

How Mice & Trackballs Work

The mouse has been a mainstay in personal computing since 1984 when it was introduced to a mass audience with the release of the Apple Macintosh. It has become such an integral tool that it's difficult to imagine a computing world without it. Not only do mice speed up computing chores, they also make such tasks infinitely easier. And when used with a GUI (graphical user interface) such as Windows, the mouse provides point-and-click accessibility to the world inside our computers.

Most mice are palm-sized and connect to a computer's serial, PS/2, or USB (Universal Serial Bus) port with a long cord that transfers data. Others are cordless and battery operated. Cordless mice send radio or infrared signals to a receiver that inserts into a computer port. Then, the mouse and computer communicate through special software known as a mouse driver.

Most mice have two buttons, although some have three, four, and even five. A typical two-button mouse has a left and right button. Users click the left button to highlight text, open menus, or double-click icons. Users click the right button

whenever they need to display a menu of shortcuts and commands. Additionally, users can program buttons to open and close programs, activate the on-screen Start menu, maximize or minimize windows, and other everyday tasks. Newer mice have a scroll wheel (or button) to easily move through Web pages or documents without using scrollbars.

Mice are generally available in three categories: optomechanical, mechanical, or optical. Mechanical and optomechanical mice use a small rubber-coated steel ball that sits between two rollers in the mouse. The rollers connect to an axle that also has a wheel connected at its other end. When the mouse moves, the ball spins the rollers, causing the wheels to rotate. In mechanical mice, this process causes electronic signals to transmit to the computer, where the software interprets the signals as mouse movements. In optomechanical mice, the LEDs (light-emitting diodes) and sensors create the signals. Optical mice, on the other hand, have no moving parts, so they use the LEDs on the bottom of the mouse and a special reflective mousepad to

register mouse movements.

On these pages, we display an illustration of an optomechanical mouse, detailing its various parts and how it sends data to the computer.

Wheels

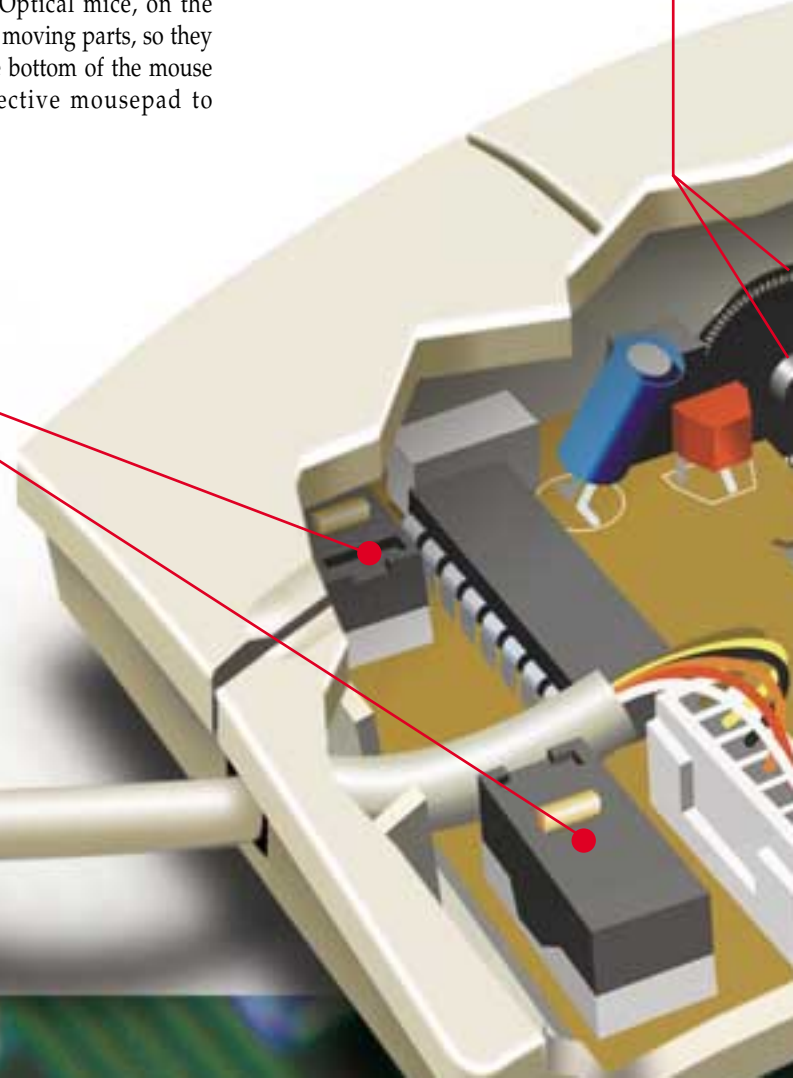
Each wheel connects to an axle and sits between an LED and a sensor. As the wheel spins, light passes from the LED to the sensor through tiny slits around the wheel's rim (or is blocked by the wheel's solid portions). The sensor detects the light changes and sends data to the computer, where software calculates the number and speed of various light changes and interprets them as mouse movements.

