INCUBATING ENTER

TECHNICAL INNOVATION AND COMMERCIAL DEVELOPMENT AT NJIT'S ENTERPRISE DEVELOPMENT CENTER

IT TAKES A LOT MORE THAN A BRIGHT IDEA TO BE A FINANCIALLY SUCCESSFUL INVENTOR. THOMAS EDISON, APPARENTLY A BELIEVER IN GETTING PRODUCTS OUT OF THE LAB AND INTO THE MARKETPLACE, WOULD LIKELY HAVE APPROVED OF NJIT'S ENTERPRISE DEVELOPMENT CENTER (EDC), A HIGH-TECH BUSINESS INCUBATOR HOUSED IN A TRIO OF BUILDINGS HEADQUARTERED AT 211 WARREN STREET IN NEWARK.

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Since 1988, the EDC has been helping innovators commercialize their ideas. The center provides office and lab space, financial help, business and technical services, networking opportunities, and the shared wisdom of the EDC's management staff. Participation is open to for-profit New Jersey-based enterprises that have been operating less than four years, and which have a new proprietary technology as a significant source of revenue. Successful applicants must also have a business plan, and a likelihood of benefiting from the EDC's three-year tenancies.

According to EDC directors Stash Lisowski and Lou Gaburo, the idea — enthusiastically endorsed and promoted by Governor James E. McGreevey — is to reduce startup risk for fledgling entrepreneurs, ultimately creating businesses that will generate jobs and bolster New Jersey's economy. One of seven such centers in the state, the NJIT EDC currently has 45 companies in residence, with combined annual sales of about $15 million and a total of 310 employees. A significant number of these enterprises are owned by minorities and women.

Nationally, the first incubation program began in 1959 in Batavia, New York. Today there are some 1,000 incubators, in all 50 states. Recent statistics indicate that the nation's business incubators employ some 82,000 full-time workers and generate about $7 billion in annual earnings, according to the National Business Incubation Association in Athens, Ohio.

Although not every hatchling flies, the NJIT EDC has graduated 63 companies, with products in biotechnology, information technology and a wide range of other fields. One oft-cited success story is that of J-Star Research, a chemistry-outsourcing company with pharmaceutical and biotech clients. Since graduating from the EDC in 1999 and setting

PHOTO: STAN OLENDER

PRISE AT NJIT

"Anything that won't sell, I don't want to invent. Its sale is proof of utility, and utility is success."
– Thomas Edison

THOMAS EDISON AND NEWARK

The Enterprise Development Center (EDC) at NJIT is part of a technological and entrepreneurial heritage in the city of Newark that includes Thomas Edison's first laboratory and manufacturing plant. Although Edison subsequently migrated to Menlo Park and West Orange in New Jersey, he was located on Newark's Ward Street in 1870, not that far from today's NJIT campus. There, for five years, Edison manufactured his innovative stock ticker and developed technology that greatly improved the speed and efficiency of the telegraph.

EDC III, the newest of the three facilities that comprise the Enterprise Development Center headquartered at NJIT

up shop in South Plainfield, New Jersey, the company has grown to have 24 employees and $2.8 million in annual sales. Another success story is New Jersey Precision Technologies, which NJIT alumnus Bob Tarantino launched in 1995 with EDC assistance. (See sidebar on page 15.)

Given the innovative thinking and entrepreneurial energy of all of the EDC's current tenants, Lisowski and Gaburo are hard-pressed to compile a short list for special mention. However, several EDC ventures can be singled out as exemplifying the spirit common to every tenant.

Holding her breath

In a fifth-floor laboratory at EDC III, research assistant Renee Cataneo is holding her breath — the day's collection of human exhalations sent to Menssana Research for Cataneo to analyze. Just as a breathalyzer can detect drunk drivers, a Menssana process can detect illness. It's the same concept, but about a billion times more sensitive, says inventor Michael Phillips, MD. Menssana has been an EDC tenant since December 2002.

In a patented process, samples are captured in activated carbon, sealed in cigarette-sized steel cylinders and then mailed to the lab for analysis. Menssana has identified distinct patterns made by more than 200 different volatile organic compounds exhaled in every breath. Phillips has proved that these patterns vary with illness and can be used to diagnose a variety of diseases.

The concept is at least as old as Hippocrates, Phillips points out. "It's more than folk medicine. Diabetics' breath smells fruity because of acetone,

Michael Phillips, founder and CEO of Menssana Research, has invented a breath analysis apparatus that can detect a wide range of diseases and reduce the need for invasive biopsies.

PHOTO: (THIS PAGE) NAJLAH FEANNY, (OPPOSITE PAGE) CYBEREXTRUDER

patients in kidney failure have breath that smells like urine, and liver disease and lung infections also have distinctive odors."

