Executive Summary

Driving the Future with AI: Advancing Ontario's Mobility Ecosystem

Assessing applications, enabling conditions, and opportunities for Ontario's mobility future

Quarterly Specialized Report Draft

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Executive Summary

Artificial intelligence (AI) is rapidly transforming the global automotive and mobility sector, reshaping how vehicles are designed, manufactured, and integrated within broader transportation systems. As adoption advances globally, jurisdictions are competing to capture economic value, build specialized capabilities, and position themselves within emerging, AI-enabled mobility ecosystems.

AI adoption is occurring across the full mobility value chain. Within vehicles, AI supports perception, decision-making, and control systems that underpin assisted and automated driving. In manufacturing, it enables predictive maintenance, automated quality control, and process optimization. Across transportation systems, AI improves traffic management, logistics coordination, routing, and fleet operations. These applications are increasingly integrated, reflecting a shift toward connected, data-driven mobility ecosystems rather than standalone technologies.

Despite strong momentum, adoption remains uneven. More mature use cases, such as fleet optimization, predictive maintenance, and ADAS, are scaling more quickly due to clear operational benefits and lower deployment risk. In contrast, fully autonomous driving continues to face technical, safety, and regulatory challenges, particularly in complex operating environments. As a result, AI deployment varies by use case, data availability, and system integration requirements, requiring differentiated strategies rather than a single adoption pathway.

Ontario is well positioned to participate in this evolving landscape. The province benefits from a strong AI research base, a globally integrated automotive manufacturing sector, and established capabilities in software, sensing, and systems integration. A dense network of academic institutions, startups, and multinational firms contributes to a robust pipeline of talent and innovation. Initiatives such as the Ontario Vehicle Innovation Network (OVIN) and its Regional Technology Development Sites provide critical infrastructure for testing, validation, and commercialization of AI-enabled mobility technologies.

At the same time, several factors continue to shape the pace of adoption. Access to high-quality, real-world data remains a key constraint, particularly for safety-critical applications such as autonomous driving. Integration across vehicles, infrastructure, and digital systems introduces complexity and requires coordination across stakeholders and standards. Talent availability in specialized AI and software roles remains competitive, and regulatory clarity, particularly around safety, liability, and data governance, continues to influence investment and deployment decisions.

In this context, Ontario's near-term opportunities are most prominent in commercially viable applications where the province already has strengths, including advanced manufacturing, applied AI, and system integration. These include areas such as fleet management, logistics optimization, and ADAS. Longer-term opportunities, including autonomous vehicles, connected infrastructure, and integrated mobility systems, will require sustained investment, regulatory alignment, and ecosystem coordination.

OVIN plays a central role in advancing these priorities by supporting research and development, enabling real-world testing, and facilitating collaboration across industry and academia. By de-risking technologies through pilot programs, strengthening data and validation infrastructure, and aligning investments with high-impact use cases, OVIN can accelerate the transition from innovation to commercialization.

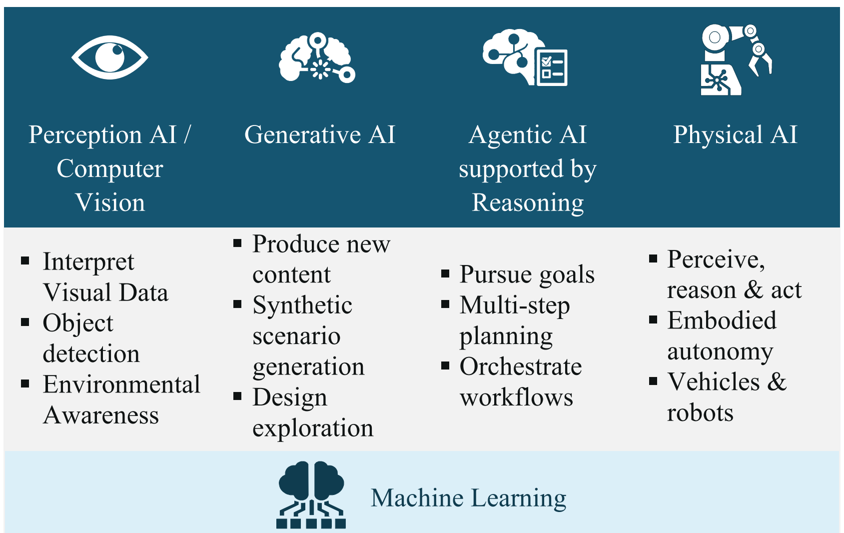
Overall, AI represents a foundational enabler of the future mobility system. While adoption will progress at different rates across applications, a targeted, ecosystem-based approach positions Ontario to build long-term competitive advantage in AI-enabled automotive and mobility innovation.

1. AI as a Transformational Technology

Core AI Technologies Reshaping the Sector

AI is rapidly reshaping the automotive and mobility sector by enabling systems to learn from data, interpret complex environments, and support real-time decision-making. At the core of these capabilities is machine learning (ML), which allows systems to identify patterns and continuously improve performance. Building on this, computer vision enables vehicles to interpret visual inputs such as objects, lane markings, and surroundings, while generative AI supports design exploration, simulation, and synthetic data development. More advanced capabilities are emerging through agentic AI, which can plan and execute multi-step tasks, adapt to changing conditions, and coordinate across systems, and physical AI, which integrates these technologies into real-world applications where vehicles and devices can perceive, reason, and act autonomously.

