OAKLAND UNIVERSITY » Fall 2012

OU RESEARCH

Volume 5, No.1

On the cover: Oakland University officially opened its new Human Health Building in fall 2012. The facility consolidates the School of Nursing and the School of Health Sciences under one roof, bringing together the multidisciplinary talent and expertise of the institution's renowned academic and clinical faculty. Designed to foster cross-discipline research collaboration and provide innovative learning opportunities, the facility responds to Oakland University's mission of advancing knowledge.

The 172,000-square-foot Human Health Building is designed to be energy efficient and sustainable, utilizes advanced green technology and is the first higher education building in Michigan to be certified as LEED Platinum. The facility features a large auditorium, nine classrooms, a full health clinic, substantially improved teaching lab space, and faculty and administrative offices for these growing academic units on campus.

The Human Health Building will enhance Oakland University's ability to remain on the cutting edge of impactful research.

Message from Susan Awbrey

Dear Friends,

Answers … Every year Oakland University invests more than $38 million in research to find answers to questions such as: How do we cure pediatric retinal disease? Can we predict hurricane storm surge levels? How do we help inner-city teenagers succeed?

At OU, we are extraordinarily proud of the wide spectrum of research and other scholarly and creative activities made possible by the excellence of our faculty, students and facilities. Every day in our laboratories, life-changing investigations are being conducted. In this issue of OU Research you will read about some of these achievements.

But it isn't just our faculty who are accomplishing great things. Our accomplished researchers also serve our students as leaders and mentors in the classrooms, instructional research laboratories, and field work. Numerous faculty-sponsored student projects have gained regional and national recognition. Our students enjoy numerous opportunities to learn through one-on-one interaction with noted and accomplished faculty. And they win awards for their efforts; you can read about some of their accomplishments in this issue as well.

In addition, OU is committed to the highest ethical standards in the conduct of research, which are essential for sustaining an excellent research program that contributes to the well-being of our local, national and global communities. The Office of Research Administration facilitates pre- and post-award processes, while promoting compliance with federal, state and university guidelines for the responsible conduct of research. Within these pages you will read about the people who help maintain these guidelines.

At Oakland University, we are extraordinarily proud of the research accomplishments of our faculty and students. I hope you enjoy reading about some of these achievements and are equally inspired as well.

Sincerely,

Susan M. Awbrey

Susan Awbrey, Ph.D.
Interim Senior Vice President for Academic Affairs and Provost

Interim Provost **Susan M. Awbrey** has been a faculty member and administrator in higher education for 28 years. She joined Oakland University in 1991 and has been an integral member of the OU community, serving as a faculty member, department chair, vice provost and senior associate provost prior to her assuming her role as provost. As a professor of education, Awbrey's research focuses on effective organizational design, development and change in higher education institutions. She has authored and co-authored numerous publications and conference papers, including the recently edited book *Integrative Learning and Action*, which is a series of essays by prominent philosophers, educators, scientists, organizational theorists and poets that speak to a desire to find ways of learning, knowing and leading that draw on the full spectrum of our intelligences to create a wiser, more collaborative global society.

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RESEARCH AT OAKLAND UNIVERSITY

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Sensing success

Combining expertise to broaden scope of research

Think innovatively. That's part of the winning equation for Xiangqun Zeng, Ph.D., who has brought in more than $5 million in grant money in her 11 years at Oakland University.

Zeng, a chemistry professor in the College of Arts and Sciences, is a leader in sensor technology, garnering international attention and funding from agencies such as the National Institutes of Health (NIH), the National Institute of Occupational Safety and Health (NIOSH) and the Office of Naval Research (ONR), while collaborating with other scientists to broaden her scope and find success.

"You have to make yourself more competitive with combined expertise," says Zeng, adding that partially overlapping disciplines helps people think outside of the box. "By combining expertise I can do things other people cannot do."

Zeng started at OU as an assistant professor in 2001 with a background in fundamental surface chemistry and electrochemistry. Soon, the attacks on September 11 shaped the direction in which Zeng's science would head, as she answered the call for more advanced detection devices — including applying for a grant to better detect anthrax — in the field of biohazardous agent detection and homeland security. She became one of the first group of grantees from the relatively young National Institute of Biomedical Imaging and Bioengineering (NIBIB), a division of the NIH.

"She's a highly productive researcher and is highly collaborative in her work, which is really something we look for in grantees," says Brenda Korte, Ph.D., NIBIB program director for sensors and microsystems.

Korte calls Zeng's work significant in identifying and moving forward critical technologies, particularly from a clinical perspective of in vitro diagnostics, where the goal is to have an easy-to-use, highly specific approach available at a low cost. It can be very difficult to overcome the multiple challenges that arise when creating a sensitive, stable device useful in its real-world application, Korte says, but Zeng prevails.

"She is focusing on all of these different aspects," Korte says. "It's challenging to cross disciplines, and she does it quite easily and quite effectively, in addition to being an extremely hard worker."

Zeng's biosensor and chemical sensor research labs focus on the molecular design of conductive polymers, ionic liquids, carbohydrates, peptides and recombinant antibodies for use in creating or further studying modified electrodes to develop new and improved sensors using label-free transducers and nanotechnology. These have applications in health care, national security, and environmental, industrial, energy and manufacturing safety.

Among Zeng's studies is the NIH-funded Recombinant Antibody Piezoimmunosensors for the Detection of biomakers such as Cytochrome CYP1B1 (a cancer biomaker) and Trastuzumab (a therapeutical drug for cancer), which involves a sensor that can help define standards for regulations and clinical treatments to determine proper dosage to keep patient toxicity levels — and consequently drug costs to that patient — as low as possible.

Also, Zeng's groundbreaking Carbohydrate and Lectin Recognition for Bacterial Detection study involves rare carbohydrate binding that shows how an infector bacteria uses carbohydrates to invade someone's system.

Zeng's lab also focuses on the Ionic Liquid Gas Sensors study funded by the NIOSH to create a wearable sensor device akin to a low-cost, clip-on thumb drive that monitors air quality measurements from an industrial worker's clothes, alerting a miner that the air quality is dangerous or toxic.

While Zeng enjoys being published in more than 50 publications and having more than 70 requests to speak at conferences — not to mention her drive to obtain greater funding to make these projects and others a reality — watching her science transfer to practical, real-world applications is what resonates the most, she says.

"I want to use very simple steps. The sensor needs to be very simple so it is low cost and can be available to everyone. Our approach is to make the simple step you can make do more," Zeng explains.

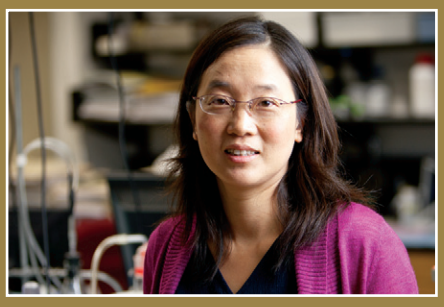
That is just part of how Zeng carved out her niche in the immunosensor arena.

"In that area, she's produced many of the highest profile, highest impact papers. She's definitely recognized as one of the leaders," says the NIBIB's Korte, who adds that Zeng's work is so valued that she serves on review panels there.

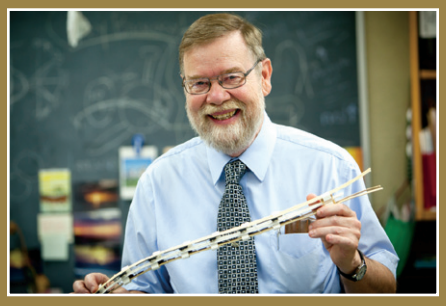
"She demonstrates so much commitment to the field and to training future researchers and exposing them to the collaborative environment," Korte says. "In that sense, she's unique."

By Cara Catallo

"I want to use very simple steps. The sensor needs to be very simple so it is low cost and can be available to everyone."



Xiangqun Zeng, professor of analytical chemistry, received her bachelor's degree from Chengdu University of Science and Technology, her Master of Science from Beijing Normal University and her Ph.D. from the State University of New York at Buffalo. Zeng's research interests focus on the area of electrochemisty and surface chemistry at solid electrodes; the development of new analytical techniques, chemical and biosensors; ionic liquids, and electroactive polymers.



Charles Lindemann, Ph.D., maintains a research program at Oakland University to investigate the mechanisms of sperm motility, with special emphasis on the workings of the flagellar axoneme. A number of talented undergraduate students have been involved in the research, which is supported by the National Science Foundation (NSF). This work is supported by the Cellular Organization Program of the NSF. The main contribution of the program is a series of reports that build a case for a Geometric Clutch mechanism to explain how cilia and flagella generate a beat. This hypothesis is tested in a working computer simulation. Much of the current experimental work in the lab is designed to test specific predictions of the Geometric Clutch model.

Molecular motion

Using the Geometric Clutch model to determine how sperm tails get their moves

Charles Lindemann's lab and office doors may be festooned with cartoons — you must admit, there is an inherent humor in studying sperm tails — yet, his National Science Foundation-funded research regarding what makes sperm move has been his serious work for more than 40 years.

While every middle school student knows that its flagellum makes a sperm move, Lindemann's Geometric Clutch model is a hypothesis that, in his computer models, has been able to demonstrate the whip-like beating of these cellular protrusions with life-like accuracy.

The model is unique in that it can simulate the beat of a cilium or a flagellum using one consistent working mechanism. "This is remarkable because the beat of a cilium and flagellum are quite different in appearance," says Lindemann, professor of biological sciences, whose early training was in physics and who had to learn computer modeling to develop the Geometric Clutch hypothesis.

Cilia and flagella get their movement from the motor protein called dynein. These proteins are mounted on microtubules called the outer doublets, and the outer doublets are arranged in a circle. In order to make a cilium or flagellum beat, these dynein motors need to attach to its neighboring microtubule and pull.

What Lindemann's Geometric Clutch model proposes is that transverse force — or t-force, which is perpendicular to the long axis of the structure — is what pushes the doublets together or pulls them apart across the circle of microtubules.

"These t-forces can be found mathematically from the geometry of the bend, and they act as a clutch to engage and disengage the motors. This is where the 'geometric clutch' comes from," says Lindemann. "It is based on the t-force pushing the doublet microtubules together to activate the dyneins and pulling the doublets apart to deactivate the motors, just like the clutch in a car engages and disengages the motor."

Since beginning his work on mammalian sperm motility, Lindemann has published 45 papers and has had a score of students work in his lab, of which 20 have been co-authors. "Students learn to apply physics and chemistry to working on a biological system," says Lindemann. "All of them learn that science requires many failed attempts before any success can happen."

