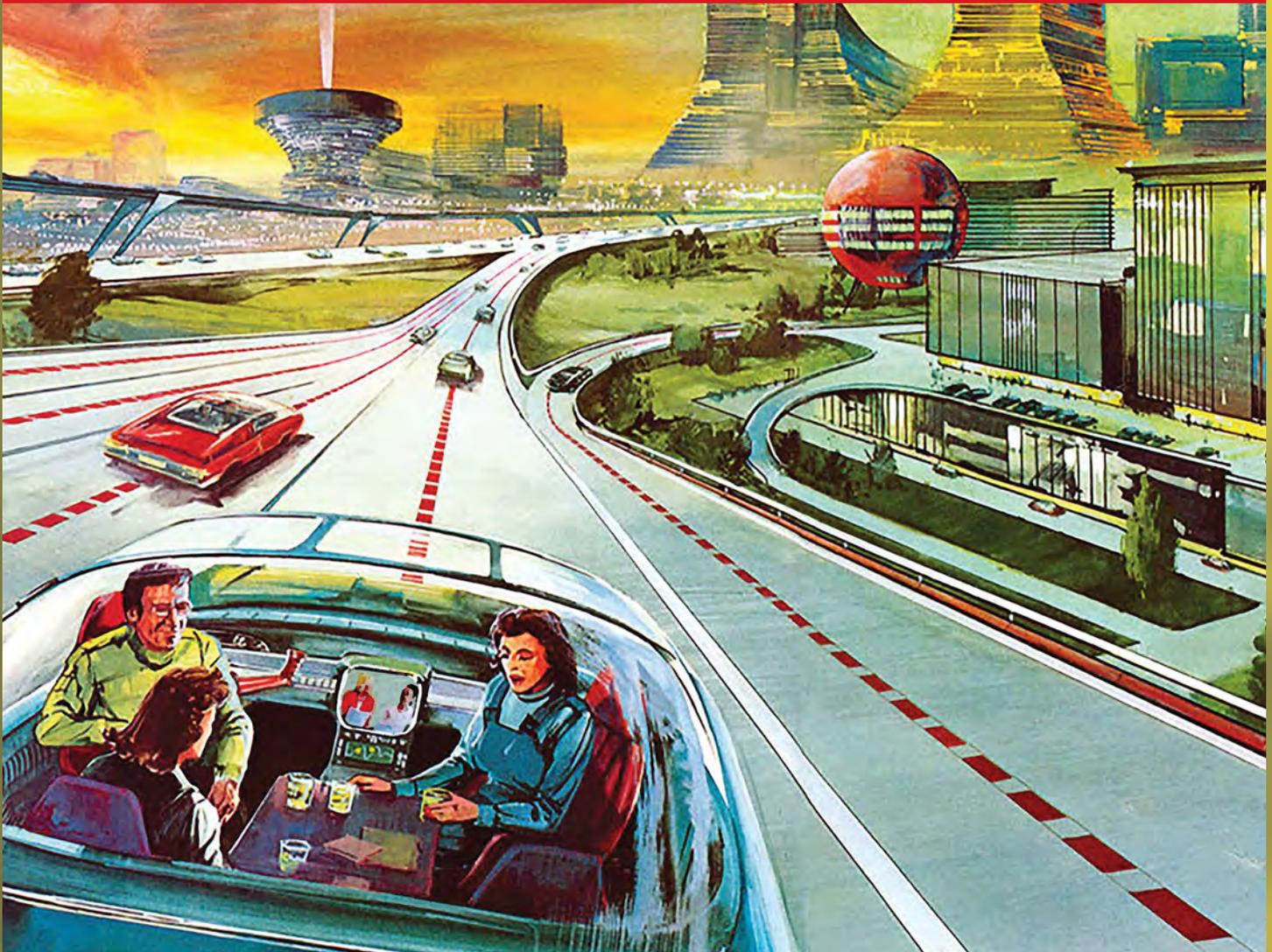




# MICHIGAN STATE UNIVERSITY PARTNERS

SUMMER 2019



## MOBILITY NOW

MSU BUILDING A FUTURE WITH APPLIED RESEARCH

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## MSU's NEXT PRESIDENT

The Michigan State University Board of Trustees, along with a diverse 18-member search committee, have selected Samuel L. Stanley Jr., M.D. by unanimous vote as the university's 21st president. Stanley, who has been the president of Stony Brook University since July 2009, will begin his tenure Aug. 1, 2019.

Last August, the trustees appointed an 18-member search committee, co-chaired by MSU Board of Trustees Chairperson Diane Byrum and Melanie Foster, MSU trustee. As part of a national search, the committee solicited input through 22 campus-wide input sessions and an online submission form where community members shared their ideas on the characteristics they desire for Michigan State's next president. The committee used those comments as the basis for the Presidential Prospectus and the criteria by which the committee evaluated each candidate.

"MSU is one of the world's leading research universities, and I am grateful to the Board of Trustees and the Presidential Search Committee that so ably represented the entire MSU community for giving me the opportunity to serve this great institution," Stanley said. "MSU's core strength is its amazing students, superb faculty, dedicated staff and proud alumni, and I cannot wait to get to campus to meet with you and learn from you. I know the Spartan community has been profoundly troubled by the events of the past years that have shaken confidence in the institution. We will meet these challenges together, and we will build on the important work that has already been done to create a campus culture of diversity, inclusion, equity, accountability and safety that supports all of our endeavors. I am so excited about MSU's legacy as the pioneer land-grant university, its remarkable progress over this decade and its amazing potential for the future. I believe our best days are ahead, and I appreciate the chance to be a part of this extraordinary journey."

"I AM SO EXCITED ABOUT MSU'S LEGACY AS THE PIONEER LAND-GRANT UNIVERSITY, ITS REMARKABLE PROGRESS OVER THIS DECADE AND ITS AMAZING POTENTIAL FOR THE FUTURE. I BELIEVE OUR BEST DAYS ARE AHEAD AND I APPRECIATE THE CHANCE TO BE A PART OF THIS EXTRAORDINARY JOURNEY."