Figure 1: AI Capability Spectrum in Automotive and Mobility



In practice, these technologies are rarely used in isolation. Mobility systems increasingly rely on multimodal AI, combining inputs from cameras, radar, GPS, and other data sources to build a more complete and resilient understanding of operating environments. This improves reliability, particularly when individual data sources are degraded. AI deployment is also shaped by system architecture, with cloud-based systems supporting large-scale data processing and continuous improvement, while edge computing enables real-time, safety-critical decision-making directly within vehicles. Together, these capabilities are driving improvements in productivity and efficiency, strengthening safety and risk mitigation, enabling automation and scalability, and supporting new business models such as software-defined vehicles and mobility-as-a-service. Beyond vehicle applications, AI is also enhancing urban mobility systems through smarter traffic management and improved safety for road users.

The Foundational Enablers for AI Deployment

The ability to deploy AI at scale depends on several foundational enablers. Robust technological infrastructure is critical, including high-speed connectivity through 5G and vehicle-to-everything (V2X) systems, as well as significant computing capacity both in the cloud and onboard vehicles. As AI adoption grows, energy demand, particularly from data centres, is increasing substantially, requiring expanded and more efficient energy systems. Digital tools such as simulation platforms and digital twins also play an important role by enabling large-scale testing and validation in safe, controlled environments.

Data readiness is equally important. The focus has shifted from large volumes of data to “smart data” that is accurate, well-labeled, and contextually relevant. High-quality data supports more reliable performance, particularly in safety-critical applications, but requires significant effort to prepare and maintain. At the same time, data sovereignty has become a key consideration, as mobility systems rely on sensitive location and behavioural data that must comply with jurisdictional regulations. These requirements can affect how data is stored, shared, and used, and can constrain scalability if not addressed early.

Governance and regulatory frameworks are central to enabling safe and trusted AI use. While global approaches continue to evolve, frameworks such as the EU AI Act and UNECE vehicle regulations are setting expectations around safety, cybersecurity, and system validation. These frameworks provide necessary guardrails for deployment, but differences across jurisdictions and ongoing uncertainty around liability and compliance can slow adoption and increase costs. At the same time, human capital remains a critical constraint, as many organizations lack the specialized skills required to design, deploy, and manage AI systems. Addressing these gaps requires sustained investment in training, hiring, and organizational readiness.

Collaboration across stakeholders is also essential. AI deployment in mobility involves a complex ecosystem of automakers, technology providers, regulators, and research institutions. No single organization can independently address the scale and complexity of connected vehicle systems, particularly given the large data volumes generated and the need for interoperable standards. As a result, partnerships are increasingly used to share resources, align system architectures, and accelerate deployment across regions and markets.

Adoption Considerations

Despite its potential, AI adoption in mobility is shaped by several operational constraints. Safety-critical performance is the most significant consideration, as failures can have severe consequences. Systems must operate with high reliability and respond in real time, requiring rigorous validation, redundancy, and adherence to established safety standards. Long product and asset lifecycles further complicate deployment, as vehicles and infrastructure must remain functional and relevant over extended periods, often spanning decades. This creates additional demands on system maintainability and update strategies.

Explainability and liability also present challenges. Many AI systems are less transparent than traditional deterministic systems, making it harder to fully explain decisions in safety-critical contexts. At the same time, responsibility for failures is not always clearly defined across manufacturers, software providers, and operators, increasing regulatory scrutiny and risk-related costs. Finally, cyber-physical security risks are becoming more prominent as mobility systems become more connected. Vulnerabilities in digital systems can translate into real-world impacts across vehicles, aviation, rail, and logistics networks, linking cybersecurity directly to physical safety.

Overall, while AI offers significant opportunities to improve performance, safety, and innovation across the mobility sector, its successful adoption depends on addressing infrastructure, data, governance, and security challenges. Ensuring trust, reliability, and regulatory clarity will be essential to scaling AI from pilot applications to widespread, real-world deployment.

2. AI in Automotive and Mobility Systems

AI in Vehicle Research and Development, Design, & Engineering

AI is increasingly embedded across the automotive and mobility sector, transforming how vehicles are designed, produced, operated, and integrated into broader mobility systems. In vehicle research, design, and engineering, AI supports a shift toward software-defined vehicles and data-driven development practices. Across early-stage design, generative AI allows engineers to define constraints such as safety requirements, dimensions, and material choices, and then rapidly generate and evaluate multiple design alternatives. This accelerates iteration, reduces reliance on costly physical prototypes, and enables earlier identification of trade-offs.

AI is also used for structural and material optimization, evaluating thousands of configurations to reduce weight while maintaining durability and safety. These capabilities are particularly important for electric and automated vehicles, where weight and efficiency directly affect range, thermal performance, and system reliability. At the validation stage, AI-enabled simulation environments allow developers to test vehicle systems across a much wider range of conditions than is possible through physical testing alone. These virtual environments support repeatable testing, including rare or high-risk scenarios, improving confidence in system performance before deployment.

