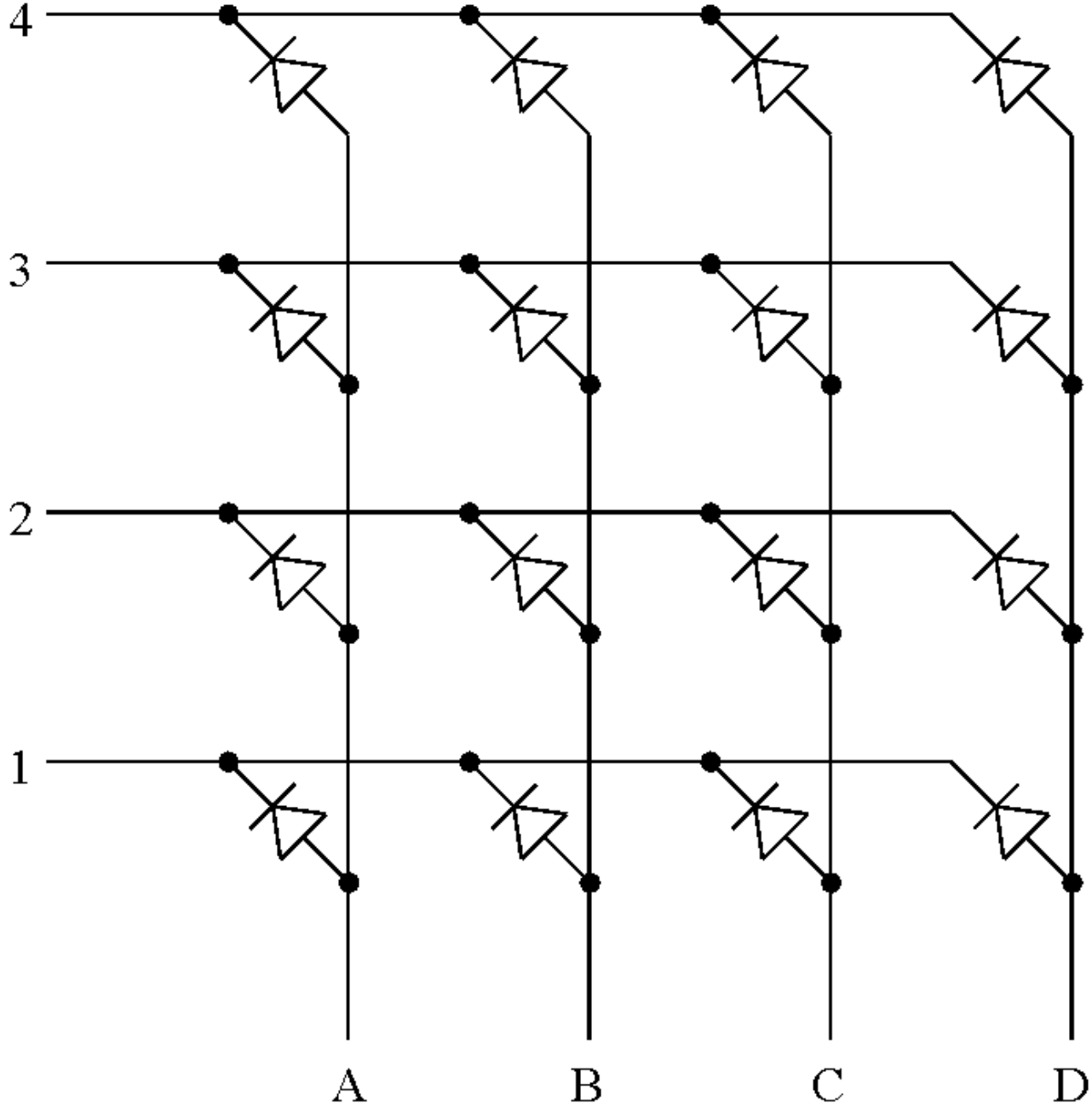
- There are mainly two categories of LCD.
  - The passive matrix LCD
  - The Active matrix LCD

Passive Matrix LCD

- Monochrome passive-matrix LCDs were standard in most early laptops.
  - Still being used today for applications less demanding than laptops and TVs.
  -
- It consisting of a grid of horizontal and vertical wires.
  - At the intersection of each grid is an LCD element which constitutes a single pixel, either letting light through or blocking it.

