

DETROIT REGION

BEYOND THE MOTOR CITY

Benchmarking the Detroit Region's
Software-Defined Vehicle Future



Detroit
Regional
Partnership



**GLOBAL EPICENTER
OF MOBILITY**
REVOLUTIONIZING THE DETROIT REGION

Beyond the Motor City: Benchmarking the Detroit Region's Software-Defined Vehicle Future

Detroit defined the vehicle of today. Now it has to own tomorrow's software ecosystem.

The automotive industry is undergoing one of its most significant transformations since the introduction of mass production. Vehicle value is increasingly being created through software rather than mechanical systems alone. Modern vehicles can receive new features, security updates, and performance improvements after they leave the factory, changing how vehicles are designed, sold, and maintained.

A software-defined vehicle, or SDV, is built around computing systems that allow software to operate more independently from the vehicle's physical hardware. Instead of relying on dozens of isolated electronic control units with fixed functions, manufacturers are moving toward more centralized systems that can be updated throughout the vehicle's life.

This shift also creates new business opportunities. Automakers can offer connected services, optional features, and performance upgrades long after a vehicle is purchased. At the same time, manufacturers must adopt faster software development practices, strengthen cybersecurity, and maintain vehicles as continuously evolving digital products.

For the Detroit Region, the transition is especially important. The region remains the global epicenter of the automotive industry and possesses deep expertise in vehicle engineering, manufacturing and systems integration. However, software development is less tied to geography than traditional automotive production. Software engineering work can move quickly to regions with larger talent pools, stronger startup communities or lower operating costs.



SDV technologies also extend beyond passenger vehicles. The same computing, connectivity, artificial intelligence and autonomous control systems are being applied to commercial trucks, drones, agricultural equipment, maritime platforms, defense systems and industrial robotics. The SDV transition is therefore part of a much broader movement toward software-defined mobility, and positions the Detroit Region not only for mobility leadership, but for long-term competitiveness across multiple high-growth sectors due to the general need for cybersecurity and other capabilities

This report examines where that innovation is occurring and how the Detroit Region compares with other leading U.S. technology centers. It analyzes three indicators:

- Venture capital investment, which shows where private investors see commercial opportunity.
- Federal small-business research awards, which reveal where government agencies are supporting emerging and mission-critical technologies.
- Patent activity, which shows where companies are developing and protecting valuable technical capabilities.

Together, these indicators provide a broad view of the national SDV landscape—from early research and startup formation to commercial investment and large-scale corporate innovation.

They also help identify the Detroit Region's strongest capabilities, its most significant gaps and the actions needed to remain competitive as software becomes increasingly central to mobility.