There are always students working in Lindemann's lab. Also working on the project are full-time technician and Co-principal Investigator Kathleen Lesich and part-time technician Tania dePinho.

Currently, Lindemann is studying how easily the flagellum compresses if it is squeezed. "Squeezing a flagellum might not sound sexy to the average person, but to me it is downright exciting. It is exciting not only because after all this time no one knows, but because if we did know we could use mathematics to predict how the flagellum stretches and distorts when it is working," he says.

If it happens that the distortion is consistent with the Geometric Clutch model, then the model is likely correct, and, therefore, it would be quite likely that Lindemann's explanation of how the flagellum works is also correct.

Presently, Lindemann is not aware of any other lab in the U.S. that is working on both the computer modeling and the laboratory experiments on sperm motility, though there are labs in Japan and Germany.

Although his computer model works well, it cannot yet simulate movement in three dimensions. Lindemann's next aim is to increase the complexity of the model to see if the clutch hypothesis can produce the three-dimensional motions that real cilia and flagella exhibit.

While he may need help from his mathematical collaborators to reach that stage of complexity, Lindemann is encouraged by the response to his model from mathematicians and engineering students. Perhaps in the future, the Geometric Clutch model will aid in the design of micromachines.

Or, notes Lindemann, "Maybe the flagellum played a special role in the evolution of higher organisms, and we will discover what that role is only after we know more about how the flagella are constructed and understand more about evolution," he says. "Knowledge opens doors, and that's what science is about."

By Alice Rhein

"Knowledge opens doors, and that's what science is about."

Through a cultural anthropologist's eyes

Gauging the rise of Pentecostalization

Henri Gooren's Ph.D. research on the Pentecostalization of religion and society in Paraguay and Chile is usually met with two immediate misconceptions: one, that Gooren, associate professor of anthropology, is a theologian, which he is not; and two, that he must be studying Roman Catholicism, since that is the prevailing religion in Latin America.

While that is true, as 70 percent of Chileans and nearly 90 percent of Paraguayans defined themselves as Roman Catholic in the 2002 census, there are changes happening within and outside the Catholic Church that Gooren says is the result of Pentecostalization.

Pentecostalization is the combination of Pentecostal growth, Pentecostal influence on other religions, and Pentecostal influence on the rest of society. With an individual grant of $ 100,000 from the John Templeton Foundation — one of only 15 awarded out of a field of more than 500 — through the Pentecostal and Charismatic Research Initiative (PCRI), Gooren has been measuring and analyzing how the influence of Pentecostalism affects other religions and society in these two diverse countries.

"I look at different church cases in these countries and look at why they are growing or not growing. Paraguay is unique in that Pentecostalism is not growing much. It is probably the only country in Latin America where it is not," says Gooren, who earned his Ph.D. in anthropology at Utrecht University, the Netherlands, where he was born.

"I am also looking at churches that are growing and non-Pentecostal churches that are Pentecostalizing."

In the Roman Catholic Church, for instance, there is the Catholic Charismatic Renewal (CCR), and mainstream Protestant churches like the Baptists and Anglicans are using Pentecostal worship styles with music, conversion stories, speaking in tongues and stories of faith healing in the mass media.

For more than a decade, and for the five years he has been with Oakland University, Gooren has studied religion in Latin America. Since 2010, he used ethnographic research, interviews and surveys to study churches and organizations in Santiago, Chile, and Asunción, Paraguay. On visits, his wife, Francine, and 17-year-old daughter, Yazmin, often accompany him. Needless to say, they spend a lot of time in church.

Since Chile has the oldest and strongest Pentecostal churches in Latin America, and Paraguay has very few, Gooren expected these two countries to provide a contrast in the levels of Pentecostalization. While that is the case, what he has hypothesized thus far is that there may be different patterns of Pentecostalization. Central American countries such as Guatemala, with its bigger churches and more open mass media, differ from South America, where the cultural and religious influences are more European rather than American.

In Paraguay, he has found more of a "Mennonitization" of the mass media, since that is an older, established religion. Pentecostalism and CCR have not had a significant impact on economic behavior, politics or gender relations. In Chile, Gooren found slow growth in the Pentecostal churches in 2011. This summer, just as there was word of a coup in Paraguay, Gooren arrived in its capital city, Asunción, to study several churches, including a Mennonite one that was reported to be Pentecostalizing.

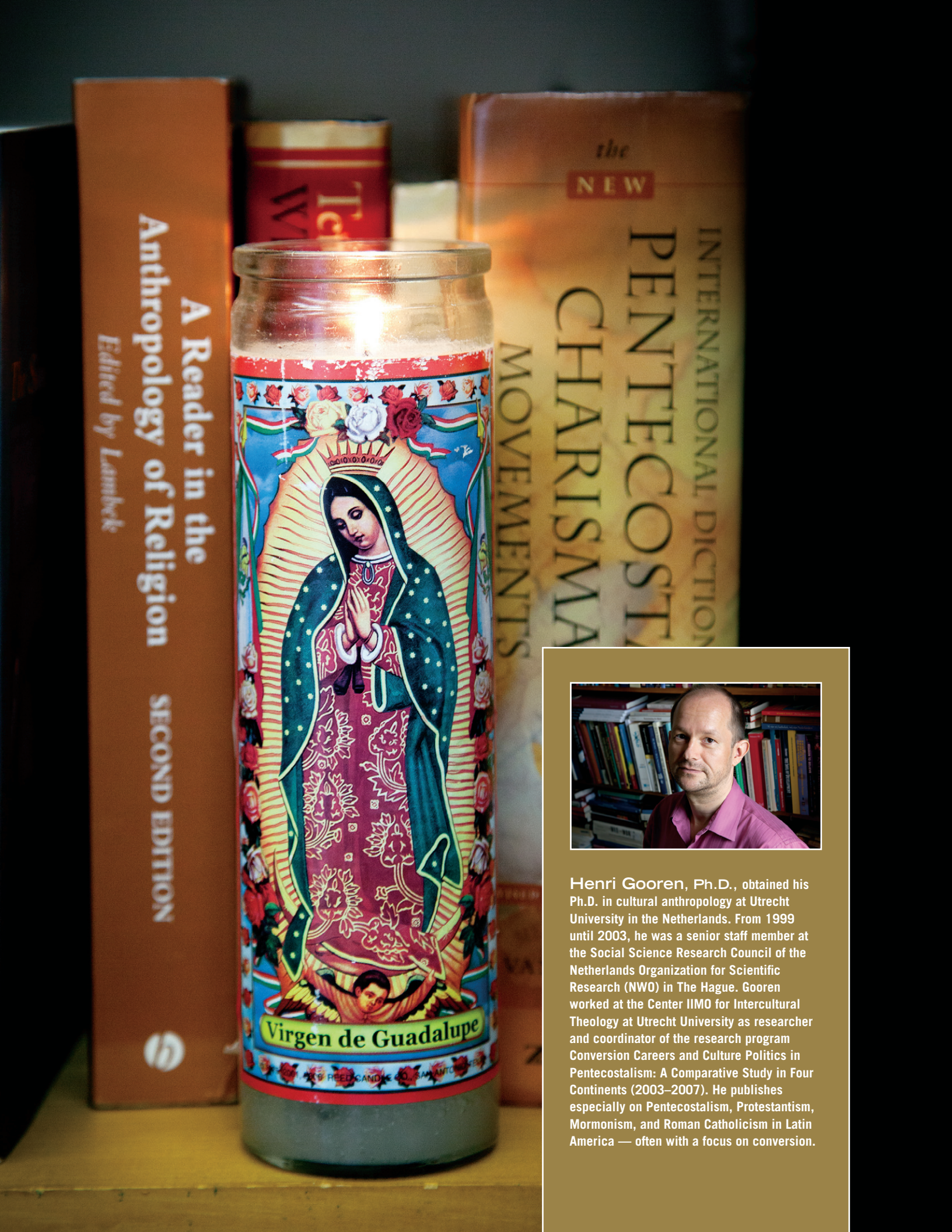
As a professor, he'll no doubt have a few interesting stories to tell. "Students like it when I can talk about a topic from my own experience," he says, noting that many of his best research questions originate from classroom discussions. "It's interesting to get their feedback because their perspective is so fresh. They have very good questions."

The biggest question that Gooren has always tried to answer in his research is why religious transformation, specifically Pentecostalization, is important to people.

"Religion is important in societies all over the world. It is a huge general phenomenon we find in all cultures. If people change their religion, that's important," he says. "If you go from being a Catholic to Pentecostal or Mormon, that's a big change. Then what starts happening in your society when, say, 15 percent become Pentecostals? That was my original curiosity and what led me to study this."

By Alice Rhein

"Students like it when I can talk about a topic from my own experience."

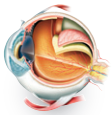


Henri Gooren, Ph.D., obtained his Ph.D. in cultural anthropology at Utrecht University in the Netherlands. From 1999 until 2003, he was a senior staff member at the Social Science Research Council of the Netherlands Organization for Scientific Research (NWO) in The Hague. Gooren worked at the Center IIMO for Intercultural Theology at Utrecht University as researcher and coordinator of the research program Conversion Careers and Culture Politics in Pentecostalism: A Comparative Study in Four Continents (2003–2007). He publishes especially on Pentecostalism, Protestantism, Mormonism, and Roman Catholicism in Latin America — often with a focus on conversion.

Kimberly Drenser received a Ph.D. in molecular genetics and microbiology in 1999 in addition to her medical degree from the University of Florida, Gainesville. She completed her postdoctoral work at the University of California, San Francisco in 1999, and has received numerous academic honors and awards. Dr. Drenser's special interest is in translating laboratory science into practical treatments for retinal diseases. She established and serves as director of the Pediatric Retinal Disease Molecular Genetics Laboratory, and is director of Ophthalmic Research at Beaumont Eye Institute in Royal Oak, Mich. She has authored and co-authored a number of peer-reviewed publications and book chapters, and has spoken at numerous national and international ophthalmologic meetings.

Visionary research

Looking into answers about pediatric retinal disease



When she was in graduate school, Kimberly Drenser, M.D., Ph.D., developed a keen interest in diseases of the retina, the part of the eye that captures images and sends them to the brain — much like the film in a camera, if you think of the eye as the lens.

But she really found her calling when she saw the number of children suffering from pediatric retinal disease, which can often lead to complete blindness.

Today, Dr. Drenser is director of Ophthalmic Research and a vitreo retinal surgeon at Beaumont Hospital, and a clinical assistant professor at Oakland University.

