Good computer interfaces respect the real world, expert says

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Before Jeff Hawkins ever started making the original Palm Pilot digital organizer, he prototyped it as a block of wood with fake buttons and a paper screen. To this day the Palm Pilot is a successful design of human and computer interaction that remains all too rare, says computer science Assistant Professor Scott Klemmer.

Every time a person uses a computer—a desktop, a cell phone or even a chip-enabled coffee maker—the interaction is specified by an interface designer. These interfaces often fall short or even fail, Klemmer says, because designers overlook the physical nature of human beings and the real world. As computers become ubiquitous, designers must take everyday users into account from the beginning, prototyping extensively to stay attuned to human needs and capabilities.

"In naïve techno-utopianism, we just put everything into the land of bits without really thinking about it," says Klemmer, who spoke Feb. 18 at the American Association for the Advancement of Science annual meeting in St. Louis. "We've lost a lot of the things that we had in the physical world—a lot of the intuitions, a lot of the fidelity of control that our bodies offer."

Traditional computer interfaces often hinder the way people work, learn, play and interact, Klemmer says. Virtual interactions should supplement—but not supplant—physical ones. At the conference, Klemmer offered designers guidance including a set of principles to keep computer interfaces in physical perspective. He hopes the

principles and closer attention to prototyping as a design methodology will help future computer interface designs deliver the benefits of information technology without sacrificing the inherent advantages of the physical world.

Design principles

Klemmer's design principles address the shortcomings of traditional digital design approaches in accounting for the physical and social nature of human beings.

One key principle, for example, is that there is a limit to how much one should make product design virtual rather than physical. Simulations can speed the process, but designers like Hawkins gain invaluable feedback from building and critiquing physical prototypes. Seeking the happiest medium between physical and virtual design methods, Klemmer and doctoral candidate Bjoern Hartmann have developed a consumer electronics rapid prototyping system called d.Tools that allows users to design a gadget's hardware and software in concert. To build an MP3 player, for example, a designer would assemble d.Tools hardware components such as "play" and "pause" buttons, a volume control, speakers and an LCD screen into a physical device. The d.Tools software, which automatically recognizes the hardware components, would bring the physical device "to life" by letting designers assign capabilities to the controls. The designers also would use d.Tools to create the interface between the user and the device.

Another principle is recognizing that the human body is a well-engineered machine capable of managing rich and intricate interactions with the world. Keyboards, mice or buttons might not provide the best interactions to meet a user's needs. All the word processors in the world haven't, for example, made the myth of the "paperless office" come true because for tasks such as taking notes or writing down ideas, people

often prefer working with pliable, reliable paper, Klemmer says. Meanwhile the popular video game Dance Dance Revolution, which players control by dancing on an electronic platform, is a huge success because it preserves the physical joy of dancing.

Designers also should keep in mind that in physical environments, people can quickly observe useful information about each other, a principle Klemmer calls "visibility." Walk around an auto body shop or an art studio, for example, and it is easy to see what everyone is working on and how that work is progressing. So far computer interfaces have, if anything, reduced visibility.

Prototypes for feedback

The design principles will have the greatest impact if they are paired with the practice of prototyping, Klemmer says. Rather than trying to devise an entire digital product or experience in the lab before testing it with users, designers should frequently test mockups, dummies and other limited versions of the project to gather specific feedback for continuous improvement.

The response of users to different kinds of prototypes can answer crucial questions early in development, such as does the product look like users want it to? Does it work like users want it to? And, does it fit in well with the experience they want to have when they use it?

The need to design interfaces that can respect but augment the physical nature of humanity is becoming more acute as computers begin to greatly outnumber people. "Having thousands of keyboards per person is not a realistic solution," Klemmer says. "The successful interfaces will weave themselves into the fabric of everyday life." That is, computing will only seem natural when it is designed to be part of the natural world.

Source: Stanford University (by David Orenstein)