Music and technology merge to form a new kind of rhythm

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usic may not be the first thing you think about when you think of Georgia Tech, but technology may very well come to mind. Researchers in the Music Department are developing a robot that plays the drums. Developed by Director of Music Technology Gil Weinberg, the robotic percussionist is the result of research that crosses several disciplines and combines Weinberg’s passions for music and technology to produce new and innovative music.

The research has created a harmony of sorts for Weinberg, who started the research about a year ago. “I was very interested in creating machine musicianship,” said Weinberg. “What we’re trying to do is bring together technological innovations and artistic creativity to create new music. Haile, the robot, allows us to create music that has never been played before. It can play differently from the way a human plays because the robot doesn’t have the same physical limitations.”

Haile can play faster than a human and can create different sounds from those a human player is able to create. In addition, the precise nature of how the robot can play numerical calculations or algorithms allows the machine to play faster and slower rhythms than a human normally would.

Weinberg was inspired to bring robotics and music together because he noticed that computerized music is usually played through speakers. He says that the speakers leave the music flat, meaning that an audience or member of the music ensemble can’t feel it.

The Music Department, part of the College of Architecture, has also fostered some unique partnerships. Weinberg teamed up with students in mechanical engineering and industrial design to help create a new look for Haile that they continue to refine.

Weinberg has been working on the robot for more than a year, and Haile’s new look will include a rotating head at the end of each arm that will have different surfaces that strike the drum. It will also have a second arm that will be able to alter the surface of the drum as the first arm strikes.

Weinberg is in the process of preparing his robotic percussionist for appearances at several upcoming conferences around the world.
What are terrorists seeking to achieve?

Terrorism is usually associated with people who are trying to extract some political benefit, and they can't do it via the ballot box so they resort to violence, often against innocent people. Osama bin Laden's terrorists are not seeking a political goal, but a religious outcome. His number one target is not the United States. It's what he calls the corrupt regime in the Muslim world — in the Arab world.

There isn't any set of outcomes that one could negotiate with Osama bin Laden. He wants a totally different world view. He wants a world that is basically empty of western civilization because he believes he has a God-given recipe of how the world and how countries should be organized. Now he's a minority within a minority in Islam. Most Muslims are peaceful. He doesn't speak for the billions of Muslims in the world, but he speaks for this tiny, violent minority.

Unfortunately, he has a number of sympathizers, and they are capable of wreaking terrible violence.

You have experienced terrorism firsthand in Beirut. How should we react to terrorism?

When I got to Lebanon, there was a vicious civil war still under way with many different contending armed factions. The U.S. Marine barracks had already been blown up with the death of 243 young Marines. The Americans had already been blown up twice. By the time I got there, we had learned some bitter lessons about perimeter security. We have seen American embassies and American military installations attacked overseas, not just in the early 1980s, but in the 1990s, in Africa, where two of our embassies were blown up, in Saudi Arabia where U.S. Air Force dormitories at Khobar Towers were blown up.

The terrorism that struck us in 2001 was of a different nature. It was the result of an intelligence failure. America is getting better, but we are a big country and we're slow to move. Unfortunately we are seeing some of that in the aftermath of the disaster in New Orleans and throughout the Gulf Coast in Mississippi and Louisiana. But that also has lessons to us about our vulnerability to future terrorist attacks — which I believe will happen.

On American soil?

On American soil.

Are we doing enough to defend our borders?

If you look at one of the scenarios that many people are concerned about, the honest answer is probably not. World trade and world shipping depends on the container. There are between 14,000 and 20,000 containers that enter the United States each day. We're inspecting about 2 percent of that number. We try to know who is shipping. We're setting up pre-inspection procedures in foreign ports, but that is a global size problem and we're probably vulnerable on that front. If we inspected every container, we'd bring trade to a standstill. Sooner or later somebody is going to do some damage to us by that means or a different means.

What about the nuclear threat?

