Sunday Star-Ledger
SUNDAY BUSINESS
SECTION THREE | NOVEMBER 6, 2011 | NJ.COM

A novel vision for hands-off surgery

N.J. Inventors Hall of Fame honors scientist

By Stacy Jones
STAR-LEDGER STAFF

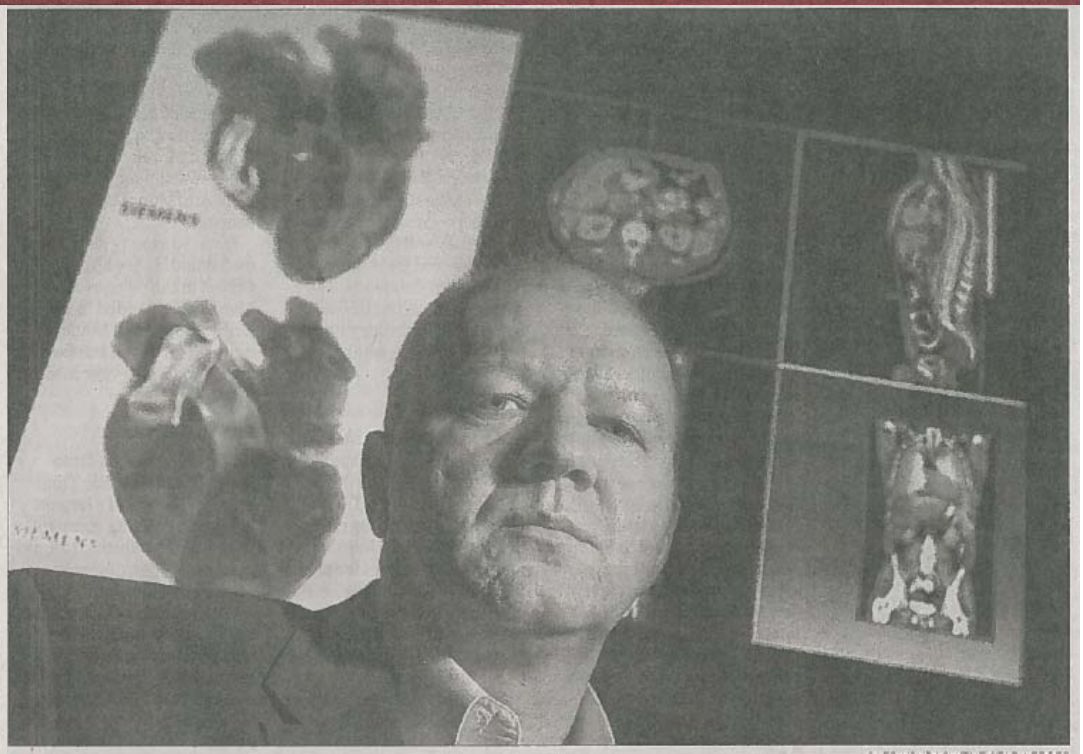
The words "heart surgery" might conjure images of doctors bent over a patient's open chest, but Dorin Comaniciu's robust computer vision application see things a little differently.

The inventor and his team at a Siemens' corporate research facility in Princeton have been refining software that doctors have been using for years to precisely scan the body and perform less invasive versions of surgeries.

So far the technology developed by Comaniciu's team has been built into equipment like CT scanners and ultrasound machines that Siemens sells to cardiologists and oncologists. Computer vision also has applications in surveillance systems, search engines and face recognition.

Comaniciu and five other New Jersey researchers were recently named inventors of the year by the New Jersey Inventors Hall of Fame. The Princeton-based scientist said he hopes to help push computer vision to a level of accuracy that will help doctors test surgeries on a digital model of a heart and peak into the future at possible outcomes.

SEE **INVENTOR,** PAGE 3



SAED HINDASH/THE STAR-LEDGER

Dorin Comaniciu, the head of global technology at Siemens Corporate Research in Princeton, stands in front of a monitor displaying advanced image analytics. Comaniciu was named one of the New Jersey Inventors Hall of Fame's inventors of the year for his work in "computer vision," which helps cameras identify and track people or objects as they move.

Inventor

CONTINUED FROM PAGE 1

Performing the same kind of detailed analysis without computer applications can be daunting, said Comaniciu, and take hours to complete.

"Using our software can reduce the time to two minutes," he said.

For cardiologists, the technology has helped lower the risks of performing surgery and made it easier to assess treatment options.

In a video of one of the team's applications in action, blood can be seen flowing into and out of the heart. The valves, or openings through which blood travels to the organ's four chambers, can become damaged and cause blood to flow in the wrong direction. When that happens, surgery is often the only remedy.

"Traditionally, valve surgery requires open chest invasive surgery," said Mark Anderson, chief of cardiothoracic surgery at UMDNJ-Robert Wood Johnson Hospital in New Brunswick. "Now you can undergo valve replacement without an open chest cardiac procedure. But for us to do that we require the ability to image the existing valve's exact location so we can position the new valve correctly and not interfere with other cardiac structures."

Once the heart has been very thoroughly and precisely mapped, surgeons insert the new heart valve on a stent, or small metal mesh tube.

"I think Siemens has definitely been a leader," said Anderson, "and we're lucky to have them here in our area."

Siemens, a German engineering conglomerate, considers health care to be one of its main divisions. The company has 20 New Jersey locations and employs a worldwide staff of 400,000 in 190 countries.

As computer vision technology continues to advance, Anderson said, cardiac procedures will become more reliable, reproducable and applicable to a broader range of patients.

"I'd say a renaissance is happening in our field right now," said Dimitris Metaxas, director of Rutgers' Computational Biomedicine, Imaging and Modeling Center. "Last century was all about getting the computer images and this is the century of computer vision."

Oncologists use the technology to delineate tumors in medical images, said Metaxas, helping doctors detect a problem and measure the success of their attempts to remove tumors.

Work in the computer vision field has many applications outside of medicine, Metaxas added.

Paired with camera-based surveillance systems and biometric data, the technology can detect when a particular person is trying to enter a building and alert its inhabitants.

It also helps search engines, like Google, scan the internet and match a source image to similar images instead of looking for text phrases.

Comaniciu found his way to biomedical imaging by way of an electronics and telecommunications degree from Polytechnic University of Bucharest, Romania, and a Ph.D. in electrical engineering from Rutgers University.

As doctors collect a growing amount of data about their patients, he said, there will continue to be a demand for ways to make sense of it.

"There is a lot we can do in this space and we are only scratching the tip of the iceberg," said Comaniciu. "The complexity of the human body is much bigger than we are capable of dealing with today."

Stacy Jones: (973) 392-7969 or stacy_jones@starledger.com