

Inside:

Zelnack Basketball Center	2
"Forgotten Genius"	3
In Brief	3
Campus Events	4

THE WHISTLE

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"Shape-memory" materials may soon aid orthopedic surgery

Rick Robinson
Research News

An early-stage medical-materials company based at Georgia Tech is developing devices that may soon improve the treatment of human orthopedic conditions.

MedShape Solutions' research focuses on "shape-memory" polymers and alloys — solid materials that can change shape on demand. Company leaders say these materials' ability to mold actively to human bone and tissue will make them useful in several types of reconstructive surgery.

MedShape's shape-memory approach — which is patent-pending and expected to go into human trials soon — derives from the work of Ken Gall, a Georgia Tech associate professor. Gall and several other scientists have been developing these materials at Georgia Tech and the University of Colorado for several years.

"Most of the materials used in medicine are inactive, such as titanium, stainless steel, polyurethane, and acrylic — they cannot respond to anything," said Gall, who has appointments in both the School of Materials Science and Engineering and the School of Mechanical Engineering. "By contrast, our materials are mechanically active — they respond to the human body by changing shape."

One MedShape product application has been designed for use in knee surgery. Currently, Gall explains, surgeons drill tunnels in bone and then anchor tendons into those tunnels with plastic or metal screw threads that often intrude into and injure tissue. By contrast, the shape-memory polymer fits into a surgical tunnel along with the tendon, conforming around the delicate tendon to hold it in place.

"This approach provides an easier surgical approach and stronger initial fixation, as well as better bone-tendon healing," explains MedShape president and CEO Kurt Jacobus, who has a mechanical engineering science doctorate as well as five years of management consulting experience with McKinsey and Company.

MedShape expects to market another product soon — a shape-memory alloy designed to help

patients with diabetes and other conditions who suffer from soft-tissue damage in their lower extremities, resulting in debilitating ankle pain.

Currently, doctors address this tissue-damage problem with a procedure called ankle fusion, Gall said. This approach has a fairly low success rate because titanium and stainless-steel surgical nails often fail to maintain compression during the healing process. MedShape's device employs "pseudo elastic" properties that allow it to achieve compression until bone fusion and healing can take place, avoiding the need for additional surgery or possible amputation.

MedShape has several other follow-on devices in the pipeline, Jacobus said. He expects these product applications to be useful in several areas of orthopedic surgery.

The work underlying MedShape's current product applications began

MedShape continued, page 3

FIRST Lego League



Photo by Ethan Trehilt

A competitor checks out the trophies for the state's FIRST Lego League championship tournament, held Jan. 20 in the Student Center Ballroom. Co-hosted by Georgia Tech's School of Electrical and Computer Engineering and the Center for Education Integrating Science, Mathematics and Computing, the competition involved teams of elementary and middle school students in designing, building and programming robots that can perform challenging tasks.

Police Department names emergency preparedness director

Michael Hagearty
Institute Communications
and Public Affairs

A tornado has touched down near the residence halls. There is major structural damage, the roof is partially gone and there is a high probability of students trapped in the rubble. In addition, the storm has crippled communication and transportation lines, causing confusion and panic.

This kind of scenario isn't pleasant to think about, but it can occur. For several years, administrators at Georgia Tech have been committed to providing emergency response plans to ensure the safety of the campus community.

Earlier this month, the Georgia Tech Police Department hired Andrew Altizer to plan for the unexpected. As Georgia Tech's director of Emergency Preparedness, he's the new point person in coordinating the campus



Andy Altizer will be heavily involved with risk analysis and planning for the Georgia Tech campus.

response to crisis.

Among other things, he'll be responsible for reviewing and updating emergency action plans, as well as developing exercise plans for the types of situations Tech might experience. He comes to Georgia Tech following four years managing the state's critical infrastructure program for the Georgia Office of Homeland Security (GEMA).

He also has experience in a collegiate environment, having previously served five years as assistant dean of community life at Oglethorpe University in Atlanta.

Georgia Tech Police Chief Teresa Crocker is pleased Altizer has brought his management skills to campus.

"This position focuses on the all-hazards approach Georgia Tech is taking when it comes to emergency preparedness," she said. "Andy will be working with departments across campus to help them get ready for whatever incident might come their way. I believe his background and experience with GEMA will certainly be an asset to Georgia Tech."

Related information...

Georgia Tech Emergency Procedures
www.emergency.gatech.edu

QUOTE UNQUOTE

"This is a little bit like airlines advertising how infrequently they crash into mountains."