There are two aspects to that. One threat is that terrorists lay their hands on an actual nuclear weapon and smuggle it in and detonate it. That takes some sophisticated competence. It's a complicated task. The other threat is called the radiological bomb — radioactive material that would produce a nuclear detonation like Hiroshima, but let's say isotopes that are used in medical treatment in the hospital that can damage to individuals who are exposed. If terrorists lay their hands on some radioactive material and strap it to a stick of dynamite, it could probably make a lot of people sick with some sort of radiation poisoning, plus it would generate a panic. There is the threat of nuclear, biological or chemical agents. A lot of experts believe there is a 50 percent probability over the next number of years that something like that will happen in the United States.

We live in a dangerous world.

What's the answer? Vigilance, protection, good intelligence, good police work and well-trained first-responders.

Does our democratic society and freedom make defending against terrorism more difficult?

Both. The Patriot Act, which was passed after Sept. 11, 2001, has been a subject of some controversy. But I am not one who believes that it has intruded or significantly diminished anybody's civil liberties. There are others who think differently.

I think we can maintain our democracy, maintain our civil liberties and still increase our anti-terror posture. I don't think it is inconsistent to maintain our democracy and our civil liberties and yet have a firm anti-terror stance.

A large number of Iraqis voted to support the new government.

Most of the terrorists in Iraq are homegrown. They are discontented people who used to work for Saddam, they are Sunni who see their privileged role in society is being undermined by the democratic system, and there are obviously some foreign fighters. But I don't think the foreign fighters are the bulk of the people who are giving us problems every day.

I think we can startag its way toward a politically capable government. In the meantime, I believe we are training army and police forces vigorously so that as those numbers grow, they'll be able to take more and more for their security. I don't think it's a fast recipe, but I think within two or three years we can be significantly out of there.

What is the role America should take in the world?

Some people believe strongly that America has a vocation to alleviate suffering around the world, and that's a noble part of the American tradition. Other people believe that we can help by increasing free trade, which will provide more jobs for more people around the world. Some people believe that we have a vocation — and the president has certainly promoted that — of spreading democracy. You can get a little bit of democracy going within political parties or among parties by adding what should America really be doing. I believe there is a common, broadly shared belief that America cannot be the world's policeman.

If things go well in Iraq, how do you view the war or terror?

It's going to be a long-term war. Let's assume that things go very well in Iraq, Afghanistan is still not under control. We know there are cells of al-Qaida working in Pakistan, Bangladesh and the Philippines. These are small groups of people, but it's going to take a long time. I think the war on terror is going to be with us. I'm sorry to say, 20 to 30 years at a minimum.

Does that mean the country comes to a halt? No. But from time to time, we're going to take a terrible, grievous blow, like Sept. 11. That will not stop this country. That will not bring this country to its knees. And at the end of the day, the United States is going to prevail.
Researchers study embryonic alteration in fish species

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I n a study illustrating the apparent linkages between the evolutionary development and embryonic development of species, researchers discovered the genetic elements that determine the structure and function of a simple biomechanical system, the lower jaw of the cichlid fish. In addition, they’ve shown that increasing expression of a particular gene in an embryo can lead to physical changes in the adult fish. The results appear in the November 11, 2005 issue of the Proceedings of the National Academy of Sciences.

“We’re using the jaw to think about the genetic basis of biomechanical systems,” said Todd Streelman, an assistant professor in the School of Biology. “We want to understand the genes that control this lever system. What we found was that this simple biomechanical system is much more complex than previously thought.”

Streelman, along with colleagues from the Forsyth Institute at the Harvard School of Dental Medicine and the Hubbard Center for Genome Studies at the University of New Hampshire, predicted that components of the jaw that were functionally or developmentally related would be controlled by the same set of genes, or genetically integrated.

“We were surprised to see that the genetic basis of components involved in opening the jaw is independent of the jaw-closing system,” said Streelman.

Researchers compared two cichlid species that dwell in Africa’s Lake Malawi. One species had force-modified jaws that are more adept at biting prey; the other had speed-modified jaws, which are more accomplished at using suction to feed on plankton. Each jaw system is essentially a lever system made up of one out-lever and two in-levers.

