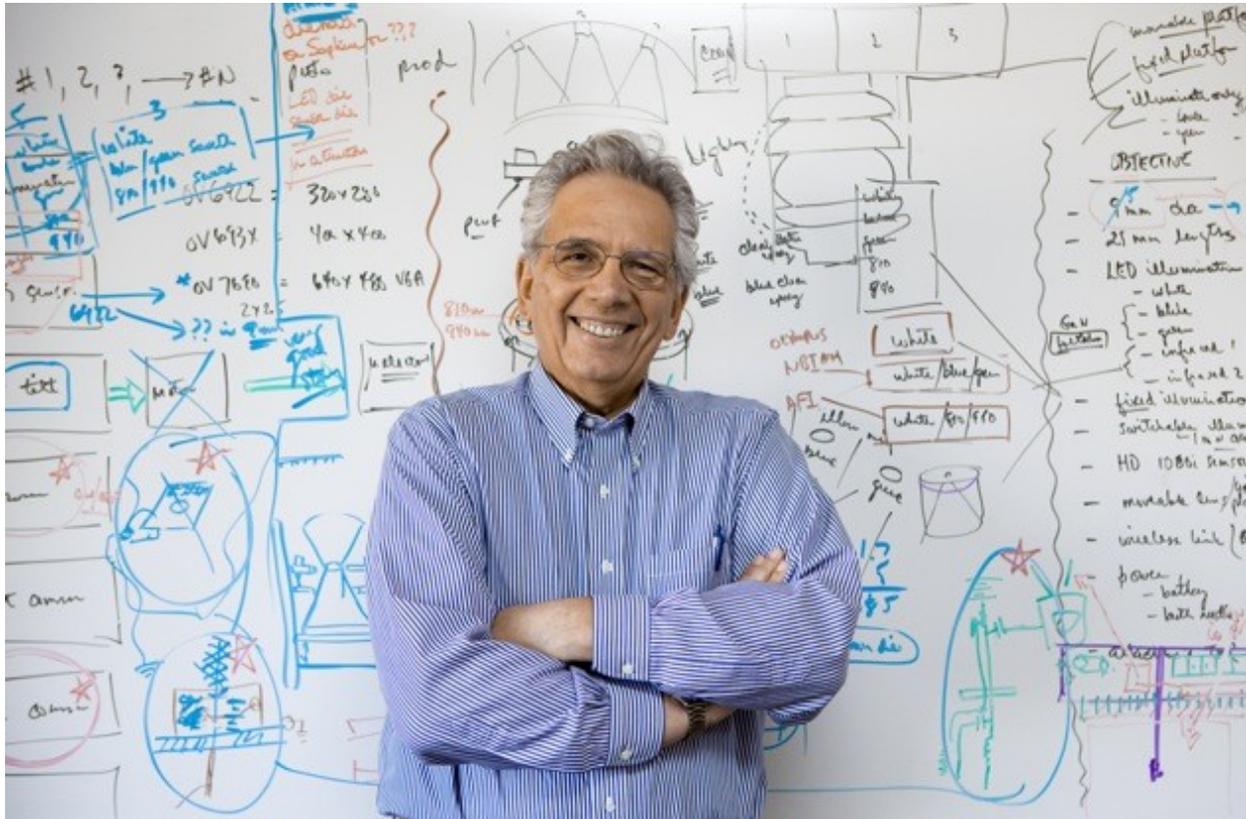


Mr. Wizard's Fantastic Voyage

By Gulf Coast Business Review - Thursday, January 14, 2010

<http://www.review.net/section/detail/mr.-wizards-fantastic-voyage/>



REVIEW SUMMARY

Businesses. Communications and networking technology.

Industry. Biomedical engineering.

Key. Patent approvals and venture capital.

An experimental device providing depth perception that turns doctors into super-surgeons with X-ray-like vision would be a valuable product for surgeons — even the ones that think they already know it all.

Imagine a sensor implanted in your body triggering a message to your doctor indicating the first symptoms of disease. Perhaps it would be the first cancer cell to appear. Or maybe the patient will have an “app for that” on her iPhone.

The limitless possibilities bring to mind scenes from *Fantastic Voyage*, the 1966 sci-fi classic film that so happens to be one of the inspirations for the new technology. (Or maybe it was Racquel Welch's performance.)

"It's very exciting and thrilling," says Richard Gitlin, 66, the visionary creative genius behind the wireless technology at the heart of the new device. He's the University of South Florida electrical engineering professor leading the biomedical engineering research at the Tampa campus along with Drs. Alexander Rosemurgy and Sharona Ross, two USF Health general surgeons.

