With professors finding success at the National Institutes of Health’s top funding tier — where impact is greatest on the treatment of cancer, stroke and other conditions — the university is finding creative ways to help more researchers achieve at this level.

Welcome to the 2019 edition of Discover magazine. Marquette University aspires to be among the most innovative and accomplished Catholic and Jesuit universities in the world. Each year as we prepare our next issue of Discover, I am so impressed and proud to be able to tell you about some of the many ways that we live out our mission through scholarship and research.

In this year’s edition we feature Kristy Nelson’s groundbreaking work on dementia: Craig Andrews’ research on marketing and public health: Bryan Rindfleisch’s scholarship on previously overlooked historical experiences of Indigenous Americans: Lisa Grabert’s leadership in the study of bipartisan Medicare reform efforts; and the health-related research that has led to a campus record number of active R01 awards from the National Institutes of Health this year. In addition, we profile the work of 10 outstanding faculty from the National Institutes of Health this year. In the NIH R01 article, the donor-supported R01 Challenge has contributed to growth in this prestigious external funding. The Explorator Challenge, also supported by generous donors, has seeded numerous innovative campus projects led by faculty, staff and students and received national recognition this year as a model that other universities could adapt to foster innovation. Thank you for helping make this and so many other opportunities possible.

Visit marquette.edu/innovation to discover more ways that Marquette innovates.

We appreciate your feedback on Discover. Please send all comments to the editor at stephen.filmanowicz@marquette.edu.

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RESEARCH IN BRIEF

An outside view of U.S. foreign policy law; helping stroke victims speak again; treating trauma-exposed children; an app to help autism caregivers; how Airbnb affects property values; fighting dental plaque; bridging a religious divide; portrayals of migrants in Spanish culture; and documenting endangered terns.

SPARK

Protecting Central American water; research partnerships with corporations; a student-run shop in Milwaukee; challenge funds inspiring innovation; a sneek peak at the Athletic and Human Performance Research Center.

BOOKSHELF

EXTENDED REACH

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MAPPING MEMORY

Dr. Kristy Nelson earns a Haggerty award for work detecting early markers of dementia and strategies for slowing the disease. Plus, fellow Haggerty awardee Dr. Craig Andrews targets public health gains with better health-risk warning.

HISTORY REVEALED

New scholarship by Dr. Bryan Rindfleisch calls for a change in the conversation about early Indigenous Americans.

FIXING MEDICARE FROM WITHIN

Former D.C. policymaker Lisa Grabert investigates the implications of health care legislation that she helped pass.

NIH R01 grants are where Marquette professors have the greatest potential health impact — and the university is getting creative to help more researchers achieve at this level.

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Dr. Kristy Nielson’s award-winning research uses fMRI imaging to reveal early signs of dementia — and explores exercise to slow brain decline.

What did you know, and when did you know it? The classic detective question is not much different from a research question that has consumed Dr. Kristy Nielson’s career. Only Nielson, a cognitive psychologist, might pose a variant — what did you know, and when did you start to forget it — as she unlocks mysteries of memory and learning, especially as they relate to aging.

In Nielson’s 22 years at Marquette, her focus has been both on older people with obvious signs of dementia — Alzheimer’s disease is the main one — and people earlier in life whose brains show markers that predict memory loss but whose behavior isn’t yet affected. Asking the questions that yield useful answers requires high-tech imaging tools, including functional MRI and electroencephalography. And Nielson notes her good fortune in getting an early start with fMRI thanks to being in Milwaukee. The Medical College of Wisconsin was one of three centers in the nation to develop the technology. At the time, the late 1990s, it wasn’t yet used to study aging or Alzheimer’s. But Nielson quickly saw its potential.

“I thought right then, as I started to learn it, that it would become incredibly important for understanding how and when the brain begins to change, letting us look inside much earlier than before — before the symptoms start — to see what changes and to try to stop it,” she says. “Of course, that’s what we still do, so it was certainly discernment.”

The role of Nielson, professor of psychology, in developing techniques that aid in the detection of cognitive dysfunction prior to full-blown dementia, stands as one of her most important contributions, says Dr. Stephen M. Saunders, chair and professor of psychology. So does her work developing procedures to improve memory, especially among individuals experiencing early memory loss due to aging.

Nielson has secured 35 research grants in her Marquette tenure, with another five ongoing. The grants have brought in more than $15 million and resulted in about 70 articles in peer-reviewed publications. In her department, “she is unmatched in the number of and total value of extramural grants she has obtained,” says Saunders, “and her research productivity in terms of publications and presentations is unparalleled.”

For all these accomplishments, Nielson was a winner of the 2018 Lawrence G. Haggerty Faculty Award for Research Excellence, Marquette’s highest research honor for faculty. In accepting the award, she recalled her undergraduate career, when she was studying speech
pathology and thinking of becoming a chef. “Then I fell completely in wonder and in love with the brain during a brain dissection class,” she says. “I volunteered as a research assistant for three different professors and became the teaching assistant for that brain dissection class. And then I realized, and here we are.”

During that span, Nielsen’s Aging, Imaging and Memory Lab has established itself as a recognized leader in research on memory with a partner list of researchers, universities and labs around the world. Using technology such as the aforementioned fMRI and EEG scanning, the lab investigates how memory can be made stronger and how the brain ages. Students use the lab to search for the roots of Alzheimer’s disease and dementia (she’s earned a reputation as a generous mentor too).

Nielsen has directed multiple long-term studies that identified extensive functional brain region differences a person’s autonomic nervous system regulation responds to difficult thinking tasks. “Thinking requires more oxygen to the brain cells, increased blood flow,” she says. “But older adults have poorer regulation, a lessened ability to respond quickly, and those with e4 have even poorer regulation. However, through exercise, this regulation can be improved, so we are beginning to study whether interventions targeting improvement in autonomic nervous system regulation could improve cognition and decrease the rate of cognitive decline in those at risk.”

Focusing on pathological and neurobiological differences, Nielson has helped reveal the brains of high-risk carriers of the genotype engaging at an earlier age in activity through which aging brains compensate for decline — essentially working harder to perform memory tasks. In earlier phases, this increased brain activity masks decline among carriers of this genotype (referred to as e4, for shorthand), until eventually these efforts fall short. “Then the system is essentially ‘tapped.’ When there is enough damage that further compensation is not possible, the brain activity actually declines, which is associated with cognitive decline.”

Fortunately, regular exercise has proved protective in e4 carriers, improving their ability to compensate for declining brain integrity — a promising line of research Nielsen is pursuing through two major National Institutes of Health grants with partners at the Cleveland Clinic, University of Maryland and elsewhere. “We are doing a clinical trial of exercise to examine whether brain function and cognition improve and are better maintained over time in those at risk for Alzheimer’s as a result of exercise,” she says. “We are also examining the ways in which exercise might have its protective effects. We are particularly studying whether exercise reduces inflammation in the brain that APOE e4 is known to increase.”

With additional NIH support, Nielsen is also working to understand the role improved cardiovascular health plays in maintaining brain function, specifically how well a person’s autonomic nervous system regulation responds to difficult thinking tasks. “Thinking requires more oxygen to the brain cells, increased blood flow,” she says. “But older adults have poorer regulation, a lessened ability to respond quickly, and those with e4 have even poorer regulation. However, through exercise, this regulation can be improved, so we are beginning to study whether interventions targeting improvement in autonomic nervous system regulation could improve cognition and decrease the rate of cognitive decline in those at risk.”

