

The State of the Touch-Screen Market in 2010

Touch screens are in widespread use, due to the intuitive interfaces they enable, which can save time and increase productivity. Falling component prices have also spurred adoption, with consumer products increasingly being designed around touch screens. Touch-screen devices are also widely perceived as cool and fun.

by Jennifer Colegrove

ONE OF THE DIFFERENCES between the touch-screen market and the display market is the relative degree of consolidation. The display market has consolidated to the point where the top 10 suppliers account for over 90% of total display revenue, while the touch-screen market, by comparison, is made up of around 170 suppliers, with the top 10 accounting for less than 50% of the total market revenue. In other words, the touch-screen market is highly fragmented.

There is also a significant geographic difference between the touch-screen market and the display market. The top 10 display suppliers mentioned above are concentrated in only three countries – Taiwan, Korea, and Japan, while the 170+ touch-screen suppliers are spread across more than a dozen countries (see Fig. 1).

Historically, the touch industry has been centered in Japan and the U.S., but over the past several years there has been rapid growth in Taiwan, China, and Korea.

Long used in industrial equipment, kiosks, and other non-consumer products, touch screens have rapidly been penetrating areas such as mobile phones, portable navigation devices, gaming, and other applications. Over the next several years, touch screens will undergo strong growth in large-size (>10-in.)

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applications such as retail, ticketing, point of information, and education/training.

Among the 20 touch-screen application categories that DisplaySearch tracks, the mobile-phone category is forecasted to be the

largest in terms of shipments and revenues during 2009–2015. There were about 220 million touch screens shipped in mobile-phone applications in 2008, which is a 16% penetration rate. DisplaySearch forecasts that

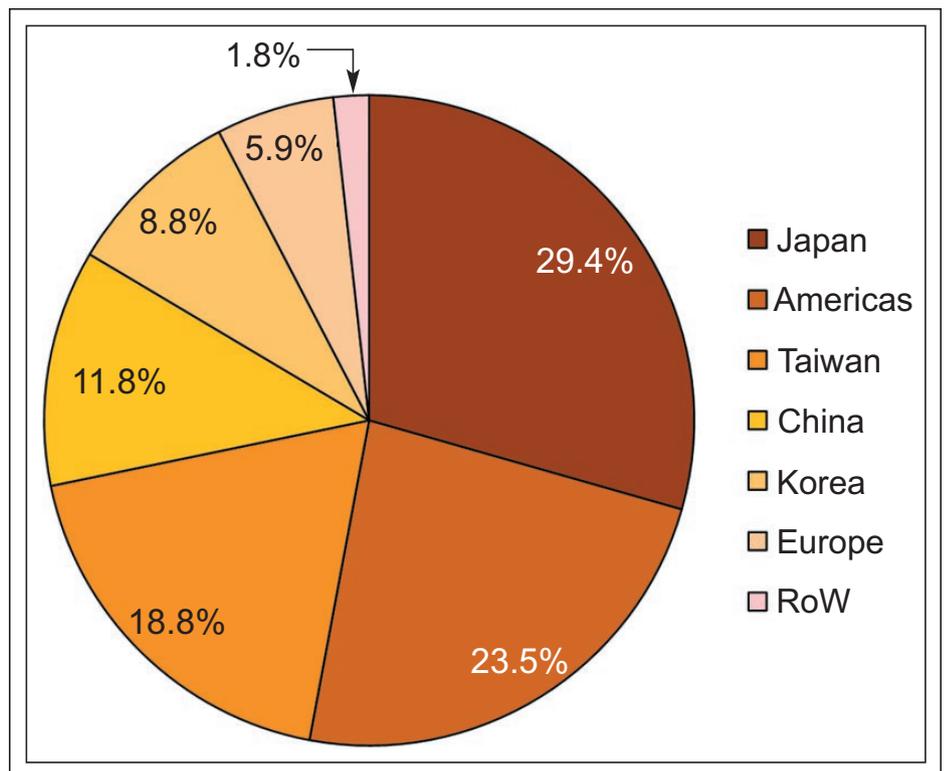


Fig. 1: The geographic distribution of touch-screen suppliers shows Japan with the highest percentage. Source: DisplaySearch 2009 Touch Panel Market Analysis Report.

