THE HUMAN SIDE OF COMPUTING

New Paradigms for Users

Members of the USER department (from left) John Haggis, Joe Betts, Julie Wright and Bob Kelley work in the group's open space. The environment lends itself to greater creative interaction, says USER Manager Ted Selker.

I n the computer business, some focus on hardware, others on software.

Ted Selker concentrates on users. His User Systems Ergonomics Research (USER) department, part of computer science, "focuses on exploring and testing new paradigms for using computers," Selker says. "We're trying to understand how to make new kinds of tools that improve the experience of getting work done."

The group works on physical, cognitive and graphical user interfaces.

Among the physical innovations are continued improvements on the TrackPoint II pointing device, which Selker invented along with Joe Rutledge in Yorktown, with assistance from Bob Olyha, and which is now a vital element in IBM's extremely popular and successful ThinkPad laptop computer.

One of the reasons for the TrackPoint's success is its ability to adapt to the natural motor movements of users. Rob Barrett, a member of the USER department, is working on ways to improve that capability. "We want to make it more responsive," he says, "so that it can almost anticipate what you want to do."

The limits of human physiology are key elements in USER's work. The researchers are trying to make the TrackPoint respond instantly to touch, but not so quickly that it's too fast for the eye to follow.

These are subtle changes, but Selker claims they can make significant improvements in users' productivity. For example, a tactile feedback mechanism that enables the TrackPoint to send a signal to the user to reflect changes as the cursor traverses the screen — entering or exiting a dialog box, for instance — can improve usage 15 percent, Selker claims.

An even more impressive improvement — up to 30 percent — can be gained by using two TrackPoints simultaneously: one to pick a function, the other to do the "dragging and dropping."

"In many types of work, one hand grabs a tool and the other uses it," says Ron Barber, who is heading up the effort. "That's the basic premise of using two pointing sticks."

"Cognitive interfaces" primarily involve improvements to COACH, a program Selker has developed for "exploring the use of intelligent agents for changing the ways people use computers." COACH, which stands for COgnitive Adaptive Computer Help, provides assistance for users based on their ability. As a user's skill increases, COACH adjusts to the new level.

The enhancements in COACH 2 include improved graphical interfaces and animation — an interest that also coincides with USER's third main focus, graphical user interfaces (GUI).

The GUI work focuses on which kinds of interfaces work best. For example, what's the best type of menu—fixed or pop-up? How about one shaped like a bookshelf? Why not one that's pie-shaped, with home base at the center and an option in each slice of the pie? And, by the way, how many slices are optimal? (Of course, that depends on the size of the pie.)

"We need to learn from physiology and cognitive psychology why some things work better than others," Selker says. "The main thing we're looking for is to make an interface feel instantly usable."

For the group, usability doesn't stop when the computer is turned off. They've come up with a variety of snap-on wrist rests that work with desk-top keyboards.

Selker and his team have also initiated design engineering changes to reduce the bulk and complexity of the ThinkPad, especially for long-distance or international travellers who have to take along extra power supplies, cables or batteries.

The USER researchers have created plugs that rotate and work in any outlet in the world. They've reduced the size of the power supply and designed it so that the cord and connector can be wrapped around and neatly tucked in it. The team has even looked at making a power supply in the shape of a cable, eliminating altogether the need for that heavy electronic "brick."

Perhaps even better than that, USER is studying magnesium fuel cells that would be so cheap and light (one fifth the size of conventional batteries) that they would eliminate the need for any additional power supplies for a travelling laptop user.

This kind of warp-speed, can-you-top-this? approach to innovation is what Selker calls the "momentum of inventive spirit" within the group.

It's an eclectic collection of skills: Barrett is an applied physicist who worked in storage systems and technology before joining USER; Barber is computer scientist with an extensive background in database technology, including QBIC (Query By Image Content); Barton Smith, a chemist, transferred from polymer

science and technology. Today he's a co-inventor on a new sensor for the TrackPoint and also works with OEM sales of TrackPoint technology to Texas Instruments, a deal which is bringing external revenue to IBM this year.

Joe Betts, a term employee, has a master's degree in oceanography from MIT and John Haggis, a vendor, is a former medical student. Bob Kelley, also a term, has his degree in computer science, but is working on transformers for the ThinkPad, as well as code for COACH 2. Julia Wright, a computer science student at San Jose State,

is helping create animated help screens for COACH 2.

"It's a very collaborative environment. That's why we work in a common area," Selker says of the group's large, open space, decorated with rugs and floor lamps. "Everybody comments on everyone's work."

"The theme of our department is that there is no theme," adds Barrett, "we're interested in anything that's a usability problem — and usability too often gets put on the back burner in many technical projects.

"What we're here to do is to make the world a little easier for everyone to use." ≡
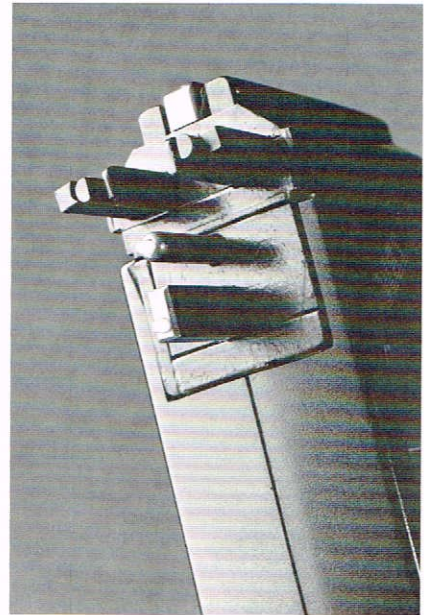
A "universal plug" provides prongs and grounds for electrical outlets anywhere in the world. When plugged into the wall, the unneeded prongs recede.

Engineering changes the USER group made to the ThinkPad power supply makes it more compact and easier to transport.