— SAMUEL L. STANLEY JR., M.D.  
MSU PRESIDENT-DESIGNEE



Samuel L. Stanley Jr., M.D.

President-designee Stanley has been the president of Stony Brook University since 2009 and has nearly 15 years of higher education leadership experience. After earning his medical degree from Harvard Medical School, he completed his resident-physician training at Massachusetts General Hospital. He then went to Washington University in St. Louis for a fellowship in infectious diseases, eventually becoming a professor in the Departments of Medicine and Molecular Microbiology and one of the nation's highest recipients of NIH funding. He was appointed Vice Chancellor for Research at Washington University in 2006, serving in that position until he was appointed president at Stony Brook.

Dr. Stanley is a member of the Board of Directors of the Association of American Universities and the Association of Public and Land-Grant Universities and recently completed terms on the NCAA Board of Directors and NCAA Board of Governors. He served for seven years as chair of the National Science Advisory Board for Biosecurity, which advises the United States government on issues related to the communication, dissemination and performance of sensitive biological research.

In addition to his extensive background in science and research, Dr. Stanley championed student achievement, access to higher education and advocating for more state and national funding for financial aid at Stony Brook. He also has been an international advocate for gender equity and ending sexual violence in his role as one of two U.S. university Impact Champions for the HeForShe UN Global Solidarity Movement for Gender Equality.

Dr. Stanley is married to Ellen Li, M.D., Ph.D., a distinguished biomedical researcher, and they have four adult children.



Illustration by Gunther Radtke

## THE FUTURE OF MOBILITY MSU LEADS IN APPLICATION OF SENSOR, SOCIAL AND SAFETY RESEARCH

BY DEVON BARRETT

Driving a car can be an experience in informational and sensory overload. Drivers are distracted, stressed, and more obsessed with multitasking than ever before, making every moment behind the wheel an opportunity for human error.

So, what happens if we take humans out of the equation and let the cars do the driving instead?

Welcome to the world of mobility, where researchers at Michigan State University are asking that question in ways that capitalize on the strengths of the university's research enterprise, namely in the nitty-gritty details of sensors, sociology, and safety as they apply to the present and future of autonomous and connected vehicles.

### Taking sensor technology to school

Autonomous vehicles cannot be expected to do everything we need them to do right away. But they can be taught, and that's where sensors—and the CANVAS (Connected and Autonomous Networked Vehicles for Active Safety) research group—come in.

Imagine a sedan, outfitted with a variety of sensors, including radar, lidar, and multispectral cameras, as well as a powerful Graphics Processing Unit based computer. It's a lot of technology for one car, but it's the most essential piece of the puzzle.

"One of the challenges with these sensors is that they each have weaknesses, particular conditions in which they don't work as well. So you have to be able to correlate data from multiple sensors," says John Verboncoeur. Verboncoeur is associate dean for

research and graduate studies, and a faculty member in the College of Engineering. He oversees CANVAS, and acts as an evangelist, a motivator, and a coordinator of mobility efforts at MSU.

He explains further, "Think of it like having two or three different viewpoints of the same scene, and from each of those viewpoints, you see a different perspective that you couldn't see from the other position. Data from each sensor serves as a backup and augmentation for the other sensors, and combining multiple streams of information adds more detail.

"For example, multiple visual perspectives can provide depth perception, such as human stereoscopic vision. Multiple spectral components let us see details that one spectral component alone may not reveal, for example infrared providing detail in situations of low-contrast visible light, or microwaves providing information when a visible camera image is washed out by direct sunlight."

CANVAS researchers are working on ways to automate that sedan's ability to fuse all of that information together into one very detailed, real-time picture of its surroundings. Perhaps the sensors will pick up on a steady drizzle that has made the pavement wet, a deep pothole a few meters ahead and a set of orange barrels blocking off a curb repair project in the opposite lane. The sensors will also see the cyclist in the adjacent bike lane, a maintenance worker slowly driving a mower through the crosswalk and a student on a skateboard rolling down the sidewalk nearby.

Then, researchers will teach the sedan to classify these objects and conditions, and make informed decisions about how to proceed:



move left to give the cyclist space, go slow over the pothole, allow plenty of stopping distance on the wet road to avoid hitting the mower in the crosswalk. The sedan will also be enabled to react, not just to these definite, visible obstacles, but the potential of an obstacle, such as if the student on the skateboard loses her balance and topples into the street, or an oncoming vehicle appears and has to swerve into the sedan's lane to avoid the orange barrels at the construction site.

Currently, this type of active safety technology only focuses on the individual vehicle it is supporting. The sedan is learning about and proceeding through its environment in a vacuum—not communicating any of the vital information it collects to the vehicles around it. But another team in CANVAS is hoping to change that, too, and move the norm toward sharing and exploiting the data the sedan collects. So when the sedan recognizes the unexpected construction barrels and the student on the skateboard, it can transmit that information to the other connected vehicles in the area: truck in the next lane, the oncoming delivery van, the campus bus preparing to turn at the stoplight, so they, too, are equipped with the knowledge to react accordingly to obstacles and potential obstacles that their own sensors may not be able to see.

In a world where vehicles are, essentially, being trained to drive, collaborate, and communicate, the infrastructure should be able to communicate too. MSU is a leader in pavement sensor technology, and, just this year, helped the Michigan Department of Transportation deploy 2,000 tiny sensors on the Mackinac Bridge. The coin-sized sensors, built in partnership with researchers at Washington University in Missouri, are powered solely by vibrations from traffic. They are inexpensive to produce, but provide critical data about the condition of the bridge's structural components.

Installing the sensors on roadways—a concept that, according to Verboncoeur, is unique to MSU—will also be a major step towards “smart” infrastructure, which is friendly to connected and autonomous vehicles. They can provide lane-edge guidance in all types of conditions, including snow-covered roads or other low-visibility conditions, and on all types of roads.

### Imagining the ‘what ifs’ of an autonomous future

Working parallel to the researchers at CANVAS are a group of researchers from other areas of strength at MSU, including urban planning, media and information, economics, business, law, and public policy, who are working on what the industry calls sociomobility.