Passive Matrix LCD

- Passive matrix LCD
  - Pixels arranged in a grid
  - Pixels are activated indirectly
    - Row and column are activated
  - Animation can be blurry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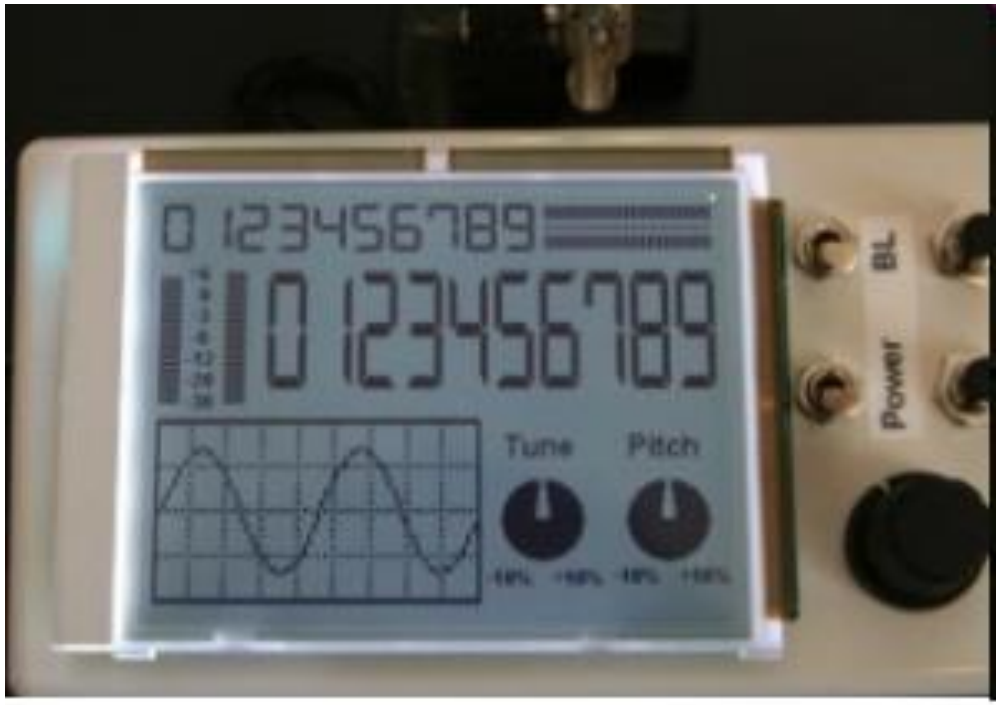
Passive Matrix Display



Active Matrix LCD

- **Active-matrix** LCDs depend on **thin film transistors** (TFT).
  - TFTs are tiny switching transistors and capacitors.
- They are arranged in a matrix on a glass substrate.
  - Each pixel is activated directly
  - Pixels have 4 transistors
    - One each for red, green, blue
    - One for opaqueness
  - Animation is crisp and clean

TFT LCD Screen

Advantages of LCD

- The sharpness of a LCD display is at maximum tweak ness.
- High peak intensity produces very bright images. Best for brightly lit environments.
- Screens are perfectly flat.
- Thin, with a small footprint. Consume little electricity and produce little heat
- The LCD display unit is very light and can be put anywhere or moved anywhere in the house.
- Lack of flicker and low glare reduce eyestrain.

Disadvantages of LCD

- After a while the LCD display the some of the pixels will die you will see a discoloured spot on a black spot on the display.
- The cost of a LCD is considerably at a high price.
- The LCD display will have slow response times.
- The LCD display has a fixed resolution display and cannot be changed.
- The viewing angle of a LCD display is very limited.

Thank You