



MICHIGAN IS AUTOMOBILITY



INDUSTRY AT A GLANCE

Michigan's automotive and mobility industry came out of the last decade following the recession with more than 60,000 new automotive manufacturing jobs, a nearly 50% growth. Looking ahead to the next decade for the world's most dense automotive industry cluster, Michigan is poised to drive next-generation mobility, the new frontier of the automotive industry.

\$225 billion

contribution to Michigan's economy annually

21

original equipment manufacturers (OEMs) have headquarters or technology centers in Michigan

96 of the top 100

automotive suppliers to North America have a presence in Michigan, and 60 are headquartered here

#1

for operational and planned U.S. Department of Transportation-funded connected vehicle deployments with 14 projects

16

universities and colleges in Michigan offer nationally ranked undergraduate engineering programs and four offer nationally ranked graduate programs

17%

of all U.S. vehicle production and 11% of all North American vehicle production occurred in Michigan in 2019

500+

miles of roadway equipped for connected and automated vehicles

\$14 billion

business-funded automotive research development occurs in Michigan annually, making up 72% of the nation's share

2,200+

facilities with engineering, design, testing, and validation capabilities.

21

vehicle models were assembled in Michigan in 2019

\$41.5 billion

in OEM investment in Michigan since 2009



Publication Sources: Automotive News, Bureau of Labor Statistics, Center for Automotive Research, CyberSeek, Detroit Regional Chamber research, EMSI, FIRST in Michigan, Integrated Postsecondary Education Data System (IPEDS), International Trade Administration, Merit Network, Michigan Defense Center, Michigan Department of Transportation, Michigan Economic Development Corporation, National Center for Science and Engineering Statistics, National Conference of State Legislatures, National Science Foundation, PatentsView, State of Michigan, Square One Network, Tax Foundation, The Brookings Institute, U.S. Department of Transportation, U.S. News and World Report, United States Patent and Trademark Office, National Venture Capital Association, Pitchbook

GLOBAL OEM DESTINATION

Headquarters in Michigan



North American Headquarters or Technology Center in Michigan



“We are committed to Michigan’s role as a global leader in transforming mobility technology and the automotive landscape while improving the lives and safety of our residents and visitors. The innovation and real-world deployment of new transportation technologies through unique and innovative partnerships will continue to advance our state and maintain our edge in mobility.”

**Gretchen Whitmer,
Governor, State of Michigan**

DRIVING BUSINESS GROWTH

Michigan has made strides since the recession, with unemployment down to 4.1% in 2018 from a peak of 13.7% in 2009. Over the past nine years, the state's thriving business climate created more than 588,000 private sector jobs, and the median household income has increased by 25%.



Automotive manufacturing jobs have grown

10%

from 2015 to 2019

From 2009 to 2019
Wayne (#1), Macomb (#8),
and Oakland County (#17)

led the nation

in new manufacturing jobs

Since the recession (2009),
automotive manufacturing
jobs have grown by

49.2%,

approximately

60,867 jobs

GLOBAL MOBILITY LEADER

Michigan is a world leader in connected and automated vehicle legislation and infrastructure investment. Matched with the testing and deployment of connected, automated, and electric vehicles, the state has become a global mobility hub.

#1 in the nation

for engineering talent concentration



Home to

globally recognized automated testing sites,

with Mcity in Ann Arbor, the American Center for Mobility in Ypsilanti, and Kettering University GM Mobility Research Center in Flint



