# TOOLS of the TRADE

Leap Motion Interface

Leap Motion is a motion-control software and hardware company, and its new Leap device lets you control your computer with hand gestures in the space in front of your monitor. The Leap is about the size of a pack of gum, and it connects to your computer via a USB connection. It creates a four-cubic-foot space in which you can move your hands to navigate through Web pages, draw on the screen, sign documents, and navigate 3-D visualization systems or models like rooms. You can also use the Leap as your input device for computer games. The device is 200 times more sensitive than existing technologies, but the price is in the range of other, more pedestrian wireless utilities—under $70. The accuracy is within 1/100 of a millimeter, and you can fine-tune your own sensitivity settings. The device will sense all 10 fingers, and it can track items like a brush or pen. It's more flexible than the control you get with touch surfaces because it can operate in 2-D or 3-D environments. The system's latency (time needed to initiate motion) is below your ability to see it, so there's no lag in its responses. There's a video demo at the home page, www.leapmotion.com.

Sony Vaio T Series

The VAIO T 13.3 is Sony's first ultrabook, weighing in at 3.5 pounds with a footprint of about 9" × 13". And it's only 0.71 inches thick. The lithium polymer battery delivers up to 7.5 hours, and the screen is a 13.3-inch LED with a resolution of 1,366 × 768. The processor is an Intel Core i5 running at 1.7 GHz. Installed memory is 4GB, which can be increased to 8GB, and there's a Hybrid Hard Drive (HHD) that combines a 500GB hard drive with 32GB MLC flash memory for faster boot-up. There are two USB ports, one 3.0 and one 2.0, with the 3.0 port providing a charging outlet for phones or other peripherals. The port will charge your devices even if the computer is in sleep mode or shut off. The multigesture touchpad reads two-finger scrolling, pinch to zoom, and swipe to flip through pages or photos. A built-in HD camera is suitable for video conferencing, with low-light and face tracking capacities for right exposure
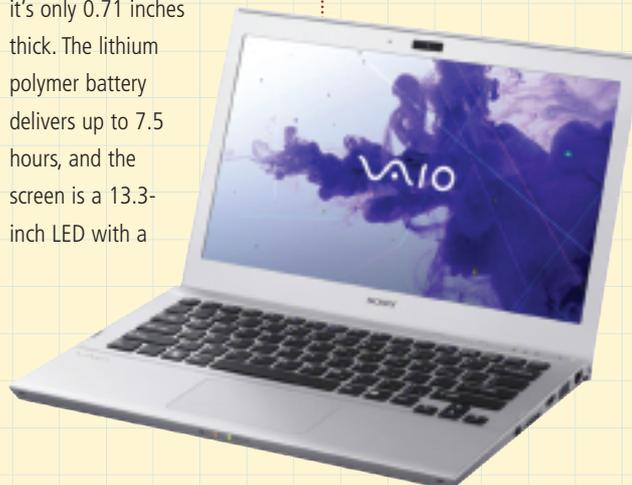
and constant focusing. The operating system is Windows 7 Home Premium. It has a silver brushed aluminum finish, and the base price is very competitive—under $800. www.store.sony.com

MacBook Pro Retina and Air

At this year's Apple World Wide Developer's Conference (WWDC) in San Francisco, there were several significant announcements regarding Apple's line of notebooks, the MacBook Pro and Air.

The MacBook Pro is now available with a Retina screen. Following the introduction of the Retina screen for the iPad tablets, Apple now has made the highest-resolution screen technology a part of its Pro notebook line. The 15-inch MacBook Pro also features flash storage, a quad-core processor, and it weighs only 4.46 pounds in a case that's only 0.71 inches thick. The Retina display has more than five million pixels, three million more than an HD television. The resulting 220 pixels-per-inch creates a density so high that the human eye can't distinguish individual

Face to Face with Your Computer

By Michael Castelluccio, Editor

The most important component of your computer is the one that establishes your direct contact with it—the graphical, auditory, or tactile user interface. It's OK if the interior hardware remains invisible, and ditto for the millions of lines of ungrammatical instructions in the operating system. It's the interface that grabs your attention and that you lock onto while working or browsing online. The friendlier the interface, the better. Or to put it another way, "As far as the customer is concerned, the interface is the product." That's what Jef Raskin, the creator of the original Apple Macintosh, believed. And it might be a major reason for the current massive migration over to tablets and smartphones.

Raskin spent a lot of time thinking about the computer user interface. He wrote a seminal book titled *The Humane Interface: New Directions for Designing Interactive Systems*. In the book, he put together a list of rules for computers based on what he called the ergonomics of the mind. He came up with five principles for the best interaction. Summarized by Richard Karpinski, they are: "An interface should be effective, habituating, reliable, efficient, and tested. To the extent that doing so does not conflict with these essentials, an interface should also be attractive." Each of Raskin's principles has rules.

