

The background of the cover is a grayscale photograph of a complex mechanical assembly, possibly a turbine or engine component, with various bolts and circular openings. In the top left corner, there is a green circular graphic with concentric lines.

# UNT<sup>®</sup>

# RESEARCH

A green light to greatness.<sup>®</sup>

2014

# CAN WE ENGINEER A BETTER FUTURE?

PLANT DISCOVERIES **PAGE 17**  
DIGITAL CURATION **PAGE 20**  
ART MEETS SCIENCE **PAGE 36**

SCIENCE, SCHOLARSHIP & THE ARTS AT THE  
UNIVERSITY OF NORTH TEXAS  
A Student-Focused Public Research University

[unt.edu/untresearch](http://unt.edu/untresearch)



Members of the UNT chapter of the Society for Automotive Engineers and Mean Green Racing built a Formula SAE series race car from the ground up, including making their own tools and reworking instruments. The students entered their first competition last summer and are hard at work at UNT's Discovery Park on their new car for 2014. See page 26 for other innovative work engineered at UNT.

## staff box

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Phil Foster

# RESEARCH

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NEAL SMATRESK IS THE 16TH PRESIDENT IN THE 124-YEAR HISTORY OF THE UNIVERSITY OF NORTH TEXAS. HE JOINED THE UNIVERSITY IN FEBRUARY 2014.

I'm proud to serve as UNT president as we build our strength as a nationally prominent research university.

As one of Texas' emerging research universities, UNT has a strong foundation with a broad base of research and scholarship across many disciplines. We also have growing strengths in important areas like engineering and the sciences.

We're classified by the Carnegie Foundation for the Advancement of Teaching as a research university with high research activity, or RU/H, which is one level away from top tier. Being at either level is a mark of excellence, but the top tier research universities are considered among the best in quality, output and impact.

My priority in the first months of my tenure has been to focus on creating a strong research master plan that lays out the resources and infrastructure we need to attain our goals.

In order for us to emerge as a nationally prominent research institution, we must advance our research and economic development activity. We must continue to develop our emerging strengths and establish more public and private partnerships, particularly with industry.

By doing this, we will create a more diversified, knowledge-based economy and workforce — which serves our community and builds prosperity for the future.

Most importantly, we will ensure that our students get a first-rate education and good jobs because a great research institution is invariably a great educational institution. Having innovative research programs that are well funded with grants means students are working in labs, interacting with top-notch scholars and accessing cutting-edge information — all of which makes them globally competitive.

Students at UNT benefit from being at an institution with growing research activities because they learn in an environment that is rich in opportunities. This allows them to pursue the best careers and achieve great success.

I look forward to working together to build our university and become the first-choice institution in the region and state.

UNT proud,

NEAL SMATRESK

President

[president@unt.edu](mailto:president@unt.edu)

## web links and info

### FOR MORE INFORMATION

For more information about the projects and researchers featured in *UNT Research*, visit us online at [unt.edu/untresearch](http://unt.edu/untresearch), email [untresearch@unt.edu](mailto:untresearch@unt.edu) or contact:

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### BIOENERGY CENTER

UNT has become a partner of the U.S. Department of Energy's BioEnergy Science Center, now an 18-partner consortium consisting of more than 300 members studying ways to generate biofuels.

Richard Dixon, Distinguished Research Professor of biological sciences, is working with the center on a project investigating how to develop liquid biofuels from genetically engineered switchgrass (see page 17). Postdoctoral researchers Luis Escamilla-Treviño and Xiaolan Rao work with Dixon on the project.

The center is one of three established by the Department of Energy's Office of Science in 2007. The centers support multidisciplinary, multi-institutional teams pursuing the fundamental scientific breakthroughs needed to make production of cellulosic biofuels, or biofuels from nonfood plant fiber, cost-effective on a national scale.

### NEW MATERIALS

New materials for applications ranging from night-vision devices and camouflage technologies to ultra-high-efficiency solar cells are

being investigated by a research group awarded \$8.5 million by the U.S. Department of Defense.

Marco Buongiorno Nardelli, professor of physics and chemistry and a fellow of the American Physical Society and the Institute of Physics, is one of the primary investigators for the five-year project, which also involves researchers from Duke University, Brigham Young University, Central Michigan University and the University of Maryland at College Park.

"The current materials, which are characterized by simultaneously being transparent and electrically conductive, contain indium as a critical element," Buongiorno Nardelli says. "But indium is scarce and there is a great urgency to find replacement

materials that are cheaper and abundant."

The project is supported through the Office of Naval Research Multidisciplinary University Research Initiative.

### PLANT STRESS DEFENSE

How a plant identifies stress factors, such as heat, disease or toxins, and then spreads the signal to defend itself against those incoming stressors was the subject of a research study led by Ron Mittler, professor of biological sciences.

It's the first research to outline the importance of reactive oxygen species for signal production in plants. The oxygen-containing molecules propagate the stress signal throughout the plant tissue.

Mittler also found that triggering a stress signal in a plant gave it time to prepare for worse conditions. For

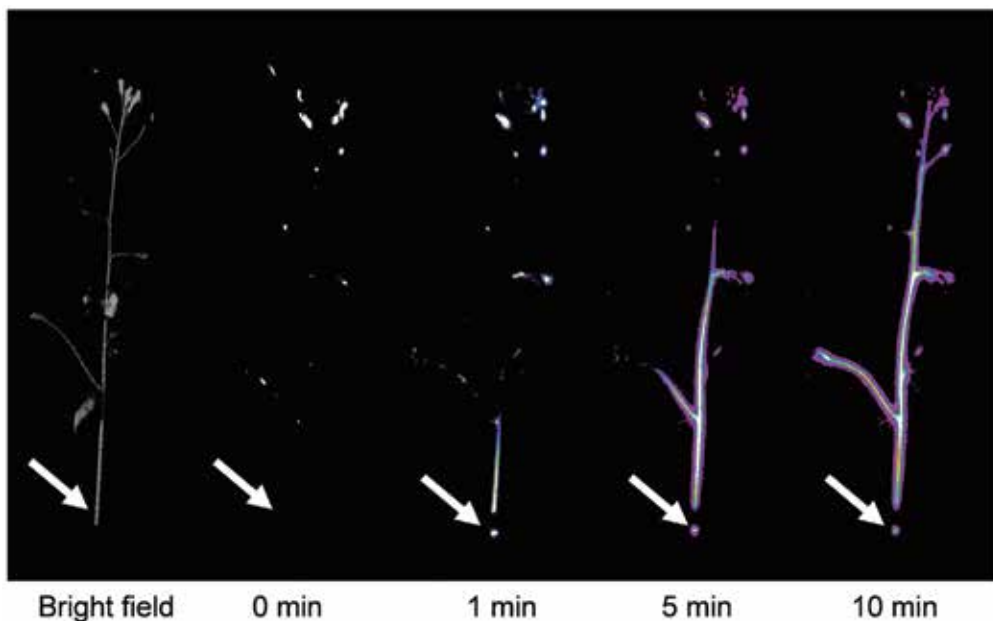
example, a plant blasted with a small amount of heat as a trigger to signal its defenses was able to survive longer heat exposure later.

Plants exposed to long periods of heat with no time to prepare did not survive.

"Now that we know we can trigger plants to prepare for situations like drought, intense heat or disease, we are one step closer to being able to save many crops that would otherwise die," Mittler says.

The research was published in *The Plant Cell* of the American Society of Plant Biologists in September 2013.

Mittler worked on the project with Vladimir Shulaev, UNT professor of biological sciences, and researchers from Bar-Ilan University in Israel.



A scan shows a plant signaling distress over a 10-minute period. Ron Mittler, professor of biological sciences, studies signaling in plants.



Lisa N. Owen, associate professor of art history, does fieldwork at the site of Badami in Karnataka, India. She earned a Fulbright award to study medieval rock-cut temples for her second book.

### FULBRIGHT AWARDS

Several UNT researchers received Fulbright grants in 2013-14. Gabriel Carranza, assistant vice provost for global engagement and adjunct research professor of biological sciences, was selected for a Fulbright Specialist Project at the State University of Ponta Grossa in Brazil, working to build a university-alumni relationship program.

Marc Cutright, associate professor of higher education and director of UNT's Higher Education Development Initiative, traveled to Uganda as a Fulbright Scholar. At Uganda Martyrs University, he taught graduate students and further developed a "work college" concept, in which all students work part-time on keeping the college running, thus reducing costs and permitting more accessible tuition. He

also worked on a project addressing the Ph.D. shortage in sub-Saharan Africa.

Tomas Mantecon, associate professor of finance, is teaching in Linz, Austria, as a visiting professor of finance and plans to research the banking crisis in Austria and around the world. His research interests include corporate finance with an emphasis on corporate control, initial public offerings and joint ventures.

James Meernik, professor of political science, received a Fulbright Specialist Grant to work with colleagues at Soochow University in Taipei, Taiwan. During his appointment, he lectured on foreign policy, transitional justice and U.S.-Mexico relations, and designed a peace studies and human rights course.

Lisa N. Owen, associate professor of art history,

received a Fulbright-Nehru Research Award to conduct fieldwork on medieval rock-cut temples in India for her second book, *Rocks, Caves and Divinity: Creating Places of Worship in Medieval Southern India*. The book examines medieval temples carved into natural rock, which are typically excluded from larger studies of India's temple architecture.

Christine Balarezo, a political science doctoral student who graduated in December 2013, was awarded a Fulbright Post-doctoral Research Grant to the University of Haifa to research the anti-human-trafficking policies and strategies of the Israeli government. She specializes in comparative politics and international relations, with a focus on human rights.

### RESEARCH NIGHT

Visitors to the new Perot Museum of Nature and Science in Dallas learned about the innovative research of UNT faculty members and graduate students at the museum's adults only Social Science night.

Among the exhibits were "Relating DNA to Individual Vulnerability to Disease," led by Qunfeng Dong, assistant professor of biological sciences and computer science and engineering; "Does Whom You Marry Matter for Your Health?" by John Ruiz, assistant professor of psychology; and "Relating People to Their Government," exhibits led by Jesse Hamner, manager of UNT's Research and Visualization Environment, examining patterns of repression, violence and protest.

"Multi-Agent Collaborative Exploration With Robots" was led by Kamesh Namuduri, associate professor of electrical engineering. Autonomous robots programmed by his students moved through the crowd.

### PROFESSIONAL LEADERS

The College of Business is celebrating 20 years of its Professional Leadership





Program, which helps students gain the polish and expertise they need to succeed in the work world.

Students review skills such as interpersonal communication, emotional intelligence and resume writing, and they work with industry mentors and use business case studies to get real-life experiences.

"In the program, you learn about defining success, the first 90 days on the job and generic finance," says Austin Hatcher, a decision sciences major and PLP student leader who has secured a position with Price Waterhouse Coopers after he graduates. "The real benefits are knowing other people in the program and the mentors, who volunteer to help students reach goals, grow professionally and avoid their mistakes."

### RENOWNED ARTISTS

UNT was the site for the world premiere of *Ahab Symphony*, the first full symphonic work of inter-

nationally renowned composer Jake Heggie, last spring. Commissioned by the College of Music and Institute for the Advancement of the Arts, the work expands on ideas Heggie first explored in his critically acclaimed opera *Moby-Dick*.

The new work was written for the UNT Symphony Orchestra, conducted by David Itkin; the Grand Chorus, directed by Jerry McCoy; and soloist Richard Croft, professor of vocal studies and celebrated tenor who performs with leading opera companies around the world.

The commission was part of Heggie's 2010-11 artist-in-residence award from the Institute for the Advancement of the Arts, which showcases excellence in the visual, per-

World-renowned artists — composer Jake Heggie, left, and faculty tenor Richard Croft — rehearse for the premiere of Heggie's *Ahab Symphony*.

From left, business majors Austin Hatcher, Alexia Ardeleanu, Ferron Young and Angelique Davis serve as student directors of the Professional Leadership Program, which is celebrating its 20th year.

forming and creative literary arts at UNT. The 2013-14 artist-in-residence is sculptor and printmaker Kiki Smith. She is working with art students and UNT's Print Research Institute of North Texas (P.R.I.N.T Press) to produce hand-pulled prints.

### MAYBORN CONFERENCE

The annual Mayborn Literary Nonfiction Conference, hosted by UNT's Frank W. Mayborn Graduate Insti-

tute of Journalism, has grown into one of the nation's pre-eminent gatherings of writers.

The institute marks its 10th conference July 18-20 at the Hilton DFW Lakes Executive Conference Center in Grapevine, with a focus on writing about science, technology, medicine and innovation. George Getschow, former *Wall Street Journal* reporter, editor and bureau chief, is the institute's writer-in-residence and conference director.

Slated for 2014 are keynote speakers David Quammen, contributing writer for *National Geographic*, and Pulitzer Prize-winning authors Lawrence Wright and Sheri Fink. For information, visit [themayborn.com](http://themayborn.com).



Jonathan Reynolds



### TINNITUS TREATMENT

Many veterans suffer from tinnitus and hearing loss as a result of exposure to gunfire, explosions, airplane noise and other harsh sounds related to military service. The UNT Tinnitus and Hyperacusis Clinic provides research, testing, counseling and treatment devices to help vets and others who suffer from this condition. Commonly known as “ringing in the ears,” tinnitus is caused by sensory and nerve damage to the inner ear.

The clinic is among a few audiology clinics in the state that integrate treatment with cutting-edge, research-supported technology, says Ernest Moore, chair of UNT’s Department of Speech and Hearing Sciences. Patients have access to specialized equipment and procedures developed by faculty experts who pinpoint the nature of tinnitus and the frequency range in which the condition occurs.

Lana Ward, supervising audiologist and coordinator of clinical audiology at the

clinic, says tinnitus can be overwhelming and permanent but treatment options such as hearing devices that redirect the brain’s focus to different sounds can “essentially train the brain to live with the condition.”

Making counseling and education essential treatment components along with hearing solutions sets the UNT clinic apart from others that concentrate mainly on hearing solutions only, Ward says.

### ALLIED HEALTH

A unique partnership of UNT, the UNT Health Science Center in Fort Worth and area community colleges is helping to improve diversity in allied health professions, especially in the physical therapy field.

M. Jean Keller, professor of kinesiology, health promotion and recreation and new fellow of the American Academy for Park and Recreation Administration, serves as principal investigator for the Allied Health Pathways program.

Supervising clinical audiologist Lana Ward, left, conducts an audiology test with clinician and audiology doctoral student Suzanne Wright at the UNT Tinnitus and Hyperacusis Clinic.

M. Jean Keller, UNT professor of kinesiology, health promotion and recreation and a newly elected fellow of the American Academy for Park and Recreation Administration, is the principal investigator for the Allied Health Pathways program.

Funded by a \$400,000 grant from the Texas Higher Education Coordinating Board and an \$85,000 matching gift from TruCare Solutions Inc., the AHP program is helping to increase the number of African American and Hispanic males who become licensed physical therapists. That demographic makes up less than 1 percent of the field, and the lack of diversity could lead to health disparities for ethnic minority populations, Keller says.

Through the AHP program, direct transfer agreements accelerate the students’ transition from the two-year colleges to UNT and on to the doctoral physical therapy program at the UNT Health Science Center.

Along the way, students receive academic advising, mentoring, health-related Spanish-language training, and opportunities for professional internships and networking. More than 50 African American and Hispanic males have entered the AHP program since it was created in 2012.

### DIGITAL RETAILING

UNT’s College of Merchandising, Hospitality and Tourism is home to the first interdisciplinary center in the U.S. with a complete focus on digital retailing.

The new Global Digital Retailing Research Center, funded by business leaders who pay for different levels of membership, will provide professionals in retail, hospitality





Guido Verbeck, associate professor of chemistry, left, and doctoral student Charlie Clemons work with the nanomanipulator. Verbeck is creating Denton County's first forensic drug lab.

management, technology and other industries with research and expertise from faculty and industry leaders.

