

School of Mechanical Engineering

Course Code : BTME 3060

Course Name: Computer Aided Design

BTME 3060 Computer Aided Design Lecture 5

2nd Year

III Semester

Galgotias University

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Name of the Faculty: Pramod Kumar

Program Name: B.Tech

School of Mechanical Engineering

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Unit I: Introduction to CAD

- Syllabus
 - Product Development Cycle
 - Introduction to CAD, Hardware and software requirement of CAD;
 - Graphics input devices- cursor control devices, Digitizers, Scanners, speech oriented devices and touch panels,
 - **Graphics display devices- Refresh cathode ray tubes, Raster-scan displays, Random-scan displays, CRT Monitors;**
 - Input devices- keyboard, joy-stick, mouse, scanner;
 - DVST, Flat- panel display, Hard copy devices - Printers and Plotters, dot matrix, inkjet, laser printers,
 - Graphics Standards – Neutral File formats –IGES, STEP,
 - Graphics software, Graphics functions,
 - output primitives- Bresenham's Algorithm and DDA.

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Objective of the lecture

- Understanding of the Graphics display devices such as Refresh cathode ray tubes, Raster-scan displays, Random-scan displays, CRT Monitors;
- Comparative study between the raster and random-scan display

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Graphics display devices

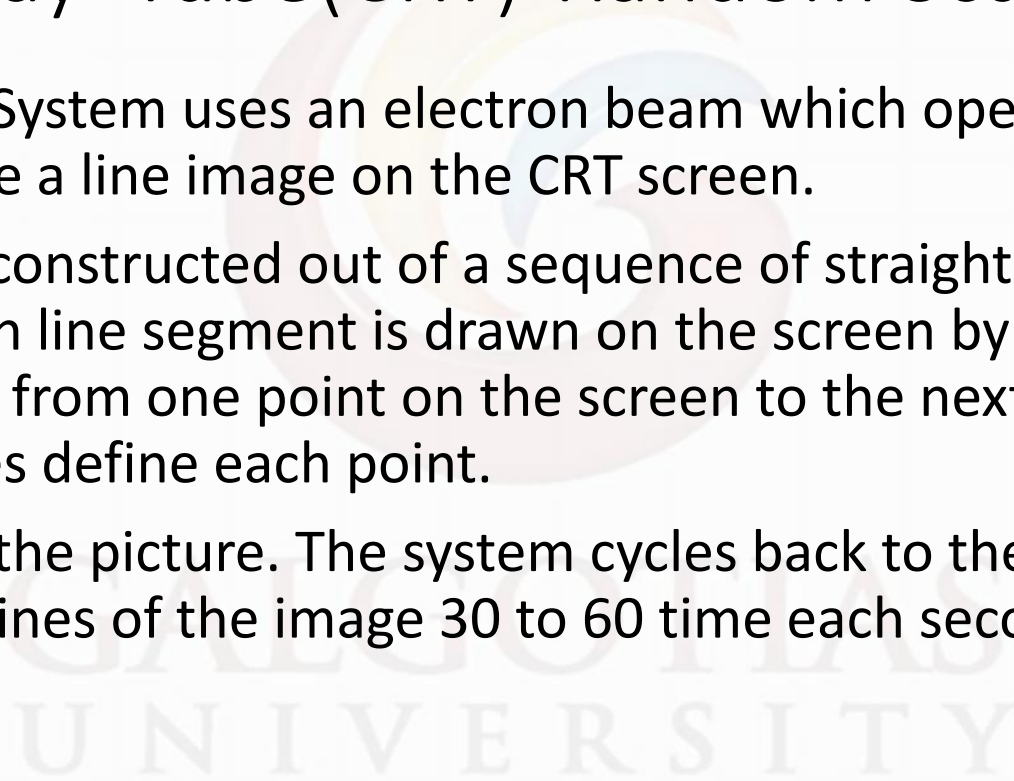
- CAD System uses various display devices and these display devices are the primary output devices.
- these devices are used to display graphical output on the screen to have a better visualization in real time.
- These devices not only display the image but is also used to interact with the image by adding deleting and modifying graphical entities on the screen.
- Thus due to interaction the graphics system are different from the passive graphic system, as in case of television.

Graphics Display Devices- classification

1. Cathode Ray Tube(CRT)
 - Raster Scan
 - Random Scan
2. Solid State Monitors(Flat Panel Display)
 - Emissive Display
 - Plasma Display
 - Thin Film Electroluminescent Display
 - LCD (Liquid Crystal Display)
3. Non-Emissive Display
 - LED(Light Emitting Diode)

Cathode Ray Tube(CRT)-Random Scan

- Random Scan System uses an electron beam which operates like a pencil to create a line image on the CRT screen.
- The picture is constructed out of a sequence of straight-line segments. Each line segment is drawn on the screen by directing the beam to move from one point on the screen to the next, where its x & y coordinates define each point.
- After drawing the picture. The system cycles back to the first line and design all the lines of the image 30 to 60 time each second.