Advances in AI are also changing how engineering workflows are coordinated. Agentic AI systems can orchestrate multiple stages of the design and validation process, linking design generation, simulation, and analysis into a continuous workflow with minimal human intervention. At the system level, this shift is closely tied to the concept of the operational design domain (ODD), which defines the specific conditions under which automated driving systems are intended to operate. As vehicles progress from driver assistance to higher levels of automation, the ODD becomes central to defining system capability, safety requirements, and liability.

Figure 2: Six levels of ADAS/AD systems

	Levels	Sample Features	Hands on	Eyes on	Mind on
Assisted	L0 Manual	Automatic emergency braking	Driver	Driver	Driver
Assisted	L1 Assisted driving	Adaptive cruise control (ACC); Lane Keeping assist system (LKAS)	Driver	Driver	Driver
Assisted	L2 Partially automated driving	Coupled ACC & LKAS	Driver	Driver	Driver
Assisted	L2+/++ Advanced partially automated driving	Navigate on Autopilot; Driver must be able to immediately take full control whenever requested	System	Driver	Driver
Automated	L3 Automated driving under conditions	Traffic jam pilot; Valet parking. Critical change: liability switches from the driver to the system	System	System	Driver
Autonomous	L4 Autonomous driving under conditions	Autonomous driving in approved ODDs; Can differentiate between L4 Highway and L4 Urban, due to their different complexities	System	System	System
Autonomous	L5 Autonomous driving in all conditions	Ubiquitous autonomous driving	System	System	System

Driver System

Source: World Economic Forum, 2025

At the same time, the transition to software-defined platforms is placing greater emphasis on lifecycle management. Vehicles must not only perform reliably at launch, but continue to operate safely as software updates are introduced and functionalities evolve over time. This has led to the adoption of structured software deployment models with continuous monitoring, validation, and governance processes embedded throughout the vehicle lifecycle.

AI Across the Automotive & Mobility Value Chain

Beyond vehicle development, AI is transforming the entire automotive and mobility value chain, from upstream resource extraction to downstream services. In upstream segments such as critical minerals extraction, AI supports exploration by integrating diverse geoscience datasets to identify promising deposits more efficiently. Machine learning models analyze geological, geochemical, and geophysical data to generate prospectivity maps and guide drilling decisions, improving success rates in an inherently uncertain process.

In extraction and processing, AI enables real-time optimization through digital twins and advanced analytics. Operators can simulate process changes and predict impacts on recovery rates and throughput without interrupting production. AI is also applied in predictive maintenance and equipment monitoring, using sensor data to detect early signs of failure and reduce downtime. These applications improve productivity, reduce resource intensity, and support more efficient use of energy and materials, although performance depends heavily on data quality, integration, and the ability to adapt models to evolving operating conditions.

In manufacturing, AI-enabled smart factories are becoming standard across automotive producers. By integrating sensors, robotics, and analytics, manufacturers can monitor and optimize production processes in real time. Digital twins allow entire production systems to be designed, tested, and refined virtually before physical implementation, reducing disruption and improving time to market. AI is also widely used for predictive maintenance, where machine learning models analyze equipment data to identify faults before they lead to production stoppages. Quality control has similarly advanced through computer vision systems that conduct continuous, high-speed inspection across production lines. These systems detect defects earlier and more consistently than manual inspection, supporting a shift toward near-zero defect manufacturing.

Robotics represents another major area of transformation. While traditional robots have been limited to repetitive tasks, the integration of AI is enabling more adaptive and flexible automation. AI-enhanced robots can respond to changes in their environment using real-time data from sensors and cameras, allowing them to perform more complex tasks with greater precision. Collaborative robots are increasingly used alongside human workers, supporting tasks such as assembly and material handling while adjusting their movements to ensure safety. Rather than fully replacing human labour, these systems are typically deployed to augment human capabilities, with workers focusing on oversight, problem-solving, and process improvement.

Once a vehicle is in use , AI is playing a critical role in battery lifecycle management, which is essential for electric vehicle performance, cost, and sustainability. AI models can predict battery degradation early in the lifecycle by analyzing initial usage patterns, allowing manufacturers to improve battery design and identify defects more quickly. During operation, AI-enhanced battery management systems monitor parameters such as voltage, temperature, and charge cycles to optimize performance and extend lifespan. AI also supports more efficient charging strategies by considering user behaviour, electricity pricing, and grid conditions to determine optimal charging times and levels.

At end of life, AI is used to assess battery health and determine whether batteries should be reused in secondary applications or sent for recycling. In second-life applications, AI helps manage groups of batteries with varying conditions, optimizing performance and extending useful life. In recycling, AI and robotics improve material recovery processes and help forecast future volumes of end-of-life batteries, supporting the development of more sustainable supply chains.

AI in Mobility Services and User-Facing Applications

AI is equally central to mobility services and user-facing applications, particularly as the sector shifts from a product-based model toward mobility-as-a-service. At the operational level, AI enables real-time fleet optimization, including route planning, demand forecasting, and vehicle dispatch. Platforms use machine learning to match supply and demand more efficiently, reduce wait times, and improve asset utilization. Predictive maintenance systems integrated into fleet operations help maintain service reliability by identifying issues before they disrupt operations. AI is also used to enhance safety by monitoring driver behaviour and providing real-time alerts.