Richard Last, who directs the bachelor's degree program in digital retailing — the first in the nation when it was offered as electronic merchandising in 1998 — is the center's senior director. He founded the *jcp.com* website in 1994 when he was manager of new business development for J.C. Penney Catalog and also is chairman emeritus of the board of *Shop.org*, the world's largest industry association devoted to digital retailing.

### VESPERS OF 1610

Ten UNT College of Music students had a rare opportunity to prepare a new edition of a significant Baroque composition, which was performed in concert last fall by fellow students.

The new edition of Claudio Monteverdi's *Vespers*, or *Vespro della Beata Vergine*, of 1610 was prepared by students of Hendrik Schulze, assistant professor of music history.

Prestigious music publisher Bärenreiter requested that Schulze edit the *Vespers*, 14 movements for soloists, chorus and orchestra considered a master work that defines

17th-century sacred music.

Schulze enlisted the students to begin work on the edition in fall 2011 in a musicology course he created for the project. They transcribed the original source materials into modern notation and corrected inconsistencies as they deemed fit according to their research. The edition was published in April 2013. Proceeds support UNT musicology students' research.

In October 2013, Richard Sparks conducted UNT's Collegium Singers and members of the Baroque Orchestra along with guest artists from top early music ensembles in the premiere of the new edition, both at UNT's Murchison Performing Arts Center and at Cathedral Guadalupe in Dallas.

Visit [unt.edu/untresearch](http://unt.edu/untresearch) for a link to the Denton performance on YouTube.

### FORENSIC DRUG LAB

Guido Verbeck, associate professor of chemistry, has partnered with Denton County to create the county's first forensic drug lab. The lab will be housed on the UNT campus.

As Denton County's population is growing closer to 1 million, the number of drug cases needing forensic testing also has increased. In the past, Denton County drug evidence was sent for testing to a lab in Garland. The Garland lab is one of the busiest crime labs in the area, which meant test results weren't returned as quickly as needed.

"With the high-tech equipment we have in the UNT Crime Lab, we will be able to analyze samples, pull drug evidence from fingerprints, and provide the services the county needs very quickly," Verbeck says.

The lab is working toward accreditation from the American Society of Crime Laboratory Directors/Laboratory Accreditation Board.

Verbeck developed a device that allows investigators to manipulate samples on the nano-scale with mass spectrometry, getting more accurate findings and saving time and money.

His small-scale forensic workstation, funded by a U.S. Department of Defense grant, was deployed to Afghanistan last summer.



Jonathan Reynolds



### HEART OF MEXICO

UNT's Frank W. and Sue Mayborn School of Journalism offered students a summer study abroad trip to Mexico with the goal of providing the challenges they could someday face as foreign correspondents or freelance writers or photojournalists.

After a week of intensive narrative documentary training at the Autonomous University of the State of Mexico's Tenancingo campus, the students traveled in small groups to find interesting citizens to profile.

Jason Yang, who is earning a master's degree in journalism and plans to become a travel writer, found a woodcrafter who had practiced his hobby for 23 years and was teaching it to teens. Yang's group spent nine days talking to and observing the man to tell his story for the Heart of Mexico Literary and Visual Storytelling Project.

"Our stories are a way to give a voice to the voiceless," Yang says.

Master's student Samantha Guzman, a multimedia producer, found the caretaker of a large statue of Jesus that sits on a mountain overlooking Tenancingo and spent almost three weeks observing, photographing and talking to him. She says the Literary and Visual Storytelling Seminar "changed my life."

"I learned that I have the skills to be a working photojournalist, but the trip also put life in a different perspective," she says.

Thorne Anderson, assistant professor of photojournalism who has worked internationally as a freelance photojournalist and covered military conflicts in the Balkans, Afghanistan and Iraq, was the trip's director.

"I wanted the students to become a lot more confident of their abilities to travel to unusual places," he says, "and gain intimate access to stories that teach us about the human condition."

The projects are online at [heartofmexico2013.com](http://heartofmexico2013.com).

"El Salto," the owner of a chair shop in Tenancingo, was one of the subjects students wrote about, photographed and filmed for the Heart of Mexico project directed by Thorne Anderson, assistant professor of photojournalism.

### HEALTH WEBSITE

A website that adapts itself to a viewer's needs is the goal of a community health project led by communication design associate professors Keith Owens and Michael Gibson. Owens and Gibson are research faculty associated with UNT's Design Research Center, where teams of faculty, students and professionals use design to create practical solutions to complex problems.

The center's partners on the website project are the Denton County Health Department, Cook Children's Hospital, the Denton ISD, Denton County MHMR and the Wellness Alliance for Total Children's Health.

The researchers created a prototype for the website, which asks visitors to enter basic information — age, sex, ZIP code and, if applicable, their diagnosis. They also indicate if they are a child, parent or guardian, healthcare professional, or childcare worker such as a teacher or counselor. The site then tailors information to the user.

For example, for a middle school girl with an eating disorder, the site could display

personal stories from others her age about how they overcame the disorder, as well as resources in her ZIP code area. The girl's mother could find healthcare providers nearby and information on her daughter's disorder.

The site isn't meant to diagnose illness, Gibson says, but to be a resource for children and families to find help. The researchers are working to secure additional funding for the project, which they hope to launch this fall.

### AUTISM TRAINING

A \$1.2 million grant from the U.S. Department of Education is funding UNT's Project STArT — Systematic Training for Autism Teachers — which will provide full scholarships and on-the-job coaching to special education teachers seeking master's degrees in special education with a concentration in autism intervention.

About 40 teachers are expected to be trained through the program, housed in the special education area in the Department of Educational Psychology. Scholars commit to serving the field for two years for each year of federal funding received. Smita Mehra, associate professor of special education, is principal investigator of the grant.

The first cohort of scholars started this spring. They will begin the autism sequence in the fall and take one summer course at UNT's Kristin Farmer Autism Center.





Harry Williams, professor of geography, and UNT graduate student Eric Simon, center, dig through sediments with Chulalongkorn University graduate students Sumet Phantu Wongraj, left, and Peerasit Surakietchai, right, to study ancient storms in Thailand.

The Project STAR-T team will measure the progress of the UNT scholars funded through the project, as well as the accomplishments of the students with autism on their individualized plans.

### ANCIENT STORMS

Digging through sediment layers can provide clues to a stormy past. Harry Williams, professor of geography, is studying evidence of ancient typhoons in Thailand to help determine how often they strike. Historical records of the storms only exist for the past 50 to 60 years.

Williams first visited Thailand with funding from UNT's Charn Uswachoke International Development Fund and then received a grant from the National Science Foundation's Catalyzing New International Collaborations

program to begin conducting the research with Montri Choowong, associate professor of geology at Chulalongkorn University, and UNT master's student Eric Simon.

The researchers dug through layers of sediments in tidal marshes south of Bangkok, where a layer of sand would indicate a past typhoon storm surge. Identifying and dating the layers allows them to construct a long-term record of typhoon strikes and determine the average number of years between major strikes.

"The smaller the intervals are between storms, the more

governments need to be prepared with mitigation measures, such as planning evacuation routes and educating the citizens," Williams says. "If past disasters aren't in most people's recent memory, they may not be aware of possible storm surge threats or know how to prepare for them."

Williams also has studied ancient tsunamis in the Pacific Northwest and storm surge deposits in the U.S. left behind by hurricanes.

### BEST IN SHOW

An illustration of the soil nematode *C. elegans* by Lacy

Fenn, assistant director of proposal development and design in UNT's Office of Research and Economic Development, won Best in Show at an exhibit at the 19th International *C. elegans* Meeting in Los Angeles last summer. She originally created the work to help showcase the research of Pamela Padilla, associate professor of biological sciences.

Padilla and doctoral students Mary Ladage and Tasha Garcia presented papers at the conference, where scientists discussed their research on the worm, often studied for gene regulation and function.

Supported by a National Science Foundation CAREER Award, Padilla studies how the worm is able to survive in extremely low oxygen environments. Her work could lead to new treatments for diabetes and other diseases.

Lacy Fenn in UNT's Office of Research and Economic Development won Best in Show at the 19th International *C. elegans* Meeting for her illustration of the often-studied soil nematode.



Lacy Fenn





Amanda Breaz

### SHAKESPEARE SCHOLAR

Andrew B. Harris, professor of theatre, premiered his play *The Lady Revealed* — focusing on British scholar A.L. Rowse and his claim that Emilia Bassano was the “Dark Lady” of Shakespeare’s sonnets — at UNT last spring.

The play also was performed in a workshop production this March in collaboration with Theatre3, one of Dallas’ most prominent theatres.

While researching another play he wrote years ago, Harris came upon Rowse’s work and became intrigued by the scholar and prolific writer who was controversial for his claims about the sonnets.

Harris discovered Bassano’s relatives while researching the play in England through a Research and Creativity Enhancement award from UNT. Those relatives led Harris to Bassano relatives in Texas, who attended the UNT production.

Associate professor of theatre Sally Vahle directed the UNT production, which featured music composed by music student Daniel Sabzghabaei. Students acted in both productions and worked on lighting, sound, costume and set design.

“The fact that the students are originating roles that have never been performed before,” Harris says, “gives them a valuable opportunity to truly start from scratch and place their mark upon the play as it evolves.”

### LIBRARY EDUCATION

The Department of Library and Information Sciences is expanding its online master’s degree program in

Yvonne Chandler, associate professor of library and information sciences, is co-directing a program to educate librarians in the Middle South, funded by the Institute of Museum and Library Services.

Students Annie Armenta and Jake McCready star in *The Lady Revealed*, a play by Andrew B. Harris, professor of theatre, about a scholar who identified the “Dark Lady” of Shakespeare’s sonnets.

library science through the newly funded project “ELMS: Educating Librarians for the Middle South.”

The goal is to educate librarians in the region with skills in digital curation and librarianship, data management, medical information, electronic resources management and other emerging technologies.

The scholarship program also is targeting students in Arkansas and western Tennessee who are from under-represented populations in librarianship or from rural areas.

Students are assigned to UNT librarians for mentoring, via videoconferencing and online communication,

while completing 36 hours of online courses.

A joint project of the UNT Libraries and the University of Arkansas for Medical Sciences Library in Little Rock, the program is co-directed by Yvonne Chandler, associate professor of library and information sciences, and Martin Halbert, dean of the UNT Libraries.

Regents Professor Ana D. Cleveland and Daniella Smith, assistant professor, also are working on the project, which is funded by a grant from the Institute of Museum and Library Services’ Laura Bush 21st Century Librarian Program.

### CARDIOMYOPATHY

UNT researchers have identified new compounds that may lead to drugs to treat forms of hereditary cardiomyopathy, a disease that weakens the heart and can lead to heart failure. The disease is the leading cause of sudden death in young athletes.



Garry Payne

From left, Morton Prager, Robert Milnes, dean of the College of Visual Arts and Design, and alumni artist Howard Sherman visit at the opening of ArtSpace Dallas.

Alysha Joseph and Diana Wang, who were students at UNT's Texas Academy of Mathematics and Science, worked with Douglas Root, associate professor of biological sciences, on the project. TAMS is a two-year residential program that allows talented students to complete their freshman and sophomore years of college while receiving the equivalent of high school diplomas.

Root, who has been researching cardiomyopathy and muscle contractile proteins for some time, says his research suggests that mutations make regions of proteins in the heart unstable.

"The idea occurred to us to see what kinds of compounds would bind to the weakened region, stabilize it and counteract the destabilizing effect of the mutations," he says.

Joseph and Wang found that small positively charged polyamine compounds did stabilize the weakened region.

The researchers presented their work in Washington, D.C., at Posters on the Hill, an annual event hosted by the Council on Undergraduate Research. The project was one of 60 chosen from more than 800 applications for the 2013 event.



Michael Clements

## ARTSPACE DALLAS

The UNT College of Visual Arts and Design's ArtSpace Dallas celebrated its grand opening in February 2014. The gallery showcases works of the college's students and renowned faculty and alumni, as well as exhibitions from UNT's internationally acclaimed Texas Fashion Collection.

Located at 1901 Main St. in downtown Dallas, the gallery connects the UNT and Dallas arts and civic communities while providing a venue to promote acclaimed artists who have worked or studied at the university. It is designed to present experimental, pivotal and breakthrough projects, says Tracee Robertson, director of UNT Galleries.

ArtSpace Dallas complements the four campus galleries and UNT on the Square in Denton, which together feature more than 100 exhibitions a year.

## ARAB FILM FESTIVAL

The Contemporary Arab and Muslim Cultural Studies Institute of UNT presented its first Arab Film Festival — the first and only Arab film festival in Texas — in 2013, and this year's festival is May 2-4 at the Angelika Film Center in Dallas.

Tania Khalaf, assistant professor of film and graduate of UNT's M.F.A. program in documentary film, organized the festival after traveling worldwide with her own films. The inaugural event included award-winning films from Lebanon, Syria, Palestine and other Arab nations, and a panel discussion about the role of media in reinforcing

and breaking down stereotypes of the Arab world.

The festival furthers the mission of CAMCSI, the only academic research institute in the U.S. focusing on the study of contemporary cultural issues of the Arab and Muslim worlds.

Directed by Nada Shabout, associate professor of art history, the institute is designed to foster an appreciation and understanding of Arab and Muslim cultures. With UNT's international studies program, it will offer an undergraduate Arab and Islamic Studies Certificate beginning this fall.



The Arab Film Festival, organized by Tania Khalaf, assistant professor of film, is the first and only Arab film festival in Texas. This year's event is May 2-4 at the Angelika Film Center in Dallas.

SUB-ANTARCTIC MAKES  
IDEAL LAB FOR STUDY  
OF ETHICS AND THE

# Web of Life

BY

adrienne nettles



Silvia Ippolito

The acrimonious relationship between humans and flies has existed for ages. But at the Omora Ethnobotanical Park within Chile's Cape Horn Archipelago, some families of this insect so pesky to humans have developed a special relationship with a peculiar moss, *Tayloria mirabilis*. While most mosses, or bryophytes, disperse their spores by wind or water, this moss emits an odor attractive to flies and relies on them to carry off its sticky spores so its germination process can continue.

For University of North Texas philosophy professor and ecologist Ricardo Rozzi, this love-hate relationship among humans, plants, tiny insects and the environments in which they co-exist has a deeper, philosophical meaning. A native Chilean, he has spent more than a decade

researching environmental ethics and biocultural conservation at the Omora Park, located in the UNESCO Cape Horn Biosphere Reserve at the southern tip of South America. The reserve is one of the world's last pristine wilderness areas.

In January 2015, as a result of Rozzi's collaborative research, the UNT Cape Horn Field Station and the Omora Park will be the site of the International Association of Bryology World Conference, along with a symposium on the art, ethics and ecology of the park's tiny plants and how humans interact with them.

"For so long it has been as if people believe that only economics and science will solve the world's problems," Rozzi says. "If we don't address ethics too, we're not addressing the root of the problem,



At right, [Ricardo Rozzi](#), professor of philosophy and co-director of UNT's Sub-Antarctic Biocultural Conservation Program, teaches "Tracing Darwin's Path" at the Omora Ethnobotanical Park in Chile with co-director [James Kennedy](#), professor of biological sciences (right foreground). At left, one of the many varieties of lichens and mosses that grow in the park.

which has to do with how we live and how we co-inhabit the planet with plants and the many other forms of life."

### CAPE HORN COLLABORATIONS

Rozzi's research and collaborations in the Omora Park and Cape Horn have helped to make UNT a leading institution for environmental ethics and research.

He works with faculty in UNT's Sub-Antarctic Ecosystems and Biocultural Conservation research cluster and Center for Environmental Philosophy, combining cultural and philosophical perspectives with scientific research in areas such as global ecological change, environmental policy and sustainable development.

