



# 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+**

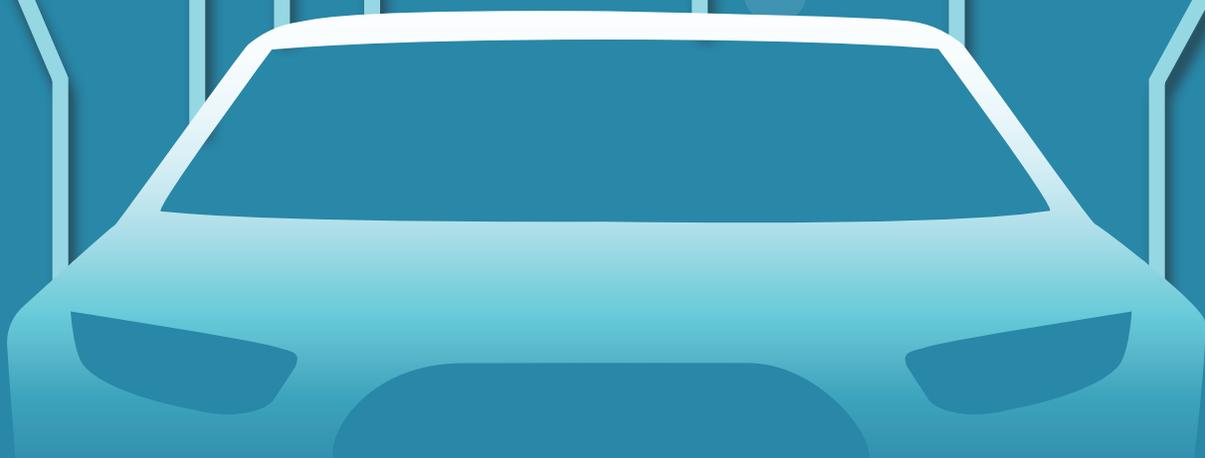
facilities with engineering, design, testing, and validation capabilities.