At the Beaumont Research Institute, her work revolves around studying retinal development in an effort to enhance understanding of pediatric retinal disease. Even more important, her goal is to develop better interventions or treatments.

"There are a number of children with inherited diseases that drastically affect the way the retina develops," Dr. Drenser explains. "Abnormal development can be very mild, but it can also lead to complete blindness."

To understand the work Dr. Drenser and her colleagues are doing, it helps to know the basic workings of the retina, which is made up of three layers. It has its own blood circulation and a network of neurons, which is what processes images and sends them to the brain. Disease affecting any of these layers will result in decreased vision and possible blindness, and once the tissue is damaged it can't be repaired or replaced.

The goal of Dr. Drenser's primary research is to better understand the genetics of pediatric retinal disease. In particular, there's one genetic pathway that's frequently involved in retinal problems.

The researchers first created an ophthalmic biobank at Beaumont, taking blood and saliva samples from children with pediatric retinal disease. Using those samples, they identified the pathway and used cell cultures to look for the activation and inhibition of certain genes.

From there, the researchers created and began testing therapeutic agents on mice in which they had induced retinal eye disease. What did they find? One of the therapeutic agents was able to stop the retinopathy and promote normal vascular growth — which then led to improved function of the retina.

Now, the researchers are preparing for a Phase I clinical trial. They're developing an agent appropriate for testing in humans and hope to begin the study within the next year or two.

In a related study they recently initiated, Dr. Drenser and her colleagues are also investigating the potential for using a therapeutic agent to promote the growth of specific retinal cells, which could re-establish normal retinal vasculature.

"The hope of doing this type of research is that you're going to be able to stop children from going blind due to an inherited disease or because they were born prematurely or had some sort of injury, by giving them a therapy that doesn't currently exist," says Dr. Drenser.

She points out that her research into pediatric retinal diseases also has the potential to lead to better therapies for adult retinal diseases related to injury or conditions like diabetes.

In addition to her work at Beaumont, Dr. Drenser works with students at Oakland University. She does the majority of her teaching during the summer, where she instructs students in the program for what they call SUPER (Summer Undergraduate Program in Eye Research) students in the Department of Biology.

But her emphasis is on mentoring students in the OU Eye Research Institute laboratory. Dr. Drenser typically has two to four undergraduate students working with her in the OU lab.

"The research that's done out of the Eye Research Institute is probably one of the best examples of truly targeted translational research," she says. "That's where the ultimate goal is to have a technology that improves diagnosis or treatment in a patient population — not just research for the sake of knowledge, but wanting that knowledge to actually translate into something that impacts a patient's life."

By Amy Lynn Smith

"The research that's done out of the Eye Research Institute is probably one of the best examples of truly targeted translational research."

Dynamic change

Studying fluid flow for better performance

For Mechanical Engineering Associate Professor Laila Guessous, Ph.D., it was nature that sparked her interest in pursuing fluid dynamics and heat transfer.

"I was intrigued by what I observed in lizards," Guessous reflects. "This made me wonder whether we could use a similar flow pulsation mechanism to control or optimize heat transfer rates in engineering applications."

This concept translates into Guessous' research in computational fluid dynamics (CFD), a branch of fluid mechanics that uses physics and numerical methods to analyze problems that involve fluid flows.

Using CFD software, virtual prototypes of a product can be built and analyzed to gather data and images that help predict the performance of the design.

"I'm researching new heat transfer correlations," Guessous explains. "For instance, is an equal or constant pulsating flow more effective at cooling objects? What about the effects of pulsation on heat transfer and drag (resistance to flow)?"

Fluid flows are involved in almost every area of industry, especially during the manufacturing and operation of various machinery and components. The bulk of Guessous' research has involved fundamental work as well as the automotive and aerospace industries.

However, any industrial process involving fluid flow and/or heat transfer can benefit from CFD analysis. Some areas include biology (insect/bird flight), biomedical (heart valves/blood flow/ filters/ inhalers), meteorology (weather predictions), and even sports equipment (cycling helmets/swimming goggles, etc.).

A deeper understanding of the most efficient heating/cooling processes — and the best materials and designs — means that researchers must not only thoroughly understand how fluid and heat transfer mechanisms improve the operation of the mechanisms but also the environmental impact.

Mainly focused on discovery-based fundamental research, Guessous also pursues applied problem-solving research, involving students in her work.

One graduate student worked with Guessous on diesel engines. This research involved cyclone separators, which serve as soot (particle) filters.

"Diesel engines are more efficient than gas engines, but, of course, their emissions are worse, and it is important that filters are designed to efficiently remove particles of different sizes." she says.

Guessous has also worked with the Air Force, predicting transient temperature distribution in high-speed slippers ("feet" supporting the missile on the launcher) and missile ejection testing. These thermal predictions helped develop new wear models. She's also focused on thermal modeling of fastening processes (bolt tightening) and resulting wear.

When it comes to the automotive sector, Guessous enjoys participating within OU's one-of-a-kind Automotive Tribology Center (ATC).

Automotive tribology is aimed at studying the friction, lubrication and wear of materials used for vehicles.

Oakland's ATC is the only university research center in the United States dedicated to advance the reliability, mobility and efficiency of automotive components.

Under the direction of Professor of Mechanical Engineering Gary Barber, the center has seven faculty members and several full-time Ph.D. and master's degree students.

While discovering ways to lower frictional energy losses and enhance reliability/durability of automotive components, emphasis is placed on engine/transmission tribology. The new technology is shared with the military, governmental and industrial sectors.

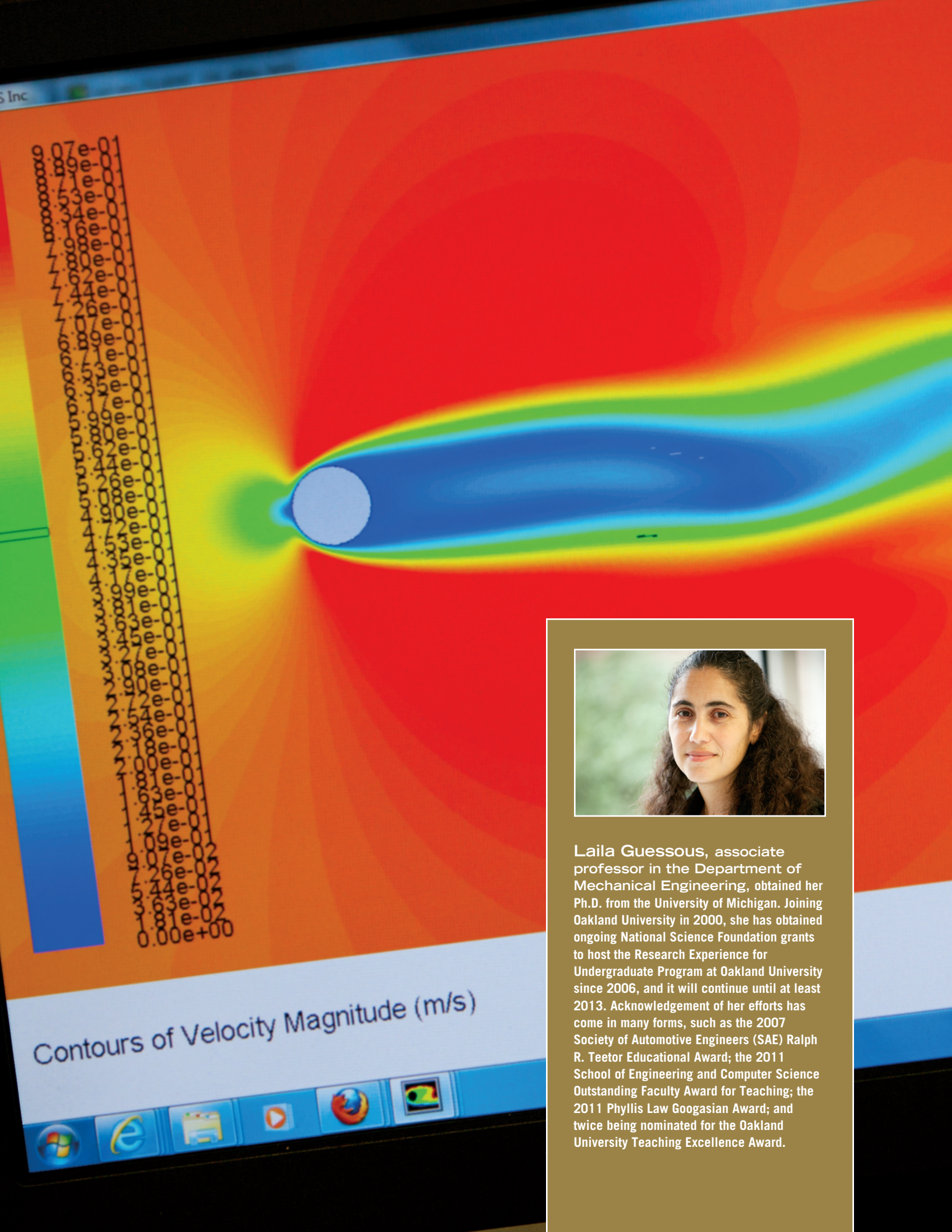
Guessous' main research at ATC is thermal modeling of "scuffing" — when two substances rub and create surface damage, which can ruin an engine.

Guessous is driven to pass along what she's learning. In addition to her classroom instruction, Oakland's Automotive and Energy Research and Industrial Mentorship (AERIM) Research Experience for Undergraduates (REU) Program is a great way to reach students.

"We want to encourage undergraduate mechanical engineering students to continue on," Guessous says. "I'd love for them to pursue graduate school and then continue their journey into the dynamic field of research."

By Mary Gunderson-Switzer

"We want to encourage undergraduate mechanical engineering students to continue on."



Laila Guessous, associate professor in the Department of Mechanical Engineering, obtained her Ph.D. from the University of Michigan. Joining Oakland University in 2000, she has obtained ongoing National Science Foundation grants to host the Research Experience for Undergraduate Program at Oakland University since 2006, and it will continue until at least 2013. Acknowledgement of her efforts has come in many forms, such as the 2007 Society of Automotive Engineers (SAE) Ralph R. Teetor Educational Award; the 2011 School of Engineering and Computer Science Outstanding Faculty Award for Teaching; the 2011 Phyllis Law Googasian Award; and twice being nominated for the Oakland University Teaching Excellence Award.