"Before UNT, no one in the world was incorporating environmental ethics into conservation with a biocultural ethics approach," Rozzi says. "One of our first achievements was establishing a network of researchers specializing in Latin American environmental ethics. Now we have researchers from Mexico, Brazil, Costa Rica, Colombia and Argentina as well as North America engaging in this very important discussion along with UNT."

Rozzi is largely responsible for creating the Omora Ethnobotanical Park as a biocultural research, scientific tourism and education site for studying animal and plant life in the biosphere reserve. As part of a joint publishing venture between the UNT Press and the University of Magallanes Press in Chile, he co-wrote a bilingual guidebook, *Miniature Forests of Cape Horn: Ecotourism With a Hand Lens*.

The book is designed to help tourists, students and researchers take a closer look at the many species of epiphytic plants, liverworts, mosses and lichens that make up the park's "miniature forests," as well as



other tiny organisms that call it home.

"Little plants such as mosses and small organisms like insects are regularly under-perceived and under-valued," says Rozzi.

Mosses have their part to play in the ecosystem, for example, helping to soak up run-off water and keeping humidity levels constant. Through cross-cultural education and dialogue, Rozzi says, humans can begin to appreciate the diversity and the beauty in tiny organisms and plant life not typically visible to the naked eye, and the importance of conserving them.

### EXPANDING NORTH

Rozzi also is a leading researcher in UNT's Sub-Antarctic Biocultural Conservation Program, which he co-directs with philosophy professor Eugene Hargrove and biology professors James Kennedy and Jaime Jiménez.

As part of the program, Rozzi teaches coursework at the University of Magallanes and co-teaches with Jiménez and Kennedy the UNT "Tracing Darwin's Path" study abroad course offered each year in the biosphere reserve. The course gives students hands-on experiences with topics such as nature writing, ethnoecology, and biocultural and sub-Antarctic watershed conservation.

"A biocultural approach makes sense because it includes the diversity of cultures, the diversity of biological forms of life, and how we coexist," Rozzi says. "For example, when our water systems are clean and healthy, humans are healthier, and the cleaner humans are, the cleaner the waters will be."

In spring 2013, UNT and the University of Alaska Fairbanks signed an agreement to extend UNT's "Introduction to Sub-Antarctic Biocultural Conservation" course to Alaska to allow faculty and students to explore and compare sub-Arctic landscapes, cultures, wildlife and conservation practices with those in the sub-Antarctic ecoregion of Chile.

"Thanks to these past and ongoing initiatives, we have been making an impact through research and education at the local, regional, national and international scales," Rozzi says.

### STARTING THE DIALOGUE

As an official representative of the International Society of Environmental Ethics and co-director of UNT's Sub-Antarctic Biocultural Conservation Program, Rozzi has brought together leading environmental philosophers to discuss cultural challenges in merging ethics and



Rocio Jara

conservation. These discussions have led to numerous publications and conferences sponsored by UNT and its Center for Environmental Philosophy with Chilean partners at the University of Magallanes and the Institute of Ecology and Biodiversity.

In 2012, a special issue of the journal *Environmental Ethics* focused on South American environmental philosophy. It was a collaboration of Rozzi and the Center for Environmental Philosophy open to researchers and philosophers from five continents — Africa, Asia, South America, Europe and North America.

“The goal of this issue and others that follow is to promote cross-cultural understanding,” says Hargrove, center director and editor of the journal — the first, and one of the most prestigious, in the field.

The issue’s success led UNT and its Chilean partners to host the Fifth Latin American (Inter-American) Environmental Philosophy Conference in 2013, which brought together philosophers and ecologists from South America and North America, along with UNT graduate students and the president of CONICYT in Chile, the equivalent of the

National Science Foundation in the U.S.

That conference and others uncovered the need to conduct research and engage in discussions on environmental ethics worldwide, Rozzi says, in areas such as extinction of biological species, loss of native habitats, increasing global temperatures and global poverty.

## WORLD VIEWS

The environmental philosophers and ecologists converging at Omora’s Navarino Island for the bryology conference in 2015 will share their perspectives on environmental ethics as it relates to their countries and the world, Rozzi says. UNT is hosting the conference with the Chilean Institute of Ecology and Biodiversity and the University of Magallanes.

The “Tracing Darwin’s Path” course and a two-day “Ecotourism With a Hand Lens” workshop will precede the conference, and UNT’s Center for Achievement and Lifelong Learning’s Travel Learn program will offer a trip to visit UNT’s facilities in Cape Horn and see students and researchers in action firsthand.

“It’s important to have these experiences and this world dialogue,” Rozzi says.

A Travel Learn trip to visit UNT’s facilities in Cape Horn will be offered in conjunction with the International Association of Bryology World Conference at the Omora Ethnobotanical Park in 2015. Visit [chile.unt.edu](http://chile.unt.edu) for more information.

“Philosophy in Western civilization has typically had to do with humans and only humans, while philosophies in other ethnic traditions, such as Native American and Asian, incorporate animals and plant life. What we’re doing is bringing these differing philosophies together.”

Cape Horn represents the ideal site to study and discuss environmental ethics because it represents the border or frontier of global development, Rozzi says. The UNT-Cape Horn Field Station is in Puerto Williams, the capital of the Chilean Antarctic Province and the southernmost town in the world.

At the station, UNT students and faculty have the opportunity to conduct field environmental philosophy and study the effects of issues such as loss of languages and biodiversity, damming of rivers, exotic invasive species and global warming.

The solutions they form can transfer to other areas of the world.

“Our work within the biosphere reserve should teach us something about global society,” says Rozzi, who adds that by educating others and continuing the work there, researchers are providing stability in an ecosystem that humans have tended to take for granted.

Rozzi and a group of UNT researchers are working on the new book *Earth Stewardship: Linking Ecology and Ethics in Theory and Practice*, which will be published this year, to further shed light on the importance of biocultural conservation.

“We want to represent the next generation of philosophers and scientists by relying on teamwork and interdisciplinary work that educates the public and contributes to academics,” Rozzi says. “Our research helps explain through real-world applications how humans have a role in the web of life.” ●



DISTINGUISHED  
RESEARCHER FINDS  
*Answers*  
in Plants

BY  
*leslie wimmer*



From potential treatments for Alzheimer's disease to improved forage crops and renewable fuel sources, University of North Texas Distinguished Research Professor Richard Dixon sees plants as opportunities to change the world.

Dixon, who founded the plant biology division at the Samuel Roberts Noble Foundation, is a world-renowned specialist in metabolic engineering of plants. He joined UNT last year as a member of the Signaling Mechanisms in Plants research cluster, a group confronting the challenge of feeding and fueling a growing population in the face of an increasing need for sustainable, bio-based materials.

A member of the U.S. National Academy of Sciences and a fellow of the American Association for the

Advancement of Science, Dixon serves on the editorial boards of five international journals and has been named one of the top 10 most cited authors in plant and animal sciences. He focuses on using metabolic engineering to produce chemicals or alter plants in ways that can improve the health of humans, animals and the planet.

"By altering genes in plants, we are able to experiment with ideas and find potential solutions scientists haven't thought of before," he says.

#### PLANT-BASED BIOPRODUCTS

Dixon and his research group recently made a plant science discovery that will lead to the development of new bioproducts from lignin, a substance that makes plants woody and firm. They discovered





that lignin can be genetically modified in ways previously thought impossible, and they found plants that produce two types of novel lignin naturally.

"These new lignin polymers provide unexpected opportunities to make bio-renewable materials," Dixon says. "Lignin has been viewed in the past as a waste product of bioprocessing. Adding value to lignin in the biorefinery could provide a much needed economic boost to the ligno-cellulosic biofuels industry."

#### CATTLE-FRIENDLY ALFALFA

Dixon first began investigating how alfalfa produces lignin in the late 1980s when he joined the Noble Foundation. In the early '90s, he began identifying the genes in alfalfa involved in making lignin, and over the next few years developed a process of controlling those genes, or slowing down lignin production.

That is important because although alfalfa is the world's top forage crop, its digestibility is still less than optimal.

"A more digestible variety could lead to better animal performance," Dixon says, "and to greater flexibility in the harvesting time, as lignin reduces the quality of the forage and conventional alfalfa hay must be harvested prior to extensive lignification."

Throughout the early 2000s, Dixon began working with Forage Genetics International, the world leader in genetically improved alfalfa. Forage Genetics was interested in Dixon's low-lignin alfalfa for its commercialization potential.

As the collaboration progressed, the company also began supporting Dixon's research group in a project to genetically introduce condensed tannins into alfalfa foliage. These compounds slow the rate of protein digestion in the rumen — the

cow's first stomach — resulting in less danger of cattle bloating and improved nitrogen nutrition, which also equates to more milk or meat production.

"Traditional alfalfa used to feed dairy cows is very rich in protein, and while this seems like it would be an advantage for the animal, in fact, the opposite can be true," Dixon says.

"Rapid degradation and fermentation of protein in the rumen causes bloating, which at worst can be lethal and also can mean that much of the potentially available protein is lost before it can be absorbed."

As Dixon and Forage Genetics continued work on improved alfalfa, the company reached out to plant scientist Tom McCoy at Montana State University to join the team. McCoy became UNT's vice president for research and economic development in 2013.

"The work Richard is doing is enhancing the feed value of a major forage crop," McCoy says. "This will significantly benefit the dairy industry both in the United States and internationally."

Mark McCaslin, CEO of Forage Genetics International, agrees.

"Richard was really able to see an idea, create a research project, and see it through while focusing on its direct impact to the cattle farming market," McCaslin says.

Today, Forage Genetics has developed products that contain Dixon's low-lignin alfalfa and are under review by the U.S. Department of Agriculture. They are expected to be available to growers and producers in the near future.

#### BIOFUELS FROM SWITCHGRASS

In addition to creating animal-friendly alfalfa, Dixon is looking for an alternative fuel source in another plant. Working

with the U.S. Department of Energy's BioEnergy Science Center, he is investigating how to develop liquid biofuels from genetically engineered switchgrass, an ideal plant for creating biofuel because it is high yielding and adaptable for growth in a wide area of the Southeast and Great Plains.

The challenge is that the sugars in switchgrass cell walls are less available for conversion to a liquid biofuel, like ethanol, than the sugars in corn kernels. Dixon's group has been working to modify the chemical composition of the cell walls to make the sugars far more accessible — again through the modification of lignin.

"Moving ethanol away from a corn-based system is important to lessen the strain on the world's food resources," Dixon says

#### GRAPE SEED AND ALZHEIMER'S

Dixon also is part of a research team exploring how grape seed compounds help prevent the development or delay the progression of Alzheimer's disease in mice.

While current research shows that compounds from grape seed extract can slow the progression of the disease, scientists don't know exactly why. Dixon is working with a research team at Mount Sinai School of Medicine in New York that hopes to identify what is happening in the brain in response to the compounds.

Having that information will allow scientists to explain, for the first time, how the compounds are affecting the development of the disease. Interestingly, the chemicals that appear to have protective effects against Alzheimer's disease are related to the tannins in Dixon's alfalfa research that protect ruminant animals from bloat.

"My mother suffered from Alzheimer's disease in her later years, so this work is very important to me," Dixon says. "The idea that we may find an answer to this devastating disease in plants, in a natural resource, is inspiring and is why I love plant science." ●

**Richard Dixon**, Distinguished Research Professor of biological sciences, specializes in metabolic engineering of plants. His work and discoveries are leading to new biorenewable materials, alternative fuels, improved forage crops and medical insights.

# UNT KNOWN FOR MAKING Information Accessible IN THE DIGITAL AGE

BY

nancy kolsti

During a visit to her small East Texas hometown, Cathy Hartman, associate dean for the University of North Texas Libraries, was surprised to learn from a fellow restaurant customer that he had seen the 1924 teaching contract of her aunt, Pearl Vinson. The document, preserved online on UNT's Portal to Texas History, stated that Vinson would teach for seven months at Cross Roads Elementary in Cass County, receiving \$85 per month.

The teaching contract is more than just history for Hartman's family. It's an example of the primary source materials from libraries, museums, archives and private donors that provide portal users with glimpses of past life in Texas.

"Unless you could travel all over the state, you wouldn't be able to see all of these items, especially since some of the smaller libraries' and museums' collections aren't widely publicized. Even if they had the content on their websites, chances are it wouldn't show up in the first 100 pages of a search engine hit list," Hartman says. "But the portal, which has more than 6 million visitors per year, is indexed by Google and all other search engines. Its content is generally at the top of the results page."

Created by the UNT Libraries' Digital Projects Unit in 2002, the portal ([texashistory.unt.edu](http://texashistory.unt.edu)) is one example of how the digital age has changed the way people access information and the way information professionals make it accessible. During the past decade, UNT has received statewide, national and international



## GUIDING THE FIELD

UNT's national and international reputation as a leader in digital curation — including a top 30 ranking among the world's institutional digital repositories — also makes it a leader in guiding the development of the field.

In 2011, the Aligning National Approaches to Digital Preservation conference at the National Library of Estonia in Tallin developed out of a series of conversations among representatives of the UNT Libraries and the U.S. Library of Congress with others. That conference and a second conference in 2013 in Barcelona, Spain, fostered international collaborations in digital preservation.

In the area of research data management — how to preserve research data and make it publicly accessible over the long term — UNT Libraries Dean Martin Halbert leads a team of researchers on the DataRes Project. Funded by the Institute of Museum and Library Services' Laura Bush 21st Century Librarian Program, the researchers are conducting a baseline study investigating universities' data management practices and the role of libraries in the process.

Data management plans detailing how research results will be shared and disseminated are required by funding agencies such as the National Science Foundation and National Institutes of Health. The two-year DataRes Project was cited in a 2013 report from the Council on Library and Information Resources.

From left, [Mark Phillips](#), assistant dean of digital libraries, [Cathy Hartman](#), associate dean of libraries, and [Martin Halbert](#), dean of libraries, help make UNT a leader in digital curation. The library has the capacity to scan 100,000 pages of content a month, indexed to the word level.







Michael Clements

recognition for its digital collections and leadership in digital curation — a term from the museum community, says Martin Halbert, dean of the UNT Libraries.

“Just as museums have objects that are displayed and cared for over the years, and the museums provide information about the objects to visitors, ‘digital curation’ refers to digital objects that are displayed,” Halbert says. “Our library has the capacity to scan 100,000 pages of content per month and index them down to the word level.”

### ONLINE RESOURCES

The portal is the largest of UNT’s digital collections and one of the most used, with more than 500,000 visitors per month. It has received several recognitions, including the 2013 Wayne Williams Library Project of the Year Award from the Texas Library Association. It also has been recognized as one of the best online resources for education in the humanities by the National Endowment for the Humanities.

Mark Phillips, assistant dean for digital libraries, notes that while the portal is “outwardly focused,” the UNT Digital Library contains material from the university. Infor-

mation available includes students’ theses and dissertations dating from the 1930s, scholarly and creative works by faculty members, and the Data Repository, a central archive for long-term access to faculty research datasets.

“Federal funding agencies now require those who receive grants to submit data management plans. With the repository, our faculty can allow the library staff to take care of it,” Phillips says.

The digital library also includes the CyberCemetery, which has archived inactive government websites, including those from past presidential administrations and defunct agencies, since 1997.

The CyberCemetery and the scanned items in the Government Documents collection led to the UNT Libraries being named one of 10 affiliated archives of the National Archives and Records Administration.

The libraries also were ranked among the top 30 institutional digital repositories in the world by the Cybermetrics Lab, a research group of the Spanish National Research Council.

Andrew J. Torget, assistant professor of history, helped develop a better way than simple keyword searches to explore the content of the historical Texas newspapers on UNT’s award-winning Portal to Texas History.

### MAPPING TEXTS

Hartman says digital curation is more than just making material available online. It includes preserving the material over time and creating metadata to provide user-friendly information about the items.

Faculty members conducting research related to digital scholarship and access also are finding the data provided by UNT’s digital collections invaluable.