But Phillips' research has taken breath analysis way beyond the sniff test. In February 2004, the federal Food and Drug Administration approved the marketing of Menssana's Heartsbreath test. The test is useful in determining whether patients with heart transplants are showing signs of rejecting the new heart. The FDA said the test may be used as an adjunct to biopsy. Eventually, Phillips believes, his test will reduce the number of biopsies performed. The Heartsbreath test costs $500, compared to several thousand dollars for a biopsy. More importantly, it is non-invasive.

Phillips has also published research in peer-reviewed journals — including the prestigious medical journal *Chest* — showing that the breath-test concept works to diagnose lung cancer, breast cancer, tuberculosis and pre-eclampsia, a precursor of a life-threatening complication of pregnancy.

The principle behind his research is a bodily process called "oxidative stress." That means that disease is associated with an increase in "free radicals," molecules whose unpaired electrons make them highly reactive. Those free radicals damage the cell membrane, releasing the volatile organic compounds, some of which are ultimately exhaled. Phillips came up with a way to use activated charcoal to capture these compounds, concentrate them in a sorbent trap, and then use a gas chromatograph to separate the compounds and a mass spectrometer to identify them. The resulting chromatogram shows a distinctive pattern that can then be used to see who is healthy and who is ill.

Phillips believes the breath analysis concept could be used to screen for an almost limitless array of diseases. One of his hardest tasks is deciding which ones to pursue. "It's completely safe, has virtually no false negative results, and it's cheap," he says.

New dimensions of success

Computer analysis of patterns plays a big part in another EDC success, a software company called CyberExtruder. Its core technology enables the conversion of a two-dimensional (2D) facial image — like the one on a driver's license or passport — into a lifelike biometrically and forensically accurate three-dimensional (3D) model of the subject's face or head. This process is completely automatic and takes less than one second per photo. The core software that facilitates this transformation has won several awards for CyberExtruder, including the Best Emerging Technology Company award at the 2003 New Jersey Venture Fair organized by the New Jersey Technology Council.

The technology under development at CyberExtruder was first commercialized in the entertainment industry for personalization of video games and for messaging applications. Significant revenue is already being generated in these markets. Looking ahead, CyberExtruder's management knew that as this technology evolved and accuracy improved it could be a critical biometric tool for the security industry as well as a continuing success in other areas.

Converting 2D images into 3D facial models enhances the accuracy of facial recognition software by enabling the use of multiple variations in a subject's pose. The software can also correct for expression, lighting and many other variables. Current face-recognition technology requires capturing an image straight-on in consistent lighting to provide accurate results.

CyberExtruder lets players really get into computer games, including the company's CEO Larry Gardner.

"The governments of Australia and the United States have contracted with us to help improve the performance of face-recognition technology in real-world applications," says CyberExtruder CEO Larry Gardner. We are currently in discussions with a number of other countries as well."

At press time, Gardner announced that they had signed a deal with Samsung to use CyberExtruder software to promote innovative communications technology during the 2004 Summer Olympics. Participants will hold a "cyber relay" around the world by uploading their own photos from their cell-phone cameras. Each photo will be transformed into a realistic figure of an Olympic runner. The user will then pass the animation via multimedia messaging to a friend's cell phone. "It's phenomenal," says Gardner, "no one's ever seen anything like this."

The next level for MRIs

With the help of the EDC, Supertron Technologies promises to take a vital medical tool a step further. There are more than 20 million MRI scans done annually in the United States, at a cost of over $15 billion. Based on research originally conducted at Columbia University, Supertron CEO Joseph R. Flicek and his colleagues have come up with technology that could make obtaining MRI scans cheaper and faster, and at the same time significantly increase their resolution.

Flicek says the standard copper coils now used in making MRIs could be replaced with Supertron's improved Q-Coil™ product family, a patented series of superconducting MRI coils. The research team is conducting tests in collaboration with Harvard University, replacing the conventional copper MRI coil with Supertron's technology. The results have been dramatic — a far sharper, more detailed image.

Supertron's coils have also been demonstrated at leading medical institutions that include Columbia Presbyterian Medical Center and Brigham and Women's Hospital. With prototype testing under way, Flicek says that "We can lower the cost of getting an MRI by 25 percent and make it easier for more facilities to have a machine, including cash-strapped clinics in developing nations."

