



Computer Graphics

Week 1 Lecture 1

The background of the slide features a collage of various interlocking gears. The gears are primarily golden-brown and are scattered across the left and bottom portions of the slide. Some gears are larger and more prominent, while others are smaller and partially obscured. The overall aesthetic is mechanical and intricate.

Course Assessment

- Session 1 Examination 10% (Week 6)
- Session 2 Examination 15% (Week 13)
- Quizzes/Assignments 25%
- Terminal Examination 50% (Week 18)

Course Contents

- Introduction to Computer Graphics
- Fundamentals of input and display devices
- Geometrical Transformations
- Homogeneous Coordinates
- Representing curves and surfaces
- Solid modeling
- 2D transformations, translation, rotation, scaling, shear etc

Course Contents (2)

- Clipping
- Windowing techniques
- Modeling hierarchies
- 3D transformations
- Viewing in 3D
- Planar projections
- 3D curves and surfaces
- Perspective viewing
- 3D clipping
- Geometric algorithms for graphics problems,
with applications to ray tracing, hidden surface elimination, etc

Text Book

- ❖ Main text book: Computer Graphics Using Open GL by M.M. Raikar
- ❖ Other Reference Books:
 - Computer Graphics , C version by Hearn and Baker
 - Open GL programming Guide by Dave Shreiner
 - Computer Graphics Principles and Practices by Foley, van Dam, Feiner and Hughes

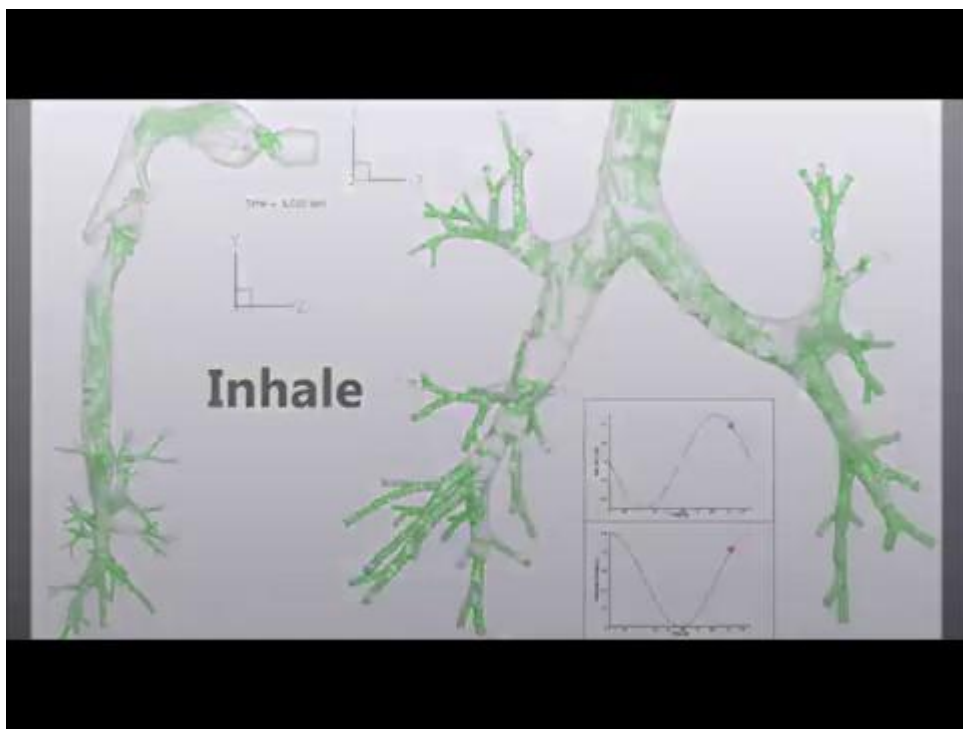
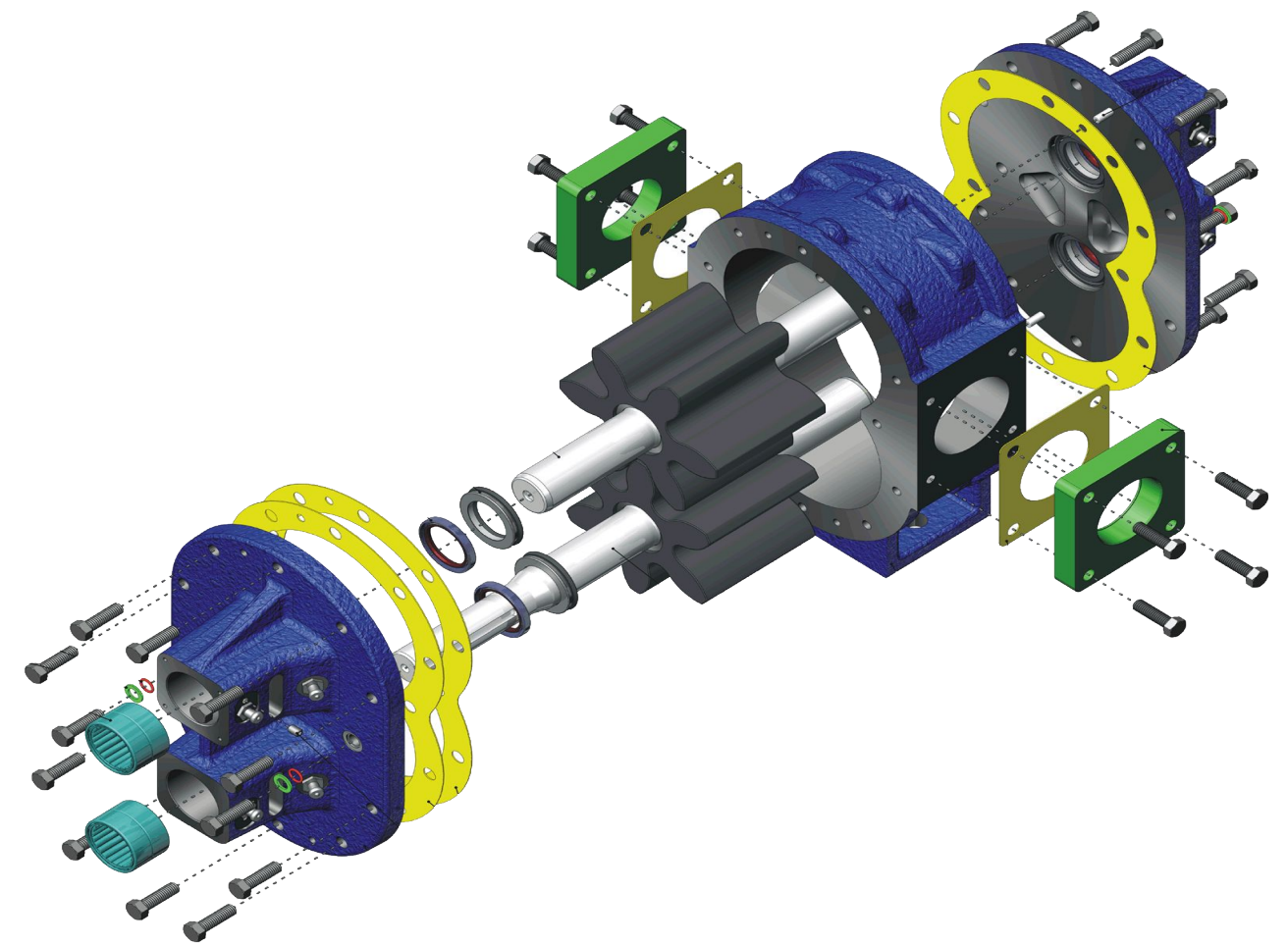
Why Study this Course ?
&
What will we be learning

