Michigan’s University Research Corridor Powers Mobility Innovation

SEPTEMBER 2021
Dear Readers,

As the birthplace of the automobile industry, Michigan has been a mobility leader since the first mile of concrete highway was built in Wayne County in 1909. The state’s already on course to maintain that position in the 21st century, as it works to lead the nation and the world in creating, deploying, and implementing new mobility technologies. These technologies include connected and automated vehicles, enhanced safety measures, expanded mass transit, innovations in road construction technology, sustainable industry supply chains, and better charging infrastructure.

The University Research Corridor (URC), an alliance of Michigan State University, the University of Michigan, and Wayne State University, is vital to the state’s mobility leadership. The URC universities have been instrumental in conducting research, transferring innovations to the market, and preparing students who will take their talents into the ever-changing mobility industry. The universities also work closely with mobility centers and businesses, including MICHauto, an initiative of Michigan’s business leaders dedicated to supporting and growing Michigan’s automotive and next-generation mobility industry; Michigan’s Office of Future Mobility and Electrification; and the Academic Consortium at the American Center for Mobility, a nonprofit smart mobility test center.

Each of our universities already plays a vital role in this exciting new transportation technology that will revolutionize Michigan, our nation, and the world.

At Michigan State University, the Connected and Autonomous Networked Vehicles for Active Safety on-campus living laboratory supports development and testing of mobility technology while cultivating new talent in a variety of fields. The initiative focuses on technology critical to connected and automated vehicles, including sensing, networking, machine learning, communication, security, privacy, traffic modeling, and infrastructure planning.

The University of Michigan’s Mcity is a public-private research partnership among industry, government, and university researchers. Its work includes funding research, working with partners to deploy connected and automated vehicles in the community, and operating the Mcity Test Facility. The test facility opened in 2015 as the world’s first purpose-built proving ground for these vehicles, offering a safe, controlled site to test performance and safety in a “city” set up to simulate urban and suburban driving.

At Wayne State University, the Transportation Research Group focuses on using technology and large datasets to manage and improve safety and mobility on roadways. WSU researchers, with funding from state and federal transportation departments, are developing and implementing new technologies that range from developing traffic calming strategies to optimizing connected vehicle data and mobility performance measurements.

We are proud the URC universities are continuing to be a part of the innovation, research and talent development that will cement Michigan’s global position in the mobility industry.

Sincerely,

Samuel L. Stanley Jr.  
President  
Michigan State University

Mark S. Schlissel  
President  
University of Michigan

M. Roy Wilson  
President  
Wayne State University
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Automated drive
Destination: 50° 43' 50.34" N  6° 10' 55.294" E
Arrival: 08:55 pm - Distance 783 miles
TCP/IP:192.56.327.684.1
SYNC: enabled  |  Sensors: active  |  Cameras: active
Executive Summary

The University Research Corridor, an alliance of Michigan’s three research-intensive universities—Michigan State University, the University of Michigan, and Wayne State University—conducts life-changing research that yields innovative ways to make transportation safer, cleaner, more efficient, and more accessible. The state is positioned to lead the world into the next generation of mobility, and its URC institutions are at the forefront of this mobility evolution.

From logistics and supply chains to machine learning and artificial intelligence, URC research drives economic development and growth. URC institutions are committed to developing a stronger future for Michigan by cultivating a tech-savvy workforce with cutting-edge skills, creating safe and sustainable technologies for communities, and curating a network of partners to deploy and evolve practical mobility applications.

This brief describes how, through talent production, research and development, technology transfer and innovation, integration, and collaboration, the URC institutions help Michigan anchor its leading edge in mobility, and how they will play a key leadership role in years to come.
Michigan’s Mobility Ecosystem

EDUCATION
Training current and future mobility workforce
With three engineering schools and three mobility centers, URC institutions train students for tomorrow’s mobility workforce.

87 key mobility degrees and programs

#1 in U.S.
The URC confers the most degrees in high-demand mobility industry fields.

LIVING LABS
Actively engaging with research ecosystems
URC develops systems for deploying autonomous and shared transportation.