Solving an urgent problem

Another fledgling enterprise in the medical field, Urovalve, Inc., has set its sights on providing a far superior solution to an urgent problem that afflicts many thousands of men. The condition occurs when physical damage or disease makes it impossible to urinate, a problem that may be chronic or acute. Chronic impairment can result from nerve damage due to spinal cord injury, congenital defects such as spina bifida, or diseases that include multiple sclerosis and polio. Acute problems can develop after prostate gland surgery or damage to the urethra.

Most patients coping with urine retention of this nature have to rely on an indwelling catheter connected to a urine collection bag or insertion of an intermittent catheter several times each day. Urovalve holds a patent on a silicone device that is implanted into the urethra during a simple proce-

GET MORE OF THE FACTS

Visit NJIT's Enterprise Development Center on the Web at www.njit-edc.org and learn more about the center's facilities, services and current tenants. You'll also find an application form if you're interested in becoming a tenant.

For additional information about the companies mentioned in the accompanying article, visit —

CyberExtruder at www.cyberextruder.com

Menssana Research at www.menssanaresearch.com

New Jersey Precision Technologies at www.njpt.com

Supertron Technologies at www.supertron.com

Urovalve at www.urovalve.com

dure performed in a physician's office or by a nurse in the patient's home. The device contains a metal valve which opens whenever the user wants, activated by a pocket-sized magnetic wand the user carries.

It was invented by Phillip J. Davis, an idea born, he says, of necessity. Davis was on a family vacation in Samoa in 1987 when an accident left him with a broken back. He fell just eight feet, from a rocky slope to a beach, but the impact fractured his spine. After a long medical journey that began with a 10-day stay in a rudimentary hospital, followed by a medical airlift to Hawaii, then expert surgery in Hawaii and Massachusetts, Davis was eventually able to walk. But the nerves that control urination remained damaged.

An MIT graduate and mechanical engineer, Davis felt there must be an engineering solution to his problem. He designed the device that became Urovalve. Davis and Harvey Homan, president and CEO of Urovalve, Inc., have found the resources of the EDC and other NJIT departments to be invaluable in helping them get their device to market. They are also in advanced discussions with the Veterans Administration Hospital in Hines, Illinois, to perform the first clinical trial of Urovalve. This facility includes the largest spinal cord injury unit in the Veterans Administration hospital system. Recently, Urovalve received an award as the most socially responsible company at the New Jersey Technology Council's 2004 New Jersey Venture Fair.

The initial target population for Urovalve in the United States is the 210,000 men with spinal injuries and a portion of the 350,000 multiple sclerosis patients, all of whom would need the device for long-term use. A future goal is to make the device available for as many as four million men with other conditions who would need to use it for only a short time.

The new company is also facing the major challenge of finding a backer willing to invest the $2 million or so it could cost to get the device into the marketplace. But Davis and Homan are determined to succeed. "Most people are not familiar with all the peripheral problems of spinal injury and disease, such as having to catheterize yourself daily," Davis says. Which brings home the lesson of why NJIT supports the EDC. It has the potential to make life better for many people through technology. ■

ACHIEVING PRECISION RESULTS

NJIT alumnus Bob Tarantino '90 had a very good idea when he came up with the concept for New Jersey Precision Technologies in 1995 and took the first step toward making it a commercial reality at the university's Enterprise Development Center (EDC). In fact, Tarantino's idea was so good that he now owns one of the leading electrical discharge machining (EDM) operations in the northeastern United States, with gross annual sales topping $4 million.

Tarantino's company has specialized in producing custom components for the electronics, aerospace, medical and other high-tech industries. The principal technology that Tarantino and his more than 30 employees apply, EDM, removes metal or other conductive material from a workpiece by generating sparks between an electrode and the workpiece. Energy from the sparks is dissipated by melting and vaporizing the workpiece material as it is shaped. Much of what Precision Technologies is currently doing with this process at the company's 10,000 square foot facility in Mountainside, New Jersey, involves producing orthopedic implants and related surgical tools.

Tarantino, who holds a degree in engineering technology from NJIT, needed specialized equipment and motivated, affordable staff when he started on the road to his present success. By establishing his company at the Enterprise Development Center, he gained access to sophisticated equipment that would have been out of the reach of most small companies, as well as to a highly skilled workforce — NJIT work-study students, some of whom have become full-time employees at Precision Technologies. The EDC, which is a proving ground for innovative technology-based products and services such as Tarantino's, also provided a subsidized rent and broad range of support during Precision Technologies' first years.

"NJIT and the EDC helped us every step of the way," Tarantino says. "In addition to the resources needed for a good start, we received the support necessary for making the full transition to the high-tech marketplace, for being successful on our own."

Bob Tarantino of New Jersey Precision Technologies, launched at the EDC, checking a bone reamer manufactured at his facility in Mountainside, New Jersey

PHOTO: BILL WITTKOP