As both a 19th-century historian and a researcher in digital scholarship, Andrew J. Torget wanted to develop a better way than simple keyword searches to explore the content of the more than one million pages of historical Texas newspapers available on the Portal to Texas History. The newspapers date to 1829.

In 2007, the UNT Libraries began digitizing the newspaper pages after receiving National Endowment for the Humanities funds through the NEH National Digital Newspaper Program. UNT was one of eight U.S. universities and the only Texas university to receive the initial NDNF funding, for its proposal “Lone Star Ink: Exploring Texas Through Historic Newspapers.” UNT has received more than \$2 million from the program to digitize newspapers.

In 2010, Torget, an assistant professor of history, and computer scientist Rada Mihalcea, now at the University of Michigan, began working with faculty members at Stanford University’s Bill Lane Center for the American West to create Mapping Texts — two interfaces for the language content of more than 250,000 pages of the historical newspapers.

Torget says the project “is about solving a big data problem.”

“When you can explore hundreds of millions of words, a basic text search simply



Jiangping Chen, associate professor of library and information sciences, researches multilingual information access. She is using human translations of metadata records to train a machine translation system.

isn't enough," he says, noting that when he searched the newspaper pages for "cotton," he received more than 71,000 results.

The researchers' goal was to develop methods for finding and analyzing meaningful content within the massive collection. The first interface on the Mapping Texts website ([mappingtexts.org](http://mappingtexts.org)) allows users to assess the amount of information available and its digital quality — the number of recognizable words compared to the total number scanned — by geographic area, newspaper and time period. The second interface allows users to assess language patterns, browsing the most common words, names and topics by geographic area, newspaper and time period.

Mapping Texts has been featured in the *Journal of Digital Humanities* and is being used by researchers of digital scholarship, Torget says. He adds that the research team hopes to expand the project to integrate the interfaces directly into the portal and include more newspaper pages.

## MULTILINGUAL ACCESS

While Torget studies better ways to explore digital content, Jiangping Chen, associate professor of library and information sciences, works on a different issue: multilingual information access. During the past four years, Chen has received two National Leadership grants from the Institute of Museum and Library Services.

In the first project, she used digital records from the Portal to Texas History and the UNT catalog to evaluate machine translation technologies, such as Google Translate and Bing Translate, and combined machine translation results to develop the most effective metadata translation strategies. In her latest IMLS research, Chen will use a machine translation sys-

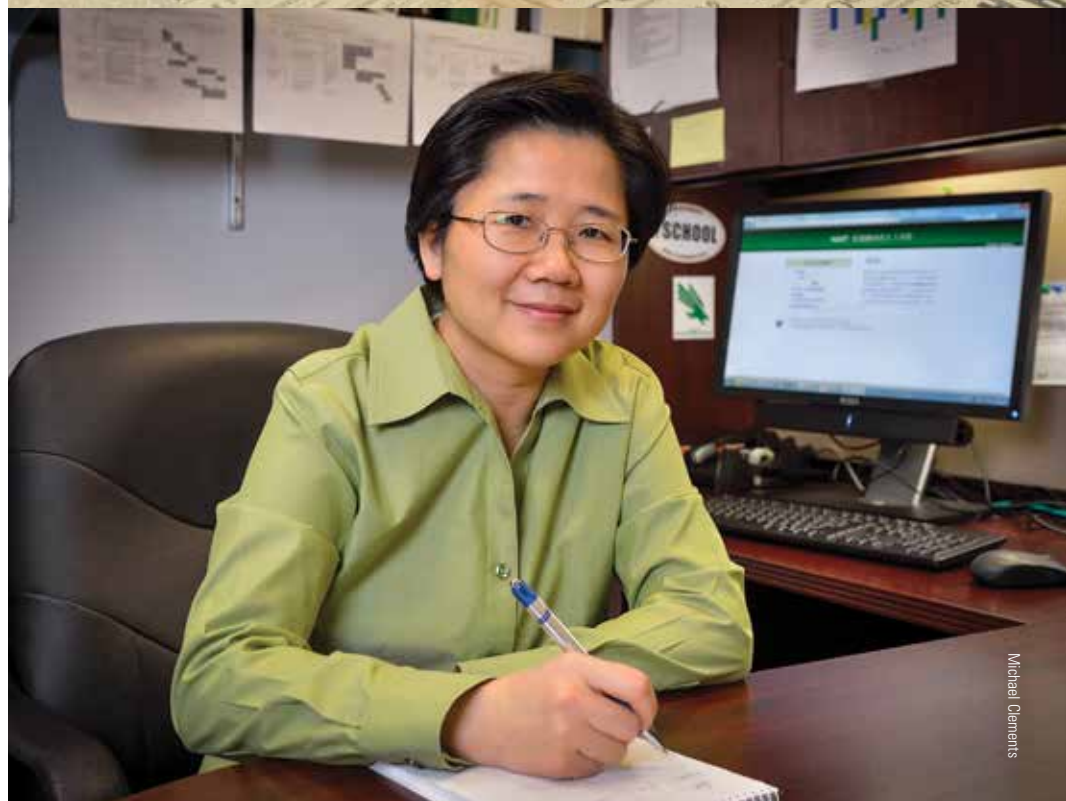
tem developed by her team to translate a collection of digital records from the UNT and Library of Congress catalogs into simplified Chinese and Spanish, the two most widely used languages on the Internet after English.

Chen's team will use translations of metadata records by native speakers of Chinese and Spanish to train the machine translation system. She notes that several U.S. digital libraries have provided multilingual information access to their collections, with all records manually translated.

"We assume that humans can do a better job than a machine translation system, but human translation is costly and slow. It also leads to inconsistency. Of course, machine translation is also not perfect," she says, noting that the word "food" has 10 translations in simplified Chinese.

"A system learned from verified human translations could do a fairly good job and perform translation much faster," she says.

Chen has been collaborating on the project with researchers from Carnegie Mellon University, Wuhan University and Shenzhen Library in China, and the Autonomous University of the State of Mexico.



Michael Clements

## HISTORY FOR ALL

As researchers continue to work on issues of digital access, UNT continues to receive attention for its digital curation initiatives. In 2012, the Oklahoma Historical Society Research Division received funding for UNT's Digital Projects Unit to create the Gateway to Oklahoma History ([gateway.okhistory.org](http://gateway.okhistory.org)). The gateway is similar to the Portal to Texas History and contains more than 600,000 pages.

Hartman says the libraries receive requests for use of the portal's items from researchers in a multitude of fields, and she is particularly proud of the Resources for Educators portion of the portal, which consists of more than 60 lesson plans being used by elementary and secondary school teachers and their students.

The plans incorporate photos, newspaper articles, memoirs, letters and maps from the portal. More than 8,000 teachers visit the site ([education.texashistory.unt.edu](http://education.texashistory.unt.edu)) each month to download the free lessons and find new ideas for their classroom curricula.

"We're bringing history to scholars of all ages," Hartman says. ●



**1 \\ Agbadza: Songs, Drum Language of the Ewes**

(African Music Publishers)

**G. Foli Alorwoye**, *professor of music, with David Locke, professor of musicology at Tufts University*

Alorwoye, regarded as one of Ghana's foremost virtuosos of traditional music and dance, explains the deeper meaning behind the music, lyrics and language of the drums that the Ewes in West Africa have developed for centuries.

The tradition, which began in the 17th and 18th centuries, is still used today in wakes, memorial services and important events. But the cultural significance is being lost as the region moves toward modernization.

Alorwoye discusses Agbadza musical instruments, song structure and drumming style. Accompanying the book is a CD of 25 songs that he transcribed into Western notation with lyrics he translated into English.

At UNT, he is the principal dancer/choreographer and director of the African Percussion Ensemble.

**2 \\ Choir of the Wells**

(Etruscan Press)

**Bruce Bond**, *Regents Professor of English*

Bond, an award-winning poet whose work has been recognized internationally, wrote this tetralogy inspired by his experience with two

long-term nervous system infections. Supported by a faculty fellowship from UNT's Institute for the Advancement of the Arts and a Research and Creativity Enhancement award, he researched the psychological aspects of the mind-body relationship and the power of mental force, and wrote most of the poems during a five-year span.

*Choir of the Wells* is his ninth book, and three others are due out next year: *The Other Sky* (Etruscan Press), poems in collaboration with the painter Aron Wiesenfeld; *For the Lost Cathedral* (LSU Press); and *Immanent Distance: Poetry and the Metaphysics of the Near at Hand* (University of Michigan Press).

**3 \\ Reckoning Day: Race, Place and the Atom Bomb in Postwar America**

(Vanderbilt University Press)

**Jacqueline Foertsch**, *professor of English*

In the first book examining the relationship of African Americans to the atom bomb in postwar America, Foertsch analyzes the response of African Americans to the Cold War in novels, press coverage, films, popular music and the protest work of leaders such as W.E.B. DuBois and Martin Luther King Jr., who argued for nuclear disarmament as well as racial equality.

In her examination of African American characters in white-authored doomsday fiction and nonfiction, she notes that they are often excluded from decision-making, portrayed as indifferent or absent entirely.

The inspiration for the book came from her "Cold War Literature and Culture" class, in which she and her students have explored novels featuring an interracial cast of characters trying to survive the atomic age.

**4 \\ Locke, Science and Politics**

(Cambridge University Press)

**Steven Forde**, *professor of political science*

Forde, whose research interests include ancient to modern political philosophy, offers a new interpretation of the philosophy of John Locke, the founder of modern democracy. He argues that Locke's devotion to modern science influenced his moral and political philosophy more profoundly than has previously been understood.

Forde maintains that natural law based on the common interest by divine command, rather than individual right based on self-interest, is at the foundation of Locke's moral philosophy, and he explores Locke's philosophy of property, politics and education in that new light.

**5 \\ This Corner of Canaan: Essays on Texas in Honor of Randolph B. Campbell**

(UNT Press)

**Richard B. McCaslin**, *professor and chair of the Department of History*; **Donald E. Chipman**, *Professor Emeritus of history*; and **Andrew J. Torget**, *assistant professor of history, editors*

This anthology includes 17 original essays on Texas history written by colleagues and former students of Randolph B. "Mike" Campbell, UNT's Lone Star Professor of Texas History and one of the leading authorities on the subject.

His definitive works have remade how historians understand Texas as a Southern state, and his research in local records has become the model for community studies in the field.

About half of the essays are written by UNT alumni who studied under Campbell. McCaslin, Chipman and Torget contribute work on Texas Reconstruction, José Antonio Pichardo and Stephen F. Austin, respectively.

**6 \\ The American Dream Through the Eyes of Black African Immigrants in Texas**

(University Press of America)

**Ami R. Moore**, *associate professor of sociology*

Moore, who came to the U.S. from Togo in 1992, examines whether black African immigrants in Texas

are achieving not only economic success but also moralistic success, such as being valued and respected.

Study participants reported challenges resulting in a sense of marginalization, but also remained willing to endure the challenges for the benefits of migration.

Moore received a Fulbright U.S. Scholar research grant to study AIDS-related issues in her native country. Her research interests also include earnings differentials and the effects of race, gender and place of birth among immigrants in the United States.

## 7 \\ Shooting Arrows and Slinging Mud: Custer, the Press and the Little Bighorn (University of Oklahoma Press)

**James Mueller**, *professor of journalism*

Mueller researched period newspapers to explore press coverage of George Armstrong Custer's famous Last Stand in 1876 at the Little Bighorn — the battle between federal troops of the 7th Cavalry and Northern Plains Indians that has been mythologized through the years.

Mueller found that many journalists not only were not biased against the Indians, but they blamed the government for starting the war and questioned who was to blame for the loss. He says the newspapers moved on to other news and left the myth-making to popular culture

— such as biographies, paintings, movies, novels and Wild West shows.

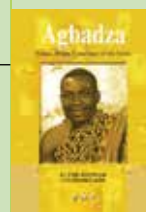
## 8 \\ Systemic Thinking: Building Maps for Worlds of Systems (Wiley)

**John Boardman of John Boardman Associates, and Brian Sauser**, *associate professor of logistics*

The authors explore how systemic thinking — understanding how systems influence one another in a world of systems — can solve problems, whether in computers, the military, business or other fields.

The book explores a graphical technique for understanding new ways to create solutions and includes systemic maps or “systemigrams,” case studies and software developed by the authors. It is a follow-up to Sauser and Boardman's 2008 book, *Systems Thinking: Coping with 21st Century Problems*.

Sauser previously managed an applied research and development laboratory in life sciences and engineering at the NASA Johnson Space Center and was the program director of the New Jersey NASA Specialized Center of Research and Training.



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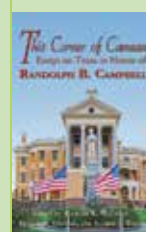
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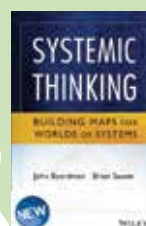
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# Engineering SOLUTIONS AT UNT

BY  
*leslie wimmer*

About 10 years ago, Phil Foster was on Galveston Island watching gas-powered cars drive back and forth along Seawall Boulevard. “I thought how progressive it would be to see gasoline-electric hybrid cars driving there instead,” says Foster, associate professor and coordinator of mechanical engineering technology in the University of North Texas College of Engineering. “Better yet, what if the cars didn’t rely on gasoline to be recharged? Hybrid cars that wouldn’t pollute the air with emissions from burning fossil fuels?”

Soon after, Foster began sketching out design concepts and fabricating parts in the engineering technology machine shop, ultimately creating the first ever liquid-cooled Stirling engine with a segmented rotary displacer. Stirling engines convert heat energy into mechanical power, rather than drawing power from the combustion of fossil fuels or from the power grid, which is itself heavily reliant on fossil fuels. In 2013, Foster was granted a patent for his invention, which is unique among Stirling engines in that it has only three moving parts, including the rotary displacer. This displacer consumes less energy than the reciprocating displacers found in traditional Stirling designs, he says.

“Stirling engines take heat energy from a difference in temperatures and, using a generator, turn that energy into electricity,” Foster says. “They are very efficient and quiet and use environmentally friendly energy sources, many of which are incompatible with internal combustion engines. They may hold the promise of replacing other engines, perhaps even smaller internal combustion engines.”

Research supporting sustainability is one of the hallmarks of UNT’s College of Engineering, which was formed by joining the engineering technology, computer science and materials science programs in 2003. Since its founding, the college has more than doubled its undergraduate and master’s enrollments, more than doubled its research award funding and nearly quadrupled its doctoral enrollments.