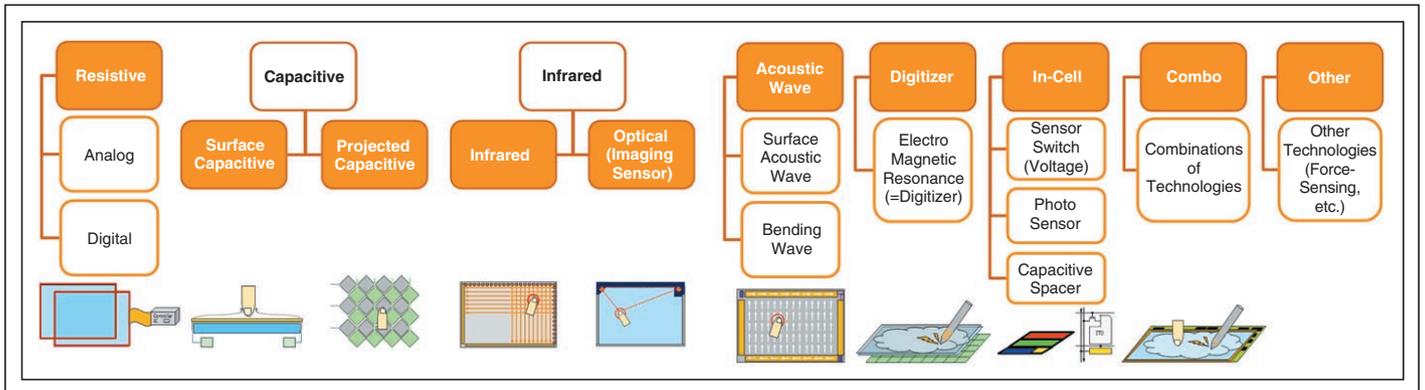


Fig. 2: DisplaySearch divides touch into ten categories with 14 sub-technologies. Source: DisplaySearch 2009 Touch Panel Market Analysis.

the penetration rate of touch in mobile phones will reach nearly 40% by 2015. Other large applications in terms of revenues are vertical markets such as retail and point-of-sales (POS), factory/industry automation, point-of-information (POI), and self-check-in, as well as growing consumer markets for notebook PCs and PMP/MP3 players.

There are over a dozen touch-screen technologies in use, and no single technology can meet 100% of the requirements for every application. As a result, there has been an accelerated stream of innovations in touch-screen technologies in the last few years.

As shown in Fig. 2, DisplaySearch groups touch technologies into ten categories: resistive (both analog and digital), surface capacitive, projected capacitive, infrared (traditional infrared), optical imaging (camera-based), acoustic wave {both surface-acoustic-wave (SAW) and bending-wave [acoustic pulse recognition (APR) and dispersive signal technology (DST)]}, digitizer, in-cell, combination, and others.

One of the more interesting variables in the touch industry is the number of suppliers for each touch technology. There are over 60 companies supplying resistive touch screens, over 30 companies supplying projected capacitive, and over 20 companies supplying surface capacitive.

A significant number of companies support only a single touch technology, a smaller number support two, and very few support three or more, such as 3M and Elo Touch-Systems/Tyco Electronics.

Market Outlook

The combination of the rapid popularization

of projected-capacitive touch technology and the widespread adoption of multi-touch capability is having profound effects on the consumer portion of the touch-screen market. DisplaySearch forecasts that the unit shipments of touch modules (defined as the combination of a touch sensor and a controller) will grow at a compound annual growth rate (CAGR) of 17% to 1.4 billion units by 2015, more than three times faster than the display market (Fig. 3). Similarly, touch-module revenues are expected to grow at a CAGR of 14% to \$9 billion in 2015, which is over 10 times faster than the display market.

The market for touch screens is relatively small compared with the display market (\$3.7 billion vs. \$90 billion in 2009), but its growth rate is much faster.

Innovations and Changes in the Touch-Screen Market

The touch-screen industry is a rapidly changing industry, but not all of the touch-screen technologies have experienced the same degree of innovation and change; the following sections discuss the ones with the most significant changes.