Anna Maria Spagnuolo, professor of mathematics and statistics, received her B.S. and M.A. in mathematics at Oakland University. She received her Ph.D. in mathematics from Purdue University. She has contributed widely recognized work studying fluid flow in porous media, collaborating with colleagues at the University of Michigan on studies modeling disease in the human body, specifically *Vibrio cholerae*. She also has collaborated with colleagues in her own department on modeling and solving problems related to an artificial heart pump. With researchers in the departments of Biological Sciences and School of Engineering and Computer Science, she has developed models for studying brain tumors and cancer detection. She also works on hurricane storm surge predictions with researchers from the University of Texas at Austin and the University of Notre Dame.

Working the numbers

Applied mathematics helps prevent deadly disease, disasters

Oakland University Professor Anna Maria Spagnuolo's mathematics research involves much more than numbers. Theories in biology, engineering and mathematics work together to curb the effects of diseases and disasters around the world.

Spagnuolo's most recent work is aimed at Chagas disease, a deadly parasitic infection common in Central and South America. She's also working on computer models to predict hurricane storm surge levels, which could help prevent deadly aftermaths like the 2005 death and destruction in New Orleans from Hurricane Katrina.

"All of this is related to math in a similar way, in that it's a mathematical model that describes the process," explains Spagnuolo, who was born and raised in Metro Detroit. "Each model is unique and complicated, but the overall approach is the same."

Her main focus is to end human suffering caused by disease, particularly Chagas, which she is analyzing with 11 undergraduate students and colleagues at Oakland University. The disease leads to early death and organ deformity in about one-third of the 10 million people infected.

Chagas is spread when an infected insect bites humans or mammals. During the bite, the insect defecates, leaving the parasite on the skin. As the person or carrier rubs or scratches at the bite, the parasite enters the bloodstream through the opening. But immunologists needed better ways to predict and prevent Chagas.

Working with immunologists and scientists, Spagnuolo poured through biological data on how the disease spreads.

"With the diseases I'm studying, we've had to dig through hundreds of biology papers and create a model based on what was known, and that made it very complicated," Spagnuolo said. "It took years to get the mathematical model."

Using that information, Spagnuolo and her group created mathematical equations that use seasonal data to predict the number of infected humans and carriers, like dogs, cats and chickens, in a village model. The information helps local health officials combat the disease through spraying and elimination of infection sources, she said.

"We learned that dogs (living in the villages comprised of thatch roof houses) are the biggest problem; having them around increases the disease the most," she said, adding that other variables can be plugged into the models to predict the disease outcome. "We can use the model to test a specific variable in order to determine if it is a driving force for the disease."

Other diseases are transmitted in different ways — and would require different models to predict outcomes. One of Spagnuolo's students is continuing to work with her on how *Vibrio cholerae* bacteria, or cholera, travels through the body, using a mathematical model of a human intestine.

Central Washington University's Gabrielle Stryker, an assistant professor in microbiology, immunology and parasitology, has collaborated with Spagnuolo on the Chagas model.

"Dr. Spagnuolo is an incredibly gifted researcher," Stryker says. "She is one of those rare individuals who is able to work across disciplines and make substantial contributions in fields outside her own."

Spagnuolo said she's always been interested in using mathematics to solve problems, from counting the number of license plates that could be made from a combination of letters and numbers to complex physics equations. She honed that love of applied math as an undergraduate and graduate student at OU before venturing to Purdue University's Department of Mathematics Ph.D. program.

"In the master's program at Oakland, I almost always had classmates from industry, and it was exciting to hear the latest problem of interest to their employers," she says.

A defining moment was when she heard a Brazilian mathematician discuss how a nuclear waste accident poisoned Brazilian children — then went to work on equations that analyze how long it would take leaking nuclear waste to contaminate local water sources. That led Spagnuolo to her current work through a National Science Foundation grant, creating a hurricane storm surge model for the Federal Emergency Management Agency (FEMA).

Spagnuolo's large, Italian family in Metro Detroit is one reason she jumped at the job at OU in 2000. She's had offers to move her research to larger schools, but she said supportive staff, enthusiasm about collaboration with other research institutions, and enthusiastic students keep her at OU.

"There is a family atmosphere among many members of my department," she said. "I really love working with faculty and students at OU."

By Tammy Battaglia

"All of this is related to math in a similar way, in that it's a mathematical model that describes the process."

Not as they appear

Studying income inequality and economic growth

In the study of economics, perhaps more than any other social science, things are not always what they appear. For example, could the disparity of income levels in a society, often seen as a negative, actually be good for the economy? And is it possible that economic growth, a seemingly positive situation, doesn't benefit everyone?

OU professor Oded Izraeli pondered these questions in recent research on the relationship between income inequality and economic growth. The results can be found in his paper "Income Inequality, Economic Growth, and the Distribution of Income Gains: Evidence from the U.S. States," published in the *Journal of Regional Science* last summer with former Oakland University colleague Fuad Hasanov, currently an economist at the International Monetary Fund in Washington, D.C. The article piqued the interest of the *Harvard Business Review (HBR)*, which published a summary in its January-February 2012 issue.

"Many politicians and government officials talk about how important it is for the economy to grow," Izraeli said. "I wanted to know, 'Important to whom?'

"Economic growth is not necessarily distributed equally to all members of society," Izraeli continued. "Some benefit much more, some much less, some not at all."

To conduct their study, Izraeli and Hasanov looked at 40 years worth of U.S. economic census data from 48 states starting in 1960. They looked at the data using different statistical models, then summarized the different results. One model suggested that raising the income inequality level above, or lowering it below, the average level made growth decline — suggesting that the inequality level at that time was most favorable for growth. Another showed that raising the inequality level at the time would be even better for growth.

It became clear that the variance of income levels in a society has a very complicated relationship with the expansion of the economy, Izraeli said. Extreme income inequality and ensuing social unrest (like the Occupy Wall St. movement) can discourage investors who might not want to spend money in a risky business environment. But, increased pressure on the government to help even out income levels can lead to policies that might also discourage investment, like more regulation and taxes. Also, too much equality can weaken the incentives of people to try to earn more or to invest.

"We need to make sure we are not moving to extreme inequality or total equality," Izraeli said. "It is best to be somewhere in between for ideal economic growth."

Izraeli and Hasanov's study ultimately finds that, although modest increases in income inequality can generate economic growth, rising inequality may actually inhibit growth.

They surmise that reducing income inequality has numerous advantages, including improving citizens' attitudes toward their circumstances and increasing their economic mobility. "Policies that aim for growth but ignore inequality may be ultimately self-defeating," they say in their *HBR* summary. "Whereas policies that decrease inequality by, say, boosting employment and education have beneficial effects on the human capital that modern economies increasingly need."

"This is an important subject that is very relevant today," Izraeli said. "Political and economic policy decisions are impacted by this question every day."

Issues like the continuance of the "Bush tax cuts," what policies should the state of Michigan enact to attract more businesses, and even how Europe should solve its growing unemployment problem are all impacted by the questions of the importance of parity of income levels to a thriving economy.

OU students will have the benefit of this study, as Izraeli is using it in his "Seminar in Economic Policy" class this semester. "I think it's a very appropriate topic to study in a class like this," he said.

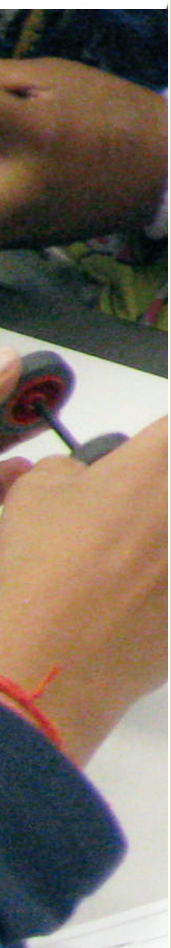
Since this paper came out last summer, Izraeli tackled another timely topic — public education. He and OU professor Kevin Murphy published a study in the Winter 2012 *Journal of Education Finance* titled "An Analysis of Michigan Charter Schools: Enrollment, Revenues, and Expenditures." The two are currently working on another article on the success of Michigan charter schools in improving the quality of education.

By Ann Marie Aliotta

"Economic growth is not necessarily distributed equally to all members of society."

Oded Izraeli, professor of economics, Oakland University School of Business Administration, received his undergraduate degree in economics and statistics at the Hebrew University in Jerusalem, Israel, and his Ph.D. in economics from the University of Chicago. His research interests are in the areas of the impact of the environment on earnings and housing values, the trade-off between environment quality and jobs, interstate differences in state and local revenues, and the economic implications of the 1986 tax reform. More recently, his research interests focused on the effect of industrial diversity on unemployment and per capita income, the impact of Proposal A on school financing in public schools in Michigan, an analysis of charter schools in Michigan, the effect of state government's party affiliation on state economic performance, and income inequality and economic growth. Some of Izraeli's research projects have already been published in journals such as the *Harvard Business Review, Growth & Change, Environment & Planning A, Public Finance Review, Journal of Urban Economics, Journal of Education Finance* and the *Journal of Regional Science*.

Geraldine Graham, director of the Project Upward Bound program at Oakland University, was awarded the Council for Opportunity in Education (COE) Board Chair Award, given to individuals who are committed to advancing equal educational opportunity and to promoting diversity in America's colleges and universities. Graham was also inducted into the COE Hall of Fame. She has served the Michigan Chapter of the Mid-America Association of Educational Opportunity Program Personnel (MI-MAEOPP) as Education Foundation chair, TRIO Day chair and the Silver Anniversary president. Graham has also been a trainer with the University of Washington's Technology Training Grant, MI-MAEOPP Board member and committee chair.



Prepping for success

Inner-city youth achieving through OU's Upward Bound

In many of America's largest inner cities, there are countless teenagers struggling to make it. At best, there's a 50/50 chance they will graduate from high school, let alone go on to college. Who cares enough to help these young people reach their potential?

Geraldine Graham does. Graham is director of OU's Project Upward Bound (PUB), a multi-faceted college preparatory enrichment program that serves disadvantaged students in three Oakland County schools. The outreach project is a high-quality national model.

"I have the best job in the world because it allows me to make a positive impact with and for youth every single day," she says.

Upward Bound is under the umbrella of TRIO programs, established by Congress' Higher Education Act of 1965. Its mission is to provide academic, social, cultural and career enrichment to prepare students to succeed in higher education — opportunities otherwise inaccessible to them.

Students must meet certain criteria (i.e., low-income households, first-generation college students, or academically at risk), but they also must demonstrate the motivation and potential to succeed in college.

Located within OU's Division of Student Affairs, PUB serves 120 students each year from Pontiac High School, Pontiac Academy of Excellence High School and Oak Park High School.

During the Academic Year Program, participants are mentored in academic, social, career and cultural enrichment. In addition, ACT preparation and tutorial services are provided, and character development meetings are held with the students at their schools. The participants' parent(s) also meet with the project adviser to make sure the children's needs are being met.

