3DIcon to pursue NIH grant for volumetric imaging technology

By Amanda Pedersen

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It might be difficult to imagine a world in which doctors and medical students can study three-dimensional volumetric images similar to the holograms that fictional hero Tony Stark uses in the "Iron Man" movies. But advancements in materials, lasers, and computing power over the last 20 years is enabling the development of projection 3-D display technologies with incredibly broad potential in the medical industry.

One company working in this space, using technology licensed from the **University of Oklahoma** (Tulsa), is looking to the National Institutes of Health to support the development of its volumetric imaging technologies, with potential applications in medical training, diagnostics, and image-guided surgery. **3DIcon** (Tulsa) reported this week that it plans to pursue a NIH grant request for small businesses that support biomedical technology development.

The NIH recently issued a request for grant proposals from companies that are past the proof of principal state of developing enabling technologies that could apply to the interests of most NIH institutes and centers and range from basic biomedicine to research in all relevant organ systems and diseases.

Doug Freitag, a specialized consultant for 3DIcon, working on federal funding and business development, told *Medical Device Daily* the company has been working on this technology for eight years. Although it is a startup, the company is public and has invested roughly $9 million to develop the technology, which was invented at the University of Oklahoma, he said.

"This technology originally was envisioned by people about 20 years ago and the technology basically requires a glass, and within that glass is a rare Earth material that we dope the glass with," Freitag said. It is glasses-free technology though, he added, so the person using it would not have to wear any special glasses to see the image.

He explained that the technology requires two lasers projected from two different directions and when the lasers interact with the rare earth material a two-dimensional image is projected from one direction into the glass, creating a virtual screen within the glass, while the second laser projects from the other direction and multiple image slices are created, ultimately creating a 3-D image.

"It is truly three-dimensional volumetric, glasses-free imaging," Freitag said. "You can truly see all around the image, you don't have to stand right in front of it."

The company said the market for 3-D display technologies is expected to reach more than $7 billion by 2018. The potential use for the technology in the medical field is quite broad, from the training of medical students to the operating room.

"We have all of this data today that is created in slices either using CT, MRI, or acoustic," Freitag said. "Any data created with these imaging techniques, we can take that data and create an image. What we can do is take that data that exists of, for example, cadavers for anatomy students. Currently they look at that data by slices on a two-dimensional screen on a flat table. What we've got the ability to do is . . . put a glass on top of that flat table and now raise the image up three-dimensionally so you truly see that anatomy in 3-D."

He said students could potentially stand around that cube of glass and actually see the 3-D volumetric image of the body with all the organs and how it would truly look if they were in the operating room. Those students would see the image in true 3-D, he added, "the way your eyes and your mind want to see 3-D."

From a diagnostics perspective, Freitag said the technology could allow a team of doctors to stand around the cube of glass and discuss a patient case and treatment options. He said they currently look at that data one slice at a time looking for problems, for example, in the brain. "We can show that brain in true 3-D so you can really see it in 3-D. If an area of brain tissue is damaged, they don't have to guess how deep that damage is," Freitag said.

Another place where 3DIcon's technology could potentially improve medical care is the operating room. The technology could enable more precise placement of implantable devices, or other devices that are used inside the body during surgery, Freitag noted, using neurological implants as example but adding that it could be applied to a wide variety of procedures.

"Currently they do that by looking at X-rays and looking two-dimensionally, they have to make a cognitive leap to understand where exactly they're placing that probe." A true 3-D view of the organ would offer "much more precise placement" inside the body, he said.

The company has had some initial discussions with researchers, including people from the Army medical community as well as R&D representatives from GE Healthcare to discuss ways 3DIcon's technology could be used in the medical field.

"The enabling technology we have is this cube of glass. We need to develop the right composition of doping materials," he explained. Twenty years ago people interested in this type of technology gave up because of challenges with materials. But today, advancements in materials as well as lasers and computing power has allowed 3DIcon to make progress for this technology, according to Freitag.

"We need to develop the glass," he said, emphasizing the need for grants like the NIH grant that the company plans to pursue. "The rest of the technology is really commercially available so once we have that glass substrate we can very easily apply it to a broad range of medical applications and non-medical applications."

3DIcon noted that recent announcements in the technology industry, including GE Healthcare winning FDA approval for its new 3-D breast imaging device, has brought significant attention to the capabilities and benefits for 3-D technology over traditional 2-D.

"As 3DIcon continues to develop its volumetric imaging technology, we are encouraged that organizations in the health industry, such as NIH, are providing resources and leadership for advancing medical technologies," said Victor Keen, CEO of 3DIcon. "We view the growing medical imaging market as aligning well with our strategic vision of identifying opportunities in industries that can best maximize and benefit from 3-D capabilities."

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