At the cutting edge of science with implications for how millions live out their later years, Nielson is driven by her development of memory-boosting techniques that help detect cognitive dysfunction prior to full-blown dementia stands as an important contribution, as does her development of memory-boosting procedures for those with early memory loss.
Dr. Bryan Rindfleisch wants to change how early American history is theorized and taught, starting with his own classroom. Too often, entire populations are referred to as “natives” organized into “bands” or “war parties” that pit the “wilderness,” carrying out massacres and “scalpings,” he argues in a 2017 article. Even in top-level conferences on the subject, the old words crop up.

To make a dent in the issue, the assistant professor of history gave his students the power to interrupt him when he used dated nomenclature, and he interrupted them. “It was a sobering experiment,” he writes, “but by the end of the semester, students remarked about the incredible change in the ways they talked about and thought about indigenous Americans and their histories and cultures. These were real people now.”

Rindfleisch’s upcoming book, George Galphin’s Intimate Empire: The Creek Indians, Family, and Colonialism in Early America is part of his mission to illuminate how indigenous Americans really interacted with Europeans. As an obscure Irishman, George Galphin traded with Creek people living in western Georgia and built a trusting relationship with them, taking over the nearby Silver Bluff plantation in the 1750s and marrying a Creek woman, Metawney, from a prominent family. Metawney came from a nearby Creek town called Coweta that Rindfleisch describes as “cosmopolitan” in that it was a crossroads for the Creeks, Europeans, escaped slaves and other peoples. Indigenous communities like Coweta, he says, kept the peace for the most part and “are probably the most adaptable cultures that have ever existed.”

Galphin got started in the Americas as a deacon-trader and quickly established himself as a trusted go-between for the Europeans and Creeks, who were also known as the Muscogee. The son of poor linen weavers, Galphin brought over some of his relatives, and his busy plantation house became a thrifty-sized melting pot. According to Rindfleisch, the richness of European-Native American relations and the many peaceful interactions are easy to overlook alongside acts of violence perpetrated by both sides. Creeks traded with Europeans for guns, and the Europeans traded with Creeks for cannon.

By the end of the French and Indian War in 1763, the English were the only Europeans remaining in modern-day Georgia, and they approached Galphin for help in acquiring Creek lands in the western reaches of the state. He brokered two land deals ceding Creek territories to the English and so became less of an ally and more of a manipulator. The sweeping Treaty of Augusta in 1773 surrendered 2 million acres of Creek land, shortly before the start of the Revolutionary War. Galphin had provided an interesting window into his time, but for Rindfleisch’s planned second book, he wants to further explore Native American history outside the influence of Europeans. A perennial problem with early American history, he says, is how it seems to require the presence of Europeans when there’s plenty to talk about without them.

As a young academic, he’s already won a string of awards, including a Marquette Way Klingler Young Scholar award in 2018 and several fellowships that will run through at least 2019: Knox College’s Blight Institute Research Fellowship in Early American History, The University of North Carolina at Chapel Hill’s Archie K. Davis Fellowship and the National Endowment for the Humanities’ Digital Native American and Indigenous Studies Fellowship.

With this scholarly support, Rindfleisch is returning to familiar ground: The Creeks and nearby Cherokee have a dense interwoven history he plans to mine further. Among his findings so far is that certain members of the Creeks held dual titles with the Cherokees, allowing them to act as diplomats or go-betweens during times of war. Similar relationships existed between the Chippewa and Choctaw tribes of present-day Tennessee, Alabama and Mississippi, so Rindfleisch submitted an article on these individuals to the prestigious Journal of Southern History, which prints very little indigenous history, to test if he could break through. To his surprise, his paper was quickly accepted for publication, and he did a scholarly fist pump. It was a departure for the journal normally focused on the Civil War and the “old South.”
Fixing Medicare From Within

For health policy researcher Lisa Grabert, it was a graduate class on physician profiling that flipped a switch in her psyche, setting her on the path to specialization in the health policy field.

The gist of the class was straightforward: Specific physicians are better at treating specific populations of people, and if you match the right doctors with the right patients, patient outcomes will improve.

The contents of that watershed class fascinated Grabert, and the promise of improving patients’ health through data inspired her to choose health care as her focus. “I thought, ‘Wow, that’s kind of amazing that you can have the power to steer patients to better or worse health care options based on data and analytics,’” Grabert recalls. “And I thought, ‘This is it. This is what I want to do for the rest of my life….’ And why not do it at the largest payer in the world, which is Medicare?”

Using data to change behavior and incentivize better health care outcomes for Medicare patients is at the heart of Grabert’s research endeavors. The Washington insider, who has held roles in the federal government’s executive and legislative branches, came to Marquette last June through a novel joint appointment with Georgetown University. As a College of Nursing visiting research professor, Grabert is in the unique position of studying the implications of Medicare legislation that she helped craft and pass.

That legislation stems from Grabert’s nearly six years as a high-ranking senior aide for the Ways and Means Committee in the U.S. House of Representatives, where management of Medicare was a recurring focus. Providing health insurance coverage to nearly 60 million Americans, 84 percent of them over 65, the program is considered a grateful Dr. Janet Wessel Krejci, dean of the College of Nursing, who adds, “Our nurses need to be empowered to understand complex health policies to students, faculty and other Marquette community members, says a grateful Dr. Janet Wessel Krejci, dean of the College of Nursing, who adds, “Our nurses need to be empowered on health care policy so that they, in turn, can help patients and communities maneuver and leverage the health care system to their advantage.”