Basic Terminologies

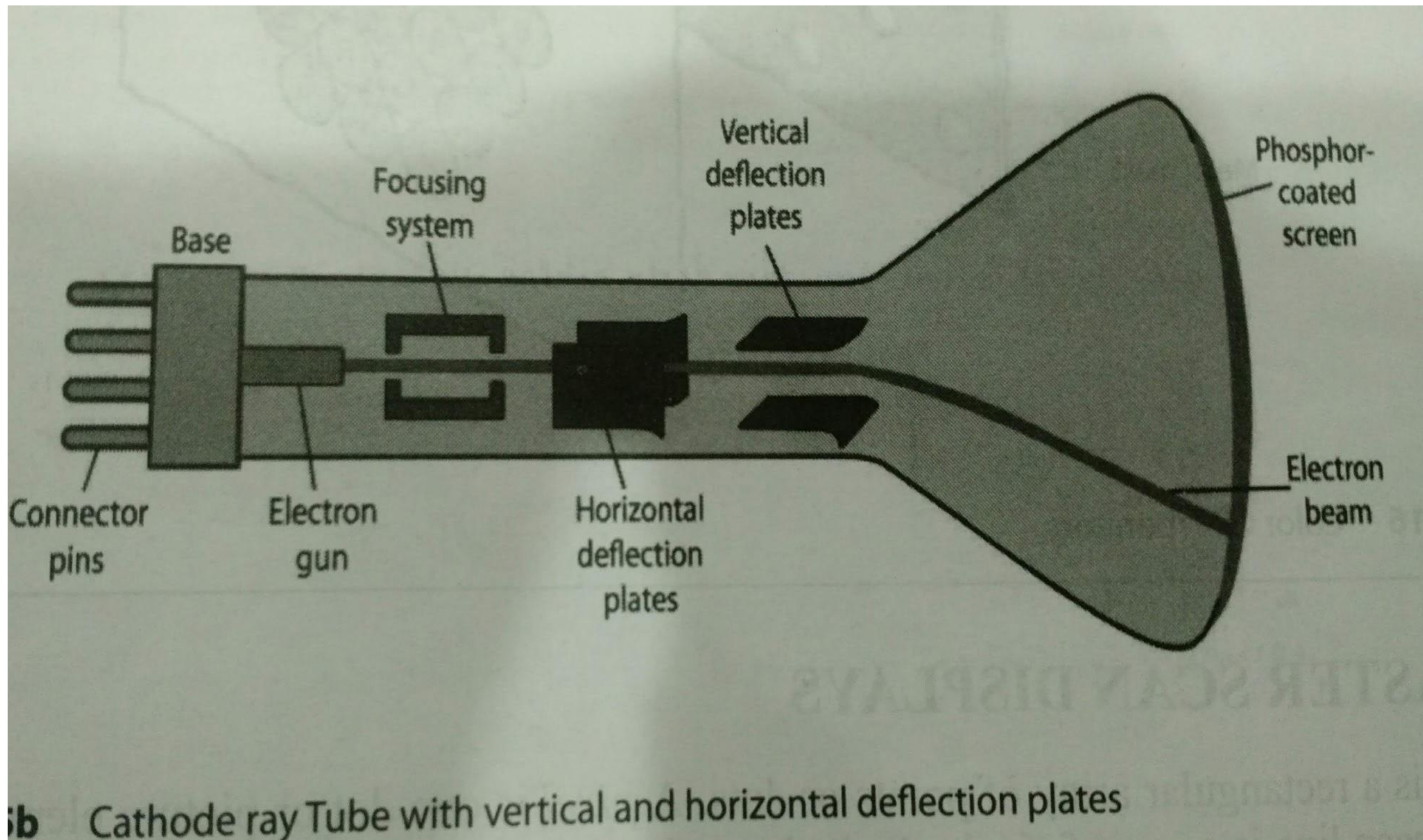
- What is Computer Graphics?
- How does Computer Graphics Differ from Image Processing?
- Phases of Graphics Pipeline:
 - Imaging = *representing 2D images*
 - Modeling = *representing 3D objects*
 - Rendering = *constructing 2D images from 3D models*
 - Animation = *simulating changes over time*