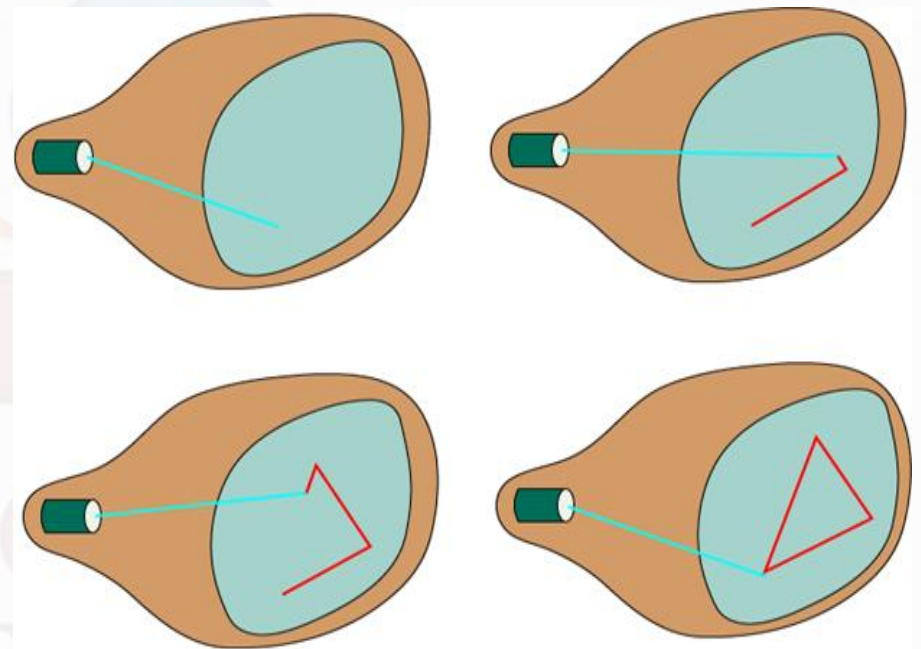
Cathode Ray Tube(CRT)-Random Scan

- Advantages:

- A CRT has the electron beam directed only to the parts of the screen where an image is to be drawn.
- Produce smooth line drawings.
- High Resolution

- Disadvantages:

- Random-Scan monitors cannot display realistic shades scenes.

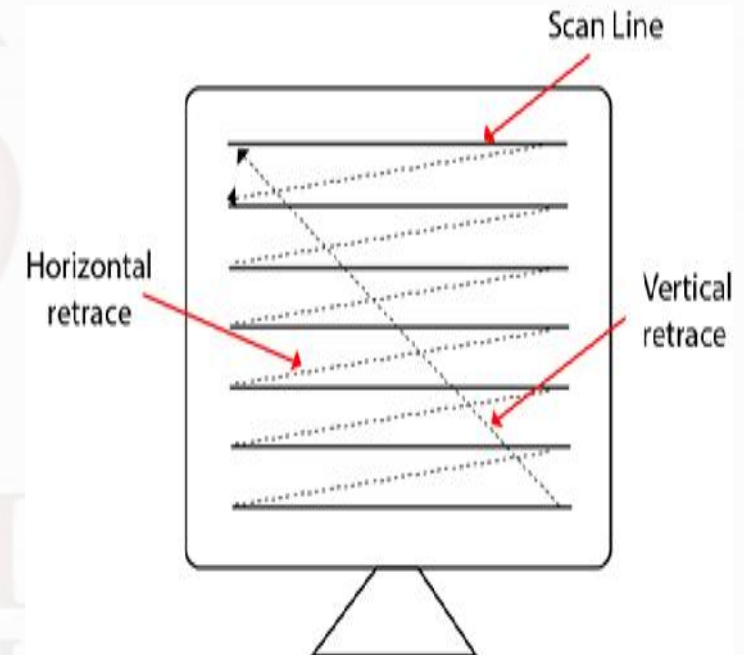


Raster Scan Display:

- A Raster Scan Display is based on intensity control of pixels in the form of a rectangular box called Raster on the screen.
- Information of on and off pixels is stored in refresh buffer or Frame buffer. Televisions in our house are based on Raster Scan Method.
- The raster scan system can store information of each pixel position, so it is suitable for realistic display of objects.
- Raster Scan provides a refresh rate of 60 to 80 frames per second.
- Frame Buffer is also known as Raster or bit map.
- In Frame Buffer the positions are called picture elements or pixels. Beam refreshing is of two types.
- First is horizontal retracing and second is vertical retracing.
- When the beam starts from the top left corner and reaches the bottom right scale, it will again return to the top left side called at vertical retrace.
- Then it will again move horizontally from top to bottom call as horizontal retracing shown in fig:

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- Types of Scanning or travelling of beam in Raster Scan
 - Interlaced Scanning
 - Non-Interlaced Scanning
- In Interlaced scanning, each horizontal line of the screen is traced from top to bottom. Due to which fading of display of object may occur. This problem can be solved by Non-Interlaced scanning. In this first of all odd numbered lines are traced or visited by an electron beam, then in the next circle, even number of lines are located.
- For non-interlaced display refresh rate of 30 frames per second used. But it gives flickers. For interlaced display refresh rate of 60 frames per second is used.



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- Advantages:
 - Realistic image
 - Million Different colors to be generated
 - Shadow Scenes are possible.
- Disadvantages:
 - Low Resolution
 - Expensive

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Differentiate between Random and Raster Scan

Display:

• Random Scan

1. It has high Resolution
2. It is more expensive
3. Any modification if needed is easy
4. Solid pattern is tough to fill
5. Refresh rate depends on resolution
6. Only screen with view on an area is displayed.
7. Beam Penetration technology come under it
8. It does not use interlacing method.
9. It is restricted to line drawing applications

Raster Scan

1. Its resolution is low.
2. It is less expensive
3. Modification is tough
4. Solid pattern is easy to fill
5. Refresh rate does not depend on the picture.
6. Whole screen is scanned.
7. Shadow mark technology came under
8. It uses interlacing
9. It is suitable for realistic display.

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Summery

- The display devices are important to the CAD system
- The technology of these devices are studied



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Questions

- Present the technology of the display devices
- Present the comparative study of the raster and random scan display



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Text book

- Display Device: Electronic Display Device and Application ... - Volume 3
- Display Devices and Systems , China Optics & Optoelectronic Manufacturers Association,

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- Thank you



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