Summertime brings unique PUB opportunities. Rising 10th and 11th grade participants of PUB's Summer Academy live on OU's campus. They're involved in a rigorous curriculum of study and social and cultural activities. There are educational field trips and student leadership conferences, which are performance-based.

Participants are expected to achieve specific learning outcomes in each class and improve their grade level performance on the Iowa Test of Educational Development (ITED). Responsibility to self only increases in the PUB program.

Rising 12th-grade participants commute to campus during their school year. They're engaged in senior seminar — exploring three career options: identifying majors required for those careers; researching scholarship opportunities; and investigating colleges/universities that provide a "good fit." The students present these findings in a college-level research paper and a PowerPoint presentation to parents and administrators.

If there's any doubt that TRIO is successful, just look at the results.

Although coming from target schools whose dropout rate ranged from 16-25 percent, 100 percent of PUB's participants last year graduated from high school and were accepted into at least one college or university. Entering college in the fall immediately after graduation is a strong predictor of college success, according to the U.S Department of Education, and 80-90 percent of PUB participants do just that. Only 34 percent of their peers at school, 42 percent across Michigan and 69 percent nationwide do the same.

Statistics from this year's PUB Summer Academy students further confirm the program's effectiveness:

- 91 percent improved their classroom academic performance, ranging from 2.5 percent to 14.4 percent.
- 78 percent completed the academy on the A/B honor roll; no students fell below grade C.
- 88 percent improved their pre- to post-academy scores on the ITED.
- 16 percent maintained a 100 percent good behavior score; 56 percent maintained a 90-99 percent score.
- 100 percent earned Completion in Character Education Certificates.
- 97 percent completed the program and are expected to return in the fall.

With success like that, it's no wonder Graham and her students periodically walk the halls of Congress to convince legislators how critical funding is.

"We have a track record of success," Graham says, "but, unfortunately, funds are being redirected to unproven new programs."

Clearly, PUB's biggest advocate is on the job.

By Mary Gunderson-Switzer

"I have the best job in the world because it allows me to make a positive impact with and for youth every single day."

Soothing hope

Groundbreaking research helps the aged

Cheryl Riley-Doucet, associate professor of nursing, has paved a path to success. She recently received the highest ranking possible from the Gerontological Society of America (GSA) for her cutting-edge work on soothing agitated senior patients.

Riley-Doucet is an expert at calming elderly patients being treated for pain, Alzheimer's disease and other chronic illnesses. She's also well-versed in dealing with caregivers, a nod to her interest in family nursing.

In June, the GSA awarded her its top honor, naming her a 2012 GSA fellow. The new initials behind her name help spotlight the important work being done at Oakland University. It also means more people will be exposed to her groundbreaking research that merges gerontology, mental health and family nursing.

"The Gerontological Society of America awards fellow status to acknowledge outstanding and continuing work in our field," said Nancy Wilson, Licensed Master Social Worker (LMSW) and chair of GSA's Fellowship Committee. "Thus, as a distinguished member of the leading interdisciplinary society focused on aging, Dr. Riley-Doucet's expertise will be increasingly in demand — raising awareness of both her research and Oakland University."

She's recently taken this expertise "on the road" into an adult day care program in Auburn Hills, Mich. Families bring their loved ones with dementia to Quality of Life Adult Day Health Care Services to be in a home-like setting while the caregiver goes to work or needs a break.

Quality of Life director Jackie Smiertka met Riley-Doucet at a local health fair and wanted to incorporate her research using a multisensory environment (MSE) to help her guests.

"I was so impressed with her work that I had to try it," Smiertka says.

Riley-Doucet, who joined OU in 2002, has set up a room that has special lights like a lava lamp and chaser lights, music, textured objects and aromatherapy elements to stimulate all of the senses.

"When people with dementia get agitated, they can't re-focus themselves anymore, so we provide a focus for them through a variety of sensory tools that gently stimulate their senses. This also provides a distraction for them from the thoughts or feelings that are causing their agitation," explains Riley-Doucet, who received her RN, BSN and master's degree in education in Canada, and her Ph.D. in nursing from Wayne State University in Detroit.

The results are immediate. "It's really intense," Riley-Doucet says. "The stimuli draw that person in and they calm down."

Smiertka likes it because it helps her guests engage again and they're reminded how much they're needed. "It doesn't matter how old you get, you need to have a purpose," she says.

Riley-Doucet, who has received $11,000 in grants through OU's Faculty Research Fellowship Award and Justine Speers Research Fund Award for versions of this study, has also taken the MSE into dementia patients' homes to see how the therapy impacted both the patient and caregiver.

In another study, Riley-Doucet collaborated with Karen Dunn from OU School of Nursing to set up a multisensory environment (MSE) in an adult day care center, and compared two types of music: religious vs. non-religious. They wanted to find out if there was a difference in patient reaction to either the religious or the non-religious music.

Riley-Doucet also has applied for a patent that relates to her interdisciplinary research, a collaboration with Hongwei Qu in OU's Department of Electrical and Computer Engineering. They've created a portable autonomous multisensory intervention device (PAMID), a biomedical device that monitors patients in real time, checking for multiple physiological factors that detect an early stage of agitation. Multi-sensory stimuli such as music, aroma therapy and gentle pulsing lights are put into a stuffed animal that also provides on-site intervention to patients to help soothe them before a caregiver comes to them.

"To show you this research can transfer to more than just the elderly population, we're now working on a study for the National Eczema Association that helps children," she says. Funded with a $24,000 grant, the researchers are testing how the PAMID works to detect and manage nighttime itching among children with atopic dermatitis, which often leads to infection and high stress in families.

"I really love doing research and then teaching what I discover because it helps others get curious, and that leads to finding the best treatment for a patient," she says.

By Rene Wisely

"As a distinguished member of the leading interdisciplinary society focused on aging, Dr. Riley-Doucet's expertise will be increasingly in demand — raising awareness of both her research and Oakland University."

Cheryl Riley-Doucet, associate professor of nursing, received her Ph.D. from Wayne State University. Her areas of research focus on nursing interventions for older adults and family caregivers who live with chronic disease and/or pain, multisensory environmental interventions for patients with Alzheimer's disease and their caregivers, and assistive technology for older adults with dementia. She is an elected fellow of the Gerontological Society of America.

Charles McGlothlin is program director of Occupational Safety and Health at Oakland University and has been a manager, professional engineer and educator for more than 30 years. He received bachelor's and master's degrees in mining engineering from West Virginia University and his Ph.D. in education and human resource studies at Colorado State University. He has also completed coursework at the Harvard Business School, UCLA and the University of Pennsylvania. In his professional career, McGlothlin served as the corporate officer responsible for health, safety and regulatory compliance for mining operations in three states.

Virtual research

Accreditation effort moves online research ahead at OU

Can you determine the effects of grain dust relative to human safety standards via computer? Can you assess the effectiveness of a process at a manufacturing plant without leaving your office? Can you evaluate occupational and environmental hygiene hazards with a touch screen? Yes.

New research, to be completed by Oakland University's Occupational Safety and Health (OSH) Program Director Charles McGlothlin, will help prepare OU students to thrive in tomorrow's online work world in the most effective, efficient way possible.

OU currently offers occupational health and safety courses to 117 students, McGlothlin says, "Current out-of-state online students will be ready for OSH program laboratory courses within the next two years. To maintain the high educational standards expected of an ABET (Accreditation Board for Engineering and Technology) accredited program, the OSH program faculty must develop effective online teaching/learning tools necessary to deliver these required laboratory courses." McGlothlin's four-month study (January through April 2013) will determine the best practices for such online teaching.

"Through the ABET accreditation process, students are assured of a high-quality educational experience that meets employers' needs," says McGlothlin. "Discriminating employers are giving hiring preference to college graduates from ABET-accredited safety-related degree programs to meet their needs for future safety professionals. Students graduating from ABET-accredited degree programs find themselves in the very favorable position of being recruited by these high-quality employers."

Additionally, McGlothlin anticipates that several new online certificate and continuing education programs will be built around new laboratory facilities in the university's recently opened Human Health Building. Online delivery of these programs in fire sciences and occupational and environmental hygiene will depend heavily on the effectiveness of the online laboratory experiences, he explains.

Once McGlothlin determines the best practices he expects those outcomes can be used in other ABET-accredited online delivery programs in schools of Engineering and Computer Science across the country.

McGlothlin will research both synchronous and asynchronous online delivery options that provide live or simulated laboratory experiences to satisfy ABET accreditation criteria in regard to required laboratory experiences.

"I have made arrangements with East Carolina University to collaborate in this effort. ECU offers an online master's degree in occupational safety and is very interested in addressing laboratory experiences in the online environment. Faculty members at East Carolina are recognized leaders in the American Society of Safety Engineers Academic Practice Specialty and are trained ABET program evaluators. "he explains. Other collaborations will include Sao Paulo University, Indiana University of Pennsylvania, Millersville University of Pennsylvania, Murray State University, and Trinidad State Junior College.

In addition, he will work with the Oakland University e-Learning and Instructional Support (e-LIS) staff to learn software alternatives that might prove useful in meeting the ABET laboratory-related criteria. Laboratory facilities in the new Human Health Building will be used to develop live video and filming options as part of the solution to delivering laboratory course content to online students. Case studies, computer-based simulations and off-campus mentors will also be evaluated as support elements for laboratory course experiences.

"OSH course content of primary concern is in occupational and environmental hygiene coursework where instrumentation calibration and use in monitoring and assessing environmental hazards are important skills our graduates must have to be effective," McGlothlin explains. "Another area of concern is robotics and system safety analysis lab experiences where students evaluate robotic and other mechanical systems and machines for appropriate safeguards. The fire protection lab involves evaluation of fire suppression systems for controlling fires. Real-time or recorded connection of distance students to these laboratory experiences is essential to delivering the same quality educational experience online as is delivered on campus."

McGlothlin's online course development work will be significant in OU's growth toward online delivery.

"A faculty-to-faculty approach supported by our OU e-LIS staff could help program directors and faculty overcome the significant technological hurdle of delivering effective laboratory experiences online," he says.

By Susan Thwing

"Students are assured of a high-quality educational experience that meets employers' needs."

Oakland University's research regulatory compliance committees

The Office of Research Administration directs and facilitates pre- and post-award processes by ensuring compliance with federal, state and university guidelines. It also oversees regulatory compliance activities to ensure safe, ethical and responsible conduct of research. In addition, the office is responsible for enhancing the research infrastructure of the institution, as well as developing and monitoring policies related to the stewardship of research activities, intellectual properties and technology transfer.

