



The Best of Times

by Geoff Walker

It's hard to imagine how the touch industry could be any more exciting than it is right now. Consider the following, especially in light of the current worldwide economic crisis:

- Consumer-device manufacturers are adopting touch at a very rapid rate.
- New touch technologies are being created.
- Touch is growing 3X (units) to 10X (revenue) faster than the display industry.
- Existing touch technologies are being refined and enhanced.
- Projected-capacitive-touch revenue has rocketed from \$20 million to \$600 million in 3 years.
- The pace and scope of university research on touch has accelerated.
- Display Week has dedicated one of the four half-day Sunday Short Courses to touch.
- SID has designated touch as a special area of focus and created symposium sessions exclusively for touch.
- Touch startups are being funded or acquired when they rarely would have been in the past (FlatFrog, Touchco, Sensitive Objects ...).
- New conferences and shows devoted to touch are being created worldwide.

One of the several factors driving this excitement is that there is no perfect touch technology. Each of more than a dozen technologies has specific strengths and weaknesses. For example, there still is not one touch technology for a smartphone that has high durability, high optical performance, multi-touch, a flush surface (edge-to-edge glass or plastic), and can be touched with any object including a small-tipped throw-away stylus – at any cost! Yet all of these characteristics are in strong demand from smartphone OEMs.

Another factor is the variation in requirements across different touch applications. For example, how many simultaneous touches does a touch technology need to support? The answer depends on the application and the device size. In small, narrow-bordered mobile devices such as smartphones and tablets, the ability to recognize and track many touches is particularly useful when implementing “grip suppression” algorithms (see the article in this issue on projected-capacitive touch technology for more details). In netbooks and notebooks, one hand is almost always used to hold the screen steady, so the maximum number of touches that the other hand can apply is limited to five, and since it's only one hand, three or four is probably a practical limit. In desktop monitors and all-in-one computers, there are zero applications today that require more than two touches, so the device OEMs currently have little interest in incorporating (more expensive) touch screens that can support more than two touches. In large-format (>30-in.) displays, the majority of applications today are “point-and-click” that require only a single touch (excepting CNN-TV's multi-touch display, of course). On the other hand, it's not much of a stretch to envision multi-player games and educational applications on large-format displays requiring 4-10 touches in the near future.

In reality, the maximum number of touches is just one of more than 40 characteristics that define a touch screen. Ultimately, what really matters is the user experience, which depends on all of the touch screen's characteristics, the user interface, the application, and the operating system all coming together to work in harmony to do what

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the user needs. In my mind's eye, I can see what I like to call the "psychic touch screen™." *It knows what the user wants, and it just does it.* It doesn't care how many fingers are used, how dry the fingers are, how hard or soft or quickly or slowly the screen is touched, where it's touched, what it's touched with, whether a hand (and maybe also a beer can) is resting on the screen, whether the device is in bright sunlight, or anything else. When users are interacting with touch-screen-equipped devices, they do not want to be thinking about touch or fingernails or anything related to the touch screen. They just want to use their devices! We have a long way to go to get to that point, but that's partly what the current excitement of the touch industry is all about. Touch is accelerating and exhilarating.

This issue of *Information Display* focuses on touch. In the Frontline Technology article "LCD In-cell Touch," my colleague Mark Fihn (Veritas et Visus) and I explore the latest status of LCD in-cell touch, the holy grail of touch for the past 7 years. In the next Frontline Technology article, "Projected-Capacitive Touch Technology," Gary Barrett (Touch International) and Ryomei Omote (Nissha Printing) together provide a thorough explanation of projected-capacitive touch technology, currently one of the hottest topics in touch. In this issue's Display Marketplace article, Jennifer Colegrove (DisplaySearch) delineates the current state of the touch market, as well as recent events in a half-dozen touch technologies. In the Enabling Technology article, "Touch Screens and Touch Surfaces Are Enriched by Haptic Force-Feedback," Bruce Banter (Tech-D-P) describes several new technologies that are being employed in haptic (force-feedback) touch screens, as well as what's happening in automotive implementations. And in a second Enabling Technology article, Mark Fihn (Veritas et Visus) and I look beneath the surface of Microsoft's Surface product and other similar vision-based touch technologies. Wrapping up this issue is Mark Hamblin's (Touch Revolution) Making Displays Work for You article, in which he explains why touch makes sense as a replacement for conventional button-and-switch interfaces and provides some eminently practical guidelines for applying touch in those environments.

I hope that you find the articles in this issue so interesting and exciting that you'll be eager to join me and the rest of the touch industry in the pursuit of the psychic touch screen! ■

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