High tech is transforming eyeglasses

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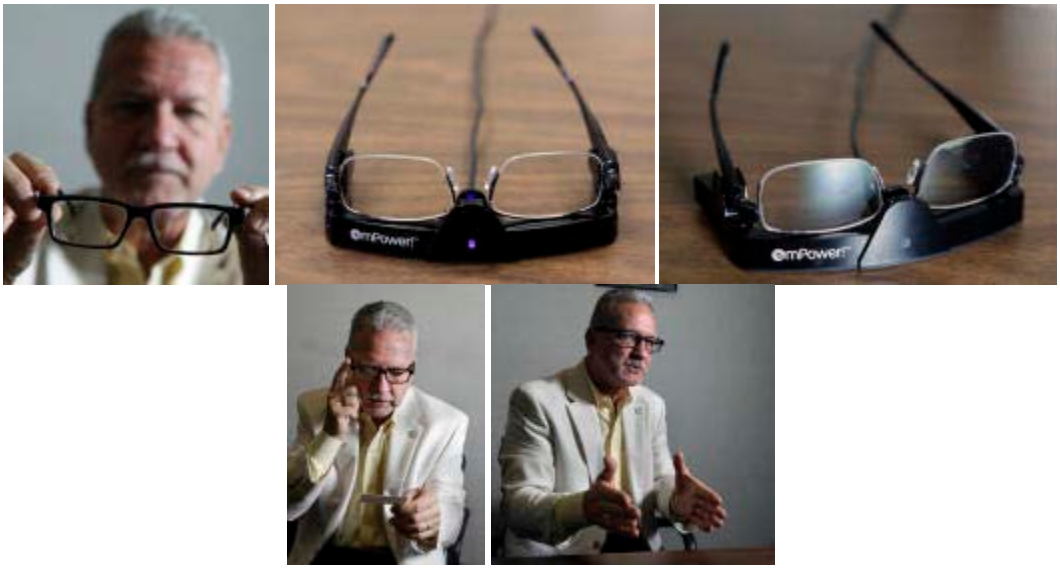

If you're over 45 and wear glasses, you've probably got more than one pair. Or you're using bifocals or progressive lenses. As most people get older, their eyes have more trouble focusing on objects that are close, which is why you need that extra help for things like sewing, drawing -- or reading this newspaper.

But it's a hassle to juggle multiple pairs of specs. And some wearers of traditional progressive lenses find their vision can be blurred or distorted in certain situations, such as when they look down at the ground.

Electronic eyeglasses may be the answer, according to developers of a new line of glasses that combine traditional lenses with transparent liquid crystals. A microprocessor makes the liquid crystals change the glasses' prescription, either automatically or on command, when activated by a tiny accelerometer or a finger touching a sensor on the earpiece.

It's a high-tech solution that Campbell optometrist Larry Wan thinks will have "huge appeal" in Silicon Valley and even places where people aren't so gadget-obsessed. He's one of about 30 Bay Area optometrists who have signed up to sell the new glasses, made by a Virginia company called PixelOptics, when they are available in California later this year. They currently are being sold in several Southeastern states.

"It's a game-changer," said Wan, who has tested the glasses with several patients. "It can give you additional reading power on demand. You can switch it on and off."

Other companies have tried different approaches to creating adjustable lenses. A Southern California firm called Superfocus makes eyeglasses with a thin, flexible membrane filled with optical fluid, which can change the shape of the lens as the wearer moves a slider mechanism on the bridge of the nose. The lenses are only available, however, in a distinctive round shape.

PixelOptics uses tiny electronic components that allow the manufacturer to produce a range of shapes and styles that look like regular frames without adding noticeable weight. Nearly a dozen years in development, the electronic glasses are being marketed by the company as a "premium product," meaning they will retail for about $1,250 to start.

While that's more than most traditional glasses, a company representative noted that it's possible to spend up to $1,000 for regular glasses with designer frames, high-end lenses, special coatings and other features.

Liquid crystal technology won't work for everyone, though a PixelOptics spokesman said most prescriptions can be accommodated. The internal batteries must be recharged every one to three days, by placing them on a conductive charger overnight.

And while the assembly is water-resistant, the company advises against cleaning the lenses under a running faucet.

"You would treat them like you treat your cellphone," explained company representative Richard Mark.

PixelOptics' glasses, marketed under the brand name "emPower," have a microprocessor and battery in each temple, with transparent leads that carry an electrical charge to a liquid crystal array in the lower part of each lens.

The electrical current can realign the crystals to change that portion of the lens, augmenting it to match the wearer's prescription for reading and close-up work. When not activated, the liquid crystals aren't noticeable, and the lenses are similar to traditional lenses, with the wearer's prescription for mid-range or distance viewing.

The crystals can be turned on and off manually, in milliseconds, by touching a capacitive sensor on the temple that works like the touch-screen on a smartphone. Swiping the sensor puts the glasses in "automatic" mode, in which a tiny accelerometer activates the crystals when the wearer tilts his head down, as if to read, and turns it off when the wearer's head is raised.

Automatic mode is handy, although it may tire the eyes at first, if there is a lot of switching back and forth, said Daniel Quon, an optometrist in Costa Mesa in Southern California, who's been trying the glasses as a replacement for his own progressive lenses. While predicting most people will opt for the "manual" mode, Quon added that his overall impression was "fantastic."

Wearers of traditional progressive lenses frequently complain that the ground looks blurry when they look down, as their vision is channeled through the close-up portion of the lens, Quon said. That can make it difficult to navigate stairs or hit a golf ball. The first time he wore the new glasses and walked down stairs, he was amazed: "Oh my God, I could see the stairway clearly."

Initial models from PixelOptics won't include sunglasses, Mark said, and tests have found that clip-on shades can interfere with the wiring in the frame and nose piece. But he said the company is working on tinting and other options.

Liquid crystal technology is well-established, although it has taken more than a decade to refine the design and manufacturing process for eyeglasses, according to Larry Thibos, a professor of optometry at the University of Indiana, who has performed research on the subject and consulted with PixelOptics founder Ronald Blum several years ago.

Similar crystals have long been used to create images on television screens and computer monitors, he noted. "Here, you are refracting light just as an eyeglass lens does, but in a different way. A glass lens bends the light because it has a curved shape. This keeps the shape but changes the refractive index of the material."

The biggest advantage, he added, is that liquid crystal glasses can be "programmable." While the initial PixelOptics glasses allow a user to switch one prescription on or off, Thibos said he believes the technology will eventually be used in glasses that can be adjusted in a variety of ways, as needed.

Thibos also said he expects retail prices will come down, as the volume of sales and manufacturing increase.

For now, said Wan, who runs Family EyeCare Center in Campbell: "There are always cheaper options, but it's like buying the latest computer. Some people will pay a little more for better performance or other features."