



She's Got Game

Theater students breathe life into software.



JEFF MILLER

Having a ball, Carrie Coon, center, prepares for a motion-capture session at Raven Software. She may not look much like an elite-force assassin, but the suit that Tim Uttech (left) and David Peng (right) have put her in will help give lifelike movement to the assassin character in a Raven video game.

Clad head-to-toe in a skintight yellow-and-black body suit, with reflective markers the size of Ping-Pong balls attached to every moving part, actress **Carrie Coon MFA'06's** new on-screen character isn't immediately obvious.

But the black high heels are a nice hint. Coon is preparing to become a video game action hero. She and several UW theater students are helping give life to computer-generated characters.

In the Middleton studios of Raven Software, Inc., one of the most critically acclaimed video gaming companies in the business, Coon is working through a wildly athletic motion-capture regimen. Her bullet-dodges, head-kicks, dive rolls, and back flips will become the raw material for depicting an elite-force assassin.

Coon, who recently earned her master's degree from UW-Madison's theater program, begins each fight move in a T

formation, with arms straight out. On black scaffolding around the performance space, an elaborate array of twenty-four infrared cameras captures her every movement. Afterward, she glides back into the T shape, giving the cameras a standard point of reference.

On a nearby computer screen, Coon's movements are collected from the markers and translated into a precise, three-dimensional stick figure that replicates her motion. It becomes the digital skeletal system for Raven's dark new character, who ideally will move in convincingly human ways.

The success of this high-tech scenario hinges on talented actors — a need that led to a unique partnership now in its second year between the company and the UW-Madison theater program. Raven auditions students, looking for the right blend of acting finesse and physical skills that will translate well to their characters. The

students are paid for their work and gain a novel addition to their acting portfolios.

"The actors are vital," says Robert Gee, project lead for Raven. "The technology is there and we keep upgrading it, but we've got to have the right actors showing the right qualities of behavior. When you're animating by hand something that really requires the subtleties of human body language, it just looks wrong."

Coon's stiletto-heeled assassin will be a prominent character in one of Raven's new games, and the motion-capture crew — or *mocap* in industry shorthand — really likes what Coon brought to the part.

Coon, in turn, enjoyed getting into character. "It's a lot of fun to imagine yourself in a completely different way, as someone with superhuman qualities," she says.

Tony Simotes, director of University Theatre, says the Raven partnership is highly valuable, showcasing "how a theater student and a theater department can interact with high technology and actually make an impact on the entertainment. This is a new kind of acting. No longer can an actor just rely upon a life on stage."

As a finishing touch for Coon's elite-force character, Raven did a "face scanning," using a scanning light projector to capture her face at different angles, then animated her facial features in 3-D. The result is a character who will not only move like Coon, but look like her, too — providing good entertainment for family and friends back in her hometown of Akron, Ohio.

"Maybe my grandmother will start getting into video games," she quips.

— Brian Mattmiller '86

The Skinny on Trans Fat

Nutritionist helps diners find health in a sea of cooking oils.

New York City is doing it. Starbucks is, too. And the Memorial Union's Rathskeller already did.

Each of these entities is going trans fat-free, switching out hydrogenated vegetable oil for various alternatives. Other cities and other restaurants — from Chicago and Los Angeles, to Krispy Kreme Doughnuts and McDonald's — are considering the same transition.

The impetus for this major shift in cooking oils stems from a rising awareness of the link between artificial trans fats and heart disease. And **Sherry Tanumihardjo**, a nutritionist at UW-Madison and UW Extension, is helping diners discover the truth about trans fats.

Tanumihardjo developed educational materials about fats for the Wisconsin Nutrition Education Program. The program's fact sheet recommends keeping consumption of trans fats to a minimum. "I haven't bought a regular microwave popcorn since I realized there was so much trans fat in there," she says.

Trans fats are found in partially hydrogenated vegetable oil, a food industry staple that

has long been the preferred oil for making processed foods because it has a long shelf life and a buttery consistency at room temperature, and it's cholesterol free. Trans fats commonly show up in cookies, cakes, doughnuts, crackers, pancakes, and stick margarine, and in the deep fryer vats that crank out the French fries and other greasy goodies. But despite being cholesterol free, hydrogenated vegetable oil negatively affects cholesterol levels in the body.