**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

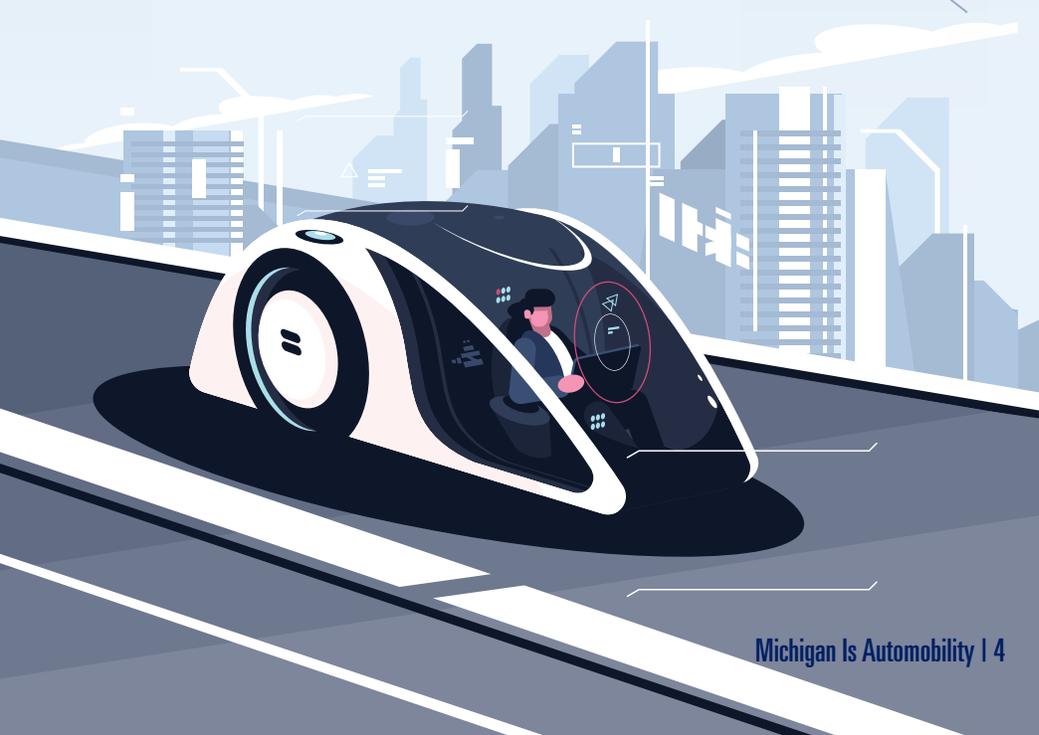
## largest deployment of V2I

(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,

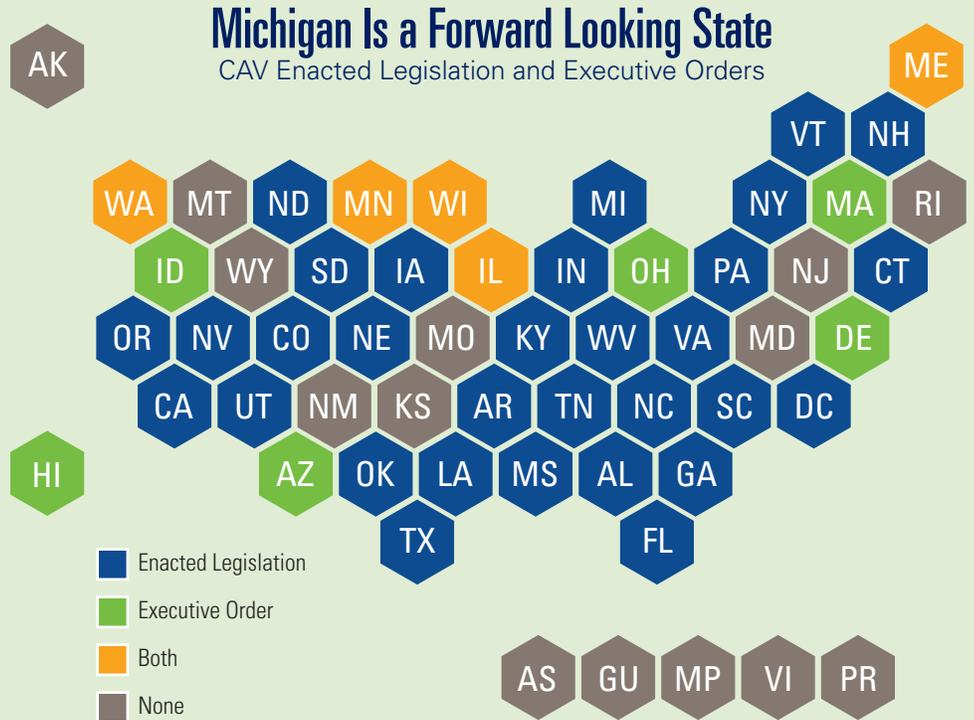
with 9,454 issued patents in 2019



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.



