2025 TECH TRENDS REPORT • 18TH EDITION

MOBILITY, ROBOTICS, & DRONES

FTSG

Future Today Strategy Group's 2025 Tech Trend Report

Our 2025 edition includes 1000 pages, with hundreds of trends published individually in 15 volumes and as one comprehensive report. Download all sections of Future Today Strategy Group's 2025 Tech Trends report at **www.ftsg.com/trends.**

© 2025 Future Today Strategy Group. All Rights Reserved.

© 2025 Future Today Strategy Group. All Rights Reserved.

© 2025 Future Today Strategy Group. All Rights Reserved.

Nick Bartlett
Manufacturing Lead

Potential new bedrock of global trade needs to accelerate.

The next decade is a pivotal period for transforming how we move people and goods. The convergence of electric vehicles, autonomous systems, robotics, and drones is revolutionary, yet the pace of change threatens to outstrip our preparedness. Uncertain regulatory frameworks, infrastructure gaps, and safety concerns could stall their momentum at this critical juncture. The central question is whether governments, businesses, and society will adapt quickly enough to fully reap these innovations' benefits and mitigate their risks.

Take the transition to electric vehicles (EVs): Record sales signal a major shift, but supply chain disruptions, uneven charging infrastructure, and fluctuating incentives make the path to full electrification murky. Autonomous vehicles are still suspended between technological breakthroughs and the deployment realities of safety incidents and legal ambiguities. In robotics, the boundaries between industrial, collaborative, and humanoid robots are blurring, driven by AI that is making machines smarter and more adaptable than ever. And drones, once a novelty, are fast becoming ubiquitous tools in applications from retail delivery to emergency response.

These trends point to an urgent need for foresight, agility, and decisiveness. Businesses and governments that integrate these technologies will lead, while those that wait risk being left behind. And societies that proactively address the ethical implications of automation will build public trust and ensure the benefits of these technologies are broadly shared.

Heading into the 2030s, mobility, robotics, and drones could become the bedrock of the global economy. The choices we make today—to accelerate innovation, to adapt infrastructure and regulation, to prioritize safety and equity—will define the trajectory of that transformation. Industry leaders, policymakers, and communities need to embrace the future of mobility and actively pave the road ahead—one that leads to a safer, cleaner, and more connected world. The age of intelligent transportation is no longer on the horizon—it is upon us.

© 2025 Future Today Strategy Group. All Rights Reserved.

From smart cars to humanoid helpers: AI, autonomy, and connectivity are transforming how we move, work, and live in an increasingly intelligent world.

1

EVs become mobile power plants

Bidirectional charging turns electric vehicles into grid-supporting energy storage for homes and cities.

2

The software-defined car arrives

Over-the-air updates, AI copilots, and immersive infotainment are redefining the automotive user experience.

3

Soft robots gain finesse and power

AI-driven grippers and flexible actuators enhance robotic dexterity for logistics and health care applications.

4

Biohybrid bots blur boundaries

Scientists are merging biological materials and robotics to create muscle-powered actuators and self-healing systems.

5

Drone delivery goes mainstream

Retailers and logistics firms are scaling up aerial last-mile delivery as they overcome regulatory hurdles and pilot limitations.

© 2025 Future Today Strategy Group. All Rights Reserved.

Electrification, automation, and AI drive unprecedented shifts across the three industries.

Fast-moving technological advancements are reshaping the mobility, robotics, and drone industries. Electrification is transforming transportation globally, with heaps of investments continuing for battery production and charging networks. This shift extends to commercial fleets, maritime transport, and aviation. Closer to home, bidirectional charging is turning electric vehicles into mobile power sources, while innovations for improving EV production and use keep the focus on sustainability.

Vehicles of all kinds are evolving into high-performance computing hubs as automakers integrate AI, edge processing, and real-time connectivity. Software-defined vehicles enable over-the-air updates, autonomous capabilities, and immersive experiences—making them more customizable and the rides more enjoyable. As automakers shift toward these data-driven models, cybersecurity and interoperability will be critical.

Automation is redefining both mobility and work. Autonomous vehicles are moving from testing to deployment, and the robotaxi market is poised for growth. Humanoid robots and cobots are reshaping employment in various sectors.

On a broader scale, the convergence of mobility, robotics, and drones is blurring physical and digital boundaries. Mobility apps are consolidating transportation modes, while vehicle-to-everything (V2X) communication enhances safety. As these technologies advance, regulators will need to balance innovation and sustainability or risk cratering these industries.

© 2025 Future Today Strategy Group. All Rights Reserved.

The market has begun to see a regulatory push toward more autonomy and testing.

JANUARY 2024

Mercedes-Benz Rolls Out Level 3 Autonomous Driving

Sales of Drive Pilot-enabled cars in select US markets mark a step toward deploying higher levels of autonomous vehicles.

OCTOBER 2024

FAA Issues eVTOL Rules

New regs for powered lift operations affect air taxis and ambulances, treating them like helicopters in urban and rural areas.

DECEMBER 2024

Cruise's Robotaxis Suspended

GM stops funding Cruise's operations, cuts the staff in half, and folds the rest of the team into its engineering arm.

DECEMBER 2024

Baidu Wins Hong Kong License

The tech company gets to be the first to test autonomous vehicles in Hong Kong, with its Apollo Go robotaxi.

FEBRUARY 2025

UAE Maps Corridors for Air Taxis and Cargo Drones

The UAE sets a 20-month timeline to integrate advanced air mobility into its infrastructure, with newly defined routes and rules.

« PAST

© 2025 Future Today Strategy Group. All Rights Reserved.

Testing proceeds while new mandates help propel these industries forward.

FUTURE »

FALL 2025

Toyota's Woven City Opens

The $10 billion smart city/"living lab" tests advanced AI, robotics, and autonomous zero-emission transportation.

DECEMBER 2025

EU Mandates EV Charging Network

The Alternative Fuels Infrastructure Regulation requires fast-charging stations every 60 km along major transport routes.

JANUARY 2026

British Autonomy

The UK's Automated Vehicles Act will enable self-driving vehicles to potentially operate on British roads by next year.

AUGUST 2026

EU AI Robot Regulations

The EU will start enforcing stricter rules for AI-enabled robotics under the Artificial Intelligence Act.

2032

Queensland, Australia's Drone Taxis

The state plans to partner with Wisk Aero and Skyports Infrastructure to introduce drone taxis by the 2032 Brisbane Olympics.

© 2025 Future Today Strategy Group. All Rights Reserved.

Imparting autonomy to make vehicles, robots, and drones smarter will yield tangible efficiency gains.

Workforce Augmentation and Upskilling

The adoption of collaborative robots (cobots) and intelligent automation requires strategic upskilling initiatives and policy responses. Organizations that proactively invest in employee training and development will gain a competitive advantage in attracting and retaining top talent.

Sustainable Ecosystems

The shift toward EVs, renewable energy-powered drones, and smart city infrastructure will aid sustainability goals and climate efforts. Companies embracing eco-friendly mobility will benefit from lower operational costs, enhanced brand reputation, and alignment with evolving regulations or ESG targets.

Intelligent Logistics Transformation

The integration of autonomous vehicles, drones, and AI-driven systems will revolutionize supply chain management, enabling real-time optimization, predictive maintenance, and end-to-end visibility. Reduced costs, improved efficiency, and enhanced customer experiences will be felt across industries.

Innovative Revenue Streams

The rise of robotaxi services, drone deliveries, and AI mobility solutions opens new revenue opportunities. Businesses that embrace autonomous transportation can diversify into rapidly growing markets and create innovative services, expanding their customer base and enhancing profitability.

Resilient Infrastructure Networks

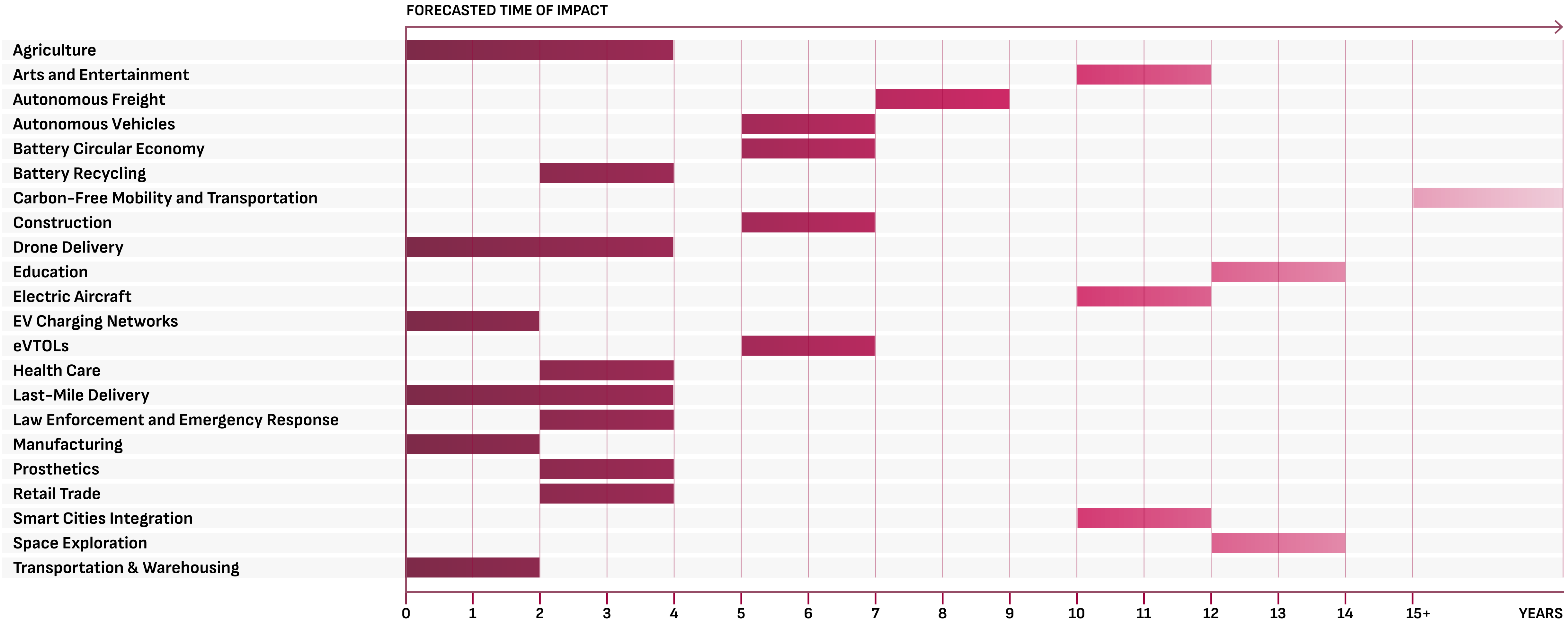
The integration of AI, robotics, and IoT in public and private infrastructure monitoring and maintenance will enhance resilience and safety. Predictive analytics, autonomous inspection drones, and self-healing systems will minimize disruptions, reduce costs, and extend the lifespan of critical assets.

Enhanced Operational Efficiency

With the adoption of AI-driven systems across transportation or combined with the use of drones and robots, businesses will see operational efficiency gains through reduced human error, lower long-term costs, and increased productivity.

© 2025 Future Today Strategy Group. All Rights Reserved.

Many industry operations are already being directly impacted.



FTSG

© 2025 Future Today Strategy Group. All Rights Reserved.

The future of mobility, robotics, and drones hinges on scaling breakthroughs, regulatory agility, and public trust—businesses must shape, not just react to, the shift.

SCALING

Driven by AI and automation advances, technologies are scaling fast in logistics, manufacturing, agriculture, and surveillance. Companies must prioritize pilot programs, expand operational use, and leverage early-mover advantages in drone delivery, autonomous transport, and industrial robotics to secure long-term leadership.

CONSTRAINTS ON ADOPTION

Infrastructure gaps, stringent airspace regulations, and high upfront costs slow adoption and are further complicated by limited charging networks, labor resistance, and cybersecurity concerns. In regulated industries like health care and finance, liability and safety concerns add complexity, delaying widespread deployment.

MEDIA MENTIONS

Expect attention around major regulatory approvals (FAA drone corridors, autonomous vehicle legislation), high-profile commercial launches (Amazon, UPS drone fleets), and military applications. Public discourse will intensify over privacy, surveillance, and job displacement, shaping consumer and investor sentiment.

R&D DEVELOPMENTS

Advancements in AI-powered navigation, lightweight materials, and swarm robotics will reshape industries. Breakthroughs in battery life, 5G/6G connectivity, and autonomous coordination will accelerate commercial viability. Defense investments will spill over into civilian applications, driving innovation but raising ethical concerns.

COSTS

Falling sensor, battery, and AI processing costs will increase accessibility. Scale efficiencies in production will drive down unit costs, though supply chain volatility could create short-term price spikes. Early adopters will gain cost advantages through automation-driven labor savings and efficiency gains.

REGULATIONS

Policy uncertainty remains a key bottleneck. Privacy laws, cybersecurity requirements, and liability frameworks will evolve unpredictably. Governments will balance economic opportunity with national security concerns, creating a fragmented regulatory landscape.

PUBLIC PERCEPTIONS

Public sentiment is polarized—enthusiasm for efficiency gains and safety improvements competes with fears of surveillance, job losses, and AI-driven inequality. Consumer acceptance will depend on transparency, ethical AI use, and demonstrated benefits. Companies must proactively address trust gaps to drive mainstream adoption.

© 2025 Future Today Strategy Group. All Rights Reserved.

These individuals lead the way in transforming mobility, robotics, and drones.

- **Dr. Sai Shivareddy, co-founder and CEO of Nyobolt,** for pioneering high-performance batteries for EVs with ultra-fast charging and longevity.
- **Dr. Siyu Huang, founder and CEO of Factorial Energy,** for innovating solid-state batteries, offering greater energy density and safety for electric vehicles—and shaping the future of EV technology.
- **Dr. Mario El Kazzi, director at PSI,** for advancing scalable, sustainable next-gen battery tech, critical for the future of electric transportation.
- **Dmitri Dolgov, co-founder and co-CEO at Waymo,** for advancing autonomous vehicle tech and expanding robotaxi services.
- **Dr. Kevin Chen, head of MIT's Soft and Micro Robotics Laboratory,** for making significant progress in developing robotic insects for artificial pollination.
- **Dr. Soon-Jo Chung, Caltech's Bren professor of control and dynamical systems,** for developing decision-making control system algorithms that enable autonomous navigation for robots.
- **Dr. Axel Krieger, associate professor of mechanical engineering at Johns Hopkins,** for his team's work enabling imitation learning in medical robotics.
- **Dr. Anand Mishra, research associate at the Cornell University Organic Robotics Lab,** for innovative use of fungal mycelia to enable "sense" in a biohybrid robot.
- **Dr. Won Dong Shin, postdoctoral researcher at the Swiss Federal Institute of Technology in Lausanne,** for work developing a fast ground-to-air transition from an avian-inspired aerial robot.
- **Vadym Melnyk, founder and CEO of DroneHub,** for developing autonomous drone operation solutions enabling industrial automation.
- **Abe Bachrach, CTO at Skydio,** for advancing autonomous drone technology, with a focus on complex navigation and object avoidance in challenging environments.
- **Rema Matevosyan, CEO and co-founder of Near Space Labs,** for helping municipalities identify challenges with high-altitude, high-resolution imagery collected by autonomous balloon drones.