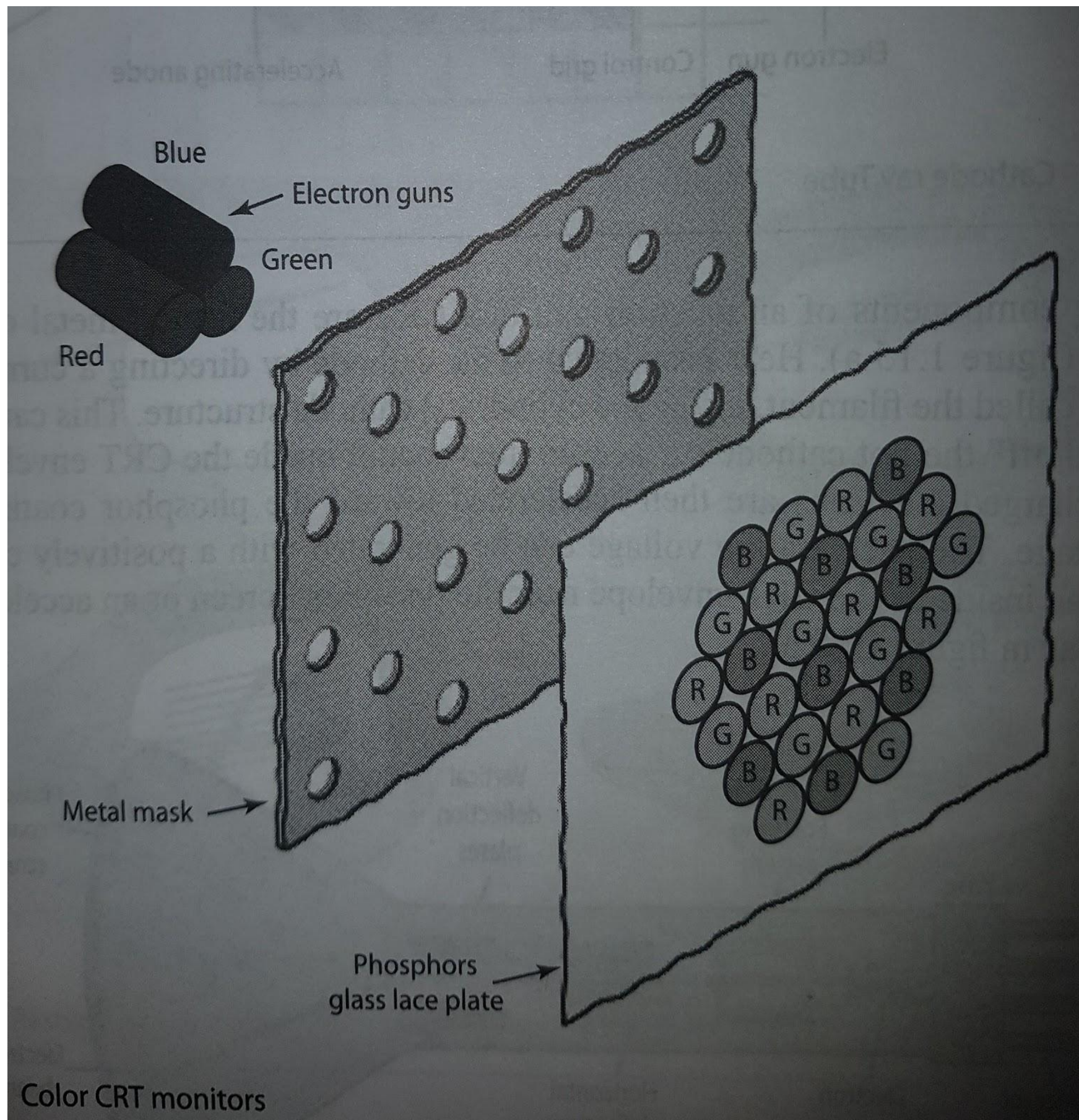
Applications

- Graphs and Charts
- Computer-Aided Design
- Virtual Reality Environments
- Data Visualizations
- Computer Art
- Entertainment Industry
- Image Processing
- GUI



