Input Devices

- Keyboards
- Mouse
- Trackball
- Spaceball
- Joystick
- Digitizers
- Dials
- Button boxes
- Data gloves
- Touch panels
- Scanners
- Voice systems

Keyboards

- Alphaanumeric keyboard
- For entering
  - Text strings
  - Non-graphic data such as picture labels
  - Screen coordinates
  - Menu selections
  - Graphics functions
- Common features
  - Cursor control keys
  - Function keys

Mouse

- Small hand-held box used to position the screen cursor
- Wheels or rollers record the amount and direction of movement
- Optical sensors
- One, two or three button

Trackball and Spaceball

- Trackball
  - A ball that can be rotated with fingers or palm of the hand
  - A two-dimensional positioning device
  - Produces screen-cursor movement
  - Potentiometers attached to the ball measure the amount and direction of rotation
  - Often mounted on keyboards or other devices such as the Z mouse


KENSINGTON
Expert Mouse


Side buttons (2)
Braided Cable
OLED display
20 million click rated switches with
Deep Click for analog control
Thumb buttons (2)
Finger buttons (2) adjustable to
keep them right at your fingertips.
Deep Click for analogue control
Thumb and Finger
rubber grips
Push / Pull trigger buttons with
replaceable Cap to position
perfectly for your grip style.
Pixart PMW3360 optical sensor
Resolution 200 - 12000 DPI
Max acceleration 50G
RGB lighting

Space ball

- Provides six degrees of freedom
- Does not actually move
- Strain gauges measure the amount of pressure applied to provide input for spatial positioning and orientation as the ball is pushed or pulled in various directions
- Used for 3D positioning and selection operations in VR systems, modeling, animation, CAD etc

Joystick

- Have a small vertical lever called the stick, mounted on a base that is used to steer the screen cursor around
- Distance that the stick is moved corresponds to the screen-cursor movement
- Potentiometers are mounted at the base of the joystick to measure the amount of movement and springs return the stick to the center position when it is released

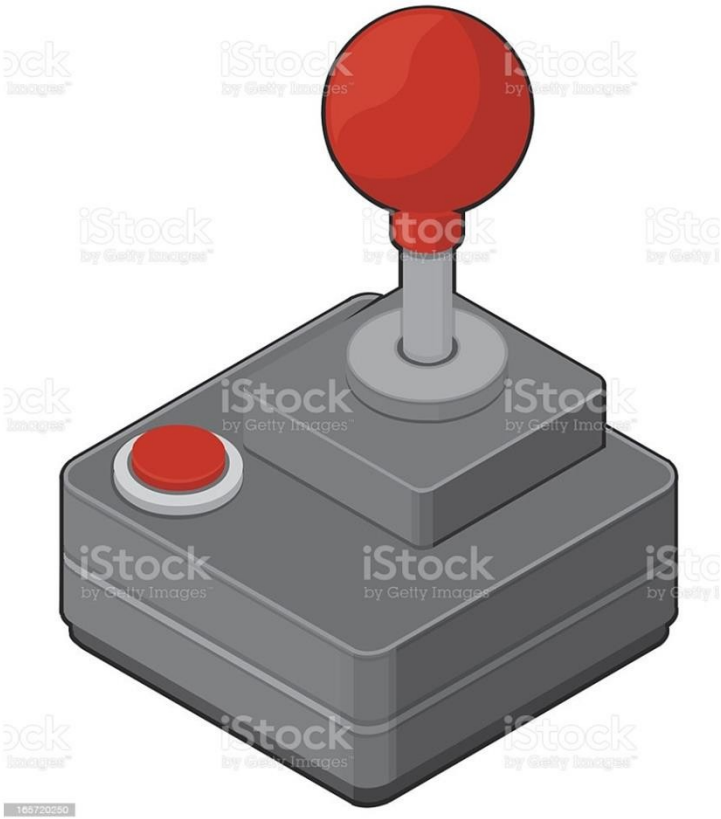
Movable Joystick

- Stick is used to activate switches that cause the screen cursor to move at a constant rate in the direction selected
- Eight switches arranged in a circle, so that the stick can select any one of the eight directions for cursor movement

Isometric joysticks

- Pressure sensitive joysticks
- Have a nonmovable stick
- Pressure on the stick is measured with strain gauges and converted to movement of the cursor in the direction specified


AXIS

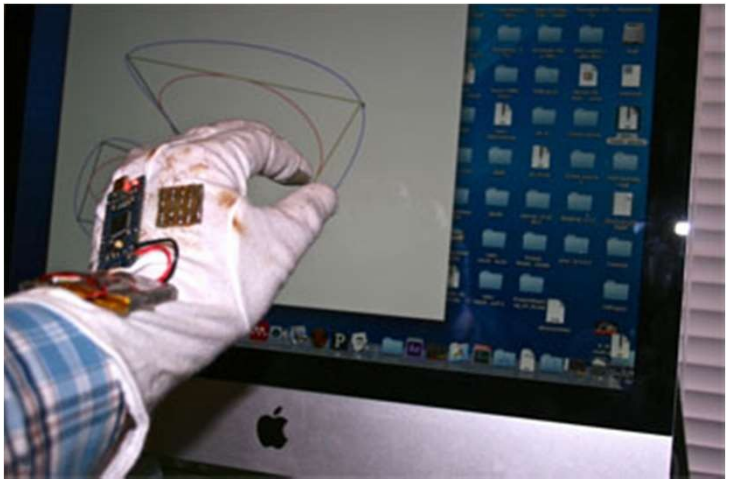

iStock
by Getty Images

Data glove

- To grasp a virtual object
- Constructed with a series of sensors that detect hand and finger motions
- Electromagnetic coupling between transmitting antennas and receiving antennas is used to provide information about the position and orientation of the hand
- The transmitting and receiving antennas can each be structured as a set of three mutually perpendicular coils, forming a 3D cartesian coordinate system