© 2025 Future Today Strategy Group. All Rights Reserved.

Autonomous tech will reshape the effectiveness of mobility and robotics...

OPPORTUNITIES

Software-Defined Vehicles Unlock Recurring Revenue

Automakers shifting to software-defined vehicles will create new revenue streams via subscriptions, over-the-air updates, and custom vehicle configurations.

Autonomous Freight Reshapes Supply Chains

Self-driving electric trucks and AI-managed logistics hubs will improve shipping efficiency, cut costs, and reduce the carbon footprint of global supply chains.

Soft Robotics Unlocks New Industries

Robots made with soft grippers and flexible actuators are more efficient and less damage-prone as they can handle delicate tasks in food processing, medical procedures, and advanced manufacturing.

Drone Swarms Quicken Logistics and Emergency Response

AI-coordinated drone swarms will optimize package deliveries, monitor environmental changes, and enhance disaster relief efforts by providing real-time aerial data and autonomous resource deployment.

...but supply chain disruptions and policy uncertainty may delay that future.

THREATS

Trade Tensions Disrupt Battery Supply Chains

Geopolitical conflicts and trade restrictions could limit access to critical minerals like lithium and cobalt, driving up battery costs and slowing EV production.

Regulatory and Policy Uncertainty

Evolving regulations on autonomous vehicles and drones pose a threat to market stability, potentially delaying or halting widespread adoption and technological deployment.

Public Safety and Liability Issues

The deployment of autonomous vehicles and drones, especially for deliveries, raises liability questions. Inadequate legal frameworks could cause delays and create uncertainty for manufacturers and insurers.

Manufacturing and Warehousing Could Shed Human Workforce

The rapid deployment of AI-powered robots in warehouses, manufacturing, and logistics could lead to mass layoffs, increasing economic inequality and requiring workforce reskilling.

© 2025 Future Today Strategy Group. All Rights Reserved.

Your organization can play a defining role in establishing the market's strategy.

Scale AI-powered predictive maintenance across vehicle fleets, aircraft, and industrial robots to reduce downtime, optimize repairs, and extend asset lifespans. Predictive analytics will become a core function in fleet management and urban infrastructure.

Build smart hubs to produce the next generation of manufacturing infrastructure. Investing in automated, AI-powered manufacturing ecosystems that produce next-gen batteries, EVs, and robotics will advantageously place organizations at the foundational level of manufacturing for years to come.

Shape policies for AI and robotics in labor. Companies must create policies and engage regulators to develop frameworks that balance automation-driven productivity gains with workforce protections, to ensure sustainable job creation amid rising robotic integration.

Proactively prepare for mass-scale EV and AV servicing as the shift to electrification and autonomy requires a new generation of service technicians trained in high-voltage battery systems, sensor calibration, and software diagnostics.

Build unmanned traffic management systems. As drones become more common in logistics, security, and infrastructure monitoring, these networks can prevent congestion, enhance airspace safety, and streamline drone integration for commercial and public services.

Explore developing public-private partnerships for smart cities. Cities must collaborate with businesses to deploy AI-powered transportation networks, urban drone logistics, and intelligent mobility systems. These partnerships will drive infrastructure modernization at scale.

Technology Deployment
Capital Expenditure
Talent Development
Regulatory Influence

© 2025 Future Today Strategy Group. All Rights Reserved.

Important terms to know before reading.

MOBILITY

ADAS (ADVANCED DRIVER ASSISTANCE SYSTEMS)

Technologies that assist drivers by performing functions such as adaptive cruise control, automated lane-keeping, pedestrian detection, emergency braking, and traffic sign recognition. Increasingly integrated with AI for predictive safety.

AMD (ASSISTIVE MOBILITY DEVICE)

A mobility aid such as a wheelchair, scooter, walker, or exoskeleton. Advances in AI and robotics are making AMDs increasingly autonomous.

BIDIRECTIONAL CHARGING

A system that enables an electric vehicle (EV) to transfer electricity back to the grid (V2G), power a home (V2H), or charge other EVs (V2V). Key for grid stabilization in an energy transition era.

EV CHARGING PORT

The connector that supplies power to an electric vehicle when plugged in. The North American Charging Standard (NACS) is becoming the dominant connector in the US, with major automakers adopting it.

ICE (INTERNAL COMBUSTION ENGINE)

An engine powered by fuel combustion, most commonly gasoline or diesel. As bans on ICE vehicles increase globally, hybrid and EV adoption is accelerating.

V2G (VEHICLE-TO-GRID)

Allows EVs to store and return energy to the grid, supporting grid resilience and renewable energy integration.

V2H (VEHICLE-TO-HOME)

A form of bidirectional charging that allows EVs to supply power to a home during outages or peak demand periods.

V2I (VEHICLE-TO-INFRASTRUCTURE COMMUNICATION)

Enables vehicles to communicate with smart city infrastructure, including traffic lights, RFID readers, cameras, and road sensors, for improved traffic flow and safety.

V2V (VEHICLE-TO-VEHICLE COMMUNICATION)

Allows vehicles to share real-time data on speed, location, and road conditions, enabling safer and more efficient driving, especially for autonomous fleets.

LEVELS OF AUTOMATION

The SAE International (formerly Society of Automotive Engineers) clearly defines six levels of driving automation:

Level 0
No Automation

A human driver manually performs all driving tasks.

Level 1
Driver Assistance

The driver remains in control, but the vehicle can provide assistance, such as adaptive cruise control.

Level 2
Partial Automation

The vehicle has combined automated functions like steering and acceleration but requires the driver to monitor the environment constantly.

Level 3
Conditional Automation

The vehicle can handle driving under certain conditions without driver supervision. However, the driver must be prepared to take control when needed.

© 2025 Future Today Strategy Group. All Rights Reserved.

Level 4
High Automation

The vehicle can perform all driving functions within predefined areas (geofenced). No driver intervention is required within these areas.

Level 5
Full Automation

The vehicle can operate independently in all conditions, eliminating the need for a driver. Fully autonomous ride-hailing fleets are emerging.

LEVELS OF EV CHARGING

Level 1
Slow Charging

Uses a standard 120V outlet, taking 60+ hours for a full charge. Typically used as an emergency or overnight charging option.

Level 2
Home and Public Charging

The most common charging method, using a 240V outlet. A full charge typically takes 6–12 hours.

Level 3
DC Fast Charging and Ultra-Fast Charging

Includes DC Fast Charging and Supercharging. Tesla, Electrify America, and other networks offer 250 kW+ chargers capable of charging an EV to 80% in under 20 minutes.

Megawatt Charging Standard or MCS

Emerging ultra-high-power charging technology designed for electric trucks and aircraft, delivering up to 3.75 MW of power for rapid recharging.

ROBOTICS

COBOT (COLLABORATIVE ROBOT)

A robot designed to work alongside human workers, assisting with tasks that require precision, repetition, or physical strength. AI-driven cobots are increasingly capable of learning from human interactions.

EXOSKELETON

A robotic assistive suit worn to enhance mobility, strength, or endurance. Used in industrial, medical, and military applications.

HUMANOID ROBOT

A robot designed with a human-like appearance and movement. AI-powered humanoids are increasingly used for customer service, elderly care, and general-purpose tasks.

MICROROBOTICS

The development of robots smaller than 1 mm, used in medical procedures, environmental monitoring, and surveillance.

NANOBOT

Robots at the nanoscale (billionths of a meter), primarily used in medicine for drug delivery and disease treatment.

NECROBOTICS

A field of robotics that repurposes biological materials (such as insect or animal cadavers) for robotic applications.

QUADRUPEDAL ROBOT

A four-legged robot designed for mobility in rough terrains. Used in search-and-rescue, military, and industrial applications.

SOFT ROBOTICS

A branch of robotics using flexible, deformable materials to create robots that mimic natural movement and adaptability. Used in medical applications and delicate manufacturing.

© 2025 Future Today Strategy Group. All Rights Reserved.

DRONES & UNMANNED SYSTEMS

AGV (AUTOMATED GUIDED VEHICLE)

A mobile robot that follows predefined paths or tracks, commonly used in warehouses and industrial settings.

AUV (AUTONOMOUS UNDERWATER VEHICLE)

A robotic submarine capable of performing underwater tasks without human control. Used for ocean research, infrastructure inspections, and defense.

BVLOS (BEYOND VISUAL LINE OF SIGHT)

Drone operations conducted beyond the direct visual range of the pilot. BVLOS regulations are evolving to allow for expanded commercial drone deliveries and autonomous operations.

DRONE (UNMANNED AERIAL VEHICLE OR UAV)

An uncrewed vehicle that can operate autonomously or remotely:

- **Fixed-Wing Drone:** Resembles an airplane; ideal for long-range missions.
- **Fixed-Wing Hybrid VTOL:** A combination of a fixed-wing aircraft with vertical takeoff and landing capabilities.
- **Single-Rotor Drone:** Resembles a helicopter, offers high endurance and heavy-lift capacity.
- **Multi-Rotor Drone:** The most common consumer drone type, typically a quadcopter.
- **Drone Swarm:** A networked fleet of drones operating in coordination. Used in surveillance, agriculture, and military applications.

EVTOL (ELECTRIC VERTICAL TAKE-OFF AND LANDING)

Electric-powered aircraft capable of vertical takeoff and landing. Increasingly used in urban air mobility (UAM) services, air taxis, and emergency response.

FEDERAL AVIATION ADMINISTRATION (FAA)

The FAA has expanded BVLOS permissions, UAM air corridors, and drone delivery regulations. Remote ID is now mandatory for all commercial UAVs unless operating in FAA-Recognized Identification Areas (FRIAs).

UAM (URBAN AIR MOBILITY)

Aerial transportation of passengers or cargo in urban environments, using eVTOL aircraft and autonomous drones. Major cities are testing vertiports to support commercial UAM services.

© 2025 Future Today Strategy Group. All Rights Reserved.

MOBILITY TRENDS

© 2025 Future Today Strategy Group. All Rights Reserved.

ELECTRIFICATION TRANSFORMS MOBILITY ECOSYSTEMS

© 2025 Future Today Strategy Group. All Rights Reserved.

ELECTRIFICATION TRANSFORMS MOBILITY ECOSYSTEMS

Decarbonizing Mobility

The push to decarbonize transportation is accelerating, with global policies, infrastructure investments, and technology advancements reshaping mobility. In the US, where transportation remains the largest source of greenhouse gas emissions, states like California are allocating more than $50 billion for climate-focused initiatives, including stricter freight pollution regulations and expanded zero emission vehicle (ZEV) deployment. Meanwhile, federal incentives have saved US consumers more than $2 billion in EV purchases, which may have contributed to the 10% increase in EV sales in Q4 2024. The Environmental Protection Agency's new emissions standards could further compel automakers to shift toward EVs, despite legal challenges from petroleum and biofuel industries.

Globally, the European Union is investing €422 million to enhance charging and hydrogen refueling infrastructure, and support its goal of cutting transport emissions 90% by 2050. New EU regulations require fast-charging stations every 60 kilometers on major highways by the end of 2025 to improve EV travel feasibility. Additionally, high-speed rail expansion is reducing reliance on short-haul flights, prioritizing new cross-border connections. In aviation and maritime environments, e-fuels, hydrogen, and electrification are emerging as decarbonization solutions, while Honda and Toyota are developing carbon-tracking systems to incentivize low-emission manufacturing. The next decade will be defined by how quickly automakers, energy providers, and policymakers adapt to this accelerating transition.

Automaker Restructuring

Global automakers are undergoing significant restructuring as they navigate the shift to electric vehicles (EVs), supply chain challenges, and changing market dynamics. In 2024 and early 2025, legacy automakers including Nissan, Volkswagen, General Motors, and Stellantis, announced major workforce reductions, factory closures, and strategic realignments. Nissan laid off 9,000 employees, while Volkswagen considered closing German factories for the first time. GM took a $5 billion write-down on its China business, reflecting increasing competition from China's BYD and a reassessment of GM's market position. Stellantis, facing declining US market share, replaced its CEO and reintroduced internal combustion engine models, signaling a strategic recalibration.

Automakers are also restructuring through partnerships. Volkswagen invested in Rivian to share EV technology, while Nissan deepened collaboration with Renault and licensed Mitsubishi's hybrid system. Ford decided to double down on hybrids, and saw payoffs with sales rising 27% in 2024. Meanwhile, emerging players like BYD continue to expand globally, challenging Western automakers with their lower-cost EVs. Trade tensions and potential tariffs add another layer of complexity that's influencing production and investment decisions. The evolving regulatory landscape, fluctuating consumer demand, and rapid advancements in automation and AI-driven manufacturing further underscore the industry's transformation.

Mass Market Goes Custom

Supply chain constraints are pushing mass-market manufacturers toward a build-to-order model. Initially triggered by the semiconductor shortage during the COVID-19 pandemic, this shift has continued due to ongoing geopolitical tensions, EV production transitions, and changing consumer expectations. Automakers like Ford and Acura are embracing direct-to-consumer sales that reduce the need for massive dealership inventories. Ford, for instance, is incentivizing preorders with discounts on models like the Mustang Mach-E. Meanwhile, software-defined vehicles are accelerating the trend by allowing for customizable features via over-the-air updates long after a car leaves the lot.

Digital retailing tools are also redefining how customers interact with vehicles. Virtual showrooms and augmented real-

© 2025 Future Today Strategy Group. All Rights Reserved.

ELECTRIFICATION TRANSFORMS MOBILITY ECOSYSTEMS

ity-based configurators enable buyers to personalize their cars without stepping into a dealership, further supporting the build-to-order model. Additionally, the rise of hybrid vehicles—which are expected to see substantive growth year-over-year in 2025—is expanding customization options. Advanced driver assistance systems (ADAS), transitioning to Level 2.5 and Level 3 autonomy, also contribute to this shift by allowing consumers to select automation and safety features tailored to their preferences. This industry-wide move to customization, once exclusive to luxury brands like Rolls-Royce and Bentley, is now becoming the standard for mainstream automakers, and it's reshaping dealerships, service networks, and profit structures.

Incentive-Driven Investments

The strategic deployment of financial incentives by automakers, governments, and policymakers is influencing the adoption and production of EVs. As of 2024, global EV investments are projected to eclipse $800 billion by 2030, with the US accounting for about a quarter of those investments.

Manufacturers are leveraging government subsidies, tax credits, and pricing strategies to stimulate demand amid fluctuating consumer interest. Ford, for instance, offered lease incentives of up to $10,500 for its F-150 Lightning EV to boost sales, while also offering an additional $1,500 rebate targeting Tesla owners. Governments are also working to lure manufacturers: Georgia, for example, has provided Rivian with $1.5 billion in tax incentives to establish a $5 billion factory that's projected to create 7,500 jobs. The US Inflation Reduction Act has fueled the rise of this country's so-called Battery Belt, a corridor spanning Michigan to Alabama, where manufacturers are capitalizing on tax breaks and lower energy costs. However, evolving political winds may challenge existing incentive structures. The Trump administration has signaled intentions to revise or eliminate the $7,500 federal EV tax credit, potentially reshaping the competitive landscape.