7,849 acres of living lab capacity

Conducting research independently and with industry partners, URC institutions feature live, controlled, connected ecosystems for mobility research and development to advance smart-vehicle technology.

RESEARCH
Growing capacity to explore burgeoning possibilities
URC leads in first/last mile, biometrics, user experience, sociomobility, mobility policy, advanced materials, cybersecurity, software, Industry 4.0.

$542.4M
Automotive R&D between 2015–2019

94%
of Michigan’s federally funded R&D is conducted by the URC
TALENT
Cultivating and connecting skilled workforce with mobility industry leaders

14,824
mobility-related degrees granted (2019–2020)

#1 in U.S.
The URC confers the most undergraduate degrees in high-demand mobility industry fields.

INDUSTRY PARTNERSHIPS
Expanding unique, successful, and sustained partnerships
URC institutions partner with industry leaders and agencies include The Car Lab, Michigan Mobility Institute, Center for Advanced Mobility, TechStars Mobility, TechTown Detroit, Michigan Council for Future Mobility, MDOT, Ford Smart Mobility, Toyota at Ann Arbor, Waymo, Lyft and Uber, Google, Roush, ICAMI.

INNOVATION & TECH TRANSFER
Accelerating ideas to market
The URC creates ecosystems to accelerate ideas to market, license technologies to companies, incubate startups and provide mentoring expertise.

TOP 10
Michigan is a Top Ten State for Academic R&D, 92 percent of which is conducted by URC institutions.

TESTING & VALIDATION
Incubating and launching new technologies
The URC helps anchor Michigan as a premier location for young companies to start, scale, commercialize and grow technologies redefining the movement of people.

Testing facilities for connected and autonomous vehicles
University owned/sponsored spaces include Mcity, Automation Alley, Ford City Insights Platform, UMTRI, Detroit Mobility Lab, MSU Mobility, MSU Connected and Autonomous Networked Vehicles for Active Safety (CANVAS).
(Re)Defining Mobility

Although mobility is defined as “the production and distribution of goods and provision of services that support any movement of people and products,” it encompasses so much more (MICHauto 2021). While the research and technology that supports the movement of people and products has existed for centuries, more recent globalization and innovation offer a unique opportunity to be more holistic in scope.

This expanded view of mobility more accurately reflects the world’s complexities. Now, the movement of people and products includes automotive repair and maintenance, military vehicles, ship building, navigation equipment, postal and delivery services, fueling stations, insurance and legal agencies, tourism, emergency and rescue logistics, telecommunications, cybersecurity, social systems, environmental justice, and many others.

With this interconnectedness, URC institutions have a unique opportunity—a responsibility—to shape and invest in the future of mobility in Michigan. The URC institutions have all founded mobility-focused research centers on their respective campuses which leverage the campus environment as research hubs and create multisector partnerships across the state.
MSU Mobility: Campus Ecosystem for Research and Development of Mobility Technologies

Michigan State University faculty from five colleges—Communication Arts and Sciences, Engineering, Law, Social Science, and the Eli Broad College of Business—partner with industry and policy experts to save lives, reduce accidents, and improve mobility and productivity. MSU is transforming its 5,200-acre campus into a live, connected ecosystem with urban, suburban, industrial, and rural zones—a unique 8.1-mile environment in which to study all areas of mobility advancement.

“MSU’s campus is unrivaled in scope, size, and diverse mobility environments, providing an ideal testing ground and validation site. Studying mobility on football or basketball game days, for example, will provide great insights on solutions for safely and efficiently navigating through densely crowded areas. In addition to using campus as an ecosystem for research and development of technologies, we are looking to develop the future of human-centric, multimodal mobility.”

LEO KEMPEL, DEAN OF MSU’S COLLEGE OF ENGINEERING

The University of Michigan Transportation Research Institute and Mcity

The University of Michigan Transportation Research Institute (UMTRI), founded in 1965, is a global leader in transportation research and a partner of choice for industry leaders, foundations, and government agencies. This multidisciplinary approach to research includes short- and long-term projects in areas involving social and behavioral analyses, accident data collection, traffic safety analysis, and standards development and testing, as well as the deployment and evaluation of new safety and mobility technologies. This well-established hub has been foundational in the ongoing growth of mobility research, technology development, and application.