At the customer level, AI supports dynamic pricing and integrated payment systems that adjust fares based on supply and demand while enabling seamless multimodal travel. Unified mobility platforms allow users to access multiple transportation modes through a single account, with AI analyzing travel patterns to improve service design and support new pricing models. In-vehicle AI applications further enhance the user experience by enabling natural language interaction, personalized settings, and intelligent navigation. These systems adapt to user preferences over time, improving convenience while reducing cognitive load during driving.

The Connected Ecosystem: Smart Infrastructure & Mobility Operations

Beyond individual vehicles and services, AI is enabling the development of connected mobility ecosystems that integrate vehicles, infrastructure, and energy systems. In the context of electric vehicles, AI supports smart charging by optimizing when and how vehicles are charged based on grid conditions, energy prices, and demand patterns. This helps reduce peak loads and integrates renewable energy more effectively. Advanced systems are also enabling vehicle-to-grid interactions, where EVs can supply power back to the grid during peak demand periods, positioning vehicles as active components of the energy system.

AI is also improving traffic management through adaptive signal control and real-time congestion management. Smart traffic systems use data from sensors and connected vehicles to adjust signal timing dynamically, reducing delays and improving traffic flow. In parallel, connected infrastructure and vehicle-to-everything (V2X) technologies enable communication between vehicles, infrastructure, and other road users. AI systems interpret this data to enhance safety and coordination, such as providing real-time hazard warnings or prioritizing emergency vehicles.

At the ecosystem level, AI supports broader system planning and coordination through demand forecasting and integrated mobility platforms. By analyzing data across transportation modes, cities can anticipate demand patterns and adjust services proactively. AI-enabled mobility systems also improve accessibility by providing personalized journey planning, real-time service updates, and multilingual support, helping make transportation systems more inclusive.

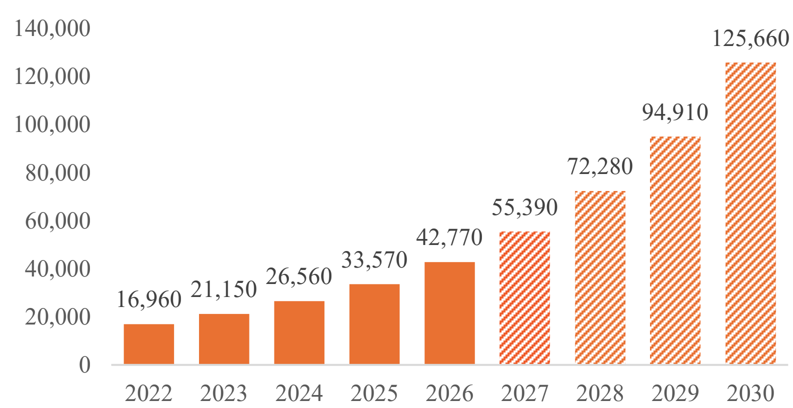
Overall, AI is transforming the automotive and mobility sector across the full value chain, from raw material extraction to end-user experience. Its impact is not limited to individual technologies, but reflects a broader shift toward connected, software-driven, and data-enabled systems. While these advancements offer significant benefits in efficiency, safety, and user experience, they also require coordinated investments in infrastructure, data, governance, and workforce capabilities to scale effectively.

3. Market Landscape

Global AI-Enabled Automotive & Mobility Trends

Global adoption of AI in automotive and mobility systems is accelerating, supported by sustained market growth, expanding deployment, and renewed investment. The global automotive AI market is estimated at approximately US$18 to $19 billion in 2025 and is projected to exceed US$38 billion by 2030, reflecting a compound annual growth rate of roughly 15 percent. This growth is driven by the increasing integration of AI across vehicle systems, manufacturing processes, and mobility services. At the same time, deployment of autonomous and AI-enabled vehicles is steadily increasing. While total volumes remain relatively modest compared to overall vehicle sales, the global autonomous vehicle fleet is expected to grow from approximately 43,000 units in 2026 to over 125,000 by 2030, indicating a gradual transition from pilot programs toward early commercialization.

Figure 3: Global Autonomous Vehicles (Units)



Source: Market.us News, 2026

Investment trends further reinforce this momentum. Global funding for mobility technologies reached approximately US$54 billion in 2024, marking one of the highest levels of investment in recent years. Capital has been directed toward key areas including sustainable mobility, connected and autonomous technologies, and mobility services. Notably, investments are increasingly focused on applications that are closer to large-scale deployment, such as electrification, ADAS features, and connected vehicle platforms, reflecting growing confidence in commercially viable AI use cases.

Commercial adoption of AI within vehicles has been most prominent in advanced driver assistance systems (ADAS), which can be introduced incrementally across vehicle models. Industry projections indicate that Level 2 ADAS features, which support partially automated driving, could account for more than half of global new vehicle sales by 2030, supported by regulatory requirements and declining hardware and software costs. Adoption of higher levels of automation is expected to progress more gradually. Level 3 systems (automated driving under conditions) are projected to expand from a negligible share of sales today to approximately 16 percent by 2035, while fully autonomous systems at Levels 4 and 5 are expected to remain limited, representing a small share of the market over the same period. This pattern reflects both the technical complexity of advanced autonomy and the regulatory and safety requirements associated with higher levels of automation.

