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THE WHISTLE

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THE GEORGIA INSTITUTE OF TECHNOLOGY

With implant, ATDC company may have an internal heart monitor

Potential for broad application in medicine

John Toon
Research News

Micromachines, devices based on micro electro-mechanical systems (MEMS) technology and built using microelectronics industry fabrication techniques, are finding their way into real-world applications.

CardioMEMS, one of the newest member companies in Georgia Tech's Advanced Technology Development Center (ATDC), is using MEMS technology to develop a new class of implantable sensor that will report blood pressure, flow rate and other key information wirelessly from deep within the body. The company's medical micromachines could one day move beyond diagnostics to help treat disease.

"The focus of the company is applying MEMS fabrication techniques to develop medical devices we hope to use initially for the diagnosis and management of disease, and ultimately for the treatment of various cardiovascular problems and other types of medical conditions," said David Stern, the company's

vice-president of research and development. "There is substantial interest in medical applications of MEMS because they hold the promise of revolutionizing the way people receive treatment."

CardioMEMS was founded by Jay Yadav, a Cleveland cardiologist, and Mark Allen, a professor of electrical engineering and MEMS researcher. The year-old company has licensed MEMS technology from both Georgia Tech and the Massachusetts Institute of Technology.

Though the technology has broad potential application in medicine, CardioMEMS is focusing first on a sensor that will be used to monitor the pressure within an aortic aneurysm and in the treatment of congestive heart failure.

Congestive heart failure affects more than 5 million persons in the United States, and the rate is increasing as people age and more of them survive heart attacks. Finding the right treatment often involves a trial-and-error process, with the physician trying different combinations of drugs and different dosages to produce the best results. That means repeated blood pressure measurements and invasive angiograms to measure the effects on the heart.

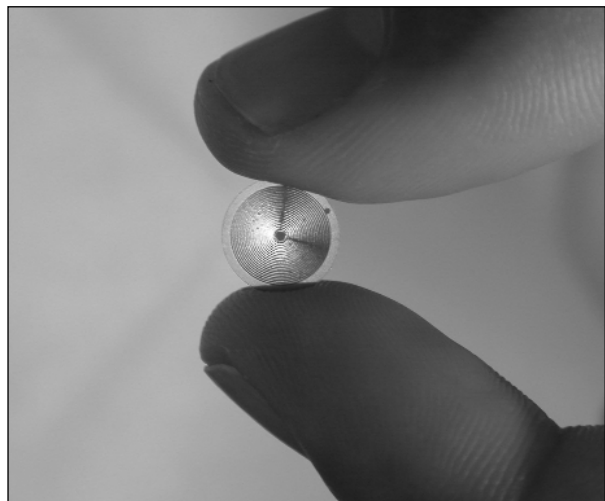
The sensor being developed by CardioMEMS could be implanted in

the heart, where it would report pressure and flow rates to an electronic device located outside the body. That would allow frequent and non-invasive monitoring that could even be done by the patient and reported to a physician over the Internet.

"This would accelerate the physician's ability to develop the optimal course of treatment with the right combination and amount of drugs for each patient," Stern explained.

"The ability to gather this information over a long period of time and at different points during the day could be very important."

The CardioMEMS product includes three separate components: the sensor, a catheter-based system for implanting the sensor, and external electronics similar in size to a palm-top computer for receiving and displaying the information. While development of the sensor requires



photos courtesy CardioMEMS

Though it uses current technology, engineering such a sensor poses problems. "The human body is a very challenging environment in which to operate devices intended for long-term use," said David Stern, vice president of research and development for CardioMEMS.

significant engineering innovation, the catheter and electronics rely on established technology.

The company expects to have completed and demonstrated a prototype early this year. Laboratory and animal studies will then begin, followed by clinical trials in humans during late summer or early fall. If all

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Auxiliary Services to provide scholarships to students of IMPACT

Michael Hagearty
Institute Communications
and Public Affairs

With a palpable impact from health and housing to parking and the arts, Auxiliary Services cuts across the entire campus. That attitude will be reflected in a new scholarship being sponsored by the department.

Rich Steele, director of the Student Center and chair of the departmental scholarship committee, said the conception of the program was simple: "We wanted to award scholarships to students who have a major impact on the Tech campus, while opening up the process to

attract applications from a wide variety of students."

A total of 10 IMPACT Scholarships will be awarded — three of which are reserved for student employees of Auxiliary Services. Like scholarships the department has given in the past, awards are based upon a student's involvement in campus organizations and activities. The approach this time around is to recognize students with less regard for organizational titles and more for passion and commitment to getting involved at Tech.