Mcity at the University of Michigan is a public-private partnership that brings together industry, government, and academia to improve transportation safety, sustainability, and accessibility. Since 2015, Mcity has invested nearly $30 million in more than 50 research projects. It is home to a one-of-a-kind Connected and Autonomous Vehicles (CAV) test facility that replicates complex urban and suburban environments and, working with partners including UMTRI, on-road CAV deployments in Ann Arbor and beyond. One example is the Mcity Driverless Shuttle research project launched in June 2018 on the public roads of U-M’s North Campus.

Wayne State University Industry Center for Advanced Mobility

Located in the heart of Wayne State University’s campus, the Industry Center for Advanced Mobility focuses on both technology research and workforce development in the dynamic landscape of mobility in the automotive industry. With a strong commitment to community engagement, the new center expands WSU’s current cyber-physical systems programs and features a broader set of degrees and certificates focused on autonomous driving, connectivity, smart infrastructure, and electrification. Combined, they represent the world’s first holistic, advanced mobility curriculum, which will attract new students and has the potential to provide training to displaced workers from rapidly evolving sectors such as the automotive and energy industries.
URC Institutions Produce Mobility Talent

Building and maintaining technologically advanced mobility systems in Michigan takes thousands of skilled workers. As new technologies evolve, expand, and are integrated into statewide mobility systems, the skill levels needed to sustain the development will likewise expand.

URC institutions prepare and train future generations of talent in a multitude of mobility-related disciplines, including engineering, finance and economics, urban planning, supply chain management, environmental conservation, fuel sciences, and transportation management.

Degrees often associated with mobility include engineering, computer programming, and design, but many other fields of study are crucial to powering 21st-century mobility challenges—chemistry, urban and regional planning, supply chain management, construction trades and sciences, sustainability, and climate change science. Social science research and applications play a vital role in designing positive consumer experiences, safety protocols, and operation instructions.
Cultivating Talent

In total, the URC identified 87 individual degree fields that are important to mobility companies. These include high-tech fields in STEM (science, technology, engineering, and mathematics), such as electrical engineering and computer science, as well as high-demand non-STEM fields, such as business administration, economics, and supply chain management.

The URC leads the nation’s top clusters in preparing the most overall graduates and the most undergraduates in fields needed by the mobility industry. When considering the fields that fall within the STEM disciplines, the URC leads in overall degrees and in undergraduate degrees. The URC also leads in the number of undergraduate degrees in non-tech fields that are in high demand by the mobility industry, such as business. And they account for more than 46 percent of the total number of Michigan graduates prepared for careers in mobility.

Michigan’s automotive industry has the strongest concentration of automotive-specialized employment in the nation.

<table>
<thead>
<tr>
<th></th>
<th>Total Degrees</th>
<th>Undergraduate Degrees</th>
<th>Graduate Degrees</th>
<th>Master’s</th>
<th>Doctoral</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Michigan Universities</td>
<td>32,604</td>
<td>22,798</td>
<td>9,806</td>
<td>9,046</td>
<td>760</td>
</tr>
<tr>
<td>High Tech</td>
<td>14,597</td>
<td>10,110</td>
<td>4,591</td>
<td>3,881</td>
<td>710</td>
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<tr>
<td>High Demand</td>
<td>18,007</td>
<td>12,688</td>
<td>5,215</td>
<td>5,165</td>
<td>50</td>
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<tr>
<td>URC Universities</td>
<td>14,824</td>
<td>9,346</td>
<td>5,478</td>
<td>4,859</td>
<td>619</td>
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<tr>
<td>High Tech</td>
<td>7,980</td>
<td>5,039</td>
<td>3,044</td>
<td>2,464</td>
<td>580</td>
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<tr>
<td>High Demand</td>
<td>6,844</td>
<td>4,307</td>
<td>2,434</td>
<td>2,395</td>
<td>39</td>
</tr>
</tbody>
</table>

Source: URC analysis using IPEDS data, August 2021

*MI degrees comparison: Of all four-year universities in Michigan, the URC accounts for 46 percent of all degrees and 56 percent of postgraduate degrees in high demand by the mobility industry.
Our Reach

The URC prepares professionals and researchers who lead the mobility sector in skill and research, driving innovation and setting high standards for new talent. These innovators pave the way toward a more sustainable and mobility-forward Michigan.