Mouse Buttons

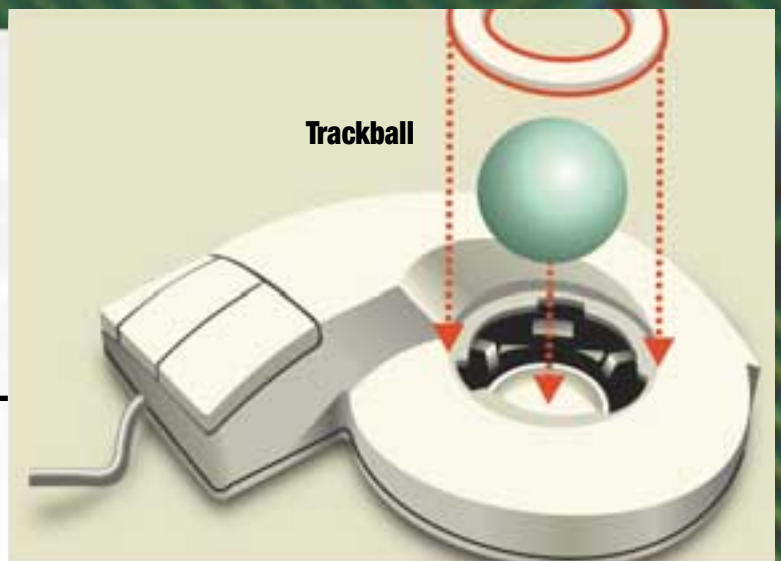
When users click a mouse button, this action transmits signals to the computer, where software carries out a designated task, depending on the button clicked. The left button typically activates menus and icons. The right mouse button usually displays menus of commands and shortcuts.

Mouse Cord

Known as a mouse "tail," this cord either connects to a computer's serial, USB, or PS/2 port. Data (regarding mouse movements) transmits from the mouse to the computer through this cord.



A trackball is essentially a mouse turned on its back. Like mice, they have left and right mouse buttons and use a serial or PS/2 port connection. Unlike mice, users don't need to drag trackballs in order to move the cursor on-screen. Instead, trackballs remain stationary, allowing users to simply move the mouse ball with their fingers or move the cursor with their thumb. Trackballs take up less desk space than mice and require less arm movement.



Trackball

Vertical Roller

This roller controls up and down cursor movements on-screen, which are movements along the Y-axis. When users move the mouse vertically, the mouse ball spins the vertical roller.

Spring-Loaded Roller

This roller holds the mouse ball in place, keeping it snug against the vertical and horizontal rollers.

Mouse Ball

The gumball-sized ball inside the mouse sits between two rollers, each of which attaches to an axle. As users drag the mouse across a smooth surface, the ball spins the rollers.

Horizontal Roller

This roller controls left and right cursor movements on-screen, which are movements along the X-axis. When users move the mouse horizontally, the mouse ball spins the horizontal roller.

Sensors

The sensors in a mouse receive flashes of light from the LEDs and transmit this data to the computer (via the mouse cord), where software calculates the number and speed of various light changes and interprets them as mouse movements.

LEDs (light-emitting diodes)

The light-emitting diodes in a mouse emit a steady stream of light that either passes to a sensor through tiny slits around the wheel's rim or is blocked by the solid portions of the wheel.