Home to the

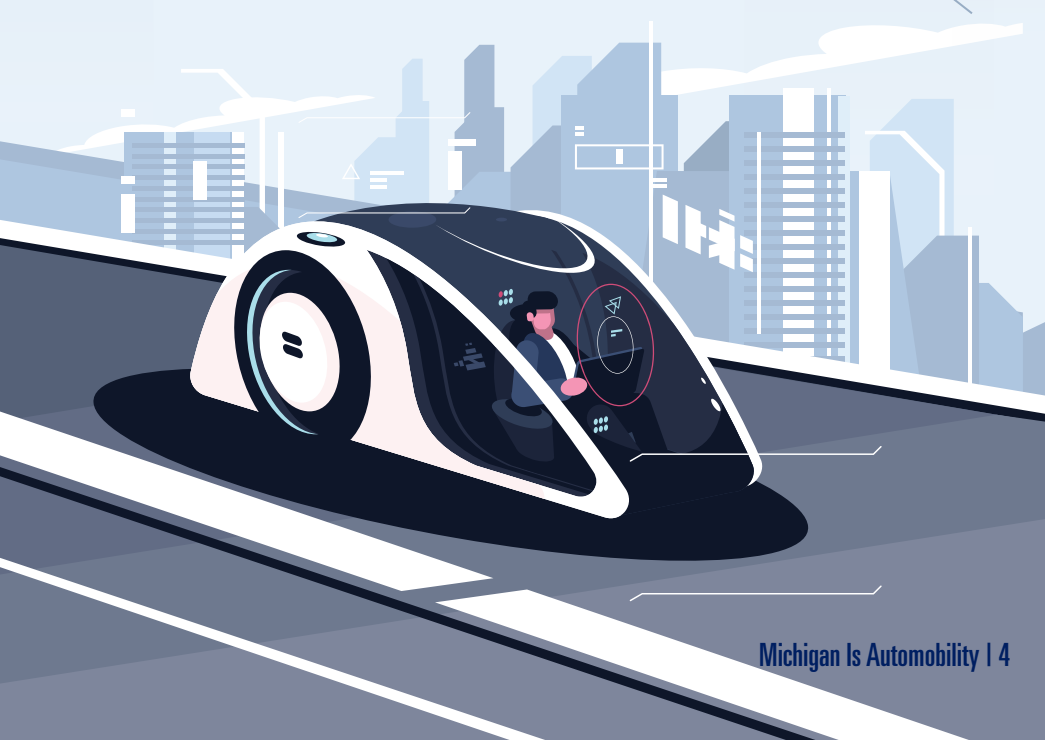
largest deployment of V2I

(vehicle-to-infrastructure) technology in the U.S., with more than 500 miles of V2I-enabled roadway

Michigan ranks

#6 in the nation for number of inventors,

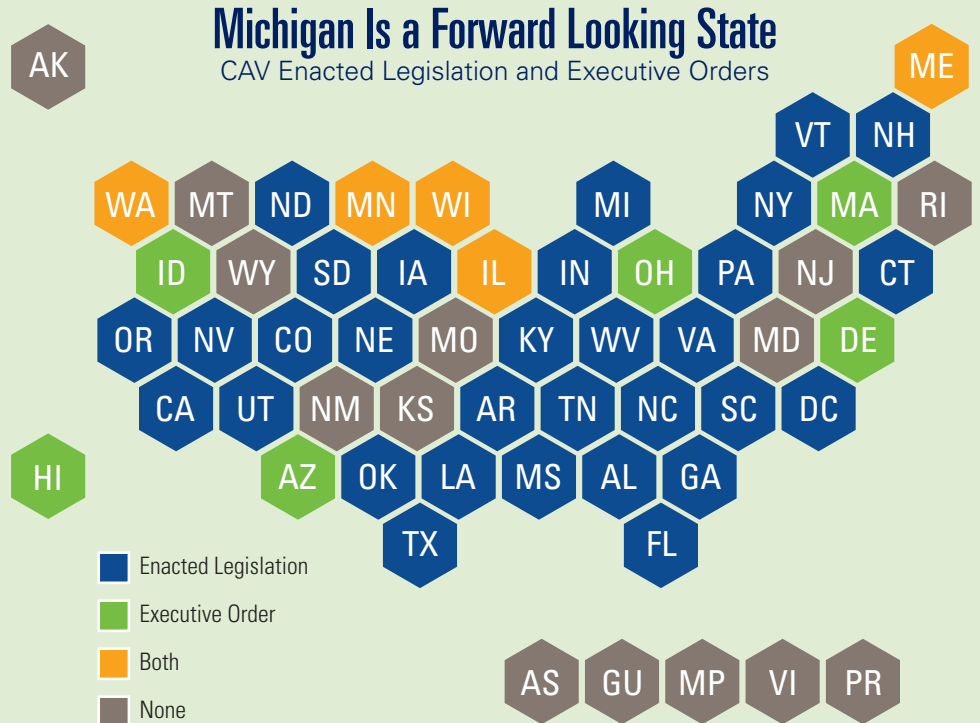
with 9,454 issued patents in 2019



BUSINESS CLIMATE

LEGISLATIVE COMMITMENT

Fully autonomous vehicles will be commonplace on roadways across the country within the next few decades. Legislation regulating connected and automated vehicle (CAV) technology is already enacted in 26 states and counting.