The Michigan State University College of Engineering Department of Civil and Environmental Engineering (CEE) provides a robust academic program in transportation planning, traffic engineering, and highway design, which is supplemented by numerous mobility-focused disciplines, such as traffic flow theory, intelligent transportation systems, and transportation and the environment.

The CEE program houses SPARTRANS, one of several new research entities housed in a recently developed research facility at Spartan Village, which is being transformed into an MSU mobility center that opened May 2019. This facility will allow for seamless collaboration with other transportation entities on the MSU campus, including the Connected and Autonomous Networked Vehicles for Active Safety program. The SPARTRANS program also leverages the unique talents of students from multiple disciplines, contributing to a robust and evolving pool of future mobility leaders. In fall 2021, MSU will launch an autonomous electric shuttle that will move students from the commuter parking lot to the main campus.

The Nexus program at the University of Michigan College of Engineering has recently added several new programs specifically designed for professional development and lifelong learning in the mobility fields. Although generally focused on engineering disciplines, the program is innovative in its interdisciplinary outreach, as it includes development opportunities for executives, managers, researchers, urban planners, and policymakers from all sectors. Modules include social and behavioral issues, mobility and the environment, mobility data, mobility law and policy, and financing.

Wayne State University College of Engineering has developed a new and comprehensive certificate program with several mobility topics, such as advanced battery systems for vehicles, autonomous and electric vehicle technologies, future mobility models, advanced vehicle technology, and other related focus areas. WSU also provides a newly established master of science program in robotics that includes a smart mobility track, and plans are in place to offer a fully online master’s program in computer science with a concentration in autonomous driving. In 2019, WSU and the Michigan Mobility Institute created the Center for Advanced Mobility to close the gap and better align academic curricula and industry needs. This certificate program is the first of its kind in Michigan.
**MARSHALL MENDOZA**
*Embedded Electronics Engineer, Nuro, Michigan State University Alumnus*

Marshall Mendoza is an electrical engineer for autonomous delivery vehicles at Nuro, which is the first company to receive an autonomous exemption from the National Highway Traffic Safety Administration. Before that, Mendoza was a Tesla electronic design engineer, and worked on the Model S, Model X, and Model 3. He earned his Bachelor of Science in Mechanical Engineering from MSU in 2010.

**ALISYN MALEK**
*Executive Director, Commission on the Future of Mobility*  
*Chief Executive Officer, Middle Third; University of Michigan Alumna*

Alisyn Malek is the executive director for the Commission on the Future of Mobility, which helps inform and implement policy changes throughout the world to optimize the movement of people and goods, making it safer, more convenient, environmentally sustainable, and accessible to all. Additionally, she is the founder and CEO of the mobility consultancy Middle Third. Alisyn earned a Bachelor of Science in Mechanical Engineering and master’s degree in Energy Systems Engineering from U-M along with a Master of Business Administration from Indiana University.

**MARYSSA WEIR**
*Lead Occupant Safety Performance Engineer, General Motors Corporation, Wayne State University Alumna*

Maryssa Weir is a front-impact safety performance integration engineer at General Motors. She holds a bachelor’s and a master’s degree, both in Biomedical Engineering from WSU, and continues to give back to her alma mater as an industry mentor, an advocate for women in her profession, an ally to her community, and an ambassador for Wayne State and the City of Detroit.
URC Institutions Produce Mobility Research

Our Investment

The URC drives an extensive amount of the academic mobility research in Michigan. The considerable investment has been financially sustained with numerous mobility-related research and development awards. In the past five years alone, the URC has conducted more than $542.4 million in automotive–related academic research and development specific to shaping the future of mobility.