Projected Capacitive: Projected-capacitive touch has grown very fast in the last few years

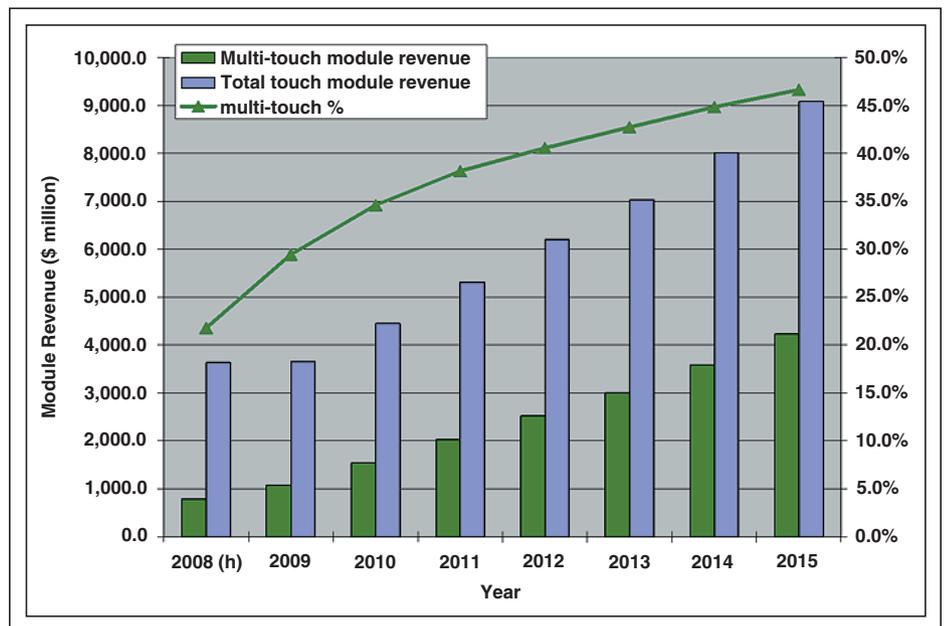


Fig. 3: DisplaySearch's worldwide touch-screen revenue forecast shows total revenues topping \$9 billion by 2015. Source: DisplaySearch 2009 Touch Panel Market Analysis Report.

since it was first popularized by Apple's iPhone and iPod Touch starting in 2007. Projected capacitive is the first serious challenger to the long-term dominance of analog resistive in the touch-screen world. Not only have more resistive touch-screen manufacturers moved to produce projected capacitive, but projected-capacitive technology has evolved to the use of a single substrate (the ITO coating layers are on one substrate). In recent years, film-based projected capacitive made with micro-fine wire has become available in very large sizes of more than 100 in. At the Consumer Electronics Show in January 2010, there was an astonishing range of products using projected-capacitive touch screens. Projected capacitive is now the number two touch-screen technology and, as such, is attracting large numbers of new competitors into the market. (See the Frontline Technology article, "Projective-Capacitive Touch Technology," in this issue for more details on the technology.)

Multi-Touch Resistive: Multi-touch resistive first appeared in the marketplace in shippable form in 2009. Although the technology had been used in a commercial product (a music controller from JazzMutant, now a division of Stantum) since 2004, it only came into prominence when projected capacitive became significant. (For more on this product, see "Developing the First Commercial Product that Uses Multi-Touch Technology," in the December 2007 issue of *Information Display*.) Multi-touch-resistive technology is created by patterning indium tin oxide (ITO) transparent conductors on PET film and/or glass. The advantages of this modification of analog resistive are that it supports multi-touch and is significantly lower cost than projected capacitive; the disadvantages are all the same ones as analog resistive (e.g., low durability and poor optical performance). It remains to be seen if the cost advantage of multi-touch resistive will remain significant as the volume of projected capacitive rockets upwards.