MICHauto Policy Priorities

Robust Talent Pipeline:

Develop a strong, diverse, and inclusive talent pipeline for the automotive and mobility industry.

Connected, Automated, Shared, and Electric Future:

Cultivate a leading mobility ecosystem for companies and research institutions.

Global Mobility Leader:

Market Michigan's one-of-a-kind automotive and mobility assets globally.

Fair International Trade:

Promote fair trade through the pursuit of high-standard trade agreements.

Business Climate

- **6%** corporate income tax
- **4.25%** personal (flat) income tax
- **6%** sales tax
- **#13** for state business tax climate



GLOBAL IMPACT

Michigan's position sharing an international border with Canada allows the state to have one of the largest export markets and remain a globally connected region.

\$58 billion

exported in goods in 2018, a 77% increase from the peak of the recession

48.5%

of Michigan's exports in 2018 were transportation equipment

7th in the nation

for exports in 2018

#1

exporter of transportation equipment in the U.S



LEGISLATIVE COMMITMENT

• GLOBAL IMPACT

Global Impact of 'Detroit Three'

Combined, Detroit's largest automakers – FCA US LLC, Ford Motor Company, and General Motors Co. – operate 81 international assembly plants.

FCA

FIAT CHRYSLER AUTOMOBILES

24



26



31

EDUCATION PIPELINE

The automotive and mobility industry depends on top engineering graduates to power Michigan's workforce. This highly skilled talent pipeline is moving the industry forward into the next decade and growing the state's economy.



8,600+

engineering degrees were awarded by Michigan education institutions in 2018, with 39% master's degrees or higher



16

universities and colleges have nationally ranked undergraduate engineering programs, and four have nationally ranked graduate programs



138,585

total degrees were awarded by state educational institutions in 2018

Top 10 Engineering Graduates

Institutions	City	Degrees Conferred (2018)	Growth % Year-Over-Year	IPEDS Tuition and Fees (2018)
University of Michigan	Ann Arbor	2,658	▲ 5.8%	\$16,225
Michigan Technological University	Houghton	1,168	▲ 1.7%	\$16,800
Michigan State University	East Lansing	939	▲ 4.6%	\$15,555
Wayne State University	Detroit	748	▲ 10.0%	\$14,175
University of Michigan	Dearborn	537	▲ 15.0%	\$13,110
Oakland University	Rochester	443	▲ 8.3%	\$13,916
Western Michigan University	Kalamazoo	412	▼ 4.6%	\$12,483
Lawrence Technological University	Southfield	407	▼ 10.5%	\$33,570
Kettering University	Flint	352	▲ 5.7%	\$40,236
University of Detroit Mercy	Detroit	180	▲ 130.8%*	\$28,000

*University of Detroit Mercy announced decreased tuition in 2018.

Community College Mobility Centers



Washtenaw
Community College
Advanced
Transportation Center



Macomb
Community College
Center for Advanced
Automotive Technology



Source: Square One Network

2030 Detroit Equitable Mobility

A joint project of the College for Creative Studies, Design Core Detroit, Ford Motor Company, and GTB, this effort focused on mobility equity in Detroit and creating solutions for how mobility impacts health, employment, education, and socialization.

CyberTruck Challenge

Government, industry, and security researchers from all over the world join students from 20 universities annually to address challenges in heavy vehicle cybersecurity and talent development.

FIRST Robotics

568 high school teams
1,026 early elementary school teams

Michigan ranks first in the number of high school and elementary school teams in the country. The global FIRST Robotics championship will be held annually in Detroit through 2020.

Formula SAE Michigan Competition

2,500+ students

Held at Michigan International Speedway, students construct a single-seat race car with the best overall design, construction, performance, and cost.

Intelligent Ground Vehicle Competition

47 teams

The annual competition at Oakland University between students encompasses the latest technologies, from electrical engineering and computer science to intelligent vehicle systems.

Michigan Mobility Institute

The initiative of the Detroit Mobility Lab has partnered with Wayne State University to create a mobility center as part of the college of engineering. The institute will advise on mobility curriculum and offer Master of Science degrees in robotics and mobility.

SAE CyberAuto Challenge

Students receive hands-on experience and learn from the best cyber researchers, hackers, automotive engineers, and academia to advance the next generation of cyber security experts.