"When you talk about heart risk, you want to have a good ratio of HDL to LDL," says Tanumihardjo.

HDL, commonly known as "good cholesterol," transports cholesterol to the liver, where it is destroyed and excreted from the body. LDL, or "bad cholesterol," transports cholesterol to the tissues in the body, and it can wreak havoc on its way — leaving deposits of cholesterol in the arteries that can lead to plaque and atherosclerosis.

Scientists now know that trans fats increase bad cholesterol and lower good cholesterol. The encouraging news

for the health-conscious is that many foods that contain trans fats are being reformulated.

"The bad news is that some in the industry are replacing trans fats with saturated fats, such as palm oil and coconut oil," says Tanumihardjo. "So, you still need to look at the nutrition label when a product says that it's trans fat-free."

Saturated fats also raise levels of bad cholesterol, so trans fat-free fries cooked in saturated fats are not appreciably better than the regular kind.

As restaurants and the food industry work to employ healthier oils and to develop new options, Tanumihardjo recommends keeping an eye on nutrition labels, and eating a diet low in trans fat, saturated fat, and cholesterol.

The big picture matters, too, she says, repeating what must be every nutritionist's mantra: "You've got to consider total diet and exercise."

— Nicole Miller MA'06



COLLECTION

The Buzz on Bees

Most people wouldn't know it, but among apiculturists, the name Charles Miller used to be the bees' knees. But then most people don't know what apiculture is.

Apiculture is the raising of bees for the purposes of harvesting honey and wax, a \$6 million industry in Wisconsin today. And at the beginning of the twentieth century, Charles Miller owned the country's leading apicultural library. That collection — nearly five thousand volumes worth — now resides in Special Collections at Memorial Library. However, the UW doesn't have a beekeeping program, so it's fair to ask why.

When Miller died in 1920, his will dictated donating his library to a university. Several different schools vied for the books, including Cornell, which then, as now, had the nation's

leading apiculture program. But Miller was a Midwesterner, and so his widow gave the books to the UW, where they formed the nucleus of the school's beekeeping studies collection.

"Today the books have more value from a history of science perspective. So they've moved over to Special Collections," says librarian **Jill Rosenshield '65, MS'68, MA'78**.

In the near future, however, the Miller Collection is looking at a technological upgrade. It's on the list of volumes that the UW Libraries hope to digitize as part of their Google Project. (See "Catching Up," Winter 2006.) Eventually, the entire collection will be available online to everyone — even students at Cornell.

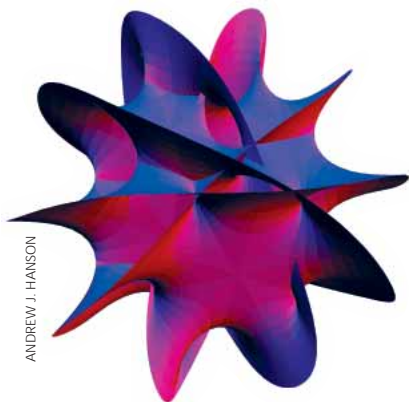
— J.A.



PIERRE HUBER

Strung Out

Scientists find a way to see extra dimensions.



ANDREW J. HANSON

Seeing in 6-D: A computer-generated rendering suggests what a six-dimensional geometry might look like.

Peering backward in time to an instant after the big bang, UW-Madison physicists have devised an attempt to unlock the hidden shapes of alternate dimensions of the universe.

Along with our four familiar dimensions — three-dimensional space and time — a powerful physics theory predicts the existence of six extra spatial dimensions that are curled in tiny geometric shapes at every single point in our universe. Called string theory, it is widely considered the most promising “theory of everything” to explain the framework of the cosmos, although the nature of these elusive extra dimensions has not been experimentally tested.

Why not? Physics professor **Gary Shiu** says that the many-dimensional shapes are far too small to see or measure through any usual means. Instead, he and graduate student **Bret Underwood** turned to the sky. In a recent study, they demonstrated that the shapes of the hidden dimensions may be “seen” by

deciphering their influence on cosmic energy released by the violent birth of the universe 13 billion years ago.

Don’t worry if you can’t picture ten dimensions. Our minds are accustomed to four and lack a frame of reference for the others, Shiu says, though computers allow scientists to predict what six-dimensional geometries could look like.

