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No Press, No Stress: When Fingers Fly

By SALLY McGRANE

TWO years ago, Wayne Westerman, a Ph.D. candidate at the University of Delaware, had a problem. His dissertation was almost due, and he couldn't type more than one page a day because of repetitive stress problems that had begun when he was an undergraduate. "I couldn't stand to press the buttons anymore," he said.

For Mr. (now Dr.) Westerman, work also provided a solution. His dissertation in the university's electrical and computer engineering department involved the development of a keyless keyboard, one that did not require the same degree of finger pressure. This new approach to entering data allowed Dr. Westerman, now a visiting assistant professor in the same department, to finish his dissertation and eventually to be free of symptoms.

Dr. Westerman and his co-developer, John G. Elias, a professor in the department, are trying to market their technology to others whose injuries might prevent them from using a computer. The TouchStream Mini from their company, FingerWorks (www.fingerworks.com), uses a thin sensor array that recognizes fingers as they move over the keyboard. The sensors monitor disturbances in the touch pad's electric field, not pressure, so typing requires only a very light touch. Unlike similar touch pads on hand-held computers or on laptops, which only recognize input from a single point, this surface can process information from multiple points, allowing for more rapid typing.

"We thought there would already be something out there that would do multifinger input," Mr. Westerman said. "We ended up building the whole thing from scratch."

The TouchStream technology also replaces computer mouse movements with gestures across the screen. To issue commands, the user runs various finger combinations over the pad. For "cut," the thumb and middle finger are pulled together in a snipping motion, and for "open," the thumb and next three fingers are drawn in a circle on the pad, as if they are opening a jar. ("Close" is the opposite motion.) Because the software knows the difference between a typing movement and a mouse or command gesture, the user can give mouse commands anywhere on the pad, even right on top of the keyboard area.

"A lot of electrical engineers come at the problem of input and go immediately to voice recognition," Dr. Westerman said. Because he had studied piano for 12 years, he said, the idea of using the technology with multiple fingers made sense to him.

FingerWorks is just beginning to offer commercial products for sale at its Web site. The TouchStream Mini is $199; the larger TouchStream Stealth, which includes an extensive two-handed-gesture set, is $329. The iGesture Pad, which supplants the mouse and number pad, is $189.

Graciela Perez, manager of the lab ergonomics program at the Los Alamos National Laboratory in New Mexico, bought one of the FingerWorks keyboards for its ergonomics demonstration room. "The whole concept is really good," she said. Although the keyboard is not the right size for a person with small hands, she added, "people really like it."

"Most of our people are on computers with keyboard trays with the mouse to one side, so the shoulder is out or even worse, back," Ms. Perez said. "There's also an anticipatory reflex with mouse work: as someone waits for the next window to come up, they hold onto the mouse for dear life." The FingerWorks keyboard, she said, "forces you to relax. It appreciably reduces force and repetitive issues and encourages dynamic motion."

The keyboard software is not configured to change key sizes for users with hands of various sizes because the keyboard overlay, which shows users where the keys are, is static. Mr. Elias and Dr. Westerman hope to incorporate a key-size option in the future.

FingerWorks may ultimately introduce handwriting in addition to gestures as an alternative to traditional typing and mousing. In theory, said Mr. Elias, the touch pad could be as thin as a sheet of paper and cover an entire tabletop. At the touch of a fingertip, the tabletop pad's software could reconfigure from a keyboard to a game console to the keys of a musical instrument. No real keys would exist. "You could spill coffee on it," he said.

Drawing: RELAXING -- The Stealth and other TouchStream keyboards monitor disturbances in the pad's electric field, not key pressure. Even gestures can be commands.