Looking further ahead, the share of Level 3 automated driving capable vehicles is projected to increase to approximately 16 percent of sales by 2035, up from less than 1 percent in 2025. This growth is expected to be driven by improvements in software performance, validation processes, and consumer acceptance. Higher levels of automation are likely to remain limited over the same period, with Level 4 and above vehicles estimated to represent around 1 percent of sales by 2035.

Regional AI Adoption Models and Strategic Differences

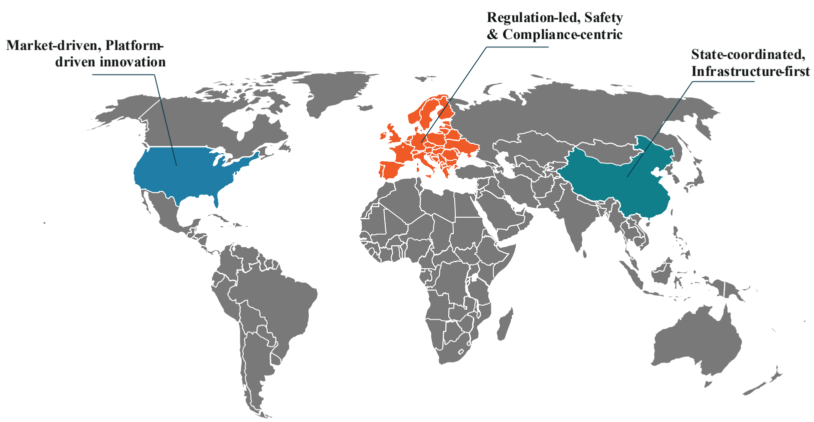
Regional approaches to AI adoption in mobility vary significantly and reflect broader differences in policy frameworks, infrastructure readiness, and industry structure. In China, a state-enabled model supports rapid scaling through coordinated investments in infrastructure, data platforms, and connected vehicle ecosystems. This approach emphasizes integration between vehicles, road infrastructure, and cloud systems, enabling accelerated deployment at scale.

In contrast, Europe tends to follow a compliance-led approach, where AI-enabled vehicle systems must meet stringent regulatory and safety requirements before deployment. While this can extend development timelines, it supports greater transparency, accountability, and public trust in AI systems.

The United States is characterized by a market-driven model, where innovation is led by private sector firms, including technology companies and established automakers. This enables rapid experimentation and localized deployment, although regulatory fragmentation can result in uneven adoption across regions.

In emerging markets, AI is often applied as a practical tool to improve mobility system performance, including traffic management, public transit reliability, and operational efficiency, even in contexts with lower levels of vehicle ownership.

Figure 4: Regional AI Mobility Deployment Trend



Canada's AI Ecosystem: Strengths & Convergence

Canada's position within this global landscape is shaped by the convergence of several structural advantages, including access to critical minerals, strong AI research capacity, and integration into global automotive supply chains. As electrification reshapes the sector, Canada's reserves of key materials such as nickel, cobalt, lithium, and graphite provide a foundation for participation across the battery value chain. Increasingly, these activities are becoming data-intensive, creating opportunities to apply AI in areas such as mineral exploration, processing optimization, and supply chain traceability. At the same time, emerging requirements for battery passports and sustainability reporting are increasing demand for digital systems capable of tracking material origin, emissions, and compliance, areas where AI-enabled solutions can support verification and transparency.

Canada's AI ecosystem is further strengthened by its established research institutions and talent base. National investments in AI have supported the development of globally recognized research hubs, including Mila, the Vector Institute, and Amii, which specialize in machine learning, computer vision, and robotics. This has contributed to a high concentration of leading researchers and has supported advancements in areas directly relevant to mobility, including autonomous systems, perception technologies, and safety-critical AI. Importantly, Canada has demonstrated an ability to translate research into real-world applications, particularly in regulated and high-reliability sectors such as automotive, aerospace, and healthcare. Collaborative initiatives between academia and industry are advancing tools for system validation and safety assurance, which are essential for AI deployment in mobility.

In addition to research strength, Canada has developed mechanisms to support AI commercialization and deployment. National innovation programs and clusters bring together industry, academic institutions, and government to accelerate applied AI projects. Initiatives such as

SCALE AI and Next Generation Manufacturing (NGen) promote collaboration on real-world challenges, including logistics optimization, manufacturing automation, and mobility system performance. These programs typically use co-investment models, encouraging private sector participation while reducing adoption risk. Complementary efforts, such as testbeds and demonstration projects, provide environments for validating technologies at scale. Examples such as Project Arrow illustrate how industry-wide collaboration can support system integration and accelerate development of next-generation vehicle platforms.

Project Arrow

Project Arrow is a multi-supplier electric vehicle initiative led by the Automotive Parts Manufacturers' Association, demonstrating the integration capacity of Canada's automotive ecosystem. Phase 1, unveiled in 2023, brought together more than 55 predominantly Ontario-based companies to design and build Canada's first domestically developed zero-emission concept vehicle, supported by CAD 5 million in FedDev Ontario funding. Phase 2.0, launched in February 2026 with two prototype vehicles, expanded participation to more than 80 suppliers and secured an additional CAD 7 million in funding.

