

Introduction

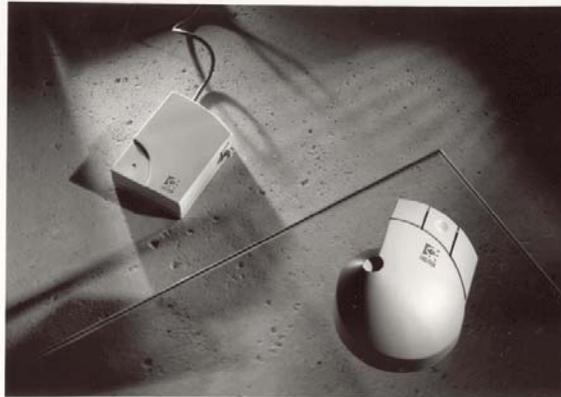
When Doug Engelbart introduced the first mouse in 1968, a new industry was born. Throughout the years since then, Logitech has been at the forefront of innovation in mouse technologies. Now, Logitech with its technology partner Agilent Technologies does it again with the world's first mouse to employ the precision and tracking ability of a laser: Logitech MX™1000 Cordless Laser Mouse.

Though that original mouse was sophisticated for its time and embraced by forward thinkers, it wasn't until the graphical user interface appeared that the mouse enjoyed widespread adoption as an essential computing tool. That occurred in 1984, when Apple introduced the Macintosh with a mouse. Connected to the computer by a cable, this one-button mouse used a rolling rubber-coated steel ball motion-tracking mechanism.

Corded, ball-based mechanical mice worked well but suffered from two insurmountable shortcomings: those annoying cords always seemed to get in the way, and the tracking ball continually gummed up with dirt, requiring frequent cleaning.

Logitech set out to solve each problem (Figure 1). In 1992, the company shipped MouseMan® Cordless, the world's first cordless mouse. Three years later, Logitech introduced optical tracking technology with its Marble™ technology for trackballs. Cordless and optical technologies were finally united in 2001 with the introduction of the Logitech Cordless MouseMan Optical, enabled by the optical engine of Logitech partner and technology innovator Agilent Technologies. During the 90s, Agilent pioneered optical sensing for mouse technology. With their familiar glowing red light-emitting diode (LED) as the source of illumination, optical mice offered vastly improved precision, better tracking, and smoother cursor movement. Elimination of the troublesome rolling ball did away the need for cleaning, greatly enhancing usability and productivity.

Figure 1: Over the past decade, Logitech has solved the problems inherent with corded, ball-based mechanical mice.



MouseMan™ Cordless Radio Mouse by Logitech

With the benefits of LED-based optical tracking technology already clear, Logitech and Agilent engineers knew that better results could still be achieved. They sought the highest tracking precision possible on the broadest array of tracking surfaces. The answer was discovered in a beam of laser light.

Laser Lights The Way

Now, in 2004, Logitech has taken the first step beyond LED illumination with the unveiling of a true, next-generation engineering breakthrough: laser illumination and tracking with the MX1000 Cordless Laser Mouse. For gamers, graphic artists, CAD engineers, medical technicians, and business users alike, laser technology is an innovation that delivers a new benchmark in mouse performance.

The culmination of years of research has produced laser technology that delivers astonishingly precise tracking. Laser tracking responds to the slightest hand movement with extraordinary accuracy. And it does so on virtually any surface, white or black, solid or pattern, shiny or matte. Laser illumination tracks flawlessly on the high-gloss surfaces that LED-based mice simply can't negotiate. These surfaces include lacquered tabletops, glazed ceramic tile, untextured plastic, metal surfaces, photo paper, laminate countertops, opaque glass, and more¹.

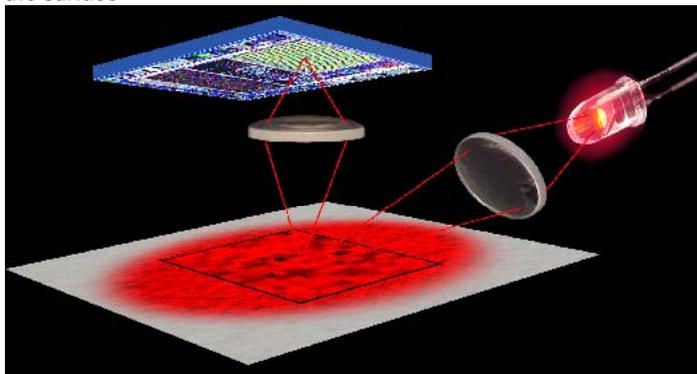
Thanks to Logitech and Agilent's groundbreaking laser mouse technology, virtually any surface, short of a mirror or pane of clear glass, will do. Mouse pads, those dust-catching relics from the era of rolling-ball mice, are, at last, no longer necessary for smooth operation.