Understanding the Software-Defined Vehicle Technology Stack

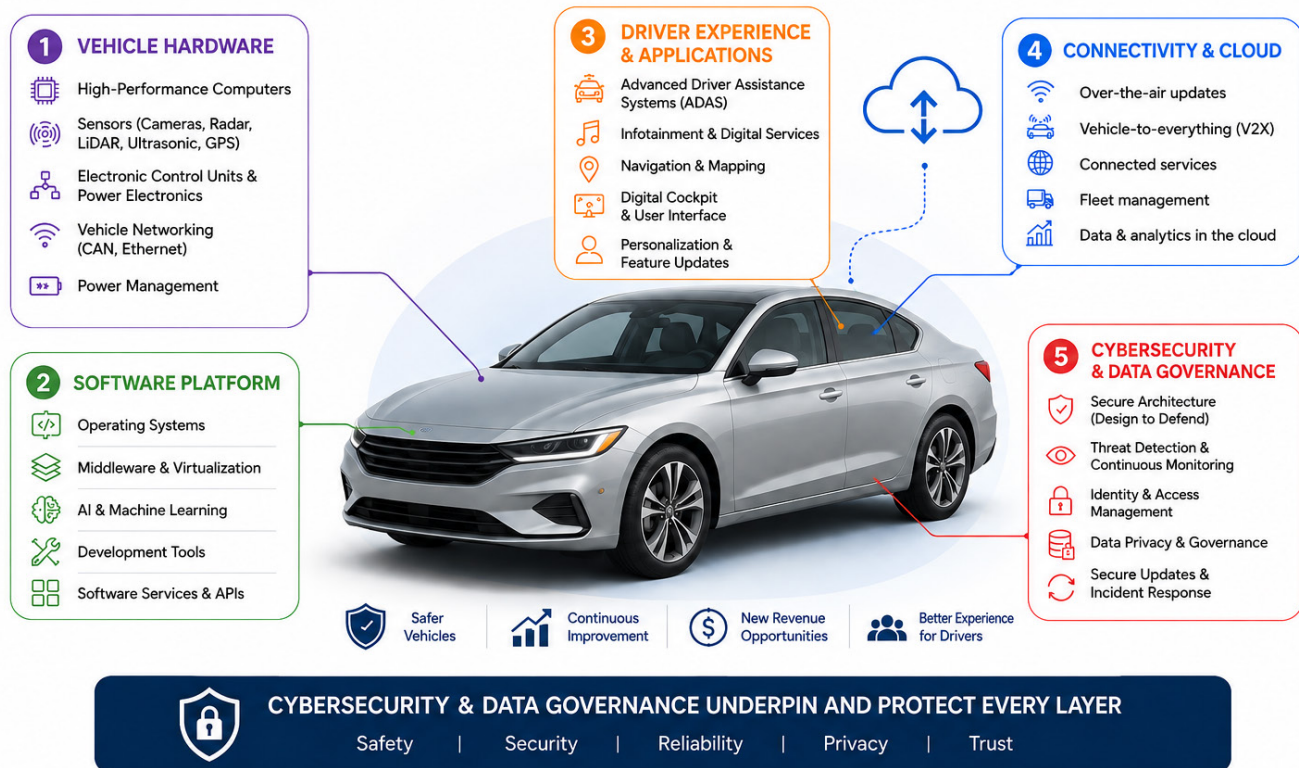
A software-defined vehicle is not a single technology—it is a collection of connected hardware, software and digital services that work together to operate and continuously improve a vehicle throughout its life.

Manufacturers are pursuing software-defined vehicles because they shorten development cycles, reduce hardware complexity, generate more data for future improvements, and provide greater hardware reuse. Vehicle owners benefit through over-the-air updates, improved safety, enhanced driver assistance, increased functionality after purchase and fewer trips to the dealership. As vehicles become connected digital platforms rather than fixed mechanical products, software increasingly determines both customer experience and long-term vehicle value.

The SDV technology stack provides a simple way to understand how these components fit together.

THE SOFTWARE-DEFINED VEHICLE

Built on a foundation of connected hardware and software, the SDV can be updated, improved and secured throughout its life.



At its foundation are the vehicle's computers, sensors and electronic systems. Above that are the operating systems and software platforms that allow applications to run and receive updates. The next layer includes the features drivers experience directly, such as advanced driver assistance systems (ADAS), digital cockpits, navigation and infotainment.