Blair Arch

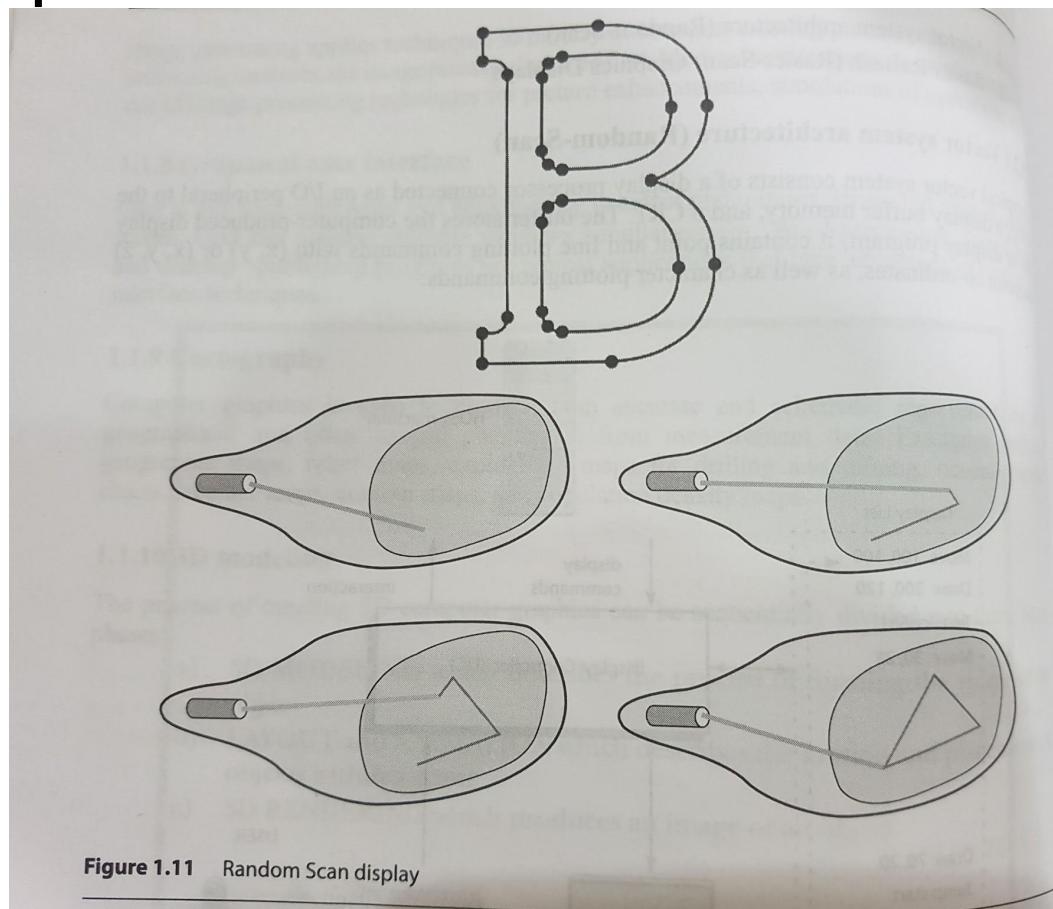




Types of display architecture

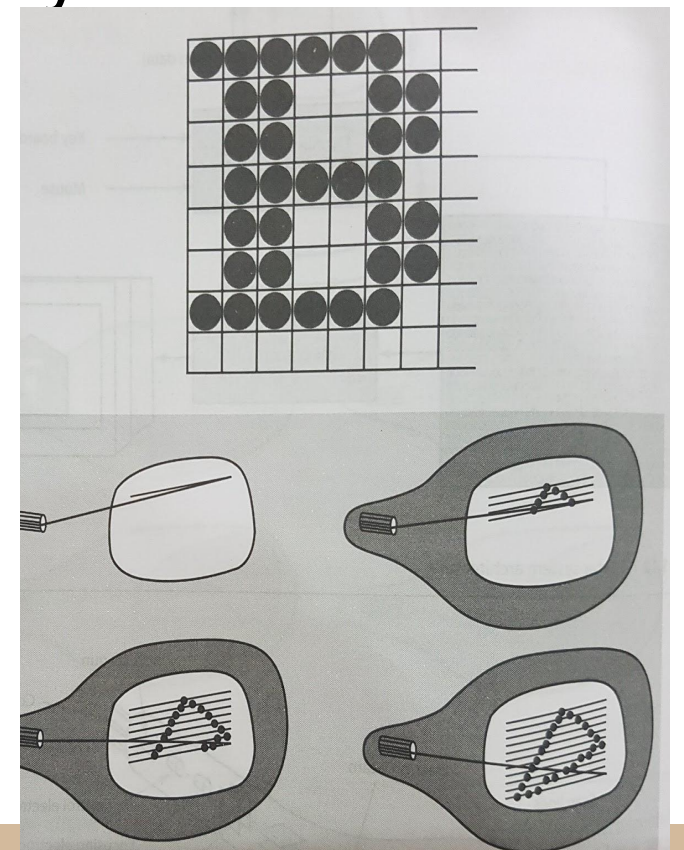
Random Scan (/Vector System)