Global trends further illustrate the evolving nature of incentive-driven investments. Mexico has emerged as an EV production hub due to US policy incentives, while Italy is shifting its subsidies toward industrial EV development rather than direct consumer incentives. As automakers balance aggressive electrification goals with economic pressures, these investment strategies will continue to dictate the trajectory of the EV market.

Global Battery Belts

The race to establish dominant EV battery production hubs is heating up, with the US Battery Belt—spanning from the Midwest to the Southeast—emerging as a major competitor to Asia's long-standing dominance. Investments in US battery manufacturing neared $200 billion over the past decade, led by automakers like Hyundai, Toyota, and Stellantis, alongside battery suppliers such as LG Energy Solution and Novonix. These investments are fueled by lower electricity costs, workforce availability, and incentives from the Inflation Reduction Act, which has attracted hundreds of billions of dollars in private capital for clean energy manufacturing. While China still refines more than 90% of the world's manganese and holds the majority share of lithium, cobalt, graphite, and nickel processing, new US lithium reserves, such as the massive find on the Nevada-Oregon border, could help shift the balance over time. Meanwhile, Europe is attempting to extract Chinese battery expertise through industrial policies that require knowledge transfer in exchange for access to EU subsidies. With production hubs expanding in Canada and Mexico, the global EV battery supply chain is undergoing a seismic shift that will determine future market leaders.

Battery Recycling

The rapid adoption of EVs has intensified demand for critical minerals like lithium, cobalt, and nickel. At the same time, the projected surge of battery waste has turned a closed-loop recycling ecosystem into an environmental and economic imperative. By 2040, up to 40% of new EV battery materials could be sourced from recycled inputs, reducing reliance on mining

© 2025 Future Today Strategy Group. All Rights Reserved.

ELECTRIFICATION TRANSFORMS MOBILITY ECOSYSTEMS

and supply chain vulnerabilities, according to the World Economic Forum. The market for EV battery recycling is projected to grow from under $10 billion as of 2024 to nearing $100 billion into the mid-2030s. Investments are accelerating—startups and major players such as Redwood Materials, Ascend Elements, and Li-Cycle are scaling operations, leveraging innovative recycling technologies like direct recycling, bioleaching, and deep eutectic solvents. Regulatory momentum is also driving change, with the EU setting recycling efficiency targets of 75% for nickel-cadmium, 65% for lead-acid, and 50% for other chemistries, while California mandates battery labeling for transparency. Meanwhile, advances in solid-state battery recycling, such as polymer-layer separation, indicate that even next-generation battery chemistries can be sustainably repurposed. As governments and industries align, battery recycling is becoming a cornerstone of the EV revolution, positioning clean mobility as truly sustainable.

Better Batteries

Battery technology is rapidly evolving as manufacturers race to develop smaller, safer, and more efficient energy storage solutions for EVs. Solid-state batteries (SSBs) are at the forefront, with companies like QuantumScape and Factorial Energy making strides in commercialization. QuantumScape's QSE-5 battery, set for production in 2025, boasts an energy density of 844 Wh/L and can charge from 10%–80% in just 12.2 minutes. Toyota plans to integrate SSBs by the end of the decade, promising a 50% reduction in size, cost, and weight. Meanwhile, GM is leading the $60 million Series B financing round of Mitra Chem to develop iron-based cathodes, which could lower battery costs and reduce reliance on scarce minerals.

Alternative chemistries are also gaining traction. CATL's second-generation sodium-ion battery, expected to hit mass production by 2027, offers 200 Wh/kg energy density and improved cold-weather performance, reducing the need for lithium, cobalt, and nickel. Nyobolt's high-silicon anode battery recently demonstrated a 10%-80% charge in just four minutes and 37 seconds, signaling major advancements in ultra-fast charging. Additionally, researchers at Pacific Northwest National Laboratory are exploring sugar-based flow batteries for long-duration energy storage, which could reshape EV charging infrastructure.

These developments signal a transformative decade for EV batteries. While SSBs promise higher energy density and safety, sodium-ion and high-silicon technologies offer cost-effective and scalable alternatives. Automakers and battery firms must now overcome production challenges to bring these next-generation solutions to market.

Solar Vehicles

Solar-powered vehicles are emerging as a viable solution for reducing grid dependency and enhancing EV efficiency. In 2024, solar EVs demonstrated the ability to travel 5-15 miles per day solely on solar energy, reducing the need for frequent charging. This shift supports lower electricity consumption while making EV adoption more sustainable. Companies like Aptera Motors and Lightyear continue to refine solar EV designs, with Aptera's ultra-aerodynamic model offering up to 400 miles per charge, supplemented by solar panels.

Bifacial solar panels, which generate up to 30% more energy, are increasingly being incorporated into solar carports and public EV charging stations, accelerating solar infrastructure development. Despite challenges—such as Lightyear's financial struggles—continued investment in solar mobility suggests a long-term move toward self-sustaining transportation.

Shifts in the Servicing Model

The traditional vehicle servicing model is undergoing a major shift as mobile repair units, over-the-air updates, and AI-driven maintenance redefine the industry. Automakers and startups are investing heavily in mobile and remote servicing, and the reliance on dealerships is waning. Ford has

© 2025 Future Today Strategy Group. All Rights Reserved.

ELECTRIFICATION TRANSFORMS MOBILITY ECOSYSTEMS

been continuing to expand its mobile service fleet of nearly 1,000 Ford Escape SUVs offering software updates, light repairs, and recall resolutions on the go. Startups like Spiffy are scaling mobile servicing by partnering with dealerships and offering franchise opportunities, backed by a $30 million investment.

At the same time, AI-powered systems are enabling predictive maintenance and automated servicing. Ford's newly filed patent outlines a system for self-driving vehicles to autonomously navigate maintenance facilities, self-schedule repairs, and undergo automated checkups. Connected vehicle technology is also driving this shift, allowing mechanics to diagnose issues remotely and optimize repair logistics. Additionally, the Federal Trade Commission's lawsuit against John Deere for restricting independent repairs highlights the broader push for right-to-repair legislation, which could further disrupt traditional service networks. As automakers compete to offer more customer-centric and flexible servicing models, dealerships must adapt or risk obsolescence in an increasingly mobile-first landscape.

Electrification Expands Beyond Passenger Cars

Electrification is transforming transportation far beyond personal vehicles. Amazon and the USPS are leading fleet electrification, with Amazon planning to deploy 100,000 electric delivery vehicles by 2030 and the USPS acquiring 66,000 by 2028. In aviation, ZeroAvia's HyFlyer II project successfully tested a hydrogen-electric aircraft, and Heart Aerospace plans to test the 30-seat ES-30 electric plane in 2025. Meanwhile, China launched its first battery-electric container ship, the 700 TEU, showcasing the potential of electrification in maritime transport.

The trend extends to micromobility and recreational travel. Segway debuted its first e-bikes at CES 2025, featuring adaptive pedal assist and a range of up to 112 miles. Electric RVs, such as RollAway's rentable EV camper and the Pebble Flow trailer, are redefining off-grid travel with solar-powered, emissions-free mobility. Even the Vatican is embracing the shift—Pope Francis received an all-electric Mercedes-Benz Popemobile in December.

As infrastructure and battery technology improve, expect further electrification in rail, commercial trucking, and air travel. Tesla's launch of its all-electric Giga Train in Germany and Amazon's investment in electric freight trucks highlight the broader industry shift. The next phase will depend on cost reductions, expanded charging networks, and policy support to sustain adoption across all vehicle categories.

© 2025 Future Today Strategy Group. All Rights Reserved.

VEHICLE CHARGING SCALES

© 2025 Future Today Strategy Group. All Rights Reserved.

VEHICLE CHARGING SCALES

Charging Gets a Roadmap

The EV ecosystem is rapidly evolving, with global investments, regulatory mandates, and private sector innovation expanding the charging infrastructure. Though the US had allocated $5 billion through the National Electric Vehicle Infrastructure Formula Program, plus an additional $2.5 billion for community chargers, the Trump administration recently suspended the program. Across the pond, the EU is mandating fast charging stations every 60 kilometers along highways by 2026. Automakers are standardizing on Tesla's North American Charging Standard (NACS) connector, and brands like Walmart, Marriott, and IKEA are installing thousands of new chargers across their properties. Despite these efforts, range anxiety persists, exacerbated by inconsistent access, slow charging speeds, and regional disparities in station availability.

Private sector innovation is addressing these gaps. Tesla's V4 chargers promise 40% faster speeds, while ultra-fast chargers reaching 350 kW can now deliver 80% charge in 20 minutes. Automakers like Honda and Toyota are developing patents for wireless charging, smart scheduling, and bidirectional energy management. Honda's wireless charging patent envisions on-the-go power transfer, while Toyota's scheduling system prioritizes vehicles based on urgency. Meanwhile, the sharing economy is entering the charging space, with private station owners making chargers available to the public.

The industry is at an inflection point: Without rapid infrastructure expansion and efficiency improvements, consumer confidence could falter. However, with standardization, ultra-fast charging, and new business models, EV charging is set to become more accessible, accelerating adoption worldwide.

Charging Standardization

The global push for EV charging standardization has reached a critical turning point. In North America, the transition to the NACS is well underway, with nearly all major automakers—including Ford, GM, Honda, Nissan, Mercedes-Benz, and Volvo—either integrating NACS ports into their vehicles or providing adapters. SAE formally adopted Tesla's J3400 connector as the region's standard in 2024, reinforcing a move toward universal compatibility. Tesla's Supercharger network, which accounts for approximately one-third of all US fast chargers, is now accessible to non-Tesla EVs, signaling a major shift toward infrastructure unification.

As interoperability expands, competitive dynamics at charging stations are evolving. Companies are exploring new revenue models, including real-time pricing tied to solar energy availability and value-added services such as entertainment and retail integrations at charging sites. Rivian, for example, has opened its Adventure Network to other EVs, while GM and Honda-backed IONNA plans to deploy 30,000 chargers by 2030. At the same time, Europe's Alternative Fuels Infrastructure Regulation is pushing for cross-border interoperability, particularly for heavy-duty vehicles, with a mandate for 350 kW chargers at major transport hubs by the end of this year.

The rapid pace of standardization is reshaping the EV landscape, but challenges remain. Tesla's layoffs within its Supercharger team raise concerns about infrastructure expansion. Meanwhile, the development of Megawatt Charging Systems for heavy-duty EVs is still in pilot stages, awaiting further harmonization efforts between North America and Europe. Nevertheless, these advancements position 2025 as a pivotal year in achieving global EV charging compatibility.

Redefining the Roadside

The rise of EVs is leading to a fundamental shift in roadside infrastructure that will transform charging stops into retail, entertainment, and energy hubs. Unlike traditional gas stations, where refueling takes minutes, EV charge times present an opportunity for businesses to capture consumer attention. Major retailers like Walmart, Macy's, and IKEA are integrating

© 2025 Future Today Strategy Group. All Rights Reserved.

VEHICLE CHARGING SCALES

charging stations to turn wait times into shopping experiences. Tesla's upcoming Los Angeles drive-in diner merges EV charging with entertainment, featuring film clips on large screens while you eat. Autonomous retail, such as Juxta's self-contained convenience stores, is emerging at charging hubs, creating new commercial opportunities.

Beyond retail, innovations in charging technology are reshaping the experience. Startups like Ample are deploying battery-swapping stations that replace depleted batteries in minutes, reducing downtime. Mobile solutions, such as SparkCharge's on-demand charging and AAA's mobile EV rescue units, are addressing infrastructure gaps. Autonomous charging robots like Parky and EV Safe Charge's robotic systems are being tested to expand access where permanent infrastructure is lacking. Additionally, electrified roads, piloted in Sweden and planned for Detroit, could enable EVs to charge while driving, potentially reducing the need for large battery packs.

Sustainability and grid integration are also key trends. Solar-powered charging stations, particularly in rural areas, are extending access to off-grid locations. Meanwhile, bidirectional charging (V2G) allows EVs to act as mobile energy sources by contributing power back to the grid. These trends point toward increasingly interconnected and dynamic roadsides where charging is seamlessly integrated into everyday activities.

Electrifying Cities

Cities worldwide are accelerating their electrification strategies as climate resilience and EV adoption become urgent priorities, pushing urban centers to rapidly expand their charging infrastructure. Decentralized energy systems, like Vermont's Green Mountain Power initiative, are gaining traction by enhancing grid stability through home battery storage. Microgrids, such as North Carolina's Heron's Nest, showcase how communities can generate and manage their own power independently, increasing sustainability and resilience.

To meet rising EV demand, urban planners are integrating charging infrastructure into public spaces, businesses, and residential developments. Per the Department of Energy, US public EV charging ports grew by 4.8% in Q1 2024, with the Northeast leading at 6.9%. The state of New York committed $60 million in early 2025 to build 267 new fast-charging stalls, including a 60-stall hub in Maspeth, Queens—the largest in the Northeast. Tokyo mandated EV charger installations in new apartment buildings by 2025, aiming for 60,000 chargers by 2030. Meanwhile, Copenhagen's long-standing plan to provide public charging within 250 meters of all multistory buildings by 2025 underscores a growing trend in accessibility-driven policy.

Governments are also exploring innovations like wireless roadway charging, as seen in France's partnership with Electreon, while the US had previously announced $25 billion to boost community charging under the Biden administration. Meanwhile, China is incentivizing off-peak charging, targeting 60% of EV energy consumption outside peak hours by late 2025. The shift to electrified urban infrastructure signals a long-term transformation, where cities not only support EV adoption but also drive grid decentralization and sustainable energy solutions.

EVs at Home

The DoE has estimated that by the end of this year, nearly 90% of EV charging will take place at home. This makes residential infrastructure a critical factor in widespread EV adoption. This shift is driven by several forces: regulatory mandates, evolving real estate trends, and technological advancements in home charging systems. States like Illinois and California have enacted policies requiring new homes to be EV-ready, while Germany's home-charging grant program was fully subscribed in hours. Real estate developers are incorporating EV chargers as a standard feature, recognizing their value to prospective buyers. At the same time, utilities are offering special overnight charging rates, making

© 2025 Future Today Strategy Group. All Rights Reserved.

VEHICLE CHARGING SCALES

home charging more cost-effective than public stations.

However, this rapid adoption is exposing challenges. A study published by the American Council for an Energy-Efficient Economy found a significant number of US homes may lack the electrical capacity to safely support EV charging, increasing the risk of brownouts, surges, and even fires. Ford's patent filings aim to address these risks with bidirectional charging and modular upgradeable systems, so homeowners can efficiently charge their vehicles and even return energy to the grid. Meanwhile, innovations such as ultra-fast home chargers capable of 350 kW speeds and managed charging programs from utilities are helping to reduce strain on local power grids. These developments suggest that the home-charging ecosystem is evolving quickly, but infrastructure challenges could prompt regulatory intervention and community-based solutions such as shared solar arrays and neighborhood charging stations.

