

Touch screen gamble: which technology to use

October 15 2009, By Steve Johnson

Prompted partly by the iPhone's phenomenal popularity, consumers are demanding and likely to get a wider range of touch screens on many more electronic devices.

The screens have become wildly trendy by allowing people to operate cell phones, bank teller machines, airport kiosks and other gadgets by simply pressing a finger to a screen or, in some cases, merely waiving their pinkie over it.

But the multibillion-dollar touch-screen market is awash with at least a dozen competing technologies, each requiring a differently designed microchip known as a controller to make their screens work. And that poses considerable risk for any semiconductor company trying to determine which technology to embrace.

"You're kind of having to make a gamble," said Randy Lawson, a senior analyst with chip research firm iSuppli. "A lot of people are asking, 'Who's going to be the winner in five years?'"

Most touch screens today use what is known as resistive technology, which incorporates two electrically conductive layers separated by air. When a finger or stylus presses the screen, it compresses the layers together and changes the electrical current, which the screen recognizes as a touch.

One [chip maker](#) long experienced with the resistive approach is Maxim

Integrated Products of Sunnyvale, Calif., which considers the technology ideal for such things as printers, MP3 players, digital photo frames and car entertainment systems.

"We've been doing resistive touch-screen controllers for the past eight years," said Bart DeCanne, a Maxim business director, noting that the technology is popular because it is relatively inexpensive and adaptable for a variety of uses.

But resistive touch screens have their limits. They tend to wear out with all the pounding they take and they aren't generally designed to accommodate gestures with more than one finger, as is possible with the Apple's [iPhone](#). With that phone, for example, a person can zoom into a picture or Web page by putting their thumb and index finger on the screen and spreading them apart. To zoom back out, the fingers are pinched together.

While companies are just beginning to explore multitouch capabilities, experts say being able to operate screens with up to 10 fingers will enable people to play virtual piano, create elaborate finger paintings, easily rearrange computerized photo albums and enjoy new types of video games, among other possibilities.

The technology generally regarded as best suited for multiple-finger commands -- and the one the iPhone uses -- is called capacitive touch, which relies on the human body's electrical properties.

In a basic configuration, a capacitive screen is given a uniform electric field by electrodes placed around its edges so that a finger touch draws current from each corner of the screen. The controller then measures the current flow from the corners to instantly calculate the finger's location. Some capacitive designs can detect a finger that comes close to the screen but doesn't actually make contact with it.

While generally more expensive to make than resistive screens, the capacitive kind are becoming more affordable and "getting a lot of interest" from chip makers, said Jennifer Colegrove, an analyst with the market research firm DisplaySearch.

One company that has forged heavily into capacitive technology over the past two years and has become a leading supplier of capacitive chips is Cypress Semiconductor of San Jose.

Many chip companies, including Cypress, don't disclose how much they earn specifically from touch-screen sales, which analysts say makes it hard to calculate the overall size of the touch-screen controller market. But the business "is on a very growth trajectory," said Gokul Krishnan, Cypress' director of marketing user interface solutions, adding that "almost everyone is switching from resistive to capacitive."

Among those jumping on the capacitive train is Maxim. But because resistive touch screens are likely to remain desirable for certain consumer and industrial applications, said Maxim's DeCanne, "we believe resistive is going to be the bulk of our business for the next two years."

Hedging its bets even more is Elo TouchSystems of Menlo Park, Calif., which has been developing touch-screen capabilities for about 40 years and became part of Switzerland-based Tyco Electronics in 1999.

Besides selling resistive and capacitive controllers, Elo offers products based on several other touch-screen technologies. Two of them pass sound waves over the screen, so a finger touch is identified by a change in the wave. Another creates a grid on the screen with infrared light-emitting diodes. When a finger interrupts the light, the touch is detected by photo sensors.

By offering several options, Elo differentiates itself from competitors that "force-fit you into one type of technology," said Lorna Wood, the company's global marketing manager.

More alternatives are probably coming, said Amy Leong, an analyst with research firm Gartner.

"The touch market is still in its infancy stage," she said. "In the next few years, we are going to see many types of touch technologies being tested and deployed for various applications."

TWO [TOUCH-SCREEN](#) TECHNOLOGIES

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