Square One Network

12,000 students
500 teachers

Square One Network works to inspire students toward college and career pathways in mobility through the annual Autonomous Innovative Vehicle Design Challenge at Kettering University. Students engineer an autonomous vehicle utilizing next-generation technology, GPS, and sensors.

Higher-Education Research Leadership

8th in the nation

for higher education
R&D performance

\$2.5 billion

in higher education R&D

\$424 million

or 17% of Michigan's
higher education R&D is
dedicated to engineering

TALENT ADVANTAGE

Michigan ranks **#1** among all states in number and concentration for the following occupations:

43,890
mechanical engineers

31,520
industrial engineers

5,060
commercial and industrial designers

1,400
model makers
(metal and plastics)

Skilled Trades



There are 1.2 million skilled trades workers across the state. Michigan's national competitive advantage includes high concentrations of skilled trade occupations, including the following occupations **exceeding the national average:**

8 times
Model makers

7 times
Tool and die makers

2.5 times
Machine setters,
operators, and tenders

3 times
Computer numerically
controlled machine
tool programmers



Michigan's **111,000+** highly skilled assemblers and fabricators working in mobility-related occupations produce the world's most complex and highly technical product.

Michigan ranks

3rd
in number of
engineers in the nation

118,205
engineers in Michigan



Statewide Job Postings

2,711

average monthly engineering hires

58,143

unique engineering job postings were available in 2019

#4

for active engineering job postings after California, Texas, and Florida

Top Counties Posting Engineering Jobs

Oakland, Wayne, and Macomb

Top Cities Posting Engineering Jobs

Detroit, Auburn Hills, and Dearborn

Top Engineering Job Postings in Michigan

Note: 2019 unique postings

5,938 design engineers

2,769 controls engineers

2,624 product engineers

2,360 quality assurance engineers

2,036 project engineers

Michigan's mobility talent drives technology companies including:

• APTIV •



DANLAW



CISCO Jasper



opentext™

pillar
Part of Accenture Industry X.0

RENESAS



TALENT ADVANTAGE

ENTREPRENEURIAL NETWORK

Through its vast network of accelerators and venture capital firms, Michigan's well-developed startup community ensures the technologies solving the world's mobility-related challenges are being created and developed in the state.

Mobility Technology Investment

23

venture capital firms funded mobility technology startups

71

organizations provided entrepreneurial support

5%

of angel investors funded mobility startups in the state



\$771 million

in venture capital investment in 2019, up 53% from 2015

11%

of venture capital investments were dedicated to the mobility sector in 2018

8

angel investors helped fund mobility startups



INNOVATION COLLABORATION

Industry 4.0 Accelerator: Led by Automation Alley, with Lean Rocket Lab, and Lawrence Technological University's Centrepolis Accelerator to help early-stage and established companies with digitization to grow innovation and commercialization.

May Mobility: Headquartered in Ann Arbor, this startup has had 170,000 revenue-generated self-driving rides since 2017. The shuttle fleets are deployed in structured environments like central business districts, corporate campuses, and dense residential developments in Detroit and Grand Rapids through public and private partnerships.

Plug and Play Detroit powered by AmplifyD: Innovation platform to open a technology hub in 2020 as a partnership with Fiat Chrysler NV and the Michigan Minority Supplier Development Council to advance automotive mobility.

StartupMICHIGAN.com: Online platform, hosted by the Michigan Israel Business Bridge, that allows connections with Michigan-based startups, companies, investors, and accelerators in order to grow companies.

Techstars: The accelerator helps founders around the world succeed in building transformational businesses across the mobility and automotive sectors. In Detroit, more than \$80 million was raised by 143 organizations to further mobility technology for 44 startups.

38
startups



22
industry
partners

This joint initiative of MICHauto and Michigan Economic Development Corp. provides a physical entry point for global mobility startups to access the vast network of automotive companies, testing infrastructure, talent, and R&D centers Michigan offers.

A Commitment to Startups

Since 2017, PlanetM has facilitated more than **\$70 million** in mobility-focused investments through pilots, testing, and connections. These investments in next-generation mobility technology companies and pilot programs help strengthen Michigan as the nation's hub for advanced automotive and mobility research.

PlanetM Pilot and Testing Grants: 40 grants totaling more than **\$1.7 million** have been awarded to global mobility companies dedicated to deploying their technologies in Michigan while allowing access to five testing facilities.

Matchmaking Services: 4,000+ ecosystem introductions have been made for companies from 33 states and 22 countries.