Canada's integration into global automotive markets further strengthens its position in AI-enabled mobility. Rather than focusing on end-to-end vehicle production, Canada often contributes through specialized components, software platforms, and analytics capabilities that integrate into global supply chains. Canadian-developed technologies, including safety-certified software systems and AI-enabled sensing solutions, are embedded in vehicles produced internationally. Similarly, expertise developed in areas such as predictive maintenance, quality analytics, and manufacturing optimization can be applied across global production environments. In infrastructure and mobility services, Canadian firms are contributing to smart city and traffic management solutions, using AI to analyze mobility data and support operational decision-making.

This approach reflects a broader strategy of leveraging existing strengths to participate in global ecosystems. Canada's integration with major automotive markets, particularly within North America, enables access to established supply chains, regulatory frameworks, and customer bases. Partnerships with international firms further support this integration, combining Canada's capabilities in resources, energy, and research with global manufacturing scale. As a result, Canada's role in AI-enabled mobility is largely defined by its ability to embed advanced technologies within existing systems, supporting both domestic adoption and export-oriented growth.

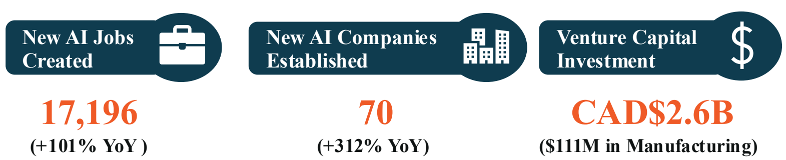
Overall, global trends in AI-enabled mobility point to steady but uneven progress. Market growth, investment activity, and expanding deployment indicate strong forward momentum, particularly in areas such as ADAS, connected systems, and electrification. At the same time, regional differences in governance, infrastructure, and market structure continue to shape how and where these technologies scale. Within this landscape, Canada is positioned to contribute through a combination of resource advantages, research expertise, and integration into global value chains, supporting the ongoing transition toward data-driven, software-defined mobility systems.

4. Ontario's Enablers and Adoption Considerations

Ecosystem & Capability Foundations

Ontario's ecosystem for AI-enabled automotive and mobility systems is built on a set of durable structural foundations that support both initial adoption and long-term scaling. At its core, the province combines a strong talent base, applied research capacity, industrial scale, digital infrastructure, and public-sector demand to create an environment where AI solutions can move from concept to deployment. These assets operate together as a system, enabling Ontario to support the full lifecycle of mobility innovation, from research and testing through to commercialization and integration within real-world operations.

Figure 5: Ontario AI Snapshot 2024-25



Source: Vector Institute, 2025

Ontario's talent and research capacity form a central pillar of this ecosystem. The province benefits from a concentrated pool of technical expertise, particularly within the Toronto–Waterloo corridor, which ranks among the leading technology labour markets globally. This concentration of AI talent underpins the development of advanced capabilities in areas such as machine learning, computer vision, and robotics, all of which are critical for mobility applications. At the same time, applied research institutions translate these capabilities into deployable systems. Universities across Ontario are actively engaged in autonomous driving, ADAS, traffic optimization, and connected vehicle research, often supported by real-world testing environments and industry partnerships. These institutions do not operate in isolation; rather, they function as part of a broader ecosystem that links academic research with commercialization pathways. As a result, Ontario is able to move AI innovations beyond laboratory settings into operational contexts, particularly in safety-critical domains such as transportation.

This research foundation is reinforced by a dense industrial and manufacturing base, which provides the scale required to deploy and diffuse AI technologies. Ontario remains the centre of Canada's automotive production, supported by major global assemblers and a large network of Tier 1 suppliers and advanced manufacturing firms. This ecosystem creates strong pathways for AI adoption, as validated solutions can be integrated into production lines, vehicle systems, and supply chains at scale. Leading automakers operating in Ontario are already embedding AI into their operations through investments in software engineering, connected vehicle technologies, and electrification. The presence of these firms, alongside advanced suppliers, ensures that AI capabilities developed within the province can be applied directly to real manufacturing and mobility challenges. At the same time, investments in battery production and electrification are strengthening Ontario's position within next-generation mobility value chains, linking AI applications to emerging opportunities in energy and storage systems.

Digital and data infrastructure further supports this environment by providing the computational backbone required for AI deployment. Ontario hosts a growing network of data centres and cloud computing regions, enabling access to high-performance computing resources needed to train and operate AI models. These capabilities are supported by a relatively low-emissions electricity system, which is increasingly important given the rising energy demands associated with AI workloads. At the same time, ongoing expansion of data centre infrastructure introduces new planning considerations, particularly related to grid capacity and local energy distribution. Connectivity infrastructure is also a key enabler. Investments in high-speed networks, including 5G corridors, allow for real-time data exchange between vehicles, infrastructure, and cloud platforms. These digital systems support core mobility functions such as connected vehicle services, over-the-air updates, and real-time traffic management, all of which depend on reliable, low-latency communication.

Ontario also benefits from a well-developed semiconductor, electronics, and software ecosystem that supports the integration of AI into vehicle systems. Technology firms operating in the province contribute to the design and development of critical components, including automotive software platforms and embedded systems used in millions of vehicles globally. This includes safety-certified operating systems and AI-enabled sensing technologies that support advanced driver assistance and connected vehicle functions. Public-sector investment has reinforced this capability by identifying microelectronics and AI chips as strategic priorities, supporting expansion in research and development. The presence of both hardware and software capabilities positions Ontario not only as a manufacturing hub, but also as a contributor to the design and validation of intelligent vehicle systems.