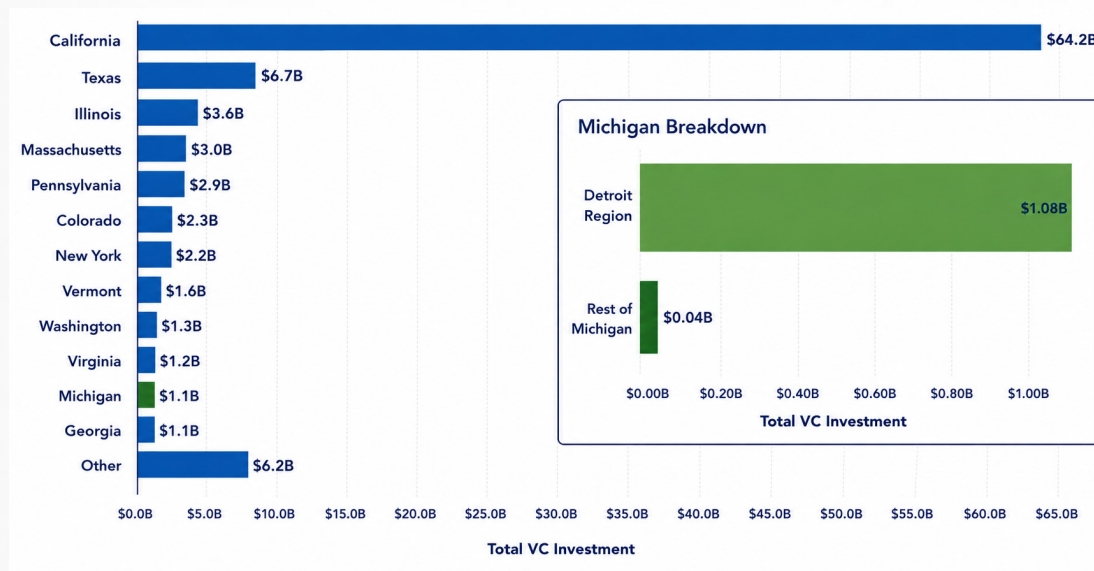
Beyond the vehicle itself, cloud computing and wireless connectivity enable over-the-air updates, fleet management and connected mobility services. Cybersecurity and data governance span every layer of the stack, helping protect vehicles, software and customer data as vehicles become increasingly connected.

This framework provides a common language for understanding where innovation is occurring. Throughout this report, venture capital investment, federal research funding and patent activity are analyzed against these major technology layers to identify the Detroit Region's competitive strengths and emerging opportunities.

Where Investment Is Fueling the SDV Economy

The software-defined vehicle economy is attracting unprecedented levels of investment, but that investment is concentrated in a relatively small number of innovation hubs. Venture capital and federal research funding provide an early indication of where new technologies are being developed and where future industry leaders are likely to emerge.

