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In on the Ground Floor

Georgia Tech VentureLab's Technology Day showcases faculty innovations moving toward commercialization.

by JANE M. SANDERS

Georgia Tech's VentureLab, a center for commercialization of university research, recently gave about 200 investors and industry representatives a first look at early-stage technologies during Technology Day.

VentureLab showcased 10 faculty-developed technologies at varying stages in the technology transfer process, opened laboratories for tours and

gave brief presentations. Then attendees had the opportunity to spend time with individual Georgia Tech faculty members and VentureLab staff to discuss the technology prospects in detail.

Also, Georgia Tech President Wayne Clough spoke to attendees, noting that while Georgia Tech is breaking ground in technology transfer activities, economic development is not a new mission for the university. The state created Georgia Tech in



President Wayne Clough

Above: A VentureLab graduate company, Qcept Technologies Inc., has developed a breakthrough, patented sensing technology called the Scanning Contact Potential Difference (CPD) sensor, shown here by CEO Bret Bergman. It senses electrical fields to discern minute physical and chemical features of surfaces.



Provost Jean-Lou Chameau

Right: VentureLab company Vivonetics is the first true living-cell gene-expression imaging company. The technology, based on research by Associate Professor of Biomedical Engineering Gang Bao, standing, has applications in drug discovery, molecular biology research, medical diagnosis and prediction of pharmaceutical treatment efficacy based on genetic analysis. Here, researchers Andrew Tsourkas and Carrie Williams, seated, use a confocal microscope to examine fluorescence from a sample of molecular beacons that could be used to detect cancer.

1885 to help move the South's economy from an agrarian to an industrial one, so economic development has always been on par with Georgia Tech's education, research and service missions, he said.

"Today our mission is only different in that we are in an age of information and services," Clough explained. "We serve the original intent of our economic development mission in a different way."

Building upon extensive federally funded research in science and engineering, Georgia Tech faculty and students are creating innovative technologies with commercial potential. "We have many great new ideas boiling away at Georgia Tech, and many of them will make their way into the commercial arena," Clough said.

Georgia Tech is committed to supporting entrepreneurial activities by faculty and students to make this goal a reality, Provost Jean-Lou Chameau told the group. He pointed to Georgia Tech's creation of VentureLab last fall and the university's operation of the Advanced Technology Development Center (ATDC), a technology business incubator. Also, the university's commitment was recognized earlier this year in "Innovation U.," a report from the Southern Growth Policies Board, which cited Georgia Tech as the most advanced with regard to universities' roles in a knowledge economy, Chameau added.

"This didn't happen by accident," Clough said of the ranking. "It took a dedicated, focused strategy."

Since its inception a year ago, VentureLab has evaluated 90 research innovations involving more than 100 faculty. A dozen of those innovations were identified as having commercial potential. Of those with commercial interest, four have so far been the basis for the formation of new companies. Two of them – Qcept Technologies and Radatec, Inc. – have already been admitted to the ATDC.

Clough and Chameau cited several reasons for Georgia Tech's entrepreneurial success. They are: ATDC, VentureLab, the Georgia Tech Research Corporation and its Office of Technology Licensing, about 2,500 contracts totaling \$320 million a year in externally funded research (putting Georgia Tech among the top 30 research institutions in the