Bidirectional Charging

Bidirectional charging is shifting EVs from mere transportation tools to dynamic energy assets. As adoption accelerates, automakers, municipalities, and utilities are integrating EVs into the energy ecosystem, using them for vehicle-to-home (V2H), vehicle-to-grid (V2G), and vehicle-to-load (V2L) applications. General Motors has made V2H a standard feature in multiple 2024 models, while Volkswagen has enabled all ID models with 77-kWh batteries to supply power back to homes. Meanwhile, California is advancing legislation that could mandate bidirectional charging for new EVs.

The global energy landscape underscores the urgency of this transition. Climate-related grid disruptions, geopolitical energy crises, and aging infrastructure are pushing governments to explore decentralized power solutions. The DoE recognizes bidirectional charging as essential for grid resilience, and cities like Utrecht in the Netherlands are investing heavily in V2G networks. Additionally, Honda's patent for a renewable energy credit system could allow EV owners to monetize excess power, potentially lowering the cost of EV ownership. With many new EVs sold becoming equipped with bidirectional capabilities, the technology will evolve from a niche feature to a widespread energy solution.

© 2025 Future Today Strategy Group. All Rights Reserved.

SCENARIO YEAR 2041

LIVING BATTERIES

The revolution wasn't just electric—it was a genesis. BioEV technology has transformed vehicles into semi-organic entities through photosynthetic panels and carbon-capture fabrics. Your car breathes. The watershed moment came in 2036 when Stanford researchers merged synthetic biology with battery chemistry, creating the first living battery cells that self-heal, self-regulate, and grow stronger with use. Now, vehicles incorporate living components that adapt to driving patterns.

Cities have evolved in response. "Feeding stations" have replaced charging points—places where vehicles absorb nutrient solutions alongside electricity. The urban landscape is dotted with vertical algae farms that sequester carbon while producing BioEV feed. Streets themselves contain microbial colonies that interact with vehicles, absorbing pollution and providing real-time environmental data.

The most striking feature of modern transportation is color-shifting exteriors—vehicles literally blush when energy reserves are low, their surfaces transitioning from vibrant green to amber, signaling neighboring vehicles to share power through proximity fields. Rural communities have become energy exporters, with agricultural waste converted to vehicle fuel through regional fermentation cooperatives. Farmers no longer simply grow crops; they cultivate transportation energy.

This has transformed our psychological relationship with vehicles. Owners report emotional attachments to their "growing" vehicles, which develop distinct behaviors based on use patterns. Vehicle "health coaches" help maintain optimal biological battery systems, a profession that didn't exist a decade ago. As 2042 approaches, researchers are exploring neural interfaces between drivers and their living vehicles. Preliminary studies suggest vehicles can anticipate driver needs by detecting biochemical signals. What began as transportation has evolved into a symbiotic relationship—technology that lives with us rather than for us.

© 2025 Future Today Strategy Group. All Rights Reserved.

IMMERSIVE VEHICLES CONNECT TO OTHER ECOSYSTEMS

© 2025 Future Today Strategy Group. All Rights Reserved.

IMMERSIVE VEHICLES CONNECT TO OTHER ECOSYSTEMS

Livable Cabins

The concept of vehicle cabins is branching away from a passive place to sit to a fully integrated living space. As vehicles gain longer ranges, enhanced automation, and connected features, manufacturers are redesigning interiors to accommodate work, entertainment, relaxation, and even sleep. Hyundai's Mobis holographic windshield and BMW's Panoramic iDrive exemplify immersive digital interfaces that transform cabins into augmented environments. Honda's 0 Series takes a different approach, focusing on "Thin, Light, and Wise" design principles, emphasizing a spacious, tech-integrated cabin that serves as a functional living space. Meanwhile, Mazda's partnership with Unity aims to create a seamless, intuitive in-cabin experience by embedding real-time 3D technology into vehicle HMIs (human machine interfaces), enhancing interaction with digital tools.

The rise of livable vehicle cabins also intersects with broader lifestyle shifts, including remote work, digital nomadism, and off-grid travel. Alpine's Cross Cabin concept and Volkswagen's California Concept incorporate modular interiors optimized for both productivity and leisure. The RV industry is responding with smart, sustainable designs like the 2025 Honda Camper Motorhome and Living Vehicle's CyberTrailer, which feature adaptive sleeping arrangements and off-grid energy solutions. The growing integration of wellness-focused features, such as air purification systems, ergonomic seating, and biometric monitoring, suggests that vehicle cabins are evolving into personalized, mobile environments rather than simply modes of transport.

Simulated Driving Experience

Electric vehicles are redefining the driving experience, but their near-silent operation presents challenges for both drivers and pedestrians. EVs are 40% more likely to be involved in pedestrian accidents than traditional vehicles, and for visually impaired individuals, this risk jumps to 93%, per the National Highway Traffic Safety Administration. To address these concerns, automakers are integrating artificial soundscapes and haptic feedback into their vehicles. Toyota, Hyundai, and Dodge are developing simulated manual transmissions with artificial engine noise to make EVs feel more familiar and engaging. Rolls-Royce has taken a luxury approach, designing a subtle yet immersive synthetic tone for its Spectre EV, enhancing the driving atmosphere without compromising the brand's hallmark refinement.

Automakers are using these simulators for research and development, calibrating stability programs, and testing autonomous safety features. Virtual reality and AI-driven simulators are also gaining traction, providing immersive driver training and reducing the risks associated with real-world testing. As EVs become mainstream, simulated driving experiences—both in-vehicle and through advanced simulators—will be key to improving safety, driver engagement, and adoption rates.

© 2025 Future Today Strategy Group. All Rights Reserved.

IMMERSIVE VEHICLES CONNECT TO OTHER ECOSYSTEMS

In-Vehicle Connectivity

The automotive industry is entering an era when vehicles are no longer just transportation—they are becoming mobile data hubs, entertainment centers, and intelligent nodes in a broader connected ecosystem. High-speed, low-latency 5G and edge computing are driving this transformation, enabling enhanced safety, real-time navigation, over-the-air updates, and even in-vehicle gaming. AT&T and Verizon are advancing connectivity frameworks to support autonomous driving and smart city integration, while General Motors has already demonstrated connected gaming tournaments using in-car Wi-Fi. Meanwhile, partnerships like Unity and Mazda's collaboration aim to redefine in-car human-machine interfaces, creating immersive, AI-driven user experiences. As connectivity grows, subscription models for vehicle features—such as Verizon's Connected Car for BMW—are becoming more common, despite consumer resistance. Beyond infotainment, advanced V2X (vehicle-to-everything) communication is improving road safety by enabling cars to exchange real-time data with infrastructure, other vehicles, and pedestrians. Looking ahead, automakers and tech firms are exploring cloud-based vehicle ecosystems, biometric authentication, and AI-powered voice assistants to make vehicles more personalized and secure. With companies like Baidu envisioning autonomous vehicles as mobile data centers, the next wave of innovation will blur the lines between automotive, cloud computing, and AI-driven smart environments.

Mobile Computing and Entertainment Hubs

Automakers are rapidly transforming vehicles into mobile computing and entertainment hubs by leveraging AI, 5G, and cloud gaming to redefine time spent in the car. BMW's collaboration with Xperi to integrate TiVo's video platform and Polestar's addition of YouTube and Nvidia's GeForce NOW to its infotainment system signal a growing trend: Vehicles are no longer just for transportation but are becoming entertainment centers on wheels. With the rise of autonomous driving, this shift is accelerating. Honda's 0 Series EVs, launching in 2026, will integrate connected technologies to transform cars into personalized, immersive spaces. Meanwhile, Sony's Afeela 1 is pushing in-car entertainment further, enabling PlayStation Remote Play via DualSense controllers.

The competition to dominate this space is intensifying. At CES 2024, Forvia launched Appning, a connected car app store aiming to capture 20% market share this year while offering developers a scalable platform to build next-gen automotive apps. This mirrors Apple's expansion of CarPlay to support multiple screens and Google's deeper integration of AI-driven entertainment into Android Auto. Automakers are also experimenting with novel interfaces—BMW's Panoramic iDrive spans the windshield, and Lincoln's 48-inch dashboard display redefines infotainment control. Audi is even introducing virtual reality gaming synced to vehicle movement for an immersive experience.

As mobile entertainment becomes a key selling point, data security and regulatory concerns will follow. The UK has already approved TV viewing in self-driving cars, but safety will be an ongoing debate. Additionally, traditional AM/FM radio faces extinction as EV manufacturers prioritize streaming and AI-curated media experiences. In-car entertainment will become a battleground where automakers, tech giants, and media companies fight for consumer attention in an era of increasingly autonomous vehicles.

CarOS

As CarOS (car operating systems) become central to the driving experience, automakers are reclaiming control of the tech behind them. Historically, tech giants like Google and Apple dominated the in-car software space through Android Auto and Apple CarPlay. General Motors is leading this new charge by eliminating CarPlay and investing heavily in its own Ultifi software, a bold move aimed at owning the user experience and unlocking new

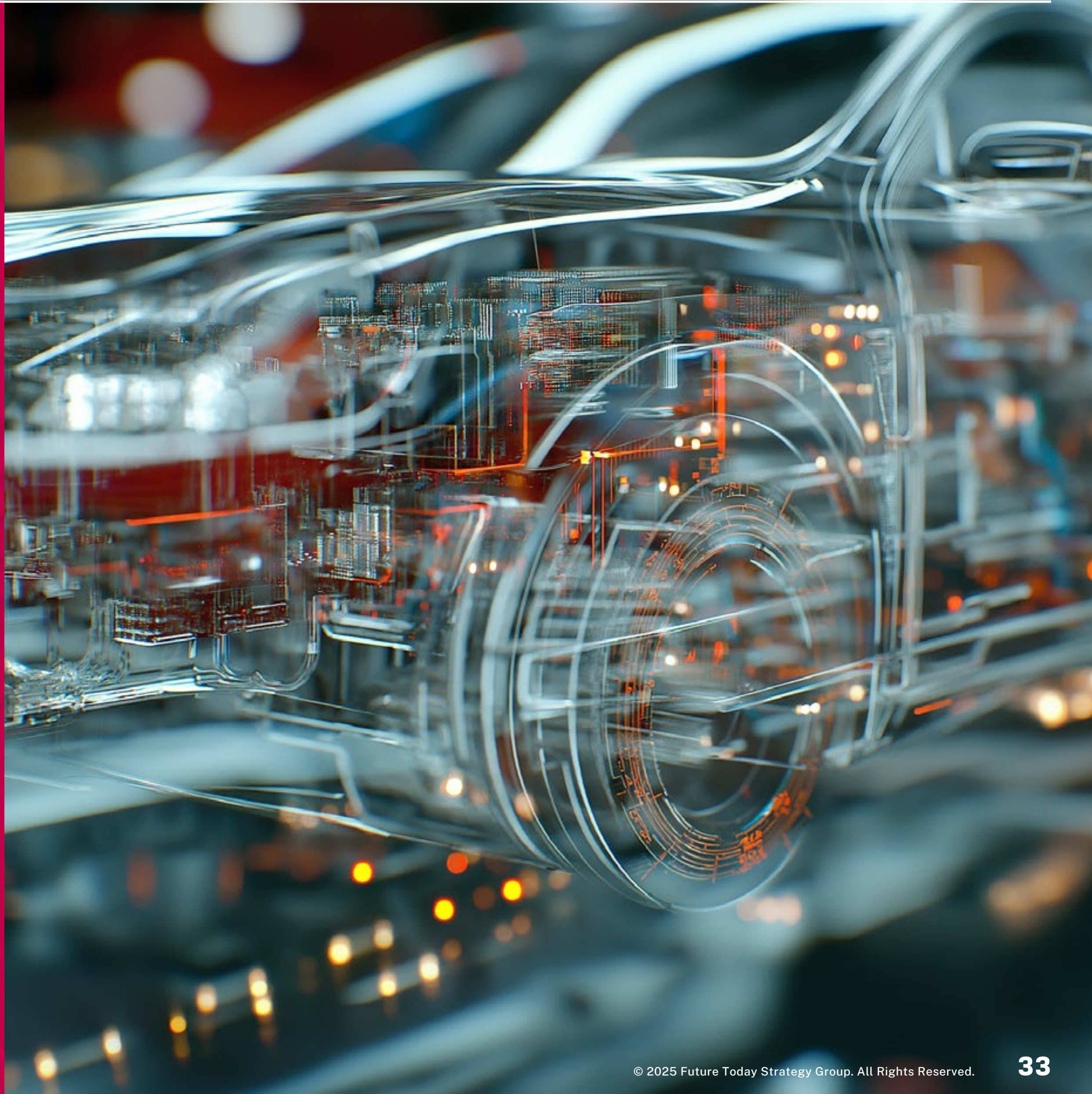
© 2025 Future Today Strategy Group. All Rights Reserved.

IMMERSIVE VEHICLES CONNECT TO OTHER ECOSYSTEMS

revenue streams. Honda, too, is developing its proprietary Asimo OS, leveraging AI to enhance automation and driver assistance. Meanwhile, Volkswagen's VW.os and Tesla's proprietary software continue to evolve, reflecting a broader industry trend toward in-house solutions.

China is emerging as a CarOS powerhouse, with Polestar partnering with Xingji Meizu Group to tailor an OS for the Chinese market, while Xpeng Motors and Huawei collaborate on AI-driven systems with predictive maintenance and natural language processing. BMW, in contrast, is refining its Panoramic iDrive system by integrating augmented reality and smart home connectivity. The push for proprietary software is driven not only by differentiation but also by data ownership—automakers see CarOS as a gateway to monetization through subscriptions and over-the-air updates.

Cybersecurity is now a critical focus, as high-profile breaches in 2024 underscored the risks of increasingly connected vehicles. The formation of the Automotive Cybersecurity Alliance signals a coordinated industry response. Open-source solutions like Elektrobit's Linux-based safety OS are also gaining traction, providing automakers with an alternative to proprietary platforms while maintaining compliance with ISO 26262 safety standards. As CarOS matures, automakers must navigate the tension between innovation, security, and user expectations in this software-defined era.



© 2025 Future Today Strategy Group. All Rights Reserved.

DATA COLLECTION ENABLES SAFETY AND AUTONOMY

© 2025 Future Today Strategy Group. All Rights Reserved.

DATA COLLECTION ENABLES SAFETY AND AUTONOMY

AV Simulation

Simulation is redefining autonomous vehicle (AV) development, accelerating progress while reducing real-world risks. Tesla's Dojo supercomputer processes billions of virtual miles, refining its self-driving capabilities, while Mercedes leverages Nvidia's Omniverse AI to model intricate driving scenarios. Mcity's open-source digital twin, launched in 2025, further democratizes mobility simulation, enabling cities and developers to stress-test AVs in virtual replicas of real-world environments.

The global AV simulation market will continue growing, fueled by advances like Ansys' 2025 R1 AVxcelerate update, which integrates enhanced radar interfaces and ASAM OSI compliance for more accurate modeling. Fujitsu's "digital rehearsal" technology now incorporates behavioral modeling to simulate human interactions with mobility systems, while AI-driven segmentation optimizes smart transportation services. As mobility ecosystems expand, interoperability is also key—cities like Singapore and Mexico City use simulated testing to refine unified fare collection systems.