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In her own words, Dr. Jennifer Evans was “a naive graduate student” in behavioral neuroscience — exploring the role of the brain’s master clock, the suprachiasmatic nucleus, in regulating sleep cycles, metabolism, insulin release and other bodily systems — when she struck gold with one of her ideas. At the time, researchers studying the body’s circadian rhythms, and the potential havoc wreaked by disrupting them, were stymied by an inability to get inside a working brain to experiment on the clock. But Evans wondered: Could cellular components of the clock be induced to get profoundly out of sync and then removed from the brain? Could those master clock cells continue to function in a culture dish to help researchers understand how the cells communicate with one another? Could various harvested cell types be activated or impaired to yield insights on their roles in the clock’s workings? Evans sought out internships and a postdoctoral fellowship to give herself the technical knowledge to test those ideas. After promising initial findings, she presented them at conferences to impressed colleagues. By the time she joined Marquette’s College of Health Sciences in 2013, the sky was the limit — if only Evans could obtain the significant sums she’d need to hire graduate and undergraduate assistants, purchase equipment, activate a full research plan and have the financial flexibility to take necessary risks. “In my first one and a half years at Marquette, I must have submitted 20 grant applications,” she recalls. “I applied to every potential funder I could find.” Evans, now an associate professor of biomedical sciences, invested special care in her applications to the National Institutes of Health. Accounting for 27 percent of the external dollars awarded to Marquette researchers, the NIH is the university’s largest single source of research funding, a significant way for faculty members in health-related fields to advance promising research ideas. (The next largest funder, the U.S. Department of Education, accounts for 9 percent.) The numbers are impressive. NIH grants currently fund 35 faculty research projects at Marquette. Those range from mentored K01 and R00 awards for post-doctoral fellows and new faculty members to a substantial $2.5 million award through the UD1 program, which funds research conducted jointly by university and health care industry partners. Four R21 grants to Marquette fund high-risk exploratory research, while 14 projects across campus receive funding through the R15 program for midsize and smaller research universities. Then there are R01 grants, NIH’s gold standard, reserved for the projects with the strongest science and most significant potential health benefits. Marquette faculty members currently serve as lead investigators on projects funded by 12 such grants, nearly $20 million powering the impressive array of science profiled in these pages, the pursuit of novel solutions in critical areas such as cancer care, stroke recovery and cardiovascular disease treatment. Fortunately for Evans, two of the applications she submitted met with success, and one of those was an NIH R01 grant totaling $1.7 million. “Excitement, relief and a sense of accomplishment and pride in being able to compete at that stage” are emotions Evans recalls feeling when the news was confirmed. And to be sure, there was nothing easy about competing for this grant, which went through two rounds of consideration (and redrafting) before getting to “yes.” “Grant writing in general is a very exacting, demanding competitive sport. And NIH R01 grants are the big leagues,” she says. “It’s also a good process for getting the best science. That challenge compels people to think deeper about their science, to think about the best way to conduct the research and how it might translate and impact the world around you. They demand you think about those things.” Besides putting Marquette on the map as a significant site for circadian rhythm research, the grant has opened an array of doors for Evans, including collaboration with a top scientist, her co-investigator Dr. Murray Blackmore, who is helping her develop new genetic approaches to manipulate master clock cells. Accounting for 27 percent of the external dollars awarded to Marquette researchers, NIH grants are a significant way for faculty members in health-related fields to advance promising research ideas.
With the number of active R01 grants climbing here recently, Marquette is aiming higher. In support of the ambitious goal in Marquette’s strategic plan to rapidly expand research funding, the university has established several initiatives to boost faculty NIH success, including:

- Facilitating grant-writing workshops, panels and institutes that teach best practices and provide mentorship.
- Sponsoring a set of the challenge grants per year to faculty members whose applications achieve high scores from NIH but miss out on approval.
- The $30,000 internal awards help the faculty members gather more preliminary data and strengthen follow-up requests for funding.
- Creating a summer cohort to help early- and mid-career researchers clarify their research aims and write more compelling applications for various grants inside and outside NIH, not necessarily R01s.
- Adding a grant writer position to the Office of Research and Sponsored Programs.
- Adding a research faculty fellow in the Office of Research and Innovation.

Serving as the first research faculty fellow is Dr. Sandra Hunter, professor of exercise science and an accomplished researcher herself, who co-leads an R01 funded project with Dr. Robert Fitts, professor emeritus of biological sciences. When not in the lab or classroom, Hunter works as the director of Marquette’s Office of Research and Sponsored Programs. They help advance Marquette’s mission as a Catholic, Jesuit university in pursuit of justice, she says. “Part of social justice is improving the quality of health for all. Clearly the NIH and Congress believe that goal is important as well, which is why researchers need to include the public health relevance of their projects in their grant proposals.”

Numerous professors have now benefited from the university’s challenge grants. “I cannot emphasize enough how important these internal grants are to help push people forward and allow them to apply for bigger grants,” says Dr. Allison Hygstrom, who used a challenge grant to hone a well-scored proposal to use ischemic conditioning, a treatment incorporating a blood pressure cuff to improve blood flow to muscles during exercise, to help those struggling to walk after experiencing a stroke. “It’s the seed money is really, really important to help you build momentum in a project.”

In complete agreement is Dr. Edwin Anthony, former assistant professor of biological sciences. The recipient this spring of a $1.2 million R01 award to study proteins involved in DNA repair, he asked Marquette research officials to inform the anonymous donor underwriting the internal challenge grants of the “critical role” these funds played in his recent NIH success.

With their real potential to yield human health benefits now or down the line, NIH-funded projects help demonstrate how these funds played in his recent NIH success.

Cleaner spectral CT images — even in highly challenging cases

For more than a decade, Dr. Taly Gilat-Schmidt, associate professor of biomedical engineering, has been driving advances in computerized tomography imaging, developing algorithms to improve the diagnostic value of CT images without increased radiation dosages to patients. CT scanners in medical centers around the world, for example, incorporate software she co-developed that smartly selects the most motion-free images of cardiac arteries from the numerous images generated by a single scan.

Two NIH grants — a previous exploratory R21 grant and a just-announced R01 grant — have Gilat-Schmidt and partners from Marquette and the Medical College of Wisconsin working on the frontier where “spectral CT” technology makes use of X-ray energy information to better distinguish among materials in the body. Gilat-Schmidt’s lab at Marquette was one of the first to acquire a prototype of a photon-counting detector system, a promising spectral technology. And with her partners on the R21 grant, she developed a key algorithm that “extracts that spectral information from detectors and uses it to make better images,” she reports.

With the new $1.4 million R01 grant, Gilat-Schmidt and her team are using that algorithm to solve a medical problem — the glare and distortions that metal objects such as orthopedic rods or screws create in CT images. Even with standard correcting algorithms applied (top left), the artifacts can obscure the exact size and shape of cancerous tumors. Applying the new algorithm to the image in a computer simulation yields a clear image (bottom left) that could allow oncologists to pinpoint and irradiate tumors with less damage to surrounding tissue. “We were shocked at how well our algorithm did. But this is a simulation,” says Gilat-Schmidt, whose challenge now is to develop therapies for health risks linked to spectral radiation disruption.

Dr. Jennifer Evans, $1.74 million

The disruption of circadian rhythms has been linked to diseases such as cancer, cardiovascular disease, obesity and immunodeficiency. Evans, associate professor of biomedical sciences, is analyzing how circadian rhythm-related neural pathways interact with each other to control circadian behavior. The insights are used to develop therapies for health risks linked to circadian rhythm disruption.

Dr. Robert Fitts and Dr. Sandra Hunter, $2.8 million

Do older adults fatigue faster because of inefficiencies in muscle fiber rather than central nervous system fatigue? Fitts, professor of exercise science, and Fitts, professor emeritus of biological sciences, address this question using a novel exercise training program and fiber-differentiated cellular examination, while developing mobility-extending exercise regimens leveraging muscle fiber types susceptible to fatigue.

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Dr. Paul Gasser, $2 million

Gasser, associate professor of biomedical sciences, and fellow neuroscience faculty members are unraveling the neurobiological mechanisms that contribute to increases in relapse vulnerability in cocaine addicts during periods of stress.

The project focuses on the regulation of dopamine levels in specific brain regions by a transport mechanism that is limited by glucocorticoid stress hormones. The findings will be used to improve treatment and management of addiction.

Dr. James Kiclaed, $1 million

Kiclaed, the chair and professor of chemistry, is using Raman spectroscopy, which provides a molecular-level fingerprint for the study of biomolecules. The project will yield new treatment criteria.