—David Dagon, a graduate student in the College of Computing, on the poor track record of the computer security industry in combating 'bot-nets,' thousands of Internet computers that have been exploited and then coordinated to forward transmissions such as spam or viruses to other computers on the Internet. (New York Times)

Expanded support inspires naming of new basketball facility

Dan Treadaway
Institute Communications
and Public Affairs

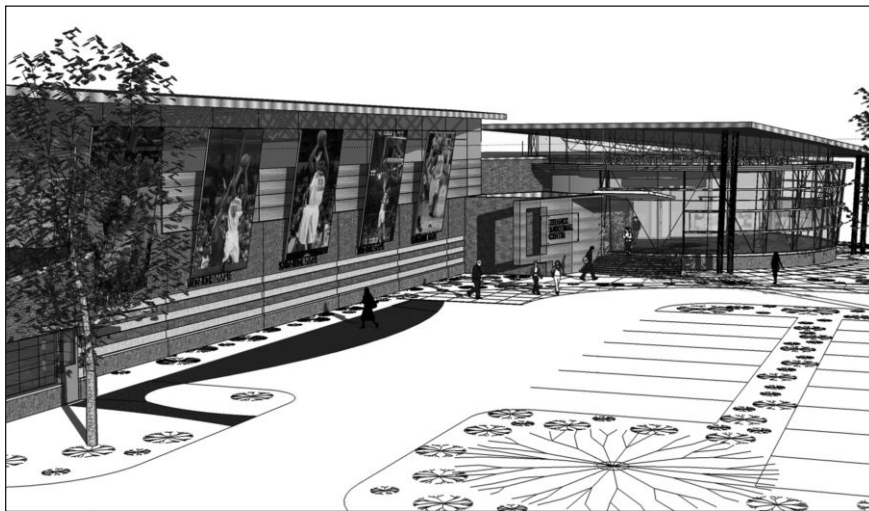
When it comes to Yellow Jacket basketball, Stephen Zelnak Jr. is truly "the man."

Last year, Zelnak made a leadership commitment that initiated efforts to design and construct a new basketball practice facility, a much-needed structure due to the outdated condition of the Freshman Gym, where practice sessions are currently held for men's and women's intercollegiate basketball.

Recently, Zelnak pledged additional funding to the project, raising his total commitment to \$3.75 million. When Zelnak's pledge is combined with an anonymous commitment of \$1.25 million, the result is an impressive \$5 million in commitments in just one year's time. (Commitments from all donors to the project now exceed \$6 million.)

"Steve Zelnak's generosity has taken our basketball program so far in such a short time," said Athletic Director Dan Radakovich. "It's hard to express just how grateful our student-athletes and our coaching staff are for this inspiring level of support. Pending approval of the Institute and the University System of Georgia Board of Regents, we plan to recognize Steve and his family through the naming of the new practice facility. We are proud to have his name so closely associated with Tech basketball."

The Zelnak Basketball Center, to be constructed near the Alexander



An early rendering of the planned Zelnak Basketball Center

Memorial Coliseum, will be a state-of-the-art facility that will not only attract the finest new players from high schools across the nation, but also play a major role in retaining and supporting current players.

"When you're competing at the level of our basketball programs, the pressures on these young student-athletes are considerable," said Men's Basketball Head Coach Paul Hewitt. "Having practice facilities of the highest quality means our players have the best resources we can offer to help them improve and refine their skills year-round and get the most out of their abilities."

"I am very pleased and humbled that Georgia Tech plans to honor my family and me through the naming of the basketball facility," said Zelnak, who graduated from Tech in 1969. "I

hope it will serve well the needs of our players and coaches, who have worked so hard to achieve remarkable success."

An avid basketball fan and former competitive player, Zelnak is chairman, president and CEO of Martin Marietta Materials of Raleigh, North Carolina.

A current member of the Georgia Tech Advisory Board, the Georgia Tech Foundation Board of Trustees, and the Campaign Steering Committee, Zelnak previously served on the College of Management Dean's Advisory Board and the Alumni Association Board of Trustees. His previous commitment established the Stephen P. Zelnak Jr. Dean's Chair in the College of Management, currently held by Steve Salbu.



