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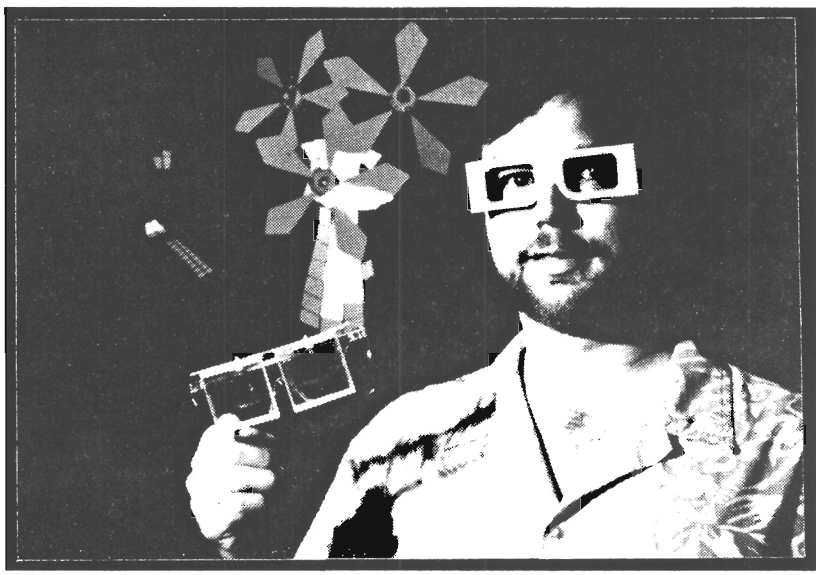
THROW OUT THOSE OLD 3-D GLASSES: CINNAMON OIL, OLD HANDBOOK & BINARY OPTICS COMBINE TO PRODUCE NEW 3-D VISION TECHNIQUE

A vial of Chinese cinnamon oil, a 1910 physics handbook and cutting edge binary optics have helped create a new three-dimensional vision technique which overcomes many of the disadvantages found in earlier 3-D systems.

Known as ChromaDepth, the new system recently made its debut in New York's Hayden Planetarium as part of "LaserDrive 3-D," a show its producer -- Audio Visual Imagineering, Inc. (AVI) -- calls "the most exciting laser show you'll ever see." In addition to its use in laser shows, amusement parks, conventions and other presentations, the technique may also be applied to heads-up aircraft displays, air traffic control monitoring, virtual reality, cartoons, textbook publishing and other applications requiring depth perception, said inventor Richard Steenblik.



Richard Steenblik wears 3-D glasses and holds an early prototype while posing in front of a computer graphic which gains depth through the technique. (Color/B&W Avail.)

"This is the first fundamentally new three-dimensional technique to be developed in a long time," said Steenblik, who invented the system while a research engineer at the Georgia Tech Research Institute (GTRI). "This technology has wide application to print, video and computer graphics. It has a number of advantages, and we expect a large and continuing market."

ChromaDepth 3-D glasses use pieces of holographic film to selectively shift the points at which different colors of light are focused. Known as chromostereoscopy, the technique makes objects of

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different colors appear to be at varying distances from the viewer. For instance, blue light shifts farther away, making blue objects appear distant, while red shifts closer, making red objects appear nearby.

The effect can be striking, and is particularly effective with bright, pure colors like those of lasers and computer graphic displays, added Steenblik, who is now a principal with Applied Physics Research, Inc. But the effect also creates depth in many greeting cards, magazine advertising and photographs. Gaining the full effect, however, generally requires careful selection and placement of the different colors.

Earlier three dimensional techniques required production of double images, which were viewed using glasses containing polarizing filters or lenses of different colors. These techniques suffered from the difficulty and expense of creating stereo images, while the eyestrain they caused gave some viewers headaches. In addition, the images were blurry if viewed without the glasses.

ChromaDepth lenses can create three-dimensional effects from any properly-colored two-dimensional image, regardless of whether the image is printed, broadcast or projected. The images look good by themselves even if not viewed with the glasses; the cost of producing them is lower than with other 3-D techniques, and they can widen the effective appeal of any prepared subject, Steenblik said.

Animated movies are excellent subjects for the technique, though he said other live subjects may not work as well where there isn't sufficient contrast, or the coloration causes the viewer to improperly perceive background objects coming forward.

Joanne McCullough, General Manager of AVI, said the new technology has been enthusiastically received by its viewers.

"We expect ChromaDepth to open new markets for us in both the corporate event field and at amusement and theme parks," she reported. "We've already brought it on line for our corporate events and trade shows, and the response from the amusement park industry is just fantastic."

Commercial use of the new technique capped a decade of development that began when Steenblik noticed slight three-dimensional effects produced by a video game. From his knowledge of physics, he knew the effect was caused by an imperfection in the lenses of the eye called chromatic aberration, and by the brain's expectation that red color often comes from objects close to the viewer -- like apples -- while blue tends to come from objects far away -- like mountains and sky.

Steenblik began work on a method of enhancing the effect, and concluded that passing light through two different liquids would provide the necessary shifting, known as refraction. A library search turned up a 1910 physics handbook which listed indices of refraction for a number of liquids in common use at that time. Steenblik found that Chinese cinnamon oil and glycerin would provide the opposing refraction needed to produce right eye and left eye views from the same two-dimensional image.

While glycerin is commonly available, Steenblik had to search for the Chinese Cinnamon oil before locating a flavorings manufacturer still producing it. By cementing microscope slides together, he built a pair of glasses containing the two liquids. As he expected, they worked well.

Steenblik patented the technique through Georgia Tech, and in 1983 began to work with a producer of video games. The volatile market for the games, however, led the company to abandon the project, leaving the inventor to start over.

About that time, he met New York businessman and fellow 3-D enthusiast Dr. Fred Lauter. Together, they founded Chromatek, Inc., to develop and commercialize the technique.

Steenblik and Lauter continued to work on the process, joining forces with Audio-Visual Imagineering to produce a 3-D show for a business convention using hand-made glasses based on double prisms instead of liquids.

The double-prism technique worked, but not as well as Steenblik hoped. It seemed to be another dead-end.

The break came when Steenblik read an article about binary optics research at the Massachusetts Institute of Technology. He realized that the cutting edge optical technology would allow inexpensive manufacture of the complex prism patterns needed to produce the 3-D effect, and after two years of working with MIT scientists, a product was ready. Steenblik attended the premiere of the Hayden snow June 12.

What was it like to see the product used after so many years of development?

"The results were stunning," Steenblik recalled. "After seeing it, I can't understand why anyone would want to sit through a laser show that wasn't 3-D."

The three-dimensional vision technique is licensed from Georgia Tech, while the binary optics technology is licensed from the Massachusetts Institute of Technology.

Applied Physics Research is a Roswell, Georgia research and development firm allied with Atlanta-based PrintPack, Inc. Audio-Visual Imagineering has offices in Springfield, Virginia and Orlando, Florida.

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