Partially Subsidized Soft-Landing Zone Space: For all things mobility, the PlanetM Landing Zone offers **subsidized** and **flexible co-working space** for startups to engage with automotive industry decision-makers to grow their business.

DEPLOYMENT LANDSCAPE

As the technology and automotive industries converge, Michigan automakers are actively engaged in partnerships with companies around the globe driving electrification, autonomous driving, mobility, and connectivity innovation. The Detroit region leads the nation with a mix of private and public proving grounds, road initiatives, and CAV investments.



Michigan leads the nation

in U.S. DOT operational or planned connected vehicle deployments.

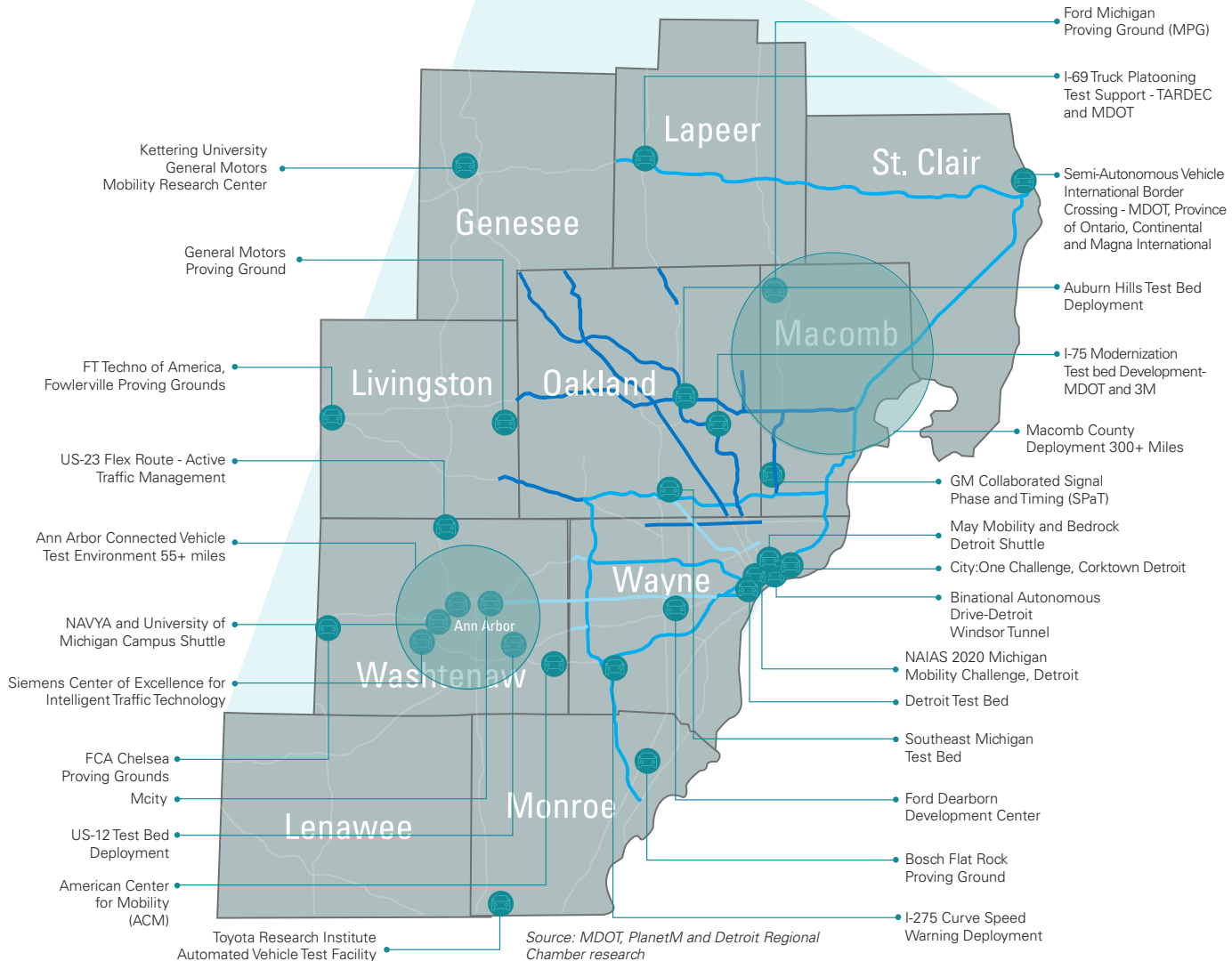
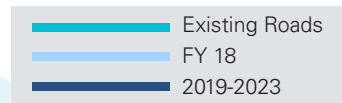
14

