

HEALTH & SCIENCE



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The 13-ounce Kurzweil-NFB Reader is a combination of a digital camera, a PDA and text recognition software that can convert a digital image of text into synthesized speech.

ANDRÉ F. CHUNG [SUN PHOTOGRAPHER]

Hand-held reader that can convert text into synthesized speech may increase independence for the visually impaired

Device provides words to live by

BY FRANK D. ROYLANCE
[SUN REPORTER]

Not long ago, James Gashel was on Capitol Hill, waiting for a meeting to start, when he realized that he needed some numbers from a chart he was carrying.

That was a problem. Gashel is blind, and so was his companion. And the chart was not in Braille. Gashel was reaching for his cell phone to call someone at his office to retrieve the numbers, when his colleague stopped him.

"Why don't you try the reader?" he asked. Of course.

Gashel, an executive at the National Federation for the Blind in Baltimore, was carrying the world's first hand-held reading machine for the blind — just developed by NFB in collaboration with

Kurzweil Technologies Inc. of Wellesley, Mass.

Combining a 5-megapixel digital camera with a personal digital assistant, or PDA, the 13-ounce Kurzweil-NFB Reader converts digital images of text into synthesized speech.

Gashel pulled out his reader, snapped a picture of the chart, "and within a minute I had the numbers I wanted," he said. And he didn't have to bother anyone else to get them.

Now in final field tests before its release for sale by Kurzweil this summer, the device was officially unveiled last week at ceremonies at NFB headquarters in South Baltimore.

Thanks to the new reader, Gashel and 75 other blind product testers across the country are sorting through their own mail, reading restaurant menus, identifying packages in the freezer by the labels and discovering many other tasks they can now do without assistance.

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FROM THE COVER

Independence in palm of your hand

BLIND [From Page 1D]

It's liberating, Gashel said. "You start to think about your capabilities differently."

In addition to many of the nation's 1.3 million blind people, he also predicts a demand from older people with failing eyesight, and young people with dyslexia or learning disabilities.

The NFB's collaboration with Kurzweil began more than 30 years ago, when founder Ray Kurzweil, a pioneer of character recognition and text-to-speech devices, came to the federation's offices, then in Washington.

He had developed the first Kurzweil Reading Machine. The size of an office copier, it could scan a document and read it in a synthetic human voice.

"That was very revolutionary," Gashel said. Until then, blind people were pretty much limited to live readers, or the limited number of publications available on tape or records, or transcribed into Braille.

The Kurzweil reader was big and expensive — \$50,000 each, Gashel said. It couldn't read photocopied matter and it had problems with pages crowded with pictures.

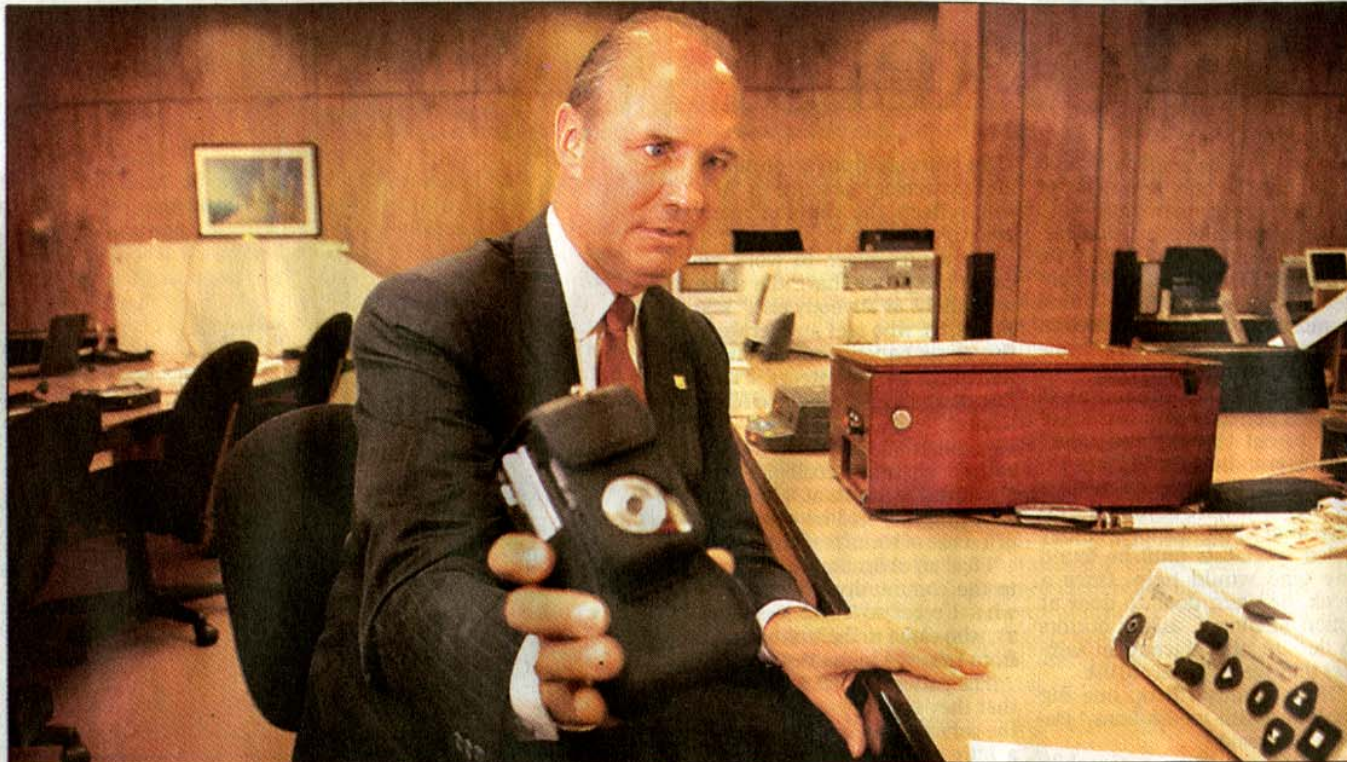
But it was clearly a breakthrough. So the NFB bought six, and began working with Kurzweil to improve them. "This was the first time an inventor of a product had ever come directly to us," seeking input from the blind in the development of an "access" machine, Gashel said.