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



**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.

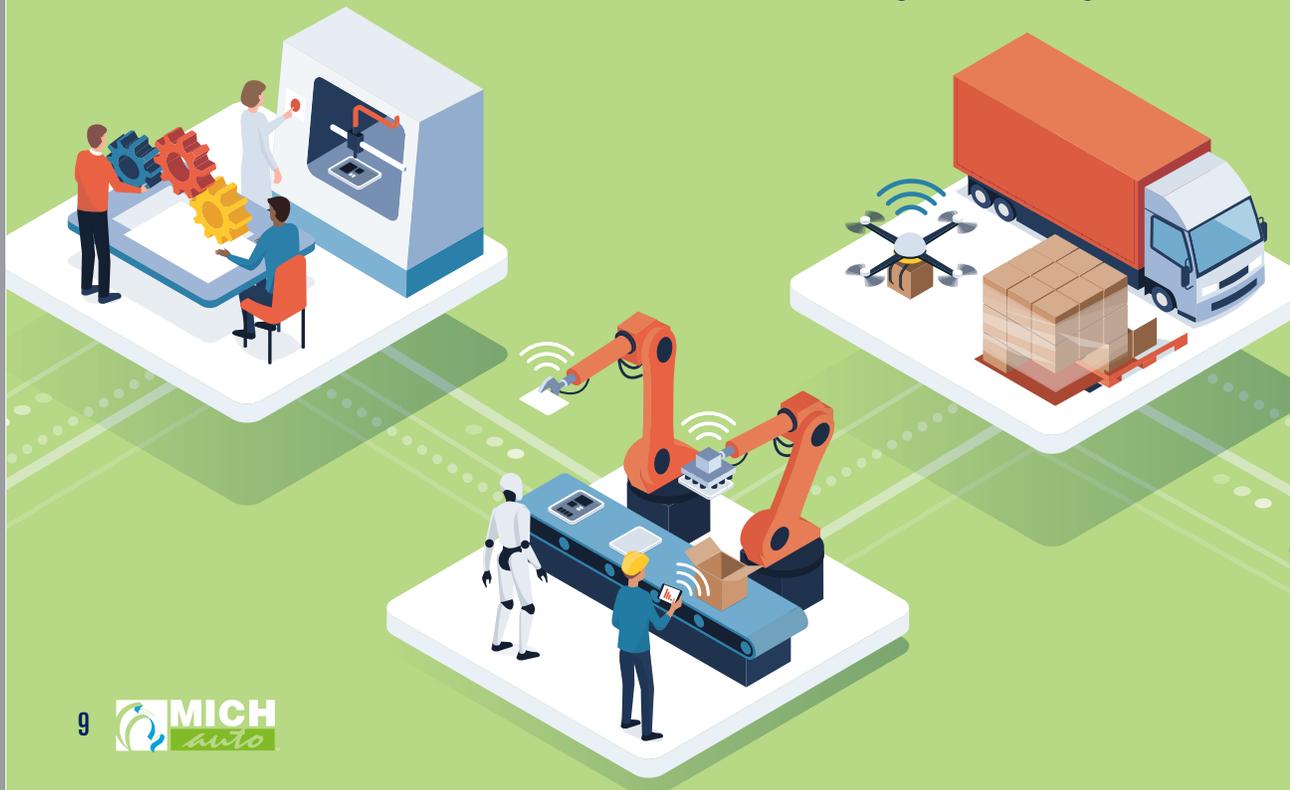
Michigan ranks

**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.

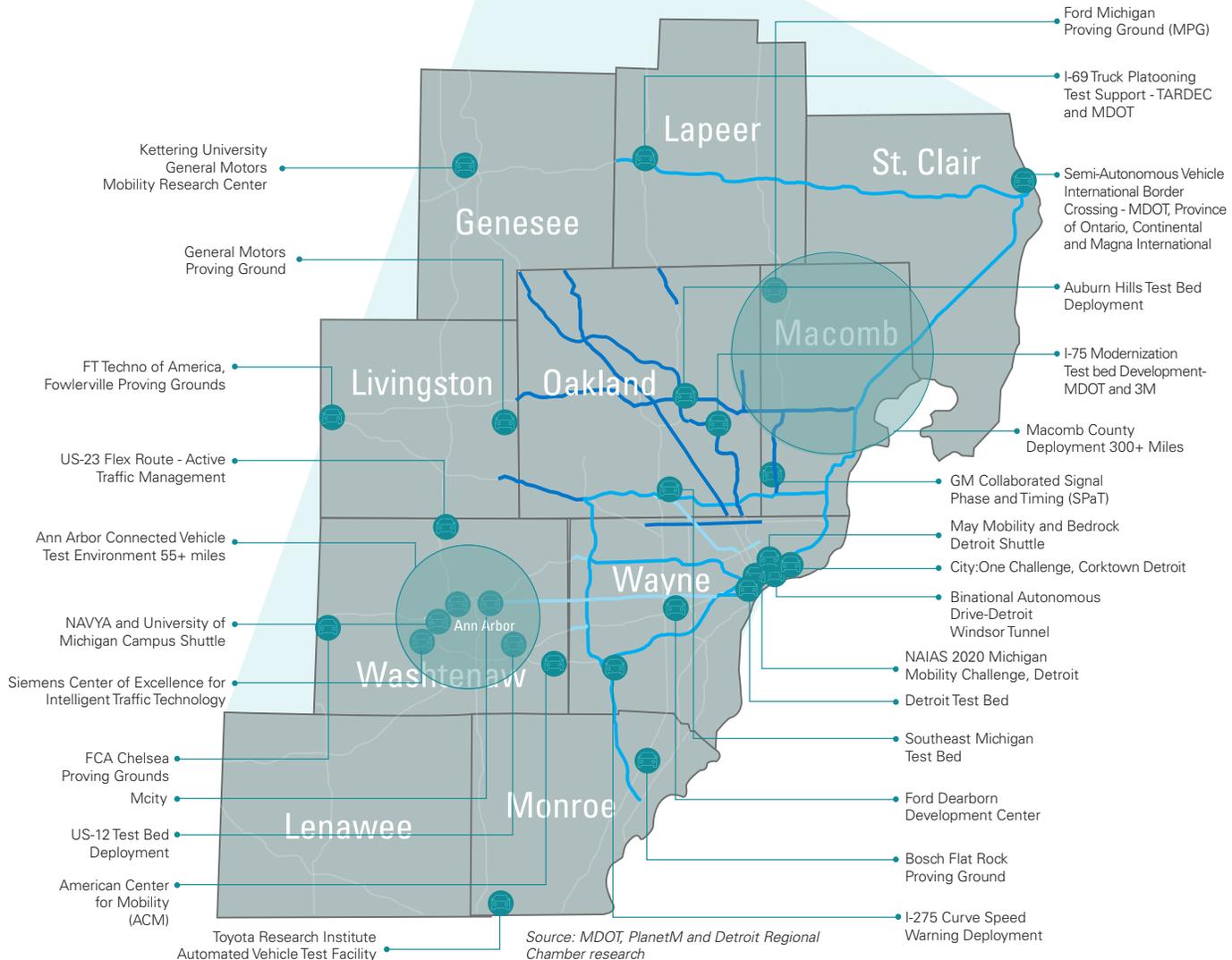
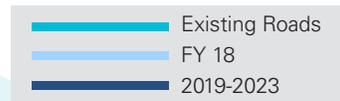
14