U.S. DOT operational or planned connected vehicle deployments

120+

pending Intelligent Transportation Service (ITS) public safety license applications with the Federal Communications Commission (FCC)

CAV Deployments



Source: MDOT, PlanetM and Detroit Regional Chamber research



Pilot Programs

As of December 2019, at least 32 PlanetM-funded mobility pilots were underway in Michigan, bringing the total to 60 pilot deployments in 23 counties.

PlanetM Mobility Grants:

A partnership between PlanetM and NextEnergy that provides expertise and project management services for pilot programs and encourages mobility startups and corporations to deploy technologies in Michigan.

\$8 Million Michigan Mobility Challenge:

A collaboration between the State of Michigan, MDOT, PlanetM, and four other state agencies, the Challenge is a grant initiative to address core mobility gaps for seniors, people with disabilities, and veterans across the state.

NAIAS 2020 Michigan Mobility Challenge:

A partnership between the State of Michigan, MDOT, and PlanetM, the Challenge calls on industry innovators to propose autonomous technology deployments that demonstrate the transformative power of automotive and connected vehicle technology.

Ann Arbor Mobility Transformation Program:

A public-private partnership among Ann Arbor SPARK, the City of Ann Arbor, Deloitte, Ford Smart Mobility, PlanetM, and the University of Michigan, this program aims to integrate data from mobility solutions into a centralized digital platform for city planners and transportation users to make more informed decisions.

Project Kinetic:

A unique collaboration between the public, private, and philanthropic sectors, which resulted in more than 120 innovative solutions including community car-share, fast charging, micro-transit, and other pilots to tackle some of the most pressing mobility challenges facing Detroit.

City: One Challenge:

A collaboration between PlanetM, Ford Motor Company, and local partners to modernize and streamline access to transportation as well as solve mobility problems to help improve the quality of life for communities. Challenges took place in the following communities:

- **Grand Rapids:** PlanetM, Ford Motor Company, Mobile GR, City of Grand Rapids, and The Right Place
- **Detroit:** Michigan Central Station - Ford Motor Company, PlanetM, and the City of Detroit

Grand Rapids Autonomous Vehicle Initiative:

Nine Michigan companies, as well as the city of Grand Rapids and the State of Michigan, formed a unique coalition placing May Mobility autonomous vehicles on city streets.

Michigan Association for Pupil Transportation (MAPT) Electric School Bus Project:

MAPT, with support from PlanetM and the Department of Environment, Great Lakes, and Energy (EGLE), awarded seven school districts a total of \$4.2 million to pay for 70% of the costs associated with buying 17 zero-emission buses as well as Level 2 and DC Fast Charging stations.

Mobileye Pilot Deployment:

A public-private partnership consisting of the State of Michigan, MDOT, PlanetM, and Mobileye, the pilot features installing Advanced Driver Assist Systems (ADAS) equipment in up to 100 fleet vehicles to reduce collisions and collect data to enhance safety for Michigan's fleets.

TECHNOLOGY ASSETS

Robotics

ASSETS



28,000

industrial robots in Michigan, more than any other state

Automate Robotics Convention | Detroit: Relocating to the TCF Center in 2021, this leading trade show for industrial automation will bring more than 20,000 exhibitors and buyers to Detroit.

Macomb Robotics Collaboration Center | Sterling Heights: Year-round collaboration space for robotics and STEM learning for the K-12 community and a place for students to engage with industry mentors and corporate sponsors to boost student interest and develop a strong talent pipeline in robotics.

University of Michigan's \$75 million Ford Motor Company Robotics Building | Ann Arbor: 140,000-square-foot facility including specialized labs, collaboration space, and Ford Motor Company robotics engineers. Includes M-Air test facility, the autonomous aerial vehicle outdoor lab.

STARTUPS



Refraction AI | Ann Arbor: Developing autonomous robots to make food deliveries from local restaurants.

Bedestrian | Ann Arbor: Partnering with Beaumont Health to introduce robots that serve hospitals by transporting lab supplies from the pharmacy to the cancer center in heated and cooled compartments.