Automakers and tech companies alike are investing heavily in digital mobility environments. Baidu's patent for AVs as mobile data centers exemplifies how simulation extends beyond driving to infrastructure resilience. Meanwhile, Uber's strategic partnership with Wayve illustrates a shift from in-house AV development to collaborative simulation-driven ecosystems. As ADAS and Level 2 autonomy features expand, simulation will be a cornerstone of safety, efficiency, and scalability in next-gen transportation.

Self-Aware Vehicles

Vehicles are evolving from passive machines to intelligent systems capable of self-monitoring, decision-making, and adapting on their own. Advances in sensor technology, AI, and vehicle connectivity are driving the rise of self-aware vehicles, which can detect road hazards, monitor driver behavior, and even regulate their maintenance. Goodyear's SightLine and IntelliGrip tires now analyze real-time road conditions, while Tata Elxsi's RoadSense alerts vehicles to potholes, emergency vehicles, and dangerous curves. Honda and Sony's Afeela vehicles integrate biometric sensors to respond to driver emotions, and adjust in-cabin environments accordingly. Meanwhile, Ford's quietly patented self-reporting system allows cars to restrict usage, disable features, or autonomously return to an impound lot.

Beyond safety, self-aware vehicles are integrating cloud computing and AI-driven decision-making. Tesla's Quantum Drive dynamically switches between electric and hydrogen propulsion for stability and efficiency. Baidu's mobile data center patent envisions autonomous vehicles as roving cloud servers, bridging connectivity gaps in rural areas and disaster zones. Similarly, IBM's patents for autonomous rideshare systems would enable users to access onboard computing power, turning vehicles into mobile workstations. Meanwhile, 5G-enabled vehicle-to-vehicle (V2V) networks allow cars to share real-time traffic and weather updates that can enhance road safety.

As self-aware vehicles continue to integrate AI, biometrics, and cloud computing, regulatory and ethical challenges will emerge. Balancing privacy, cybersecurity, and AI decision-making in critical scenarios will be key as this technology reshapes urban mobility, fleet management, and personal transportation.

Pilot and Passenger Observation

AI-driven in-cabin monitoring is rapidly advancing as it integrates biometric identification, driver behavior tracking, and predictive safety interventions. Systems like Smart Eye's Driver Monitoring System and Magna's advanced driver assistance solutions can detect distraction, drowsiness, and even intoxication, and provide real-time alerts. The US government has explored mandating in-vehicle breathalyzers by 2026, while Ford's scene authentication patent could soon enable facial recognition for verifying drivers. These technologies

© 2025 Future Today Strategy Group. All Rights Reserved.

DATA COLLECTION ENABLES SAFETY AND AUTONOMY

enhance safety but introduce major privacy concerns. Automakers are already sharing detailed driving data with insurers, sometimes without explicit user consent, and it's impacting insurance rates. Simultaneously, AV providers like Lyft and Mobileye are deploying AI-driven monitoring to improve fleet performance and passenger security. As AI assumes greater control in vehicles, regulations that balance safety benefits with data privacy will be crucial.

Mobile Weather Stations

Mobile weather stations (MWS) are emerging as crucial tools in industries like agriculture for real-time environmental monitoring that will improve disaster response and urban planning efforts. Advances in AI, IoT, and sensor networks are enhancing their predictive capabilities, making them indispensable for data-driven decision-making. In 2024, New York City's FloodNet initiative leveraged MWS to keep track of water levels and predict flooding, while California deployed them to detect wildfire risks and ecological changes. Connecticut has used MWS to track air pollution and reinforce compliance with emissions thresholds. These efforts illustrate the growing reliance on mobile, sensor-equipped systems to manage climate-related challenges.

Autonomous vehicle manufacturers are also integrating MWS into their fleets. Waymo, for example, equips its AVs with LiDAR, radar, and cameras to assess microclimate changes, improving both vehicle navigation and weather forecasting. Meanwhile, AI-powered forecasting tools from companies like Munro Instruments are boosting the accuracy of mobile weather predictions, particularly in regions with rapid weather shifts. The expansion of wireless sensor networks, which eliminate the need for complex infrastructure, further enhances MWS deployment in remote or mountainous areas.

Agricultural technology leaders like John Deere have integrated MWS with farm management systems, to help optimize field operations based on hyperlocal conditions. Additionally, new sensor technologies, such as ultrasonic wind sensors and mobile lightning detection, are expanding the functionality of MWS in both urban and rural settings. As government initiatives and private sector investments accelerate, MWS are set to become essential for mitigating extreme weather impacts and optimizing infrastructure resilience.

Mobility Superapps

Mobility superapps are redefining urban transportation with their integration of ride-hailing, public transit, micromobility, and delivery services onto a single platform. Companies like Uber, Grab, and Bolt are leading this shift, leveraging vast datasets to improve their users' experience, and they're having an effect on urban planning. Uber's UK app now consolidates bikes, scooters, trains, and even flights, while Grab has built its own mapping system to improve hyperlocal navigation that's outperforming traditional providers like Google Maps. With extensive growth in highly populated areas of the world, the number of daily active users of multiple superapps has substantially grown, signaling a transformation in mobility habits.

Beyond consumer convenience, superapps are shaping sustainable urban mobility. The rise of 15-minute city concepts has spurred local superapp development that integrates transportation with broader urban services. Governments and city planners are beginning to utilize mobility superapp data to optimize their infrastructure, improve traffic management, and reduce carbon emissions. Superapps' growing global footprint is evident from Yandex Go's European expansion in 2024 and Bolt's diversified offerings—including micromobility and digital payments. These platforms' role in shaping intelligent, seamless, and sustainable mobility ecosystems will keep expanding.

Utilizing Mobility Data

Mobility data is increasingly viewed as a strategic asset for transforming transportation, urban planning, and business operations. The expansion of open-source map data from Amazon, Microsoft, and Meta—adding competition to Apple and Google—has sparked new innovations in

© 2025 Future Today Strategy Group. All Rights Reserved.

DATA COLLECTION ENABLES SAFETY AND AUTONOMY

mobility solutions. This year, more than 500 cities are expected to deploy digital twins, sophisticated simulations powered by real-time mobility data, to explore urban transportation improvements before putting them into place. AI-powered traffic management systems are also gaining traction for using predictive analytics that enhance traffic flow and reduce congestion. And micromobility data is reshaping city infrastructure by helping governments identify the best spots for e-scooters, bike docks, and EV charging stations.

However, as data collection becomes more pervasive, privacy concerns will escalate. Automakers, including GM, Kia, and Hyundai, have been found sharing driver behavior data with insurance companies, sometimes without clear consumer consent. LexisNexis and Verisk, major data brokers, aggregate this information to generate driver risk profiles, influencing insurance premiums. In response, regulators are investigating potential breaches of consumer rights, while researchers are developing privacy-preserving synthetic mobility datasets that allow for analysis without compromising personal data. The rise of 5G—expected to account for 34% of mobile traffic by the end of 2024, according to Ericsson—will make mobility insights even more precise, offering businesses new options for data-driven decision-making. As this landscape evolves, balancing innovation with ethical data practices will be crucial for maintaining consumer trust and regulatory compliance.

Relying on ADAS

Advanced driver assistance systems are transforming the driving experience, reducing human input in routine tasks such as lane keeping, adaptive cruise control, and emergency braking. However, as reliance on these systems grows, safety experts are raising concerns about driver disengagement and system limitations. The Insurance Institute for Highway Safety found that most partial automation systems do not adequately ensure driver attention, with only one out of 14 tested earning an "acceptable" rating. Regulatory bodies, including NHTSA, are also investigating issues like Tesla's "Actually Smart Summon" feature after multiple reported crashes. While ADAS has the potential to prevent a substantial number of deaths and accidents, failures in sensor accuracy, adverse weather performance, and driver overconfidence present new risks. Automakers must address these challenges through enhanced driver monitoring, stricter safety regulations, and improved sensor technology to ensure ADAS fulfills its promise of safer roads.

Pedestrian Safety

As autonomous vehicles and micromobility options proliferate, pedestrian safety concerns are mounting. High-profile incidents—such as a Cruise AV veering off-road in Austin, Texas, and robotaxis obstructing emergency vehicles in San Francisco—have fueled public unease. NHTSA is investigating Tesla's remote parking features after 16 alleged collisions. Meanwhile, the surge of pedestrian fatalities in New York City—an 18% increase in 2024—was partly blamed on the rise of new transportation methods. The Insurance Institute for Highway Safety projects 3.5 million AVs on US roads by 2025, amplifying safety concerns. Research from the University of Iowa found that children's road-crossing behavior is influenced by AV signaling, highlighting the need for standardized vehicle-pedestrian communication. Efforts to address these risks include California's Complete Streets Action Plan, which aims to enhance 623 pedestrian safety locations by December 2025, and the state's 2024 Daylighting Law, which improves crosswalk visibility. Advances in AV tech also play a role: Nvidia's latest patent seeks to enhance AI perception, potentially improving pedestrian detection. As cities integrate AVs, pedestrian safety will depend on regulatory measures, improved technology, and community engagement.

© 2025 Future Today Strategy Group. All Rights Reserved.

DATA COLLECTION ENABLES SAFETY AND AUTONOMY

AV Viability

Autonomous vehicles are steadily advancing but remain far from achieving full self-driving capability. While most new vehicles now include semiautonomous features—such as lane-keeping, automatic braking, and adaptive cruise control—higher-level autonomy is only beginning to emerge. In 2024, Mercedes-Benz launched Level 3 Drive Pilot in select US markets, with Audi and other manufacturers preparing similar rollouts following regulatory approvals in Europe, China, and Japan. Robotaxi companies like Waymo are expanding services to new cities, testing Level 4 autonomy. While investment in automotive-related AI and IoT is accelerating, the regulatory uncertainty in the US, cybersecurity risks, and ethical challenges remain significant barriers to full adoption.

The commercial sector is a proving ground for AVs, particularly in trucking and logistics. Companies like Aurora Innovation are testing autonomous long-haul trucking, with regulatory-friendly states such as Texas leading the way. These companies underscore the economic viability of autonomy in high-efficiency industries, though full Level 5 implementation remains elusive. The focus is shifting toward enhancing in-vehicle experiences, as seen in IBM's and Baidu's patents for using AVs as mobile data centers. Ford, Tesla, and Honda are also integrating advanced entertainment and workspace features to capitalize on passengers having more free time.

Local AV Regulations

As autonomous vehicle technology advances, local governments are asserting control over their streets while balancing innovation with public safety and economic considerations. In 2024, multiple states, including California, South Dakota, Kentucky, and Alabama, passed legislation allowing Level 3-5 AVs on public roads under specific conditions, such as safety driver requirements, insurance mandates, and law enforcement interaction plans. California's failed SB 915 would have given cities the authority to regulate AV services. So far Gov. Gavin Newsom has vetoed bills that sought stricter reporting and operational limits. In parallel, major urban centers like Phoenix and Los Angeles are expanding AV testing, with Waymo's January 2025 launch of freeway testing and multicity expansions underscoring the growing presence of AVs in complex traffic environments.

Despite this momentum, a fundamental challenge remains: regulatory fragmentation. Cities regulate their streets, states oversee broader transportation policies, and federal agencies control highways—yet seamless AV operation requires interoperability across all jurisdictions. The US could overcome this by following the European Union's lead for more standardized governance. The EU plans to develop a unified AV framework by 2026. Meanwhile, congestion pricing models, such as New York City's $9 entry fee, could impact AV deployment strategies, influencing fleet operations and route planning. As AV adoption grows, cities must align local policies with state and federal regulations to prevent a patchwork of inconsistent rules that could stall industry progress.

© 2025 Future Today Strategy Group. All Rights Reserved.

DATA COLLECTION ENABLES SAFETY AND AUTONOMY

Robotaxi Expansion

Robotaxis are entering a period of accelerated growth, driven by technological advancements, regulatory shifts, and shifting consumer sentiment. In 2024, Waymo doubled its weekly paid trips to 100,000 and expanded service to multiple new US cities, including Los Angeles, Austin, and Miami. Baidu's Apollo Go robotaxi division is on track to reach profitability in 2025, aided by its ability to cut vehicle costs to $28,000—far lower than US competitors like Waymo, whose vehicles cost upward of $150,000. Tesla is also entering the space, with plans to launch its own robotaxi service in Austin by mid-2025.

However, regulatory challenges remain a key factor. Cruise, GM's self-driving unit, was forced to shut down after a high-profile accident led to regulatory scrutiny and loss of operational permits in California and Texas. Waymo faces a new federal investigation into 22 incidents involving its vehicles, per NHTSA. Despite these setbacks, data suggests that robotaxis may already be safer than human-driven cars: A 2024 Swiss Re study found an 88% reduction in property damage claims and a 92% reduction in bodily injury claims for Waymo vehicles compared to human drivers.

Internationally, China is leading adoption, with Baidu expanding to Hong Kong and Singapore, and Wuhan aiming to become the first fully driverless city. Waymo announced plans to test its robotaxis in Tokyo in 2025, marking its first international expansion. With both technological and operational hurdles being addressed at an accelerated pace, robotaxis are approaching a pivotal tipping point in adoption.

© 2025 Future Today Strategy Group. All Rights Reserved.

SCENARIO YEAR 2036

THE AUTONOMOUS CITY SIGNATURE

By 2036, autonomous vehicles do more than navigate cities—they're reshaping them through unprecedented coordination. More than 60% of urban transport now operates at Level 4 autonomy, but the revolution isn't just technological—it's artistic.

The transformation began when Copenhagen replaced traditional traffic management with "aesthetic orchestrators"—AI systems that optimize for both efficiency and beauty of movement. Rather than vehicles simply maneuvering through intersections, they perform through them, adjusting their trajectories miles in advance to weave patterns visible from observation decks that have become tourist attractions.

The impact is both practical and profound. Commute times have decreased by 43% while commuter anxiety has fallen by 64%. Traffic accidents in these zones are now statistical anomalies, 98% less frequent than in manual areas. Former parking structures have been converted into viewing platforms where people gather to watch the daily commuter ballet. Signature "performances" occur during rush hours.

Cities have developed distinctive movement signatures. Paris vehicles flow in elegant arcs reminiscent of the Seine's currents, and Tokyo's rigid grid creates precise geometric patterns that transform throughout the day. Acoustic engineering ensures vehicle movements generate harmonious sound patterns at key intersections, as traffic flow serves as both visual and musical composition.

The autonomous ecosystem extends beyond passenger transport. Delivery robots operate in choreographed formations, fulfilling logistics while contributing to the urban performance. Neighborhoods program local vehicles to reflect community celebrations, with hundreds of synchronized vehicles creating living monuments during festivals.

"Manual enclaves" remain as cultural touchstones where traditional driving is preserved as artisanal practice. But even here, human drivers often attempt to mimic the graceful patterns of their autonomous counterparts.

