

iPod click wheel

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The **iPod click wheel** is the navigation component of several iPod models. It uses a combination of touch technology and traditional buttons, involving the technology of capacitive sensing, which senses the capacitance of the user's fingers. The wheel allows a user to find music, videos, photos and play games on the device. The wheel is flush on the face of the iPod and is located below the screen.

The design was first released with the iPod Mini, and was last used with the iPod Classic.



The iPod line's signature click wheel

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Details

The click wheel detects a user's input via its touch sensitive ring. Because of four mechanical buttons that lie beneath it, the ring is able to perform multiple commands.^[1] For example, browsing through music, after selecting a particular song, the click-wheel is used to adjust the volume. Pressing the select button can be used to skip to a specific part in the song.

The primary technology that the click-wheel demonstrates is that of Capacitive sensing. This technology actually dates back to 1919, where it was first utilized in a musical instrument called a Theremin. It allowed the pitch and volume of the instrument to be controlled by the distance from the musician's hands to two antennae. When two metal plates are placed very close to one another, without coming into contact, a current passes through the plates, energy is stored, but once the current is taken away, the stored energy creates a current on its own. This is how a capacitor gathers and stores energy.^[2]

This same principle is applied to the iPod Classic and on the first through fifth generations of the iPod Nano.

The "brain" behind the click-wheel is the conductive membrane behind the plastic covering. This membrane has "channels" that when connected, create a set of coordinates. These channels are conductors, which when connected to another conductor (a finger in this case), try to send a current through the user's finger, but are blocked by the plastic covering the click-wheel. So instead of passing through the plastic, the current creates a charge at the closest location to the finger, which is also known as capacitance. The component that detects this change in capacitance is the controller. Whenever the controller senses a change, it sends a signal to the microprocessor, which performs the desired action. The faster a finger moves around the wheel, the more concentrated the stream of signals it sends out. The moment the finger leaves the wheel, however, is when the controller stops detecting change in capacitance, therefore stopping the current process.^[1]

Lawsuits

It is not widely known that Apple did not develop the click wheel; Synaptics came up with the design for the device.^[3] There have nevertheless been a few lawsuits concerning its capacitance-sensing technology.

APLIX EXHIBIT 2029
SCEA v. APLIX
IPR2015-00476

References

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3. Hurst, Wolfgang. "A Study of Algorithms in Mobile Devices" (<http://portal.acm.org/citation.cfm?id=1227368&coll=GUIDE&dl=GUIDE&CFID=6187803&CFTOKEN=40286539&ret=1#Fulltext>) March 2007 Click Wheel Study (accessed October 12, 2008).

External links

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