“We found that as the closing in-lever gets longer, the out-lever gets shorter and vice-versa,” explained Streelman. “When the in-lever is long, this gives the jaw a high mechanical advantage and the jaw can produce more force for biting. When the out-lever is long, that results in a lower mechanical advantage and a better design for suction feeding. This negative correlation is produced by genetic integration.”

But, when the team mapped the regions of the genome controlling the jaw-opening system, they found that these levers are controlled by different chromosomes.

In another part of the study, researchers showed that the gene bmp4 is a major factor in controlling the jaw-closing system. When the team injected bmp4 protein into the developing embryos of another fish species, the zebrafish, they saw that the mechanical advantage (and thus the biting power) of the jaw increased.

“This experiment uses the traditional disciplines of developmental genetics and evolutionary biology,” said Streelman. “We’ve demonstrated that important functional differences operating in adult organisms are elicited by changes in early development. Our next goal is to understand the genetic bases underlying the differences between the simple biomechanical system of the jaw and the complex systems of the anterior jaw in these fish.”

Awards & Honors

Assistant Vice Provost for New Program Development William Holm (Distance Learning and Professional Education), recently received the University Continuing Education Association (UCEA) Region South Continuing Education Faculty Award. The award recognizes a faculty member who has assisted in the field of continuing education in a worthy and exemplary manner. The award was presented at the UCEA South Regional Conference in September.

Assistant Director Giselle Martin (Office of Undergraduate Admission) was presented with the Rising Star award by the National Association for College Admission Counseling. The award honors individuals and programs that exemplify excellence and dedication to serving the needs of students in the transition from high school to college.

Assistant Professor Elliot Moore (School of Electrical and Computer Engineering) has received a CAREER Award from the National Science Foundation for his research entitled “Extraction and Integration of Voice Source Features into the Acoustical Analysis of Spoken Text.” He is the first Georgia Tech Savannah faculty member to receive an NSF CAREER Award.

Professor Michael Saunders (School of Civil and Environmental Engineering) has been selected as the 2005 recipient of the Water Environment Federation’s Gordon Maskew Fair Medal for Outstanding Service in Engineering Education. Saunders is being commended for his contributions to the education and development of undergraduate, master’s, and doctoral engineering students. He will receive his award during a ceremony in Washington, D.C. later this month.

At last week’s Women’s Leadership Conference, special citations were awarded as follows:

• Janice Wittschiebe, who received both her bachelor’s and master’s degrees in the College of Architecture, was named Outstanding Alumna.
• Professor Bonnie Heck (Electrical and Computer Engineering), the School’s first female graduate, received the award for Outstanding Faculty Member.
• The recruiting manager for the College of Engineering and GT Savannah representative, Cindy Jordin (Career Services), was named Outstanding Staff Member.
• Administration Director Janice Rogers (Georgia Tech Research Institute) was named Outstanding Staff Member.
• Doctoral candidate Shannon Watt (Chemistry and Biochemistry) was named Outstanding Graduate Student.
• Elizabeth Seelenbinder (Computer Science) was named Outstanding Undergraduate Student.

Golden Shoe Award

Georgia Tech’s Center for Quality Growth and Regional Development (CQGRD) and Emory University won a Golden Shoe Award from Pedestrians Educating Drivers on Safety (PEDS) for creating an ongoing venue for multidisciplinary discussions and research on the relationship between health and the built environment through the Healthy Places Research Group.

The Healthy Places Research Group (HPRG) is a collaborative effort involving Emory University’s Rollins School of Public Health, Tech’s College of Architecture and CQGRD. It also involves professionals from the Centers for Disease Control and Prevention, researchers, students and others interested in exploring the co-relationship between the built environment and the health of communities.

The HPRG meets once a month to discuss issues and exchange information pertaining to health policy and impacts. Participation is open to anyone interested in exploring the characteristics and advancement of healthy places. For more information, visit www.coa.gatech.edu/cqgrd/projects.htm.

