ARIM: From Nobel-Winning Science to Stanford Licensing

After a decade of investment by OTL in over 20 patents, a group of cutting-edge microscopy and memory technologies known as Atomic Resolution Instruments and Memories (ARIM) is finally coming to fruition through four current licensees, with others waiting in the wings.

Developed in the laboratory of Calvin Quate, Professor of Electrical Engineering and Applied Physics, the ARIM technologies are based on the "scanning tunneling microscope" (STM), first developed in 1981 by Gerd Binnig and Heinrich Rohrer at IBM’s laboratories in Zurich, Switzerland.

In search of a new way to analyze surfaces, Binnig and Rohrer looked to vacuum tunneling—the bringing of two conductive materials so close together that the electron clouds of their atoms overlap, causing electric current to "tunnel" across the gap between the materials.

As the distance between the materials changes, so does the current, and the two researchers hoped that by translating those fluctuations into a computer image, they could map tiny imperfections on a given surface. It would be microscopy as analogous to Braille as to visual magnification.

Using a tiny spherical tip, the two expected to be able to distinguish features around 45 Angstroms (Å; 1 Å = 1/10,000,000,000 meter) in size. Instead they found that a protuberance on the tip allowed current to flow across an area of 2 Å — approximately the size of an atom — thus allowing, for the first time, an individual atom to be seen.

For their discovery,

Binnig and Rohrer were awarded the Nobel Prize for physics in 1986.

The STM found its way to Stanford when Scott Elrod, a student of Calvin Quate’s, built one and wrote the first dissertation in the field, thereby establishing the first and foremost American research...
A Sampling of License Agreements Signed by OTL in the Last Quarter

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**Seismoguard™ Licensed to Advanced Seismic Devices, Inc.**

The Seismoguard™, reported in the inaugural issue of Brainstorm a year ago, has been licensed to Advanced Seismic Devices, Inc., of Freedom, California, and will soon be available for purchase and installation.

The Seismoguard™ is a self-triggering device for keeping library books (and potentially other items) from falling from their shelves during an earthquake.

For information contact: Advanced Seismic Devices, Inc. P.O. Box 1148 Freedom, CA 95019 (408) 663-5486

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**STANFORD TECHNOLOGY BRAINSTORM**

Editor: Eric Greensfeld

STANFORD TECHNOLOGY BRAINSTORM is published quarterly by Stanford University's Office of Technology Licensing (OTL) to provide information about OTL and general formation of interest to the licensing community, both within and outside Stanford.
unheard-of field of "biotechnology."

"But the recombinant DNA patent, shared by Stanford and the University of California, is now the biggest commercial success ever licensed by the University. This single invention 20 years ago has led to an industry which has yet to realize its full potential...[And] the investigators were simply pursuing new knowledge, not application of that knowledge.

"As my former Chicago colleague, Merton Miller, the Nobel Laureate in Economics recently said in *The Wall Street Journal*, some basic research may not be worth very much in the long run, while some is worth a great deal. 'Though,' and I quote here, 'such is the cruelty of our fate that we won't know which is which until many years have passed.'

"...Another challenge facing Washington is the need to reduce the layers of regulation that make government contracting for both universities and industry a laborious, time-consuming, and wasteful process.

"The National Institutes of Health recently revised its proposal forms required to be used by universities. The old forms were estimated by NIH to take 10 to 15 hours to complete; the new forms are estimated by NIH to each take 50 hours to complete (as aside from the technical components of the proposals, that is). What benefit will befall the public from requiring 50 hours to complete a single proposal, which, I might add, has less than a 1-in-5 chance of even getting funded?

"...I urge the government to simplify its relationship with research performers. It is not productive to try to solve the nation’s ills through all of the regulations contained in government contract clauses. Good work and good institutions need a lot of breathing space. Please let us not imitate the worst aspects of European bureaucracy.

"Universities too have their challenges: We need to take whatever steps are necessary to restore public confidence in the integrity and relevance of American universities' research enterprises. In particular, we need to be accountable through self-regulation...

"While some parts of the government are urging stronger university-industrial ties to insure transfer of technology, other parts...are urging tighter restrictions on university-industrial relations to prevent conflicts of interest. *Universities need to solve these problems themselves.*

"...And the challenges facing industry? I am sure there are many of which I am not even aware. Nevertheless, I will make one observation: Looking at the past 20 years, it has been argued that many new technologies have been created in the United States, but that the links from the invention to advanced R&D and marketing stages have been weak, due in part to industries’ short-term payoff strategies rather than long term investments.

"While American companies must be willing to make selected long-term investments...we recognize that industry cannot afford to make major investments in every new potential innovation.

"...*Universities may be able to play a role here by involving industrial scientists more in university research activities, which, in turn, may help to give industry a longer-term view of scientific directions, processes, and strategies. Also, universities' curriculum and research could benefit from increased understanding of industry’s needs and problems.*

"...I encourage United States industry to consider this option...[Technology transfer] is a "bodily contact sport," the "rubbing of mind against mind" depending on person-to-person exchanges of ideas and information. To the extent that industry can send their best people to participate in university research programs, the better the chances are for technology transfer to occur on both sides.

"...In summary, let us all understand the distinct role of each of our sectors in technology transfer without micromanagement of each other. The R&D enterprise in American can easily be smothered by internal and external politics, pressures and red tape. Let us find ways to simplify our relationships with each other. And, most of all, let us find ways to increase trust in ourselves and each other."

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