Four committees assist in guiding and ensuring compliance.

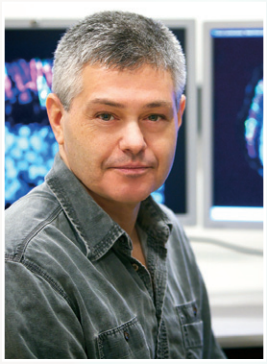
Institutional Animal Care and Use Committee (IACUC)

Chair: Shravan Chintala

At Oakland University, researchers and course directors assure the humane use and care of animals in activities they conduct or which are conducted under their direction. They have a direct responsibility to see that animals are adequately cared for and properly used. Before investigators or course directors can procure animals or initiate any research, testing or instructional project involving the use of vertebrate animals, they must submit an application to and receive approval from the IACUC.

Chair of the IACUC is Shravan K. Chintala, who received a Ph.D. in microbiology from Osmania University in India in 1992. He obtained his formal training in cell biology at Cleveland Clinic Foundation (1992–95) and molecular biology and neuroscience at the University of Texas M.D. Anderson Cancer Center (1995–99). Chintala joined the Eye Research Institute of Oakland University in October 2001. Under his leadership, the Council on Accreditation of the Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC International) informed Oakland University that the IACUC program conforms to AAALAC International standards in July 2012. AAALAC also stated especially noteworthy were the health of animals; the excellent condition of the facility; the effective oversight of animals by the veterinarian and husbandry staff; the engagement and participation of IACUC members, including the nonaffiliated member, in the process of reviewing and monitoring the program; and the excellent relationship between the administration and program personnel.

Chintala has received funding from the Massachusetts Lions Eye Research Fund and the National Eye Institute for his laboratory research, which is focused on the role of proteases in the death of retinal ganglion cells in glaucoma.



Institutional Biosafety Committee (IBC)

Chair: Andrew Goldberg

Through its extensive evaluation program, the IBC ensures that all research, teaching and testing involving recombinant DNA, infectious agents and cultured cell lines comply with all relevant government rules and regulations.

The current chair of the IBC is Andrew F.X. Goldberg, who received a B.S. in biochemistry from SUNY-Binghamton in 1985 and a Ph.D. in biochemistry from Brandeis University in 1992. His postdoctoral studies were conducted at the University of British Columbia and at the University of Washington. Goldberg joined the Eye Research Institute in 1999, has served as director of the ERI Ocular Structure and Imaging Core since 2002, and was promoted to associate professor of biomedical sciences in 2005.

Goldberg has received grants in excess of $3.6 million from extramural sources — including the National Science Foundation, the Grass Foundation, the E. Matilda Zeigler Foundation, and National Eye Institute — to investigate structure and function of rod and cone photoreceptors. His research contributions include more than 25 widely cited publications in this subject area. He has served on NIH study sections, international grant review panels, and state-level research review boards. His professional affiliations include the American Society for Biochemistry and Cell Biology, the Association for Research in Vision and Ophthalmology and the Society for Neuroscience.

Goldberg has served the OU IBC continuously since 2000, and has chaired the committee since 2009. His accomplishments include transitioning the IBC application process from paper to electronic format in 2005, and leading a team to create the IBC's first Web page in 2009. Goldberg cites the dedication of fellow OU staff members Judette Haddad and Domenico Luongo as factors in the success of his long-term IBC service.

Institutional Review Board for the Protection of Human Subjects (IRB)

Chair: Christine Stiller

All research conducted by Oakland University's researchers, faculty, students or staff involving the participation of human subjects must be submitted for review by the IRB. The IRB is guided by the ethical principles found in the report of the National Commission for the Protection of the Human Subjects of Biomedical and Behavioral Research.

Chair of the IRB is Christine Stiller, special instructor in physical therapy at Oakland. She holds a Ph.D. in educational psychology. Her clinical background is in pediatrics, and she is actively involved in providing physical therapy services to schools in the area. She also serves as coordinator of the Graduate Certificate in Pediatric Rehabilitation and the Transitional Doctorate in Physical Therapy. Her research interests are in pediatrics and professional socialization in physical therapy.

Radiation Safety Committee (RSC)

Chair: Arik Dvir

Radioactive material (including machinery producing ionizing radiation) can only be used by authorized Oakland University permit holders or under the supervision of a permit holder. User permits are issued by the Oakland University Radiation Safety Committee (RSC).

Chair of the RSC is Arik Dvir, associate professor and chair, Department of Biological Sciences. His current research studies the rate-limiting steps during early stages of eukaryotic mRNA synthesis. Dvir's research is conducted using a biochemically defined, reconstituted transcription system, and his current investigation includes the interrelations of downstream DNA, ATP cofactor and TFIIH function in transcription initiation and promoter escape, and the relationship between promoter structure and the conformation of the transcription complex.

Research centers and institutes

The Automotive Tribology Center

The Automotive Tribology Center in the School of Engineering and Computer Science (SECS) tests the science of lubrication, friction and wear on a vehicle's engine. Faculty and student researchers analyze materials so that automakers can lower friction to improve fuel efficiencies in vehicles. Research partners include General Motors Powertrain Division, Chrysler Corporation, Ford Motor Company, the Tank and Automotive Research Development and Engineering Center (TARDEC), ConocoPhillips and Argonne National Laboratory. The center is one of the only tribology centers in the country dedicated to automotive tribology research and uniquely positioned to advance the reliability, mobility and efficiency of automotive components.

Center for Applied Research in Musical Understanding (CARMU)

The mission of the Center for Applied Research in Musical Understanding (CARMU) is to build and advance a research-based pedagogy of teaching for musical understanding, as well as support pre-K-12 music educators in Michigan, the United States and internationally. The center seeks national and international eminence in applied research in musical understanding and supports faculty, graduate and undergraduate research in musical understanding.

Oakland University Center for Autism Research, Education and Support (OUCARES)

OUCARES integrates academic coursework, knowledge and research with hands-on work to prepare professionals to be leaders in the autism community. Through these academic and service programs, OU also provides supportive individual and family programs. OUCARES encourages the exchange of ideas relating to the education and support of individuals with autism spectrum disorder as well as providing services and support needed to improve daily living.

Center for Biomedical Research

The mission of the Center for Biomedical Research is to vigorously promote and support biomedical research and education at Oakland University and allied institutions; to recruit and retain outstanding biomedical scientists; to facilitate collaborative biomedical research projects; and to develop gift, grant, and contract support for biomedical research programs, graduate and undergraduate training, as well as core facilities and equipment.

Center for Integrated Business Research and Education (CIBRE)

CIBRE at the School of Business Administration connects business professionals, students and academics to address and shape the future of business research and business education locally, regionally and globally. CIBRE provides a place where business leaders, researchers, professionals and students can share resources and ideas and identify actions to address organizational issues, educate current and future professionals, and support economic development in the community and the world.

Center for Robotics and Advanced Automation (CRAA)

The Center for Robotics and Advanced Automation (CRAA) in the School of Engineering and Computer Science (SECS) was established in 1981 and is at the forefront in research and development in the areas of automatic controls, robotics, automotive engineering, machine vision and related fields. CRAA, to date, has made major contributions to SECS and OU, particularly in enhancing SECS's graduate programs and enrollments.

Center for Social and Behavioral Research (CSBR)

The Center for Social and Behavioral Research (CSBR) embraces an interdisciplinary commitment to promote excellence in social and behavioral research as well as the productivity of social and behavioral researchers across disciplines at Oakland University. CSBR welcomes and promotes collaborations of internal and external partners with social and behavioral researchers at Oakland University, works to strengthen disciplines associated with social and behavioral research, and expands opportunities for undergraduate and graduate students to experience social and behavioral research.

Clean Energy Research Center (CERC)

The School of Engineering and Computer Science is home to the Clean Energy Research Center (CERC). The CERC engages in multiple, clean energy research, development and educational activities. The CERC also has created an environment that fosters commercial partnerships and provides an educational platform for student research and clean energy curricula development, while cultivating an entrepreneurial atmosphere within the OU research and development community to allow technology transfer and commercialization of new technologies.

Counseling Center
The School of Education and Human Services Counseling Center is a teaching and research facility for the Counselor Education program that offers personal and career counseling to the community at no cost.

Eye Research Institute (ERI)
The ERI has a 42-year history in vision research and has received more than $50 million from external funding sources, mainly the National Eye Institute (NEI). Each year, the ERI, in conjunction with the Center for Biomedical Research, awards competitive Summer Vision Research Fellowships to OU undergraduates. In addition to conducting vision research, the ERI is also formally associated with the Department of Ophthalmology at Beaumont Health System.

Fastening and Joining Research Institute (FAJRI)
FAJRI is the only known facility of its kind in the world: an academic, nonprofit research facility dedicated solely to the fastening and joining of materials. This one-of-a-kind facility pursues fundamental and applied research to develop and disseminate new technologies in fastening and joining engineering. Through its research, FAJRI helps improve the safety and reliability of equipment, machinery and mechanical structures. The research conducted also significantly improves the mobility and combat-readiness of military vehicles.

Galileo Institute for Teacher Leadership
The Galileo Institute for Teacher Leadership is dedicated to improving the learning of all students, elevating the education profession, enhancing the leadership skills of teachers, and fulfilling the vital role of public education in achieving a civil, prosperous and democratic society. The commitment to the concept of developing teacher leaders, to defining what teacher leadership is and why it is so important, is at the heart of the institute.

Institute of Radio Frequency Electronics and Nanoelectronics
The mission of the Institute for Radio Frequency Electronics and Nanoelectronics is the research, engineering and development of multifunctional, miniature, rapid response signal processing devices for defense and consumer electronics; development of human resources for employment in high-tech electronic industry; and encouragement of small business spinoffs to serve the Department of Defense and private industry.

Institute for Stem Cell and Regenerative Medicine (ISCRM)
The Oakland University William Beaumont Institute for Stem Cell and Regenerative Medicine (ISCRM), a partnership between OU and Beaumont Health System, engages in both basic and translational stem cell research, seeking to generate knowledge and insight with the potential to change human lives for the better.

Lowry Center for Early Childhood Education
The Lowry Center offers early childhood education programming to children from 18 months to 5 years old using the newest innovative equipment, materials and practices to cultivate the development of young children. The center's mission is to provide an exemplary laboratory center for early childhood education for the university and the neighboring communities.

Prevention Research Center
The Prevention Research Center is designed to promote community health through education, promotion and translational research. Translational research discovers which strategies work in the community: the community of youth, the community of women, or the community of senior citizens — all at high risk. The center brings experts from OU and the community together to make a difference in people's lives.