Motion Tracking

Logitech's revolutionary laser-powered mice unite the precision of laser illumination with the proven technology of sensor-based motion tracking in a way never done before.

To detect movement, all sensor-based mice, regardless of light source, use sensors to "read" the light beam as it is reflected back into the mouse from the tracking surface (Figure 2).

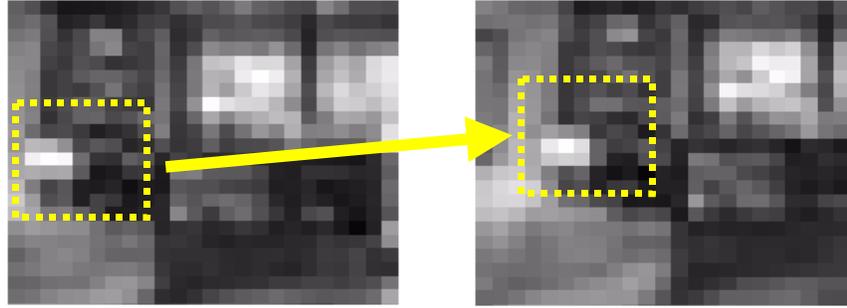
Figure 2: An optical mouse works by reading a reflected light beam on the surface



Each second, Agilent's optical sensor inside Logitech's mouse takes more than 6000 snapshot 'fingerprints,' converts the information to digital format and uses the changes in 'fingerprints' to calculate the mouse's precise location, speed and direction of movement (Figure 3). Armed with that knowledge, Logitech's driver software then communicates with the computer's operating system, which moves the cursor image on the screen.

¹ Laser still may not track on mirrored or clear surfaces, such as windowpane glass.

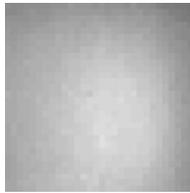
Figure 3: Interpreting differences in image fingerprints can be translated to movement of the mouse



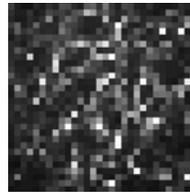
Laser illumination reveals structure that an LED simply cannot express. The coherent nature of laser light creates patterns of high contrast when its light is reflected from a surface. The pattern appearing on the sensor reveals details on any surface, even glossy surfaces that would look totally uniform when exposed to the LED incoherent illumination (Figure 4). The precision image sensors then have no difficulties in tracking on these patterns and calculating position and movement. This is how laser enables tracking on virtually any surface².

Figure 4: Laser uncovers surface features not detected by LED.

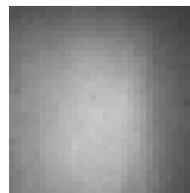
Glossy packaging (LED)



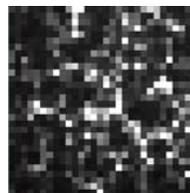
Glossy packaging (Laser)



Whiteboard (LED)



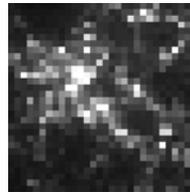
Whiteboard (Laser)



White Tile (LED)



White Tile (Laser)



² Laser still may not track on mirrored or clear surfaces, such as windowpane glass.

Safety First

A quick look around any home reveals lasers improving our lives. From CD and DVD players to printers and handheld pointers, lasers designed for consumer use offer enormous benefits and a high degree of safety. But lasers also conjure up images of destructive ray guns, a staple of science-fiction movies. Fortunately, that's not the case with Logitech's laser mouse technology. Logitech's laser mice are perfectly safe for consumers, earning a Class I eye-safe designation. After all, transmitting a beam of light for the tiny distance required, less than an inch, requires only a minuscule amount of power.

Conclusion

Though the benefits of optical mice became clear more than a decade ago, now it can be said that Logitech has fully delivered on the original vision. The technological breakthrough of Logitech and Agilent's laser illumination and tracking system makes available for the first time a cordless experience of world-class precision and silky smooth operation on even the most problematic surfaces. With MX Laser, Logitech remains the worldwide leader in input-device innovation.

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