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

Grant aims to broaden participation in computer science

The College of Computing has announced that it has been awarded a grant from the National Science Foundation's (NSF) Broadening Participation in Computing Initiative to expand the pipeline of quality students and faculty at all educational levels and increase the participation of historically underrepresented minorities in undergraduate and graduate computer science programs. The College will receive approximately \$2 million over the next three years and will use the money to develop these programs in Georgia, with the long-term goal of creating scalable initiatives for the entire United States.

"The core computer science curriculum first established in the 1960's has become too narrow in focus and too antiquated in application to satisfy the educational objectives of a technology-driven world," said Professor Mark Guzdial. "In anticipation of the expansive and extensive impact that technology will continue to have on our culture and society, it is imperative that educators engage a broader base of potential

computer science students, particularly women and minorities, through more contextualized and appealing methods and practices. With this grant, the College has an exciting opportunity to integrate a new and highly creative approach to computer science education across the learning spectrum — from kindergarten to college, and beyond."

Potential projects include partnerships with state and local youth-oriented organizations to increase participation computer science programs at the K-12 level; involvement of computer science undergraduate and graduate level students as mentors; workshops for faculty at other institutions to teach vanguard educational approaches; support in disseminating curriculum ideas; and the development of streamlined methods of communicating results to peer institutions.

Guzdial based the winning proposal on his experience in helping create the Bachelor of Science in Computational Media degree program in 2003, and rebuilding the computer science curriculum on the Threads

platform in 2006. Developed in recognition of the field's significant and increasing impact in non-traditional subject areas, these highly-contextualized and transformational approaches have proven successful in engaging a wider spectrum of computer science students. Presently, 23 percent of computational media students are women, and the total number of enrolled students has increased 77 percent from 2005 to 2006.

"The computing industry can only achieve its full potential when it best resembles and reflects the users and communities whose lives we are trying to impact," said Richard DeMillo, dean of the College of Computing. "At the College of Computing, we are defining the new face of computing by expanding the horizons of traditional computer science students through lifelong, relevant education focused on real-world issues. The model for broadening computing participation here in Georgia will serve as a model for our industry, and the entire United States."

Tech professor contributes to documentary on renowned chemist

"Forgotten Genius" recognizes pioneering African American scientist

Elizabeth Campell
Institute Communications
and Public Affairs

No book-length biographies have been written about Percy Julian, one of the most famous chemists of the twentieth century, but he will get some recognition when NOVA, a popular science program, airs "Forgotten Genius" about his personal and professional life on Feb. 6 at 8 p.m. on local PBS stations.

Julian broke the color barrier in American science and won worldwide acclaim for his work in organic chemistry and as the first black director of an industrial chemistry research lab. A brilliant chemist, his career was marked by many scientific breakthroughs that improved lives. He converted soybeans into synthetic steroids on an industrial scale, and his innovative approach helped make drugs like cortisone affordable and available to millions. His inventiveness helped lay the groundwork for the entire field of steroid medicine, and later the birth control pill.

Willie Pearson Jr., a professor in the School of History, Technology and Society, has been involved with NOVA from concept through production. Several years ago, Pearson, who specializes in science and technology policy-related research on the production of doctoral scientists and engineers, was contacted by NOVA to help with a proposal for a program about Julian. He reviewed the producers' materials, critiqued their proposals and served as a member of the program's advisory board.

"My contribution to this program was to help the producers find materials and validate facts and provide the broader context of what was



School of History, Technology and Society Professor Willie Pearson has been closely associated with the production of this biography for several years.

happening in the science field during Julian's life," says Pearson. "This project has turned into a much bigger project than NOVA originally anticipated. To see this project come into final production is very rewarding."

Pearson, whose on-camera interview appears in the program, emphasized what an extraordinary man Julian was. "In addition to his remarkable accomplishments as a chemist, entrepreneur and philanthropist, he was a gifted writer of both scientific and literary works which is an unusual combination," says Pearson. "His life story has some controversy as well, and it is interesting to see how those aspects of his life are handled in the final program as well."

For more information...

"Forgotten Genius"
www.pbs.org/wgbh/nova/julian

MedShape, cont'd from page 1

about 10 years ago at the University of Colorado, where Gall began his academic career. The basic research, performed by Gall and others, received about \$4 million in funding from the National Institutes of Health and the National Science Foundation over a number of years, as well as about \$1 million in private-placement funding.