The two primary sources of funding for mobility-related R&D are the federal government and private industry. These highly competitive funding sources can be used in any state but are spent in Michigan—because of the expertise and capacity of our URC universities. These investments have allowed URC institutions to lead the nation in development of mobility technology and the workforce to drive progress.
Innovation abounds within the URC, from autonomous vehicles, crosswalk and curb sensors, supercomputing, cybersecurity, economic analysis, vehicle design, and cloud-based software that runs CAV tests to social systems, equity, consumer experiences, and collaborative network development. Currently URC institutions have more than 40 smart intersections installed on their campuses, with more planned in the future.

The URC engages students, faculty, and staff in campus living laboratories to advance dynamic learning outcomes and a new workforce with the highest potential for impact.

The URC institutions help Michigan stay at the forefront of innovation. These campuses are models—living laboratories—for the future of infrastructure. Cutting-edge URC research, talent, and facilities will help to ensure that Michigan creates innovative and reliable CAVs, our water supply is safe, renewable energy sources are engineered and adopted, and advanced broadband service expands to all communities.

The two primary sources of funding for mobility-related R&D are the federal government and private industry.

While this investment in a physical campus is substantial, the value of campus space increases significantly when campuses are transformed into living laboratories that allow students, faculty, researchers, and many other partners, stakeholders, and other community collaborations to maximize the learning experience, accelerate technology transfer, and utilize the real-world testing environment that a physical campus provides. URC institutions provide 7,849 total campus acres of living labs to enrich mobility research and speed deployment of technology solutions.

### URC MOBILITY-RELATED AWARDS DATA TOTALS BY FUNDING SOURCE (2016–2020)

<table>
<thead>
<tr>
<th>Source</th>
<th>Estimate</th>
<th>Share of Total</th>
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<tbody>
<tr>
<td>Total</td>
<td>$542,407,193</td>
<td>-</td>
</tr>
<tr>
<td>Federal Government</td>
<td>$251,603,035</td>
<td>46.4%</td>
</tr>
<tr>
<td>State and Local Governments (MI)</td>
<td>$24,311,362</td>
<td>4.5%</td>
</tr>
<tr>
<td>Industry</td>
<td>$209,499,261</td>
<td>38.6%</td>
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<td>Nonprofit</td>
<td>$24,806,274</td>
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</tr>
<tr>
<td>Higher Education</td>
<td>$29,483,324</td>
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</tr>
<tr>
<td>Other</td>
<td>$2,094,437</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

Source: URC analysis of university awards data, September 2021

PUBLIC SECTOR CONSULTANTS 2018
Mobility Changemakers

At the core of URC mobility research is a large network of faculty and researchers from around the world. These global mobility pioneers develop and test new technologies, lead innovation and entrepreneurship, create curricula for a burgeoning mobility workforce, study social systems, and so much more. A few of these research innovators include:

**PETER SAVOLAINEN, PHD**  
Professor and Associate Chair, Civil and Environmental Engineering, Michigan State University

As a transportation engineer, Dr. Savolainen examines the fundamental nature of road user behavior. His research examines how drivers alter their behavior in response to changes in the roadway environment such as speed limits, centerline and shoulder rumble strips and red-light-running cameras at signalized intersections.

Dr. Savolainen has served as Principal Investigator (PI) or co-PI on more than $18 million of externally funded research through competitive grant awards. He was named a Fellow of the Institute of Transportation Engineers for his contributions to improve mobility safety.

**XI JESSIE YANG, PHD**  
Assistant Professor, Industrial and Operations Engineering  
University of Michigan

Dr. Yang received a National Science Foundation (NSF) Career Award in April 2021 for her research focused on one of the fundamental questions of human-technology partnership: how to facilitate the establishment of appropriate trust in technology. She says, “Realizing the full economic, safety, and health potential of [advanced] technologies is only possible if people establish appropriate trust in them. This project aims to understand and model the dynamics of trust development, and to develop adaptive autonomy that facilitates the establishment of appropriate trust.”