Venture-Backed Investment in SDV Technology Companies in the US

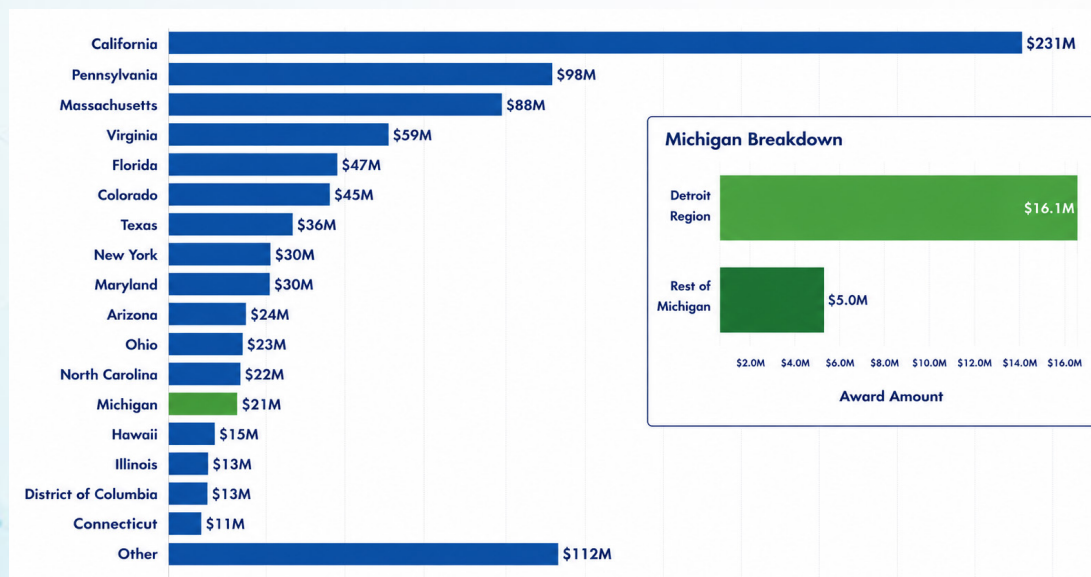


Source: Analysis of PitchBook data 2021-Q2 2026

Venture capital investment is heavily concentrated in California, which accounts for more than \$64 billion in SDV-related investment. This reflects the headquarters locations of major mobility companies including Waymo, Rivian, Tesla and Lucid. However, venture capital reporting follows company headquarters rather than where engineering work is performed. Many California-based companies maintain major engineering operations in Michigan, meaning a significant share of product development, software engineering and advanced vehicle R&D is conducted in the Detroit Region despite investment being recorded elsewhere.

Michigan ranks behind at approximately \$1.1 billion, yet nearly all of that investment is concentrated within the Detroit Region. This highlights Detroit's continued importance as Michigan's primary center for automotive innovation while also illustrating the growing scale of competition from software-focused ecosystems elsewhere.

SDV Technology-Related SBIR/STTR Awards



Source: Analysis of SBIR.gov data 2021-Q2 2026

Federal Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) awards reveal a similar pattern. California leads the nation with more than \$231 million in awards, while Michigan has secured approximately \$21 million, including more than \$16 million awarded to organizations in the Detroit Region.

Taken together, venture capital and federal R&D funding measure different stages of innovation. Venture capital reflects private-sector confidence in commercial opportunities, while SBIR/STTR awards indicate where government agencies are investing in emerging technologies. Viewed together, these indicators show that the Detroit Region remains an important innovation hub, but one operating within an increasingly competitive national landscape.

Intellectual Property: The Detroit Region's Competitive Advantage.

While venture capital and startup activity receive much of the attention, they represent only one measure of innovation. Patents tell a different story—one that reflects deep technical expertise, long-term research investment and the ability to develop commercially valuable technologies.

By this measure, the Detroit Region stands among North America's strongest software-defined vehicle innovation hubs. Michigan ranks second only to California in SDV patent activity, with 2,941 patents filed during the 2021-Q2 2026 study period. Even more significant, 96% of those patents—2,829 in total—originate within the Detroit Region, underscoring the area's concentration of automotive engineering talent and research capabilities.

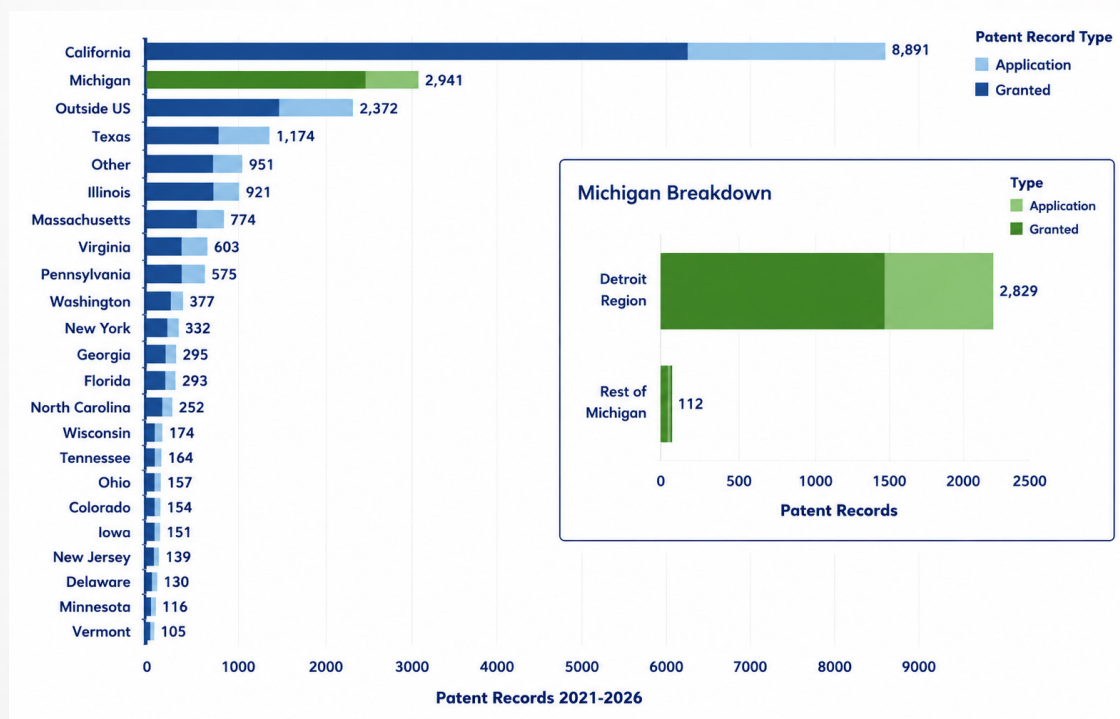
Similarly, many federally funded mobility programs awarded to organizations outside Michigan ultimately rely on engineering partners, suppliers and technical expertise located in the Detroit Region. The region frequently serves as the execution engine for advanced mobility research, translating externally funded concepts into deployable vehicle technologies.