As 2040 approaches, the next evolution is emotional response routing—journeys planned not just for efficiency but for psychological impact. What began as transportation optimization has evolved into an art form that transforms how humans experience movement through shared spaces.

© 2025 Future Today Strategy Group. All Rights Reserved.

ROBOTICS & DRONES TRENDS

© 2025 Future Today Strategy Group. All Rights Reserved.

COBOTS BECOME COWORKERS

© 2025 Future Today Strategy Group. All Rights Reserved.

COBOTS BECOME COWORKERS

Accelerated Adoption

The rapid growth of collaborative robots (cobots) is reshaping labor dynamics across industries worldwide. Demographic shifts, labor shortages, and technological advancements are propelling businesses toward cobot integration. In Japan, cobots mitigate workforce shortages due to an aging population. For example, Fujita Works uses cobots in welding, reducing training time and enhancing productivity. Major corporations like Amazon are also expanding cobot usage; its Sequoia system in warehouses is designed to improve order fulfillment speed by 25% without reducing human labor.

Government policies are accelerating this trend. New York's Warehouse Worker Protection Act indirectly incentivizes automation by imposing strict worker safety and productivity quotas, making cobots a practical solution for compliance. Saudi Arabia's Vision 2030 aims to establish 32,000 smart factories that integrate robotics and AI, in addition to a robot factory funded by $150 million from SoftBank. This shift aligns with technological advancements like AI-powered digital twins that enable predictive maintenance and optimized operations.

The cobot landscape covers more than traditional manufacturing. In health care, ABB's YuMi assists in surgeries, and in construction, firms like Canvas use cobots for drywall finishing. In fast food, robots at restaurants like Kernel streamline operations, giving workers time to focus on customer service. Cobots are demonstrating their versatility and potential to enhance efficiency, safety, and profitability across diverse sectors.

General-Purpose Robots

General-purpose robots are evolving rapidly, fueled by AI breakthroughs, advanced sensory systems, and increased investment. Companies like Figure AI and Sanctuary AI are leading the charge with humanoid robots designed for diverse applications, from warehouse logistics to eldercare. Figure AI's Figure 02, tested at a BMW facility, demonstrates real-world adaptability, while Sanctuary AI's Phoenix, equipped with haptic sensors and AI control, learns new tasks through simulation and demonstration. Meanwhile, China's Agibot has claimed the mass production of nearly 1,000 humanoids, signaling a push toward large-scale deployment.

A major bottleneck in general-purpose robotics is training, but new AI-driven approaches are accelerating progress. MIT's Heterogeneous Pretrained Transformers, inspired by large language models, allows robots to learn from vast, diverse datasets, improving their adaptability to novel tasks. Similarly, RoboCat, a self-improving AI agent, can train robotic arms in as few as 100 demonstrations, significantly reducing the need for human oversight. These developments suggest that robots capable of performing multiple, complex tasks with minimal retraining are closer than ever.

As industry adoption grows, commercialization efforts are ramping up. Tesla's Optimus is slated for limited manufacturing in 2025, with broader deployment expected in 2026. Pudu Robotics and Wisson Robotics are also introducing new bipedal and soft-bodied robots with expanded capabilities. The International Federation of Robotics predicts that general-purpose robots will transform manufacturing, logistics, and service industries by mid-decade, making them essential workforce tools rather than futuristic concepts.

Domestic Robots

AI-driven domestic robots are expanding their responsibilities from handling simple automated tasks to acting as sophisticated, interactive companions. In 2024, the market for household robots noticeably grew with the debut of innovations like Samsung's Ballie, a mobile smart home hub that autonomously monitors pets and projects videos, and the SwitchBot K20+ Pro, a modular robot capable of vacuuming, air purifying, and even delivering objects. Robotic vacuum cleaners, now equipped with mechanical arms and AI-powered navigation, continue to dominate the space, while new categories—such as social companion

© 2025 Future Today Strategy Group. All Rights Reserved.

COBOTS BECOME COWORKERS

robots like ElliQ 3, which uses generative AI for conversation and cognitive engagement—are gaining traction. These robots not only perform household tasks but also provide emotional support, particularly for seniors. Meanwhile, advancements in mobile manipulators and cobots suggest a near future where robots can perform complex, hands-on domestic work with increasing autonomy. Apple's recent robotics research, including a mobile assistant and a robot lamp designed for expressive, human-like interactions, hints at a shift toward embedding personality into domestic automation. As AI and robotics continue to integrate seamlessly into everyday life, the home is transforming into a fully automated and emotionally aware ecosystem.

Robots Expand Creative Collaboration

Robots are rapidly integrating into creative fields, challenging the notion that artistic expression is solely human territory. In South Korea, the humanoid robot EveR 6 conducted a live orchestra, demonstrating the potential for robotics in music performance. Meanwhile, Alter 3, a humanoid robot, has advanced beyond conducting to collaborate on art projects with human artists while blending robotic precision with artistic interpretation. In visual arts, AI-powered robotic arms are assisting painters and sculptors by analyzing artistic styles and suggesting new techniques. Museums have begun employing humanoid robots, such as advanced versions of Ameca, as interactive guides capable of answering visitor questions in multiple languages and offering personalized experiences.

In education, storytelling robots like Kee-Ko and Tega are evolving, now using AI to adjust their narratives based on students' reactions. These robots are proving especially useful in language learning and creative writing classes. Even in entertainment, Tesla's Optimus robot, initially designed for industrial tasks, has demonstrated human-like movements with a potential for engaging with audiences. The emergence of AI-enhanced music composition is further proof of robotics' creative potential—robots now analyze complex musical structures, collaborate with human musicians, and even perform in live concerts.

As robots become increasingly intuitive and expressive, their role in creative industries will continue to expand. The fusion of robotics and art is not about replacing human creativity but enhancing it—pushing the boundaries of artistic collaboration and changing how we create and experience culture.

© 2025 Future Today Strategy Group. All Rights Reserved.

COBOTS BECOME COWORKERS

Space Exploration Robots and Drones

Space robots and drones are entering a new era of autonomy as they shape the future of extraterrestrial exploration, infrastructure development, and orbital maintenance. In 2024, NASA's Artemis program began testing robotic assistance systems to construct lunar structures, transport materials, and assist astronauts, marking a crucial step toward a sustainable human presence on the moon. Meanwhile, advancements in AI-driven autonomy are revolutionizing space drones, enabling them to execute complex missions with minimal human intervention. These developments are critical as communication delays remain a fundamental challenge for space robotics, especially for Mars and deep-space missions.

On the orbital front, space debris mitigation is gaining momentum. The ClearSpace-1 project is preparing for its first mission to capture and deorbit space junk, while advancements in Unmanned Aircraft System Traffic Management (UTM) systems are addressing congestion in Earth's lower orbit. Additionally, NASA's OSAM-1 robotic servicing mission, scheduled for launch in 2025, is set to demonstrate the ability to repair and refuel satellites in space, signaling a shift toward long-term orbital sustainability.

Lunar and Martian surface exploration is also evolving. Research from ETH Zurich is advancing robotic teamwork among quadruped robots for resource harvesting, while GITAI is developing robotic arms and rovers designed to autonomously construct off-world habitats. And events like RoboPalooza, a NASA-backed competition in the Mojave Desert, are accelerating the development of next-generation planetary rovers with enhanced autonomy and mobility. These innovations, combined with ongoing work on solar sail propulsion and AI-powered high-altitude observation drones, underscore a broader trend: Robotic autonomy will be the cornerstone of future space operations.

© 2025 Future Today Strategy Group. All Rights Reserved.

ROBOT AND DRONE INFRASTRUCTURE

FTSG

© 2025 Future Today Strategy Group. All Rights Reserved.

ROBOT AND DRONE INFRASTRUCTURE

AI-Powered Robotic Training

Virtual training and AI-driven decision-making are accelerating the capabilities of autonomous robots and drones. Nvidia's Isaac Sim and Isaac Gym use simulation and digital twins to train robots in parallel environments, slashing development timelines. Research collaborations, such as Nvidia's Eureka, leverage OpenAI's GPT-4 to refine robotic training goals, demonstrating how generative AI optimizes learning. Plus there's Toyota's AI robots, which have exhibited the ability to master complex tasks in mere hours, providing another example of how virtual training is redefining industrial automation.

AI-powered vision systems are enhancing robot adaptability, so they instantly can recognize new objects and environments. MIT's recent work in AI-driven packing optimization showcases robots efficiently organizing items into tight spaces—a task requiring spatial reasoning traditionally difficult for machines. Digital twins further improve path-planning by simulating diverse environmental conditions and ultimately preparing robots for real-world unpredictability. Beyond training, AI is also redefining robotic autonomy. DeepMind's latest patent aims to help enhance AI decision-making by simulating multiple environmental scenarios. This aims to ensure robots can respond to unexpected variables, reducing reliance on human intervention.

The integration of generative AI is creating robots capable of autonomous learning from diverse data sources, including human demonstrations and internet-scraped visuals. Researchers at University of California, Berkeley have applied reinforcement learning to robots, enabling them to assemble complex objects with human-like precision. Meanwhile, Google's work on long-term memory for robots allows machines to retain situational awareness, improving decision-making over time. As AI-driven training continues to evolve, these advancements signal a new era where robots seamlessly integrate into industries ranging from manufacturing to health care, reshaping the workforce and increasing operational efficiency.

Robot and Drone Swarms

Robot and drone swarms are poised to revolutionize industries by enabling large-scale, autonomous coordination in complex environments. Governments and private enterprises are accelerating research in this area, leveraging breakthroughs in artificial intelligence, connectivity, and decentralized control. The US Pentagon's Replicator program aims to deploy thousands of autonomous drones by August 2025, focusing on swarming tactics through its Autonomous Collaborative Teaming and Opportunistic Resilient Network Topology projects. Sweden's Saab-developed swarm program, set for testing in March 2025, will allow soldiers to control up to 100 drones simultaneously.

Beyond military applications, swarm robotics is transforming agriculture, disaster response, and smart manufacturing. In agriculture, autonomous swarms optimize irrigation, monitor crop health, and reduce pesticide use. Researchers at Imperial College London are exploring drone-based 3D printing, enabling autonomous construction in remote locations. Meanwhile, in places like the MIT AI Lab, federated learning and agentic AI systems are improving swarm coordination, allowing for more adaptive and resilient robotic networks.

As swarm intelligence advances, breakthroughs in soft-jointed robotics and stigmergy-based behaviors will unlock new capabilities, enabling robot swarms to operate in extreme and unpredictable conditions. However, challenges remain in real-time data processing and decentralized control. The integration of 5G and machine learning will be critical for unlocking the full potential of these autonomous networks, and set the stage for their widespread deployment.

Drone Fleets

Autonomous drone fleets are expanding across industries, reshaping logistics, security, and environmental monitoring. Companies like Amazon, Uber, and Alphabet's Wing are scaling drone delivery operations. Amazon continues to experiment with

© 2025 Future Today Strategy Group. All Rights Reserved.

ROBOT AND DRONE INFRASTRUCTURE

drone delivery of prescriptions and some retail products in very limited markets. Wing, in collaboration with Walmart, has initiated 6-mile drone deliveries in Dallas, illustrating a shift toward mainstream retail logistics. Multiple companies, including FedEx in conjunction with Elroy Air, and Ford, are also developing drone-based cargo transport and vehicle-integrated drone deployment systems, signaling future advances in autonomous mobility.

Regulatory progress is accelerating drone fleet adoption. Amazon's MK30 drone, approved by the FAA for beyond-visual-line-of-sight (BVLOS) operations, represents a significant shift in drone oversight. However, despite launching, operations paused in January 2025 due to software issue-related incidents.

Military applications are also growing, with the US Navy investing nearly $1 billion in unmanned surface vessels and establishing its second autonomous drone squadron, "Hell Hounds." The UK Royal Air Force is also expanding its Protector RG Mk1 drone fleet, signaling a broader shift toward unmanned defense systems.

Environmental and public safety applications are also increasing. The National Oceanic and Atmospheric Administration is deploying oceanic drones to monitor climate change, while law enforcement agencies, such as the Dallas Police Department, are integrating drone fleets for surveillance, with 139 drones deployed 8,000 times in 2024. As drone technology advances and regulations adapt, autonomous drone fleets are set to transform industries, as they enable faster deliveries, safer inspections, and more efficient resource management.

Unmanned Traffic Management

As drones proliferate in commercial and public services, airspace congestion has become a pressing challenge, prompting rapid advancements in Unmanned Aircraft System Traffic Management. The FAA, in collaboration with NASA and industry partners, has made strides toward real-time, scalable drone traffic systems, with localized UTM operations already active in Dallas, Tel Aviv, and North Sea ports as of late 2024. In parallel, the UK's Project Skyway operationalized a 265 km UAV corridor in 2024, and India plans to become a global drone hub by 2030, underscoring the urgency of global drone traffic solutions.

AI and machine learning are transforming UTM systems, allowing for predictive analytics and autonomous airspace decision-making. Innovations like MIT's real-time path-planning algorithm and the integration of 5G networks are enabling faster, more reliable communication between drones and control systems. Regulatory frameworks are also evolving—Avinor's nationwide UTM implementation in Norway, and FAA-approved drone delivery corridors in the US, signal a shift toward structured, scalable airspace solutions. As airspace digitization accelerates, governments and private firms must align on standards to ensure safety, scalability, and seamless drone integration.

© 2025 Future Today Strategy Group. All Rights Reserved.

MOVING PEOPLE, PETS, AND OBJECTS

© 2025 Future Today Strategy Group. All Rights Reserved.

MOVING PEOPLE, PETS, AND OBJECTS

Last-Mile Delivery

The last-mile delivery sector is rapidly evolving as robots, drones, and autonomous vehicles become integral to logistics networks. Uber Eats has expanded deploying autonomous sidewalk robot partnerships with Serve Robotics in Miami and Avride in Jersey City, Austin, and Dallas. Avride plans to scale its fleet to more than 100 delivery bots in 2025, reflecting growing industry confidence in automation. Meanwhile, drone deliveries are gaining momentum, with Walmart leveraging Zipline, Wing, and Flytrex to establish drone hubs across seven states.

Autonomous deliveries are addressing long-standing inefficiencies in urban and suburban logistics. Starship Technologies' robots perform more than 100,000 daily road crossings, and Ottonomy's Ottobot Yeti has introduced doorstep package transfers, eliminating the need for human retrieval. These advancements enhance accessibility for individuals with disabilities and enable deliveries in areas where traditional couriers are less viable. Hybrid fleets combining drones, delivery robots, and electric vehicles are becoming the new standard as they reduce costs and emissions. AI-driven automation is further optimizing route planning and demand forecasting, aligning with growing consumer expectations for same-day and on-demand delivery. The shift toward robotic and drone-based delivery is accelerating, and shaping a future where human couriers are increasingly augmented—or replaced—by machines.

