



The Winning Combination of Keyboard and Touch for Ultrabooks™

Touch interfaces are one of the key factors behind the rapid rise of Ultrabook™ device adoption, which is projected to accelerate with estimates of a 53 percent compound annual growth rate through 2017.¹ In response, software makers are considering how touch interaction should factor into their product roadmaps.

Application architects must establish strategies without a substantial history to suggest how users will want to interact with software on Ultrabooks, which retain the traditional keyboard, mouse, and trackpad inputs of laptops, as well as adding touch-sensitive screens.

Some usability experts have pointed out the rapid adoption of touch by users of tablets and smart phones. Others have been skeptical that the same pace of adoption would occur for common productivity applications when keyboards are available. Some have even expressed concern about fatigue from prolonged use of touch interfaces. Research by Intel and others suggests that user experiences targeting both touch and other means of interaction—including hardware-based keyboards—may be most widely accepted by the full breadth of users.

This article illustrates to application architects and other decision makers at software companies in both the business and consumer markets the combined advantages of designing for keyboard and touch usage models. It is part of a series of papers that explore key considerations in taking advantage of the Ultrabook market segment with software:

- **Harnessing the Ultrabook™ Experience to Sell More Applications:** <http://intel.ly/selling-ultrabook-apps>
- **Optimizing the Cost-Effectiveness of Software Development for Ultrabooks™:** <http://intel.ly/reduce-dev-costs>
- **The Winning Combination of Keyboard and Touch for Ultrabooks™:** <http://intel.ly/keyboard-and-touch>
- **Ultrabooks™ Broaden Software Usage Models on Touch-Capable Mobile Devices:** <http://intel.ly/broad-usage-models>
- **Sensors Deliver New Opportunities for Ultrabook™ Software Innovation:** <http://intel.ly/sensors-for-software-innovation>

Users Love the Combination of Keyboard and Touch

To gauge user preferences for interacting with their applications, Daria Loi, who holds the title of user experience manager at Intel, conducted user experience testing² over a variety of tasks, with 81 users from the United States, Brazil, Italy, and China. Test subjects included those with no experience with touch at all to daily use on devices such as tablets and smart phones. The test scenarios included productivity and other tasks, including changing system settings (as shown in Figure 1), creating a Microsoft Office* PowerPoint* slide, writing an email message, and so on.



Figure 1. Changing PC settings using touch.

The test subjects found touch to be a compelling way of interacting with the Ultrabook device. Many reported that the addition of touch made their experience faster, easier, more intuitive, and more enjoyable. Arm fatigue from using touch interfaces was not reported as a significant consideration. At the same time, test subjects reported wanting to keep traditional ways of interacting, including as a hardware-based, tactile keyboard. Tallying the average number of interactions test subjects made using each type of input device revealed the following:

- **Touch screen:** 77 percent of interactions
- **Keyboard:** 8 percent of interactions
- **Mouse:** 12 percent of interactions
- **Trackpad:** 3 percent of interactions

These results strongly suggest that users will readily expand the ways they go about doing tasks to include touch interface components, while continuing to use the keyboard, mouse, and trackpad. In fact, that tendency follows the now-common experience of using, for example, the keyboard and mouse (or other pointing device) together in day-to-day computer work. Moving from using both hands on the keyboard to placing one on the mouse is so common as to be hardly noticed, and the participants in the study showed a tendency toward a similar movement between the keyboard, mouse, and touchscreen.

The most straightforward conclusion that application designers are likely to make from this research is that the user experience should embrace the touch interface, while continuing to incorporate the keyboard and mouse as well. This approach is in keeping with the overall notion of targeting Ultrabook devices with new and existing software titles, since these systems bring together all three types of input devices.

It's also worthwhile to consider that the mouse has evolved functionally over time, for example adding the scroll wheel and more buttons. Already, we see touch modalities such as flicks and swipes that have taken the advance beyond simple screen taps. It would be difficult to predict what sorts of user interactions and experiences might follow, now that touch has been incorporated into productivity-oriented computer systems, but advances seem likely to continue, and software makers on the whole are likely to move early to prepare themselves and their products accordingly.