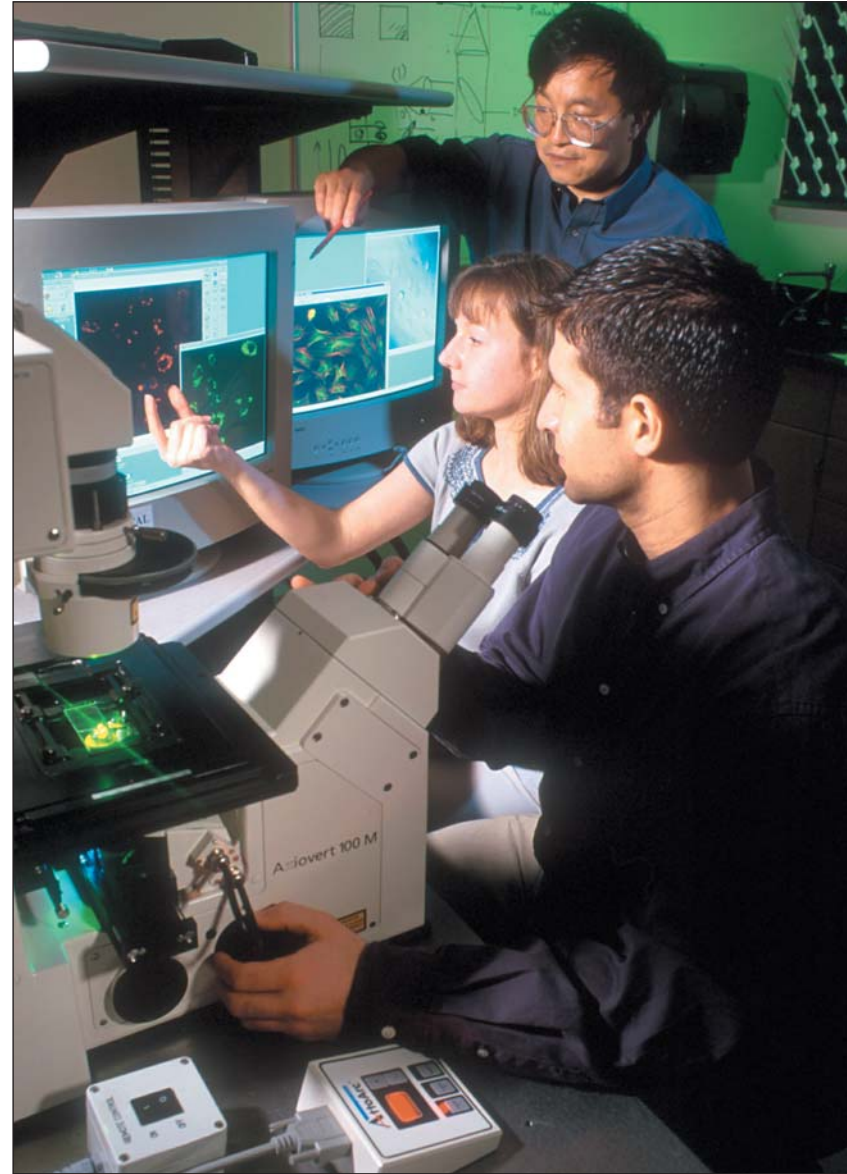


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nation), eminent scholars funded by the Georgia Research Alliance (GRA), relationships with industry partners and strong state support, and Tech's emphasis on collaboration among Georgia research institutions. In addition, Georgia Tech's administration strongly encourages faculty and students to become entrepreneurs.

Despite Georgia Tech's success, Chameau said the university wants to do more. He cited the Washington Advisory Group study that Georgia Tech recently commissioned and the recommendations that resulted from it. One recommendation already implemented was the creation of VentureLab as a one-stop center for entrepreneurs and industry. Another recommendation was the establishment of metrics to measure the university's economic development success, and some of these are already in place, he added.

"We have a strong commitment to commercialization," Chameau said. "It is an important part of our culture at Georgia Tech. Now we have people who want to come here because of our commercialization support. So we are fairly successful. But we are not satisfied. We will keep improving."

Clough encouraged both faculty and industry representatives to familiarize themselves with VentureLab. "It is a mechanism to simplify interaction between industry and faculty," he said. "It is one-stop shopping for faculty. VentureLab will help faculty down the long and complicated route to commercialization."

VentureLab evaluates faculty technologies' commercial potential, research team experience and business interest. For technologies meeting these criteria, VentureLab provides business support services and advice, connections to outside funding and pre-seed awards to move innovations toward commercialization. And VentureLab organizes events such as Technology Day to create a bridge between technologists and investors and potential customers.

VentureLab will help maximize the economic return the state of Georgia receives on its investment in Georgia Tech, noted Wayne Hodges, vice president for Economic Development and Technology Ventures.