Mark Wilson, professor of urban and regional planning in the College of Social Science, is one of those researchers, who compares the dawn of autonomous vehicles to the dawn of another disruptive innovation: the internet.

“When you look at the internet,” Wilson says, “it seemed to appear from out of nowhere in the early nineties, and at the time, it was seen as an engineering challenge.” The initial deployment of the internet considered all the necessary technological components—hardware and software, modems, circuits.

“Today on the internet, some of the biggest issues aren't in the details of the engineering or the technology at all. They're social.



*Nizar Lajnef, associate professor of civil and environmental engineering at MSU, is leading a team of researchers that is placing a series of sensors on Michigan's Mackinac Bridge. The prototype sensors are designed to monitor the iconic bridge's infrastructure and are powered by the vibrations generated by traffic.*

They're related to the internet's impact on interaction and engagement, retailing, freedom of speech and expression,” Wilson says.

There was no infrastructure or precedent for dealing with the social issues that came with the internet, because nobody was thinking that far into the future.

The goal of the sociomobility research group is to do that kind of thinking about autonomous vehicles, so that when the technology is ready, nobody is left scratching their heads about its effect on jobs, cities, traffic laws, the insurance industry, the supply chain or the security of information. Their ever-evolving body of research includes:

- Looking at how the general public is being educated about connected and autonomous vehicle technology, what their perceptions are, and what can be done to address skepticism or doubt.
- Looking at autonomous public transit, how transit passengers interact with one another and how a bus or a taxi with no driver present to enforce rules and decorum might adapt.
- Considering how the prospect of “having the car do all the work” affects the decisions people make before they get into a car. Are they more likely to consume drugs or alcohol, or be excessively tired or impaired in some other way that would affect their ability to take the wheel in an emergency?
- Understanding what type of workforce will be needed—and what kind of education they'll need—to build and service the complex devices and technologies associated with the vehicles and the infrastructure.
- Additionally, considering how those complex technologies will be made accessible for persons with disabilities, the elderly and underserved populations, and people who have never driven a vehicle.

“This is more than just our research. This is about MSU providing a service to the public. We need to be mindful that public citizens will be the ones to make the decisions, and we want them to be informed,” Wilson says of the potential impact of these questions and answers he and the Sociomobility research group are seeking. “Our engineers want to say, ‘Here's the technology,’ and we want to say ‘Here's how we talk to communities and work through scenarios to make decisions about how that technology is used.’”

### Putting it all together—to solve a real problem, today

At any given time on Michigan State's 5,300-acre campus, people on foot, on bikes and on small electric- or gas-powered scooters are attempting to share the road, the crosswalks and the parking lots with people operating much larger, heavier, faster-moving vehicles. There are thousands of variables and opportunities for human error around every corner on a day-to-day basis.

But instead of trying to completely eliminate humans from the equation in every vehicle on every road in the country, MSU wants to specialize in low-speed pedestrian-dense multi-modal environments.

“Think of these areas as ‘first mile, last mile,’” Verboncoeur says. “If you're commuting from somewhere, your first mile is the streets you travel to get to the highway or the public transit station, and your last mile is the streets you travel to get to your destination—your office, your corporate campus, your factory.”

First mile last mile streets, like those on campus, are frequently congested and make finding parking a challenge. But what would happen if, instead of driving their heavy passenger vehicles that “last mile” onto campus, people parked in lots on the periphery and utilized a fleet of much smaller, lightweight electric vehicles to get to and from their destinations on campus?

Alongside the ubiquitous scooters and bikes, Verboncoeur suggests connected, automated golf-cart-sized vehicles that are electric and made for short-distance movement. They will take much less of a toll on the infrastructure and the environment, and greatly increase the safety of pedestrians.

This is an area of mobility that, Verboncoeur suggests, isn't being explored as deeply at other research institutions, which are focused more on automation in high speed and intermediate environments, rather than first mile, last mile environments.

“Right now, we think we can be the center of the universe for this particular niche,” Verboncoeur says, “developing technologies for low speed, last mile, multimodal transportation beyond autonomous cars.”

MSU researchers in engineering and sociomobility are also heavily focused on making campus a friendly environment for autonomous vehicles. In fact, MSU's diverse landscape is the perfect place to test, teach and refine the technology as it continues to evolve.

Researchers are already working to incorporate sensors into vehicles that already spend a lot of time on campus. Imagine a city bus. It has a driver, and it goes about its route like normal, but it is outfitted with a suite of sensors that track obstacles and events the bus encounters during the day.

Then, with the addition of what Verboncoeur calls a “decision engine,” the bus will be able to take in the information from the sensors and make immediate judgments on what it might do in a particular situation. The decision engine won't change the behavior of the bus, it is merely a simulation, but it will allow researchers to grade the engine's decisions and determine whether it made a better or quicker decision.

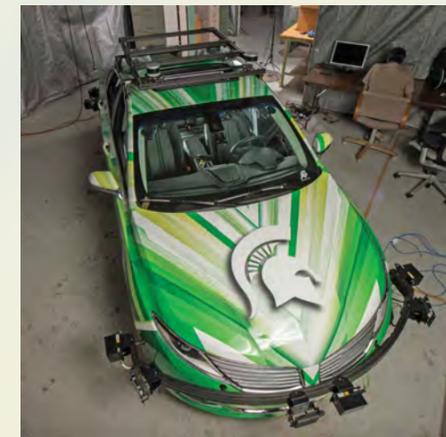
Once the vehicles reach a certain level of proficiency—one in which they're consistently equal to or better than a human driver—researchers will know that the technology is ready for use in an actual, autonomous car, which they will start testing in the former Spartan Village apartment complex south of campus, renamed Spartan Mobility Village.