Expanded Payload Capacity

The expansion of payload capacities in drones and robots is reshaping industries, from logistics and infrastructure to defense and disaster response. Alphabet's Wing has doubled its drone payload capacity to 5 pounds while maintaining a 12-mile range, reflecting growing consumer demand for larger deliveries. Similarly the market also saw the introduction of the DJI FlyCart 30, which can transport up to 30 kg over a distance of 16 km, and the JOUAV CW-80E, which is capable of carrying 25 kg for up to 10 hours. Meanwhile, companies like Elroy Air are pioneering heavy-lift cargo drones capable of carrying up to 500 pounds more than 300 miles, potentially revolutionizing supply chains in remote areas. In construction and industrial applications, the Griff Aviation 300 can lift up to 500 pounds, offering new solutions for material transport.

Energy innovations are also pushing the boundaries of drone performance. Hydrogen fuel storage systems developed by Honeywell and the US Department of Energy could significantly extend flight durations, while solar-powered drones like Airbus' Zephyr 8 have already demonstrated 26-day endurance. The US Army is experimenting with Ultra LEAP and Global Hawk drones, which can stay airborne for at least two days, highlighting military advancements that may influence commercial applications. Regulatory frameworks are evolving in parallel, with the FAA looking to expand permissions for BVLOS operations, enabling drones to cover longer distances with heavier payloads.

The impact of these advancements extends beyond delivery and defense. High-altitude robotic balloons, weighing just 12 pounds, are now capable of capturing detailed aerial images across vast areas, aiding urban planning and disaster assessment. As AI enhances autonomous navigation, heavy-lift drones will become more reliable, increasing their adoption across industries. These innovations signal a future where drones and robots handle heavier tasks with greater efficiency, unlocking new possibilities for transportation, logistics, and beyond.

Flying Taxis (eVTOLs)

Electric vertical takeoff and landing aircraft—commonly known as flying taxis—are on the verge of commercialization, driven by advancements in technology, investment, and regulatory progress. Major players, including Joby Aviation, Archer, and Alef Aeronautics, are targeting 2025 for the first commercial flights, with locations such as Dubai, Paris, and select US cities leading the charge. The FAA finalized new

© 2025 Future Today Strategy Group. All Rights Reserved.

MOVING PEOPLE, PETS, AND OBJECTS

eVTOL regulations in late 2024, establishing pilot training and operational requirements, while vertiport infrastructure is rapidly expanding, with hundreds planned worldwide.

Investment in the industry continues to accelerate. Stellantis and Boeing are backing Archer, while Alef Aeronautics secured more than $850 million in preorders for its Model A flying car. Paris had plans to showcase the world's first flying taxi network during the 2024 Olympics, and Dubai's Advanced Air Mobility center is positioning the UAE as a global hub for eVTOL innovation.

Despite optimism, challenges remain. Battery limitations restrict current eVTOLs to ranges of about 100 miles, and regulatory approvals remain a hurdle, particularly in the US. Additionally, the high cost of early models, such as Alef's $300,000 flying car, limits consumer adoption. However, as technology scales and manufacturing costs drop, eVTOLs could transform urban mobility, cutting travel times while reducing congestion and emissions.

Ocean-Faring Drones

Ocean-faring drones, including unmanned surface vessels (USVs) and autonomous underwater vehicles (AUVs), are transforming maritime industries. The Yara Birkeland, Norway's fully autonomous cargo ship, is continuing its autonomy trials on select routes as of late 2024, signaling the rise of AI-driven shipping. Maersk has followed with a slightly different approach, integrating AI-powered situational awareness systems rather than pursuing fully autonomous ships. Regardless of the specific approach, these vessels reduce operational costs, lower emissions, and enhance safety by eliminating human-related errors. Meanwhile, defense applications are expanding—Ukraine has deployed USVs in naval conflicts. Singapore, too, launched AI-powered patrol USVs in January 2025 to bolster coastal security.

Scientific exploration is benefiting from ocean drones as well. The University of Bremen's TRIPLE project is leveraging AUVs for subglacial lake exploration. The Woods Hole Oceanographic Institution deployed a swarm of AUVs to map deep-sea ecosystems with unprecedented detail. Additionally, conservation efforts are accelerating through use of devices like the Searial Cleaners PixieDrone that are helping remove trash from marinas, resorts, docks, and public places. As AI, robotics, and sustainable propulsion advance, ocean-faring drones are poised to redefine security, commerce, and environmental stewardship across the world's waters.

© 2025 Future Today Strategy Group. All Rights Reserved.

SCENARIO YEAR 2033

AERIAL CORRIDORS

City skies now play host to a myriad of autonomous aerial vehicles moving through invisible corridors 100-400 feet above street level. What began as small-scale delivery experiments has evolved into a comprehensive transportation layer that transformed urban logistics.

The shift accelerated after the Global Supply Chain Crisis of 2027, when the pressures of trade wars came to a head while traditional ground transportation faltered in the US and Europe. The subsequent Emergency Drone Corridor Act established regulated flight paths and advanced unmanned traffic management systems. Today, these digital highways support more than 8 million daily drone flights across North America.

Multimodal heavy-lift drones, evolved from early eVTOL prototypes, form the backbone of this network. These hydrogen-powered craft, with 800-pound payload capacities, handle everything from emergency medical deliveries to modular home component transport. Amazon's ubiquitous Skycarrier-7 can transition from package delivery to passenger transport in under five minutes.

Cities have adapted with "Skyports" crowning most taller buildings, where ground robots receive packages from landing drones. Wealthier residents enjoy direct-to-balcony delivery, while apartment complexes feature community drone docks with secure retrieval lockers. The "Clear Skies Initiative" has pushed legislation requiring distinctive drone sounds and minimum altitudes over residential areas, while debates continue about equitable access between drone-serviced and traditional neighborhoods. For professionals, SkyCommute offers members access to passenger drones for trips under 30 miles through dynamic corridors monitored by AI systems that have nearly eliminated midair incidents.

Following Hurricane Isaac in 2030, drone swarms restored critical supply lines to isolated communities within hours, demonstrating their transformative impact on disaster response and helping cement their place in society into the mid-2030s.

© 2025 Future Today Strategy Group. All Rights Reserved.

BLURRING THE HUMAN-MACHINE LINE

© 2025 Future Today Strategy Group. All Rights Reserved.

BLURRING THE HUMAN-MACHINE LINE

Natural Exoskeleton Movement

Exoskeletons are advancing beyond rehabilitation and industrial applications to enhance natural human movement, driven by AI, machine learning, and lightweight materials. In February 2025, German Bionic introduced the Apogee Ultra, a robotic exoskeleton capable of reducing strain during physically demanding tasks by providing dynamic lifting support of up to 80 pounds. Meanwhile, the FDA recently expanded clearance for Wandercraft's Atalante exoskeleton for rehabilitation, signaling increased regulatory acceptance. Innovations such as textile-integrated exoskeletons, developed by the Swiss Federal Institute of Technology, promise less bulky, more wearable solutions for mobility enhancement. Additionally, Stanford Biomechatronics Laboratory's self-adjusting battery-powered exoskeleton demonstrates how AI-driven adaptation can personalize support in real time. Looking forward, exoskeletons are being integrated with augmented reality and IoT to optimize movement and provide performance analytics for users and caregivers.

Exoskeletons Unlock Superhuman Potential

Advancements in exoskeleton technology are accelerating human augmentation and blurring the line between natural ability and machine-enhanced performance. In industrial settings, exoskeletons like German Bionic's Apogee reduce strain on workers by offsetting up to 80 pounds of weight, minimizing injury risks and increasing endurance. Meanwhile, Georgia Tech researchers have developed a task-agnostic robotic exoskeleton controller that enhances hip and knee joint power by 15%-20%, enabling more efficient movement across various applications. Beyond labor-intensive jobs, exoskeletons are now entering athletics—Chung-Ang University's wearable suit has demonstrated a 0.97-second speed boost for runners by optimizing acceleration and hip extension. The Hypershell X Series, introduced in 2025, takes this further with a 40% leg strength increase and 30% reduction in fatigue for outdoor enthusiasts. On the medical front, the CES 2025 award-winning XoMotion exoskeleton allows hands-free movement for rehabilitation patients, a big step in revolutionizing mobility solutions. With exoskeletons improving strength, endurance, and speed across industries, ethical concerns arise: Will these devices empower workers or push them beyond their limits? The rapid evolution of wearable robotics signals a future where human capabilities extend far beyond their biological constraints.

Redefining Personal Mobility

AI-driven robotics and assistive technologies are transforming personal mobility as they offer new levels of independence to individuals with impairments. Recent innovations highlight this shift. Control Bionics' DROVE integrates AI-powered navigation into wheelchairs, allowing users who have limited hand functionality or can't use standard joystick controls to move independently using a digital camera system and the NeuroNode interface. Labrador Systems' Retriever robot enables mobility-impaired individuals to transport items within their homes via voice or touchscreen commands. Meanwhile, Stanford's exoskeleton research has led to a device that enhances walking efficiency, reducing energy expenditure by 17% while increasing speed by 9%.

This year, WeWalk introduced the Smart Cane 2, an AI-enhanced navigation tool for visually impaired users. This next-gen cane offers real-time obstacle detection, a GPT-powered voice assistant, and integration with public transport systems, powered by Moovit. Its new lightweight design and tactile controls improve usability, while a barometric pressure sensor and ultrasonic time-of-flight technology enhance environmental awareness. In the wearables sector, NeuroVision Pro, set for release in late 2024, uses AI and neural interfaces to convert visual data into neural signals, offering real-time spatial awareness and text recognition.

Beyond assistive devices, autonomous vehicles and AI-driven mobility services are becoming integral to urban transit. Micromobility leader Lyft is restructuring its operations, filing patents for tandem

© 2025 Future Today Strategy Group. All Rights Reserved.

BLURRING THE HUMAN-MACHINE LINE

riding detection and smart scooter-camera systems to enhance safety and efficiency. With e-bike ridership growing rapidly—Lyft logged 56.7 million bike and scooter trips in 2023—AI-powered micromobility solutions are likely to play a critical role in future transportation ecosystems. These innovations signal a shift toward more inclusive, tech-driven mobility solutions.

Humanoid Robots

Humanoid robots are rapidly advancing from concept to deployment, driven by breakthroughs in AI, computer vision, and robotics hardware. Figure's $675 million funding round, backed by Microsoft, OpenAI, and Amazon, underscores growing investor confidence in AI-powered robotics. OpenAI's partnership with Figure aims to enhance robots' language understanding and make them better at interacting with humans and autonomously adapting to tasks. Tesla's Optimus Gen2, unveiled last year, features improved dexterity and balance, while Amazon is testing Agility Robotics' Digit for warehouse logistics.

Another example is Fourier Intelligence's GR-1, which addresses global aging trends by assisting eldercare residents.

Despite rapid innovation, commercialization hurdles persist. High production costs, safety concerns, and the need for reliable general-purpose applications could slow adoption. The debate over humanoid versus task-specific robotic designs continues, with critics questioning the necessity of a human-like form for industrial applications. However, the race to develop AI-integrated humanoids is intensifying, with industry leaders betting that robots will soon fill labor gaps and redefine automation.

Soft Robotics Get a Grip

Soft robotics is advancing rapidly, transforming industries from logistics to health care by enabling robots to grip objects with human-like dexterity. Historically, robots struggled with delicate handling, but innovations in materials, 3D printing, and AI-driven perception systems are closing the gap. MIT's Series Elastic End Effectors use soft bubble grippers and mapping cameras to grasp tools with adaptive force, while researchers at University of California, San Diego developed 3D-printed soft grippers powered solely by pressurized gas—eliminating complex actuation systems. These breakthroughs are reshaping warehouse automation, where soft robotic arms now outperform traditional rigid grippers in handling diverse products.

Beyond dexterity, soft robots are gaining strength. Korea Advanced Institute of Science and Technology unveiled a woven-structure robotic gripper capable of lifting more than 100 kilograms, demonstrating that softness no longer limits load-bearing capacity. Tesla's Optimus humanoid robot, recently showed off a demo of upgraded hands with 22 degrees of freedom, exemplifies the integration of precision grip and human-like dexterity, with potential applications in manufacturing and personal assistance. As AI-enhanced perception and novel materials advance, soft robotics will expand into new domains, from search-and-rescue operations to assistive exoskeletons.

© 2025 Future Today Strategy Group. All Rights Reserved.

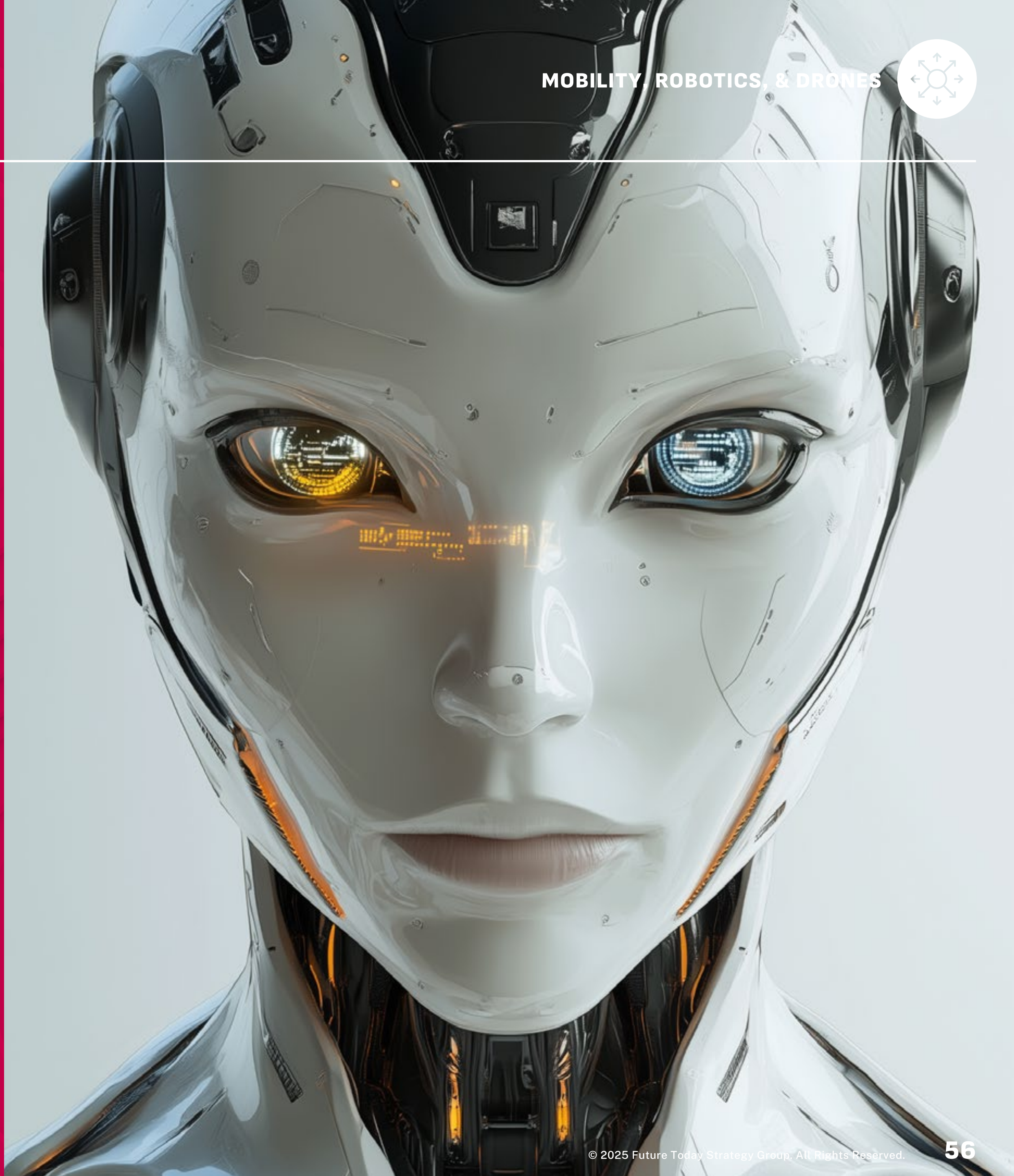
BLURRING THE HUMAN-MACHINE LINE

Robotic "Vision"

Robot vision is evolving beyond traditional cameras and lidar, integrating multi-sensor fusion, AI-driven perception, and novel imaging techniques to create more adaptable and capable machines. Sensor fusion—combining LiDAR, radar, 2D/3D cameras, accelerometers, and gyroscopes—allows robots to interpret their environment with greater accuracy. Emerging technologies like PanoRadar, which uses AI-processed radio waves for 3D imaging, are pushing perception beyond human limitations, enabling robots to "see" through smoke, glass, and walls. Meanwhile, Google and Nvidia are developing patents to improve robotic awareness and object recognition, making autonomous machines more efficient in industrial, transportation, and consumer applications.

