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'Augmented reality' glasses tackle tunnel vision

14:02 31 August 2006
NewScientist.com news service
Mason Inman

Superimposing computer-generated images over real scenes can dramatically improve the way people with visual impairment use their sight, say US researchers.

That conclusion is the result of tests of a so-called augmented-reality system on patients with tunnel vision, a condition which narrows a person's field of view.

The conventional way of helping people with tunnel vision is to use lenses that compress a wide angle image into the subject's restricted field of view. This technique makes it difficult to pick out fine details, however, and also makes objects appear further away. As this approach can be hard to adjust to, it has not been embraced.

Instead, Eli Peli, an ophthalmologist and bioengineer at Harvard Medical School in Boston, has invented a device that provides augmented vision. "It puts a cartoon on top of a person's regular view," Peli explains. The system sketches out what the wider field of view looks like and superimposes that on the person's usual view. Choose between videos of the system in action.

Stripped away

The device consists of glasses fitted with a small camera and a transparent display on one lens. The camera feeds wide-angle images to a computer about the size of a pack of cigarettes which the viewer wears.

The computer processes the images by identifying the edges of objects in a scene and stripping away other details. The result is a wide-angle image containing only the ghostly outlines of objects. The computer then feeds this cartoon-like view to the display on the glasses, updating the image 30 times per second as the viewer moves his or her head and the scene changes.

But is this a help or a hindrance for people suffering from tunnel vision? To find out, Peli and his colleague Gang Luo asked subjects with the condition to find objects outside of their narrow field of view. They found that the usual strategy for people with tunnel vision was to carry out a random search in the hope of eventually landing on the object.

When wearing the new device, however, most subjects found the objects far more quickly. In fact, the device cut the search time by up to 75%, the researchers report. By having their gaze guided toward an object, "their path was much more direct", says Peli. He and Luo will report their results in the September issue of *Investigative Ophthalmology & Visual Science*.

Clever approach

There were some drawbacks however. The team found that wearing the device reduced the speed at which people moved their gaze. But Peli believes that this would increase with practice.

"This is the most promising thing that I've seen in years," says ophthalmologist Henry Greene at the University of North Carolina at Chapel Hill, US. "It's the only one able to combine electronically produced imagery with normal vision to allow patients to become aware of things they couldn't before."

Robert Massof, an ophthalmologist at the Wilmer Eye Institute in Baltimore, US, agrees. "This is probably the cleverest approach out there," he says.

Both Greene and Massof believe the augmented-vision device could help with other vision problems too. "You can tailor it to an individual's problem," Massof says. For example, increasing the contrast of images so that people with impaired vision could recognise faces.

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Augmented reality techniques can dramatically improve the sight of people with tunnel vision (Image: Eli Peli)

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