OU SmartZone Business Incubator (OU INC)
Oakland University's SmartZone Business Incubator (OU INC) provides entrepreneurial resources and strategic business solutions to develop intellectual property. The incubator supports existing and grows new technology-based and life science businesses with university resources, decision support technology, business counseling services, and financial/capital acquisition assistance.

Student research award recipients, 2011-12

Student award recipients receive financial assistance to support their research as well as the opportunity for travel support to present their research at a professional conference. The program is sponsored by the Office of the Provost.

University Research Committee Student Research Awards

Hypertension and Prehypertension Measures Identified by Physical Therapists in the Home Care Setting
Student Researcher: Sara Arena
Faculty Mentor: Jacqueline Drouin, Physical Therapy

Application of Theta Function on the Wave Function
Student Researcher: Lubjana Beshaj
Faculty Mentor: Tanush Shaska, Mathematics and Statistics

Effect of Exercise Habits on Playing Related Injuries for University Music Students
Student Researcher: Amanda Biglow
Faculty Mentor: Sara Maher, Physical Therapy

Media Coverage of Natural Disasters: A Cross-cultural Rhetorical Analysis
Student Researcher: Ryan Blank
Faculty Mentor: Dana Driscoll, Writing and Rhetoric

Effects of BPA on BRCA1 and BRCA2 genes in T47D Breast Cancer Cells
Student Researcher: Alessandra Boufford
Faculty Mentor: Sumit Dinda, Biomedical Diagnostic/Therapeutic Sciences

Day of Arts Presentation
Student Researcher: Jonathan Busch
Faculty Mentor: Jacqueline Wiggins, Music, Theatre and Dance

The Russian Nation as a Political Tool for Justifying Authoritarianism: From Nicholas I to Vladimir Putin
Student Researcher: Sean Cannady
Faculty Mentor: Paul Kubicek, Political Science

Toxicity of Heavy Metals in Stem Cells
Student Researcher: Nicholas Ciavattone
Faculty Mentor: Rasul Chaundhry, Biological Sciences

Conference on College Composition and Communication and Research Network Forum
Student Researcher: Amanda Deschamps
Faculty Mentor: Dana Driscoll, Writing and Rhetoric

A Numerical Investigation of the Effects of Flow Pulsation on Dynamic Forces over a Cylinder
Student Researcher: Eric D'herde
Faculty Mentor: Laila Guessous, Mechanical Engineering

Boko Haram in the Context of Jihad and Transnational Terrorism
Student Researcher: Benjamin Eveslage
Faculty Mentor: Peter Trumbore, Political Science

Effects of Baseline Activity Levels on Physical Activity, Energy Expenditure, Sleep and Fatigue in Men Undergoing Radiation Therapy for Prostate
Student Researcher: Joshua Halas
Faculty Mentor: Jacqueline Drouin, Physical Therapy

Innovation in Song: Brahm's "Der Abend," Op. 64, No. 2
Student Researcher: Jane Hines
Faculty Mentor: Melissa Hoag, Music, Theatre and Dance

Equation of Algebraic Curves Over Their Minimal Field of Definition
Student Researcher: Valmira Hoxhaj
Faculty Mentor: Tanush Shaska, Mathematics and Statistics

Increasing the Rate of Hydrogen Fueling Catalysts
Student Researcher: Richard Hulme
Faculty Mentor: Greg Felton, Chemistry

Thirst and Sodium Palatability During Running
Student Researcher: Jed Hummel
Faculty Mentor: Tamara Hew, Exercise Science

Effects of Baseline Activity Levels on Physical Activity, Energy Expenditure, Sleep and Fatigue in Men Undergoing Radiation Therapy for Prostate Cancer
Student Researcher: Nathan Kangas
Faculty Mentor: Jacqueline Drouin, Physical Therapy

Mentoring Researchers in an Arts-infused Community
Student Researcher: Shinko Kondo
Faculty Mentor: Jacqueline Wiggins, Music, Theatre and Dance

Reduction of Noise Levels in the Pediatric Intensive Care Unit of Beaumont Hospital
Student Researcher: Avanish Konkani
Faculty Mentor: Barbara Oakley, Industrial and Systems Engineering

Synthesis and Electrochemistry of Rhenium and Manganese-based Electrocatalysts for the Reduction of Carbon Dioxide to Carbon Monoxide
Student Researcher: Daniel Kurtz
Faculty Mentor: Greg Felton, Chemistry

Thematic Music Activates Concepts and Affects Performance in a Story Generation Task
Student Researcher: Candice Lambert
Faculty Mentor: Cynthia Sifonis, Psychology

Biological Markers in Atherosclerosis
Student Researcher: Christopher Lucier
Faculty Mentor: Rasul Chaundhry, Biological Sciences

American Dance Festival
Student Researcher:
Catherine MacMaster
Faculty Mentor: Gregory Patterson, Music, Theatre and Dance

Translating Movement: A Study of Dance in American and Ghanian Cultures
Student Researcher:
Catherine MacMaster
Faculty Mentor: Alison Woerner, Music, Theatre and Dance

Effect of Hazardous Chemicals on Cord Blood Stem Cells
Student Researcher: Christina McKee
Faculty Mentor: Rasul Chaundhry, Biological Sciences

Music Primes Schemas on a Narrative Generation Task
Student Researcher: Stacy Memering
Faculty Mentor: Cynthia Sifonis, Psychology

Finding My Voice: Musical Thinking/ Process as Analysis Process in a Qualitative Study
Student Researcher: Miroslav Minovski
Faculty Mentor: Jacqueline Wiggins, Music, Theatre and Dance

Most Commonly Reported Injury Categories Among Female Roller Derby Athletes
Student Researcher: Teresa Nagy
Faculty Mentor: Jacqueline Drouin, Physical Therapy

Discovery, Annotation and Expression Analysis of Argenine/ Serine (SR) in Maize and Sorghum Using the Plant Genome Database Plant GDB
Student Researcher: Tara Patrick
Faculty Mentor: Shailesh Lal, Biological Sciences

Coming to an Understanding: Writing Centers and Multicultural Views of Plagiarism
Student Researcher: Enrique Paz
Faculty Mentor: Dana Driscoll, Writing and Rhetoric

Percussive Arts Society International Convention
Student Researcher: Stephanie Perlaki
Faculty Mentor: Mark Stone, Music, Theatre and Dance

Clearing Away the Rubbish, Reinventive Virginity in Blake's Visions of the Daughters of Albion
Student Researcher: Aaron Richman
Faculty Mentor: Robert Anderson, English

Oral History Association Annual Conference in Denver
Student Researcher: Rachel Seiderman
Faculty Mentor: Cornelia Pokrzywa, Writing and Rhetoric

Developments in Renewable Energy Using Hydrogen Fuel Catalysts
Student Researcher: Leart Sejdarasi
Faculty Mentor: Greg Felton, Chemistry

Theatre for the Thirsty Presents: Kingdom Undone
Student Researcher: Gina Smothers
Faculty Mentor: Jeremy Barnett, Music, Theatre and Dance

Attitudes on Academic Writing: Perspectives in Japan
Student Researcher: Jessica Tess
Faculty Mentor: Dana Driscoll, Writing and Rhetoric

Mentoring Researchers in an Arts-infused Community
Student Researcher: Phyllis White
Faculty Mentor: Jacqueline Wiggins, Music, Theatre and Dance

Effects of Baseline Activity Levels on Physical Activity, Energy Expenditure, Sleep and Fatigue in Men Undergoing Radiation Therapy for Prostate
Student Researcher: Tracey Winkler
Faculty Mentor: Jacqueline Drouin, Physical Therapy

Estrogen-like Effects of Bisphenor A (BPA) on Estrogen Receptor (ER) and Tumor Suppressor Protein p53 in Breast Cancer Cells
Student Researcher: Maria Yonen
Faculty Mentor: Sumit Dinda, Biological Diagnostic and Therapeutic Sciences

Provost Undergraduate Student Research Awards — Fall 2011

Effects of Bisphenol A (BPA) on the Expression of Estrogen Receptor and Tumor Suppressor Protein p53 in Breast Cancer Cells
Student Researcher: Maria Yonan
Faculty Mentor: Sumi Dinda

Effects of BPA on Tumor Suppressor Proteins BRCA1 and BRCA2
Student Researcher: Alessandra Boufford
Faculty Mentor: Sumi Dinda

Overcoming Fundraising Challenges: A Community Resource for Small Nonprofit Organizations
Student Researcher: Emily Day-Cervenak
Faculty Mentor: Dana Driscoll

A Solution of the Mechanical Bidomain Model Using Numerical Methods
Student Researcher: Vanessa Punal
Faculty Mentor: Bradley Roth

Differentiation of Cord Blood Stem Cells into Neural and Retinal Progenitor Cells
Student Researcher: Katie Bochenek
Faculty Mentor: Rasul Chaudhry

Student research award recipients *continued*

Increasing the Rate of Hydrogen-producing Catalysts
Student Researcher: Richard Hulme
Faculty Mentor: Greg Felten

Role of CD8 T Cells in the Clearance of HSV-1 Infection from the Cornea
Student Researcher: Ashima Vohra
Faculty Mentor: Susmit Suvas

Lowering the Energy Barrier to Hydrogen Production
Student Researcher: Joseph McCormick
Faculty Mentor: Greg Felten

Provost Undergraduate Student Research Awards — Winter 2012

Assessment of the Occurrence of Antibiotic Resistant Bacteria in Microbial Communities of Wild Waterfowl (Geese) Feces
Student Researcher: Natasha Bhutani
Faculty Mentor: Satish Walia

What Makes the Happiest People So Darned Happy?
Student Researcher: Alyssa Vela
Faculty Mentor: Robert Stewart

Associations Between Civic Engagement and Satisfaction with Life
Student Researcher: Emily Olthof
Faculty Mentor: Robert Stewart

What Contributes to Satisfaction with Life and Well-being?
Student Researcher: James Byrne
Faculty Mentor: Robert Stewart

An Oncology Exercise and Health Promotion Research Program
Student Researcher: Lauren LaBelle
Faculty Mentor: Tanis Hastmann

Super Foods Taste and Try Challenge
Student Researcher: Emily Gellish
Faculty Mentor: Tanis Hastmann

Catalytic Conversion of Carbon Dioxide into Liquid Fuels
Student Researcher: Daniel Kurtz
Faculty Mentor: Greg Felten

The Effects of Sialytransferase on the Synthesis of Gangliosides
Student Researcher: Megan Czarnowski
Faculty Mentor: Kathleen Moore