There, a loop of road is being outfitted with pavement sensors and configured for testing of autonomous vehicles. The brick buildings will provide more realistic challenges for the radar, lidar, and cameras which respond differently to actual buildings than they do to, say, plywood facades of buildings. Real pedestrians and obstacles can be brought in to simulate an environment very similar to the first mile last mile landscapes where MSU hopes autonomous and connected cars

and other vehicles will make the most difference. Ultimately, these technologies will demonstrate proficiency levels surpassing human drivers, and graduate to the full campus environment, initially under close researcher supervision.

If CANVAS and the Sociomobility group can demonstrate pedestrian safety, less traffic congestion, and a smaller ecological and infrastructural footprint to the public, they are confident that they can help people see autonomous cars the same way.

“We don't want to get rid of walking and biking and driving, and change the layout of our cities just because we have autonomous vehicles,” Mark Wilson says. “We don't want to get so caught up by the shiny new object and the novelty of it that we lose all sight of what this is really about, which is ‘I need to get from point A to point B. What is the best way to do that?’”



*MSU researchers are using this specialized Lincoln to put a number of technologies through their paces, including radars and other sensors, cameras and computer software.*



## Beckman Young Investigator Award supports MSU Biochemist Michaela TerAvest



*Michaela TerAvest, assistant professor of biochemistry, was one of 10 early career faculty members from across the country to be awarded the Beckman Young Investigator Award by the Arnold and Mabel Beckman Foundation.*

Michaela TerAvest, Michigan State University assistant professor of biochemistry, was recently awarded the Beckman Young Investigator Award by the Arnold and Mabel Beckman Foundation.

The award program provides research support to the most promising young faculty members in the early stages of their academic careers in the chemical and life sciences, particularly to foster the invention of methods, instruments and materials that will open new avenues of research in science.

TerAvest joined the MSU Department of Biochemistry and Molecular Biology in 2015 after completing a position as research associate at the University of California, Berkeley. She received both her master's and doctorate degrees in biological and environmental engineering at Cornell University.

"For the TerAvest Lab, this award represents a special opportunity to pursue a high-risk, high-reward project," TerAvest said. "With this funding, my lab will develop microbial electrosynthesis technology to simultaneously capture carbon dioxide, store renewable energy and produce valuable chemicals."

TerAvest's research involves better understanding bacterial respiratory processes and their impact on engineered metabolic pathways for sustainable biotechnology. Her BYI project will tackle the reduction of greenhouse gas emissions and excess electricity storage by engineering a bacterium to use electricity as an energy source to produce biofuels.

"I believe this technology has the potential to reduce global climate change, which is my highest professional goal," TerAvest said. "I am deeply grateful to the Arnold and Mabel Beckman Foundation for helping me work toward that goal. Personally, I am inspired by Dr. Beckman and Mabel's philanthropy and honored to receive an award from their foundation. I hope to follow in their footsteps and use the products of my scientific work to give back to my community."

"Michaela TerAvest is to be congratulated for being a recipient of this very prestigious award, which recognizes the innovative and high caliber research conducted in her laboratory," said Erich Grotewold, BMB chair. "Her project is ambitious and has the potential to be a game-changer for how excess electricity is stored and utilized."

Since 1990, the Beckman Young Investigator program has given 360 awards totaling more than \$98 million. The program provides research support to the most promising young faculty members in the early stages of their academic careers in the chemical and life sciences, particularly to foster the innovation of methods, instruments and materials that will open up new avenues of research in science.

## Next Generation Nutrition supports at-risk pregnant women in Uganda

Researchers in MSU's Department of Food Science and Human Nutrition will develop and test a system to deliver vital nutrients to at-risk pregnant women in Uganda, thanks to support from the Bill & Melinda Gates Foundation. The Next Generation Nutrition in Uganda project is spearheaded by Dr. Lorraine Weatherspoon, with co-principal investigators Dr. Muhammad Siddiq and Dr. José Jackson-Malete. Their work will evaluate the effectiveness and appeal of a nutrient-enriched, bean-based instant sauce product for Ugandan pregnant women who are at-risk for complications including microcytic anemia, low birth weight and neural tube defects.

Weatherspoon is professor and director of the Didactic Program in Dietetics in the College of Agriculture and Natural Resources Department of Food Science and Human Nutrition. A native of Durban, South Africa, she is internationally regarded as a leading expert in community-based nutrition and related research. Dr. Siddiq is a research associate professor, also in the Department of Food Science and Human Nutrition. Dr. Jackson-Malete is the co-director of the Alliance of African Partnership at MSU.

Several years ago, Weatherspoon was a co-principal investigator on a project focusing on the nutritional health of children with HIV in Botswana and Tanzania. Her work involved developing bean-based products to improve child nutrition, and ultimately led to the Next Generation Nutrition in Uganda project. The Bill & Melinda Gates Foundation, which focuses on poor health in developing countries among other issues, awarded the first phase of the project a \$100,000 grant through the foundation's Grand Challenges Explorations initiative, with the potential for a five-year, \$1 million grant for phase two if successful.

Dr. Weatherspoon notes that most of the current international efforts to combat nutrition issues are focused on children.



*(l to r): Two undergraduate students from Rwanda, Dr. Jose Jackson-Malete, Dr. Sharon Hooper, Dr. Muhammad Siddiq and Dr. Lorraine Weatherspoon as they taste-test the fortified bean product.*

However, a lack of iron and folic acid during pregnancy can have severe ramifications such as placental and fetal abnormalities, low birthweight, preterm birth and perinatal maternal and child mortality. So the Next Generation Nutrition in Uganda project aims to prevent common nutritional issues from the start, focusing on pregnant women and the critical periods from conception through delivery of their babies.

Since adherence to pills has not proven to be effective in developing countries, Weatherspoon and her team are trying a food-based approach. The product also must be commercially viable, easy to store, convenient to use and culturally acceptable. Knowing that beans are popular in most African countries, as well as locally available and nutritious, the team chose beans to formulate the product.

The final result is a composite of beans that are thermally processed, dried, milled and mixed with roasted and milled silver fish and a mix of iron, folic acid and vitamin A. The product will then be packaged in an edible film pouch that dissolves and releases the contents when exposed to hot water, which can be made into a tasty sauce.