"What we're focused on here," says Gitlin, "is first taking minimally invasive surgery to the next level of faster, cheaper and hopefully better."

In fact, the multidisciplinary team of engineers and surgeons may be on the verge of major scientific breakthroughs that could advance modern surgery in a big way and provide a needed boost to the Tampa Bay area economy. "This is what we believe to be a real paradigm change in surgery," says Rosemurgy.

The method of change comes from MARVEL: Miniature and Anchored Remote Videoscope for Expedited Laparoscopy. The team plans to commercialize MARVEL after it morphs from prototypes over roughly the next 18 months. Though venture capital dollars are in short supply in Florida these days, the wow-factor of the technology should help Gitlin's group attract investors.

Plus, fortunately for the inventors, what little venture capital dollars are available in the state happen to be concentrated in the Tampa Bay area (See Review, Coffee Talk, Jan. 8, 2010.)

Gitlin is one of a few creative masterminds behind MARVEL.

Rosemurgy and Ross are part of a medical team that last July successfully performed what they believe is the first single incision gallbladder removal without the use of general anesthesia. And together with Dr. Michael Albrink, Rosemurgy and Ross pioneered the first laparoscopic endoscopic single site, or "LESS" surgeries (one incision through the belly button) in 2007 at Tampa General Hospital.

But the wizard behind the curtain for MARVEL is the highly acclaimed and published Gitlin, a Bell Laboratories Fellow and one of about 2,100 members of the National Academy of Engineering. Masterminds like Microsoft's Bill Gates are club members. (See related story.)

'Luck favors the prepared'

Perhaps best known for being the co-inventor of DSL while at Bell Labs, Gitlin has 43 U.S. patents and is working on 10 more. DSL, or digital subscriber line, was one of his first "aha" moments that he recalls as, "Oh my God, we can send megabits on copper!"

DSL is the technology that first allowed about two megabits of data per second to be transmitted over copper telephone wire. It revolutionized the data communications industry by providing cost-effective upload and download speeds for homes and businesses.

Gitlin's DSL work was instrumental in creating Globespan, an early DSL chip vendor.

He was also the co-inventor of multi-code technology used in 3G wireless and is credited with pioneering a form of spatial processing used in 3G and 4G wireless communications known as multiple input multiple output (MIMO). MIMO advanced smart antenna technology is targeted for future versions of MARVEL.

And Gitlin literally wrote the book, with a co-author, on data communications. "Data Communications Principles" an electrical engineering textbook published in 1992, was the standard text for data communications students for a decade.

With a background like that, it's clear that getting Gitlin to come to USF a year and a half ago was a major coup for the university. For instance, four of his 10 patents pending relate to MARVEL.

"I consider myself to be very fortunate and somewhat lucky," says Gitlin, although his favorite expression is "Luck favors the prepared."

Long before his 32-year career at Bell Labs, the self-described "techie" grew up in Brooklyn watching NBC's "Mr. Wizard" science show. He explored a different New York City street every Saturday with his father.

The scientist-to-be often ended up in the many museums that dot the Big Apple, including the Nikon museum and a Lionel Train exhibit in Times Square. It was there, says Gitlin, where he "got very interested in distribution and switching and how you control these things."

An uncle who was a surgeon tried to push Gitlin into medicine, but the youngster fainted at the site of blood when allowed to witness a surgery at 14. Perhaps that's one motivation to Gitlin's quest to improve minimally invasive surgery.

Gitlin entered college at 16 and he earned his undergraduate degree with honors from the City College of New York. Schools such as Stanford and the University of Pennsylvania sought the rising academic star for more research, but he eventually settled on a career in business.

From 1995 to 1998 Gitlin was senior vice president for communication science research at Bell Labs, with 600 employees under him. He had also served as chief technology officer for Bell Labs' Lucent data networking business unit.

The affable Gitlin talks appreciatively of his time there, saying of the DSL invention: "We were such the wonderful organization and we were able to hire such bright people, that many times, especially when I got into management, that I'd have an idea, but with the really great ideas they'd say, 'we'll take over now.' So it was just a thrill."

After a stint as a professor at Columbia University, Gitlin returned to a business life in 2002. He and a team of entrepreneurs raised \$110 million to create Silicon Valley data-switching company Hammerhead Systems.

A key product of the startup was a data switch that routes information for carriers to handle the growing traffic of smart phones. But the economy caught up with them and the company closed its doors last March.

“A different atmosphere”

That bit of bad luck opened the door for USF to bring Gitlin to Tampa, where he could apply his skills to biomedicine.

Professor Sal Morgera, chair of the department of electrical engineering calls Gitlin, “an attractor of excellence.” Rosemurgy agrees, saying “in many ways I equate him to Magic Johnson because he makes everyone around him better.”

