

2. Over View Of Graphics System

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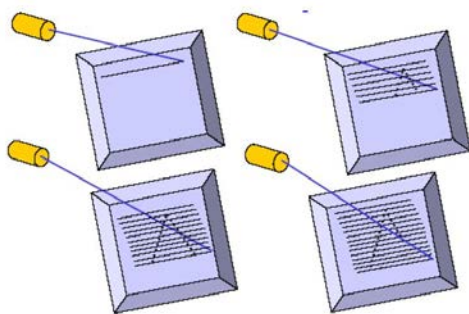
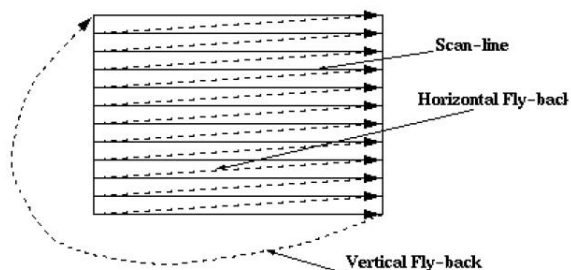
2.1 Graphics System

- There are different formats used for storing a picture in a computer; but, unlike text and data files, which are primarily made up of alphanumeric characters, graphics formats are more complex.
- Two major categories of graphics formats are vector graphics (objects made up of lines) and bitmapped graphics (TV-like dots).
- Images stored in vector format can be moved to another vector system typically without loss of resolution. There are 2D vector formats as well as 3D vector formats.
- During transfer of raster images among different devices, resolution is a major concern. Such transfers can occur without loss of resolution as long as the new format supports the same or is of higher resolution to the old one.
- Standard graphics formats allow images to be moved from machine to machine, while standard graphics languages let graphics programs be moved from machine to machine.
- For example, GKS, PHIGS and OpenGL are major graphics languages that have been adopted by high-performance workstation and CAD vendors. GDI and DirectX are the graphics languages in Windows.
- High-resolution graphics is typically expensive to implement due to its large storage and fast processing requirements. However, as desktop computers become more powerful, graphics have become widely used in every application.

2.2 Raster Scan Displays

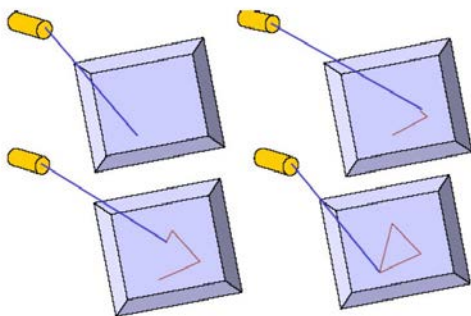
- In a raster-scan system, the electron beam is swept across the screen, one row at a time from top to bottom.
- As the electron beam moves across each row, the beam intensity is turned on and off to create a pattern of illuminated spots.
- Picture definition is stored in a memory area called the refresh buffer or frame buffer used for redrawn.

- Each screen point is referred to as a pixel or pel (picture element).
- Intensity range for pixel positions depends on the capability of the raster system.
- In a B&W system, each screen point is either on or off. So only one bit is needed.
- The frame buffer in B&W system is called as bitmap. For multi-color systems the frame buffer is called as pixmap.
- Refreshing on raster-scan displays is carried out at the rate of 60 to 80 frames per second. The unit for refreshing rate is Hertz (Hz).



2.3 Random-Scan Displays

- The CRT has the electron beam directed only to the parts of the screen where a picture is to be drawn.
- Random-scan monitors draw a picture one line at a time, called as vector display.
- Refresh rates on a random-scan system depends on the number of lines to be displayed.
- Picture definition is stored as a set of line-drawing commands in the refresh display file or refresh buffer.
- To display a specified picture, the system cycles through the set of commands in the display file, drawing each component line.
- These systems are designed for the line-drawing applications and can't display realistic shaded scenes.



Difference between Raster Scan Display and Random Scan Display

Base of Difference	Raster Scan Display	Random Scan Display
Electron Beam	The electron beam is swept across the screen, one row at a time, from top to bottom.	The electron beam is directed only to the parts of screen where a picture is to be drawn.
Resolution	Its resolution is poor because raster system in contrast produces zig-zag lines that are plotted as discrete point sets.	Its resolution is good because this system produces smooth lines drawings because CRT beam directly follows the line path.
Picture Definition	Picture definition is stored as a set of intensity values for all screen points, called pixels in a refresh buffer area.	Picture definition is stored as a set of line drawing instructions in a display file.
Realistic Display	The capability of this system to store intensity values for pixel makes it well suited for the realistic display of scenes contain shadow and color pattern.	These systems are designed for line-drawing and can't display realistic shaded scenes.
Draw an Image	Screen points/pixels are used to draw an image.	Mathematical functions are used to draw an image.