Weatherspoon and her team already are in the initial stages of product formulation.



## Forbes CMO Symposium brings C-suite executives to campus

Chief marketing officers from across the country shared advice on growth, disruption and innovation in a changing world during the Forbes CMO Alumni Symposium held November 2, 2018 at Michigan State University.

Nine chief marketing officers—all MSU alumni from the Eli Broad College of Business and the College of Communication Arts and Sciences—shared insights from their decades of industry experience in building brands through customer engagement; powering marketing strategies through technology and data; and achieving competitive advantage through superior value creation.

“The industry is changing so dramatically, and now, more than ever, marketing practitioners need to connect with academia, and vice versa, so everyone can benefit, and we can develop and nurture the next generation of marketing leader,” said Jennifer Rooney, Editor, CMO Network, Forbes, who has been helping connect CMO’s across the country with their alma maters for almost six years.

Douglas E. Hughes, chairperson of the Department of Marketing and the United Shore Faculty Fellow in Sales Leadership at the Broad College said: “This event, and MSU’s partnership with Forbes, represents our institutional mission which is to disseminate knowledge through collaborative relationships while developing transformational leaders who make business happen.”

The featured presenters included:

- Andrea Brimmer, Chief Marketing and Public Relations Officer, Ally Financial
- John Costello, Chief Executive Officer, Bottom Line Branding
- Tom Dobry, Senior Vice President and Chief Marketing Officer, Lithia Motors
- Chris Fredrickson, President and Founder, Traverse City Whiskey Co.
- Casey Hurbis, Chief Marketing Officer, Quicken Loans
- Elizabeth Ross, President and Chief Executive Officer, Periscope
- Andy Royston, Global Chief Marketing Officer, Kerry Group
- Jay Spenchian, Senior Vice President, Marketing, U.S. Cellular
- Tamara Steffens, GM, Business Development for Microsoft
- Jim Trebilcock, Chief Concentrate and International Officer, Keurig Dr. Pepper

The event attracted nearly 400 students, as well as faculty and members of the Mid-Michigan business community, who were joined



Tamara Steffens moderated a panel discussion with (from left) Andy Royston, Andrea Brimmer and Chris Fredrickson.



Left: Bottom Line Branding CEO John Costello captivated the audience with insights on building brands.



Above: A lunch afforded opportunities for students to engage with marketing leaders.

by Forbes editors, and deans and department chairs in the Eli Broad College of Business and the College of Communication Arts and Sciences.

Andrea Brimmer, Chief Marketing and Public Relations Officer, Ally Financial, received her B.A. in Advertising from the College of Communication Arts and Sciences and was the key driver to bring the Forbes CMO Symposium to MSU.

“I think about my tenure at Michigan State University, and when I was here, I did not imagine myself as the CMO of a Fortune 500 company someday. But I believe I am proof that if you really hustle, there are endless opportunities in this industry for your career,” she said.

Throughout the symposium, business executives reflected on a wide range of topics including data analysis, disruption in established markets and pointers for bringing about innovation. Panel discussions covered broad trends, ranging from the prevalence of social media marketing and ad retargeting to the renewed focus on reaching consumers on an emotional level. The presentations and panel discussions also were packed with advice for undergraduate students.

“Putting your head down and working hard is the key to success,” said John Costello, CEO of Bottom Line Branding. Costello earned his M.B.A. from the

Broad College of Business in 1970. He shared his view with the students in attendance on the importance of building a personal brand and rising above the competition. “The strategies and principles of building business brands are actually pretty similar to the strategies in building your own personal brand.”

He said one of his key strategies is to “differentiate or disappear,” a goal that he believes both individuals and companies should strive to attain.

The day provided multiple formats for CMO alumni to share their stories, interact with faculty and inspire students.

“I think the things you will remember most,” said Dean Prabu David, College of Communication Arts and Sciences, “are the creativity, the surprise and the humor from the campaigns today. This human element will remain a key component of consumer interaction for years to come, and all of you will have the opportunity to be a part of it.”

For students and others in attendance, the CMO Alumni Symposium fostered many memorable moments, according to Melissa Priebe, a Communication Arts and Sciences student, who wrote of her appreciation for “actionable insights into business leadership, inspiring the next generation of C-Suite executives.”



## Foundations helping Education Policy Innovation Collaborative to provide evidence-based learning approaches in Michigan Schools



Michigan State University researchers will help Michigan develop a new student-centered approach to learning with nearly \$1.5 million in private grant funding from the William and Flora Hewlett Foundation.

Seven Michigan school districts are piloting competency-based education, or CBE, programs, which give students individualized support and opportunities to advance based on their own levels of mastery.

Michigan's Department of Education is partnering with the Education Policy Innovation Collaborative, or EPIC, at MSU to study how those districts implement the concept. Research will include surveys of parents, teachers and students, as well as classroom observations and assessments of overall patterns and trend data.

"Innovative methods of teaching help address the individual learning

styles of students," said Interim State Superintendent Sheila Alles. "Keeping students engaged in a manner that aligns with their style of learning will drive achievement and help Michigan become a Top 10 education state in 10 years."

The project is part of EPIC and MDE's ongoing strategic research partnership, intended to provide the state with evidence to help inform and improve policy and practice.

By conducting research in close collaboration with state officials, EPIC will help educators and policymakers learn more quickly how education reforms are working, as well as why and for which students and teachers. CBE is a key strategy in the state's plan to make Michigan a Top 10 education state in 10 years.

"We are thrilled to work with MDE and the seven pilot districts to better understand how CBE is being implemented and the successes and

challenges of this approach," said Katharine Strunk, co-director of EPIC and the Clifford E. Erickson Distinguished Chair in Education. "There is a lot of rhetoric but very little evidence about the details and efficacy of CBE. We applaud MDE for asking the tough questions early in their process."

The seven school districts—Alpena, Armada, FlexTech High School-Nov, Fraser, Kenowa Hills, Schoolcraft and Tecumseh—each received a share of \$500,000 in competitive state grants to use competency-based learning in classrooms. Efforts include implementing competency-based curricula; developing formative assessments; providing professional development for teachers; and building partnerships with business and community members.