Before Gitlin arrived on campus, other engineers told him their experience working with physicians was not very good because doctors would treat engineers merely as technicians, despite their impressive credentials.

But so far, Gitlin’s gamble in coming to USF has paid off. “I found the atmosphere here to be totally different and I’m delighted,” he says from his unheated third floor office while working over winter break. “I’m energized and I can’t wait to get into the office every morning or to the hospital in the afternoon.”

Always intrigued by the intersection of engineering, micromedicine and micromachines, Gitlin says he long “had this idea of using communications and networking to improve surgery, and it was driven by two observational things in my life.”

One was a TV show about five years ago, where a woman wearing an antenna array had swallowed a camera pill and was walking around New York’s Metropolitan Museum of Art while giving her surgeon a view inside her.

“The second thing was this movie, ‘Fantastic Voyage,’ where you go inside to fix something,” says Gitlin. “What if we took this camera and made a bunch of them, and put them in a body and use communications and networking so these cameras can communicate?”

“Aha moments”

Gitlin’s team is now working to do just that.

The communications networking strategy is a distributed approach where a computer processes all the camera views. The system projects images from above and behind the surgeon onto the patient lying on the operating table, allowing the surgeon to indirectly see inside the patient.

Other internal devices could be power sources, lasers or other cutters. “The surgeon could do surgery on a screen with an image of the inside,” says Gitlin. “With multiple cameras you get depth perception.”

It's a major advancement from the da Vinci surgical system, a robot that costs up to \$2.3 million, but can't go everywhere. Gitlin knows about the minimally invasive da Vincis — one operated on his kidney about 10 years ago.

Gitlin ran with his idea of taking minimally invasive surgery to a new paradigm by taking it to Rosemurgy and Ross. "Prior to that," says Gitlin, "I had discussed it with faculty members in electrical engineering and mechanical engineering at USF and everybody felt we had a collective 'aha' moment that we could do this."

One key benefit of the MARVEL device is that it incorporates light sources and cameras along with a wireless transceiver, into a single device. That frees up a port for another surgical tool, which allows the surgeon to work two-handed instead of one-handed. Another hoped for benefit is to minimize accidental, life-threatening cutting of arteries during surgery.

The device is currently being used in experimental surgeries with animals. Discussions to miniaturize MARVEL are ongoing with Draper Labs, which has a facility at USF. The team is exploring other ways to work with Draper.

Gitlin would also like to see a new institute for engineering and medicine at USF. "I'm big on creating things of sustainable value," he says. "I hope I see some more 'aha' moments."

MARVELous invention

The Miniature and Anchored Remote Videoscope for Expedited Laparoscopy (MARVEL) research project addresses the surgical technology and techniques necessary for minimally invasive surgery (MIS). In contrast to open surgeries, MIS reduces potential harm to the patient by using small incisions within the body to insert specially designed endoscope/laparoscopic tools to perform the operation.

Past efforts to reduce the invasiveness of MIS even further have also been developed. One surgery, known as laparoendoscopic single site (LESS) surgery, is when a multi-port trocar is used to provide entry for surgical tools into the patient's body.

MARVEL then takes the next step in minimizing surgery duration, safety, and invasiveness, its creators say. It does that through a prototype miniature and anchored remote, wireless videoscope platform for expedited laparoscopy that's used in conjunction with LESS surgery.

Gitlin's creative flow

Career highlights of creator Richard Gitlin

- State of Florida 21st Century World Class Scholar
- Agere Systems Chair, Distinguished Professor of Electrical Engineering, University of South Florida
- Master and Doctor of Engineering Science degrees in electrical engineering from Columbia University
- Bachelor's degree with honors in electrical engineering, The City College of New York
- Member National Academy of Engineering (2005)
- Fellow of the IEEE (1985) and Bell Laboratories Fellow (1987)

- Co-recipient of the 2005 Thomas Alva Edison Patent Award and the Steven O. Rice Prize
- Senior Vice President for Communications and Networking Research, Bell Laboratories
- Chief Technology Officer, Hammerhead Systems
- Co-inventor of multicode CDMA (used in 3G wireless)
- Co-inventor of DSL (1986)
- Pioneered MIMO spatial processing (now used in 3G/4G wireless)
- Co-inventor of adaptive equalizer to compensate for polarization dispersion in fiber optic systems
- Co-author of “Data Communications Principles” textbook (1992)
- More than 40 U.S. patents in data communications, digital signal processing, wireless systems and broadband networking, 10 patents pending

***Jay Brady** covers state and local government issues. He can be reached at jbrady@review.net, or at 941-362-4848.*