Dr. Nicholas Reiter

Reiter, associate professor of biomedical engineering, is studying a gene that could help damaged spinal nerves grow, with the potential of restoring movement to a body that had lost it. Several years into the project, Blackmore and his team were spurning “robust regenerative” spinal nerve growth using a technique called stem-cell bridging to insert the pro-regenerative gene, KLF6, harvested from a virus, into the DNA of mice with damaged spinal cords. “That was the good news. The bad was that the animals in the study were not seeing any benefits in increased function or mobility,” says Blackmore.

At a research crossroads, the path also taken

Blackmore was at a crossroads, facing a choice between two possible solutions. The first involves improving the function of nerve fibers his team has already grown — possibly through rehabilitation or electrical stimulation. “Or maybe the axon has a targeting problem through rehabilitation or electrical stimulation. The results will help develop new therapies for people with SCI.

Championing RNA, tackling cancer

Among the three primary biomolecules of living cells, much attention has been lavished on DNA, with its elegant double-helix structure and role as part of the blueprint of our genome. Proteins are praised as workhorses, turning fuel into cell productivity. RNA, meanwhile, has often been described in humbler terms. “RNA was thought to be this flexible and unstructured molecule,” says Dr. Nicholas Reiter, assistant professor of chemistry. “It was thought to be this intermediary — a means to get to the core machinery of the cells.”

Still early in his career, Reiter is among the leading scientists revealing the relationship between RNAs newly discovered structural diversity and its movement in myriad cell functions. It’s a role he’s played since his NIH-funded post-doctoral years, when he mapped out the near-atomic-level structure of an essential RNA-centric enzyme, ribonuclease P, that helps process all transfer RNAs, the key communicators of protein synthesis. The result showed that RNA, much like protein machinery, has rich structural complexity and helped close the book on Nobel Prize-winning 1980s research that discovered catalytic RNA. Funded by a $1.5 million R01 award, Reiter is using X-ray crystallography to define the mechanism by which a non-coding RNA, TERRA, acts in genome surveillance at the ends of chromosomes. The TERRA RNA is designed to curb cancer cell proliferation.

Dr. John LaDisa, $1.5 million

LaDisa, Eng’00, Grad’01, ’04, associate professor of biomedical sciences, is using Raman spectroscopy, which provides a molecular-level fingerprint for the study of biomolecules. The project will yield new treatment criteria.
As an undergrad research assistant using images to understand how bacteria colonies were populating in a petri dish, Dr. Henry Medeiros never envisioned how this technology would evolve. Now, as an assistant professor of electrical and computer engineering in the Opus College of Engineering, Medeiros is using similar techniques to develop computer vision applications for manufacturing, agriculture and security advancements.

"Computer vision research began 60 years ago, but in the first 50, progress was very slow," Medeiros says. With recent advances in machine learning, the field now is evolving at a much faster pace, and Medeiros thinks, "It's a great time to be a part of that." With even "more significant advances developing over the next decade," Medeiros' research seems to be surging with the technology tide.

Computer vision describes how computers can be programmed to "understand" information from digital images or video in order to perform tasks that humans typically do. Think facial recognition security on a mobile phone. Or driverless vehicles that track surrounding vehicles and pedestrians. Both apply computer vision in different ways.

With funding from the U.S. Department of Agriculture, Medeiros’ research team and USDA researcher Dr. Amy Tabb are using similar techniques to develop computer vision applications to combat the world's food security crisis. To predict fruit orchard productivity and better manage crops and harvesting, growers have traditionally used workers to manually count the number of flowers shortly after blooming. Medeiros’ project aims to improve bloom estimation by applying novel image understanding methods combined with recently developed multi-target tracking algorithms to analyze series of apple tree images collected manually, by ground robots or by drones under natural, challenging conditions that include imperfect weather and terrain. The result is faster, more accurate estimation.

Another project, funded with a three-year $299,930 grant from the National Institute of Standards and Technology, aims to measure the performance of a robotic manipulator mounted on an automated guided vehicle, or AGV. The team is investigating how well the robotic vision system can identify test points on a mapped artifact while both the AGV and manipulator simultaneously move. This technology, currently used in space exploration and military operations, is being tested for use in manufacturing assembly.

Medeiros’ lab is also deploying computer vision technology to identify and track passengers and baggage at simulated airport security checkpoints on a project funded by the Department of Homeland Security, and to measure river basin levels during peak flows to help mitigate stormwater runoff and untreated wastewater discharges. Interviewing people at the Ministry of Foreign Affairs, the Ministry of Defense, think tanks, universities and international law firms. He also collected Japanese-language publications on U.S. foreign relations law at the National Diet Library, Japan’s equivalent of the Library of Congress, and university law libraries.

His conclusions? "Normal programs of study and training on U.S. foreign relations law are essentially nonexistent in Japanese academia and within the government," says Scoville. He found just a handful of academics writing on the subject, contributing to a tradition of scholarship on U.S. foreign relations law in Japan dating to at least the 1930s. But he did find individuals carving out deep pockets of U.S. foreign relations law knowledge on a “need-to-know basis,” including officials at Japan’s Ministry of Economy, Trade and Industry, which is mired in bilateral trade negotiations with the Trump administration.

Scoville aims to facilitate more cross-cultural negotiation with foreign officials, and to further his international law knowledge on a “need-to-know basis,” including officials at Japan’s Ministry of Economy, Trade and Industry, which is mired in bilateral trade negotiations with the Trump administration.

Scoville spent the four-month grant period interviewing people at the Ministry of Foreign Affairs, the Ministry of Defense, think tanks, universities and international law firms.
Dr. Jeffrey Berry, associate professor of speech pathology and audiology in the College of Health Sciences, believes that improvements in the current models for helping people with brain injuries relearn how to communicate may come from finding a closer match with how speaking is learned in the first place. He has received a $450,000 grant from the National Institutes of Health to examine new therapies for non-progressive dysarthria, a speech disorder caused by muscle weakness stemming from stroke or brain injury.

“The current standard for rehabilitation therapy is a mimic-type setting, where automated motor behaviors present in speech — how you move your jaw, your lips, your tongue — are broken down into small chunks. It’s extraordinarily difficult and tedious,” Berry says. “It’s like learning to play the piano at an extraordinary level one key at a time. How do you go from a single key to Bachmanoff?”

Berry believes that auditory feedback is a key to developing more effective strategies to help people with severe dysarthria master those nearly automatic motor behaviors that most of us take for granted. “In this study, we’re looking at how what you hear affects how you learn, or relearn, to move your tongue, lips and jaw for speech,” Berry says.

In his lab, patients connect to a speech synthesizer that is manipulated using their own motor controls. The resulting auditory outputs don’t sound like their voices; they’re closer to a text-to-speech program on a computer. But self-agency, the simple fact that the speech sounds result from their motor behavior, allows their brains to identify them with their own speaking.

“There are different neurological pathways involved in processing auditory information, and one of the things we know is that listening to yourself speak, as opposed to listening to someone else, excites different networks in the brain,” Berry says. He anticipates that through this mechanism of auditory processing, using the voice synthesizer, patients will develop a less conscious method of actual speech, almost like an auditory motor reflex. “Our hope is that this auditory processing will cause the motor function to compensate over time, which will help the patient rehabilitate more quickly and more effectively,” he says.

