Thin-Air Display Is Promising, but Thin on Details, Too

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IMAGINE a touch screen on which the elements of the image displayed can be moved around with a fingertip. Now imagine the same scene without the screen: the image can still be moved with a fingertip, but it floats unsupported above a quietly whirring gray box that is connected to a laptop computer.

That describes what took place here when the prototype of a new device called the Heliodisplay was shown publicly for the first time.

The Heliodisplay is an interactive technology that projects into the air above the machine still or moving images that can be manipulated with a fingertip. The images are two-dimensional, and they are not holograms. The Heliodisplay's inventor, Chad Dyner, says the technology could one day replace conventional cathode-ray tubes, liquid crystal displays and plasma screens.

IO2 Technology, a company he founded, has completed a working prototype of the device, named after Helios, the Greek god of the sun. Mr. Dyner said he was seeking patents for the technology behind it and would not say much about how it works.

A prototype shown to a reporter (and later to an audience attracted by a notice on IO2's Web site) looked like a bulky breadbox. It displayed images over a field measuring 15 inches diagonally, including streaming video scenes of brightly colored tropical fish and soaring jet planes. Other images, including illustrations of a strand of DNA and a human skeleton, could be moved from one part of the display to another using one's finger, while four colored circles expanded or contracted at a touch.

Mr. Dyner, a 29-year-old graduate student at the Massachusetts Institute of Technology, did not attend the demonstration in Lake Forest on Dec. 5 and said he could reveal little about the device.

"All I can say is that it's a very simple system, using conventional air," he said by telephone from Cambridge, Mass. "Essentially, the device converts the imaging
properties of the air so that the air is taken in, converted instantaneously, and then re-ejected out. Then we're projecting onto that converted air."

Pressed for more detail on the nature of the conversion, Mr. Dyner referred to it electronic and as thermodynamic. After air is drawn into the machine, he said, it "moves through a dozen metal plates and then comes out again." No moving parts are involved, he added.

He said the device works by creating a cloud of microscopic particles that make the air "image-friendly." The machine, he asserted, uses no harmful gases or liquids, but he would not say whether it uses water. "The ambient air is bottom-projected and illuminated, generating the free-space image that floats in midair," he said. At the demonstration, there was no odor in the air, and the area onto which the images were projected seemed dry to the touch.

Not everyone is convinced that the Heliodisplay will do justice to its mythical namesake.

"Does it violate any principles of science? Absolutely not," said Selim Shahriar, a computer science professor at Northwestern University, after reading about the Heliodisplay at the IO2 Web site. "But extraordinary claims require extraordinary proof."

Mr. Shahriar conceded that he had not seen a live demonstration of the device and thus could not offer a conclusive judgment.

Mr. Dyner, an architect by training who spent a year working for Frank O. Gehry & Associates, has no formal education in electrical engineering or computer science. He is a first-year master's candidate in the M.I.T. Media Laboratory's Tangible Media Group, whose students pursue multimedia projects. Mr. Dyner said his work on the display technology and at the university were separate.

Mr. Dyner built the first prototype, which had a five-inch diagonal display, in an apartment in Hermosa Beach, Calif. He founded IO2 in July 2002, and enlisted the help of two Chicago-area business consultants, Michael Morton and Bob Ely, in commercializing the technology.

"I've always been intrigued by electronics and fascinated about how things work," said Mr. Dyner, who was born in Venezuela and lived there through high school. He recalled learning about consumer electronics at his grandfather's electronics shop in Caracas. "I've basically taken apart everything that I've ever owned, trying to learn how it works."

The Heliodisplay is not the first device to project images into the air, but its interactive capability, which Mr. Dyner described as a "virtual touch screen," sets it apart from a similar machine made by a Finnish company, FogScreen. Viewers can use a finger or
a hand-held object - rather than a keyboard or mouse - to manipulate images in the display.

Mr. Dyner said the Heliodisplay uses an optical laser-tracking system to follow the user's movements. "It can be a surgical knife, a pen, a pencil, a hand, a finger," he said.

At the demonstration in Lake Forest, Michael Fox, a Los Angeles architectural and design consultant who built the prototype on display, showed how the interface technology worked. Linked to an IBM Think Pad, the Heliodisplay projected images of four colored circles onto a virtual screen in the air. Using his finger, Mr. Fox, 36, moved a floating cursor across the screen. When the cursor landed on a colored circle, it shrunk. When he moved the cursor away, the circle returned to its original size. In another demonstration, Mr. Fox used his hand to move images of a skeleton and a strand of DNA around the screen.

The cursor appeared to be quite sensitive to both light and touch. When there was too much light or when Mr. Fox moved his finger too forcefully, the cursor froze, and the image could not be manipulated until Mr. Fox tinkered with some knobs on the machine.

Mr. Dyner envisions many uses for the Heliodisplay. He said it could be used for museum or trade-show displays or for advertisements, and would be ideal for collaborative work. "I envision this in a conference-room setting, in the center of a large table," he said. "Everybody can rotate it, move it around and update it in real time."

Chuck McLaughlin, an independent consultant in Menlo Park, Calif., who specializes in display technologies, said the Heliodisplay sounded promising, but he questioned its commercial prospects. "It's so far out of the ordinary," Mr. McLaughlin said. "I don't see what the market for this is."

He said very few new display technologies turn out to be feasible. "I've seen a lot of these things come and go over the years, and a few of them have practical applications, but most of them don't," he said.

Mr. Ely, the consultant who is working for IO2 Technology, admitted that he was initially skeptical, too. He said he had heard about the Heliodisplay last year when a friend of Mr. Dyner's used the concept as the basis of an entry in an entrepreneurship competition sponsored by the University of Chicago. Mr. Ely was a contest jury member.

"The plan talked about this projector that projected into the air," Mr. Ely recalled. "I said to myself, 'I don't know much about physics, but I know that's impossible.'"

Then Mr. Dyner demonstrated the five-inch prototype. "It was a real showstopper,"
Mr. Ely recalled. "There wasn't a sound in the room."

Mr. Dyner is confident that naysayers will be impressed when they see the Heliodisplay. After issuing a news release about it in August, the company received dozens of inquiries, Mr. Ely and Mr. Morton said. The device has been shown to would-be partners and investors who have signed nondisclosure agreements, and Mr. Dyner said the United States military had expressed interest.

IO2 does not yet have a manufacturer for the Heliodisplay, but Mr. Dyner says he hopes production will begin in 2005. The company's Web site, www.io2technology.com, offers advance orders at a price of $22,500; but although several have been received, Mr. Ely said, none has been accepted.

In addition to finding a manufacturer, IO2 Technology faces another difficulty: competition from FogScreen (www.fogscreen.com), whose similar device projects images onto a cloud of water vapor. FogScreen says it has been monitoring developments related to IO2. "They haven't published anything, so I cannot really tell anything," Ismo Rakkolainen, the company's research director, said by telephone from Finland.

Mr. Rakkolainen said that FogScreen uses a laminar airflow process to project images onto a thin screen made of water and ultrasonic waves. Current FogScreen prototypes lack the interactive capabilities of the Heliodisplay, although Mr. Rakkolainen said the next generation of the device would behave like a touch screen.

Mr. Dyner and his advisers acknowledge that the Heliodisplay technology is not yet ready for the marketplace. But they argue that the technology could one day revolutionize the way we look at air. As Mr. Ely put it: "People looked at the first flight of the Wright brothers and said: 'Only 120 feet? I can walk 120 feet. What do we need this thing for?' Add 10 years and it's a totally different world."