FarmWise | Livonia: Manufacturing robots, in partnership with Roush Performance, that can weed crops on large farms.

CROSS-INDUSTRY



Domino's Pizza | Ann Arbor: Opening Domino's Innovation Garage with dedicated space for its teams to test delivery innovations including the GPS delivery tracking experience, autonomous pizza delivery vehicles, and robots similar to Nuro's R2.

U.S. Army Combat Capabilities Development Command Ground Vehicle Systems Center | Warren: More than 1,000 researchers and engineers develop and maintain vehicles for all U.S. Armed Forces with a mission to research, develop, engineer, leverage, and integrate advanced technology into ground systems and support equipment throughout the lifecycle.

Cybersecurity

The Michigan Cyber Range, powered by Merit Network, is the nation's largest unclassified network-accessible cybersecurity training platform. Through teaching, testing, and training, the network assists higher education, K-12, and government sectors in strengthening Michigan's cyber defenses by mitigating the growing number of cyber threats and providing a more secure environment that promotes economic development.

Source: Merit Network

8,760

cybersecurity job openings in Michigan

#9

for cybersecurity growth potential

Source: Business Facilities magazine

Labs and Research Centers



Opened in 2017, the American Center for Mobility (ACM) is a national center for CAV research, testing, product development, validation, and certification.

- **500 acres** with **12** configurable test environments used by government, industry, and academia
- **\$2.4 million** awarded for fuel-efficiency research by U.S. Department of Energy



Provides emission testing services, along with developing, designing, and fabricating new and cost-effective technologies to reduce emissions and increase fuel efficiency.



Public-private partnership operated by the American Lightweight Materials Manufacturing Innovation Institute (ALMMII) to develop and deploy advanced lightweight materials manufacturing technologies and implement training programs to prepare the workforce.

University of Michigan

Battery Lab: Part of the Energy Institute public lab developed with Michigan Economic Development Corp. and Ford Motor Company to work with the industrial and academic energy storage user community to prototype and study batteries.



This mock city is a test environment created to cultivate diverse expertise and resources required for emerging technologies.

59

industry partners

40

R&D projects

\$26.5

million invested

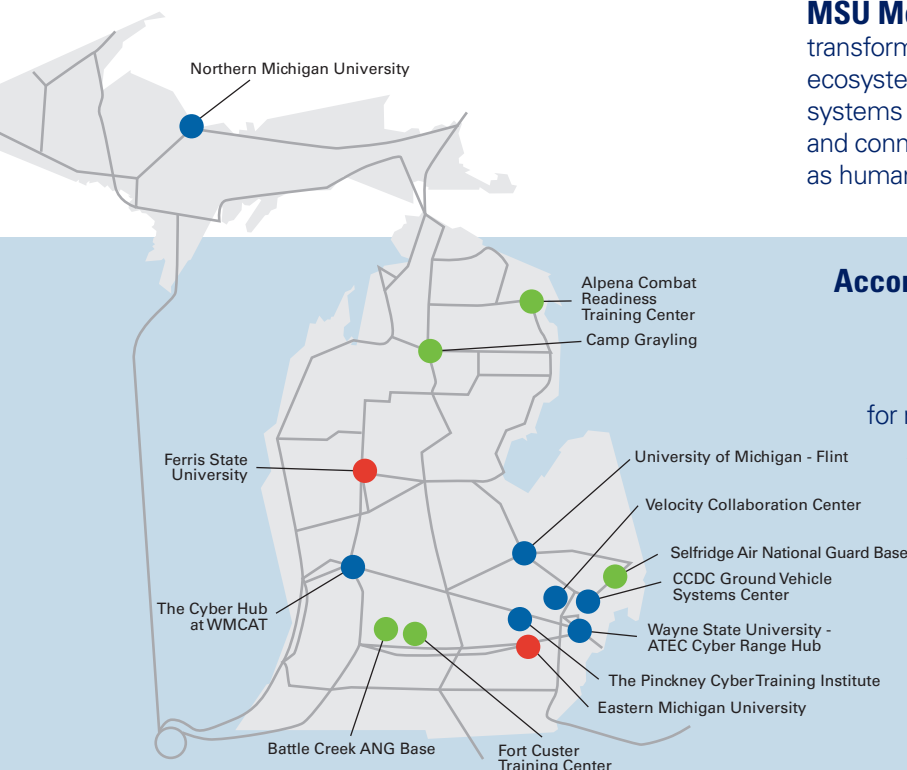
Transportation Research Institute (UMTRI):

Dedicated to improving transportation, with more than 1,000 interdisciplinary research projects focused on increasing driving safety and transportation systems.