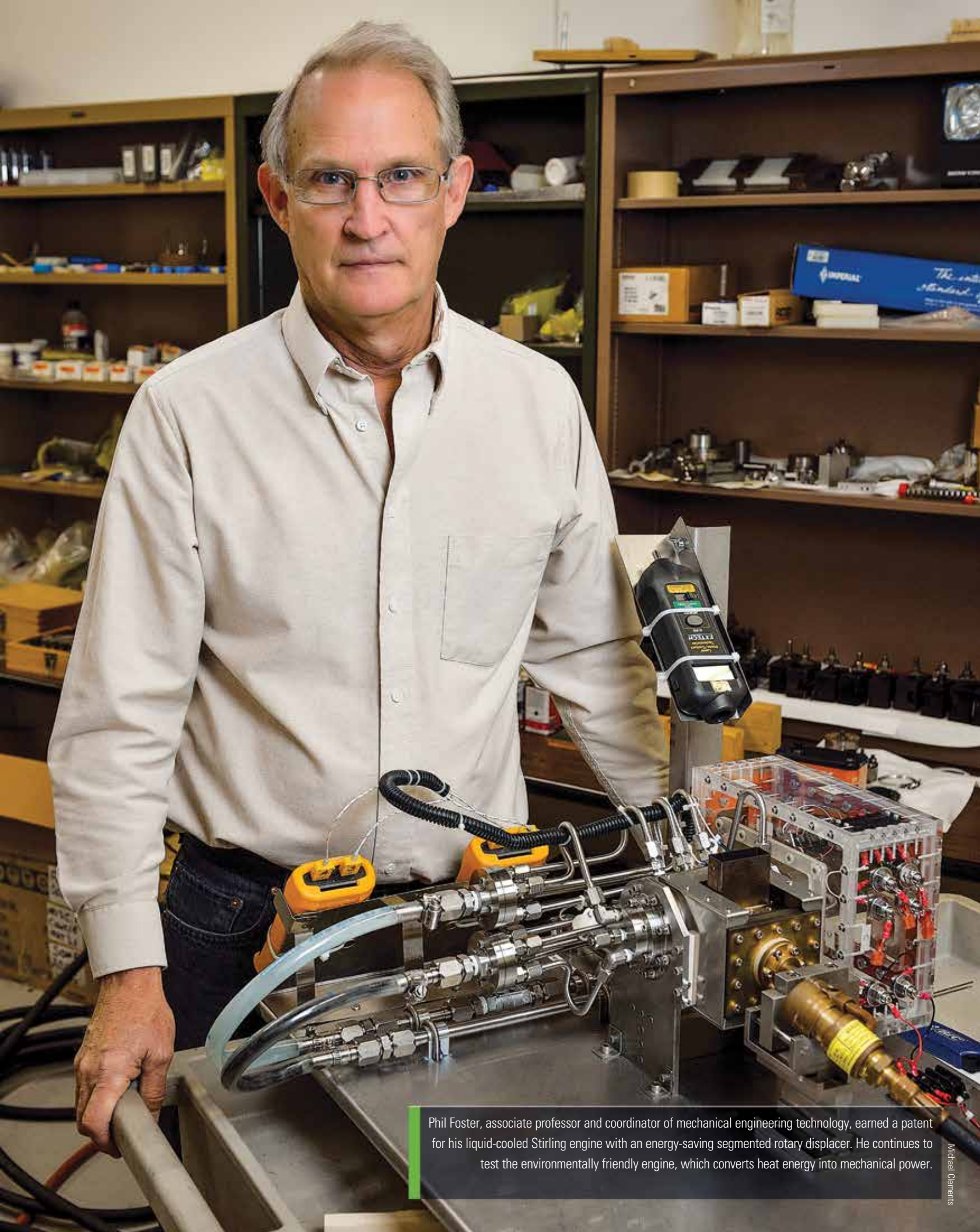
Located at UNT’s Discovery Park campus, a 300-acre research park in north Denton, the college added electrical engineering in 2005, and the combined mechanical and energy engineering program became the first of its kind in the nation in 2006. This year, the college marks the addition of biomedical engineering, the engineering field that is expected to become the fastest growing in the country over the next decade. The program will focus on biomedical instrumentation, mechanics and informatics.

“A great advantage of being a young, modern college is that we have the newest technologies available to researchers,” says Dean Costas Tsatsoulis. “This is great for faculty, but also for students, who graduate ready to use the industry’s most up-to-date equipment.”



For details on other innovative research and a video highlighting the College of Engineering, visit [unt.edu/untresearch](http://unt.edu/untresearch).





Phil Foster, associate professor and coordinator of mechanical engineering technology, earned a patent for his liquid-cooled Stirling engine with an energy-saving segmented rotary displacer. He continues to test the environmentally friendly engine, which converts heat energy into mechanical power.





**Yan Huang**, associate professor of computer science, left, is researching a location-based search function for social media, funded by the U.S. Department of Defense. **Yong Tao**, Distinguished Research Professor, chair of the Department of Mechanical and Energy Engineering and director of the PACCAR Technology Institute, right, directs UNT's Zero Energy Laboratory. He is identifying gaps in sustainability knowledge with a National Science Foundation grant.

Students also have the advantage of working with outstanding faculty researchers, who are developing new technologies and real-world solutions in multiple fields.

### SUSTAINABLE ENERGY TECHNOLOGY

At UNT's Zero Energy Laboratory — the only lab of its kind in Texas — director Yong Tao and his students focus on improving the environment as they work with the latest sustainable energy technologies and monitor how people use energy in their everyday lives. The lab, which opened in 2012, is a testing ground for solar and wind power systems, energy-efficient windows, sustainable building materials and energy monitoring systems.

Over the lab's first year, Tao — a Distinguished Research Professor and chair of the mechanical and energy engineering department who also directs the PACCAR Technology Institute at UNT — worked to understand how humans use energy and what factors affect that use.

The facility contains a working laboratory space and a test living area. Research participants visit the living area and use its kitchen, bathroom and bedroom space the way they would in their own homes. From the laboratory space,

Tao and his students monitor the water and energy use data.

"Having data on how real people use real technology is important because, right now, most builders use simulation software to understand how energy is used in a home," Tao says. "If we understand how humans use energy and use technology, we can design better appliances, materials and power sources in the future."

Tao found that the cultural and geographic backgrounds of building occupants greatly impact their use of energy. For example, compared to China, the United States consumes more than five times the energy per capita.

"We also found that an occupant's behavior is influenced by sociocultural environment, technology innovation, building design and local climate," Tao says.

He received a \$653,000 National Science Foundation grant, part of the NSF's Research Coordination Networks — Science, Engineering and Education for Sustainability program, to identify gaps in sustainability knowledge.

Tao will bring together researchers with backgrounds in engineering, construction, computer science, environmental science, business, architecture

and social science to share data and fill in knowledge gaps.

"Uncertainty in human behavior — or why people use energy the way they do — can affect energy consumption by 40 to 60 percent," Tao says. "We can design energy-efficient buildings and create new technologies, but without a strong understanding of these issues in human behavior, as well as government policy and business, those technologies won't be put to their best use."

### EMERGENCY RESPONSE

In UNT's Center for Computational Epidemiology and Response Analysis, researchers are monitoring technology of a different kind. Simulated disease outbreaks spread across the center's maps and display screens, helping faculty and students better understand how to respond to and plan for emergencies.

Armin Mikler, professor of computer science and director of the center, received an \$800,000 grant from the National Institutes of Health to work with other UNT and UNT Health Science Center researchers on the Response Plan Analyzer, or RE-PLAN. The computer-based system will help emergency planners

identify vulnerable populations — for example, residents who have no access to vehicles during an evacuation or are unable to leave their homes due to health problems — and modify response plans accordingly.

“The Centers for Disease Control and Prevention mandates that all counties prepare for adverse events, and our RE-PLAN system can serve as a very useful interface for identifying problem areas and better preparing for emergencies,” Mikler says.

Mark Fulmer is the preparedness planner for Tarrant County Public Health, which is working with the researchers on the project. He says the system offers a variety of interactive tools to help planners prepare for different scenarios, such as major highways becoming inaccessible and requiring the rerouting of resources.

“Plans are most successful when plenty of data is available for research and testing,” Fulmer says. “The RE-PLAN system’s benefits really boil down to it being a strong source of information we can use to evaluate and test plans, which is essential before any incident actually occurs.”

### SOCIAL MEDIA SEARCHES

Down the hallway, computer science associate professor Yan Huang also is working on new technology that could prove helpful in emergencies — in this instance, through social media.

She is developing a location-based search function that will allow users of social media platforms to search for and find more information than ever before. On many social platforms today,

users search for an event, such as a natural disaster, using keywords — for example “Earthquake in Los Angeles.” The problem with keyword-based searches is that only social media updates and pages with those exact words will be found.

Funded by a U.S. Department of Defense grant, Huang is developing a model for detecting events that incorporates check-in data, text data and hometown location from users’ social profiles. The model will predict user locations using postings and locations referenced in text on social platforms, and will rely heavily on how people connect and interact with each other on social networks. The work will be tested on data publicly available such as Twitter and Gowalla. She is working with Rada Mihalcea, former UNT associate professor now at the University of Michigan.

“A tremendous amount of information is being shared every day on social platforms, including information that is valuable to others, such as events, gatherings or natural disaster occurrences,” Huang says.

“With this algorithm, a user will be able to search for events, and results will include tweets or other social updates that may not explicitly mention a location.”

### MEDICAL INVENTIONS

Across departments, College of Engineering faculty are researching ways to improve health and save lives. Narendra Dahotre, Distinguished Research Professor of materials science and engineering — and newly named fellow of the National Academy of Inventors — has filed a patent on a new laser technology he and his



### UNT COLLEGE OF ENGINEERING

- The 300-acre Discovery Park, home to UNT’s College of Engineering, is the largest research park in the North Texas region.
- UNT has been named by *GamePro* magazine and *The Princeton Review* as one of the top institutions in North America to study computer game design. The Department of Computer Science and Engineering is one of the oldest in the country, celebrating more than 40 years of excellence.
- The college is the headquarters for the Net-Centric Software and Systems Center, a National Science Foundation Industry/University Cooperative Research Center based at UNT, and is home to sites for two other I/UCRCs — the Center for Friction Stir Processing and the Center for Advanced Non-Ferrous Structural Alloys.
- The PACCAR Technology Institute at Discovery Park, funded by a \$1.5 million donation from the PACCAR foundation, supports research related to alternative energy, energy efficiency and industrial processes.
- Outstanding faculty and graduate students publish their research in respected international journals. Since the college’s founding in 2003, faculty members have nearly quadrupled the amount of published research from the college.
- The college is a major contributor to industry in the North Texas region and beyond, graduating more than 2,500 engineers since its founding.
- UNT’s history in technology education dates to the turn of the 20th century when courses in subjects such as joinery and mechanical drawing were first offered. The Department of Engineering Technology evolved from the university’s longtime program in industrial technology and industrial arts.





Jonathan Reynolds

Gayatri Mehta, assistant professor of electrical engineering, is working with a team of researchers to develop an electronic vest for athletes that can monitor EKG data and warn of potential cardiac issues.

research associate at the Indian Institute of Technology-Madras developed for cutting and shaping bone. It causes minimal damage, could speed up surgery and recovery times, and could lessen the amount of blood lost during operations.

“This laser technique is a revolutionary tool, and could replace many of the conventional metal tools that cause so much excess damage during surgery,” says Dahotre, who has researched laser technologies for nearly two and half decades. “The technique we developed allows for precise interaction of the laser beam with the matter it is cutting.”

Dahotre says the technology would be ideal for such procedures as joint replacements, bone grafts, limb salvaging and removal of cancerous segments of bone. He also plans to develop a robotic system that would allow surgeons to operate remotely using computer controls for automation and precision.

Gayatri Mehta, assistant professor of electrical engineering, is working with a team of interdisciplinary researchers from UNT — Hyoungh Soo Kim, Hualiang Zhang and Kamesh Namuduri from electrical engineering; Nandika D’Souza from materials science and mechanical and energy engineering; Tae-Youl Choi from mechanical and energy engineering;

and Jakob Vingren from kinesiology, health promotion and recreation — to develop an electronic vest for athletes that can monitor EKG signals and alert emergency medical service personnel to impending cardiac events.

The group is working with a researcher from the Texas A&M Health Science Center and a physician from the Baylor University Medical Center to develop lightweight conductive fabric with sensors that can detect, amplify and interpret EKG data to determine if an athlete is experiencing cardiac-related abnormalities during sports events.

“This fabric would alert athletes, emergency personnel and others to potential cases of sudden cardiac arrest,” Mehta says. “If we can detect early signs, we are one step closer to preventing casualties.”

## ROBOTS AND HEALTH

Focusing on the area of mental health, Rodney Nielsen, associate professor of computer science and engineering, is developing a companion robot that aims to help senior citizens overcome depression.

Nielsen’s Companionbot, the size of a large stuffed animal, would stay in a person’s home, monitor actions and

language for signs of depression and intervene. The Companionbot focuses on dialogue, generating and answering questions, and monitoring participants for signs of physical, mental or emotional deterioration.

“If a person dropped a glass of water and said, ‘I do this all the time, this is all my fault,’” Nielsen says, “the Companionbot would respond with encouraging information and questions to get the participant to move the focus away from negativity.”

Nielsen’s project is funded by a nearly \$2 million grant from the National Science Foundation. He is working with researchers from the University of Colorado Denver’s Anschutz Medical Campus, the University of Denver and Boulder Language Technologies on the project.

Opportunities for conducting research in the health field will increase as the College of Engineering opens its new Department of Biomedical Engineering. Students will be able to collaborate with faculty at the UNT Health Science Center and learn from experts.

“Our program will be unique in that students will develop a strong base of engineering fundamentals while working with faculty who are well known in industry and academia for their work in the biomedical field,” Tsatsoulis says.

## REAL-WORLD SOLUTIONS

The link to industry is strong in the college, where the emphasis is on research that offers solutions for real-world issues. For example, Haifeng Zhang, assistant professor of engineering technology, is teaming up with industry professionals and Stony Brook University to create a new self-powered temperature and pressure sensor that can operate underground and withstand the stresses of oil and gas drilling.

His research is funded by a Grant Opportunities for Academic Liaison

with Industry (GOALI) grant through the National Science Foundation.

"Developing this new sensor is very exciting," Zhang says. "It will need to withstand the harsh, high-temperature environment of drilling a few hundred meters below the earth's surface. Very few sensors on the market could survive that."

Real-world problems also are the focus for seniors in the college, who are required to take a two-semester capstone course to apply the information and skills they've learned in a group research project.

A design by Adam Marlowe, Bryan Cotanch and James Parker has become the first undergraduate project in UNT history to earn a patent. The three engineering technology students, who graduated in 2009, created a brake system that signals brake lights to turn on when a vehicle slows down, even if the driver hasn't touched the brake pedal.

Cotanch is now an electronics technician with the Federal Aviation Administration, and Marlowe is a systems integration engineer at L3 communications.

"Getting a patent on the design was huge for me," Marlowe says. "It's the No. 1 bullet under 'accomplishments' on my resume."

Foster, who continues work on his patented Stirling engine, teaches machining and senior design courses in the engineering technology department and has helped hundreds of students with their projects since he joined UNT in 1982.

He also has seen firsthand the conception, birth and growth of the College of Engineering. While programs and enrollments have expanded, he says one thing has been constant.

"The entire engineering faculty remains committed to helping students acquire the education and research experiences essential to success when they graduate and enter into engineering careers around the world." ●

## FRICION STIR PROCESSING



A new custom-designed lab houses the UNT site of the Center for Friction Stir Processing.

Rajiv Mishra's Center for Friction Stir Processing came to UNT in 2011. Mishra, professor of materials science and engineering, brought the center to UNT's College of Engineering because of its faculty expertise and connections to industry partners.

The lab is part of a National Science Foundation-funded Industry/University Cooperative Research Center working to improve the performance of alloys through friction stir processing, an emerging technique for joining solid-state metals.

The process is environmentally friendly, energy efficient and versatile, and is of growing interest to corporations and industry partners including Boeing, General Motors, the Army Research Laboratory, Pacific Northwest National Laboratory and more.

In fall 2013, the College of Engineering custom-designed a \$2 million lab space at UNT's Discovery Park campus for the center. The 2,700-square-foot lab features specially designed workspaces for post-

doctoral and graduate students and an equipment layout ideal for friction stir processing research.

"Often, researchers have to adapt or grow into their lab spaces, but we were able to customize this space so it flows ideally for our research needs," Mishra says. "We have high-quality friction stir machinery and materials characterization machines, including a laser welding machine provided by the U.S. Army Research Office."

The lab also features a number of solid-state joining machines, a friction stir spot welding machine provided by General Motors and an ultrasonic spot welding machine. The diverse equipment is a draw for potential industry and research partners.

Mishra works alongside university partners Brigham Young University, University of South Carolina, South Dakota School of Mines and Technology, and Wichita State University to conduct research for industry through the I/UCRC.

Chanjuan Chen

**Chanjuan Chen****Sustainable fashion**

A master's student in fashion design, Chen won two first-place awards for graduate students at the International Textile and Apparel Association's 2013 conference for her dress design, "Origami Meets Eco-Fashion."