2012 postdoctoral scholars at Oakland University

Sreenivasulu Gollapudi
Current projects: (1) Functionally Graded Ferroics and Magnetoelectric Interactions; (2) Self-assembled Multiferroic Nanostructures and Studies on Magnetoelectric Interactions
Department: Physics
Faculty Mentor: Gopalan Srinivasan

Rakesh Pathak
Current project: Mechanisms of RSC Recruitment and its Role in Transcription
Department: Biological Sciences
Faculty Mentor: Chhabi Govind

Nian Wang
Current project: Degradation of Articular Cartilage Detection by Micro-MRI
Department: Physics
Faculty Mentor: Yang Xia

Zhe Wang
Current project: Autonomous Electrochemical Gas Detection Microsystem for Mine Safety
Department: Chemistry
Faculty Mentor: Xiangqun Zeng

Hettige Chiminda
Current project: Autonomous Electrochemical Gas Detection Microsystem for Mine Safety
Department: Chemistry
Faculty Mentor: Xiangqun Zeng

Anil Kumar
Current project: Mechanisms for Radiation Damage to DNA
Department: Chemistry
Faculty Mentor: Michael Sevilla

Amitava Adhikary
Current Project: Radiation Damage to DNA — Effects of Modifiers and LET
Department: Chemistry
Faculty Mentor: Michael Sevilla

Abdul Rehman
Current Project: Ionic Liquid Electrochemical and Piezoelectric Sensors for Standoff Explosive Detection
Department: Chemistry
Faculty Mentor: Xiangqun Zeng

Chunhui Xiao
Current Project: Ionic Liquid Electrochemical and Piezoelectric Sensors for Standoff Explosive Detection
Department: Chemistry
Faculty Mentor: Xiangqun Zeng

Liang Tan
Current Project: Label-free Biosensors for Detection of Serum Biomarkers for Clinical Diagnostics
Department: Chemistry
Faculty Mentor: Xiangqun Zeng

Roman Khymyn
Current Project: Materials World Network: Dynamically Controlled Artificial Magnonic Materials Based on Arrays of Nano-sized Magnetic Dots
Department: Physics
Faculty Mentor: Andrei Slavin

Jing Li
Current Projects: (1) Development and Laboratory Implementation of an Accelerated Testing Method for Vehicle Systems Using Time-dependent Reliability/Durability Principle; and (2) Enhancements to the Chrysler Door Closing Effort Model and Development of a Liftgate Closing Effort Model
Department: Mechanical Engineering
Faculty Mentor: Zissimos Mourelatos

Xianjie Yang
Current Projects: Fastening and Joining Research: Vibration-loosening, Non-linear Modeling and Simulation, Fatigue and Damage Modeling.
Department: Mechanical Engineering-FAJRI
Faculty Supervisor: Sayed Nassar

Andrey Ilinich
Current Project: Numerical and Experimental Analysis of Tube Hydroforming Mechanics for Advanced Manufacturing Processes
Department: Mechanical Engineering
Faculty Mentor: Lorenzo Smith

Alexander Mamutov
Current Project: Numerical Modeling of Electrohydraulic Forming Processes
Department: Mechanical Engineering
Faculty Mentor: Lorenzo Smith

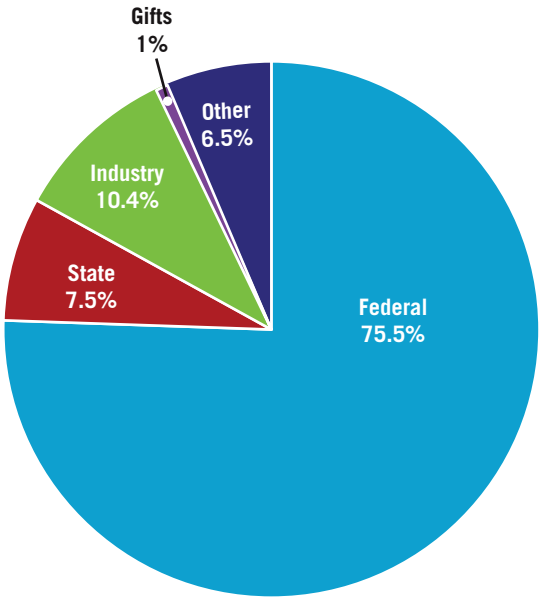
Vijitashwa Pandey
Current Projects: (1) A Novel Integrated Approach for a Resource-efficient Design Validation Co-process; (2) Reliability Assessment and Optimization of a Smart Charging Microgrid
Department: Mechanical Engineering
Faculty Mentor: Zissimos Mourelatos

Zhonglai Wang
Current Project: Time-dependent Reliability Using Subset Simulation with Markov Chain Monte Carlo and Splitting
Department: Mechanical Engineering
Faculty Mentor: Zissimos Mourelatos

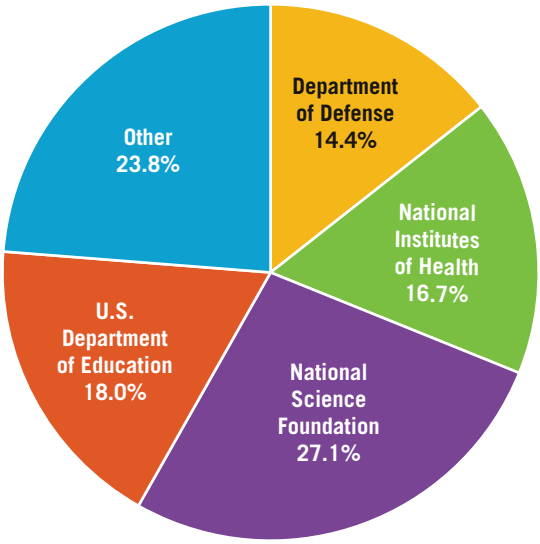
By the numbers

Fiscal Year 2011

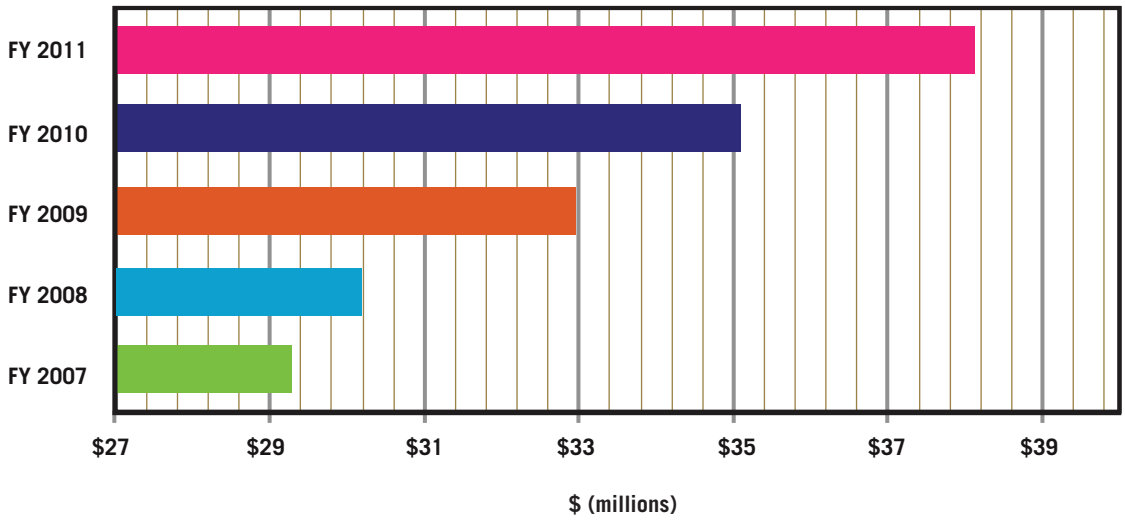
Research support by source



Federal research awards by agencies



Institutional research expenditures



Office of Research Administration agency list — FY 2011

Aastrom Biosciences, Inc.
American Chemical Society
Auto/Steel Partnership
Battelle, Pacific Northwest Division
Bayer CropScience
Beaumont Health System
Beta CAE Systems USA, Inc.
Blue Cross Blue Shield of Michigan
Camille and Henry Dreyfus Foundation
Centers for Disease Control
City of Detroit
Clinton River Watershed Council
Community Foundation for Southeastern Michigan
Chrysler Corporation
Defense Advanced Research Projects Agency
Department of Veterans Affairs
Detroit Area Pre-College Engineering Program
DTE Energy
East Michigan Environmental Action Council
Economic Development Administration
Elsa U. Pardee Foundation
Federal Aviation Administration
Fisheries and Oceans Canada
Ford Motor Company
Foster-Miller, Inc.
General Dynamics Land Systems, Inc.
General Motors Corporation
General Motors Powertrain
Harley-Davidson Motor Co.
Harvard Medical School
Health Resources and Services Administration
Henry Ford Health System
Hughes Research Laboratory
Huron Mountain Wildlife Foundation
Infogation Corporation
Intelligent Automation, Inc.
International Writing Centers Association
Intrepid Control Systems
International Joint Commission
Kellogg Foundation
Korea Institute of Energy Technology Evaluation and Planning
Macomb County Government
Macomb Intermediate School District
Magna International, Inc.
Michigan Campus Compact
Michigan Council for Arts and Cultural Affairs
Michigan Department of Community Health
Michigan Department of Education
Michigan Department of Labor and Economic Growth
Michigan Economic Development Corporation
Michigan Humanities Council
Michigan Space Grant Consortium
Michigan Universities Commercialization Initiative
Microstar Technologies LLC
Midwest Campus Compact STEM Consortium
Midwest Eye-Banks
National Eczema Association
National Inclusion Project
National Institutes of Health
National Science Foundation
National Security Agency
National Writing Project
Oak Ridge National Laboratory
Office of Naval Research
OptimizeRx
Pharaoh Industries
Procter & Gamble Pharmaceuticals, Inc.
Reading Recovery Council of North America
RHK Technologies
RNET Technologies, Inc.
Ropard Foundation
Sigma Theta Tau International
Southeast Michigan Resource Conservation & Development
SpinDance, Inc.
St. John Health System
State of Michigan
TD Auto Finance
The E. Matilda Ziegler Foundation for the Blind, Inc.
The Fieldman Sims Foundation
The Kresge Foundation
The Lincy Foundation
The Templeton Foundation
ThromboGenics
Trier University of Applied Sciences
U.S. Army
U.S. Automotive Materials Partnership
U.S. Department of Agriculture
U.S. Department of Education
U.S. Department of Energy
U.S. Department of Labor
U.S. Environmental Protection Agency
U.S. Small Business Administration
U.S. Navy
Vision Research Foundation
Vistakon Pharmaceuticals

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