In addition to conducting research, the project will help train local administrators and educators to develop local student assessments tailored to CBE systems. With the competency approach, grades are based on confirmation that students have mastered key concepts and skills, and not rely on tests or homework alone.

"This effort is an exciting example of what is possible when researchers are able to work in partnership with state and local educators to ask questions that are immediately relevant to the work of educating kids," said Deputy State Superintendent Dr. Venessa Keesler. "That is the kind of work we have seen the Hewlett Foundation supporting for years. We are thrilled to be engaged in this project."

## Growing research, growing support

Philanthropic support is essential to EPIC's ability to be flexible, and tailor its work to the various issues faced by Michigan schools in real-time, in accordance with its research findings. A recent grant of \$400,000 from the Smith Richardson Foundation will support these efforts. The Smith Richardson Foundation has a long history of contributing to public debates and addressing some of the country's most serious public policy challenges, including those related to education. In particular, Smith Richardson has an interest in human capital development, and how to make schools more productive by increasing teacher quality and creating more effective curricula—two things EPIC is excelling at.



Katherine Strunk, co-director of EPIC.

*Initially funded in 2017 by a \$1.9 million seed grant from the Laura and John Arnold Foundation, now Arnold Ventures, EPIC is a relatively young initiative, but that has not stopped many other philanthropic organizations from taking notice and supporting its work. Since 2017, researchers at EPIC have received more than \$4 million in funding from foundations such as Arnold Ventures, the Smith Richardson Foundation, Bloomberg Philanthropies and the Hewlett Foundation, in addition to \$2.3 million in federal and state grants.*

## Secondary education research for marginalized youth

A nearly \$1 million grant from the Spencer Foundation to the College of Education at Michigan State University will help bring visibility to marginalized youth's schooling experiences, needs and aspirations to improve global and national secondary education discourses, policies and practices.

The Spencer Foundation supports research projects that investigate ways in which education can be improved around the world. Amita Chudgar, associate professor of education policy, was awarded the Lyle Spencer Research Award from the foundation for her project focusing on understanding marginalized youth's secondary education experiences in low-income countries.

In collaboration with Nancy Kendall from the University of Wisconsin-Madison and Thomas Luschei from Claremont Graduate University, Chudgar and the research team will begin the project in fall 2019. They will conduct a two-year, mixed-method study in rural and urban public secondary schools in the countries of Colombia, India and Malawi, where they have strong research networks and youth face distinct sources of marginalization. The focus will be on the practices and effectiveness of secondary education and gaining a greater understanding of educational relevancy to marginalized global youth.

"Promoting a relevant education for global youth is currently an incredibly popular topic in education discourse," said Chudgar. "We have very little understanding of what youth secondary education experiences and aspirations truly are at the ground level, especially the youth that are marginalized in these low-income countries. It is difficult to determine what makes an education truly relevant to youth without understanding their experiences and aspirations."

The current focus on secondary education in the educational community first inspired



Amita Chudgar, associate professor

Chudgar to take a closer look at secondary education for marginalized populations in 2015. With a grant from the MacArthur Foundation, Chudgar's initial research project focused on studying the access to and outcomes of secondary education in five countries. Chudgar saw the usefulness and effectiveness of secondary education research after its conclusion and was encouraged to further her research with help from the Lyle Spencer Research Award with hopes of challenging and informing global youth discourses to determine the extent and relevancy of secondary education for marginalized youth.

"Global youth aged 15-25 are a very crucial demographic for our planet going forward for a number of reasons," said Chudgar. "From maintaining a good civic presence, to environmental awareness, economic growth and so forth. Young people are our leaders for change and reform, and an exploration of what it means to educate youth is still limited and in need of urgent attention"

Chudgar and her team will travel to these three continents in the coming months to begin their research. They are looking forward to gaining insights on the relevancy of secondary education and returning with new insights from the perspectives of marginalized youth that have the potential to challenge and inform the current thinking and dialogue around secondary education.



*Sporting cap, gown and a Dow STEM scholar medallion, some of the first Dow STEM Scholars gathered for a last group picture as undergraduates*

## Talented students attain STEM goals as Dow Scholars

This May the first cohort of Dow STEM scholars received degrees from Michigan State University in a wide range of STEM fields, helping to blaze a path for future students who aspire to careers in science, technology, engineering and math, or STEM.

The Dow STEM scholar program launched in 2014 with a \$5 million grant from the Herbert H. and Grace A. Dow Foundation to further their goal of increasing the number of STEM degree holders graduating from Michigan's universities. The program was designed to help students coming into MSU who did not receive the pre-college math training they needed to pursue degrees in science-related fields. Based on their pre-MSU math testing scores, the statistical prediction for these students to successfully graduate in a STEM field was less than six percent.

The inaugural graduates earned degrees in kinesiology, biomedical laboratory science, zoology, human biology, biochemistry and molecular biology, and genomics and molecular genetics. The first graduates' future plans include medical school, an accelerated nursing program and other advanced degrees. At the MSU convocation ceremonies, two Dow STEM scholars were selected to deliver the student addresses for their colleges.

The program's success also has had an impact well beyond the success of the students participating. The program has helped to inform decisions and policy changes to improve MSU's entry-level math and science courses as well as to enhance academic advising and tutoring support for all students.

"Because of the Dow STEM Scholars, all MSU students will have expanded opportunities in STEM-related disciplines," said Kristen Renn, professor of higher, adult, and lifelong education and associate dean of undergraduate studies. "We are grateful to the Herbert H. and Grace A. Dow Foundation for its investment that drew upon MSU's leadership in STEM education to help more students prepare for careers in STEM professions."

The foundation's support helped fund the program in its first four years and created an endowment to provide ongoing support for peer mentors and opportunities for the scholars to participate in research.

The program also provides professional advisors, summer learning experiences, access to gateway courses to help new students transition from high school, and opportunities to interact with faculty and industry professionals. The MSU Neighborhoods initiative also played a key role, as the Dow STEM Scholars were clustered in two of the five MSU Neighborhoods to take advantage of concentrated professional and peer support and to foster learning communities of STEM scholars.