Imagine the immense frustration of knowing what you want to say but being physically unable to articulate it because of a stroke or other traumatic brain injury. For more than 480,000 people each year, this frustration becomes their new reality.

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RESEARCH IN BRIEF

RESEARCHER
Dr. Sheikh Iqbal Ahamed
Professor, Mathematics, Statistics and Computer Science

CARE IN THE PALM OF YOUR HAND
Professor capitalizes on cell phone convenience to address the challenges of caring for children with autism.

The difficulty in treating autism spectrum disorder is reflected in its name. Because the condition presents itself in a range of symptoms and severity levels, each patient needs treatment personalized to his or her needs. That's difficult for doctors and costly for families.

Fortunately, Dr. Sheikh Iqbal Ahamed has developed a treatment personalized to his or her needs. That's difficult for doctors and costly for families.

Ahamed says earlier collaborations with Dr. Amy Van Hecke at the Sheikh Mujib Medical University in Bangladesh will launch mCARE in three locations in Bangladesh. The plan echoes a 2011 project Ahamed developed with oncologist Dr. Richard Love: an app that helped terminal Bangladeshi breast cancer patients manage their pain. That app proved so effective that Ahamed's team has expanded its palliative care work to include Love's patients in Nepal.

Ahamed and partners from Purdue University, the University of Toronto and the University of Maryland in Baltimore will launch mCARE in three locations in Bangladesh.

Ahamed's latest app, mCARE, allows caregivers to log a child's behavior and development by answering questions that are customized based on factors identified by each child's doctor, such as cognitive function or self-destructive actions. Doctors can then securely access that information online and use it to inform treatment decisions.

Ahamed says his work is just beginning to accept mHealth as a treatment option, but Ahamed has never doubted its potential. He even plans to integrate mHealth research into Marquette's data science curriculum. "It's an area where we can grow not only locally, but also globally."

CLAIRE NOWAK, COMM '16

HOW THE AIRBNB RENTAL NEXT DOOR AFFECTS YOUR HOME VALUE

Inside the latest research from the new academic director of Marquette's Center for Real Estate

It's no secret that Airbnb has disrupted the tourism industry worldwide, but how does the 10-year-old, $2 billion company affect the people and properties around its short-term rental properties?

That's the question Dr. Anthony Pennington-Cross, the Robert Bernard Bell, Sr., Endowed Chair in Real Estate and professor of finance in the College of Business Administration, is researching. Using eight years of Wisconsin Airbnb data, Pennington-Cross is looking at how this flexible supply of temporary lodging impacts property values.

A member of Marquette's finance faculty since 2006, Pennington-Cross studies mortgage trends, commercial property fundamentals and other urban and real estate issues. As a teenager from the New Jersey suburbs, trips to Manhattan sparked his fascination for cities, why people moved to them, or — as was the national trend when Pennington-Cross was growing up in the 1970s — why they left. To this day, he is especially curious about property value fluctuations and passionate about finding answers through research.

And this year, Pennington-Cross was named the Bell Chair, making him the academic leader of Marquette’s Center for Real Estate and its undergraduate research major, ranked 11th in the country by U.S. News & World Report. As the program's recruiter in chief, he helps freshmen see that real estate can be more than selling single-family homes and that Marquette's program is a route to expertise in managing and evaluating commercial property — anything from marketing and selling to ownership and finance.

With about 20 to 30 real estate majors graduating with bachelor’s degrees each year, he's proud that the program boasts a 100 percent job-placement rate.

Pennington-Cross currently works with a graduate of Marquette’s Master of Science in Applied Economics program on the Airbnb research, investigating not only Airbnb’s impact on property values but also on crime rates, specifically in Milwaukee. "There’s not much research on this currently, so we’re trying to be early adapters,“ Pennington-Cross says. "It’s part of a greater discussion on the shared economy. How does disruption affect an established industry and the people around it?"

ELIZABETH BAKER, COMM '17, GRAD '19

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RESEARCH IN BRIEF

Dr. Andrew Dentino, D.D.S.
Associate Dean, Research and Graduate Studies; Director, Predoctoral Program in Periodontics
MARQUETTE UNIVERSITY

Plotting Against Plaque

New dental research asks: Can polymers on dentures or in toothpaste act as shields against bacteria?

Dental plaque is a fact of life even for the most disciplined brushers. Constantly forming on the teeth as bacteria colonize into a sticky, invisible film, it can wreak havoc on tooth enamel and gums if we don’t remain vigilant.

Marquette University School of Dentistry’s Dr. Andrew Dentino, to these brushers. Constantly forming on the teeth as bacteria colonize into a sticky, invisible film, it can wreak havoc on tooth enamel and gums if we don’t remain vigilant.

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Marquette University School of Dentistry’s Dr. Andrew Dentino, to these brushers. Constantly forming on the teeth as bacteria colonize into a sticky, invisible film, it can wreak havoc on tooth enamel and gums if we don’t remain vigilant. On the rapel and resist front, Dentino’s research to develop “super surfaces” of synthesized polymers includes an R01 grant from the National Institutes of Health, which from 2007 to 2010 funded a collaboration to develop a membrane-like shield of phosphated acrylic for dentures. When the research team inoculated it with “every oral bug under the sun,” Dentino says, none was able to colonize on the surface, which Dentino eventually patented. This work attracted the attention of a major oral health care company, which funded Dentino’s work to develop and potentially patent water-soluble polymers that could eventually boost toothpaste’s ability to battle bacterial film development and maturation. “(The company) will do the next series of studies,” Dentino says. “Do these polymers have a robustness that will allow them to function in the human mouth like we see them functioning in a petri dish – essentially, with saliva on top of a tooth?”

Paula Wheeler

Walking a Spiritual Path Together

Theologian Dr. Susan Wood has helped Catholics, Lutherans and those of other faiths find common ground.

In recent decades, the Catholic Church has been asking new questions on many topics, including how to overcome the divisions that arose between Christians in the last millennium. If “the university is a place where the church does its thinking,” as Rev. Theodore M. Hesburgh, former Notre Dame president, claimed, then Marquette needs faculty like Dr. Susan K. Wood, SCL, to consider these questions.

Wood, Grad ‘16, a Sister of Charity of Leavenworth, Kansas, returned to teach and conduct scholarship at Marquette in 2005. She twice served as chair of the Department of Theology for a cumulative eight years, starting in 2009. Regularly invited to help the church think through issues around the world, Wood has represented the Catholic Church in many international and national dialogues with the Orthodox, Lutherans and Baptists. She has also served as a guest faculty member at both the University of Tübingen in Germany — long a center of Lutheran-Catholic engagement — and at the Pontifical Gregorian University in Rome.

Her publications develop this work, including A Shared Spiritual Journey: Lutherans and Catholics Traveling Toward Unity, published in time for the 500th anniversary of the Reformation in 2017 and co-written with Lutheran theologian Timothy Wengert. “Since the book was about ecumenical dialogue, it was important to model that process by writing about it with a Lutheran co-author,” says Wood. In 2015 Wood co-drafted the Declaration on the Way: Church, Ministry and Eucharist. The heart of this document is 32 common affirmations about the church, the ordained ministry, and the Eucharist gleaned from the last 50 years of Lutheran-Catholic dialogue. It concludes by identifying areas in which more work is needed.