She researched sustainable clothing, natural fabric, origami techniques and transformable design — garments that can be worn in several ways — to prepare for the project with the help of Marian O'Rourke-Kaplan, associate professor of design.

Chen's winning design, which received the Cotton Inc. Innovations in Cotton Design Award and the Fashion Supplies Innovation Design Award, was influenced by the origami principle of folding to prevent fabric waste.

Marisha Frazier

She is preparing her final collection of sustainable, transformable clothing for her M.F.A. and plans to pursue a career in academia and further her research in fashion sustainability.

**Marisha Frazier****Ecotoxicology**

Frazier, a senior biology and chemistry student in the Honors College, is a McNair Scholar. The program prepares students who are first generation or underrepresented in graduate education for doctoral education, providing research mentors and individual research opportunities.

As a researcher on the team of James Kennedy, Regents Professor of biological sciences and director of the Elm Fork Education Center and Natural Heritage

Museum, she is studying the health and water quality of the Trinity River through analysis of aquatic insect populations.

She also helps sample and test mosquitoes for West Nile virus in research Kennedy and his students conduct for the city of Denton. Their research results are reported to the state and federal government.

Frazier is interested in entomology and ecotoxicology and hopes to work for the Centers for Disease Control and Prevention.

**Melissa Hatheway****Musician health**

Hatheway, a senior music education major and clarinetist, won the Alice G. Brandfonbrener Young Investigator Award at the Performing Arts Medicine Association's annual symposium

Melissa Hatheway

in 2013 for her research on health issues of marching band musicians. She is the first undergraduate student from the United States and the first non-medical student to win the award.

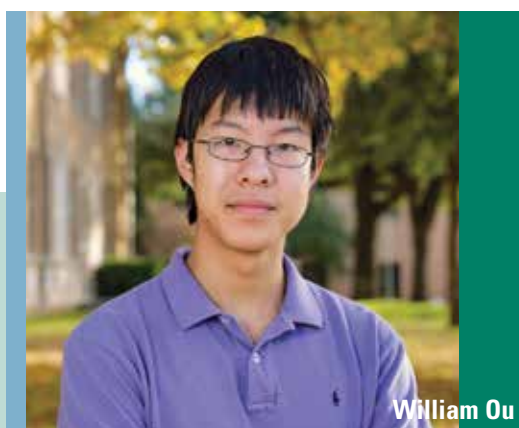
Working with faculty mentor Kris Chesky, director of education and research for UNT's Texas Center for Music and Medicine, she conducted an epidemiological survey of marching band members to investigate the impact of marching band on participants' health and which members are most prone to experience pain.

She found that the music majors in the marching band experience more pain and injuries, due to longer hours of daily music-making, than the non-music majors. Her research was published in the *Medical Problems of Performing Artists* journal.

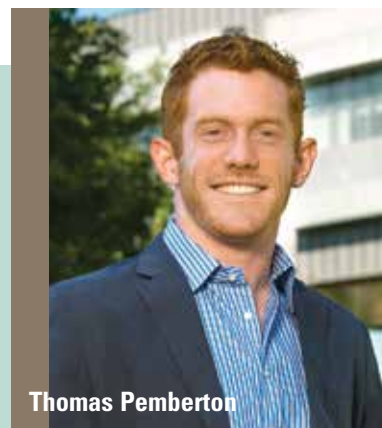




**Katherine Lester**



**William Ou**



**Thomas Pemberton**

Hatheway, an Honors College student, plans to work as a teacher and continue her research in graduate school.

#### **Katherine Lester** Medical geography

Lester, who earned her bachelor's degree in geography in August 2013, is working on her master's degree in applied geography at UNT with the support of a National Science Foundation Graduate Research Fellowship. As an undergraduate, she was selected as a finalist for the Harry S. Truman scholarship.

In her work with Joseph Oppong, professor of geography, she uses geographic information systems to determine areas underserved by mental health services, particularly for the homeless, and recommends solutions.

She is evaluating a proposed scattered supportive housing initiative to house 2,000 chronically homeless people in Houston. The model she is creating for locating new mental health facilities, which also can be applied in Dallas-Fort Worth and other urban areas, would help agencies use available funding for mental healthcare in Texas more efficiently.

Lester hopes to pursue a career in academia and applied policy research.

#### **William Ou** Metal catalysts

Ou, a student in UNT's Texas Academy of Mathematics and Science, was named a regional semifinalist in the 2013 Siemens Competition in Math, Science and Technology, one of the most prestigious

competitions for high school students. TAMS is a two-year residential program at UNT that allows talented students to complete their freshman and sophomore years of college while receiving the equivalent of high school diplomas.

For his Siemens project, Ou investigated metal catalysts that can be used to convert organic compounds into hydrogen gas with Tom Cundari, Regents Professor of chemistry. Discovering more efficient ways to create hydrogen gas would be useful for crude oil processing and other industries.

#### **Thomas Pemberton** Marketing

Pemberton, who earned his bachelor's degree in marketing in December 2013, was named the 2013 Collegiate Marketer of the Year by the

DFW American Marketing Association for implementing a digital marketing strategy for Culinaire International.

The project used emerging technology and social media to increase brand awareness and brand affinity for Belo Mansion, a popular event venue that had not previously earned additional revenue from marketing initiatives.

In addition to taking classes, Pemberton ran his own business, Trending Global LLC, and worked as a full-time project manager at SPYCH, a Dallas-based marketing research and strategy consulting firm.

He credits his mentors in the Department of Marketing and Logistics — Michael Gade, principal lecturer, and Francisco Guzman, associate professor — for helping him succeed.

Heather Quinn

**Heather Quinn****Nonprofit management**

As a student in the UNT Honors College, Quinn earned an applied arts and sciences bachelor's degree in August 2013, with concentrations in nonprofit management, public administration and sociology. Through the UNT service learning program, she was introduced to the creators of Serve Denton, a future multi-tenant nonprofit center in Denton.

For her Honors research, she helped design a central intake system for the organization, providing a process to share client information across multiple agencies. She now works as the center's collaboration director. Her faculty mentor was Brenda McCoy, senior lecturer and chair of community and professional programs.

Quinn's research was featured in the Honors College

Rania Salman

journal, *The Eagle Feather*.

She also was a National Merit Scholar, earned a PEO STAR Scholarship and gave the keynote address at UNT's 2013 Honors Day.

**Rania Salman****Education**

Salman, a doctoral student in teacher education and administration, was awarded a scholarship from Kappa Delta Pi, an international honor society in education, for her dissertation research, "The (Mis)Representation of the Middle East and Its People in Elementary School Social Studies Textbooks: A Postcolonial Analysis."

In a study of elementary and middle school history and geography textbooks, Salman found that when the Middle East was mentioned, themes of oil, conflict and

terrorism dominated the content. Little attention was paid to the culture and history of the region or the intricacies of each country. Simplified information and over-generalizations were common in the presentation of historical events. Her faculty mentor is Karthigeyan Subramaniam, assistant professor of teacher education and administration.

A recruiter and program advisor for UNT's Department of Educational Psychology, Salman earned her master's at UNT in human development and family studies. She plans to finish her doctorate this year and go on to teach at the collegiate level.

**Adriana Solis****Fashion merchandising**

Solis, a senior merchandising major, is the founder and

Adriana Solis

president of Method Seven Enterprises LLC, a 45-member student-run organization that produces *Method Seven Magazine*. Merchandising and digital retailing lecturer Jessica Strubel is the group's advisor.

*Method Seven's* business plan won first place in the 2013 New Venture Creation Contest hosted by the UNT Murphy Center for Entrepreneurship, earning the organization a \$20,000 grant. The biannual online magazine features the latest fashions from local designers, design students and retailers for the 18- to 25-year-old demographic.

Solis coordinates the work of students in merchandising, journalism, communication design, photography, finance, mathematics, marketing and accounting to plan and create each issue, aimed at helping



Josh Urbanovsky



Jenny Wakefield



Helen Xiong

retail clients better understand their customer base.

#### Josh Urbanovsky Entrepreneurship and computer science

Urbanovsky, a senior majoring in computer science and entrepreneurship, was recognized as one of the top business students in the state by the Texas Business Hall of Fame in November, receiving a \$10,000 scholarship.

His faculty mentors include Whitney Peake, assistant professor of management, and Armin Mikler, professor of computer science and engineering and director of the Center for Computational Epidemiology and Response Analysis.

Urbanovsky helped Mikler and a team of graduate students develop the bio-emergency assessment software RE-PLAN (see page 28), and

also built a new version of the center's simulator, demonstrating how a disease or epidemic might spread over time.

He plans to pursue a doctoral degree in computer science at UNT and start his own high-tech company.

#### Jenny Wakefield Learning technologies

Wakefield, a learning technologies doctoral student and a mentor for UNT's accelerated online program, won a fellowship in 2013 from Alpha Chi, a national college honor society.

Her research covers an array of topics in formal learning, such as the use of social media, games, simulations, virtual worlds and transmedia. She has written six book chapters and published two articles, with a third due to be published in

the *International Journal of Social Media and Interactive Learning Environment* about her research on the use of Facebook and Twitter as a teaching tool.

For her dissertation, she is researching the use of alternative reality games and transmedia storytelling in formal higher education learning with Scott Warren, associate professor of learning technologies.

She earned a bachelor's in applied arts and sciences with a major in applied technology and performance improvement, and a master's in computer education and cognitive systems, both from UNT.

#### Helen Xiong Materials engineering

As a TAMS student, Xiong was named a Barry Goldwater Scholar in 2013 for her work with Witold

Brostow, Regents Professor of materials science and engineering and member of the Renewable Bioproducts research cluster at UNT.

The Goldwater program is considered to be among the country's most prestigious scholarships for students planning careers in math, science and engineering.

Xiong's work helped refine the equation for defining polymer brittleness and helped describe the strengthening properties of clay in industrial machinery and the study of friction in materials science.

During her time at UNT, Xiong also was named a regional finalist in the 2011 Siemens Competition for work with carbon nanotubes and organic solar cells. She graduated from TAMS in spring 2013 and is completing her bachelor's degree at Stanford University.



RESEARCHERS PUSH  
THE BOUNDARIES OF THEIR FIELDS  
AS THEY MERGE

# Creativity & Technology

BY

*margarita venegas*



N

early 10 years before he joined the faculty at the University of North Texas College of Music, Panayiotis Kokoras won a competition that earned him a residency at one of the world's most distinguished electroacoustic music studios. The options included programs in France, Switzerland, the U.K. — or Denton, Texas.

One of the first college electronic music centers in the United States, UNT's now-expanded Center for Experimental Music and Intermedia is celebrating its 50th anniversary in 2013-14. It continues to uphold a distinguished reputation in computer music and interactive/intermedia performance.

"CEMI has a great history and has been at the forefront of the international

contemporary and experimental music scene for 50 years now," says Kokoras, a UNT assistant professor of composition since 2012. "It has excellent facilities, amazing colleagues and talented students."

UNT has long been known as an incubator for creativity, and the work at CEMI is just one of the ways faculty and students are exploring new media and pushing the boundaries of their fields as they merge art with science and technology.

## EXPERIMENTAL MUSIC

"Composers have always tried to find new modes of expression," says CEMI director Andrew May of the appeal of using computers and other media to express sounds and music.

At right, Panayiotas Kokoras, assistant professor of composition, demonstrates his work *Sense* at Dallas' Perot Museum of Nature and Science. At left, a detail from the work of graduate printmaking student Jon Vogt serves as a visual response to the complexities of metabolism.

CEMI — which includes faculty in composition and iARTA, UNT's Initiative for Advanced Research in Technology and the Arts — was opened in 1963 as the Electronic Music Center by faculty composer Merrill Ellis. Musicians progressed from using magnetic tape for compositions and analog synthesizers for live performances to incorporating dancers, actors and visual projections. Today, CEMI students and faculty produce interactive computer music, immersive video and sound spatialization, physical computing and more.

In the 1980s, the center received worldwide attention when it hosted the seventh annual International Computer Music Conference. It will again host the ICMC in 2015 and this year will host the International Confederation for Electroacoustic Music Festival and Conference.

For Kokoras, the appeal of the world of electroacoustic music is the ability to capture and manipulate sounds in their finest detail. That's the purpose behind one of his latest works, *Sense*, for which he developed a device that allows humans to "hear" ultrasound and infrasound frequencies through sound vibrations felt in the skin, bones and nerves.

The device includes a plate that funnels ultrasonic sound upward, so that when a listener places a hand above it, the sound — the kind heard and used by dolphins in communication — can be felt on the palm.

Other pieces are attached beneath the chair of the seated listener to relay infrasound — the kind created by earthquakes and volcanoes — in a rumble that can be felt throughout the body. Headphones relay the music in the composition that is within the range of human hearing.

"This is a more holistic way of listening," says Kokoras, who will release the

plans for the device so that other composers may use it.

In other CEMI research, Jon Christopher Nelson, associate dean of operations and professor of composition, is working on a computer program that will make a virtual instrument that can be modified so it can start off producing a string sound and end up producing a percussion sound.

May, who says he was interested at an early age in programming as well as music performance on violin, is working to find a way to make the computer adapt better in live performances. He creates software that lets the computer "listen" to live performances and make musical decisions emulating those of real musicians.

"I feel fortunate to be part of a program that has this level of experimentation," May says.

#### VISUAL PARTICLE CHAMBER

That experimental environment allows composition professor David Stout to incorporate science into his work as he researches the extension of sound through new modes of technology.

"Science and art share many of the same tools," notes Stout, coordinator of iARTA, which brings together faculty

researchers from music, dance, film, art and engineering.

Stout's current projects include the book *The Reemergence of Alchemy at the Intersection of Art, Science and Digital Media* and continued work as a founding member of the collaborative media performance and installation group NoiseFold.

His most direct collaboration of art and science at UNT is *Shadow Box Attractions*, a digital media project that uses software he conceived and created with the help of three programmers to form a virtual particle chamber.

Stout can place positively or negatively charged nodes at various locations within the chamber, which features reconfigurable "force fields." The results are lines or wisps — or sometimes flashes or dots — of black particles that float, fall, rise and tumble around in three white boxes projected onto separate screens.

The sounds associated with the piece range from insect-like buzzes to something resembling shattering glass or static.

"The project shares an 'imaginative corollary' to historic research in contemporary particle physics," Stout says, "while being an artwork that seeks to dramatize the dynamic interplay of elemental forces."







Gary Payne

## DATA VISUALIZATION

UNT faculty also explore art and technology in fields outside of music. Another core iARTA faculty member, Ruth West, is a new associate professor at UNT whose expertise spans the areas of information science, new media, computer science and biological science.

West, who pioneered cross-resonance research over the past 10 years and is outfitting her xREZ ArtScience Laboratory on campus, works with emerging technologies to find new ways to visualize and uncover interconnections within big data.

"In art and in science, human beings look for or make patterns, then they disturb those patterns," West says. "It's the generation of the pattern and the disruption of the pattern that gives us information about the thing underlying it."

Her previous work includes *Atlas in silico*, an installation developed at the University of California at San Diego by an interdisciplinary 19-member team.

It features an interactive virtual environment driven by data from the Global Ocean Sampling expedition, a survey of the diversity of microbes in the oceans. Each particle in the installation's virtual 3-D world represents a data record for a

protein sequence that was sampled. The particles' movements and sounds reveal larger patterns within the data.

"The GOS data collection is basically a snapshot of the micro-organismal biodiversity of the world's oceans. It changed our view of life on Earth," West says.

"So for *Atlas in silico*, we developed this novel visualization of the data, using algorithms to create visual and auditory data signatures as a way to provide the information so that it can be experienced by a broad public and researchers alike."

With UNT colleagues, West collaborated in fall 2013 on an interactive installation and community engagement project at the Perot Museum of Nature and Science in Dallas that employed the rePhoto application she helped develop.

The application allows users to align camera images taken from the same perspective at different times to show progress or change over time. It has been used, for instance, in environmental monitoring of tree health and growth.

