COMPUTER GRAPHICS
INPUT DEVICES

COMPUTER GRAPHICS

- Computer graphics are graphics created using computers , generally the representation and manipulation of image data by a computer with specialized software and hardware.
- It's a sub-field of computer science which studies methods for digitally synthesizing and manipulating visual content.
- Early applications in engineering had to rely on expensive and cumbersome equipment , advances in computer technology made computer graphics a practical tool.

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- Today computer graphics used routinely in diverse areas such as:
  - Science
  - Engineering
  - Medicine
  - Business
  - Art and Entertainment
  - Education and Training
  - Advertising

INPUT DEVICES SPECIALLY DESIGNED FOR INTERACIVE INPUT

- Mouse
- Trackball
- Space ball
- Joystick
- Digitizers
- Dials
- Button Boxes.

INPUT DEVICES USED IN PARTICULAR APPLICATIONS

- Data Gloves
- Touch Panels
- Image Scanners
- Light Pens
- Voice Systems

1.KEYBOARDS

- An alphanumeric keyboard on a graphic system is used as a device for entering text strings.
- Keyboard is an efficient device for inputting nongraphic data as picture labels associated with graphic display.
- **Function keys** are used to enter frequently used operations in a single keystroke.
- **Control Keys** used to select displayed objects by positioning the screen cursor.
- A numeric keypad is included on the keyboard for fast entry of numeric data.

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- Keyboard uses an arrangement of keys to act as mechanical levers.
- Following the decline of punch cards, paper tape keyboard became the main input device.
- Despite the development of other input devices such as mouse, touch screen, pen devices, voice recognition but keyboard remains the versatile device for human input into computers.

USES OF KEYBOARD

- Used to type text and numbers in word processor, text editor.
- Used in computer gaming.
- Used to give commands to OS of a computer Example : ctrl + Alt + Delete

KEYBOARD TYPES

- **STANDARD :** Desktop computer keyboards such as 101 US traditional, 104 key windows keyboard.
- **LAPTOP SIZE :** Have shorter distance for keystroke and reduced set of keys.
  - Does not have numerical keypad and functions keys are placed at different location.
- **THUMB SIZE :** Smaller external keyboards introduced for devices without built in keyboard such as PDA, Smartphone.

2. MOUSE

- A mouse is a small hand held box used to position the screen cursor.
- **METHOD OF DETECTING :**
  - Wheels or rollers on the bottom of the mouse can be used to record the amount and direction of movement.
  - Optical sensor in which mouse is moved over a special mouse pad that has a grid of horizontal and vertical lines.

- A mouse can be picked up and put down at another position without change in cursor movement it is used for making relative changes in position of screen cursor.
- One, two or three buttons are included on the top of the mouse for signaling the execution of operation, such as recording cursor position, invoking a function.


Genius

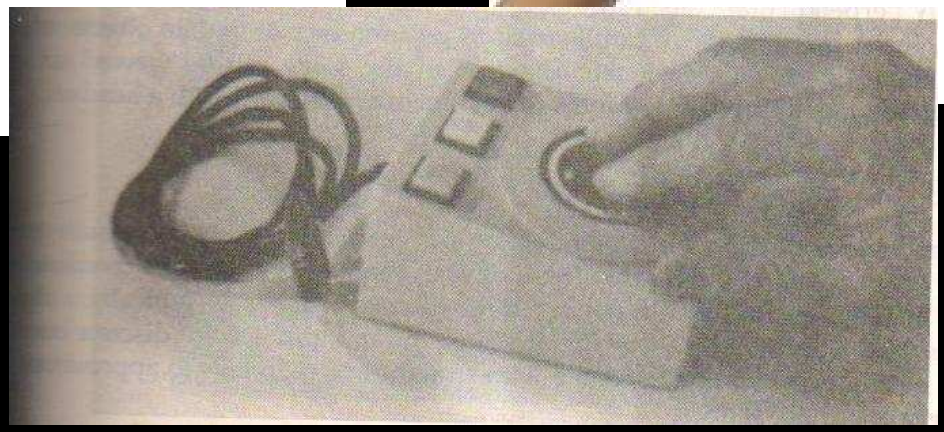
Z - MOUSE

- Z mouse includes three buttons a thumbwheel on the side, a trackball on the top, and a standard mouse ball underneath.
- We can pick an object, rotate it and move it in any direction and we can navigate our viewing position through a three dimensional scene.

Z - MOUSE

3. TRACKBALL

- It's a ball that can be rotated with the fingers or palm of the hand to produce screen cursor movement.
- Potentiometer attached to the ball measure the amount and direction of rotation.
- Trackballs are mounted on keyboards or other devices such as Z mouse.



SPACEBALL

- Trackball is two dimensional positioning device but a spaceball provides six degrees of freedom.
- Unlike the trackball, a spaceball does not move.
- Strain gauges measure the amount of pressure applies to the spaceball to provide input for spatial positioning and orientation when ball is pulled in various directions.
- Used for 3-dimensional positioning, selection, modeling,animation,CAD.