The first principle involves a kind of invisibility. The product shouldn't get in your way or offer any kind of distraction. More precisely, "A gesture is an action that you finish without conscious thought once you have started it." There are three rules that will help make your interactive gestures so natural they become invisible. First, Raskin says the gesture should be habituating. After you use it for a while, it becomes automatic. To make it habituating, it must be modeless. If a gesture has different modes, then the same gesture might yield different results. That would defeat rule one because an attentive state would be required to keep track of the modes, and

pixels from a normal viewing distance. The 15.4" Widescreen LED-Backlit IPS Display has a native resolution of 2,880 × 1,800. This new version of the MacBook Pro is the lightest ever and is almost as thin as the MacBook Air. The aluminum body is still engineered out of a single block. The 256GB flash storage contributes to the lighter weight, and it runs up to four times faster than traditional notebook hard drives. The quad-core processor is an Intel Core i7 with up to 2.7 GHz. Ports include two Thunderbolt and two high-speed USB 3.0 ports, along with a new HDMI port to connect to HDTVs, 802.11a/b/g/n Wi-Fi, and Bluetooth 4.0. The battery provides up to seven hours of wireless productivity, and it can be recharged up to 1,000 times. The Pro notebook runs the OS X Lion operating system.

The improvements in the next generation of the MacBook Air include an upgraded processor, new Thunderbolt ports, a backlit keyboard, and Mac OS X Lion operating system with an upgrade to the OS X Mountain Lion when it's released later in the year. The MacBook Air is the original ultrabook lightweight, with an aluminum unibody that's 0.11 inches at its thinnest point and only 0.68 inches at the thickest. The 11-inch Air weighs 2.38 pounds, and the 13-inch weighs 2.96 pounds. With new Intel Core i5 and Core i7 processors, the Air is up to twice as fast as the previous generation. There's a full-size backlit keyboard and Multi-Touch glass trackpad. Other specs on the MacBook and Pro series are available at www.apple.com.

that isn't automatic. Rule three requires that the interface must be monotonous. Monotony will guarantee that you don't have to choose among multiple gestures, so there should be only one way to achieve a single-gesture subtask whether it's a mouse click, finger swipe, or keystroke.

The second principle requires that the interface be reliable. It shouldn't crash, and the system shouldn't lose any work you have done or information you have downloaded, even if you make a mistake. Raskin points out that this isn't usually seen as a task for the interface, but he claims it's possible to build this kind of reliability on top of even an unreliable operating sytem.

The third principle demands that an interface be efficient and as simple as possible. The interface should take very little time to learn and even less to use.

Principle four alerts the designer that "the suitability of an interface can only be determined by testing." Don't turn the user into the beta tester. And he warns, "It is never the user's fault, but also remember that people find it difficult to change, so difficulties based on previous habits may not be dispositive."

And, finally, principle number five asks that an interface be "pleasant in tone and visually attractive." It will disappear soon after it is learned, but the way it works should be natural and agreeable to whatever senses are involved—the look of the screen or the feel of your fingertips on the glass display.

COMPUTING ANTHROPOLOGY

How far have we progressed on the path to Raskin's humane interface? If you consider what was going on in the beginning, it looks like we might have traveled half the distance or maybe more.

In 1945, mathematicians like Claude Shannon were boiling down all communicable information to the existence of two symbols (0 and 1). That was followed by the arrival of 53 kilobytes of high-speed random-access memory in 1953, and Von Neumann's Universal Turing Machine (i.e., computer) was born. Forget intuitive. At that point, the basic concern about the interface was simply whether or not it would work.

The days of paper rolls and punch cards then gave way to a much more involved keyboard and command line marriage that demanded its own new language for systems like UNIX or DOS. The user finally was talking (typing, actually) to the computer with directions like CD (change the directory) and DIR (list the files in this directory). The interface was entirely unnatural, and the language consisted of translated abbreviations.

The evolution continued, and we entered a kind of cave painting phase. We got to point onscreen with Doug Englebart's mouse device, and the Palo Alto Research Center created a primitive windows system with a GUI (graphical user interface). Pictures of folders and tasks appeared on the wall, and we could poke at icons to wake them up.

Then researchers like James K. Baker, creator of Dragon Systems NaturallySpeaking, used speech recognition and text-to-speech engines to allow us to converse with our computers, giving operating instructions and dictating text. That particular Marconi threshold continues to grow new branches with high-visibility apps like Dragon Dictation on the iPad and Siri on the iPhone.

Two years ago, a new form factor designed specifically for touch input was debuted by Apple, and today the iPad is still creating downward pressure on laptops and desktops. That's mainly because of the estimated 80 million to 84 million units sold since the April 3, 2010, release. The tablet form factor resembles a Gutenberg-type artifact—a book that packs serious electronics between glass and aluminum covers. Beneath the magnetic flip cover fit unlimited numbers of pages and the entirety of the Internet. The interface reintroduced two ancient and intuitive input devices—fingers and pens.

To get an idea of how natural the iPad interface is, you need only spend a few hours tapping, zooming, and sliding your fingers over the Gorilla glass. It doesn't take long before a tablet user finds herself reaching to move items on her desktop or laptop screen as well.

A browse through the developer's handbook for iPad app creators reveals quite a few Raskin principles and rules. For example:

• "To avoid confusing people, never use the standard buttons and icons to mean something else. (Modeless)

• Make the main function of your application immediately apparent.

• Allow people to make the fewest possible gestures to do what they want.

• When appropriate, add a realistic, physical dimension to your application. Often, the more true-to-life your application looks and behaves, the easier it is for people to understand how it works and the more they enjoy using it."

Raskin's humane interface is natural, easy, pleasant, and, most of all, invisible. It makes you forget that you are interacting with a machine. And all of it works because someone figured out how to reduce all information to combinations of 0 and 1. **SF**