

Alan Pierce

The Virtual Retinal Display

THE glasses in Figure 1 look like the shades that Doc wore in one of the *Back to the Future* movies. These Virtual Retinal Display (VRD) glasses are, however, functional and give their wearer



Fig. 1

Illustrations courtesy of Microvision, Inc.

the heads-up display vision seen in the movies *Robocop* and *Terminator*.

The writers, directors, and special effects gurus in these movies gave their main science fiction characters the ability to see data and other visual images as transparent overlays projected in space. These VRD glasses provide this type of visual display without the use of tiny clear thin film LCD video monitors. The image that is seen by the wearer is actually painted by a scanner directly onto the retina of the person's eye.

If you look carefully at Figure 1, you can see how the image is projected by the Retinal Scanning Device, located near the wearer's ear, and reflected by the shades directly through the pupil onto the retina of the wearer's eye. A targeting system similar to the Eye Control targeting technology explored in my May/June 1996 column is currently being tested. At this time, VRD can only adjust for small eye movements. Therefore, a person wearing the glasses needs to look straight ahead to keep the beam centered on the pupils of her eyes.

The VRD uses a low power light to project electronically generated information and images directly into the eye. These images are painted, pixel by pixel, directly onto the person's retina without the

use of any kind of imaging screen. (See Fig. 20)

These images match HD (high definition) TV in quality and may be limited to a text or image overlay seamlessly joined with the natural images from the real world. In this augmented vision configuration, VRD technology may be used by the military on the battlefield, executives in boardrooms, surgeons during operations, the deaf for open captioning, and others who may benefit from information superimposed on our natural world.

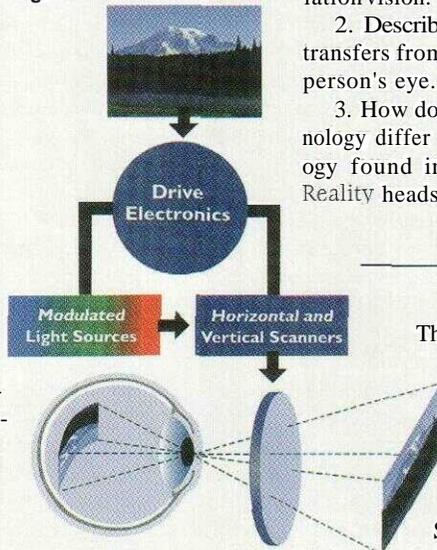
The VRD can also project full motion video that would paint out a person's actual surroundings and transport her into an electronically created virtual world. In this simulation configuration, VRD can provide visual images for training, arcade gaming, virtual travel, and visualization of products and structures not yet constructed.

This technology has been developed by Microvision for the United States Air Force. The military goal is to develop a very wide field display system that could help the wearer command, control, and communicate using computer information systems without looking away from a battlefield's action. The underlined letters show how the Air Force developed the acronym, C4I, for this technology. You may learn more about VRD at the Microvision website: <http://www.mvis.com>. **TD**

Recalling the facts:

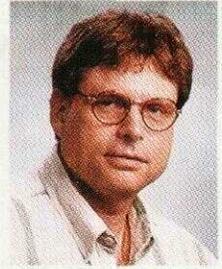
1. Describe some of the uses for VRD augmented vision and VRD simulation vision.
2. Describe how the image transfers from the scanner to a person's eye.
3. How does this VRD technology differ from the technology found in current Virtual Reality headsets?

Fig. 2



The anti-gravity illustration in the May/June 1998 "Technology Today" column was courtesy of Jeff Stoecker.

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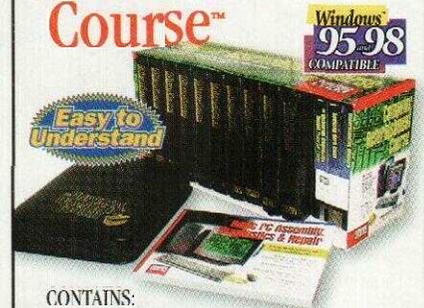
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