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
- **$14 billion** business-funded automotive research development occurs in Michigan annually, making up **72%** of the nation’s share
- **500+** miles of roadway equipped for connected and automated vehicles
- **$41.5 billion** in OEM investment in Michigan since 2009
- **2,200+** facilities with engineering, design, testing, and validation capabilities.
- **96 of the top 100** automotive suppliers to North America have a presence in Michigan, and 60 are headquartered here

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.
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
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.

Michigan Is a Forward Looking State
CAV Enacted Legislation and Executive Orders

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
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
- #1 exporter of transportation equipment in the U.S
- 7th in the nation for exports in 2018

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.
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

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

*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
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
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:

- **43,890** mechanical engineers
- **31,520** industrial engineers
- **5,060** commercial and industrial designers
- **1,400** model makers (metal and plastics)
- **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 and **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

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
- CISCO
- DANLAW
- IBM
- Jasper
- NVIDIA
- OPMETEXT
- PILLAR
- RENESAS
- WAYMO
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
- 11% of venture capital investments were dedicated to the mobility sector in 2018
- $771 million in venture capital investment in 2019, up 53% from 2015
- 8 angel investors helped fund mobility startups
Entrepreneurial Network

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.

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.
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

- Existing Roads
- FY 18
- 2019-2023

- Ford Michigan Proving Ground (MPG)
- I-69 Truck Platooning Test Support - TARDEC and MDOT
- Semi-Autonomous Vehicle International Border Crossing - MDOT, Province of Ontario, Continental and Magna International
- Auburn Hills Test Bed Deployment
- I-75 Modernization Test bed Development - MDOT and 3M
- Macomb County Deployment 300+ Miles
- GM Collaborated Signal Phase and Timing (SPaT)
- May Mobility and Bedrock Detroit Shuttle
- City:One Challenge, Corktown Detroit
- Binational Autonomous Drive-Detroit Windsor Tunnel
- NAIAS 2020 Michigan Mobility Challenge, Detroit
- Detroit Test Bed
- Southeast Michigan Test Bed
- Ford Dearborn Development Center
- Bosch Flat Rock Proving Ground
- I-275 Curve Speed Warning Deployment

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.
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

**American Center for Mobility**

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

**EPA United States Environmental Protection Agency**

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

**Lift LIGHTWEIGHT INNOVATIONS**

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

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

Mcity: 59 industry partners and $26.5 million in research, development, and deployment projects

Next-Generation Mobility

1.8 million vehicles assembled at plants

21 models produced in 2019

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
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)

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

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

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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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