Gall moved to Georgia Tech in 2005, and MedShape has received significant support from the State of Georgia since then. VentureLab — a

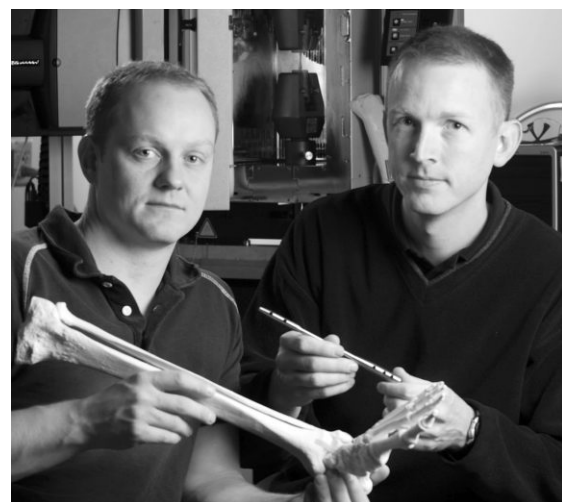
unit of Georgia Tech Commercialization Services that aids fledgling companies based on faculty discoveries — helped the company win Georgia Research Alliance commercialization grants. Moreover, in recent months MedShape has moved into on-campus research and office space.

"MedShape stood out above many other start-up projects," said Greg Dane, a Commercialization Services technology-evaluation manager who advises the company. "The first reason is the technology itself, which has received major funding for years and has a strong patent position. Second, the management is quite strong — you don't often find someone like Kurt Jacobus, who has a Ph.D.-level background in the science itself, as well as extensive management experience."

The company's founders include several staff scientists, including Reed Bartz, a specialist in orthopedic surgery and team physician for the University of Nebraska; Douglas Pacaccio, a specialist in foot and ankle reconstruction, and Chris Yakacki, a doctoral candidate and shape-memory materials scientist.

MedShape's leaders are currently weighing several options for funding their initial products' path to the market, which will include further product development, U.S. Food and Drug Administration clearance, human trials and manufacturing. At this time, they have not decided between a round of venture-capital funding or a strategic partnership with a large company or consortium.

"No matter which path we take, we're still going to bring the same products to market," Jacobus said. "We now have seven full-time employees, and we expect to have a product to market in two years."



Ken Gall (left) and Kurt Jacobus display MedShape's DynaNail device, a shape-memory-alloy nail for use in ankle-fusion surgery — along with a lower-extremity skeleton that represents the surgical target.

IN BRIEF:

Signing celebration

Georgia Tech will hold its annual football signing day celebration on Wednesday, Feb. 7, at the Hilton Atlanta in the Crystal Ballroom. Head Coach Chan Gailey and his staff will discuss Tech's 2007 football signees, including a video presentation on each signee.

Doors open at 5:30 p.m., with appetizers and a cash bar. The Tech cheerleaders and pep band will also be on hand. Tickets will be sold at the door.

GT Scholarships

Is your child a Georgia Tech student? If so, the Georgia Tech Faculty Women's Club may be able to help with tuition expenses. The Faculty Women's Club offers scholarships to undergraduates whose parents are Georgia Tech employees. Scholarships range from \$500 to \$1,500 and are based on financial need and academic achievement. Completed applications must be received before March 7. To receive an application form, e-mail Karin Baldzer at gtfwcshkb@earthlink.net or visit www.gtfwc.gatech.edu.

Baseball team raising money for childhood cancer

Georgia Tech's baseball team has joined forces with the St. Baldrick's Foundation to raise money to find the cure for childhood cancer. The Yellow Jackets have agreed to shave their heads as a part of the St. Baldrick's event, setting the lofty goal of raising at least \$5,000 by March 17. They are asking for the assistance in helping raise the funds.

For every \$250 donated by fans over the next two months, one player on the team will have their head shaved following the Yellow Jackets' game against Boston College on St. Patrick's Day. Donations can be made by going to the St. Baldrick's Web site (www.stbaldricks.org) and clicking "find an event" to search for events in Atlanta.

Calls for abstracts

Graduate students across the country are invited to attend the Georgia Tech Graduate Technical Symposium, also known as (GT)2 (GT-squared), hosted by the Georgia Tech Black Graduate Student Association (BGSA). The objective of the Symposium is to provide a forum for exceptional undergraduate and graduate students to communicate advances in their research to both corporate and university representatives as well as network with students from across the country. The Symposium is scheduled for March 15-16, with the theme "Merging Multiculturalism and Multidisciplinary Research."

To submit a research abstract or register for the event, visit www.gtbgsa.org/gt2.

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