Vector Scan Display	Raster Scan Display
1. In vector scan display the beam is moved between the end points of the graphics primitives.	1. In raster scan display the beam is moved all over the screen one scan line at a time, from top to bottom and then back to top.
2. Vector display flickers when the number of primitives in the buffer becomes too large.	2. In raster display, the refresh process is independent of the complexity of the image.
3. Scan conversion is not required.	3. Graphics primitives are specified in terms of their endpoints and must be scan converted into their corresponding pixels in the frame buffer.
4. Scan conversion hardware is not required.	4. Because each primitive must be scan-converted, real time dynamics is far more computational and requires separate scan conversion hardware.
5. Vector display draws a continuous and smooth lines.	5. Raster display can display mathematically smooth lines, polygons, and boundaries of curved primitives only by approximating them with pixels on the raster grid.
6. Cost is more.	6. Cost is low.
7. Vector display only draws lines and characters.	7. Raster display has ability to display areas filled with solid colours or patterns.

2.4 Graphics input devices

Keyboard

- The keyboard is the most common input device for entering numeric and alphabetic data in to a computer system by pressing a set of keys which are mounted on the keyboard, which is connected to computer system.
- The keys on computer keyboards are often classified as follows:
- Alphanumeric Keys - letters and numbers.
- Punctuation Keys - comma, period, semicolon, and so on.
- Special Keys - function keys, control keys, arrow keys, Caps Lock key, and so on.

Touch Screen

- A touch screen is a display which can detect the presence and location of a touch within the display area.

- The term generally refers to touch or contact to the display of the device by a finger or hand.
- Touch screens can also sense other passive objects, such as a stylus. However, if the object sensed is active, as with a light pen, the term touch screen is generally not applicable.
- The ability to interact directly with a display typically indicates the presence of a touch screen.
- The touch screen has two main attributes. First, it enables one to interact with what is displayed directly on the screen, where it is displayed, rather than indirectly with a mouse or touchpad.
- Secondly, it lets one to do so without requiring any intermediate device.
- Such displays can be attached to computer terminals or to networks. They also play a prominent role in the design of digital appliances such as the personal digital assistant (PDA), satellite navigation devices, mobile phones, and video games.

Joystick

- A joystick is an input device consisting of a stick that pivots on a base and reports its angle or direction to the device it is controlling.
- Joysticks are often used to control video games, and usually have one or more push-buttons whose state can also be read by the computer.
- A popular variation of the joystick used on modern video game consoles is the analog stick.
- The joystick has been the principal flight control in the cockpit of many aircraft, particularly military fast jets, where centre stick or side-stick location may be employed.
- Joysticks are also used for controlling machines such as cranes, trucks, underwater unmanned vehicles and zero turning radius lawn mowers.
- Miniature finger-operated joysticks have been adopted as input devices for smaller electronic equipment such as mobile phone.

Digitizers

- A graphics tablet (or digitizing tablet, graphics pad, drawing tablet) is a computer input device that allows one to draw freehand images and graphics, similar to the way one draws images with a pencil and paper.
- These tablets may also be used to capture data or handwritten signatures.
- A graphics tablet (also called pen pad or digitizer) consists of a flat surface upon which the user may "draw" an image using an attached stylus, a pen-like drawing apparatus.

- The image generally does not appear on the tablet itself but, rather, is displayed on the computer monitor.
- Some tablets however, come as a functioning secondary computer screen that you can interact with directly using the stylus.
- Some tablets are intended as a general replacement for a mouse as the primary pointing and navigation device for desktop computers.

Voice System

- Voice input device - A device in which speech is used to input data or system commands directly into a system.
- Such equipment involves the use of speech recognition processes, and can replace or supplement other input devices.
- Some voice input devices can recognize spoken words from a predefined vocabulary, some have to be trained for a particular speaker.
- Speech recognition (also known as automatic speech recognition or computer speech recognition) converts spoken words to machine-readable input (for example, to key presses, using the binary code for a string of character codes).
- The term "voice recognition" is sometimes incorrectly used to refer to speech recognition, when actually referring to speaker recognition, which attempts to identify the person speaking, as opposed to what is being said.

Trackball

- A trackball is a pointing device consisting of a ball held by a socket containing sensors to detect a rotation of the ball about two axes—like an upside-down mouse with an exposed protruding ball.
- The user rolls the ball with the thumb, fingers, or the palm of the hand to move a cursor.
- Large tracker balls are common on CAD workstations for easy precision. Before the advent of the touchpad, small trackballs were common on portable computers, where there may be no desk space on which to run a mouse.
- Some small thumb balls clip onto the side of the keyboard and have integral buttons with the same function as mouse buttons.
- The trackball was invented by Tom Cranston and Fred Longstaff as part of the Royal Canadian Navy's DATAR system in 1952, eleven years before the mouse was invented. This first trackball used a Canadian five-pin bowling ball.

2.5 Graphics Software

- There are two general classifications for graphics software: general programming packages and special-purpose applications packages.
- A general graphics programming packages provides an extensive set of graphics functions that can be used in a high-level programming language. It includes those for generating picture components(straight line, polygons, circles and other figures), setting color & intensity values, selecting views and applying transformations.
- Application graphics packages are designed for non-programmers.
- These computer graphics may be clip art, Web graphics, logos, headings, backgrounds, digital photos, or other kinds of digital images. Some of the graphics software title
 - Photoshop
 - Illustrator
 - Paint Shop Pro
 - CorelDraw
 - The GIMP
 - Microsoft Paint, Digital Image Suite ,CAD