"We're trying to get a high level of diversity in terms of the kinds of background a student has," Steele said. To ensure that scholarships are open to a majority of students, Steele

supposed that for some applicants, "involvement might be through community services or related to student research or as a student employee or as a student leader — any number of things."

Monies for the scholarships come from so-called "Buzz Funds," or revenue generated from the sale of licensed Georgia Tech merchandise.

Each time a licensed item bearing a Tech trademark is sold, the Institute collects a portion of the wholesale price, amounting to nearly \$300,000 annually. Funds from licensing are split evenly between the Athletic Association, the Alumni Association and Auxiliary Services.

Full-time students and co-op

students on work term with a minimum 2.5 grade point average are eligible.

Though students must apply for the scholarship, Steele said he hopes faculty and staff would encourage students they feel would be competitive for such an award. An application form will be on the Auxiliary Services home page beginning Feb. 22. The application deadline is March 8.

For more information...

Auxiliary Services:
www.importantstuff.gatech.edu

“QUOTE— UNQUOTE”

“They need to fill jobs vacated by an aging and retiring population.”

—Ralph Mobley, director of Career Services, on why there has been stronger recruitment among federal and state government agencies, in contrast to a soft market for private sector jobs.
(Electronic Engineering Times)

“The airport is really the economic strong point for the city. I don’t believe the executive branch of state government is likely to do anything to hurt the city of Atlanta, given the problems they’re now facing.”

—Michael Meyer, a professor in the School of Civil and Environmental Engineering, on whether the city should retain control of Hartsfield Atlanta International Airport. Meyer is referring to the \$80 million budget shortfall that Mayor Shirley Franklin inherited from her predecessor.
(USA Today)

Artist-in-Residence documenting city’s urban redevelopment

Sean Selman
Institute Communications
and Public Affairs

Photos often help jump-start conversations, but a new artist-in-residence at Georgia Tech hopes her photography will aid discussion on sprawl and the evolution of urban landscapes.

Visiting Assistant Professor Ruth Dusseault joined the faculty in the College of Architecture last fall, where she holds a joint appointment between the Architecture and Industrial Design programs. She teaches an introduction to photography course for architecture students and continues her work on a photo timeline of the massive Atlantic Steel redevelopment project north of campus.

“I love teaching photography,” Dusseault said. “I think there are a lot of artists at Tech, and the College of Architecture seems to be the net that catches a lot of them. For architecture students, I think an understanding of photography makes them more visually literate and helps them to present their ideas.”

Dusseault is the College of Architecture’s second artist-in-residence, part of a program begun four years ago to bolster the arts on campus and strengthen ties across academic programs.

“We believe this post injects new energy and ideas into our curriculum,” College of Architecture Dean Thomas Galloway said. “Having an artist-in-residence goes beyond teaching a class or producing artwork for the campus. The mere fact that a photographer of Ruth’s caliber is working on campus on a daily basis raises awareness for visual arts and provides greater interaction opportunities for our students, faculty and staff.”

Associate Professor Ellen



Ruth Dusseault

photo by Pam Drake

Dunham-Jones, director of the Architecture Program, said her students benefit tremendously from studying photography.

“It is an excellent way of learning how to be more observant of the world around us, to really see things clearly and appreciate how the framing of visual imagery adds meaning to that world,” Dunham-Jones said. “Ruth’s work tends towards photographing architectural subjects and urban scenes. At the same time, she’s extremely knowledgeable about the wide range of critical and