For the Perot event, West joined fibers faculty members Lesli Robertson and Amie Adelman, Make Art With Purpose director and artist Janeil Engelstad, and three students to invite

David Stout, professor of composition and coordinator of iARTA, at the computer second from right, performs at CEMI's 50th anniversary concert.

members of the public to collaborate in creating geometric fiber sculptures and to write their responses to the social interaction as the researchers observed the process. The installation was documented with rePhoto as the piece grew and changed.

The idea was for community members to see how they could work together and possibly translate that to social and environmental concerns. The community engagement angle of the project, West says, spurs interaction as well as observation.

"These are two important aspects of scientific research and two of the elements that drive the rePhoto app," she says. "Documentation such as this is vital to research."

## ROBOTS IN ART

Cultural studies of technoscience are a focus for artist Paula Gaetano-Adi, assistant professor of new media at UNT. Funded by a VIDA Art and Artificial Life Awards' Artistic Production Incentives grant, she found herself in a remote village in the Peruvian Amazon last summer, sifting through a 30-pound box of screws for her project *TZ'IJK* — the Mayan word for "mud."

The project, which uses robots to portray the Mayan creation myth, was conceived by Gaetano-Adi and her mentor, Gustavo Crembil, assistant professor of architecture at Rensselaer Polytechnic Institute. Constructing 50-inch balls with a robotic mechanism in the middle, they would surround them with a polycarbonate membrane tied with bendable wood and covered in mud using a pre-colonial South American building technique.

But, when they got to the Peruvian village where they were to learn the technique, they realized that procuring screws for the prototype robot was not as easy as going to the local hardware store. The villagers, who live without many technologi-



cal advances, brought them the box of random screws to sift through.

It was one experience that highlighted that juxtaposition of what Gaetano-Adi portrays in much of her artwork — seeking to understand how Western methods, knowledge and technologies are used and adapted in the local ways of South Americans.

In 2006, she won first prize in the VIDA 9.0 international competition on Art and Artificial Life for *Alexitimia*, a robotic artwork that looks like a lump of flesh. When the piece is touched, it begins to “sweat,” emitting water through tiny pores. While it appears to be a crude entity with only one way of communication — touch — it is at the same time a complex robot made to interact with viewers.

“Robots raise intriguing cultural questions about our ‘humanness’ that seem to engage philosophers, artists, scientists and technologists,” says Gaetano-Adi, who is particularly interested in creating what she terms “Embodied Artificial Life” artworks.

She and Crembil named the prototype they made for the *TZ’IJK* project *Mestizo*. It recalls the Mayan myth that the gods made several false starts in creating man, including making him out of mud, which led to a sightless, bumbling creature.

Once the artists have full funding for the project, they plan to make several mud-covered robotic spheres of varying sizes that will shake, move and rock, once again combining high-tech with low-tech.

*TZ’IJK* is already getting exposure. *Mestizo* was one of 10 finalist projects in the fifth Electronic Arts and Video Transitio\_MX Festival: Biomediations last fall. Gaetano-Adi and Crembil presented a paper, “Mestizo Robotics,” which describes the work they did to create the prototype, at the Re-New Digital Art Festival in Copenhagen, Denmark.

“The idea of *mestizo* as a blending of races applies to our approach to robotics in art,” Gaetano-Adi says. “We’re using indigenous processes to create autonomous robots, blending craft and technology, tra-

ditional and modern, small-science and big-science.”

## THE SCIENCE OF ART

On the opposite end of the art-technology spectrum, UNT alumnus Marcus Young, who received Bachelor of Fine Arts degrees in ceramics and sculpture, is using technology to evaluate art.

When Young came back to teach at his alma mater in 2012, it was not in the College of Visual Arts and Design, but as an assistant professor of materials science and engineering. A strong interest in fundamentally understanding the materials used in art led Young to pursue a doctorate in materials science and engineering.

While earning his Ph.D. at Northwestern University, he worked in art conservation at the Art Institute of Chicago. When he returned to UNT, he collaborated with Dallas Museum of Art chief conservator Mark Leonard to undertake a similar project.

The museum has more than 400 American silver and silver-plated pieces from the late 19th century and 20th century. The makers often kept their manufacturing processes closely guarded secrets, and many are no longer in business.

To help the museum and current manufacturers know more about these processes, Young and graduate student Matthew Carl developed a novel technique using a focused ion beam system, which allows for the examination of a microscopic cross-section of the object.

The technique — which is being used for the first time on metal museum artifacts — makes it possible to image the plating thickness and the plating and base metal texture of a cross-section about 30 x 30 x 90 microns. A human

Paula Gaetano-Adi, assistant professor of new media, traveled to a remote village in the Peruvian Amazon for her work *TZ’IJK*, using robots to portray the Mayan creation myth.



Gaetano-Adi



Jonathan Reynolds

hair is roughly 50 to 120 microns thick.

"It is not possible with the human eye to see where we took the sample, but it's enough to get down to the underlying base metal," Young says.

The FIB system also is equipped with a scanning electron microscope with electron backscattered diffraction and energy dispersive spectroscopy, which enables the researchers to see what materials the artist used to create the object and gives insight into how the base metal was processed and how the plating was applied, Young says.

So far, Young and Carl have completed analysis of about 10 objects, which include service items such as teapots and utensils. The project will take a few years to finish, says Young, whose art background gives him a greater understanding of the need for conservation science.

"In materials science, we can often section objects to make analysis easier. But, in conservation science, because of the value and uniqueness of the objects,

analysis is limited to only a handful of non-destructive techniques," he says. "This FIB technique offers one more powerful tool."

#### STUDENT EXHIBIT

Art and science often can be used together to help explore complex processes. Such was the idea behind an exhibition conceived by Guido Verbeck, associate professor of chemistry, and Andrew DeCaen, associate professor of art. Verbeck's study of chemical processes in metabolic disease and DeCaen's artwork exploring the science of food overlap in addressing the issue of obesity.

From the scientific perspective, obesity can lead to metabolic disease. Educating those with these diseases, such as diabetes, can be difficult since it's not easy for a layperson to understand the science behind what triggers the diseases and makes them progress.

To help with that, Verbeck and DeCaen proposed a collaboration that educated College of Visual Arts and Design students through a series of lectures about metabolic processes and disorders and invited them to interpret the disease through a juried art exhibition. Verbeck opened up his lab to the art students, who

Marcus Young, assistant professor of materials science and engineering, and graduate student Matthew Carl analyze Dallas Museum of Art artifacts.

were encouraged to ask questions of chemistry students in order to develop ideas for their artworks.

"It was exciting to see so much exchange of ideas," DeCaen says.

Twenty-nine of 43 artworks submitted were displayed in November 2013 at UNT on the Square. The work varied from prints to sculptures, photographs, drawings and more, and the winning students received UNT scholarships.

While science is objective, art can be more subjective and allows for interpretation of concepts in a variety of ways, says Jon Vogt, a second-year graduate printmaking student. His prints showing the complexity of metabolism in the body and the vast number of intricate information systems at work won one of the Best of Show prizes.

Seeing an exhibition that mixed science and art was a way to start a conversation about a topic that might not otherwise be addressed, says Aaron Flynn, a second-year graduate ceramics student who replicated the process of diabetes in his Best of Show ceramics piece.

For Caitlin Odneal, the Best of Show winner whose photos depict sugar crystals under a microscope, the outreach to the community was important, but she also was grateful for the opportunity to show in the exhibition.

"This is what I want to do in my career — mix science and art, maybe working for a hospital," says the senior photography student.

The sentiment of uniting the arts with science and technology is one echoed by students and faculty across campus, says CEMI director May.

"Working with technology gives artists a chance to collaborate in more ways than ever before," he says. "This is a changing environment — and a very exciting place to be." ●



Watch a CEMI video at  
[unt.edu/untresearch](http://unt.edu/untresearch).



EXPERTS ACROSS  
FIELDS JOIN

# UNT Faculty

As a student-focused public research university, the University of North Texas is dedicated to providing an excellent educational experience to its 36,000 students while powering the region, state and nation through innovative education and research.

Nationally and internationally recognized faculty experts teach in 200 degree programs, fueling the intellectual vitality of the region and preparing students to become leaders and innovators in work and in life.

Distinguished researchers, scholars and artists serve as dedicated mentors and share their expertise and creativity in laboratories, classrooms, galleries and concert halls, in the community and around the world. Researchers across disciplines consistently break new ground, working together to improve the environment, advance culture and address some of society's biggest challenges while providing excellent learning opportunities for students.

The following provides a snapshot of new faculty throughout the university.



**SAMIR AOUDI**

Associate Professor of Materials Science and Engineering and Physics;  
Member of UNT's Multi-scale Surface Science and Engineering Research Cluster

Aouadi's research interests include nanostructured thin film deposition and surface engineering, with a focus on protective, biomedical and thermal management films. Among his projects are self-lubricating protective coatings for high-temperature tribological applications, surface modification for coronary stents and other biomedical applications, and nanostructures for next-generation photocatalytic, solar cell and electronic devices. Previously a professor and interim chair of the physics department at Southern Illinois University, he has been a principal investigator or co-principal investigator on grants totaling more than \$1.8 million from such agencies as the Department of Defense, the National Institutes of Health and the National Science Foundation.





DOROTHY M. BLAND

Dean of the Frank W. and Sue Mayborn School of Journalism

Bland was formerly a professor of journalism at Florida A&M University's School of Journalism and Graphic Communication and directed its Division of Journalism — the first accredited journalism program at a historically African American university — for five years. She has served on site teams for the Accrediting Council on Education in Journalism and Mass Communications at universities in numerous states. She also was a juror for the Pulitzer Prizes and a guest lecturer at the Poynter Institute, Kuwait University and other institutions. Before joining FAMU, she worked in various newspaper positions for 25 years. She was a reporter and editor at *USA Today*, served as president and publisher of the *Chillicothe Gazette* and *Fort Collins Coloradoan* and earned three Gannett President's Rings for outstanding performance.

KIRSTEN BROBERG

Assistant Professor of Composition Studies

Broberg's music has been performed by internationally recognized ensembles such as the Kronos Quartet, Chicago Symphony Orchestra MusicNOW Ensemble, New York New Music Ensemble, and Ensemble Dal Niente, an award-winning experimental contemporary music group she founded in Chicago. She also co-founded Ensemble 61, based in Minneapolis. Her music is featured at international festivals and around the country as well as on radio broadcasts and recordings. She won a Fromm Foundation Commissioning Grant from Harvard University and two Encore Grants from the American Composers Forum, among other awards. Her interests include spectral music, orchestration, extended instrumental techniques, musical process, text setting and music for dance.



E. WHITNEY MOORE

Assistant Professor of Kinesiology, Health Promotion and Recreation

Moore's expertise is in exercise prescription and the psychological aspects of physical activity. Her primary goal is to find ways to help coaches and teachers maximize their motivational impact, so that youth participate in and enjoy physical activity. Her research is centered on the principles of achievement goal perspective theory and self-determination theory. She previously owned and operated the start-up Moore Training, which primarily brought collegiate-level athleticism training to youth and adolescent athletes in Tucson, Ariz. Her work on developing youth's positive view of physical activity and on student well-being interventions in the management classroom, such as stress management techniques and gratitude journaling, has been published in the *Strength and Conditioning Journal* and the *Journal of Management Education*.



#### LEGRANDE SLAUGHTER

##### Associate Professor of Chemistry

A National Science Foundation CAREER award winner, Slaughter studies transition metal organometallic chemistry and catalysis, including the design of catalysts and novel materials, catalysis of organic reactions in medicine and industry, and catalysis for energy conversion. He has received more than \$1.2 million to fund his chemical research program, including grants from the Petroleum Research Fund and Chevron Phillips as well as NSF. He also has been actively involved in educational outreach activities, including programs to introduce rural high school students to scientific research. Slaughter came to UNT from Oklahoma State University, where he had taught since 2002. He previously was a postdoctoral researcher at Stanford University and the Technische Universität München in Germany.

#### TODD A. WARD

##### Faculty Director of the Behavior Analysis Online Program

Ward is directing a UNT program that provides online courses for several hundred students each semester who are pursuing certification as behavior analysts or assistant behavior analysts for work related to developmental disabilities and autism. To research the quality of instruction and to evaluate and refine the system, Ward created the Instructional and Behavioral Systems Lab at UNT. He is studying ways to promote student performance and create computing-related projects for research and business intelligence. His work has been published in *Behavior and Social Issues* and the *Journal of Contextual Behavioral Science*, among others, and he serves on several editorial boards. He was previously assistant director of technology for an instructional system at the University of Nevada at Reno and served as a behavior analyst for Chrysalis of Northern Nevada.



#### RUTH WEST

##### Associate Professor of Information Science, Biological Science, Computer Science and New Media; Member of the Initiative for Advanced Research in Technology and the Arts

West's interests include molecular genetics, information aesthetics, virtual environments, psychology, neuroscience, and mobile and social technologies. At UNT, she directs the xREZ ArtScience Laboratory, creating ways to visually and audibly represent large-scale research data across multiple fields and demonstrating its interconnections (see page 38). She previously worked at the University of California-San Diego's National Center for Microscopy and Imaging Research and UCLA's Center for Embedded Networked Sensing. Her work has received support from the National Institutes of Health and the National Science Foundation and has been featured in *WIRED's* NextFest, the *American Journal of Human Genetics* and the *Proceedings of the National Academy of Sciences*, among other publications.

## HONORS RESEARCH TRACK LINKS

# Faculty & Students

BY  
*jessica deleón*

As University of North Texas Honors College senior Corina Gomez searched for a thesis topic in her Philosophy of Water class, she turned to her teacher, Irene Klaver, for inspiration.

Klaver, professor of philosophy and religion studies and director of the Philosophy of Water Project, suggested that Gomez, whose parents are from Mexico, look at how the Latino population has been affected by water issues.

"I never thought about the issue that way," Gomez says.

The topic — in which Gomez examined how Dallas' beautification of the Trinity River affected residents of the city's Oak Cliff neighborhood — proved to be a good choice. She presented her findings with other undergraduates at the annual University Scholars Day, and her paper was published in *The Eagle Feather*, the annual research journal of the Honors College.

Gomez is just one of many Honors College students who are guided by faculty mentors in their research — a requirement of the Honors Research Track. Thanks to UNT's professors, students have participated in research projects from beginning to end and gotten a head start on their future careers.

"Honors College students are talented, accomplished and motivated. They are seeking the best academic and intellectual experience," Honors College Dean Gloria



### HONORS COLLEGE

Research with faculty mentors is just one of many elements of the UNT Honors College experience. The college, which with an enrollment of 1,900 is the largest in the Dallas-Fort Worth area, is open to students with a high grade point average, class rank and SAT score. They take challenging courses and can choose to live in Honors Hall, a residence hall reserved for Honors College students.

Those who choose to participate in the research track may present their findings at conferences and at University Scholars Day in the spring, or be published in *The Eagle Feather*, the college's annual journal, which celebrated its 10th issue in fall 2013.

Dean Gloria Cox notes that most Honors College students are committed to attending a graduate or professional school, and undergraduate research experience is vital to their success. The students also become candidates for major national and international awards.

But Cox says the Honors College does much more than prepare students for graduate study and career development.

"Honors College students take with them from UNT a fine academic record and a great intellectual experience, which are rewards in themselves," she says, "and go out to realize their hopes and dreams."

Honors College senior **Corina Gomez**, left, was inspired by **Irene Klaver**, professor of philosophy and religion studies and director of the Philosophy of Water Project, to investigate the effects of the Trinity River beautification project on the residents of Dallas' Oak Cliff neighborhood.

The Honors Research Track pairs students with faculty mentors.







Cox says. “We believe that opportunities to acquire research skills and engage in scholarly work in their discipline are essential components of that experience.”