These affirmations were ratified unanimously by the U.S. Catholic Bishops’ Committee on Ecumenical and Interreligious Affairs and by the ELCA’s Churchwide Assembly — by an overwhelming vote of 931-9. Wood attended the assembly and says of the experience: “The enthusiasm of the ELCA delegates gave an overwhelming mandate to the churches to get on with the work of reconciling division and achieving church unity. Far from today being an ‘ecumenical winter’ as is sometimes said, there are new reasons for ecumenical work. These include the large number of people in inter-church marriages, the shared work for social justice, and the joint witness demanded by an increasingly secular world.” Continuing in this vein, as she departs to become Academic dean of Regis College, a Jesuit school of theology in Toronto, Wood’s latest projects include research on how the sense of the faithful (sensus fidelium) in different faith traditions contributes to the unity of the churches.

Dr. Susan Wood

RESEARCH IN BRIEF

IMMIGRATION ON STAGE

Sparked by his own journey, Dr. Jeffrey Coleman examines the role of African immigrants in Spanish theatre.

Two teenage stowaways from Guinea found frozen to death in the wheel bay of a jet airliner at the Brussels airport in 1990 might have faded from public memory, if not for the letter found with them. “We suffer too much in Africa. … We need you to fight against poverty and to put an end to the war in Africa,” Yaguine Koita and Fodé Tounkara wrote, addressing “officieux of Europe.”

In his scholarship, Dr. Jeffery Coleman, assistant professor of languages, literature and cultures, has turned to this letter repeatedly in illuminating problems of race and immigration in Europe, particularly as seen through the lens of Spanish theatre. In considering playwright Juan Diego Botto’s dramatization of Koita and Tounkara in his play El Privilegio de Ser Perro, Coleman casts the boys as emissaries challenging “Europe’s amnesia in regards to its colonial and neo-colonial connection to Africa.”

Coleman’s forthcoming book, The Necropolitical Theater: Race and Immigration on the Contemporary Spanish Stage, examines how Spanish plays between 1991 and 2016 treat three major migrant groups: Latin Americans, North Africans (mostly Moroccans) and sub-Saharan Africans. In the case of the last group, “they never survive the play,” Coleman says. They die on route, get to Spain and die from illness, or meet some other doom, such as being murdered by neo-Nazis, he explains.

By exposing these patterns, Coleman hopes to make Spanish theatre professionals more conscious of how they treat race and immigration onstage. “One thing I found troubling in the research is a lot of the playwrights weren’t even conscious of the patterns they were producing or reproducing.”

His own immigrant experience partially fuels his scholarly interest. Born in Ghana, Coleman came to the United States as a boy with his family, after an intermediate stay in Spain. “That’s where the desire to learn Spanish actually came from when I was younger,” he says. Coleman earned his doctorate in Spanish from the University of Chicago.

On a research trip, Coleman met with a collective of black actors in Madrid, leading to inclusion in a WhatsApp messaging group that keeps him informed of controversies, such as a casting debacle involving a white actor in blackface playing a black drag queen in a Spanish production of Tony Kushner’s Angels in America.

Coleman is now broadening his research to consider representations of blackness in Spanish popular culture, including stereotypical black figures on the packaging of the Spanish candy Conguitos and the tradition in many cities of having a white actor in blackface portray Balthazar and Melchior in the Three Kings Day. “What does it mean,” he asks, “that Spain is still propagating these types of images when there are now thousands if not millions of black citizens and migrants living there?”

DR. JEFFREY COLEMAN

RESEARCH IN BRIEF

FLUENT IN FILM

In both documentary and feature film genres, Kristin Holodak is committed to visual storytelling.

Kristin Holodak’s documentary Young of the Year explores the mystery of the roseate tern, endangered despite high birth rates and stable adult mortality trends. “Somewhere between hatching and returning to breed three years later, young terns are dying in disproportionate numbers,” says Holodak, assistant professor of digital media and performing arts.

To document terns preparing for their high-risk first migration from Massachusetts to Brazil, Holodak fought through several setbacks. An initial attempt to film during nesting season was abandoned when permitting fell through. After obtaining footage of adult terns, she created an initial cut of the film but realized it failed to do justice to the birds’ journey. “I believed the film was going to help the birds,” Holodak says. “The birds are the birds without me, but they will have an easier time if people see my film.”

Waiting a year to shoot the chicks, Holodak had her patience rewarded. Completed in 2018, her film has had six festival screenings and won four awards, including the Impact Docs Award of Merit, recognizing documentaries with great potential to inspire change.

Now working on her first feature-length film, Enid’s Wall, Holodak is playing out a similar script involving unwavering vision, fearless commitment and peer recognition. The film is based on a short story by Jennifer Grassli that Holodak is adapting into a 90-page script. The subject matter — a mature woman, newly moved into a community “as old as the sea itself” — and deciding what choices and sacrifices to make in fitting in — resonates with the filmmaker. Holodak moved frequently during her 20s and 30s, leaving her to navigate many new environments. And relocation is a constant of 21st-century Americans, she says, adding urgency to the search for belonging.

Early versions of the script have met with praise, including an official selection in the Auckland Film Festival’s screenplay competition in New Zealand. Selection by the Stone Slab Labs brought Holodak to Palm Springs, Calif., last fall to continue honing the script in a workshop setting.

The extra time with her script — alternating with efforts to secure a producer to coordinate the project’s financing and many moving parts — has only deepened her connection to her baby-boomer main character, Enid. Despite numbering more than 37 million, “rarely do the women of this generation get to see themselves in a film,” says Holodak. “Rarely are they everyday people with the same everyday issues as everyone else.” When it debuts, Enid’s Wall will make up for this shortcoming, and do it eloquently.

KRISTIN HOLODAK
Assistant Professor, Digital Media and Performing Arts

Waiting a year to shoot the chicks, Holodak had her patience rewarded for her persistence. Completed in early 2018, her film has been screened at six festivals and won four awards.

ALYSSA DUETSCH
COMMUNICATION STUDENT

ALYSSA DUETSCH
Stories of the Marquette community igniting innovation and entrepreneurial spirit.

Faculty, staff and students at Marquette are on a quest for new knowledge, new tools and new ways to reduce health and educational inequities.

1. Modeling Clean Water
   Professors and their Jesuit university partners protect resources in Central America.

2. Branching Out
   Partnerships with corporations and utilities expand faculty research.

3. Pop Hit
   A new student-run business program helps two students showcase their startup skills.

4. Spurring Solutions
   Fostering collaborative innovation, Marquette’s challenge funds drive results and draw accolades.

5. Human Performance
   Research in Marquette’s newest facility may improve game-day performance and reduce injuries.

6. Difference Makers
   Marquette hosts Force for Positive Change Awards supporting entrepreneurial social innovators.

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BETTER DATA, CLEANER AGUA

Marquette professors join research colleagues from Central American Jesuit universities to help communities in El Salvador and Nicaragua protect precious water resources.