Electron beam is deflected only along the path where display is required

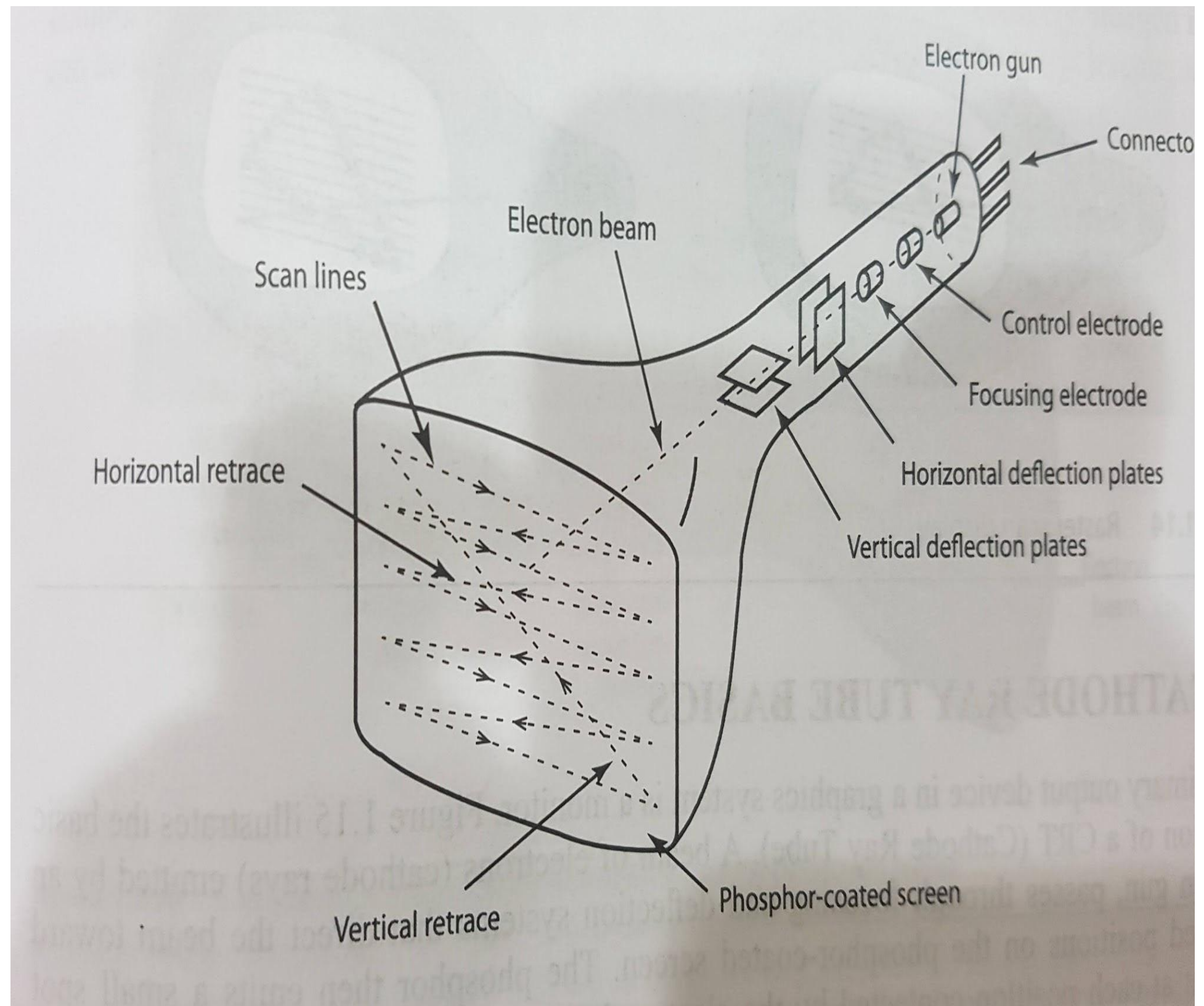


Raster Scan

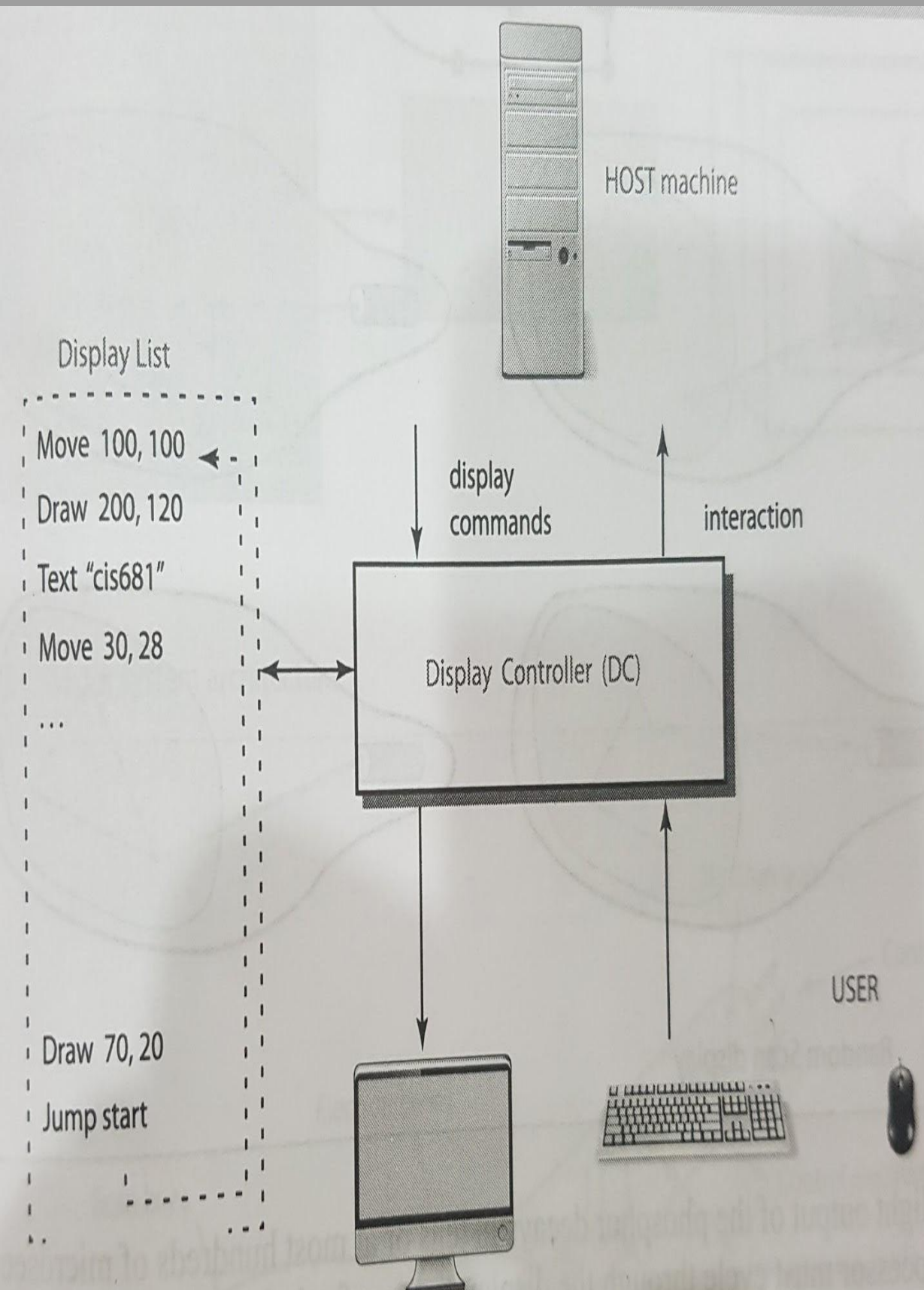
Image is divided into matrix of pixels and electron beam is scanned sequentially from top to bottom row-wise (& then back to top). Beam intensity is set to reflect pixel intensity