4. JOYSTICK

- A joystick consists of a small vertical lever called the stick mounted on a base that is used to steer the screen cursor around.
- Most joysticks select screen positions with actual stick movement others respond to pressure on the stick.
- Some joysticks are mounted on a keyboard , others function as stand-alone units.

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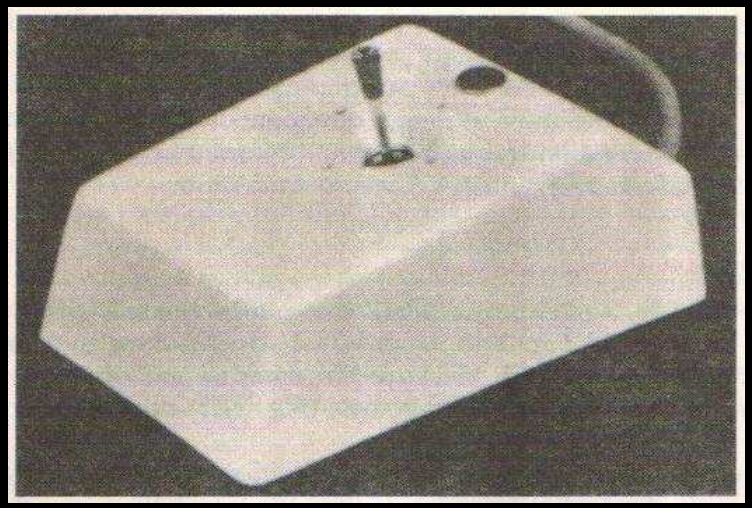
- The distance that the stick is moved in any direction from its center position corresponds to screen-cursor movement in that direction.
- Springs return the stick to the center position when it is released.



JOYSTICK

5. DATA GLOVE

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- Used to grasp virtual object.
- The glove is constructed with series of sensors that detect hand and finger motions.
- Electromagnetic coupling between transmitting and receiving antennas used to provide information about position and orientation of hand.
- Input from the glove can be used to position or manipulate objects

6.DIGITIZER

- A digitizer is a computer input device that enables a user to hand draw images and graphics , similar to a person draws images with pencil and paper.
- Also used to capture data , handwritten signatures.
- Used to trace an image from piece of paper.
- Capturing data in this way either by tracing or entering the corners of linear shapes is called **digitizing.**

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- Digitizer consists of a flat surface upon which the user may draw using an attached stylus a pen like drawing apparatus.
- The image is not displayed in the tablet rather displayed in the computer monitor.
- Graphics tablets are constructed with rectangular grid of wires embedded in the tablet surface.
- Electromagnetic pulses are generated along the wires and an electrical signal is induced in a wire coil in a stylus to record tablet position.


'65
OSCAR
SHOW

7. IMAGE SCANNERS

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- Drawings, color and black & white photos can be stored for computer processing with an image scanner by passing an optical scanning mechanism over the information to be stored.
- The gradations of gray scale or color are recorded and stored in an array.
- To the internal representation of a picture we can apply transformations to rotate, scale, crop and apply various image processing methods.

8. TOUCH PANELS

- Allows displayed objects to be selected with the touch of a finger.
- Mainly used in processing options that are represented with graphical icons.
- Systems can be adapted for touch input by fitting a transparent device with touch-sensing mechanism over the video monitor screen.
- Touch input can be recorded using:
  - Optical
  - Electrical
  - Acoustical

OPTICAL TOUCH PANEL

- Employ line of infrared Light Emitting diodes [LED] along one vertical edge and along one horizontal edge of the frame.
- Opposite edges contain light detectors.
- Detectors are used to record which beams are interrupted when the panel is touched.
- The two crossing beams that are interrupted identify the horizontal and vertical coordinates of the screen position selected.

ELECTRICAL TOUCH PANEL

- It is constructed with two transparent plates separated by a small distance.
- One of the plates is coated with conducting material and the other plate with resistive material.
- When the outré plate is touched, it is forced into contact with inner plate.
- This contact creates a voltage drop across the resistive plate that is converted to coordinate values of selected screen position.

ACOUSTICAL TOUCH PANELS

- High frequency sound waves are generated in horizontal and vertical directions across the glass plate.
- Touching the screen causes part of each wave to be reflected from finger to emitters.
- The screen position at the point of contact is calculated from the measurement of time interval between transmission of each wave and its reflection to emitter.