About her own research described here, Loi said, "If I did this study 8 or 10 years ago, I don't think I'd get the same results. In the past few years, people have been exposed to touch through new personal devices and public interactions with ATMs or airport check-in machines. Overall, touchscreens are increasingly becoming smoother and more responsive than ever before. The user interfaces are now optimized for touch."

Touch is a Logical Addition to New and Existing Applications

Enabling the user interface of a new or existing application for touch can improve the user experience as well as help to enhance the appeal of an application among users of Ultrabooks and other touch-enabled devices. In addition to the positive user impressions reported in the testing above, scrolling (using swipe motions and momentum in the on-screen movement) can improve usability compared to scroll bars. Interfaces can even incorporate horizontal scrolling to reach some of the controls, which is typically unacceptable in non-touch environments.

User Impressions of Touch Interface Interaction²

“Having a laptop with touch is having a laptop with an extra gear.”

– Pino, 35, Italy

“I like touch, but for typing I prefer the feel of the keyboard.”

– Marcus, 49, United States

“WOW ... this is easy ... It’s almost reading your mind. You think of it and do it. Just touch it.”

– Pamela, 49, United States

One obvious important business concern associated with extending applications for the Ultrabook segment is to continue to provide the best experience possible to users of devices that are not touch-enabled. This consideration follows logically from an early step in Ultrabook enablement—planning which applications are best suited to Ultrabooks. For business applications, executives and other knowledge workers are likely first adopters, so applications used by those groups may be logical choices.

Tools and best practices are helping to make touch enablement as efficient as possible, so that software makers can extend their applications to the Ultrabook segment rapidly and cost-effectively. The [Intel® Developer Zone Ultrabook community](http://software.intel.com/en-us/ultrabook) (<http://software.intel.com/en-us/ultrabook>) is a core resource for business decision makers in the software industry, as well as development teams that do the day-to-day work extending products for touch.

Changes to the basic visual layout of the user interface are typically valuable or even necessary when enabling for touch. For example, fingertips require larger targets for buttons and other controls than interfaces based on mice or other pointing devices, which can lead to crowding. Many different approaches can be used to address this issue, including the following:

- **Adding keyboard shortcuts** can help enhance usability, giving users more ways to interact with the application.
- **“Extending” the screen using horizontal scrolling** can reduce crowding by making it so not all of the interface needs to fit on the screen at once.
- **Using different controls** may make an interface better suited to touch, such as a slider switch in place of a box where a numeric value would have been placed.

One high-profile example of the emerging trend toward designing software for touch is Microsoft Windows* 8, which includes touch support in both the new Windows 8 UI shown in Figure 1 and the traditional desktop interface. Microsoft Office 2013 will also embrace the Ultrabook’s expanded capabilities with touch-enabled design, while continuing to embrace the full range of PCs. Other major application makers are moving in similar directions.



Figure 1. The Windows 8 New UI on an Ultrabook.

Keyboard and Touch—A Winning Combination for Productivity

The tangible feedback of a hardware keyboard carries significant value to users, particularly in the context of productivity applications, and especially in a work context. Study subjects reported that touch makes computing more of a play-like experience, with an immersive quality that creates a pleasant user experience. At the same time, it was reported that the physical keyboard offered by Ultrabooks is preferable in terms of usability. In the words of one participant, “I like touch, but for typing I prefer the feel of the keyboard.” The addition of touch to the user experience is therefore best thought of as an expansion of previous modalities, rather than a substitution.

Hardware keyboards have advantages in terms of user experience, relative to software-based virtual keyboards. Many users find the direct tactile feedback associated with physical keys to be helpful when placing their fingers for touch typing, which can help avoid misplaced keystrokes and make typing more accurate. Physical keys also allow users to rest their fingers on the keys without making inadvertent keystrokes. Moreover, physical keyboards don’t take up valuable screen space as software-based virtual keyboards do.