Optical Imaging: Optical-imaging touch-screen technology can be very cost-effective in large sizes (>10 in.) because it requires only two cameras and an infrared (IR) source. Initial suppliers of optical-imaging touch technology included Canada-based SMART Technologies and New-Zealand-based Next-Window. Along with multi-touch resistive, projected capacitive, traditional infrared, and SAW touch technologies, optical imaging is aiming to ride the wave of Windows 7,

Microsoft's first operating system to support multi-touch, launched in September 2009. As optical imaging has taken off, more companies are entering the market. For example, Taiwan-based Quanta has started manufacturing desktop and notebook PCs that include optical-imaging touch. Quanta uses Pixart Imaging as its touch-controller IC supplier; Pixart Imaging licensed SMART Technologies' DViT (Digital Vision Touch) technology and related know-how in 2009.

In-Cell: In-cell touch has been a kind of Holy Grail in the touch industry for the last 3 years – it just seems natural for touch to be totally (and invisibly) integrated into the displays. Research continued during 2009 on in-cell in all three technology variations – photo-sensor (also called light sensing), sensor switch (also called voltage sensing), and capacitive spacer (also called charge sensing). One key milestone occurred in May 2009 when the first actual product using any form of in-cell touch started shipping. The product, a netbook from Sharp that sold only in the Japanese market, used a 4-in. 854 × 480-pixel LCD equipped with photo-sensor in-cell touch in place of the conventional opaque touchpad. AU Optronics Corp. (AUO) also announced an in-cell touch-enabled display in 2009. LG Display recently announced it will mass produce 13.3-in. capacitive in-cell by the end of this year. In-cell touch is likely to appear in several mobile phones in 2010. (See the Frontline Technology article, "LCD In-Cell Touch" in this issue.)

Surface Acoustic Wave: Surface acoustic wave (SAW) has been one of the workhorses of the touch industry for over 20 years. It has been widely used in kiosks and other public applications. Until 2009, it has always supported only single-touch. Elo TouchSystems changed this when it announced in December 2009 the launch of IntelliTouch Plus, a two-touch implementation of SAW. (See this issue's Industry News for more information.) This was particularly significant not only because of the technical innovation that it represents, but because it allows SAW to compete with optical in the desktop space.

Multi-Touch: Multi-touch is defined as the ability to support two or more simultaneous touches. Although multi-touch was invented many years ago, it remained an obscure curiosity until Apple launched the iPhone in 2007. When Microsoft launched Windows 7 in 2009, multi-touch became a "must-have"

characteristic of many consumer touch devices. It is worth pointing out that multi-touch is generally not very significant in most vertical applications. There just are not that many situations where the user of a device such as an ATM or airport check-in terminal needs to touch more than one spot on the screen at a time. Multi-touch is not a touch technology in itself; it is a characteristic that is supported by various touch technologies, including projected capacitive, traditional infrared, optical imaging, bending wave, surface acoustic wave (recently), in-cell touch, and, of course, multi-touch resistive.

It should be noted that just because a given touch technology is capable of supporting multi-touch, not every implementation will expose multi-touch to the user. For example, at the Consumer Electronics Show in January 2010, one vendor was demonstrating a touch-controlled recipe reader intended for kitchen use. When asked if it supported multi-touch, the vendor said that there was no need for multi-touch in the simple, straightforward user interface and that projected capacitive was used in the device because of its high durability and high optical performance.

Taiwanese Players Entering the Touch Industry

In 2008, there were 37 touch-screen manufacturers in Taiwan, seven of which were pursuing projected capacitive, including J-Touch, Young Fast Optoelectronics, Wintek, and TPK Solutions. Recently, color-filter makers (Cando and Sintek), equipment makers (Usan Technology and Mirle Automation), and driver-IC supplier Sitronix (which partnered with France-based Stantum on multi-touch resistive controllers) have all started to explore the touch market.

Apple's iPad: A New Wild Card?

In January, Steve Jobs announced that Apple's iPad will be available at the end of March 2010. The iPad will have a 9.67-in. LCD and projected-capacitive touch screen. Apple's iPhone had a big impact on the mobile-phone business and on small-sized projected-capacitive touch screens. How will the iPad impact the mini-notebook/tablet PC and medium-sized touch-screen markets? Will it also stir a new round of "me-too" followers to make similar devices? These questions will be answered during the next year or two. ■