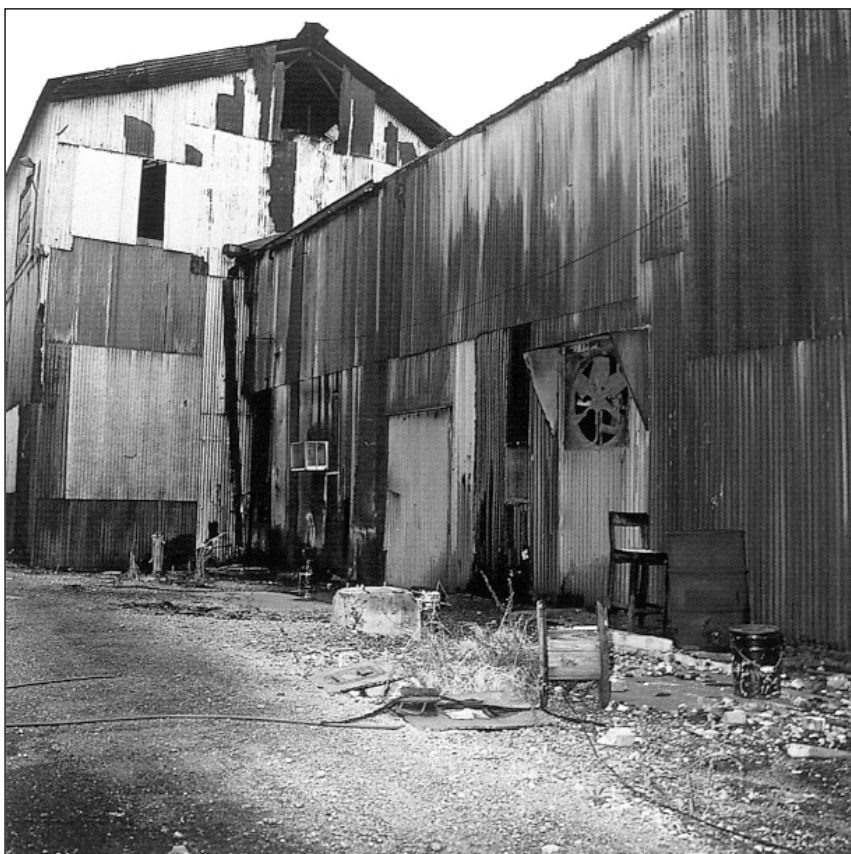


photo by Ruth Dusseault

Dusseault’s images touch on a range of issues, including how places establish or retain cultural memory. A forthcoming exhibition will feature her work at the former Atlantic Steel mill site in Atlanta. This image from one of her early exhibits shows the site before it was demolished to make way for the Atlantic Station redevelopment project.

fine art approaches to contemporary photography. I think she’s particularly well suited to helping our students appreciate how to engage their work in everything from identity politics to the traditions of street photography.”

The intersection of art and urban design

Although Dusseault began documenting redevelopment at the former Atlantic Steel mill in 1999, the College of Architecture recently commissioned her to continue her work at the site. She intends to document the construction of Atlantic Station, a 138-acre, \$2 billion mixed-use development that will feature residential, office and retail space. The site’s first phase of development is slated for completion in October 2003.

“She’s working on a three-tiered project that intersects art and urban design,” Galloway said. “It began with research on the Atlantic Station redevelopment project and will broaden into a multi-artist exhibition and public forum here at the college.”

Atlantic Steel manufactured steel products at the 120-acre mill site between 1901 and 1999. The closed site now is the location of the largest urban redevelopment in the United States, a brownfield project that will result in Atlantic Station. Dusseault’s photo project at the site addresses a variety of topics sensitive to Atlantans, including historic preservation, social gentrification, the suburbanization of the urban core, the ecological memory of land, environmentally friendly living and the definition of place.

A multi-tiered exhibition

As part of her work at Georgia Tech, Dusseault will collaborate with Professor Chris Jarrett in the College of Architecture on a photographic

exhibition and essay, Terrain Vague: Photography, Architecture and the Post-Industrial Landscape. The multi-artist exhibition is scheduled to appear at the Atlanta Contemporary Art Center next year.

Dusseault and Jarrett also will organize a related symposium to be held at the College of Architecture. During the symposium, some of the exhibiting artists will present their work and ideas along with noted urban theorists.

“I’m fascinated by the range of issues that this project touches on, from the specifics of brownfield reclamation and strategies of cleaning up contaminated sites, to broader questions of how places establish or retain cultural memory,” Dunham-Jones said. “I love how Ruth’s eye both for detail and the big horizon of this transformed landscape convey the vastness of the changes going on and invite us to speculate about how we’re building our world.”

Dusseault said she has photographed Atlanta’s urban landscape for about 10 years.

“Nobody had ever photographically documented this site,” she explained. “It was too dangerous for visitors, so it became sort of invisible to most people. It was a non-place in the middle of the city.”

Dusseault began taking photos of the site, authenticating it before it began to disappear. She earned several grants and commissions for her work and, when they ran out, she continued to take photos of the site.

“I felt somebody had to do it,” she said. “I’m interested in how places form personal identity; that’s an interest I have in common with the architects. I think the arts can help to decode the built environment through poetic acts.”



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Georgia Tech is a unit of the University System of Georgia.

If you build it...



photo by Michael Haggerty

Russ Chandler Stadium, the home of Georgia Tech baseball for more than 70 years, has undergone a complete reconstruction for the 2002 season — in less than eight months — at a cost of \$9.7 million. With a new seating capacity of 4,157, the facility has more than doubled in size from the previous stadium. The new Russ Chandler Stadium features approximately 1,100 chairback seats behind the home plate area in addition to nearly 3,300 bleacher seats. Two enclosed luxury suites are located to one side of the press box, while six open-air, covered suites are on the other side of the press area.