Detroit Innovation Center: Opening in 2021, the \$300 million research and innovation center will serve up to 1,000 students pursuing degrees in a range of high-tech innovation disciplines, including mobility, artificial intelligence, data science, entrepreneurship, sustainability, and cybersecurity.

Michigan State University

MSU Mobility: Michigan State University has transformed the campus into a live, connected ecosystem including research focused on integrated systems of communication and controls for autonomous and connected vehicles and their environment, as well as human engagement with autonomous technology.



According to CompTIA's 2019 CyberState report:

#7

for net technology jobs added

#10

in share of workers in technology industries

#9

for net technology employment

- Merit Backbone
- Cyber Range Sites
- MiNG Cyber Hubs
- Local Cyber Hubs

Deployments and Pilot Projects

#1 for U.S. DOT-funded operational connected vehicle deployments

\$7.5 million U.S. DOT federal grant for R&D and testing of self-driving technologies awarded to State of Michigan, University of Michigan, American Center for Mobility

1st international border crossing by U.S. Army, TARDEC, and MDOT truck platooning test

Ann Arbor Connected Vehicle Test Environment:

27 square miles

5,000 test vehicles

Largest real-world deployment of CAV infrastructure

Next-Generation Mobility

FCA
FIAT CHRYSLER AUTOMOBILES

Ford

GM

ARGO AI

CRUISE

Ford
FORD SMART MOBILITY

RIVIAN

TOYOTA
RESEARCH INSTITUTE

WAYMO

1.8 million
vehicles

assembled at plants

21 models

produced in 2019

planet
LANDING ZONE
by American Center for Mobility

Entrepreneurs

23 venture capital firms
and **eight** angel investors
in the mobility space with 71
organizations providing
entrepreneurial
support

Testing and Validation Centers

13 proving grounds

American Center for Mobility:

500 acres and **\$135 million** investment

Moity: **59** industry partners and
\$26.5 million

in research, development, and
deployment projects

Talent Advantage

118,200+ engineers in Michigan,
ranking third in the nation

18% of U.S. automotive manufacturing
jobs are in Michigan

#1 in the nation with:

43,890 mechanical engineers

31,520 industrial engineers

5,060 commercial and
industrial designers

OBILITY ECOSYSTEM

Transportation, Distribution, and Logistics Supply Chain

#1 northern international border crossing

100+ years of transportation, distribution, and logistics expertise

Michigan State University ranked #1 graduate program for supply chain management



Legislation

Michigan CAV legislation leads the nation, allowing driverless cars and vehicle platooning testing on public roads

Industry 4.0

Cybersecurity

14 sites and hubs

operated by Michigan Cyber Range

Leader in cyber-physical security through Michigan's network of OEMs, suppliers, startups, and higher education initiatives such as Wayne State University's graduate certificate program in Cyber-Physical Systems (CPS)



Michigan Tech

Culture

Automotive Hall of Fame
Chevrolet Detroit Grand Prix presented by Lear Corporation
The Henry Ford
Michigan International Speedway
North American International Auto Show and AutoMobili-D
Woodward Dream Cruise



Education Pipeline

8,600+ engineering degrees conferred annually

16 nationally ranked undergraduate engineering programs

4 nationally ranked engineering graduate programs

#1 in the nation for high school and early elementary school FIRST Robotics teams



Robotics

28,000 industrial robots, more than any other state

140,000-square-foot

University of Michigan Ford Motor Company Robotics Facility opening in 2020



Defense

\$3.8 billion defense spending in Michigan

140,000+ employed
Nearly 4,000 companies serving the defense industry in Michigan



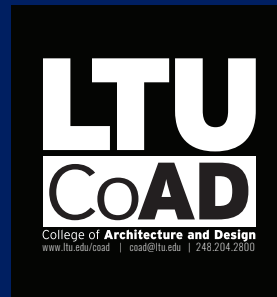


Promote. Retain. Grow.

As Michigan's only automotive and mobility cluster association, MICHauto provides a platform for industry leaders and stakeholders to engage in advocacy, build awareness, increase access to talent, and foster next-generation mobility.



The artwork featured on the cover of this publication was created by student illustrator Evelyn Curry in partnership with:



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