- Input from the glove can be used to position or manipulate objects in a virtual scene
- A two-dimensional projection of the scene can be viewed on a video monitor, a three-dimensional projection can be viewed with a headset


Virtual Technologies, Inc.
Palo Alto, CA
CyberGlove
SiliconGraphics



Digitizers

- For drawing, painting or interactively selecting coordinate positions on an object
- Used to scan over a drawing or object and to put input a set of discrete coordinate positions, which can be joined with straight line segments to approximate curves of surface shapes

- A graphics tablet or a data tablet
  - To input 2D coordinates by activating a hand cursor or stylus at selected positions on a flat surface

- Acoustic tablet
  - Use sound waves to detect a stylus position
    - Strip microphones or point microphones can be used to detect the sound emitted by an electrical spark from a stylus tip
    -


Teacher
Student
Student
Student


alamy stock photo

Image scanners

Touch panels

- Allow displayed objects or screen positions to be selected with the touch of a finger
- Employ a line of LEDs along one vertical edge and along one horizontal edge of the frame
- The opposite vertical and horizontal edges contain light detectors
- The detectors are used to record which beams are interrupted when the panel is touched

How does a touch screen works.

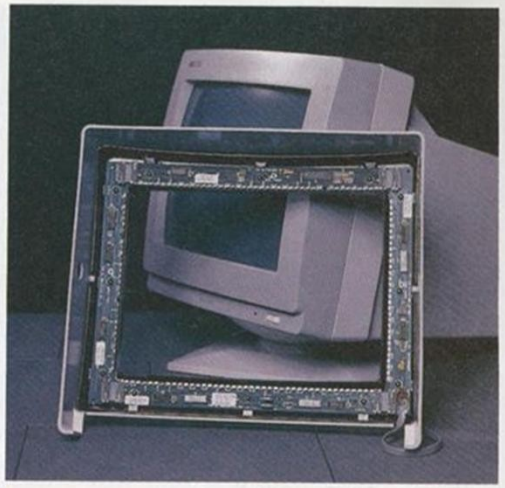
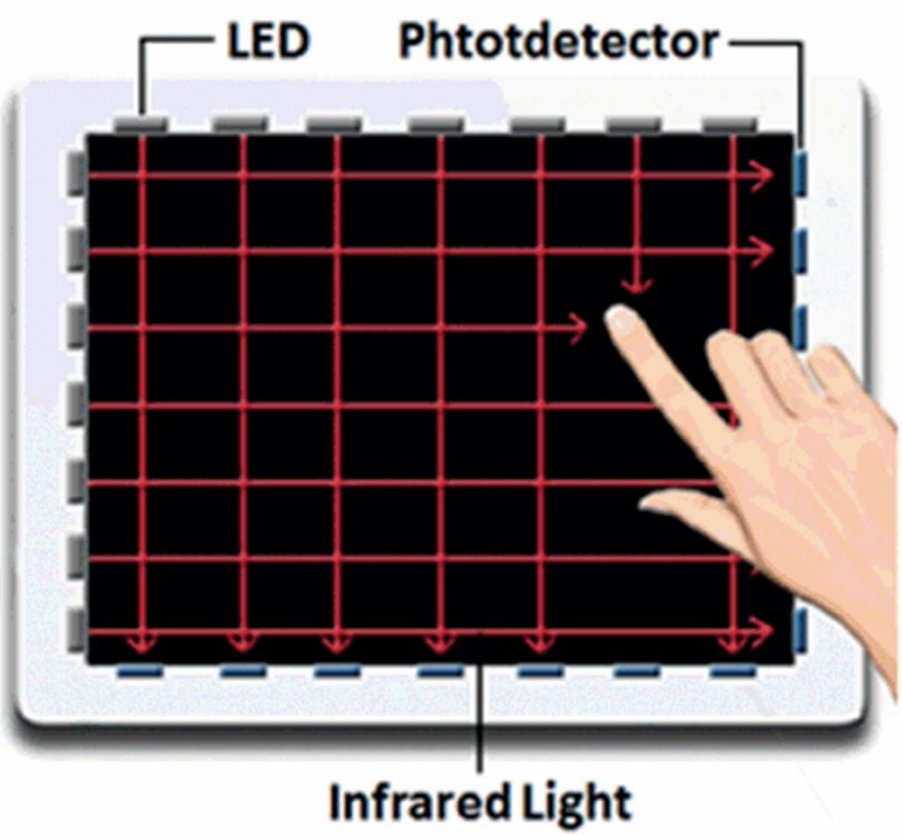


Figure 2-55
An optical touch panel, showing the arrangement of infrared LED units and detectors around the edges of the frame. (*Courtesy of Carroll Touch, Inc.*)

An optical touch panel, showing the arrangement of infrared LED units and detectors around the edges of the frame.

(e)



Light pens

- Pencil shaped devices used to select screen positions by detecting the light coming from points on the CRT screen

Voice systems

- Speech recognition systems

Voice recognition using Raspberry Pi 3