Returning visitors may notice that it's not just the seating that has changed. Home plate was moved outward 20 feet and the field was rotated clockwise to accommodate new dimensions, creating more room in left field. Home field advantage has been important to the Jackets' success. Since 1985, when Chandler Stadium's grandstand was built, the Yellow Jackets have posted a 485-125 record (.795 winning percentage) at home. For the Jackets' season schedule, refer to www.ramblinwreck.com/

IN BRIEF:

Money in the bank

The Georgia State Employees Credit Union has agreed to guarantee checking and or savings accounts for all Georgia Tech employees who enroll in their payroll direct deposit program and have not had a previously defaulted account with the credit union. With the campus moving to 100 percent direct deposit of payroll effective July 1, this will be a benefit to those who do not already have an established bank account. Credit Union representatives will be on campus on the following days to assist with opening an account: Feb. 20, 12:30 – 4:30 p.m., Poole Room in Wardlaw Center; Feb. 27, 8 a.m. – noon, room 117 of Student Services; March 14, 2 – 6 p.m., room 201 of the O'Keefe Building; and March 27, noon – 4 p.m., room 117 of Student Services. For more information on the credit union's full range of financial services, refer to www.secuga.org/

Tired? It might be for the wrong reasons

While athletes should expect to be tired after an intense workout, at other times — such as when they wake up, after a light or moderate bout of exercise, or even several days after working out — fatigue might be a cause for concern. According to the editors of the Georgia Tech Sports Medicine & Performance Newsletter, there is a checklist available for athletes that might explain their tiredness — for the wrong reasons. In the February issue, factors such as overtraining, nutritional deficiencies, chronic lack of sleep and post-viral fatigue are explored as possible reasons for such inexplicable exhaustion. For complete coverage, including a listing of other articles in the February issue, refer to www.news-info.gatech.edu/news_releases/tired.html.

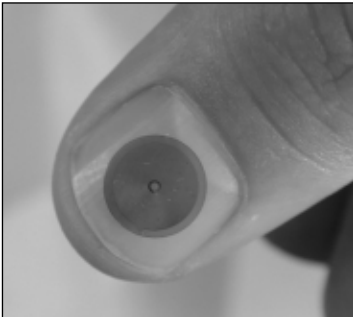
Math clubs

More than 500 of the world's leading mathematicians will gather at Georgia Tech March 8-10 to examine the latest research in their field and present results of their own work when the School of Mathematics hosts the 2002 Spring Southeastern Section Meetings of the American Mathematical Society (AMS) and the Mathematical Association of America (MAA). "The AMS and the MAA are the two largest professional mathematics organizations in the country," said Professor Richard Duke, the School's interim chair. "The AMS primarily is interested in research and the MAA in college-level teaching. They hold one large, joint national meeting each year with other groups, and each holds several of their own regional meetings around the country annually." Tech will be well represented: 15 faculty from the School of Mathematics, plus another three from the school's graduate students are among the presenters. An additional five talks will be given by faculty from Tech's School of Physics, the School of Mechanical Engineering, the College of Computing and the School of Chemical Engineering. Another five faculty members are co-authors of papers that will be presented at the gathering. "The AMS attendees will almost all be university faculty members and serious researchers, and will include some of the country's leading experts in certain sub-fields of mathematics," Duke said. "The typical MAA attendee will be a faculty member from a smaller institution, and they will be talking about educational issues such as the use of technology in the classroom."

MEMS, cont'd from page 1

goes well, the company hopes to have U.S. Food and Drug Administration approval to market the system by the end of 2003. CardioMEMS will also seek approval to sell the device in the European market. The sensor is based on Allen's Georgia Tech patent for a wireless MEMS sensor for monitoring jet engines. "If this could be rugged enough to survive the conditions within a jet engine, it should also survive inside the body," Stern added. "The human body is a very challenging environment in which to operate devices intended for long-term use." Both CardioMEMS co-founders have experience with starting up medical device companies. Yadav, an interventional cardiologist at the Cleveland Clinic, founded a company

known as Angioguard and sold it to Johnson & Johnson. Allen was co-founder of Redeon, a producer of microneedles for painless drug delivery.



The company chose to locate in Atlanta for its proximity to MEMS research and fabrication facilities at Tech's Microelectronics Research Center.

Stern says having Yadav and Allen as consultants not only gives CardioMEMS access to

their knowledge and advice, but also opens up networks of physicians and MEMS researchers to help the company develop customers and future technology. Beyond sensing blood pressure and flow, the sensor also has potential applications elsewhere in the body. Stern estimates that the market for passive sensing of all kinds in the body could be worth more than a billion dollars. And he says passive diagnostics are only the first step; MEMS technology could also be used for active management and treatment of disease.

For more information...

CardioMEMS
www.cardiomems.com