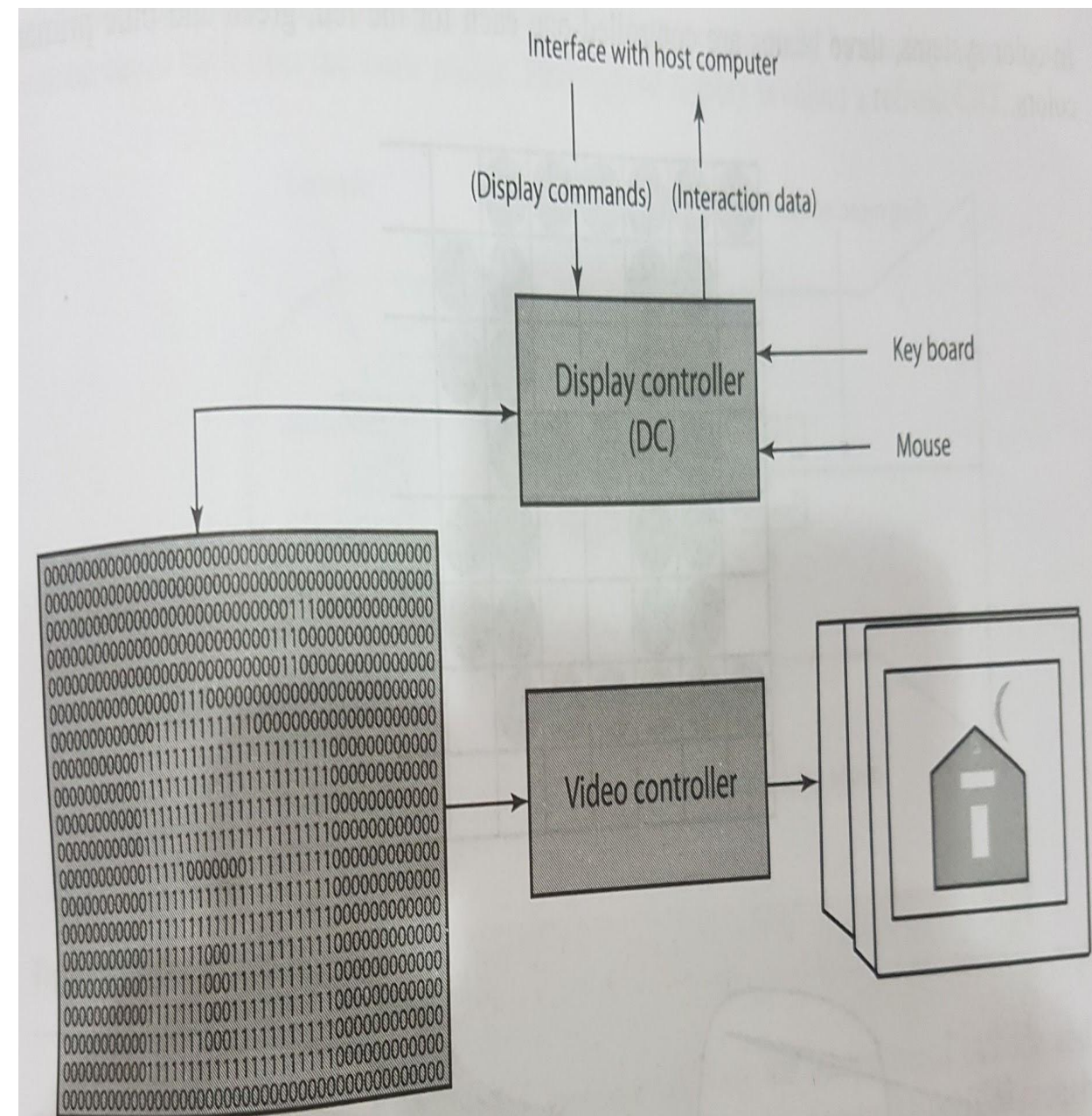
Random Raster



Random



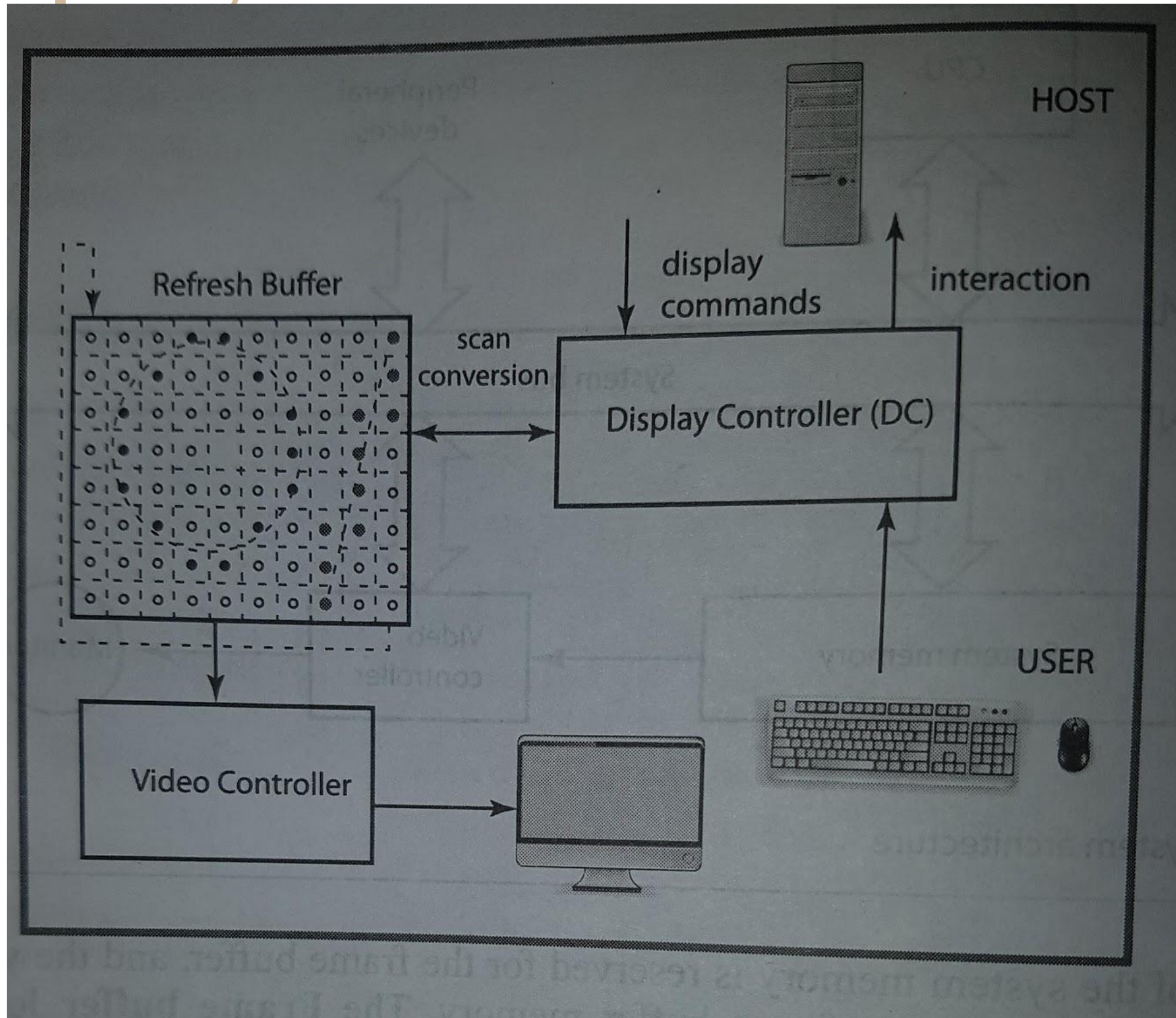
Raster



Differences

Vector system	Raster System
The refresh buffer stores op-codes and end-point co-ordinate values only	The entire image of say, 1024 lines of 1024 pixels each must be store explicitly
Difficult to display filled areas	Possess ability to display areas filled with solid colors
Vector displays flicker when the number of primitives in the buffer become too large	Is independent of the complexity (Number of polygons) of the image, since the hardware is fast enough that each pixel in the buffer can be read out on each refresh cycle
Uses random scan	Uses raster scan
Can draw a continuous, smooth line	No smooth line is obtained, stair casing effect or jaggies(aliasing) Displays mathematically smooth lines, polygons, and boundaries of curved primitives such as circles and ellipses only by approximating them with pixels on the raster grid.

Display Controller



The End

Reading : Chapter 1



Text

Basic Terminologies

- What is Computer Graphics?
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Text

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