"Georgia Tech has a rich environment for innovation, and there is strong support for commercializing technology throughout the market cycle," he said. "Through annual events like Technology Day, VentureLab will bring faculty together with investors, established companies and entrepreneurs to help move innovations out of the lab and into the marketplace."

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PHOTO BY STANLEY LEARY

Building upon extensive federally funded research in science and engineering, Georgia Tech faculty and students are creating innovative technologies with commercial potential.

Technology Day Presentations

At Technology Day, VentureLab showcased six technologies, two companies and two graduate companies. Here is a brief overview of the presentations:

OptiPhonics: This VentureLab technology has proven itself the world's most sensitive microphone in research conducted by Levent Degertekin, an assistant professor of mechanical engineering at Georgia Tech. The microphone is 100 times better than the best optical microphone on the market now. Among its other advantages are the microphone's extreme compactness, low power consumption and tunability so it can adapt to changing conditions. OptiPhonics' platform technology has potential applications in many markets, including hearing aids, cell phones, speech recognition, speaker verification, disk-drive failure detection, SONAR/oil exploration, surveillance and security.



A microphone that is 100 times better than the best optical microphone on the market now is under development by OptiPhonics. The platform technology has potential applications in many markets, including hearing aids.

Qcept: A VentureLab graduate company, Qcept has developed a breakthrough, patented sensing technology called the Scanning Contact Potential Difference (CPD) sensor. It senses electric fields to discern minute physical and chemical features of surfaces. Tiny variations in surface geometry or the presence of surface chemicals cause variations in voltage within the sensor. The resulting, time-varying signal is analyzed by Qcept's proprietary software for imaging and industrial control. The technology is based on more than 10 years of research by Steven Danyluk, a professor in the School of Mechanical Engineering and director of the Georgia Tech Manufacturing Research Center. Qcept's markets include defect management and inspection in the semiconductor industry, and industrial machine monitoring, such as sensing critical conditions in shafts, rotors and bearings. Qcept has been accepted as a member company in the Advanced Technology Development Center (ATDC).

“We have many great new ideas boiling away at Georgia Tech, and many of them will make their way into the commercial arena.”

Vivonetics: VentureLab company Vivonetics is the first true living-cell gene-expression imaging company. The technology, based on research by Gang Bao, an associate professor of biomedical engineering at Georgia Tech, has applications in drug discovery, molecular biology research, medical diagnosis and prediction of pharmaceutical treatment efficacy based on genetic analysis. Vivonetics’ product is a probe created from a novel combination of molecular beacons and resonance energy transfer (RET) probes. The probes deliver a better-performing, robust and adaptable technology, resulting in a time and cost savings. The company will pursue the \$3-billion-a-year drug discovery market initially.

Innovative Fluidics: A VentureLab technology called Innovative Fluidics offers novel fluidic thermal management solutions for the microelectronics industry. Its patented synthetic jets technology (SynJets) – based on research by Professor Ari Glezer of the School of Mechanical Engineering — delivers highly efficient air cooling of devices such as laptop computers at a fraction of the flow rate of traditional fans. Personal digital assistants (PDAs) and cell phones are other devices where SynJets could be used to cool processors. In addition to SynJets, Innovative Fluidics has developed a two-phase cooling technology called VIDA for high-power servers and devices with a self-contained, pump-free spray cooling mechanism.

Radatec: A VentureLab graduate company that has been accepted into ATDC, Radatec has developed a proprietary system to predict fatigue in previously inaccessible industrial environments, including those with extremely hot, dirty and dynamic conditions. The system, developed by GTRI researchers Jon Geisheimer and Scott Billington, uses advanced radar components and novel signal processing. Radatec is initially targeting the electricity-generating gas turbine market. Radatec’s solution will make it possible for the first time to monitor the gas turbine combustion area, saving companies up to \$21,000 an hour in down time and lost revenue per turbine. A prototype system is complete and will be tested in early 2003 at a U.S. Navy facility.