Eventually, Kurzweil began to sell improved versions to schools, libraries and rehabilitation agencies. But even though prices fell over the years, the reader remained too costly for individuals.

Just as importantly, "There was always a need for something portable," Gashel said.

By the mid-1990s, the advent of desktop computers and scanners enabled Kurzweil to develop a PC-based reader — the Kurzweil 1000. Character-recognition software was improving, too. And laptops made the hardware required smaller.

But one problem remained: "You would have to have a scanner — it would be quite a bit of



James Gashel, with the National Federation for the Blind in Baltimore, was one of dozens to test the new Kurzweil-NFB Reader, using it to sort mail, read menus and identify documents. "You start to think about your capabilities differently," Gashel says.

ANDRÉ F. CHUNG [SUN PHOTOGRAPHER]

paraphernalia to carry about," Gashel said.

Digital photography provided the needed breakthrough; that, and the miniaturization of computer power in the PDA — the hand-held computer that millions use to organize their lives.

The Kurzweil-NFB Reader, which is expected to cost less than \$3,000, marries a small, 5-megapixel Canon camera to an ASUS A730 PDA. They are wired together and held by a vinyl case about 6 inches by 3 inches by 2½ inches. It's all operated with just nine buttons, with voice prompts from a small speaker or through earphones.

Holding the device about 16 inches above a sheet of paper lying on a table, Gashel lines up the shot. He is guided by a sort of audio viewfinder: "Right, bottom edges are visible ... two degrees counterclockwise relative to page."

The camera speaks in an oddly Eastern European male voice, but it's one that's familiar and comfortable for people who use electronic readers.

Gashel pushes a button and the shutter clicks. A few seconds later, the device is reading the release aloud, flawlessly.

Tests on a business card and an ATM receipt are rougher. The device misses some lines of type, and mistakes some characters for others. But it does better on a second try, "learning" as it goes along.

Had it been his own ATM slip, Gashel said, "I would have known what I withdrew, and I'd know most of the information, even if it didn't hit it right."

Many times, he said, "you're not going for perfect; you're going for 'What is this?'"

Jim McCarthy, 39, director of governmental affairs at the federation, has also been testing one of

the readers. A new office arrangement has left him without a nearby assistant, so something as simple as sorting through papers on his desk becomes an issue.

"I'm probably 25 feet from the closest person," he said. It's not a big deal to walk around the corner and ask someone to identify a piece of paper, "but it seems like a waste of time."

The reader "allows people to sort pertinent documents in a way a lot of us aren't accustomed to. That is pretty liberating," he said.

Lou Ann Blake, 46, a visually impaired research specialist at the federation, has also been a test-driver. "I read the cooking directions on a bag of pasta," she said. "It was plastic and I kinda had to flatten it out. But it did quite well."

Videotape labels, bills, letters, 401(k) statements — it read them all.

"Some of the pronunciations it doesn't get quite right — legal terms, Latin terms," she said. But "it's amazingly easy to use. I have a harder time using the copy machine here sometimes."

But the key advance is the new device's portability, said John Pare, 47, director of sponsored technical programs at the NFB, who started to lose his sight at 35. "No matter where you are, you're constantly being handed printed material," he said. "It's the way the world works. In restaurants, the airport, hotels, at a conference."

The Kurzweil reader enables the blind to grab an image quickly, anywhere — even in the dark — and "read" it themselves instead of relying on friends or strangers to read the documents aloud.

"It's been very gratifying," Kurzweil said. "When we started this project about four years ago, we weren't ... entirely sure to what extent we could compensate for

distortion in the images that would occur using a hand-held camera."

Where a scanner provides a flat, uniform image and perfect lighting, the hand-held digital camera would tilt and rotate relative to the page — then the user would move and the lighting would be uneven.

Worse, the pages of an open book are curved, with portions at different distances from the camera.

"So we developed image enhancing software that takes this image and modifies it to get rid of all those distortions," Kurzweil said. "And we had to fit all this software [along with the character recognition program] into this little computer."

But it worked. "We have 75 in the field, and hundreds very soon," he said. "And the feedback from blind users is that it's having tremendous success."

If it does well, the federation could eventually profit. Gashel said the NFB owns 40 percent of the rights to the technology. In the meantime, the software will continue to be improved so that the device can read more varied and complex material.

Kurzweil also predicts a time when a blind person will be able to enter a room, snap a picture, and have the reader identify the types and locations of lamps, tables, people and other items in the room.

Also, devices "will continue to get smaller over time," he said.

Gashel expects the gadget will be crammed into a cell phone some day. But Kurzweil is thinking even smaller.

"In five to seven years, the camera will pin on your lapel and take pictures as you walk around," describing the scene as you go, he said.

NFB chef and teacher Marie A. Cobb, 59, of Catonsville, who is visually impaired, has been using the reader since January. She has her own hopes.

"What I'm looking for is the day when I can take it into a mall and have it tell me the name of the stores, and the locations on those big directories. I would love that," she said.

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