THE DETROIT REGION IS #2 IN NORTH AMERICA FOR SDV PATENTS

Unlike venture capital, which often measures emerging startups, patents capture sustained innovation occurring inside established companies, research organizations and advanced engineering teams. Detroit's strength reflects decades of expertise in vehicle systems, embedded software, autonomous technologies and advanced mobility platforms.

Equally important, a large share of these filings have progressed to granted patents, demonstrating that the Detroit Region is not only generating ideas but successfully converting them into protected intellectual property with commercial potential.

Taken together, these findings reinforce Detroit's enduring competitive advantage. While other regions may lead in startup investment, the Detroit Region continues to lead where it matters most for long-term industrial leadership: creating the technologies that define the future of mobility.



SDV-Related Patents by State

Source: Analysis of PitchBook data 2021-Q2 2026

The Detroit Region's Mobility Strength Visualized

The Detroit Region’s software-defined vehicle patent portfolio is concentrated in the technologies that matter most for the future of mobility. Rather than specializing in a single discipline, the region demonstrates strength across the core systems that enable autonomous operation, connected mobility, intelligent vehicle control and advanced driver experiences.

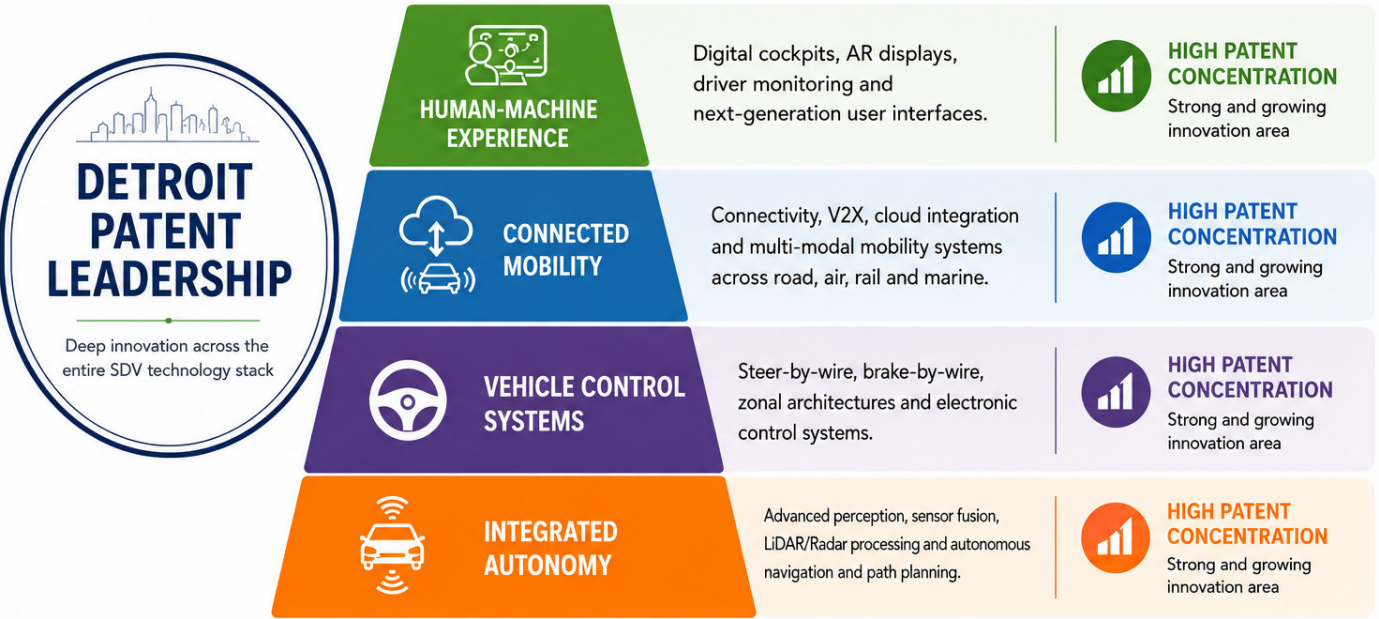
These capabilities reflect decades of engineering expertise and reinforce the Detroit Region’s position as one of North America’s leading R&D centers for applied mobility innovation, fluent in the software, electronics and systems engineering required to build tomorrow’s intelligent vehicles.

WHERE DETROIT LEADS

Detroit’s patent portfolio shows deep strengths across the technologies that power the software-defined vehicle.



Detroit Region innovation is concentrated where it matters most for the future of mobility.





From autonomy to user experience, Detroit leads with deep, applied innovation that powers the core of the software-defined vehicle.

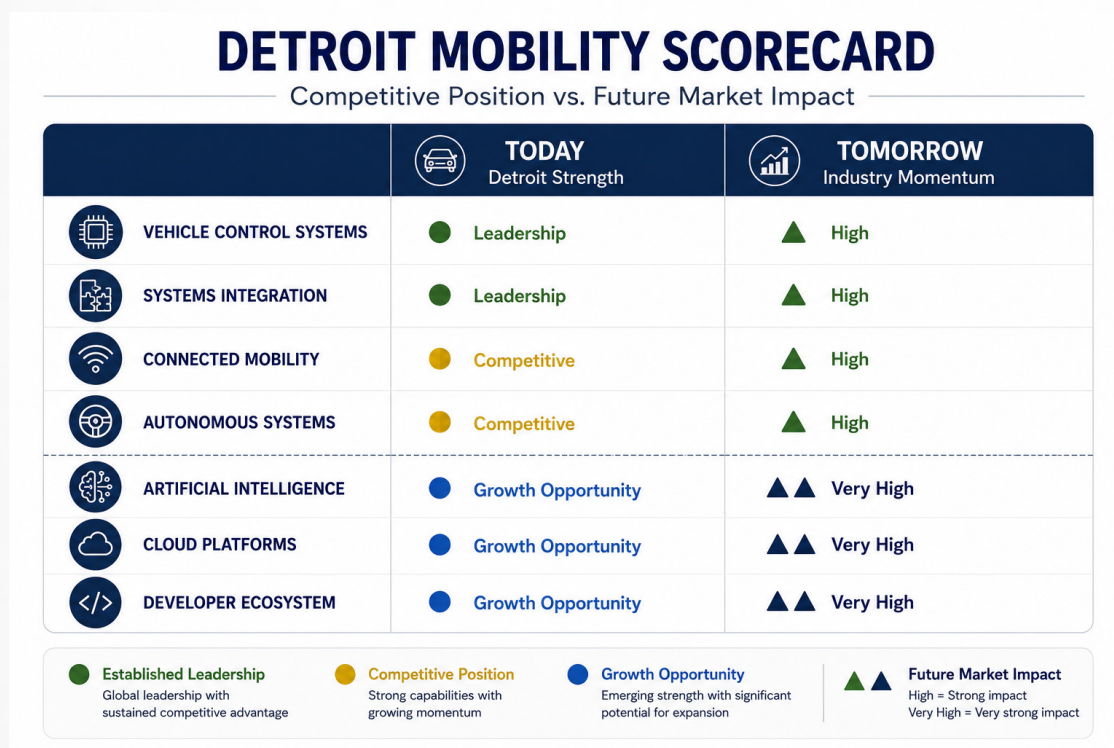
Note: Patent concentration reflects both the volume of patent records (2021–2025) and the proportion that are granted patents.