**WEISONG SHI, PHD**  
Professor of Computer Science, IEEE Fellow, Associate Dean, College of Engineering, Wayne State University

Dr. Shi leads a team of researchers that have proposed HydraOne, an indoor experimental research and education platform for CAVs. HydraOne is a small, low-cost, fully functional development tool equipped with a chassis power system, visual sensors, voice control, and computing and communications systems—basic components to support deployment of intelligent connected vehicle research. “HydraOne is also a perfect platform to educate the next generation of workforce in the CAV space, which is an urgent need,” says Shi.
Research outcomes are actualized through the process of technology transfer, which is the vital, active, and intentional process to move research—in the form of products, processes, and services—from the lab to practical application in communities and new markets.

Technology transfer can be thought of as the process of commercializing research. It is key to getting important findings out of the lab and into the world. URC institutions take all precautions to ensure that the products are both protected from infringement and market worthy. The 2018 URC infrastructure report highlighted the university’s significant role in technology transfer: “Intellectual property is protected with copyrights and patents, and the universities can find the best partners to license the research or provide the financing needed to make it marketable. When appropriate, the universities can also provide the support needed to turn an invention into a successful startup company.” In this manner URC institutions serve as a key stakeholder in both fostering research and cultivating innovative ideas.

Technology transfer within the mobility sector has evolved into a much richer and more multifaceted activity within URC institutions. This includes marketing technologies and creating startup business plans, creating and executing licensing agreements, monitoring regulations, cultivating partnerships, promoting economic development and STEM programs, and working to fund new business through grants, investors, and other programs.
**URC Researchers Lead Mobility Innovation**

Mehrnaz Ghamami, Michigan State University assistant professor of engineering, is a dedicated transportation engineer, planner, and mathematical modeler in sustainable transportation modes, including bikes and alternative-fuel vehicles. Through MSU Mobility and her extensive experience in the field, Dr. Ghamami is bridging the research-to-technology-deployment gap through in-house research entities or programs such as SPARTRANS; Spartan Innovations, Preparing the Future Workforce for the Era of Automated Vehicles (WEAVE); The Hatch; and others working on technology transfer and entrepreneurship in mobility.

Through the living laboratory of University of Michigan, the City of Ann Arbor will soon be home to more than 20 smart intersections. Research conducted by U-M, its partners, and collaborative research centers have made this technology deployment a reality. “One of the most promising aspects of this project is that we will be able to pave the way for a national connected and automated vehicle deployment,” says UMTRI director James Sayer. “We will definitively demonstrate not only the technology but [also] a clear path to funding the infrastructure—both aspects needed for a national deployment. Furthermore, the Smart Intersections Project will provide significant day-one benefits to early adopters, including saving pedestrian lives.” Smart intersections and related technologies offer the community a direct and accessible interaction with mobility in everyday life.

TechLab at Mcity is a company-in-residence program designed to accelerate early-stage advanced mobility companies in the CAV industry through the work of elite and technically skilled students. To date, more than 120 students and 14 startups have participated in the TechLab program. Mcity OS is a new cloud-based tool developed by Mcity engineers and introduced in February 2021, allowing users to design and execute complex, repeatable test scenarios for CAVs using any device with an Internet connection, at any mobility test site. U-M’s Office of Technology Transfer granted the first license to the American Center for Mobility.

Alongside these ground-based advances, mobility has implications for air travel. At Wayne State University, a project by Yanchao Liu, assistant professor of industrial and systems engineering, addresses the knowledge gap on how to manage multiple unmanned aerial vehicles—also called drones—in complex operational, environmental, and traffic conditions. Commercial drones have many applications, not the least valuable of which is accelerated delivery of packages, food, and other goods to consumers living in an increasingly on-demand society. Commensurate with the need for faster service at a lower cost, drones sold in the U.S. this year will generate more than $1.9 billion in revenue. These figures are expected to grow seven times over by 2025.

**Accelerating Innovation to Market**

The Michigan Translational Research and Commercialization (MTRAC) Innovation Hub for Advanced Transportation at U-M recently awarded a combined $710,000 to eight high-tech, early-stage projects. These projects tackle market needs, offering ways to increase the efficiency, safety, and sustainability of moving people and goods.