At a recent Dow STEM Scholars honors ceremony, 92 students were recognized for academic achievements, including cumulative GPAs of 3.0 or higher. The students honored were quick to express gratitude for the Dow STEM Scholars program.

Graduate Jessica Kwalli who received a special recognition award for her commitment to the program said: "Becoming a Dow STEM Scholar was the best part about Michigan State for me. I will be forever grateful for all the support I received."

## Students graduate career-ready:

### Engineering and Science Success Academy expands with corporate support

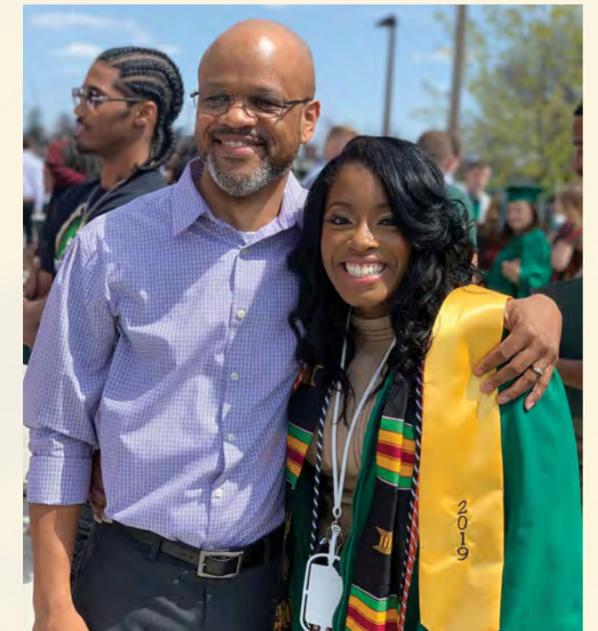
Michigan State University and its three primary STEM colleges are making strides to support and retain underrepresented student populations to ensure they leave MSU career-ready. The Engineering and Science Success Academy (ESSA) is a program offered to incoming freshmen who come from at-risk backgrounds and want to pursue degrees in the colleges of Agriculture and Natural Resources, Engineering or Natural Science.

To strengthen ESSA and the opportunities offered to participating students, Marathon Petroleum Corporation recently renewed its support of the program with a commitment of \$150,000 over the next three years. Marathon Petroleum's philanthropic vision is centered on strengthening communities. The company has a strong commitment to education, and particularly to ensuring those from socially or economically disadvantaged backgrounds have opportunities to succeed. The company has supported the ESSA program at the same level for the past three years.

"We have long recognized that employees from a wide variety of backgrounds make us a much stronger company," said Buffy Day, Marathon Petroleum's Vice President of Talent Development and Organizational Capability, whose responsibilities include the company's recruiting activities. "When we hire skilled college graduates who bring us their unique perspectives, it helps us keep our edge in innovation and hones our competitiveness. Michigan State's Engineering and Science Success Academy gives students of all backgrounds an opportunity to live up to their tremendous potential, and gives our company and other STEM-focused companies the opportunity to gain from these students' talent and drive."

Students who meet the qualifications are able to apply to ESSA and the program currently has a capacity of 60 students. The program lasts for two years and its hallmark is rigorous engagement with academic advisors, career placement staff, faculty and each other, ensuring students experience an open and comfortable learning environment. It brings structure and guidance to students who may need added support adjusting to a more demanding schedule. Once students are enrolled in the program, all components are mandatory, including academic advising and the summer bridge program which is a four-week, pre-freshman intensive program. At the end of their two years in ESSA, students have more than 1,000 hours of engagement related to their major.

Since its creation 12 years ago, ESSA has become a critical tool for student success. In 2018, 84 percent of ESSA students were able to improve their math placement exam results at the completion of the summer bridge program. Additionally, the six-year STEM graduation rate is 60 percent for ESSA students, and only 30.8 percent for students in the same target demographics who do not participate in the program. ESSA students may also have better career placement



*Theo Caldwell, assistant dean of student inclusion and diversity in the College of Engineering, congratulates ESSA participant Sierra Scott, who earned a bachelor's degree in materials science on May 5, 2019. She has accepted a position with Honda.*

**"MICHIGAN STATE'S ENGINEERING AND SCIENCE SUCCESS ACADEMY GIVES STUDENTS OF ALL BACKGROUNDS AN OPPORTUNITY TO LIVE UP TO THEIR TREMENDOUS POTENTIAL, AND GIVES OUR COMPANY AND OTHER STEM-FOCUSED COMPANIES THE OPPORTUNITY TO GAIN FROM THESE STUDENTS' TALENT AND DRIVE." --BUFFY DAY, MARATHON PETROLEUM'S VICE PRESIDENT OF TALENT DEVELOPMENT AND ORGANIZATIONAL CAPABILITY**

success post-graduation, as they are introduced to a myriad of career opportunities through the program.

In addition to the partnership with Marathon Petroleum, funding for the program has also been provided by ArcelorMittal, BP, Eli Lilly, Ford, P&G, PPG and ZF.

## Rethinking dialogues, rethinking history museums

*Scholars, students and museum professionals from MSU and South Africa's Stellenbosch University are partnering to strengthen the Ubuntu Dialogues.*



Michigan State University has a long history of involvement in South Africa, dating back to the era of apartheid when MSU became the first major public university in the US to totally divest from its South African portfolio in 1978. Following the advent of democracy in 1994, MSU established new partnerships with universities and other institutions in South Africa to support the transition. Today, this legacy of partnership continues as Michigan State's African Studies Center and South Africa's Stellenbosch University Museum have received an investment of \$800,000 from The Andrew W. Mellon Foundation to deepen an existing initiative, the *Ubuntu Dialogues*.

Support from the foundation will allow the two universities to bring together scholars, students and museum professionals from the United States and South Africa over a three-year period to break down barriers, build trust among communities, and encourage constructive dialogue.