Call for nominations

An open call has been issued for nominations for the Outstanding Staff Performance Award. The award, which recognizes those staff members who render outstanding performance in support of instructional, research or administrative activity, is given annually to five staff members.

A statement of conditions for the Outstanding Staff Performance Award can be obtained by e-mailing gerri.naramore@carnegie.gatech.edu.

Nominations should be directed to Ms. Paramore via campus mail code 07430 and are due no later than January 20, 2006. For more information, call 894-8887.

Hewitt signs top prospects

In what might be the strongest recruiting class Georgia Tech has put together since 1989, head coach Paul Hewitt and his coaching staff signed four high school players to letters-of-intent last week, including a pair of top-10 players: point guard Jarvis Crittenton of Atlanta and forward-center Malcolm Mackey, who carried the Yellow Jackets to an ACC title and a Final Four finish in 1990.

Crittenton and Young are the highest-rated players to sign with Tech since Hewitt became its head coach. Also signing grants with the Yellow Jackets Wednesday were forward Zach Peacock of Miami and center Brad Sheehan of Latham, N.Y.

Tech’s signing class was ranked the sixth-best in the nation by Scout.com, seventh-best according to Rivals.com.

Tech’s 1989 class included point guard Kenny Anderson and forward-center Malcolm Mackey, who carried the Yellow Jackets to an ACC title and a Final Four finish in 1990.

Toy Drive

The 5th Annual Michael Isenhour Toy Drive will take place Saturday, Nov. 26 at the gates of the Georgia Tech vs. Georgia football game. Sponsored by Tech’s Student-Athlete Advisory Board, new, unwrapped toys will be collected at all gates outside Bobby Dodd Stadium. Toys will be donated to Children’s Healthcare of Atlanta. Isenhour, a former basketball player and Student-Athlete Advisory Board member, died in 2002 following a battle with leukemia.
**Campus Events**

**Art & Culture**

**Nov. 17-19**
DramaTech Theatre performs its fall musical, "West Side Story," at 8 p.m. For more information, visit www.dramatech.org.

**Nov. 29**
Poetry at Tech welcomes Georgia poets Judith Ortiz Cofer, Patrick Phillips and Memye Curtis Tucker, at 4:30 p.m. in the Clary Theater. For more information, visit www.iac.gatech.edu/poetry.html.

**Brown Bags/Conferences/Lectures**

**Nov. 15**
The Computing Science and Systems Division and the School of Aerospace Engineering host a distinguished lecture featuring Patrick Cousot, computer science professor at the École Normale Supérieure in Paris, France, on "Static Program Verification by Abstract Interpretation," at noon in the TSRB Auditorium. For more information, e-mail shanita@fcs.gatech.edu.

**Nov. 15**
The Materials Council Seminar Series continues with University of Texas at Dallas Professor Bruce Gnaed on "Materials and Processes for Flexible Electronics," at 3 p.m. in room 185, Love Building.

**Nov. 15**
The annual Tennenbaum Lecture will be given by Pete Peterson, senior chairman and co-founder of the Blackstone Group, on "The Tri-Deficits: What They Are and Why They Matter," at 4:30 p.m. in the Clary Theater. For more information, visit www.gttisc.gatech.edu.

**Nov. 15**
The annual Carreker Distinguished Lecture will be delivered by R. Stanley Williams, director of the Quantum Science Research Group at Hewlett-Packard Laboratories, on "Defect Tolerant Nanoelectronics," at 5:30 p.m. in the Van Leer Auditorium.

**Faculty/Staff Development**

**Nov. 17**
The Library's Tuesday Talks lecture series continues with Chemical and Biomolecular Engineering Professor Tom Fullter, on "The Energy Challenge and Fuel Cells," at 2 p.m. in the Wilby Room. For more information, call 894-4350 or e-mail pgroup@library.gatech.edu.

**Nov. 29**
The Office of Sponsored Programs hosts a workshop on "Material Transfer Agreements (MTAs) and Non-Disclosure Agreements (NDAs) at noon in the Research Administration Building. To reserve a seat, e-mail nadia.zitman@osp.gatech.edu or call 894-6944.