Where the Detroit Region's Advantage Meets an Emerging Opportunity

The Detroit Region enters the software-defined mobility era from a position of considerable strength. The region’s engineering expertise, patent leadership and deep automotive ecosystem provide advantages that few regions can match.

At the same time, the research reveals an important pattern. The Detroit Region's greatest strengths are concentrated in the technologies that power and integrate intelligent vehicles. Meanwhile, some of the fastest-growing areas of software innovation—including cloud platforms, AI, developer tools and digital services—are attracting greater levels of startup activity and venture investment elsewhere.

The same capabilities that made Detroit a global automotive leader provide a strong foundation for expanding into the software ecosystem that increasingly surrounds the vehicle. The question is no longer whether the Detroit Region can compete in the software-defined era, but where its greatest opportunities for growth lie.



The Detroit Region Mobility Scorecard illustrates both the region's current strengths and where future growth is likely to occur. Detroit holds established leadership in vehicle control systems and systems integration while maintaining competitive positions in connected mobility and autonomous systems. At the same time, the industry's fastest-growing opportunities are shifting toward artificial intelligence, cloud platforms and developer ecosystems.

The scorecard identifies Detroit's greatest opportunity for growth: building upon its engineering leadership while strengthening the software ecosystem that increasingly underpins intelligent mobility.

A Strategic Shift: Vertical vs. Horizontal Integration

The Detroit Region's SDV ecosystem reflects the automotive industry's traditional strength in vertical integration—bringing together hardware, vehicle engineering, software, validation, and manufacturing into deployable mobility systems.

Unlike many competing states whose investments span diverse software and defense sectors, Detroit's activity remains closely tied to OEMs, Tier 1 suppliers, and production-oriented mobility applications.

At the national level, however, SDV innovation is increasingly driven by horizontal technology platforms that serve multiple industries simultaneously. The same technologies powering connected automobiles are also enabling autonomous drones, industrial robotics, maritime systems, commercial aviation, agricultural equipment, and defense platforms. Investors are increasingly funding companies that develop reusable software, AI, sensing, connectivity, and autonomy capabilities that can be deployed across many vehicle types rather than a single transportation market.

This distinction is important for Detroit's future competitiveness. As cybersecurity, software and connected systems become foundational technologies across the modern economy, the Detroit Region's software-defined vehicle expertise provides a competitive advantage that extends well beyond automotive.

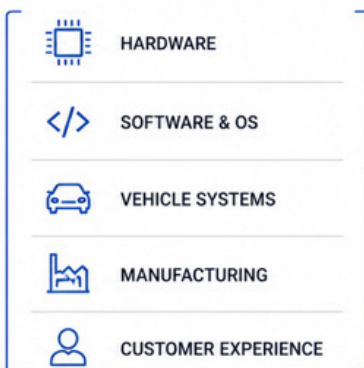
Historically, the Detroit Region has excelled at vertically integrating complete vehicle systems—combining electronics, software, controls, manufacturing, and validation into commercial products. Increasingly, however, value creation is shifting toward horizontal enabling technologies that sit beneath multiple industries

BUILDING THE FUTURE OF MOBILITY

VERTICAL STRENGTH. HORIZONTAL IMPACT.