According to string theory mathematics, the extra dimensions could adopt any of tens of thousands of possible geometric shapes, each shape theoretically corresponding to its own universe with its own set of physical laws. To get at which shape corresponds to our universe, Shiu and Underwood devised an approach based on the idea that the six tiny dimensions had their strongest influence on the universe when the universe itself was a tiny speck of highly compressed matter and energy — that is, in the instant just after the big bang.

“Our idea was to go back in time and see what happened

back then,” says Shiu.

Lacking the requisite time machine, they use the next-best thing: a map of cosmic energy released from the big bang. The energy has persisted virtually unchanged for the past 13 billion years, making the energy map basically “a snapshot of the baby universe,” Shiu says.

Just as a shadow can give an idea of the shape of an object, the pattern of cosmic energy in the sky can give an indication of the shape of the other six dimensions present, Shiu explains. Initial results show that specific patterns of cosmic energy hold clues to the shapes of hidden dimensions. Researchers hope that by using more sensitive instruments to capture even more detailed cosmic maps, they can narrow down the possibilities — and inch closer to identifying the geometry that fits our universe.

“This provides a rare opportunity in which string theory can be tested,” says Shiu.

— Jill Sakai PhD’06

STUDENT WATCH: Hot Spots

These days about 80 percent of campus buildings have wireless computer access, providing both a wealth of resources and an omnipresent distraction in lecture halls and classrooms.

The most common concern among instructors using wireless technology is that “you’re up there talking, and students are checking their fantasy baseball league,” says **Jake Blanchard**, a professor of nuclear engineering and engineering physics whose students use computers during class.

The university’s Division of Information Technology offers tips on etiquette for students who want to access wireless during class — including turning the volume down on laptops — and recommends that professors lay down ground rules, such as prohibiting use during exams.

“You don’t know what people are sharing with each other through instant messaging and that kind of stuff,” says **Michael Pitterle ’78, MS’83**, associate professor of information technology at the School of Pharmacy.

Yet, says Norwegian instructor **Peggy Hager MA’84**, wireless technology has “enhanced my teaching incredibly,” allowing her to show news reports or video clips from Norway via YouTube.com.

Some professors wish they could turn off wireless access, but others say that’s not practical, pointing out that students could still use cell phones to surf the Web.

“My feeling is if they’re inclined to do that, then I’m just not keeping them busy enough during class,” Blanchard says.

— Jenny Price ’96

At the Crossroads

Researchers-to-be gain new problem-solving skills.

David Beebe '87, MS'90, PhD'94 has come a long way. Today, he is a pioneer in micro-technology research, but like all scientists, the professor of biomedical engineering began at the bottom of the heap. And while Beebe's road to the top was paved with hard work and years of schooling, laboratory training grants played a profound role in shaping his future career.

These grants have a rich legacy at UW-Madison, helping to educate new generations of scientists to be fluent in the technical wizardry and interdisciplinary problem-solving skills needed in modern laboratories. Some thirty training grants, most funded by the National Institutes of Health, are available to UW-Madison graduate and postgraduate students, says **Petra Schroeder '87, MA'91**, assistant dean of the Graduate School. Currently about three hundred students are participating in training programs.

The grants focus on a number of areas, such as social work programs that examine how families cope with mental disorders, or bioinformatics, which tackles data-heavy biological and medical programs with approaches rooted in computer science. A third, the Biotechnology Training Program (BTP), teaches students to do research at the juncture of the biological and physical sciences.

Beebe is living proof of the BTP's value. As a graduate student eleven years ago, he participated in a poster session at the annual BTP banquet. A scientist from ABS, a De Forest-based company specializing in bovine science and technology, approached Beebe's display. After reading about his unique work on microtechnology, the representative asked if Beebe could help ABS create



AARON WAVES

David Beebe, right, received his degrees in electrical engineering, but his work requires extensive knowledge of biology, as well. Grants from the university's Biotechnology Training Program helped him learn to do research that crosses the borders between the physical and biological sciences. Here, he talks with Michael Toepke, another training grant recipient.

new techniques for labeling cow embryos — “to make sure Farmer Jones gets back to the right egg,” says Beebe.

Although the offer captured his interest, Beebe explained that first he had to focus on his PhD. But after completing BTP and graduating from the UW, Beebe remembered the conversation and called the company's rep. “Do you still want to label embryos?” Beebe asked her.