**Miscellaneous**

**Nov. 14 - Dec. 19**
The annual Georgia Tech Best Practices Challenge begins. Applications will be accepted from Nov. 14 until Dec. 19. For more information on criteria, awards and entry forms, call 894-1065 or visit www.orgdev.gatech.edu/bp.

**Nov. 15**
The deadline to submit Fall semester applications for both the TAP and STRAP tuition assistance programs. Send applications to Kimberly Porter in the Office of Organizational Development, mail code 0206. For more information, call 894-2249 or visit www.orgdev.gatech.edu/tuition.

**Dec. 2**
Deadline for students to apply for the Spring 2006 President’s Undergraduate Research Award (PURA). Application available online. For more information, visit www.undergradresearch.gatech.edu.

**Note:** Due to Thanksgiving break, the next issue of the Whistle will be published on Nov. 28.

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**Classifieds**

**Appliances**

- Jenn-Air 30-inch electric downdraft Cooktop. Ceramic surface, 4 burners. Excellent condition. $300. E-mail phurst62@minsprings.com or call 770-509-7300.

**Automobiles**

- 1990 Toyota 4-Runner. Excellent condition, 199,900 miles, 6-cylinder engine, 4WD fully loaded. $3,500. E-mail mark.sanders@gmail.com or call 404-377-7100. Pictures available. Great first vehicle for your child.

- 2001 Ford Taurus four-door sedan, all power. Radio and CD player, 104,200 miles. $7,500. Call H. T. Marshall at 404-577-6662 or e-mail htmarshal!@earthlink.net.

- 2004 Mini Cooper S with 29,800 miles. Premium package, leather, climate control, harmonicardon sound, Xenon headlights w/ washers, sunroof, dynamic stability control, free scheduled maintenance to 50,000 miles. $21,500. E-mail cindy.milliron@dopp.gatech.edu.

- 2004 Nissan Murano SL. Copper exterior, charcoal interior, 208 miles, air bags ABS, 6-disc CD, sunroof, Xtronic CLV transmission, 20 mpg, excellent condition. $24,995. E-mail sabberekle@prinpcs.com or call Sean, 678-805-8096.

**Computers**

- IBM Thinkpad42. Like new, still under warranty. $1,279. RAM, 50GB hard drive, Mobile Centrino technology. $950 OBO. $400 less than regular price. Call 770-630-2727.

**Furniture**

- Jenny Lind baby crib and mattress by Simmons. Solid black maple, excellent condition. $110. Call 770-923-1048.

**Real Estate/Roommates**

- 2BR/2.5BA home for sale in friendly neighborhood. Blue sky, 2BR/2BA newly renovated contemporary condo in walking distance of Tech. High-end Grohe kitchen and bath, low fees, lots of light, lots of storage. $179,900. E-mail tyanna.herrington@fcs.gatech.edu.

- 1BR/1BA apartment, 950 square feet. Central air, includes washer/dryer and water. All electric, average bill $75. One block from Georgia Tech bus, MARTA and Piedmont Park. Call 404-668-7220.

**Miscellaneous**


- Furnished downtown 1BR condo. See www.thewilliamoliver.com. Utilities paid with association fee. Pre-paid parking, 24/7 concierge. 10-year tax abatement. $11,000. Call 678-9249 or e-mail omara_keiko@bellsouth.net.

- 3BR/2.5BA house for sale in friendly downtown Duluth community. Loft office/playroom/4’ bedroom. $192,000. Call 770-335-6770 or visit www.owners.com, listing ID: ATG0578.

- 3BR/2BA house for rent in Ben Hill. Not on bus line. Also, 3BR/1BA house in Adamsville, on bus line. Katrina victims and Section 8 welcome. Call 404-699-0589.

**Sports/fitness/recreation**

- Weider Universal Gym with weight bar, free weights and all attachments. $50 OBO. I want this out of my house. Call 404-448-3298.

**Note:** All ads are for sale西亚gatech.edu.