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.

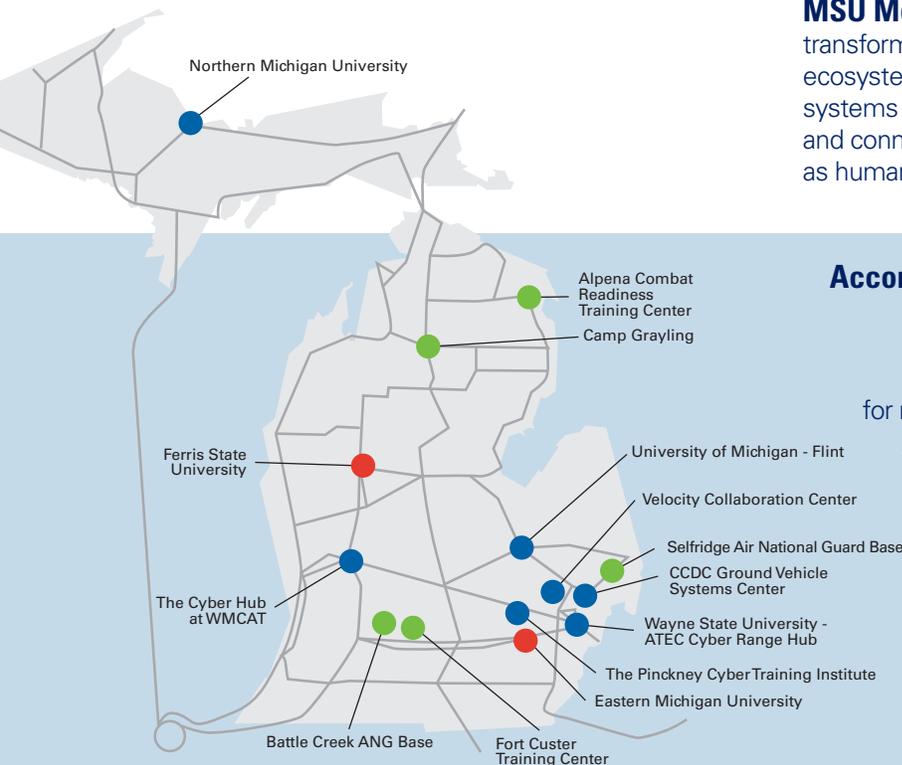
**59** industry partners    **40** R&D projects    **\$26.5** million invested

**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

## 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

## 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

## 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)



## 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



## 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



Michigan Tech

## Defense

\$3.8 billion defense spending in Michigan

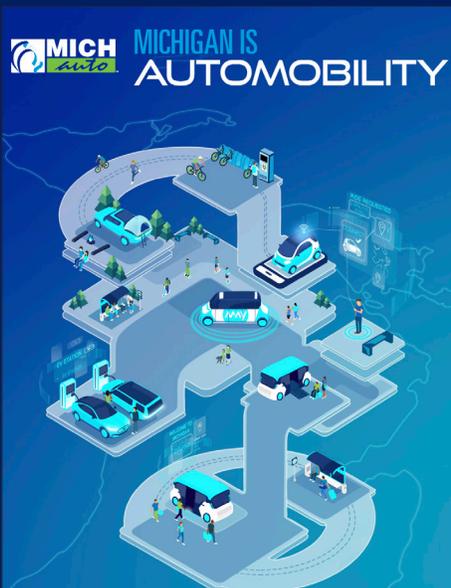
140,000+ employed  
Nearly 4,000 companies serving the defense industry in Michigan



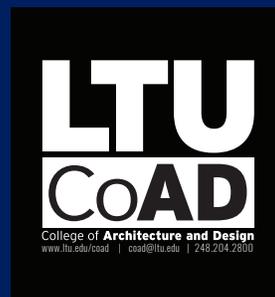


# Promote. Retain. Grow.

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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