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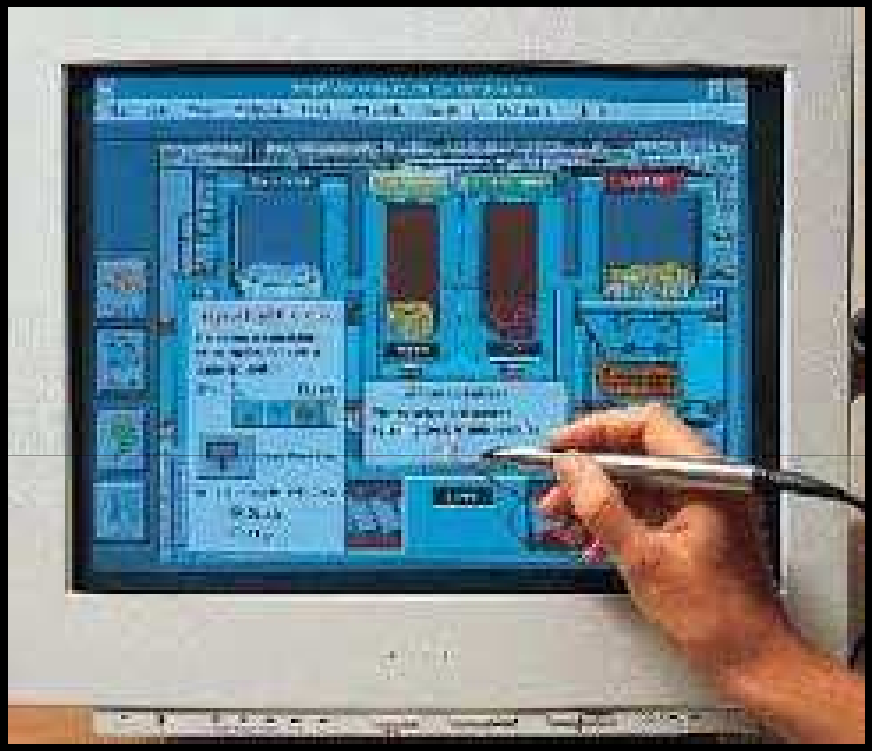
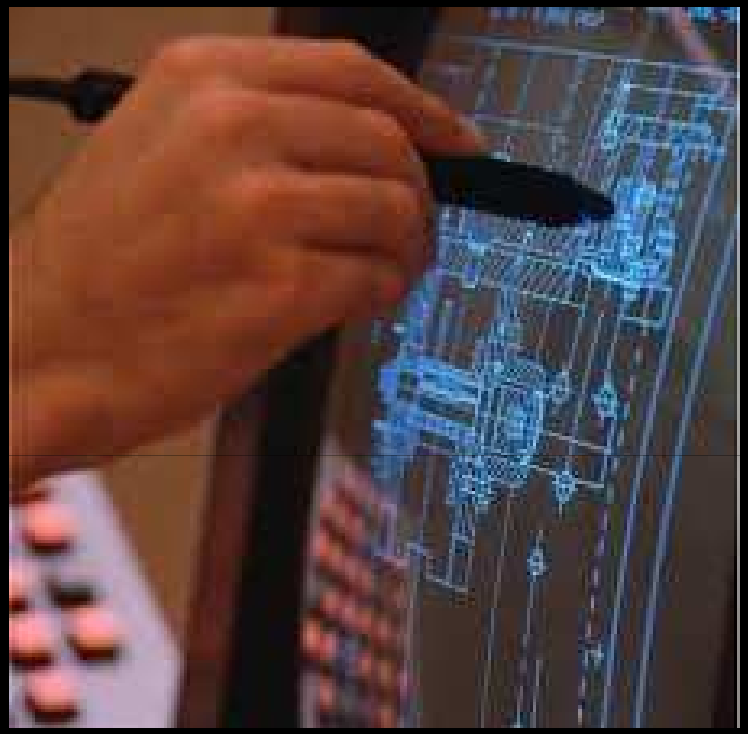
9.LIGHT PEN





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- Pencil shaped devices are used to select screen positions by detecting the light coming from points on the CRT screen.
- **They are sensitive to the short burst of light emitted from the phosphor coating at the instant the electron beam strikes a particular point.**
- **Background light in the room are not detected by light pen.**
- A light pen pointed at a spot on the screen as the electron beam lights up that spot, generates an electrical pulse causes the coordinate position of the electron beam to be recorded.

DISADVANTAGES OF LIGHTPEN

- Part of the screen image is obscured by the hand and pen.
- Prolonged use of light pen causes arm fatigue.
- Cannot detect positions within black areas.
- Give false readings due to background lighting in a room.

10. VOICE SYSTEMS

- Speech recognizers are used in some graphics workstations as input devices to accept voice commands.
- The voice-system input can be used to initiate graphics operations or to enter data.
- It operate by matching an input against a predefined dictionary of words and phrases.

WORKING OF VOICE SYSTEM

- A dictionary is setup for a particular person by having the person speak the command words to be used into the system.
- Each word is spoken and the system analyzes the word and establishes a frequency pattern for that word in the dictionary along with the function to be performed.
- When a voice command is given the system searches for frequency pattern match.
- Voice input is spoken into microphone mounted on a headset.

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- If a different person is to use the system the dictionary must be reestablished with that person's voice patterns.
- Voice systems have some more advantage than other input devices because the attention of the operator does not have to be switched from one device to another to enter a command.