- At the center of a rural community in El Salvador lies Laguna Verde, a small crater lake that serves as the area’s main source for drinking water and irrigation of crops such as coffee. It’s also a recreational attraction for tourists taking boat tours. In the past few years, however, nutrient runoff from surrounding watersheds has trickled into the lake, diminishing both water quality and the residents’ quality of life. Dr. Anthony Parolari, assistant professor of civil, construction and environmental engineering, aims to turn that around.

In collaboration with Universidad Centroamericana El Salvador, Parolari is co-leading a research team seeking to understand what influences the lake’s water quality. In San Salvador, engineering professor Dr. Jacqueline Cativo’s students are in the field collecting data such as rainfall inputs, temperatures, pH levels, dissolved oxygen and conductivity, all water-quality indicators. Back at Marquette, Parolari’s research team is analyzing the data to measure how these parameters have changed over time.

With enough data, Parolari and Cativo hope to build a computer model that could predict the lake’s water quality a few months or even years in advance, which could help the community determine when and how to take action to protect the lake. “If we can show this community that we’re able to collect data and make that information available, we can help them understand their impact and how to use their water resources better,” explains Parolari.

Parolari’s project is one of several collaborative research projects in Central America involving Marquette faculty members and students, and part of a broader commitment by the Opus College of Engineering to partner with Jesuit universities around the world. In Nicaragua, Dr. Walter McDonald, assistant professor of civil, construction and environmental engineering, is working with water resource researchers at the Jesuit-run Universidad Centroamericana Nicaragua to build a similar data-driven model to improve pollution reduction and flood control in and around Lake Nicaragua, the largest lake in Central America.

Students there have collected data for a model that can suggest different management action plans for the rainstorms and seasonal flooding that cause damage to homes and crops. The model tells researchers about current conditions, estimates the damage from rainstorms and informs decision makers on what flood control actions to take. A related effort is an effort to monitor areas of the watershed near Managua, Nicaragua, that may be draining pollutants into Lake Nicaragua.

For both McDonald and Parolari, these research projects are about empowering the local communities where they are working. Says Parolari, “If you think about the Jesuit educational mission, part of it is seeking knowledge and trying to understand the world around you.”
As partnerships with corporations and utilities blossom, faculty research expands in new directions.

BRANCING OUT

Government guidelines warn consumers against throwing expired or unused medications down the drain or toilet, where they can work their way into surface waters and groundwater. With additional pharmaceutical chemicals passing through human waste streams, Dr. Kyana Young, a postdoctoral fellow in the Office of Research and Innovation, is exploring a potential remedy — helping municipal water facilities treat such chemicals. Young was awarded one of four initial grants through the Water Coordinated Activities on Research for the Environment project, or WaterCARE, through which the Milwaukee Metropolitan Sewerage District will fund approximately $275,000 annually in Marquette faculty research over five years.

Projects cover diverse areas of study. Young is building a lab-scale wastewater treatment process in Marquette’s lab at the Global Water Center, modeling her system on the process at the MMSD plant. She’ll conduct research using MMSD facility samples. “We are exploring alternative treatment technologies, such as advanced oxidation processes, to degrade or remove pharmaceuticals from treated effluent in a way that’s cost-effective,” Young says.

David Stiffling, Eng ’00, Law ’04, director of the Water Law and Policy Initiative at Marquette Law School and professor of law, is studying MMSD’s climate change mitigation and adaptation programs. “The WaterCARE agreement takes this partnership to another level,” Stiffling says, “and will help drive cutting-edge water research at Marquette.”

With these partnerships growing in number and generating benefits for researchers and funding partners alike, here are two more to watch:

**SOLAR PAVERS**

Dr. Ronald Coutu, Jr., the V. Clayton Lafferty Endowed Chair and professor of electrical and computer engineering, is a good example of Marquette faculty members conducting research supported directly by corporations, although his “laboratory” is see of a kind. To test the durability of “solar pavers” — Solar Roadways Inc.’s quest to turn segments of roadways and sidewalks into the equivalent of 2,500 watt solar panels — Coutu’s team created something called a “heavy vehicle simulator” outside Engineering Hall.

“Specifically, we tested this unique pavement material in submerged environments, under extreme temperature conditions, and under dynamic loading,” he says.

That’s where the nearly 5-ton wheel system came in handy, guided by the tracks to pass or “drive” over the panels about 800,000 times to test durability. “I think it’s important for Marquette because it highlights how our expertise is valued and, in this case, needed by industry to validate potential ‘game-changing’ sustainability technology,” Coutu says.

**DATA SCIENCE**

The partnership of Northwestern Mutual, Marquette and the University of Wisconsin-Milwaukee to create the $40 million Northwestern Mutual Data Science Institute is poised to change the regional economic landscape. “It will help build a technology ecosystem and advance southeastern Wisconsin as a national hub for technology, research, business and talent development, while creating an organic pipeline of tech talent in the area,” says Gretchen Miller, Northwestern Mutual’s assistant director for digital and innovation communications.

The institute will give data science research a further boost, he says, adding three faculty members, that’s a substantial increase in the amount of research being conducted,” says Dr. Thomas Kazmierak, director of computing for the Department of Mathematics, Statistics and Computer Science. Five additional graduate research assistants supported by the institute will give data science research a further boost, he says. Watch the “Spark” section for details on the future impact of this work.

GENE ARMAS
As a student-run business program grows, two undergraduates score with a locally sourced store.

Since its founding in the fall, the Blue & Gold Ventures, Marquette’s Incubator — were launched through Opening a week before Black Friday and Business Administration. Block, both seniors in the College of creation of Jack Toner and Isabelle hood, it was something more: the boutique that populates the neighbor looked every inch the kind of fashionable from local entrepreneurs. Although it Holiday Pop-up Shop found an inviting Walker’s Point who strolled into the Nest 3 Holiday shoppers in Milwaukee’s Entrepreneurs, who appreciated the Milwaukee startup community. For Ventures board member and leader in the south of Milwaukee’s Third Ward came deal on a prime storefront space just including from generous alumni. A great resourcefulness and expert support, beverage to event planning. Tracking their performance, the students project in my life.”

As a student-athlete on Marquette’s women’s and men’s basketball teams were tearing up the courts of the Big East this winter, Marquette researchers were keeping tabs on their movement patterns during practices, accumulating data that may lead to improved game-day performances and fewer injuries. Tracking and deciphering this data — collected through wearable monitors more sophisticated than the activity trackers many of us wear today — is a collaborative research effort led by Dr. Kristof Kipp, associate professor of exercise sciences, and involving Marquette faculty from computer science, engineering and communication. The project is one of four funded by Marquette’s Athletic and Human Performance Research Center pilot grants. The AHPRC, which opened this spring, is the university’s newest building gem. Next to state-of-the-art athletics training and support facilities is 5,400 square feet of dedicated research space where academic researchers from a variety of disciplines collaborate on investigations in elite athletic performance, human performance, rehabilitation, fitness data analytics and other related disciplines. Dr. Sandra Hunter, AHPRC planning director and professor of exercise sciences, says the new space will allow faculty researchers to access expertise and equipment — including gold-standard exercise physiology testing systems and a DEXA bone density machine room — that had not been available to them before and that could lead to unexpected collaborations. Dr. Jack Sansalini, H Sci ’13, Grade ’18, assistant planning director and postdoctoral fellow in exercise science who is housed at the facility, agrees: “It’s going to be fun to see what additional projects evolve in this space. More researchers are welcome here. We’re excited to see what happens with that potential.”