In parallel, Ontario's logistics and trade networks provide real-world environments where AI can be applied to freight and mobility operations. Key transportation corridors, including cross-border routes and major highways, handle high volumes of predictable, time-sensitive freight traffic. This creates strong use cases for AI applications such as route optimization, congestion management, and connected trucking technologies. The province's multimodal infrastructure, including airports, ports, and rail terminals, generates large volumes of operational data that can be used to improve efficiency through AI-driven analytics. These logistics systems are complemented by public-sector initiatives aimed at improving freight performance, indicating institutional readiness to adopt digital tools across transportation networks.

Public-sector institutions play a further enabling role by acting as early adopters and providing operational environments for testing and deployment. Provincial and municipal agencies manage large-scale transportation systems that generate significant data, which can be used to develop and validate AI models. Traffic management systems, open data platforms, and public transit operations all provide opportunities to test AI applications under real-world conditions. Policy and procurement also shape demand by creating requirements for solutions that improve safety, electrification, and system performance. Collaboration between public agencies, universities, and industry further accelerates innovation by supporting pilot projects and applied research in live environments.

Deployment & Adoption Readiness

Ontario's approach to scaling AI-enabled mobility is reinforced through structured programs and testbeds that enable staged deployment and risk reduction. Initiatives led by the Ontario Vehicle Innovation Network (OVIN) provide a coordinated pathway for companies to move from early-stage development to real-world implementation. Pilot programs, including on-road testing frameworks and corridor-based trials, allow technologies to be evaluated under controlled conditions while generating the evidence required for broader adoption. For example, automated vehicle and truck platooning pilots support testing under defined safety requirements, while dedicated innovation corridors enable companies to deploy connected and autonomous technologies in live traffic environments. Complementary testbeds provide urban and cross-border environments for experimentation, supporting use cases that involve integration across vehicles, infrastructure, and municipal systems.

A key strength of this approach is the availability of testing, validation, and certification infrastructure. Facilities such as specialized proving grounds and integrated test environments allow developers to evaluate safety, performance, and cybersecurity under realistic conditions. These capabilities are critical for AI-enabled mobility, where systems must meet stringent safety and reliability standards before deployment.

Ontario’s leadership in pilot regulation and testing frameworks also contributes to the development of expertise in safety assurance and governance, supporting the transition from experimentation to commercialization.

Deployment readiness in Ontario is therefore best understood as a staged process, supported by coordinated infrastructure, programs, and partnerships. Regional technology development networks connect small and medium-sized enterprises with post-secondary institutions, industry partners, and municipal systems, allowing solutions to progress through defined stages of testing and validation. This approach reduces barriers to adoption by providing access to resources, expertise, and real-world environments. It also reflects the complexity of AI-enabled mobility, where solutions must integrate across multiple domains, including vehicles, infrastructure, data systems, and regulatory frameworks.

Regulatory Framework

Ontario’s regulatory framework supports this staged approach by balancing innovation with safety and public trust. Pilot programs provide controlled pathways for testing emerging technologies, ensuring that deployment occurs within defined parameters and is supported by measurable performance data. This framework has expanded over time to include not only passenger vehicles, but also commercial and freight applications, reflecting the broader scope of mobility AI. Coordination with federal safety guidelines ensures alignment across jurisdictions, while initiatives in related sectors, such as energy, provide additional flexibility to test technologies that intersect with mobility systems, such as electric vehicle charging.

Overall, Ontario’s ecosystem combines talent, infrastructure, industrial capacity, and governance into an integrated platform for AI-enabled mobility. Rather than relying on a single strength, the province’s advantage lies in how these elements reinforce one another, enabling AI technologies to move from research to deployment and scale within real-world transportation systems.

5. Opportunities for Ontario

Ontario's opportunity is not limited to a single technology or application. It lies in the province's ability to integrate AI across the broader mobility ecosystem, from manufacturing and vehicles to infrastructure and services. The opportunities below outline how focusing on targeted deployment, leveraging existing strengths, enabling regulatory clarity, and strengthening commercialization pathways, can position Ontario as a leading jurisdiction in AI-enabled automotive and mobility innovation.

5.1 Scaling AI-Enabled Mobility Deployment in Targeted Use Cases

Ontario has a near-term opportunity to scale AI through targeted mobility applications where operational value and demand are already clear. High-frequency logistics use cases, including short-haul freight routes between warehouses and distribution centres, are particularly well suited due to stable operating conditions and strong economic drivers such as labour shortages and cost efficiency. These environments offer a practical pathway to move beyond pilots into real-world deployment while building public familiarity with AI-enabled systems.

Additional opportunities exist in fleet management and infrastructure optimization. Applications such as predictive maintenance, real-time routing, and traffic signal optimization can improve reliability, reduce costs, and enhance system performance across public and private operations. Existing initiatives, including Technology Pilot Zones, provide a strong foundation for scaling this approach by linking AI developers with end users and real-world deployment environments.

5.2 Leveraging Ontario's Manufacturing Base for AI-Driven Production and Systems Integration

Ontario's automotive and advanced manufacturing ecosystem provides a strong platform for integrating AI across production and vehicle systems. AI-enabled smart factories, robotics, and digital twins are improving production efficiency through predictive maintenance, automated quality control, and real-time optimization. The province's strength lies in its ability to embed these capabilities within existing OEM and supplier networks, enabling scalable, production-level adoption.

Beyond manufacturing, there is growing opportunity in software-defined vehicles and systems integration, where AI capabilities are embedded directly into vehicle platforms. As value shifts toward software, data, and continuous updates, Ontario firms can capture new opportunities through onboard AI systems, edge computing, and vehicle data platforms. This extends into global markets, where Ontario-based companies can participate by supplying AI-enabled components, systems, and integration services rather than focusing only on physical manufacturing.

5.3 Strengthening Ontario's Position in AI Development, Data, and Digital Platforms

Ontario's AI research ecosystem and talent base position the province to lead in data-driven mobility solutions. As mobility systems generate increasing volumes of vehicle, infrastructure, and operational data, the ability to convert this data into actionable insights is becoming a key competitive advantage. Opportunities include development of digital platforms for real-time road intelligence, predictive analytics, and system optimization across transportation networks.

These applications extend beyond automotive into municipal infrastructure and urban planning, creating cross-sector opportunities with export potential. Scaling these solutions will require continued investment in pilot programs, access to public-sector data, and partnerships that enable real-world validation. Strengthening linkages between research institutions and industry will be critical to converting Ontario's talent advantage into sustained economic value.

5.4 Enabling AI Deployment through Regulation, Standards, and Trust

Regulatory clarity and public trust are essential to unlocking AI adoption in mobility. Stakeholder feedback highlights that current frameworks often lag technological development, creating uncertainty around safety, liability, and system performance. Establishing clear guidance and standardized validation processes would reduce risk for industry and accelerate deployment, particularly for safety-critical applications such as autonomous vehicles.

At the same time, building public confidence remains a key factor. Demonstrating safety through controlled deployments, improving transparency, and clearly communicating system performance will be essential to broader acceptance. Early use cases in well-defined environments can serve as important proof points for scaling adoption.

5.5 Unlocking Collaboration and Data-Sharing Models Across the Ecosystem

AI-enabled mobility requires coordinated action across government, industry, and research institutions. Ontario has an opportunity to strengthen collaborative models that support shared testing infrastructure, data platforms, and validation environments. These resources reduce cost and risk while enabling faster innovation and deployment.

There is also potential to expand data-sharing and intellectual property models, particularly in areas with strong public value such as safety and infrastructure optimization. To support this, clear incentives and governance frameworks will be needed to encourage private-sector participation. As systems scale, clearer definition of roles and responsibilities across stakeholders will improve accountability, reduce duplication, and support more efficient implementation. Cross-sector collaboration, including transportation, energy, and urban infrastructure, will further enable integrated, system-level AI solutions.

5.6 Advancing AI-Enabled Energy Integration and Grid Flexibility

Ontario has an opportunity to integrate AI-enabled mobility more fully within the provincial energy system, particularly as electrification accelerates. Electric vehicles, charging infrastructure, and distributed energy resources can be coordinated through AI to manage demand, improve load balancing, and align electricity consumption with generation.

Scaling these capabilities will require coordinated planning across fleets, utilities, and infrastructure providers, as well as mechanisms such as demand response programs, dynamic pricing, and energy aggregation models. Interoperability across systems will also be critical. Establishing shared standards and data frameworks can improve visibility, reduce integration challenges, and support seamless operation across vehicles, charging infrastructure, and the grid.

5.7 Strengthen Industry and Academic Integration

Ontario’s research institutions provide a strong foundation for AI innovation, but there remains an opportunity to strengthen pathways from research to deployment. Expanding applied research partnerships, co-op programs, and demonstration environments can help ensure that technologies developed within Ontario are commercialized locally.

Deeper collaboration between academia and industry will accelerate product development, support retention of intellectual property, and strengthen domestic firms across the AI mobility value chain. This integration is particularly important in areas such as manufacturing, autonomous systems, and mobility operations, where practical deployment and validation are essential.

5.8 Scaling Commercialization and Global Competitiveness

Ontario’s long-term opportunity lies in scaling AI innovations into globally competitive products and services. While the province has strong research and early-stage development capabilities, challenges remain in scaling companies, accessing capital, and retaining talent. Strengthening commercialization pathways, including access to customers, funding, and international markets, will be critical to sustaining growth.

Export opportunities are emerging in areas such as autonomous systems, fleet management platforms, and smart infrastructure solutions. By leveraging domestic deployments as proof points, Ontario companies can strengthen their competitiveness in global markets. Supporting a stronger risk capital environment and encouraging investment in scaling firms will help ensure that successful companies grow within the province.

6. OVIN Team

Information on OVIN team members and relevant contacts for outreach is available on OVIN's website at: https://www.ovinhub.ca/connect/team/

7. Disclaimers

This report was commissioned by the Ontario Centre of Innovation (OCI) through a Request for Proposals titled "Ontario Vehicle Innovation Network (OVIN) – Annual Comprehensive Sector Report & Quarterly Specialized Reports," dated September 26, 2025, and has been prepared by MNP LLP. It is one of five reports covering an analysis of Ontario's automotive technology, electric vehicle and smart mobility landscape while incorporating implications for the sector's skills and talent landscape.

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