She did. Beebe got his first training grant from the USDA to research the cow embryo labeling. The work kick-started projects that culminated in the formation of Beebe's start-up company, which creates tech-

nology to manipulate livestock embryos and aid in human in-vitro fertilization. Today, Beebe is a leader in the understanding and development of miniaturized systems for use in medicine and biology.

“The exciting areas of sciences are at the interface of different fields,” says Beebe, noting that BTP gives budding scientists the wherewithal to develop interdisciplinary solutions for the biggest scientific questions. “BTP is exposing students to the depths and variety of problems in opposing disciplines, so in the next step of their careers they can draw upon that.”

— Adam Dylewski '07

In an effort to increase security, the university has converted **campus ID numbers** so that they're no longer based on Social Security numbers. Alumni will need this new number to view their student records or order transcripts online. To find your new campus ID number, contact the Office of the Registrar at (608) 262-0920. You may order transcripts at myinfo.wisc.edu.

Journalism professor Jim Baughman chronicles the early history of network television in his new book, **Same Time, Same Station**, published by Johns Hopkins University Press. Following the medium from 1948 to 1961, Baughman shows how television pioneers laid the groundwork for the way TV shows are produced and watched today.

In a coalition with other Midwestern universities, the UW has launched a new research network that doubles Internet access. Created along with the Universities of Iowa and Minnesota as well as Iowa State University, the **Broadband Optical Research, Education and Sciences Network (BOREAS-Net)** gives the university a download speed that's 20,000 times faster than consumer broadband, and a million times the capacity of typical American homes.

The Law School and the Division of International Studies have launched a new joint initiative, the **Center for Global Legal Studies**. The center will promote socio-legal research on issues of international and comparative law.

Campus has a new landmark, in the form of a very old building. The **Dairy Barn**, built in 1898, has been named a National Historic Landmark by the National Park Service.

Barn to Lose?

UW hopes to arrest the decline in the number of food-animal vets.

It's becoming easier to spend your life without ever stepping on a farm, and that, says **Nigel Cook**, could be a problem. Cook heads the food-animal production section at the School of Veterinary Medicine. In direct proportion to that lack of experience, Cook and his colleagues are finding it harder to get — and keep — students interested in studying food animals. In the last decade, the percentage of Wisconsin veterinarians who treat farm animals on a daily basis has dropped by a third.



JEFF MILLER

Veterinarian Jay Peters DVM'97 examines a Holstein during a large-animal medical clinic visit. The number of food-animal veterinarians is dropping, a trend that may put a strain on food safety.

Because food-supply veterinarians are responsible for the well-being of farm animals, they play an important role in the nation's health. They monitor the use of pharmaceuticals to keep antibiotic residues out of meat and milk, and they respond when disease outbreak threatens, enabling the country to deal with potential epidemics.

"The recent outbreak of foot-and-mouth disease in the United Kingdom is an example of a profession stretched to its absolute limits in a very small country," says Cook, "and the United States is much larger."

Though food-animal medicine is necessary, it's becoming less attractive as a career. Veterinary training is expensive, and other careers offer a speedier return. For example, the managers of dairy herds can earn similar wages to veterinarians, enabling them to work with farm animals while avoiding the debt load of veterinary school.

Furthermore, those students who are interested in veterinary practice are often pulled in other directions. "Even if students come into the school with a food-animal focus," says Cook, "we may lose them during the course of the four-year program, or after a short time in practice." The first two years

of veterinary school are heavily oriented to small animals. "We've got wonderful food-animal courses in the final year of the program," explains Cook, "but we lose students to other areas of interest before they get to that point. They get distracted and see plenty of other opportunities."

The lifestyle of a food-animal veterinarian may be even more of a problem than cost. Most farm veterinarians work in small practices and often must be on duty nights and weekends. Getting predictable time off from work is difficult.

To alleviate the problem, Cook and his faculty are trying to get food-animal courses added to the first and second years of the curriculum and to improve mentoring for interested students. And the university's student-run production-medicine club is holding weekend events for high school students and agriculture teachers.

"It's the path I chose, and I think it's a pretty important job," says Cook. "We make sure that the general public has a safe and affordable food source. We're advocates for the cow every day we're out there, and we make sure they're treated and cared for adequately."