IN SEARCH OF SOLUTIONS

Fostering collaboration and innovation, Marquette’s major challenge funds are driving results and garnering national accolades.

When undergraduates began envisioning a new collaborative space for student innovation and entrepreneurship, they had somewhere to turn for help advancing the concept. They pitched it to Marquette’s Explorer Challenge (then called the Strategic Innovation Fund), had their submission selected and worked with partners to turn their ideas into the vibrant 707 Hub, now one of the most popular places on campus.

The Explorer Challenge and its companion, The President’s Challenge, encourage innovation through collaboration. Students, faculty and staff submit proposals to The Explorer Challenge for up to $25,000 in seed money for original projects that create positive results. With support from the Johnson Controls Foundation, The President’s Challenge provides a $250,000 two-year grant for an interdisciplinary, university-community collaboration that aims for solutions to pressing problems. Announced in January, the winner of the first President’s Challenge proved to be a model representation of the award’s high impact promise — and its stipulation that project teams bring together faculty members across fields such as STEM, the social sciences and humanities, with one or more community organization to tackle neighborhood inequalities such as health, education and prosperity. Led by Dr. Amy Van Hecke, professor of psychology, the project — the Next Step Clinic — will create a mental health clinic providing trauma-informed care to underserved children and families in Moline Park, one of Milwaukee’s poorest neighborhoods. Community partners include the Milwaukee Coalition for Children’s Mental Health, Next Door Foundation and True Love Baptist Ministries. The two challenges are key ways the university is forging “a campuswide culture of innovation and entrepreneurship,” says Marquette President Michael M. Lovell. And now that culture-changing approach is generating national praise. The University Economic Development Association recognized The Explorer Challenge with two national innovation awards this fall. At presentations at the events’ annual summit by Dr. Jeanne Hossenlopp, vice president for research and innovation, and representatives of two other finalist universities, attendees voted to award Marquette the groups 2018 Award of Excellence. The second honor was the Editors’ Choice Award from the Journal of Economic Development in Higher Education. The organization called The Explorer Challenge ran an original, scalable and sustainable solution that should be replicated.”

LEAH HARRIS, COMM ’18

PERFORMANCE BY DESIGN

Check out the collaborative research happening — already — in the newest facility on campus.

As student-athletes on Marquette’s women’s and men’s basketball teams were tearing up the courts of the Big East this winter, Marquette researchers were keeping tabs on their movement patterns during practices, accumulating data that may lead to improved game-day performances and fewer injuries. Tracking and deciphering this data — collected through wearable monitors more sophisticated than the activity trackers many of us wear today — is a collaborative research effort led by Dr. Kristof Kipp, associate professor of exercise sciences, and involving Marquette faculty from computer science, engineering and communication. The project is one of four funded by Marquette’s Athletic and Human Performance Research Center pilot grants. The AHPRC, which opened this spring, is the university’s newest building gem. Next to state-of-the-art athletics training and support facilities is 5,400 square feet of dedicated research space where academic researchers from a variety of disciplines collaborate on investigations in elite athletic performance, human performance, rehabilitation, fitness data analytics and other related disciplines. Dr. Sandra Hunter, AHPRC planning director and professor of exercise sciences, says the new space will allow faculty researchers to access expertise and equipment — including gold-standard exercise physiology testing systems and a DEXA bone density machine room — that had not been available to them before and that could lead to unexpected collaborations. Dr. Jack Sansalini, H Sci ’13, Grade ’18, assistant planning director and postdoctoral fellow in exercise science who is housed at the facility, agrees: “It’s going to be fun to see what additional projects evolve in this space. More researchers are welcome here. We’re excited to see what happens with that potential.”

SARAH KODZEL, ARTS ’10

INNOVATION
Marquette combines forces with UW–Madison’s WARF to boost Wisconsin’s social entrepreneurs.

Supporting Entrepreneurs as Difference Makers

Marquette partners with UW–Madison’s WARF to support social entrepreneurs as they strive to solve social or environmental challenges in sustainable, just and effective ways.

As the first Wisconsin university with a well-established social innovation program, Marquette was the natural choice for co-producing the annual Force for Positive Change Awards, a juried program offering financial support to 10 winning entrepreneurs as they strive to solve social or environmental challenges in sustainable, just and effective ways.

Partnering with Marquette on this platform for modeling Wisconsin’s best social innovation work are the Wisconsin Alumni Research Foundation and philanthropic power couple John and Tashia Morgridge, also co-founder of the TOSA Foundation, and John, chairman emeritus of Cisco Systems, initiated the awards idea with WARF to inspire entrepreneurs to make a difference in Wisconsin. “Because of Marquette’s strong reputation in social innovation and research, the partnership with WARF on the Force for Positive Change program is a great collaboration for us,” explains Kelsey Otten, Grad ‘14, Marquette’s associate director for social innovation, who also manages the new student innovation space, the 707 Hub. After debuting in Madison, Wisconsin, the contest is planned for November 15, 2019. Eight winners at the last event were awarded $12,500 each to grow their companies.

The 707 Hub offers a co-working space for students and alumni to develop social innovation projects.

The Catholic Church in Southwest Iowa: A History of the Diocese of Des Moines is edited by Rev. Steven Avela, Ph.D., professor of history, is the first book-length study of the history of the Roman Catholic Diocese of Des Moines, Iowa. Commissioned by the diocese to commemorate its centenary, it tells the story of key figures in the church’s formation in the region.

Real Estate Finance in a Nutshell, co-edited by Dr. Michael O’Hear, professor of law, presents an overview of the law of real estate finance, including financing devices, tax issues, the mortgage market, government involvement and foreclosure.

Prisons and Punishment in America: Examining the Facts by Vada Waters Lindsey, associate professor of law, presents an overview of the law of real estate finance, including financing devices, tax issues, the mortgage market, government involvement and foreclosure.

SMART & SAVVY: Negotiation Strategies in Academia is co-authored by Andrea Schneider, professor of law, and her father, Dr. David Kupfer, chair emeritus of the psychiatry department at the University of Pittsburgh. The project began when they recognized the lack of negotiation training for academics and started to develop the training sessions, which were received with positive reactions and requests for more advanced instruction. The book serves as a framework to help academics navigate workplace communication and master negotiation skills.

The History of Childhood: A Very Short Introduction is co-edited by Dr. James South, professor of philosophy, is a collection of essays that explores the different philosophical puzzles within the HBO show, such as the nature of autonomy and the pursuit of liberation and free thought. It’s a companion to the show for viewers looking to dive deeper into its philosophy.

SUPPORTING ENTREPRENEURS AS DIFFERENCE MAKERS

When you endow research at Marquette, you create opportunity and possibilities. Marquette has always fostered spirited dreamers and decided problem solvers — those with the passion for discovery. Here, researchers pursue answers to seemingly unanswerable questions, tackle new challenges, and work to find solutions to problems yet to fully surface. Endowed research and innovation initiatives may inspire something remarkable. Join the exploration; your support can Be The Difference.

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