RFID: Engineers led by Gisele Welch in the Georgia Tech Research Institute’s Logistics and Maintenance Applied Research Center have developed a VentureLab technology from radio-frequency identification tags that track the location and condition of high-value assets, ranging from pharmaceutical drugs to aircraft engines. For example, if an airplane operating in the field needs a new engine, logistics staff can quickly find in a warehouse the right configuration to match its requirements.

About the size of a cell phone, these “talking tags” also monitor the stored equipment’s condition — such as possible condensation inside an engine — and alert appropriate maintenance authorities. Welch is starting a company to market the technology and deliver an initial order to the U.S. Navy.



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Orthonics: A VentureLab technology, Orthonics is an early-stage tissue engineering company developing advanced biomaterials that will promote bone growth and adhesion. Applications include scaffolds for bone and tissue repair, spinal disc replacement and artificial cartilage. The technology is based on research by Georgia Tech faculty members Barbara Boyan and David Ku, and Khumin Whang of the University of Texas. The advantages of Orthonics’ technology include its ideal mechanical properties, the non-metallic artificial material from which it’s made and its inherent ability to integrate with bone through natural processes. The company will initially target bone, spinal disc and cartilage applications because they are most advanced. The spinal repair market generates \$3 billion a year, as does the hard-tissue repair market.

Jacket Micro Devices: A VentureLab company, Jacket Micro Devices has developed a proprietary, high-performance organic fabrication technology to produce radio-frequency (RF) devices that are smaller and more cost effective than existing ones. The technology can deliver a tenfold improvement in cost, size and performance, according to federally funded studies by Georgia Tech researchers Madhavan Swaminathan, George White, Sid Dalmia and Venky Sundaram of the School of Electrical and Computer Engineering. Jacket Micro Devices is initially targeting the \$1 billion market for RF filters, such as those used in cellular phones. Its secondary market is manufacturers of integrated passive devices and modules.

Diabetes Tissue Engineering: An early-stage VentureLab technology is a suite of proprietary tissue engineering technologies that collectively offer the potential for a comprehensive solution to the management of patients with insulin-dependent diabetes. The technology — under development by Athanassios Sambanis of the Georgia Tech School of Chemical Engineering, Peter Thule of the Emory University School of Medicine and Ioannis Constantinidis of the University of Florida Department of Medicine — involves obtaining liver cells and enteroendocrine cells via biopsy, then engineering these cells to secrete insulin. The engineered cells would be encapsulated in a biomaterial and implanted back in the patient. The implanted cells would secrete insulin in response to dietary changes in glucose concentrations and thus reduce or eliminate the need for daily glucose monitoring and insulin injections. The market for this technology is large with more than 3.7 million insulin-dependent diabetics in the United States alone.

MEMS Inspection Technologies: Another VentureLab technology is a “laser interferometer on a chip” based on federally funded research by Assistant Professor Levent Degertekin and Professor Tom Kurfess, both of the School of Mechanical Engineering at Georgia Tech. The device can calculate sub-nanometer, out-of-plane distances in the inspection of micro electro-mechanical systems (MEMS). This technology is 100 times smaller than typical, bench-size laser interferometers and also 100 times cheaper to build. Another advantage is the device’s ability to measure three-dimensional moving MEMS devices up to gigahertz speeds. MEMS Inspection Technologies, the company being formed to market the technology, expects to package the devices for use by research and development laboratories.

Left: A company started by GTRI researcher Gisele Welch, right, is marketing radio-frequency identification tags that track the location and condition of high-value assets, ranging from pharmaceutical drugs to aircraft engines. These “talking tags,” developed at GTRI, also monitor the stored equipment’s condition and alert appropriate maintenance authorities.



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An early-stage VentureLab technology is a suite of proprietary tissue engineering technologies that collectively offer the potential for a comprehensive solution to the management of patients with insulin-dependent diabetes. Researchers are developing an implantable, tissue-engineered artificial pancreas, which will regulate insulin for more than a year before needing replacement in a minor surgical procedure. Georgia Tech graduate student Tony Tang is conducting experiments for the project.