### WATER ISSUES

Gomez learned about the social, cultural and environmental effects of water in Klaver’s class. She says she was inspired by Klaver’s involvement in water issues, including her position as European ambassador for water and cultural diversity for the United Nations Educational, Scientific and Cultural Organization.

“She just works constantly to make things better,” Gomez says.

In suggesting Gomez’s thesis topic, Klaver noted that when cities beautify rivers and waterways, the surrounding land often becomes more valuable, drawing in people with higher incomes and affecting longtime residents — in the complex process known as gentrification.

Gomez pored over newspaper reports and property values to study the impact of the Trinity River Corridor Project in Oak Cliff — once considered a “rough” neighborhood and now one of the hipper communities of Dallas.

She found that property values did not increase as much as she thought they would, but some businesses may have been affected negatively. For instance, the owner of a botanica, selling medicinal herbs and religious items to the Latino community, worried he would have to change locations after his neighbors were offered money to move away.

Klaver noted that Gomez’s interest in water issues has included recruiting students to clean up a Denton creek as part of a Stream Clean event sponsored by Keep Denton Beautiful. Gomez volunteers each semester as part of the requirements of her UNT Multicultural Scholastic Award.

“She hears about issues, researches them and creates an informed plan of action,” Klaver says.

After she graduates in the spring, Gomez hopes to pursue a master’s and law degree in environmental policy.

“I feel like I will make a difference through the work that I do,” she says.

### BREAKTHROUGH DRUGS

Robby Petros, assistant professor of chemistry, told Clifford Morrison that if his research didn’t go the way he thought it would, he could learn from it. In fact, they may have stumbled on a molecule that could help develop other drugs.

“We just opened the door for something new and exciting,” says Morrison, a senior majoring in chemistry and biochemistry.

Morrison and Petros were investigating a process for synthesizing a prodrug form of the molecule Sunitinib, which can keep pancreatic cancer tumors from easily bringing in new blood vessels to support their growth. Prodrugs are inactive compounds that, when introduced to the body, can turn into medicinal drugs.

But along the way, the researchers found a better way to synthesize another type of molecule, medium-ring diaza heterocycles, than had previously been reported.

“Instead of just synthesizing one therapeutic molecule, we are hoping this synthetic process could lead to a variety of therapeutic molecules that could each potentially serve a different purpose,” Morrison says. “These could be the next cancer cure, the next aspirin, the next useful medicine.”

As a McNair Scholar, Morrison logged 400 hours of work in Petros’ lab over the summer, and he served as president of Alpha Chi Sigma, the professional chemistry fraternity, and as a peer mentor for chemistry students. He also has earned a Terry Scholarship and is part of the Emerald Eagle Scholars Program.

Morrison plans to pursue a doctorate after he graduates in 2014 and a career in metabolic engineering. Petros believes Morrison has the right characteristics for that field.

“He is very persistent,” Petros says. “That’s one of the major traits you need to be a researcher.”

### BINGE DRINKING

Junior psychology and biology major Alexandra Ruuska’s thesis began with an email that “proved to be a golden ticket.”

Cox sent out a list of research opportunities that included a project with Victor Prybutok, Regents Professor of decision sciences, about how effective three videos with varying presentation styles — comic, serious and informational — were in persuading students not to engage in binge drinking. Ruuska was eager to work on a study from inception to publication.

“We don’t just collect data,” she says. “We participate in every step of the research process.”

The study, conducted under the guidance of Prybutok and his wife, Gayle Prybutok, a doctoral student in the College of Information, examined how likely students were to change their drinking behavior or share a particular video with friends.

Ruuska will use the data for her Honors College thesis, specifically comparing Honors College students to non-Honors College students. Mark Vosvick, associate professor of psychology and director of the Center for Psychosocial Health Research, where Ruuska is an undergraduate research assistant, is mentoring her for that study.



“We don’t just collect data. We participate in every step of the research process.”  
— Alexandra Ruuska, junior psychology and biology major in the UNT Honors College

Ruuska reviewed the existing literature on college binge drinking, chose the videos and obtained the approval of the UNT Institutional Review Board, which authorizes all studies at UNT that involve human subjects. She also recruited 560 participants.

"There's an intellectual curiosity and alertness that makes her unique," Prybutok says. "She works hard."

Ruuska, an aspiring psychiatrist, is presenting her findings at the Southwest Business Decisions Institute regional conference.

"The ivory tower casts a big shadow, but once you walk up to it with all its standards in mind, it's not as daunting as it once appeared," she says.

### DEVELOPMENTAL PHYSIOLOGY

Junior biology major Camilla Smith always has been a go-getter. She volunteered to help Dane Crossley, assistant professor of biological sciences, in his developmental physiology laboratory and he later agreed to mentor her for her Honors College thesis.

"She's committed and she's interested in the outcome of the research and the day-to-day work," Crossley says.

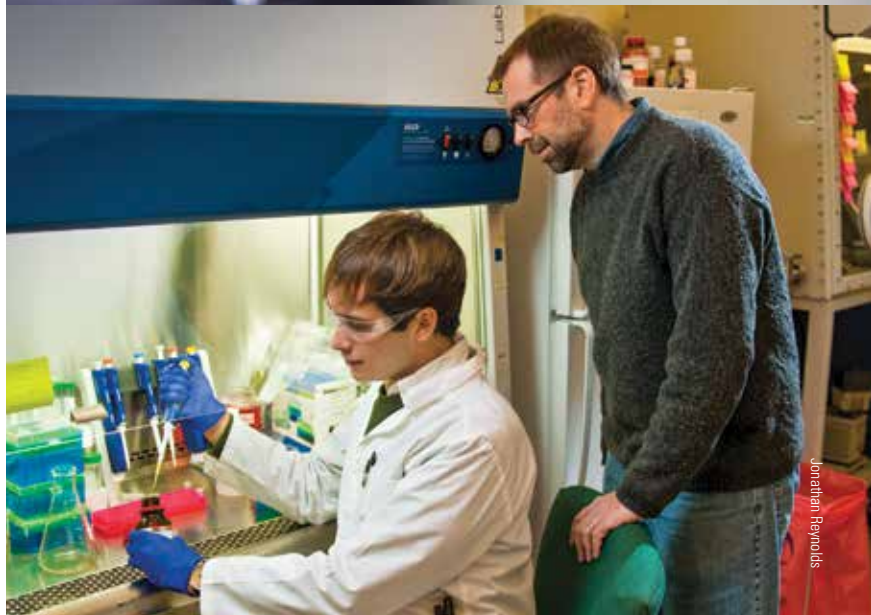
Smith will be examining how different incubation conditions affect alligators' growth, development and metabolic rate after they hatch. In particular, she will examine if oxygen consumption changes because of incubation conditions. Because the work may apply to vertebrates as a whole, it could lead to a better understanding of human diseases attributed to stress during fetal development. Smith will finish gathering the data this spring and plans to write her thesis this summer.

She previously worked with a research team from the study abroad organization The School of Field Studies, tagging and taking genetic samples of sharks in Turks and Caicos. As a freshman, she produced an informational booklet about bats while interning at the Houston Zoo.

That experience inspired her interest in conservation. Smith hopes to pursue a doctorate in marine biology with a specialty in shark biology and eventually work with animals at a zoo or aquarium. She says she appreciates Crossley's patience, especially since she asks so many questions.

"I hope this project will give me the education, experience and skills I will need not only to get into graduate school, but also to be successful there and in my future career," she says. ●

Honors College students on the research track are guided by faculty mentors. From top, [Clifford Morrison](#) and [Robby Petros](#), assistant professor of chemistry, work on a better process for synthesizing therapeutic molecules; [Alexandra Ruuska](#) and [Victor Prybutok](#), Regents Professor of decision sciences, examine binge drinking among college students; and [Camilla Smith](#) and [Dane Crossley](#), assistant professor of biological sciences, study incubation conditions affecting alligators' development.



Jonathan Reynolds



Jonathan Reynolds



Jonathan Reynolds



# NEW INDEX PROVIDES FIRST STEP FROM Blight to Light

BY  
*ellen rossetti*

A building with flaking paint surrounded by unkempt grass, a house with leaning walls that needs to be demolished, a foreclosed property — what is urban blight and what is its financial impact on a city?

University of North Texas researchers from the Department of Public Administration — which houses the nation's eighth-ranked city management and urban policy graduate program — tackled the issue in a study commissioned for Dallas Area Habitat for Humanity. They created a composite index that can be used to measure blight not just in Dallas but in communities across the nation, and not just once, but over time.

## UNIVERSITY ASSISTANCE

The UNT study uncovered the areas of blight in Dallas and calculated the costs of urban decay. Habitat officials say the study is a way of raising awareness about the extent of the issue and starting a conversation about improvements.

"We felt very strongly that help needed to come from one of our local universities," says Jane Massey, director of neighborhood research and revitalization at Dallas Area Habitat for Humanity and a



## NATION'S BEST

UNT's Department of Public Administration is home to a Master of Public Administration program that ranks among the best in the country, coming in at No. 8 in *U.S. News & World Report's* list of the top programs in the area of city management and urban policy. The department also offers a Ph.D. in public administration and management.

Many graduates serve as leaders in local government, federal and state agencies, and non-profit organizations. More top-level city executives in Texas hold a master's degree from UNT than any other university. Students seeking M.P.A. degrees have the option of studying emergency management, financial management, local government management, nonprofit management and human resource management.

"It was when I was at UNT that I really came to appreciate the importance and dignity of public service," says Jane Massey, director of neighborhood research and revitalization for Dallas Area Habitat for Humanity who earned an M.P.A. from UNT in 1979. "We hear so much bashing of bureaucrats and the government. I think we have lost that concept of people being public servants and really working to try to advance the common good — and I learned a lot of that at UNT."

Department of Public Administration faculty members who created a new way for cities to measure urban blight are, from left, [Simon A. Andrew](#), [Praveen Maghelal](#), [Hee Soun Jang](#) and [Sudha Arlikatti](#). Their composite index incorporates physical and socioeconomic indicators of blight.





UNT alumna who worked with the team during the course of its study.

“As a nonprofit, we believed a university could tackle this in a completely non-biased way and that it would be clear to readers of the study that we weren’t guiding what the result was going to be. That to me is one of the great beauties of university research.”

The research, conducted by faculty members Simon A. Andrew, Praveen Maghelal, Sudha Arlikatti and Hee Soun Jang, captured attention across the Dallas-Fort Worth area.

It also caught the eyes of researchers and government officials across the country who want to learn more about applying the index to their own communities.

### COMPOSITE INDEX

The team brings strength in statistical analysis from Andrew, spatial analysis from Maghelal, city planning from Arlikatti and knowledge of nonprofits and local government partnerships from Jang. Their first challenge was defining blight and finding a way to effectively measure an issue that could otherwise be considered subjective.

“In evaluating blight, we looked at the key measurements we have to include — the physical and social measurements,” Jang says.

The researchers nailed down seven physical indicators: abandoned properties, vacant residential properties, vacant commercial properties, mortgage foreclosed properties, tax foreclosed properties, tax delinquent properties and demolished structures.

They also identified seven socioeconomic indicators: poverty, unemployment,

ethnicity, race, renter household, population and single-parent household.

“The index had to be objective to be replicated, and it had to use public data that is easily accessible and could be used again,” Maghelal says. “Nothing has been developed on the scale of what we’ve done.”

With those 14 indicators, the team created a “composite blight index” that superimposes physical characteristics over socioeconomic characteristics to provide a more complete picture. Since the index uses public information from the U.S. Census, Dallas County Appraisal District and Dallas City Hall, the information can be collected and re-evaluated in years to come, showing improvements or declines in the community.

“Anyone can claim they are looking at blight in a comprehensive way. But they didn’t aggregate it and superimpose it in a way you can visualize it,” Andrew says. “The visualization of a problem — when you can see it — gives it meaning.”

Plus, the index can be adapted to fit various communities, the researchers say.

“You can be flexible on the indicator you use,” Andrew says. “You can adapt it, modify it and put weight into it if you choose to. If you don’t have a vacant property indicator, there are others you can use. That’s the beauty of it.”

### CALCULATING THE COSTS

In Dallas, the researchers found that 48 of the city’s 350 census tracts are highly blighted. Another 184 are moderately blighted, and 118 are in low-blight areas. The blighted areas place an economic strain on the city, researchers found. About 41 percent of properties with late taxes were in those 48 high-blight

areas, and 49 percent were in moderately blighted areas.

Demolition of properties between 2007 and 2011 cost the city about \$1.6 million, and about 47 percent of that cost was attributed to the high-blight areas.

Between 2010 and 2012, the city filed \$10.2 million in non-tax liens for cleaning or mowing property, securing vacant buildings, demolishing dilapidated structures and other work. On average, 86 percent are unpaid, adding up to \$8.79 million.

“It’s a very important study,” Arlikatti says. “We hope policy makers will look at the issue in a different way and use our findings to initiate some targeted decisions for blight reduction.”

### THE FIRST STEP

Dallas Area Habitat and others are discussing possible solutions as part of a partnership called EPIC (Economic Partners Investing in Communities). Community leaders including Dallas Mayor Mike Rawlings gathered with UNT researchers last fall in a Dallas forum, “From Blight to Light,” to discuss next steps.

Thomas Evenson, dean of the UNT College of Public Affairs and Community Service, which houses the Department of Public Administration, called the study the first step in addressing the issue.

“It may also be the most important step — getting the momentum going,” Evenson said at the event. “Much of our mission is focused on strengthening the community. ... And there isn’t a much better example of that than the blight-to-light initiative.” ●



“We hope policy makers will ... use our findings to initiate some targeted decisions for blight reduction.” — Sudha Arlikatti, associate professor of public administration





## end note

It's exciting to serve as UNT's vice president for research and economic development when there is good momentum, opportunity and potential. There also is a strong commitment to enhancing UNT's research portfolio. I'm particularly impressed with the quality of our faculty and their interest in developing multi-investigator, interdisciplinary research to compete for large federally funded research grants.

This interdisciplinary approach and our faculty quality are the essential ingredients for building a Tier One research university. I know this from serving as the vice president for research, creativity and technology at Montana State University for 15 years. Attracting competitive faculty and building interdisciplinary teams were significant factors in moving MSU into the nation's top tier of research universities as classified by the Carnegie Foundation for the Advancement of Teaching.

The collaborations taking place at UNT hold a lot of promise. New and longtime faculty members are working together to develop focused research institutes of excellence — for example, a proposed BioDiscovery Institute: Bio-based Engineering for a Sustainable Future and a proposed Materials Science for Enabling Competitive Products Institute. This cross-disciplinary

approach capitalizes on UNT's strengths and is one of the best ways to compete as a research institution.

It also is essential to note the accomplishments of our faculty across the entire campus. A university is not great without excellent scholarship across all disciplines, including the arts, humanities, education, and social, behavioral and economic sciences, as well as the STEM disciplines. The articles in this issue highlight the breadth of our excellence.

Partnerships are key to our progress. We are teaming up with national labs, industry and other universities to conduct research, advance knowledge and contribute to economic development through eventual commercialization where feasible.

Being a high-quality research university is important for many reasons, the most important being that having a strong research portfolio enhances students' education. Our students learn from faculty pushing the boundaries of knowledge through funded research and have access to state-of-the-art equipment purchased through competitive awards our faculty have earned.

**Tom McCoy**

Vice President for Research and Economic Development



Adam Wilson

## 100,000 STRONG

UNT was one of four U.S. higher education institutions to receive the first grants from President Barack Obama's 100,000 Strong in the Americas initiative, designed to increase the number of U.S. students studying in Latin America and the Caribbean to 100,000 and the number of Latin American and Caribbean students studying in the U.S. to 100,000. UNT will use the grant to support U.S. students participating in field courses, research and internships in Chile, including at the pristine UNESCO Cape Horn Biosphere Reserve. The resources will more than triple the number of students in UNT's "Tracing Darwin's Path" study abroad course. Read more about the UNT program on page 14.