— Candice Gaukel Andrews '77

Problem Solved

Two mathematicians at the UW recently solved a legendary number puzzle that has baffled researchers for eighty-seven years.

Professor **Ken Ono** worked with visiting assistant professor **Kathrin Bringman** to prove the final theory of Indian mathematician Srinivasa Ramanujan. Together, they shed light on the long-standing mystery of mock theta functions, a formerly inscrutable series of infinite numbers.

Three months before his death in 1920, Ramanujan wrote a letter to his friend and mentor, G.H. Hardy, describing a series of "very interesting functions which I call 'Mock' theta functions." He gave several examples, but his explanation of the functions was obscure, even to the best mathematicians of the day. Mathematicians have struggled to unlock the code of mock theta functions ever since.

When Ono and Bringman found a connection between mock theta functions and another mathematical theory that was only recently developed, the power of Ramanujan's puzzle was revealed. The UW team has developed a definition of mock theta functions and a method for deriving them, which may help solve other problems in mathematics, chemistry, and physics.

— Erin Hueffner '00



AARON MAVES

If a Tree Falls ...

A late spring snowstorm nearly destroyed a hundred-year-old tree in the campus's Allen Centennial Gardens. The tree, known as the Goff Larch, had been transported there from Door County, Wisconsin, by horticulture professor Emmett Goff in 1899. A heavy April snow snapped limbs off the tree, and university officials at first assumed it was a total loss. But Dennis Stimart, the current chair of the horticulture department and director of the gardens, says the damage isn't fatal. The broken branches have been turned over to research associate Bjorn Karlsson, who salvages historic trees to turn them into custom furniture.

Stiff Stuff

Everyone knows diamond is the hardest material around. But it's also the stiffest, meaning that its rigid structure resists bending and stretching. Although such structures as airplanes, buildings, and even golf clubs benefit from stiff material, diamond is simply too expensive to use in these applications.

Now UW researchers may have found a way to trump the gemstone. Using a unique combination of barium titanate and tin, they have made the first known material that's stiffer than a diamond.

Diamonds get their stiffness and stability from their dense, extremely tight atomic bonds. The researchers' new composite, however, is created with ordinary materials held together in an extraordinary way, according to **Roderic Lakes**, a professor of engineering physics. "We're using a material now that's chosen for having the ability to change volume during phase transformation,"

he says. "The material we chose — barium titanate — goes from one solid to another solid."

Barium titanate is an oxide of barium and titanium that forms in four different crystalline structures at different temperatures. But embed bits of it in a tin matrix, and the shift from one crystal formation to another is held back, creating stored energy. As a result, the composite is stiffer than either of the constituent materials — ten times as stiff as diamond.

Potential commercial uses are still far down the road, however, chiefly because the new composite exhibits its stiffness only at certain temperatures. "The temperature at which this material works is like a hot day in Libya," Lakes says. "So it's like 65 degrees Celsius, and a hot day in New York is 40 Celsius. It's a higher temperature than is convenient. We think we can tune that, but that's in the future."

— Staff

A Wisconsin **autism study** has found that five out of every 1,000 children born in the state since 1994 display symptoms of autism. The Wisconsin Surveillance of Autism and Other Developmental Disabilities System is part of a national study overseen by the Centers for Disease Control, which has found that the incidence of autism has increased dramatically during the last fifteen years. UW-Madison's Waisman Center for the Study of Human Development surveyed 35,126 children for the study.

In February, a team of UW accounting students won the national **xTax Campus Competition** in Washington, D.C. The team's winning effort was a presentation that offered a fictional island country ideas on how to change its tax policies. The victory earned the students \$15,000 and the Alexander Hamilton Award.

History professor **Ned Blackhawk**'s new book, *Violence of the Land: Indians and Empires of the Early American West*, has won him the prestigious Frederick Jackson Turner Award from the Organization of American Historians. The book chronicles the role of violence in shaping the development of the United States. The award, which was named for a famed UW historian, carries a \$1,000 prize.

The UW's Center for Real Estate has been renamed in honor of the late Professor **James A. Graaskamp**, a legendary figure in the field of real estate education. The center was founded in 1971, but it didn't come into its own until Graaskamp joined the faculty in 1974. He redesigned the curriculum, turning the program into a model for business schools around the country.