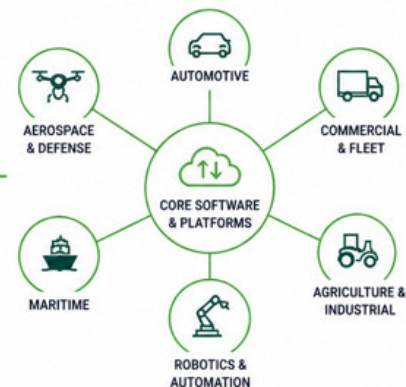
VERTICAL INTEGRATION

Build complete mobility systems from end to end.



HORIZONTAL INTEGRATION

Build foundational technologies that power many industries.



VERTICAL EXCELLENCE BUILDS VEHICLES.



HORIZONTAL LEADERSHIP MOVES THE WORLD.

STRATEGIC PRIORITIES FOR THE FUTURE



1 ACCELERATE SOFTWARE STARTUP FORMATION

Support entrepreneurs building cloud platforms, AI applications and mobility software that complement Detroit's established automotive expertise.



2 EXPAND COMMERCIALIZATION PATHWAYS

Strengthen connections between universities, startups, suppliers and OEMs to move intellectual property from research into scalable businesses.



3 INVEST IN DIGITAL TALENT

Develop and attract software engineers, AI specialists and cybersecurity professionals while continuing to leverage Detroit's world-class automotive workforce.



4 FOSTER CROSS-INDUSTRY COLLABORATION

Encourage partnerships across manufacturing, software, logistics, infrastructure and emerging technology sectors to accelerate innovation.



5 LEAN INTO HORIZONTAL INTEGRATION STRATEGIES

Strengthen capabilities in cloud platforms, AI, connectivity and autonomous systems that create value across multiple industries while reinforcing Detroit's leadership in vehicle systems integration.

Key Findings

- **Detroit's Competitive Advantage Remains Systems Integration**

The Detroit Region continues to lead in the technologies closest to the vehicle, including electronic architectures, vehicle control systems, embedded software and systems integration. These capabilities reflect decades of engineering excellence and remain the foundation upon which software-defined mobility will be built.

- **Software-Defined Mobility Extends Beyond Automotive**

National investment, patents and federal R&D demonstrate that SDV technologies are increasingly being applied across aerospace, defense, robotics, maritime, logistics and industrial automation. The technologies enabling connected and autonomous vehicles are rapidly becoming horizontal platforms serving multiple mobility sectors.

- **Detroit Is Well Positioned to Lead the Next Phase of SDV**

The region is strengthening its position in connected mobility, autonomy and intelligent vehicle systems through growing venture investment, patent activity and collaboration among OEMs, suppliers, startups and research institutions. These assets provide a strong foundation for continued innovation.

- **The Greatest Opportunity Lies in the Software Layer**

Cloud platforms, AI-enabled mobility applications, cybersecurity, developer ecosystems and digital services represent the fastest-growing areas of the SDV stack. Expanding these capabilities would complement Detroit's traditional engineering strengths while supporting new business models built around software and data.

- **Future Competitiveness Depends on Balancing Vertical and Horizontal Integration**

Detroit has long excelled at vertically integrating complete vehicle systems. Sustaining global leadership will increasingly require developing the horizontal software, AI, connectivity and digital platforms that power mobility across multiple industries—not just automotive.

Closing Statement

The transition to software-defined mobility represents one of the most significant transformations in the automotive industry's history. The Detroit Region enters this era from a position of considerable strength, with world-class engineering talent, deep intellectual property and an unmatched mobility ecosystem. But leadership is not guaranteed. By building upon these assets while expanding its software capabilities, the region has the opportunity to shape the next generation of intelligent transportation—just as it helped define the last.





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This effort was commissioned by GEM and done in collaboration with the partners:

