The DISRUPT Framework

Artificial Intelligence and Automobiles

GLOBAL X
by Mirae Asset

The DISRUPT Framework: Understanding the Future of Innovation

In the rapidly evolving world of artificial intelligence (AI), staying ahead of the curve is crucial. For investors, it's not just about recognising the next trend but about pinpointing where within a theme or industry to allocate resources - whether upstream or downstream, small-cap disruptors or established players, or emerging markets versus mature leaders. The challenge lies in cutting through the noise to distinguish transformative developments from those that may be overhyped. That's why we developed the DISRUPT framework - a systematic tool designed to evaluate and track the progress of AI and other groundbreaking technologies. By providing a structured, data-driven approach, the framework helps investors identify not only viable themes but also the specific opportunities within those themes that align with long-term, sustainable growth.

Expected Outcome

The DISRUPT Framework evaluates seven key criteria: disruption, innovation, scalability, resilience, uptake, potential, and transformation. Together, these elements combine to create a detailed picture of a specific innovation, offering insights into its lifecycle stage, market dynamics, and optimal investment opportunities. A five-level rating system is applied to assess the maturity of these technologies, ranging from early-stage development (Nascent) to full-scale implementation and maximum impact (Fully Realised). This approach ensures that every innovation is rigorously analysed, helping investors make informed decisions that balance potential risks with opportunities for meaningful returns.

	Component	Objective	Guidelines
D	**D**isruption	Identify and analyse technologies causing major disruptions in various industries.	• Identify Technologies • Assess Impact • Market Dynamics
I	**I**nnovation	Track cutting-edge innovations driving change and breakthroughs.	• Research and Development • Technological Breakthroughs • Recognition and Impact
S	**S**calability	Assess the scalability and growth potential of disruptive technologies.	• Market Size • Barriers to Entry • Adoption Catalysts
R	**R**esilience	Evaluate how technologies contribute to business resilience and adaptability.	• Risk Management • Sustainability • Business Continuity
U	**U**ptake	Monitor the market uptake and adoption rates of disruptive technologies.	• Adoption Curves • User Engagement • Market Penetration
P	**P**otential	Assess the future potential and impact of disruptive technologies.	• Strategic Partnerships • Long-term Forecasts • Investment Opportunities
T	**T**ransformation	Analyse how disruptive technologies are transforming industries and societies.	• Competitor Analysis • Economic Impact • Societal Change

Rating	Description
Nascent	Early stages of development with limited real-world application.
Developing	Progressing, but significant advancements needed before becoming mainstream.
Established	Proven and widely used, though room for further growth and improvements remains.
Advanced	Highly developed, with few obstacles, close to full-scale implementation and monetisation.
Fully Realised	Fully adopted and delivering maximum impact across industries.

Artificial Intelligence and Automobiles

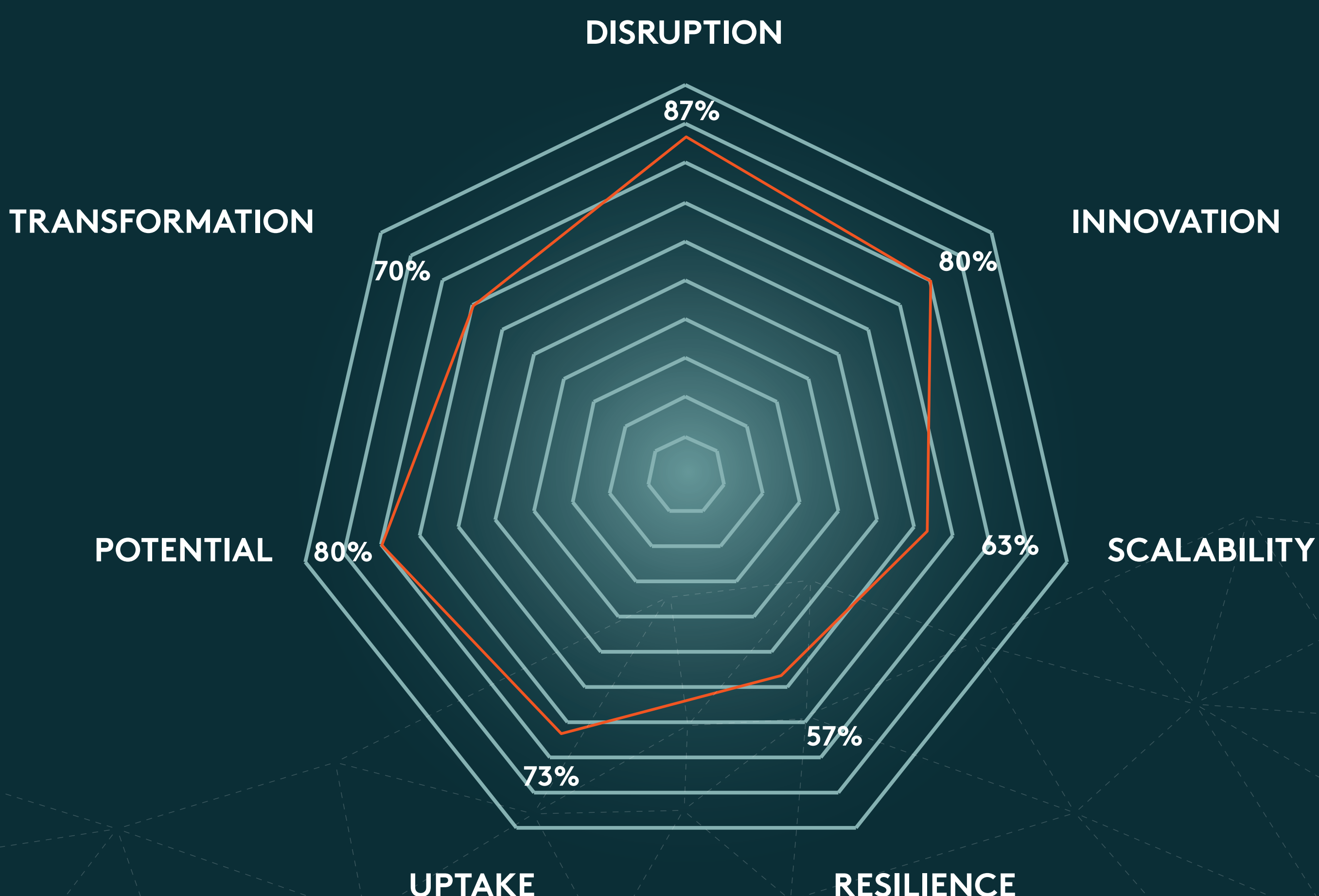
We believe AI is driving one of the most significant transitions in the automotive sector in decades. Vehicles are shifting from hardware-led machines to software-defined platforms, powered by advances in perception models, in-vehicle compute, and intelligent energy optimisation. AI now influences how cars are designed, manufactured, operated, and updated, with applications spanning smart cockpits, fleet optimisation, predictive maintenance, and assisted driving[1].

Our DISRUPT framework analysis shows that AI in Auto is highly advanced in disruption and innovation, supported by strong adoption, improving scalability, and meaningful long-term economic potential. The technology is already embedded across global OEMs and EV makers, while partnerships between chip suppliers, cloud providers, and autonomy developers continue to deepen. Regulatory progress, rising safety standards, and the spread of software-defined architectures are accelerating the shift[2].

This creates a broad and investable opportunity set across the automotive value chain. The strongest opportunities lie in the midstream where AI capability is already central to model design and production. Semiconductors, sensors, vehicle compute, simulation engines, and software stacks are scaling across the US and China in particular, with Korea and Japan strengthening through component and manufacturing leadership. These layers benefit from rising global AI penetration and tend to outperform downstream OEM exposure, which remains more sensitive to regulation, competition, and pricing.

The theme is investable today, not through speculative autonomy bets, but via the enabling infrastructure that underpins modern vehicles. With AI adoption now widespread across production, fleet operations, and consumer models, the connection between AI capability and commercial deployment is strengthening rapidly.

AI in Automobiles



Source: Global X ETFs as of 5 Dec 2025

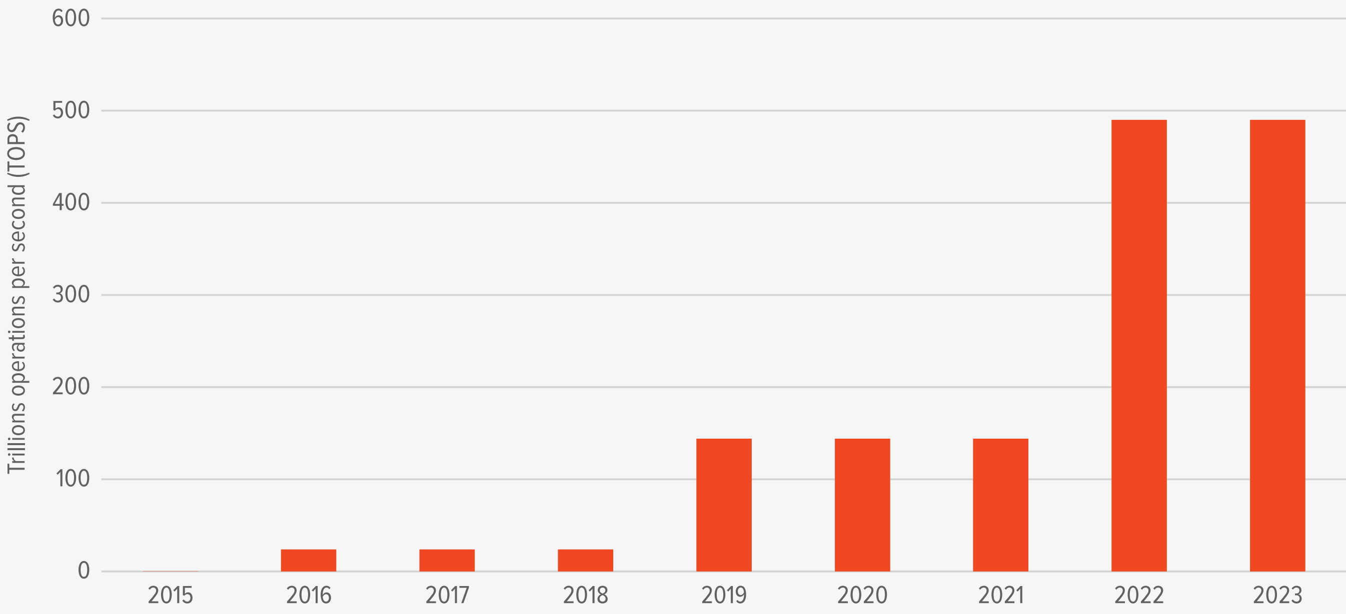
Disruption: AI Is Rewriting the Architecture of the Modern Vehicle

Traditional automotive engineering has been driven by hardware. Engines and mechanical systems shaped how cars were built, and most features operated in isolation. Software played a limited role, and updating capabilities often required new physical components.

AI breaks from this model by shifting the core of the vehicle towards compute. Modern cars rely on centralised processors, sensor fusion, and machine learning models that interpret the driving environment in real time. This enables capabilities beyond traditional rule-based systems, including predictive safety, intelligent energy use, and continuous refinement through fleet data[3].

AI COMPUTE DEMAND FROM EV'S (TOPS)

Sources: Tesla, after1989.com Using Tesla and MobileEye as Industry Benchmark.



The disruption comes from moving away from fixed-function hardware to a software platform that can learn, update, and scale across entire model ranges. Improvements can be deployed over the air, reducing the need for hardware redesign and creating a virtual layer that enhances manufacturing, operations, and the driver experience.

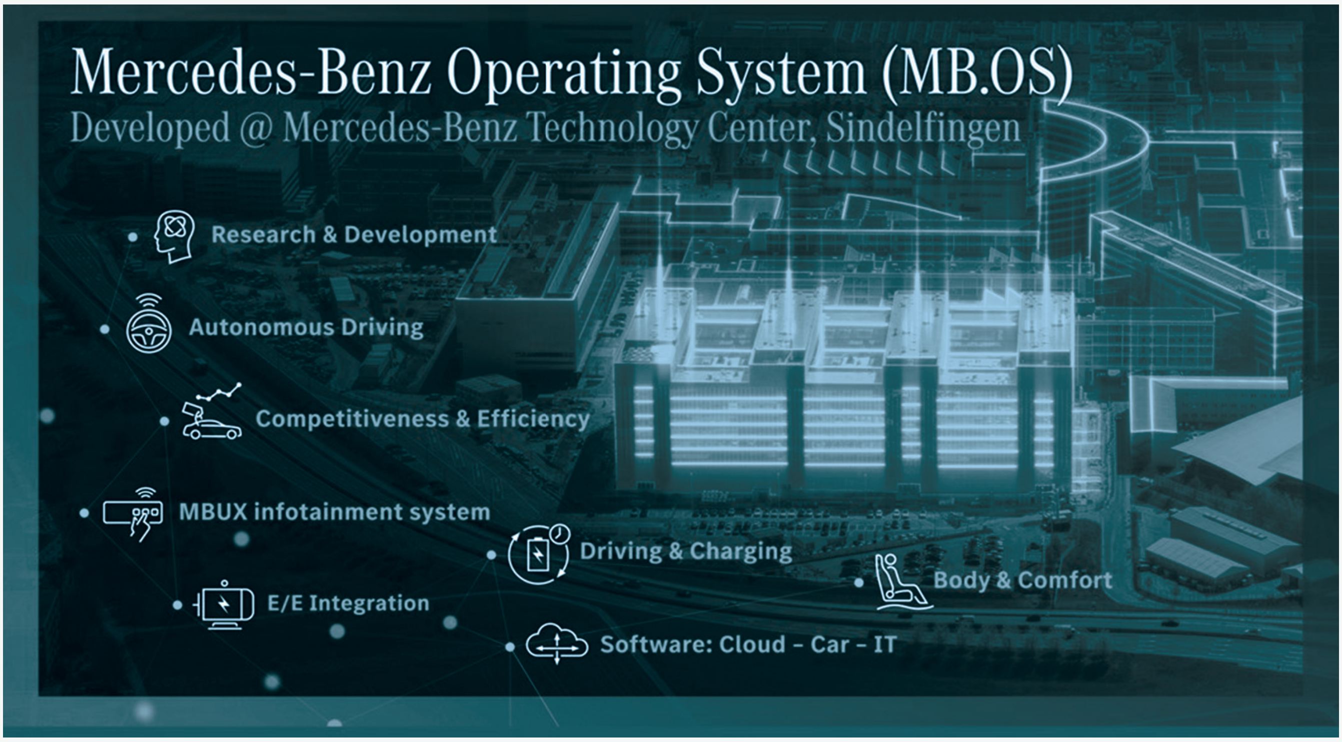
This shift, pioneered by Tesla and now adopted by global OEMs like BYD, Hyundai, and Mercedes, is reshaping industry structure. Suppliers such as Nvidia, Qualcomm, and Mobileye are becoming central as they provide the compute foundations for these AI systems.
This extends far beyond autonomy, influencing how vehicles are designed and competitively positioned[4].

Difference between traditional and AI vehicle supply chain	
Old Architecture	**Ai-Centric Architecture**
Multiple isolated ECUs	Central compute
Mechanical systems	Sensor fusion
Limited software	Unified software layer
Point-to-point wiring	High-bandwidth networking
Minimal data flow	Continuous data flow
	OTA capability

Source: Global X ETFs.

AI is also opening new markets, from energy optimisation in EV fleets to smart cockpits and real-time vehicle health monitoring. Growing regulation and higher safety expectations are accelerating the need for AI-driven capability across regions.

The shift from hardware to AI-led systems represents a break with the historical automotive cycle. It reframes how cars are developed, deployed, and monetised. Instead of selling a static product, automakers are moving towards a continuously improving platform where value compounds through data, software, and fleet-level optimisation.



Source: Mercedes Benz.

Innovation: From Mechatronics to Models – Software Now Drives the Vehicle

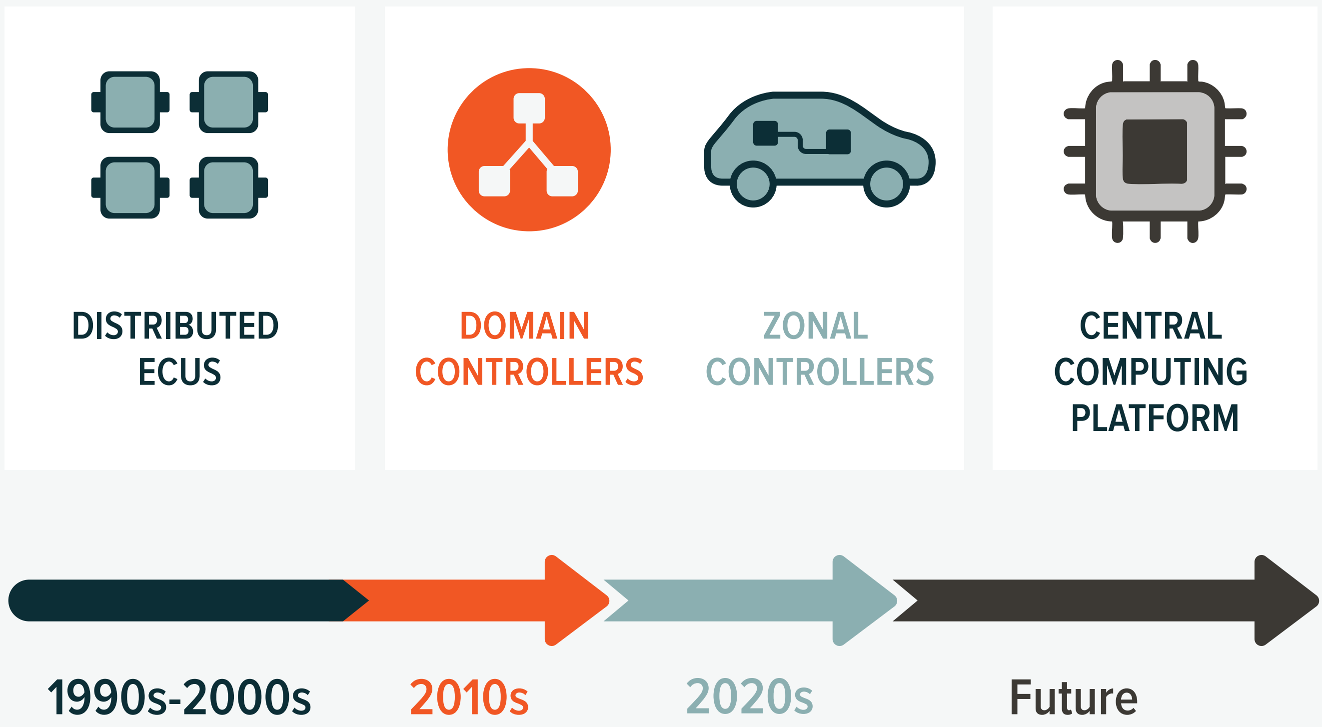
AI is shifting to innovation inside the vehicle. Instead of progress being tied to engines or standalone electronics, development now is now focused on the intelligence layer that interprets the driving environment and optimises how the vehicle behaves. Perception models, and adaptive software are becoming the main sources of improvement, allowing automakers to refine capability long after the car has left the factory.

The real step change is happening in the training and validation pipeline behind these systems. Large driving datasets, cloud-based training infrastructure, and simulation are allowing faster and more scalable way to improve safety, energy use, and driving behaviour. Much of the vehicle's performance now evolves through iteration rather than mechanical redesign.

Different manufacturers are taking different paths, but the direction is the same. Tesla continues to focus on end-to-end learning from fleet video. Chinese players such as BYD and XPeng are sharpening cockpit intelligence and data-driven energy management. Global OEMs including Hyundai, Mercedes, and Toyota are standardising intelligent functions through integrated platforms from Nvidia, Qualcomm, and Mobileye that harmonise perception, planning, and in-vehicle compute[5].

EVOLUTION OF VEHICLE ELECTRONIC ARCHITECTURE

Source: Ersa Electronics.

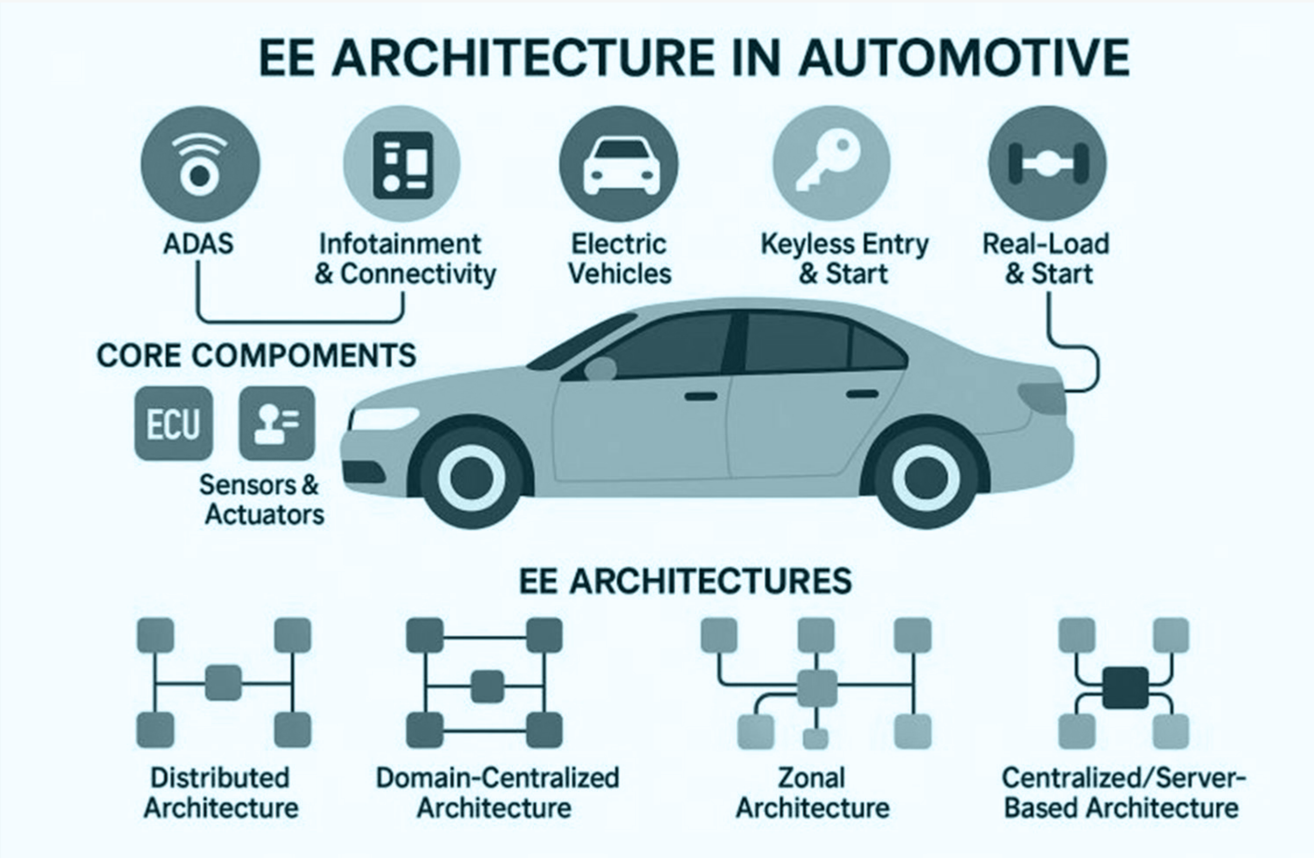


This creates a software-led vehicle that gains capability through updates rather than hardware changes. Route planning, battery management, and driver assistance mature as more data enters the system. Instead of fixed logic, the car becomes an adaptive platform that improves with scale and drives consistency across entire model ranges.

The breakthrough is not any single feature but the intelligence layer that now underpins the entire design philosophy. It reshapes how vehicles compete, how they are maintained, and how they generate long-term value. Innovation shifts toward software, data, and continuous refinement, setting up the pathway for the commercial models highlighted on the first page.

EE ARCHITECTURE IN AUTOMOTIVE

Source: Prateek Kumaar, HL Mando – LinkedIn post (May 2025).



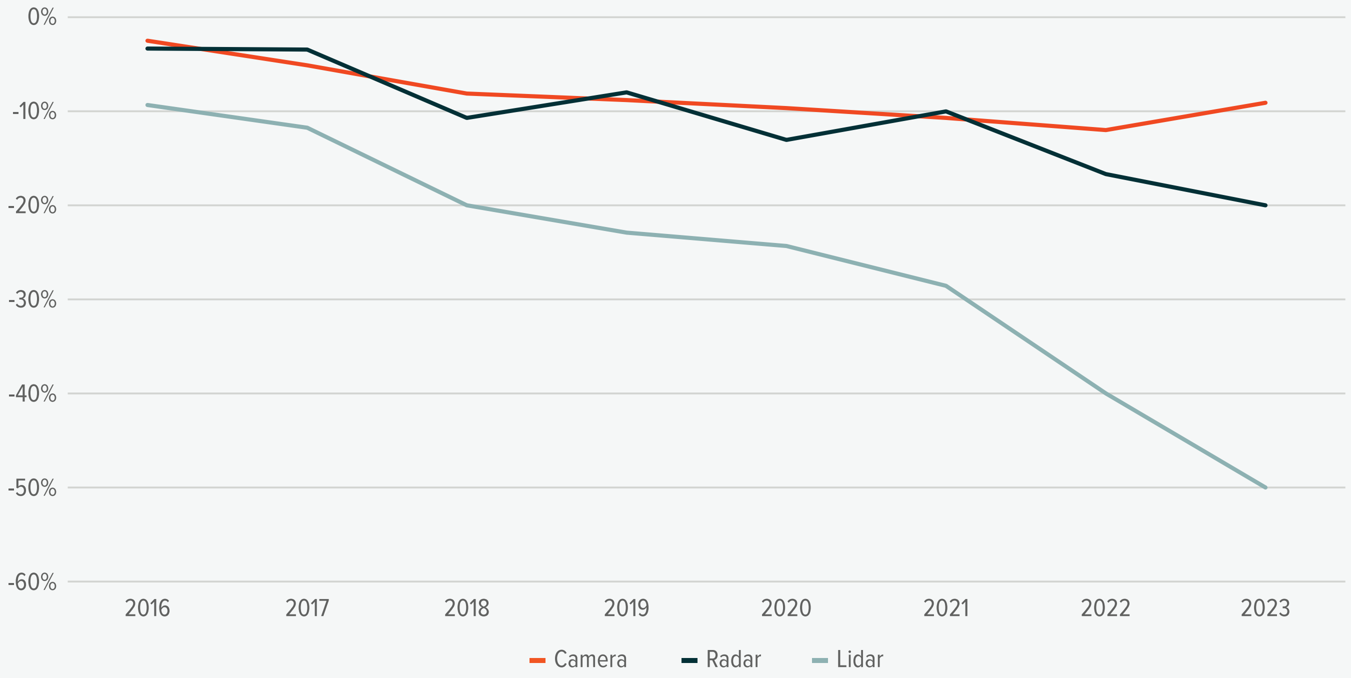
Scalability: From Isolated Features to Mass-Market Integration

Most automotive AI began as premium features tied to expensive hardware and separate electronic control units that managed functions independently. This created fragmentation across the vehicle, with upgrades limited by the physical components in each system. The challenge now is whether AI capability can extend beyond these isolated functions and scale across full model ranges in a commercially viable way.

The transition to centralised vehicle computing suggests it can. Automakers including Tesla, BYD, Hyundai, and XPeng are consolidating their intelligence layers into unified architectures where a single processing platform supports perception, energy optimisation, cockpit systems, and assisted driving. This reduces duplicated hardware, allows improvements to be deployed through software updates, and helps intelligence scale with production volume rather than relying on bespoke engineering for each model[6].

COST DECLINE OF KEY AUTO COMPONENTS IN US$ (YOY)

Source: McKinsey & Company, Deloitte 2021–2023 Automotive Outlook.



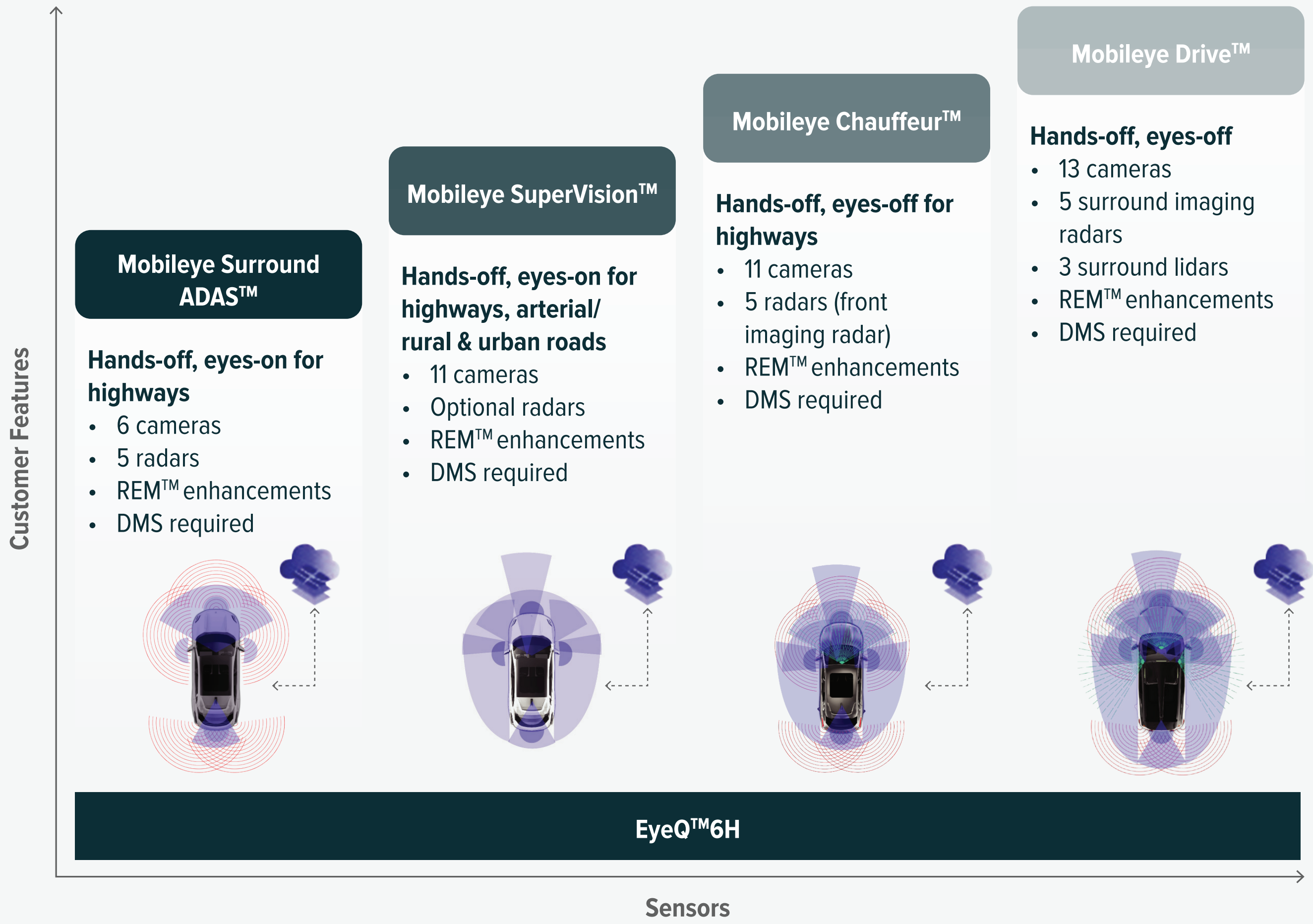
Suppliers are reinforcing this shift. Nvidia, Qualcomm, and Mobileye are delivering integrated platforms that combine sensing, mapping, simulation, and decision-making. This gives automakers a consistent base to deploy advanced capabilities without rebuilding the entire system for every model year, improving cost structures and widening the availability of AI-driven features beyond top-tier trims[7].

Costs are falling as sensors, cameras, and in-vehicle computing become more affordable, while synthetic data and cloud-based simulation reduce the time and expense of training and validation. This is enabling AI-enhanced safety, smart cockpit functions, and fleet-level optimisation to move into mid-market vehicles[8].

The common theme is the shift from isolated hardware modules to standardised compute and adaptable software. The automotive model is beginning to resemble the broader electronics industry, where scale is achieved through shared platforms and continual refinement rather than one-off engineering.

EYEQ™ SCALABILITY

Source: MobileEyE.



Resilience: Building Reliability Into an AI-Centric Vehicle

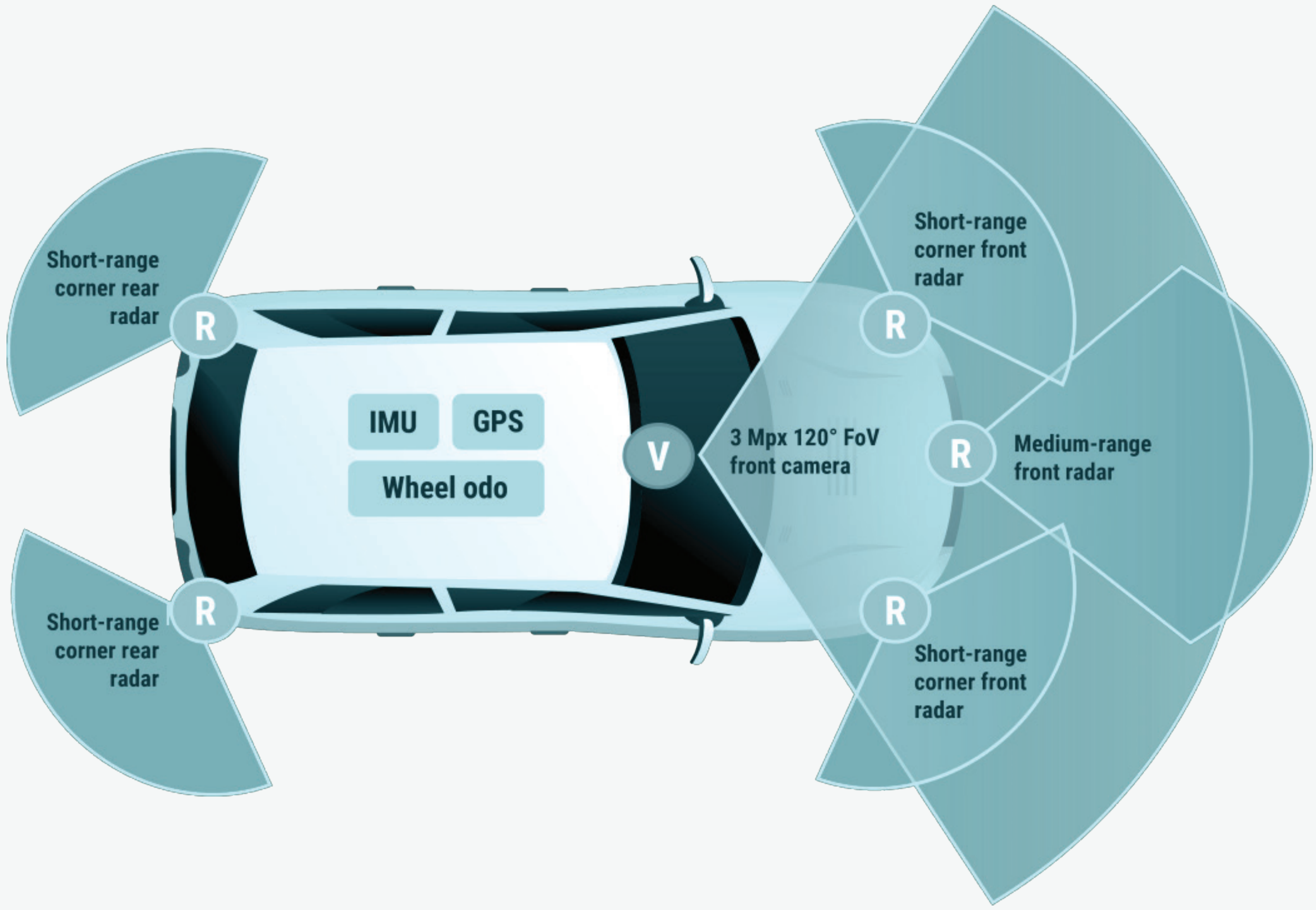
AI is strengthening the resilience of the automotive sector by improving safety, energy efficiency, and operational reliability, but it also introduces new dependencies that need careful management. Modern vehicles rely on complex software stacks, sensor suites, and cloud services to deliver assisted-driving functions, and intelligent energy use. This creates a more adaptive system, yet one that must still withstand software faults and data quality issues.

Automakers are responding by building multiple layers of redundancy. Safety systems increasingly use overlapping sensors, fallback perception, and conservative decision models that help vehicles maintain control even when components fail. Energy-management algorithms optimise charging cycles and driving patterns, supporting more reliable long-distance use and better asset utilisation across logistics operators[9].

Sustainability is another area where resilience is emerging. AI is improving route planning, thermal management, and battery health monitoring, which enhances efficiency and reduces waste across passenger vehicles and commercial fleets. These benefits vary across markets because they depend on connectivity, data infrastructure, and consistent software updates, but the direction of travel remains positive.

LAYERED PERCEPTION IMPROVES VEHICLE RELIABILITY

Source: Ledderboard.

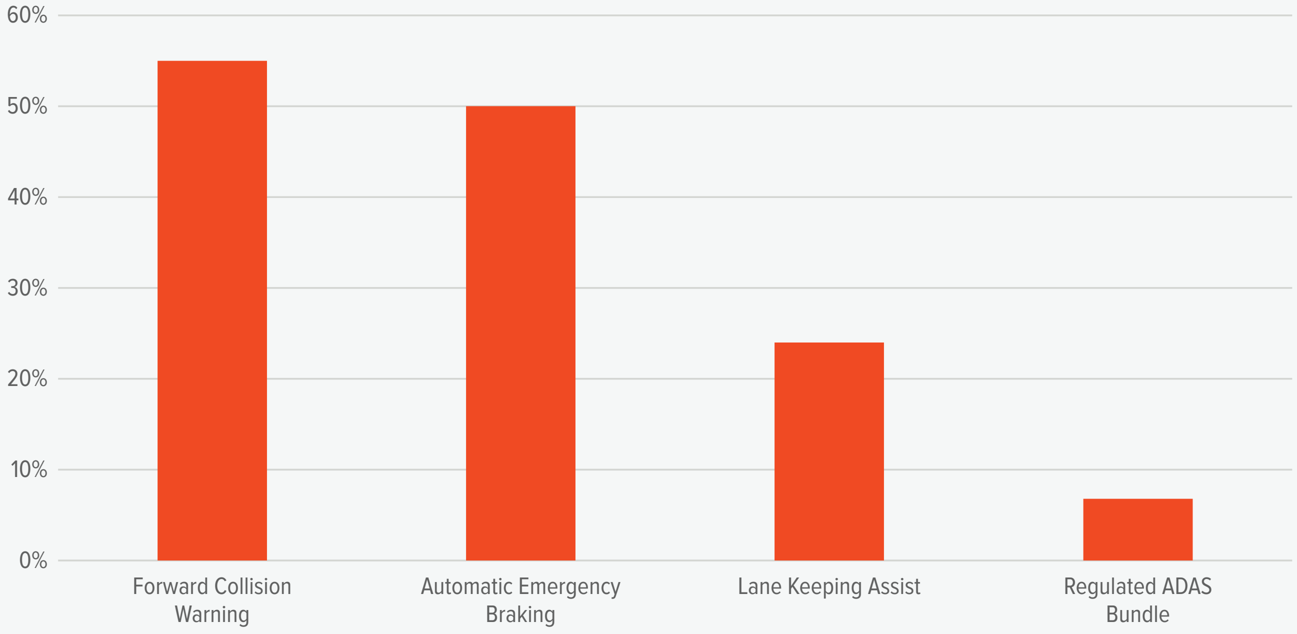


Reliance on connected services introduces new challenges. Vehicles depend on cloud-based mapping, remote diagnostics, and over-the-air updates, which means outages or cyber incidents can impair functionality. Most global manufacturers now operate dedicated security teams, incident-response protocols, and offline recovery modes, yet the risk profile remains different from traditional mechanical systems.

The broader shift is toward a vehicle ecosystem that is more adaptive, efficient, and secure, but also more digitally dependent. AI is helping strengthen resilience, though it requires continuous monitoring, strong validation, and coordinated infrastructure support to ensure consistent performance across markets and use cases.

CRASH REDUCTION VS VEHICLES WITHOUT FEATURE (%)

Source: Crashstats, NHSTA.



Uptake: Moving AI Capability From Early Adoption to Everyday Use

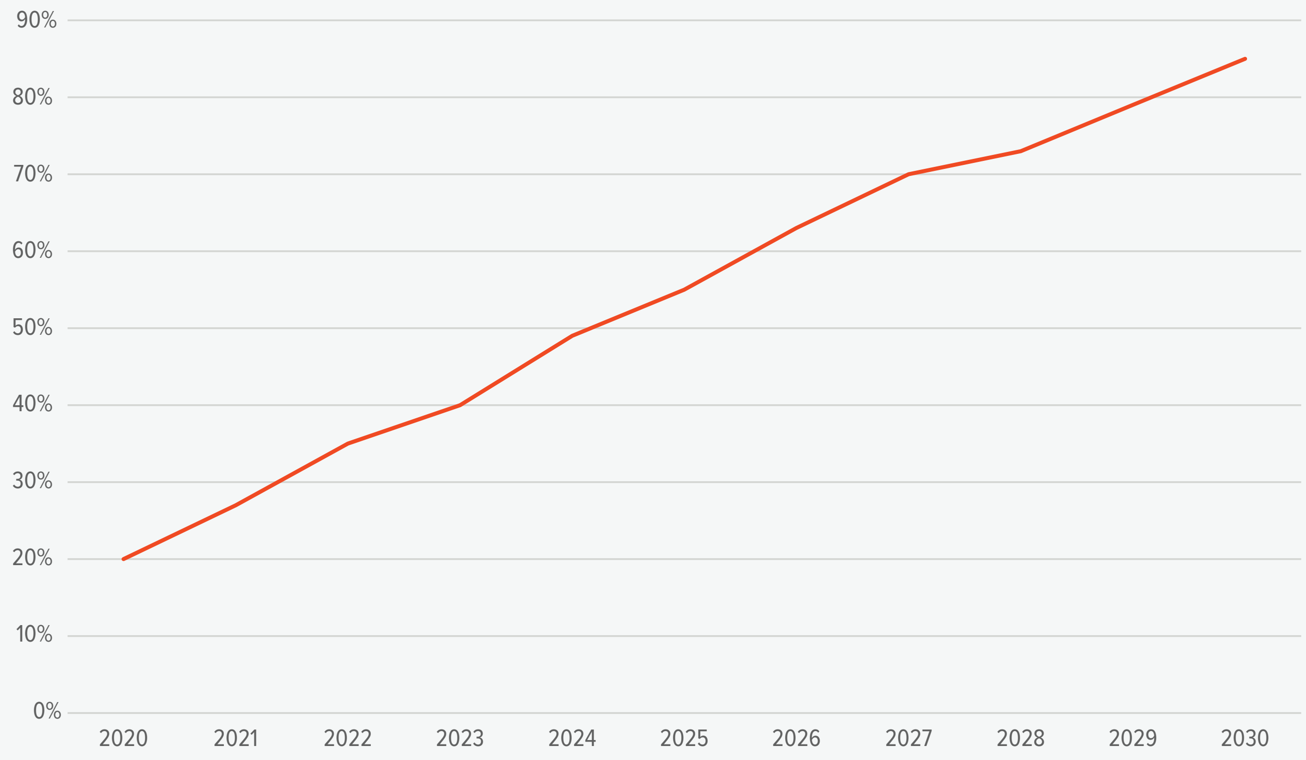
Adoption of AI in the automotive sector is progressing, but it is uneven across regions and manufacturers. Most OEMs have deployed AI features in safety, infotainment, and energy optimisation, yet large-scale reliance on AI-driven decision-making remains early. AI is gaining traction upstream, where robotics, and computer vision systems are being used to streamline manufacturing and shorten development cycles. These improvements support faster rollouts of software-led models and help reinforce adoption inside the vehicle.

User engagement is improving as buyers become more comfortable with intelligent assistance. Smart cockpits, adaptive interfaces, and predictive maintenance are seeing rising usage, particularly in EV-focused markets like China and Europe. Real-world feedback loops are helping refine models, although the depth of engagement varies depending on connectivity and software maturity[10].

Penetration is increasing fastest where AI provides clear utility. Fleet operators, ride-hailing networks, and logistics groups are integrating AI for routing, diagnostics, and driver monitoring, where efficiency gains are immediate. Mass-market adoption is slower because many models still lack the compute headroom and sensor density needed to support advanced features consistently.

AI ROBOTICS ADOPTION IN AUTOMOTIVE MANUFACTURING

Source: Intretech.

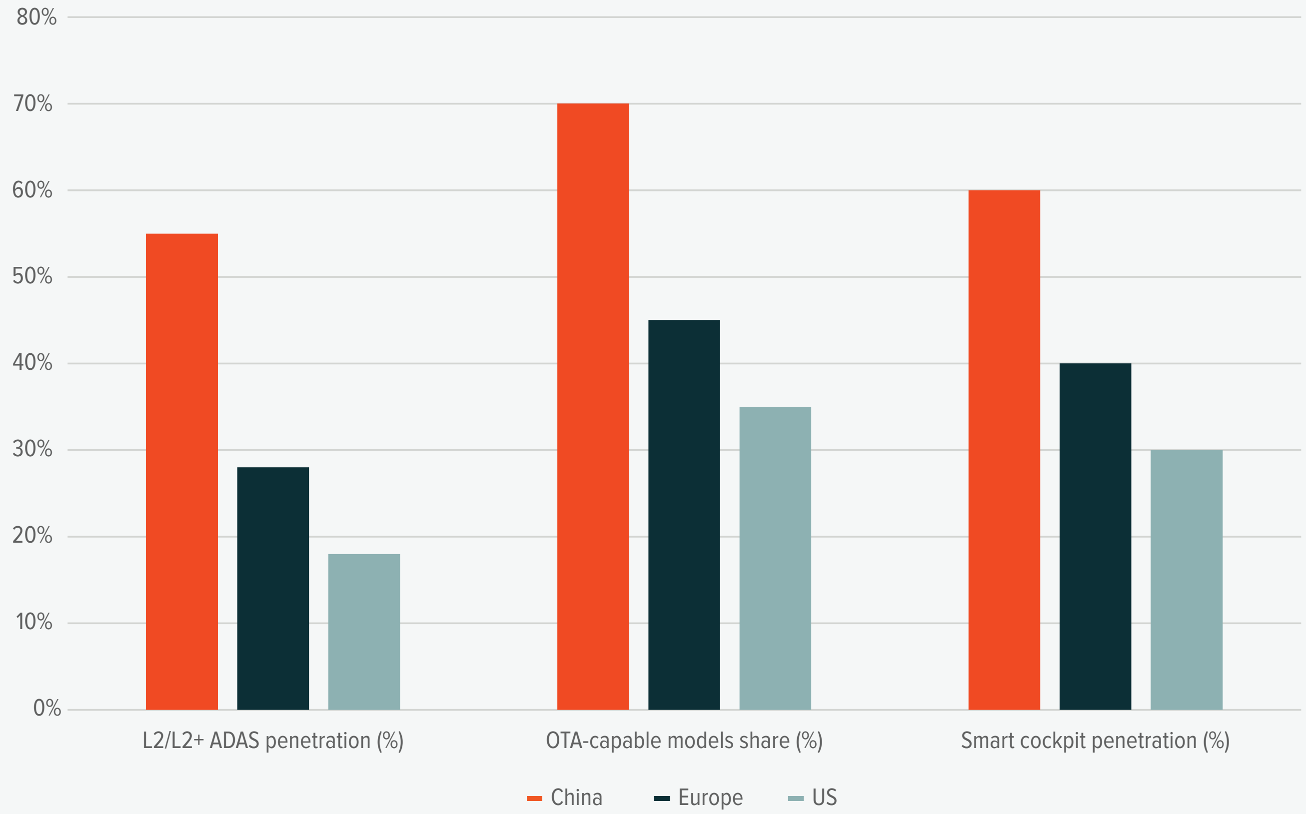


Geographic differences are becoming more pronounced. China and parts of Europe are moving ahead due to stronger regulatory alignment, richer data ecosystems, and faster vehicle refresh cycles. The US market remains more mixed, with premium segments leading while lower-priced models update more slowly[11].

Overall uptake is strengthening, but it depends on sustained investment in software quality, factory automation, and vehicle connectivity. As these foundations mature, AI-enabled capability is expected to shift from optional feature to standard expectation.

AI FEATURE ADOPTION ACROSS MAJOR AUTO MARKETS

Source: Company data, GII Research.



Potential: Unlocking Long-Term Value Across the Auto Sector

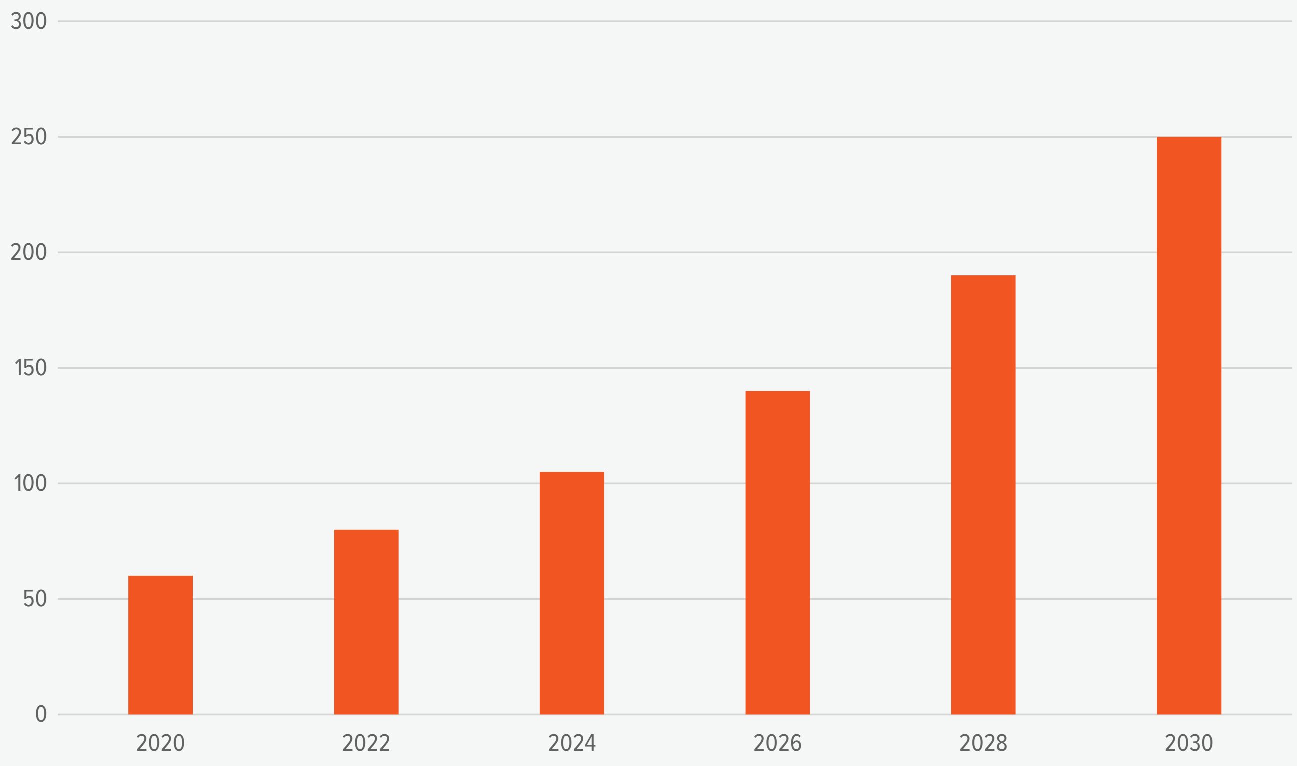
AI is opening a long runway of growth for the automotive industry by shifting value creation from hardware to software, data, and intelligent services. As vehicles gain more sensing capability, stronger compute, and richer connectivity, automakers are positioned to build recurring revenue through features, upgrades, and fleet-level optimisation that extend far beyond the traditional sales cycle. This creates a structural move towards higher-margin, software-led business models that scale across entire portfolios.

Strategic partnerships are deepening across the value chain as OEMs work with chip designers, cloud providers, and simulation platforms to secure capability, training infrastructure, and reliable supply of in-vehicle compute. These alliances are becoming central to competitiveness. Markets such as China, the US, and Europe are emerging as early leaders because they combine regulatory momentum, strong EV penetration, and supportive digital ecosystems[12].

Investment opportunities are broadening as the industry transitions. The most investable layer today sits in the enablers of AI capability. This includes semiconductors, sensors, optical components, vehicle compute, synthetic data platforms, mapping providers, and software stacks that anchor assisted driving and smart cockpit functions. These midstream segments benefit across automakers and regions, regardless of which brand or autonomy pathway dominates over time.

ANNUAL SOFTWARE / CONNECTIVITY REVENUE PER VEHICLE (GLOBAL AVERAGE, USD)

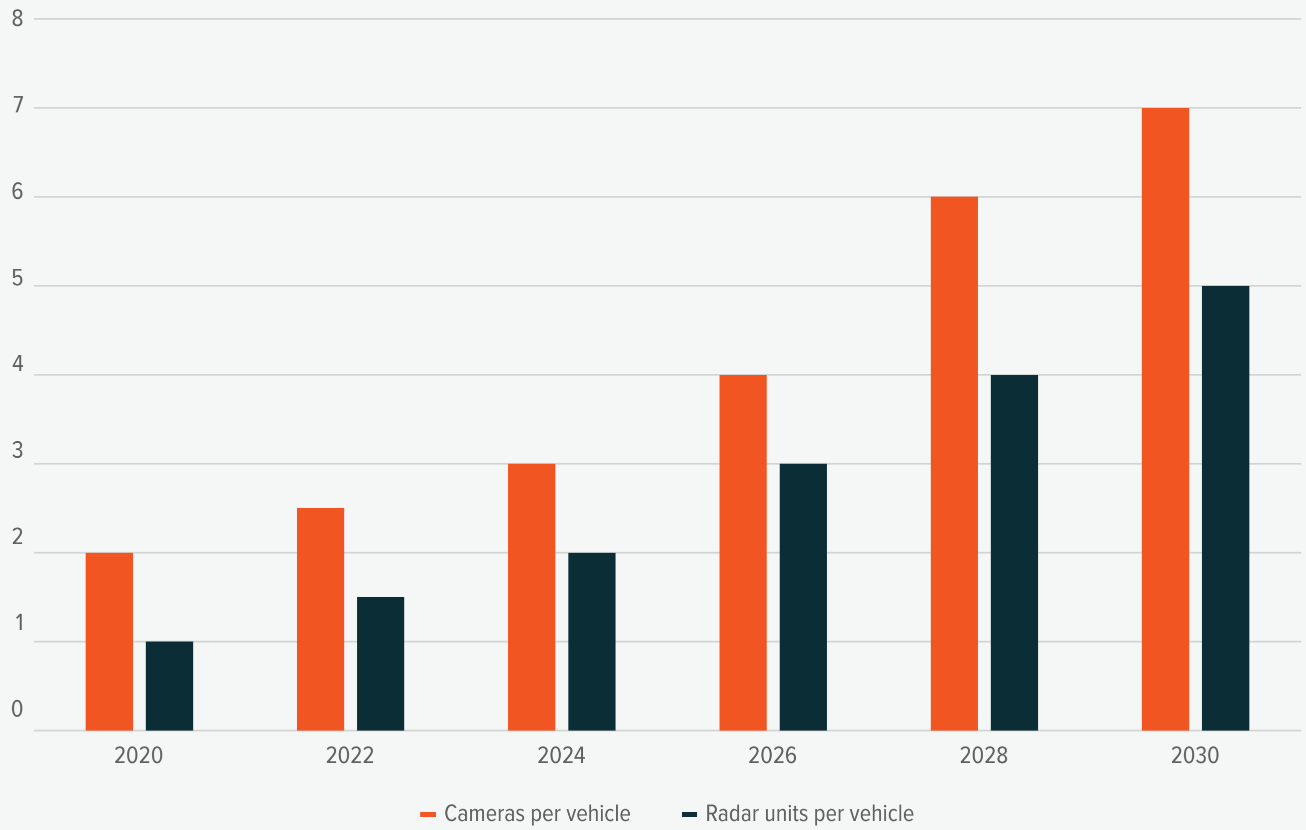
Source: McKinsey & Company.



The longer-term potential extends into fleet logistics, commercial EVs, energy management, and intelligent infrastructure. As regulatory frameworks mature and data infrastructure expands, AI-led functionality will deepen across markets, creating a sustained cycle of technological and economic uplift across the sector.

GLOBAL AVERAGE SENSOR CONTENT PER VEHICLE (2020–2030)

Sources: Mobileye, Valeo, Bosch.



Transformation: The Shift Toward Intelligent and Connected Mobility

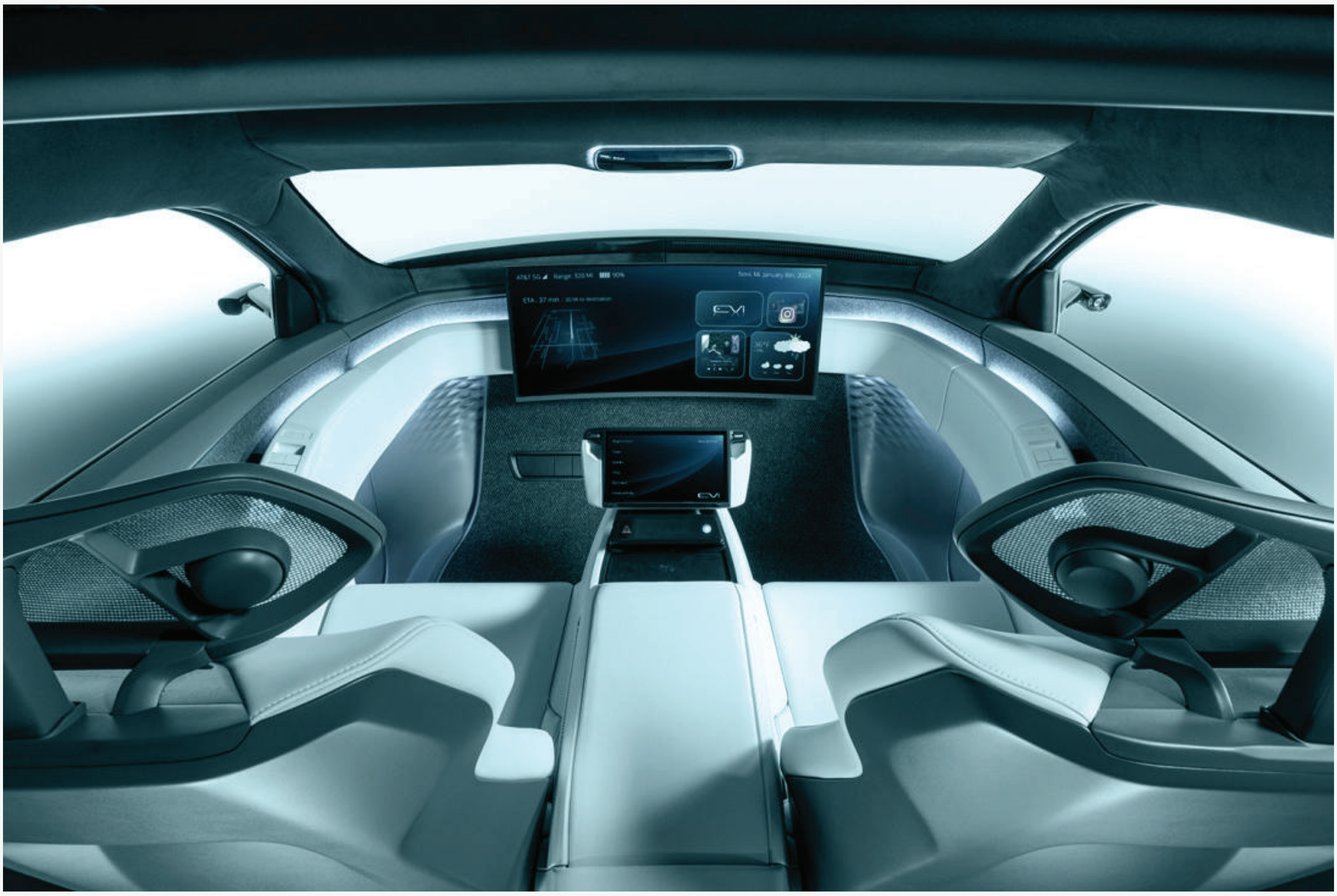
AI is changing the way vehicles create value, with software and data becoming central to product design and market positioning. Automakers are reshaping their platforms around unified computing, richer sensing, and continuous learning, which shifts competitive advantage away from mechanical systems and toward scalable intelligence embedded across model ranges.

The economic effects are becoming clearer as AI improves utilisation across passenger and commercial fleets. Predictive diagnostics, smarter routing, and energy optimisation are reducing downtime and costs, while supporting more efficient logistics networks. These improvements differ by region, but they indicate a long-term shift in how transport assets generate returns[13].

AI-led simulation and data-driven validation are transforming product development. Automakers are reducing reliance on physical prototypes and moving more testing into synthetic environments, which shortens engineering cycles and allows faster refinement of safety, energy use, and cabin intelligence. This is increasing the strategic importance of compute infrastructure and training inside global OEMs[14].

UNIFIED COMPUTE CABIN DESIGN

Source: Yanfeng.



The social impact is beginning to emerge. Assisted-driving functions are improving accessibility for older drivers and enhancing safety in urban environments. Fleet optimisation is supporting more reliable delivery networks, while new roles are forming in data operations and AI support. Labour transition remains uneven, but the broader direction is toward higher digital capability across the sector.

Regulation is reinforcing the transition. Requirements around braking, lane assistance, and monitoring are rising worldwide, which is accelerating adoption of AI-based perception systems. Markets with clearer standards are seeing improvements in collision rates, while others advance as policy and infrastructure align.

Year	Regulatory milestone (global trend)
2020	AEB recommended in many markets
2022	EU General Safety Regulation passed
2024	Mandatory AEB, LKA, ISA in EU Phase I
2026	Next wave of ADAS requirements (global alignment)
2030	Broad standardisation of AI perception + monitoring

Source: EU General Safety Regulation (GSR2).

as of December 2025

AU$15bn+
Across 48 Strategies

50+ employees based in
Sydney, Melbourne, Brisbane and Perth

THEMATIC GROWTH		COMMODITIES		INCOME		CORE	
Disruptive Technology		**Miners**		**Fixed Income**		A300	Australia 300 ETF
ACDC	Battery Tech & Lithium ETF	ATOM	Uranium ETF	BANK	Australian Bank Credit ETF	GARP	S&P World ex Australia GARP ETF
BUGG	Cybersecurity ETF	GMTL	Green Metal Miners ETF	USHY	USD High Yield Bond (Currency Hedged) ETF	GRPA	S&P Australia GARP ETF
DTEC	Defence Tech ETF	WIRE	Copper Miners ETF	USIG	USD High Corporate Bond (Currency Hedged) ETF	OZXX	Australia ex Financials &sources ETF
FTEC	Fintech & Blockchain ETF	**Synthetic**		USTB	US Treasury Bond ETF (Currency Hedged)	RSSL	Russell 2000 ETF
GXAI	Artificial Intelligence ETF	BCOM	Bloomberg Commodity Complex ETF	**Covered Call**		U100	US 100 ETF
ROBO	ROBO Global Robotics & Atomation ETF	**Physical**		AYLD	S&P/ASX 200 Covered Call Complex ETF		
SEMI	Semiconductor ETF	ETPMAG	Physical Silver Structured	QYLD	Nasdaq 100 Covered Call Complex ETF		
TECH	Morningstar Global Technology ETF	ETPMPD	Physical Palladium Structured	UYLD	S&P 500 Covered Call Complex ETF		
Multi-Theme		ETPMPM	Physical Precious Metals Basket Structured	**Dividend**			
DRGN	China Tech ETF	ETPMPT	Physical Platinum Structured	ZYAU	S&P/ASX 200 High Dividend ETF		
FANG	FANG+ ETF	GHLD	Gold Bullion (Currency Hedged) ETF	ZYUS	S&P 500 High Yield Low Volatility ETF		
FHNG	FANG+ (Currency Hedged) ETF	GOLD	Physical Gold Structured				
People & Demographics		GXLD	Gold Bullion ETF				
CURE	S&P Biotech ETF						
Physical Environment & Infrastructure							
AINF	Artificial Intelligence Infrastructure ETF						
HGEN	Hydrogen ETF						
PAVE	US Infrastructure Development ETF						

INTERNATIONAL ACCESS		DIGITAL ASSETS		LEVERAGED & INVERSE	
Regional		EBTC	21Shares Bitcoin ETF	LNAS	Ultra Long Nasdaq 100 Complex ETF
ESTX	EURO STOXX 50® ETF	EETH	21Shares Ethereum ETF	SNAS	Ultra Short Nasdaq 100 Complex ETF
Single Country					
J100	Japan TOPIX 100 ETF				
NDIA	India Nifty 50 ETF				

References

[1] McKinsey & Company, 25 Aug 2025, The rise of edge AI in automotive.
[2] ResearchGate, 18 Sep 2025, AI-Driven Innovation Upgrade in The Automotive Manufacturing Industry: A Comprehensive Empirical Study.
[3] Automotive Industries, April 2025, Sensor Fusion and the Next Generation of Autonomous Driving Systems.
[4] AI Magazine, 9 Oct 2025, BYD is Gaining Ground on Tesla Thanks to its AI Strategy.
[5] Reuters, 25 Jul 2025, How China's new auto giants left GM, VW and Tesla in the dust.
[6] 36kr, 20 Oct 2025, A Handbook to Decipher Autonomous Driving Jargon.
[7] Counterpoint Research, 16 Oct 2025, Global Shifts in ADAS and Autonomous Vehicles to Reshape Competitive SoC Suppliers Landscape by 2035.
[8] Omdia, 28 Nov, 2025, The smartest car: How AI is poised to disrupt every aspect of the automotive industry.
[9] Mobileeye,. 9 Dec 2025, Autonomous-Vehicle Safety Demands True Redundancy™.
[10] McKinsey & Company, 22 Apr 2025, New twists in the electric vehicle (EV) market.
[11] EY, 9 Sep 2025, Europe recalibrates as China races ahead and US stalls in EV transition: EY analysis.
[12] Automotive News, 22 Apr 2024, Exploring strategic automotive partnerships in the software-defined vehicle era.
[13] ResearchGate, 10 Aug 2025, Dynamic AI Systems for Real-Time Fleet Reallocation.
[14] S&P Global, 25 Jul 2025, AI in the automotive industry: Trends, benefits & use cases (2025).
[15] OECD, Jun 2023, Making Automated Vehicles Work for Better Transport Services.

About The Author

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Billy joined Global X in 2024 and is responsible for investment research and ETF analysis in the technology sector. Billy has over a decade of experience in financial services, focusing on equities and technology, previously working as Equity Analyst at Optiver in Sydney, and was the Director of Equity Research for China Internet at Haitong International in Hong Kong. Billy has been a top ranked equity analyst for regional software and internet by Asiamoney. Billy holds a Bachelor of Commerce from the University of Melbourne and is a qualified CPA Australia.

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