Project examples include fast-charging batteries; an inclement weather autonomy system, which provides safe operation of autonomous vehicles in poor weather; solar charging stations; and a method for light metal extrusion that reduces waste by 25 to 50 percent. “The projects receiving funding this year reflect the diversity of advanced automotive technologies being developed at Michigan’s universities. These technologies hold the potential to fuel our region’s mobility industry in the years to come,” says Kelly Sexton, U-M associate vice president for research, technology transfer and innovation partnerships.

Open to researchers in higher education institutions, hospital systems, and nonprofit research centers throughout Michigan, this hub is jointly run by the U-M Center for Entrepreneurship and U-M Office of Technology Transfer in partnership with the Michigan Economic Development Corporation.
Michigan State University has a new exclusive partnership to provide e-scooters on campus with Spin, a San Francisco-based micromobility unit of Ford Motor Company, that will bring hundreds of e-scooters to campus this fall. The partnership is a continuation of the university’s effort to use the campus as a testbed to drive the future of human-centric mobility solutions. “We are excited to provide our campus with improved mobility while continuing to evolve MSU into a best-in-class destination,” said Brice Nelson, senior director of corporate partnerships at Business Connect, a unit housed under the MSU Innovation Center.

As robots and autonomous systems are poised to become part of everyday life, the University of Michigan and Ford Motor Company opened a one-of-a-kind facility in April 2021 to develop robots and roboticists that help make lives better, keep people safer, and build a more equitable society. U-M’s Ford Motor Company robotics building is a four-story, $75 million, 134,000-square-foot complex situated on North Campus. As the new hub of the U-M Robotics Institute, its first three floors hold custom U-M research labs for robots that fly, walk, roll, and augment the human body—as well as classrooms, offices, and makerspaces. Through a unique agreement, the fourth-floor houses Ford’s first

**URC Institutions Produce Mobility Integration**

Integration of mobility is about partnerships, collective impact, and collaborative problem solving to bring mobility technology into practical application. While technology transfer is the process by which research and development of products and services move into the marketplace for deployment, integration is the network of partners and collaborators that support and sustain mobility systems.
robotics and mobility research lab on a university campus, as well as 100 Ford researchers and engineers.

The Wayne Mobility Initiative is a newly formed interdisciplinary group promoting integrative collaboration across the university. It recently launched the Mobility for All competition. While technology design competitions are not unique, the Mobility for All initiative is the first mobility-focused competition of its kind in the state that includes engagement with the surrounding community to identify real-life challenges, tap into interdisciplinary fields of research, and explore the ongoing sustainability of new mobility technology.

In a collaborative project with Spatial Integrated Systems Inc., the U.S. Army Ground Vehicle Systems Center, and U-M, Dr. Saravanan Venkatachalam, assistant professor of industrial and systems engineering at WSU, is working on a project to improve deployment of unmanned ground vehicles (UGVs). Helping UGVs perform complicated tasks requires a model that can incorporate the uncertainty of delay from unknown terrain or obstacles. This research provides novel algorithms to successfully deploy a team of UGVs while addressing uncertainties in human-robot interaction dynamics and considering “expected” uncertainties in the future.
Conclusion

URC institutions have a long-standing history of leading research, advancing technology, driving innovation, and contributing to the evolution of the automotive and transportation industries. The words “automotive” and “transportation” have expanded their definitions in the past few decades from meaning cars, trucks, and buses, to referring to the mobility of people and products and creating equitable and accessible mobility systems. Mobility is also a significant gateway to enriching sustainable communities within the state. URC institutions are the cutting-edge facilities and leading innovators that bridge research and technological breakthroughs to the marketplace, demonstrated by the many partnerships, projects, and products presently deployed throughout Michigan. URC researchers have led the way to developing mobility solutions that are already demonstrating value to global transportation systems and supply chains, and the investments in mobility solutions by URC institutions will continue to foster change and cultivate state-of-the-art advancements in research, technology, policy, and societal benefit.
References