While the keyboard (whether hardware or software-based) is relatively unimportant as an input method for some classes of applications (a media player is one example), it is vital to others (a word processor may be the clearest illustration). Most classes of applications fall somewhere in between. Rather than trying to limit the role of the keyboard in Ultrabook applications, therefore, it often makes the most sense to support the notion of users moving back and forth between the keyboard and touchscreen.

A prime example of this type of usage in the pre-Ultrabook world is the equivalency between keyboard shortcuts and on-screen interactions using the mouse. Both are valuable, and the combination makes the user experience more powerful than either approach would be on its own. Different users will have different preferences, and most users will even favor one method or the other to different extents on different days. Therefore, application designers should bear in mind this variation when they plan how users will interact with their software. Failure to do so will limit productivity, lessen flexibility, and hamper the user experience.

Development Resources that Help Build a Competitive Advantage

Software makers have a lot to gain from the free-of-charge resources available through the Intel Developer Zone Ultrabook Community. Extend the expertise of your development team to include best practices, tools, and techniques for the Ultrabook category.

Quickly grasping the new opportunities and implementing the skill sets required to take advantage of them helps make applications early to market so they can start building market segment share as soon as possible. A few resources from the community that may prove especially beneficial in driving excitement around your software offerings for Ultrabook devices include the following:

- [The Human Touch: Building Ultrabook™ Applications in a Post-PC Age](http://software.intel.com/en-us/articles/the-human-touch-building-ultrabook-applications-in-a-post-pc-age/) (<http://software.intel.com/en-us/articles/the-human-touch-building-ultrabook-applications-in-a-post-pc-age/>) presents Intel research that investigates which application characteristics create the most compelling user experiences on Ultrabook devices.
- [User Interface Design Guidelines for Great Experience Design](http://software.intel.com/en-us/articles/user-experience-design) (<http://software.intel.com/en-us/articles/user-experience-design>) introduces considerations for developers as they produce UIs that deliver outstanding user experiences.
- [Adding Touch Support to Desktop Applications for Ultrabook™ Running on Windows* 8](http://software.intel.com/en-us/articles/touch-gestures) (<http://software.intel.com/en-us/articles/touch-gestures>) provides hands-on coding instructions that demonstrate how to touch-enable an application UI.
- [Developing Power Efficient Desktop Applications for Ultrabook™ on Windows* 8](http://software.intel.com/en-us/articles/power-management) (<http://software.intel.com/en-us/articles/power-management>) is a developer how-to article with in-depth examination of techniques for power-related coding in .NET.
- [Re-imagining Apps for Ultrabook™ series](http://software.intel.com/en-us/blogs/2012/08/09/re-imagining-apps-for-ultrabook-part-1-touch-interfaces/) (<http://software.intel.com/en-us/blogs/2012/08/09/re-imagining-apps-for-ultrabook-part-1-touch-interfaces/>) offers new ways of thinking and practical design advice that can help fuel innovation at software companies as they explore the new opportunities for Ultrabook devices.



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www.intel.com/ultrabook

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Matt Gillespie is an independent technology and business writer with a specialty in illuminating the real-world value of emerging hardware and software technologies, mostly working for the microprocessor industry. His previous work experience includes hands-on network IT at California Federal Bank, research writing at the University of California, Davis Center for Neuroscience, and equities writing at Morningstar Inc., the Chicago financial publisher. Matt studied physics and sculpture but eventually received a degree in English from the University of Illinois. You can reach him at spanningtree-at-comcast-dot-net.

Ultrabook™ products are offered in multiple models. Some models may not be available in your market. Consult your Ultrabook™ manufacturer. For more information and details, visit <http://www.intel.com/ultrabook>.

¹ ABI Research, “Netbooks, Smartbooks & Ultrabooks.” September 10, 2012.

² [The Human Touch: Building Ultrabook™ Applications in a Post-PC Age](http://software.intel.com/en-us/articles/the-human-touch-building-ultrabook-applications-in-a-post-pc-age/) (<http://software.intel.com/en-us/articles/the-human-touch-building-ultrabook-applications-in-a-post-pc-age/>).

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