The *Ubuntu Dialogues* project began two years ago with seed funding from MSU's Alliance for African Partnership. "What is unique about this project is that the agenda is set by our South African partners, and we are bringing our rich knowledge and expertise gained from years of partnerships to support our mutual goals," says Dr. Jamie Monson, the Director of Michigan State University's African Studies Center.

To further promote the growth of democracy, MSU had adopted a policy to only work with historically black universities in South Africa. The *Ubuntu Dialogues* project is a departure from Michigan State's post-apartheid stance because Stellenbosch University is a historically white institution. Many of the prime ministers who ruled South Africa during the days of apartheid

studied at Stellenbosch University. However, the Stellenbosch University of today is a far cry from the past. The University has actively sought to redress its wrongs and to embody the values of being inclusive, transformative and future-focused.

In addition, museums in South Africa have long been regarded as deeply compromised colonial institutions, in which low-income persons of color are invariably relegated to subordinate subject positions. Yet, at their best moments, museums can emerge as vital arenas of transformative dialogue, mutual discovery and debate, and in doing so actively create a visible tableau of interdependent human community, the very essence of "Ubuntu." This has been the approach taken by the Stellenbosch University Museum under the leadership of its current director, Bongani Mgijima.

"The premise of this project is that museums can accommodate both curation of art and creation of ideas," notes Dr. Monson, to serve as dynamic and digital crossroads and contact zones within which diverse people and communities from around the world can engage on equal footing to discuss common issues facing them across the continents. Dr. Monson pointed to U.S. movements to address pressing issues such as Black Lives Matter, while in South Africa students have formed movements such as Fees Must Fall. The *Ubuntu Dialogues* project will allow young people from both countries to share different perspectives and strategies related to these challenges. In addition to the discussions, there will be virtual and in-person seminars, an exchange program and graduate fellowships to encourage the sharing of ideas and the development of a professional pipeline for individuals who have traditionally been underrepresented in museum leadership positions.

## Transforming the exhibit experience

A \$50,000 grant from the Knight Foundation to the Eli and Edythe Broad Art Museum at Michigan State University will help create a system of smart labels that combine ultra-thin touch displays and microcomputers to deliver interactive, informational content about artwork.

While standard content delivery in the form of printed labels and wall text at museums often reach the largest segment of visitors, they pose significant limitations due to static, one-size-fits-all delivery. The MSU Broad is reinventing the content delivery system with help from the Knight Foundation.

"The move toward smart spaces is a very contemporary idea," said Brian Kirschensteiner, chief preparator at the MSU Broad. "It's happening in our homes and businesses and needs to happen in museums."

Kirschensteiner and Associate Curator Steven Bridges worked with a team of MSU students to create "prototype 1" of the new, interactive label this past year, and put their design to the test in an Optical Art exhibition at the MSU Broad Art Lab. The content for the label was created with help from Director of Education at the MSU Broad Michelle Word and Assistant Professor of Psychology Jan Brascamp and his class of MSU psychology students. The students generated the basic text descrip-

tion for the exhibition and built in tiers of content that users can move through depending on their interest. Certain key words are hyperlinked, leading users to additional content.

Museums around the country including the Metropolitan Museum of Art, the Newport Art Museum and Crystal Bridges Museum of American Art have all contacted Kirschensteiner with interest in the technology. While other museums have been using iPads to create layers of content, an iPad on a wall becomes an object. What this team has done is create an interactive label that looks as much like a standard label as possible.

The team is now actively laying the ground work for "prototype 2." This version will allow users to ask questions and post comments which will turn white and blend into the wall when not in use and provide analytics to better understand how visitors interact with exhibitions. This idea will further move the museum experience from static and passive towards dynamic and interactive.

Kirschensteiner has no plans to keep this technology self-contained and is actively working on ways to collaborate with peers at other institutions. The team is transforming the future of the museum and helping others do the same.



*Prototype interactive labels look traditional while functioning as technology tools to gauge and enhance visitor engagement at the MSU Eli and Edythe Broad Art Museum.*

## North American International Auto Show Reception

To conclude a week of exhibiting and engaging with industry partners, MSU hosted a reception for Detroit corporate partners. Addressing the crowd was Bill Golling, an MSU alumnus, president of Golling Chrysler, Dodge, Jeep, Ram, Inc. and chairman of the NAIAS. Deans from the Colleges of Natural Science, Social Science, Engineering, Communication Arts and Sciences and the Eli Broad College of Business helped highlight the unique role MSU plays in the auto industry.



*Left: Bill Golling, the event chairperson, addressed the crowd at the Spartan reception during the 2019 NAIAS.*

*Right: Michigan Lt. Governor Garlin Gilchrist examines MSU mobility initiatives.*

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**MSU STUDENT START-UPS SHOWCASED AT 2019  
CONSUMER ELECTRONICS SHOW**

Three student startup teams from Michigan State University participated in the 2019 Consumer Electronics Show, where they showcased their innovative projects and start-up ventures.

Students in the Colleges of Engineering, Business, and Communication Arts and Sciences had the opportunity to showcase their own concepts and ideas, network with major corporations, and enter a start-up competition. The experience was offered to students in partnership with Spartan Innovations.

The MSU student teams included: AgileCare Solutions, which works to build a suite of software solutions to help inform family caregivers on options and resources for their ailing loved ones; Vloggle, advertised as “video at your fingertips,” allowing users to shoot, edit, share and stream video or vlog content in real-time; and Social Movement Media, offering a breadth of social marketing services to clients that include Chevrolet and Hard Rock Café.

CES is the world’s gathering place for all those who thrive on the business of consumer technologies. It has served as the proving ground for innovators and breakthrough technologies for 50 years—the global stage where next-generation innovations are introduced to the marketplace.

Taking place in Las Vegas, CES hosts more than 4,500 companies. The high definition television, Microsoft Xbox, Android device and Satellite Radio represent some of the products announced at past shows.

*Students in the Colleges of Engineering, Business and Communication Arts and Sciences participated in the 2019 Consumer Electronics Show in Las Vegas.*