New AI algorithms also enhance robotic vision. Researchers from the University of Edinburgh designed an ant-inspired navigation system that outperforms traditional computer vision in complex environments.

Nvidia's latest patent enables robots to detect objects at varying distances with greater precision by segmenting images for neural networks. Vision Transformers and self-supervised learning methods are advancing monocular depth estimation and multi-view reconstruction, allowing robots to perceive spatial relationships more effectively. As sensor fusion technology grows, robot "eyes" will continue to improve, enhancing automation, logistics, and human-robot collaboration.



© 2025 Future Today Strategy Group. All Rights Reserved.

TAKING CUES FROM NATURE

© 2025 Future Today Strategy Group. All Rights Reserved.

TAKING CUES FROM NATURE

Quadrupedal Robots

Quadrupedal robots are rapidly evolving as they gain agility, intelligence, and new applications across industries. Companies like Boston Dynamics, Unitree Robotics, and Deep Robotics are integrating GPT-based AI, advanced LiDAR, and reaction wheel actuator systems to improve mobility and adaptability. The Unitree B2-W can now perform a handstand, while Deep Robotics' Lynx model navigates extreme terrain with ease. Researchers at Carnegie Mellon have enabled quadrupeds to balance on narrow beams, and ETH Zurich is testing robots for lunar exploration. AI-powered virtual training, such as MIT's LucidSim, is making these robots more versatile by allowing them to learn complex tasks in simulated environments before real-world deployment, which may drive broader adoption in security, inspections, emergency response, and consumer applications.

Biohybrid Robotics

The field of biohybrid robotics—the integration of living and deceased organisms and biological materials with robotic systems—is in a state of rapid advancement. The point is to achieve capabilities beyond traditional artificial constructs. Researchers at Harvard and Caltech have developed a "medusoid" robot that mimics jellyfish movement using rat muscle tissue and silicone polymers. Scientists at Tohoku University are incorporating wood lice and chitons as effectors in robotic arms. And at Cornell, a research team has engineered robots powered by the mycelium of king oyster mushrooms, which function as biological controllers, to respond to environmental stimuli like light. This innovation suggests potential applications in agriculture, where fungi-controlled robots could monitor soil conditions and autonomously adjust fertilization.

Necrobotics, first demonstrated in 2022 by Rice University researchers using a deceased spider's natural hydraulic system to function as a robotic gripper, is being explored as a low-cost, sustainable alternative to conventional robotics.

The push for biohybrid systems extends beyond organic materials in mechanical structures. In 2025, researchers at Northwestern University and Georgia Tech developed synthetic neurons with response times comparable to human neurons, a breakthrough that could enable real-time tactile sensing and perception in robots. Similarly, Japanese scientists created a robot face covered in living, self-healing skin that can display facial expressions, further blurring the line between biological and synthetic entities. These advancements, while promising, raise ethical concerns, particularly regarding the release of biohybrid organisms into ecosystems and their long-term impact. As this field matures, regulatory frameworks will be necessary to balance innovation with ethical responsibility.

Bioinspired Robotics

As robotics evolve, engineers are increasingly turning to nature's most efficient designs to enhance agility, adaptability, and functionality. From insect-like micro-drones to AI-powered animal-inspired robots, the field of bioinspired robotics is rapidly advancing across industries. Researchers at ETH Zurich have demonstrated superior maneuverability in confined spaces with Magnecko, a gecko-and spider-inspired robot capable of scaling walls and ceilings using electro-permanent magnet modules. Similarly, Gecko Robotics' AI-enhanced wall-climbing bots are assisting the US Navy in digitizing vessels while reducing maintenance downtime.

The study of animal locomotion is also influencing soft robotics. North Carolina State University researchers have created a caterpillar-inspired robot that utilizes silver nanowires to move through controlled heating. Meanwhile, a manta ray-inspired soft robot has set a new speed record of 6.8 body lengths per second by leveraging fluid dynamics to improve propulsion. In aviation, the Raven drone at Swiss Federal Institute of Technology in Lausanne mimics bird takeoff strategies, using spring-like legs for more energy-efficient flight. Even

© 2025 Future Today Strategy Group. All Rights Reserved.

TAKING CUES FROM NATURE

mythical creatures are serving as inspiration—Tampere University has developed fairy-like robots using stimuli-responsive polymers for potential agricultural applications like pollination.

These breakthroughs are not just theoretical. MIT's SoftZoo platform is optimizing soft robot design by simulating various animal-inspired morphologies. NASA's Jet Propulsion Laboratory is exploring robotic insects, capable of enduring harsh planetary conditions. With AI integration enhancing these biologically inspired systems, the future of robotics will be defined by efficiency, adaptability, and unprecedented versatility.

Shape-Shifters

Fluid movement in robotics is advancing beyond rigid structures, enabling machines to navigate complex environments with greater adaptability. Researchers at Carnegie Mellon, Sun Yat-sen, and Zhejiang universities have developed shape-shifting robots that transition between solid and liquid states using magnetic fields. These robots can escape enclosures and perform intricate tasks such as targeted drug delivery and circuit assembly. Northwestern University has a soft quadruped robot, powered by soft rubber actuator like a human muscle, that can move safely and seamlessly, including in hazardous conditions.

Other innovations include a vine-like robot from the University of California, Santa Barbara, which moves toward light sources, making it a potential tool for search-and-rescue operations. Researchers at Lawrence Livermore National Laboratory are developing soft materials that change shape in response to light, enabling robots to crawl, swim, or fly in extreme environments. Additionally, liquid metal hydrogel composites, highlighted in a 2023 research paper, are opening new possibilities for surface-tension-driven artificial muscles and dynamic robotic structures.

With AI and machine learning enhancing real-time adaptation, robots are becoming more responsive and capable of seamless movement across diverse terrains. These breakthroughs signal a shift toward robotics that not only imitate biological motion but also surpass human limitations in extreme environments.

Multimodal Movement

Robots are no longer constrained to a single mode of movement. They are evolving to seamlessly transition between walking, flying, crawling, swimming, and even shape-shifting. This shift in multimodal mobility is unlocking new applications in search-and-rescue, industrial inspections, space exploration, and beyond. Caltech's Multi-Modal Mobility Morphobot, capable of rolling, crouching, climbing, and transforming into a flying quadcopter, exemplifies this trend.

Soft robotics and origami-inspired engineering are further expanding possibilities. The University of Washington's microfliers leverage origami-based folding techniques to change descent paths, while UCLA's OrigaMechs integrate data processing directly into flexible robotic structures, reducing reliance on traditional semiconductors. Advances in AI-driven control systems are also enabling robots to autonomously select the most effective locomotion mode. Carnegie Mellon's 2025 AI model, for example, dynamically adjusts robot movement based on terrain conditions, and NASA's latest planetary exploration robots utilize real-time sensor fusion to navigate extraterrestrial landscapes.

As these systems become more sophisticated, industries are finding new use cases. Mobile manipulators—robot arms combined with autonomous mobile robots—are transforming warehouses, while Google's RT-2 vision-language-action model enables robots to interact with environments in human-like ways. These advancements signal a future where robots will no longer be confined to single-use applications but will instead operate dynamically across multiple domains, reshaping industries and expanding automation's frontier.

© 2025 Future Today Strategy Group. All Rights Reserved.

SCENARIO YEAR 2046

MOBILITY PARTNERS

By 2046, humanoid robots have transformed urban transportation, creating a new mobility paradigm unimaginable two decades earlier. In cities worldwide, personal mobility companions—descendants of early Figure and Optimus models—serve as both assistants and transport enhancers.

Standing just under 5 feet, these carbon-composite “Mobility Partners” accompany elderly citizens and those with disabilities. Their revolutionary adaptive grip technology, evolved from 2020s soft robotics, allows them to convert into support exoskeletons within seconds, bearing 80% of a user’s weight while maintaining natural movement. For longer journeys, the humanoid transforms into a personalized vehicle, using its legs as a stabilizing platform while the user sits in its reconfigured torso. Urban infrastructure has adapted accordingly. Narrow “companion lanes” line boulevards, and buildings feature specialized docking stations for quick charging. This symbiotic relationship has reduced traditional vehicle traffic by 38% in urban cores and reclaimed vast former parking areas for community use.

The social landscape reflects this transformation. The “Natural Movement” political faction advocates for robot-free zones, while complex etiquette has developed around human-robot interaction. Dating apps now include filters for “companion-free encounters,” and restaurants maintain both humanoid valet services and storage facilities. Despite these tensions, health officials celebrate the benefits: Walking rates have increased 64% among seniors, and mobility-related injuries have plummeted as companions’ AI anticipates falls before they occur. As one city official noted, “We didn’t eliminate cars by building better public transit—we did it by reimagining personal mobility itself.”

© 2025 Future Today Strategy Group. All Rights Reserved.

AUTHORS & CONTRIBUTORS

© 2025 Future Today Strategy Group. All Rights Reserved.

Nick Bartlett

Manufacturing Lead

Nick Bartlett is a Director at Future Today Strategy Group and leads our Financial Services & Insurance and Transportation & Manufacturing practice areas.

Prior to FTSG, he held positions in corporate strategy and insights generation roles, serving as a partner to senior leadership at multiple Fortune 100 financial services companies. Throughout his career, he has specialized in framework design, corporate innovation, strategic management, and insurance.

Nick has an extensive background in developing strategic insights across a variety of industries (e.g., manufacturing, transportation, construction, energy) and subject matter areas (e.g., small business, mobility, robotics, platforms & ecosystems), in addition to the shifting nature of business and consumer preferences. He has deep experience in developing and implementing both trend sensing, as well as signal identification for large organizations. Nick has also led the design and establishment of internal foresight and scenario development capabilities across multiple institutions.

He serves as a coach in the strategic foresight MBA course at the NYU Stern School of Business. Nick holds both an MBA and a Bachelor of Arts in Public Relations from Quinnipiac University.

Chief Executive Officer
Amy Webb

Managing Director
Melanie Subin

Director of Marketing & Comms.
Victoria Chaitoff

Creative Director
Emily Caufield

Editor
Erica Peterson

Copy Editor
Sarah Johnson

Andrew McDermott
Business Process Manager, Contributor

© 2025 Future Today Strategy Group. All Rights Reserved.

SELECTED SOURCES

© 2025 Future Today Strategy Group. All Rights Reserved.

"20% More Powerful Tandem Solar Panels Enter Commercial Use for the First Time in the US." Oxford PV, 5 Sept. 2024, https://www.oxfordpv.com/news/20-more-powerful-tandem-solar-panels-enter-commercial-use-first-time-us.

"Alat and SoftBank Group Form a Strategic Partnership to Manufacture Groundbreaking Industrial Robots in the Kingdom." SoftBank Group Corp., 20 Feb. 2024, https://group.softbank/en/news/press/20240220.

Anindya, Michelle. "Grab Built Its Own Map in Southeast Asia, and Is Now Going After Google." Rest of World, 13 Nov. 2024, https://restofworld.org/2024/grab-google-maps-southeast-asia/.

Anuszczyk, Simon R, and John O Dabiri. "Electromechanical Enhancement of Live Jellyfish for Ocean Exploration." Bioinspiration & Biomimetics 19, no. 2 (February 2024): 026018. https://doi.org/10.1088/1748-3190/ad277f.

Apptronik. "Apptronik and Mercedes-Benz Enter Commercial Agreement That Will Pilot Apptronik's Apollo Humanoid Robot in Mercedes-Benz Manufacturing Facilities." PR Newswire, 15 Mar. 2024, https://www.prnewswire.com/news-releases/apptronik-and-mercedes-benz-enter-commercial-agreement-that-will-pilot-apptroniks-apollo-humanoid-robot-in-mercedes-benz-manufacturing-facilities-302089972.html.

"A New Era for Batteries: Argonne Leads $50M Sodium-Ion Innovation Push." Argonne National Laboratory, 21 Nov. 2024, https://www.anl.gov/article/a-new-era-for-batteries-argonne-leads-50m-sodiumion-innovation-push. Press release.

Bradsher, Keith. "China Is Testing More Driverless Cars Than Any Other Country." The New York Times, 13 June 2024, https://www.nytimes.com/2024/06/13/business/china-driverless-cars.html.

"CN118100238 Control of Vehicle and Domestic Energy Storage Systems." https://patentscope.wipo.int/search/en/detail.jsf?docId=CN430695273&_cid=P12-M7MUBD-74551-1.

"DJI Updates GEO System in U.S. Consumer & Enterprise Drones." DJI, 13 Jan. 2025, https://viewpoints.dji.com/blog/geo-system-update. Press release.

Dlouhy, Jennifer A. "Longtime Oil and Corn Foes Unite to Battle Biden Car Standards." Bloomberg, 13 June 2024, https://www.bloomberg.com/news/articles/2024-06-13/longtime-oil-and-corn-foes-unite-to-battle-biden-car-standards.

Dvorak, Phred. "Solar-Powered Planes Take Flight." The Wall Street Journal, 11 June 2024, https://www.wsj.com/science/environment/solar-powered-aircraft-planes-research-e551596c.

Felton, Ryan. "Jeep Maker Stellantis Brings Back American Classics After CEO Exit." The Wall Street Journal, 21 Jan. 2025, https://www.wsj.com/business/autos/jeep-maker-stellantis-brings-back-american-classics-after-ceo-exit-87636364.

"First Partial Driving Automation Safeguard Ratings Show Industry Has Work to Do." IIHS, 12 Mar. 2024, https://www.iihs.org/news/detail/first-partial-driving-automation-safeguard-ratings-show-industry-has-work-to-do.

Gandia, Antoni, and Andrew Adamatzky. "Fungal Skin for Robots." BioSystems 235 (January 1, 2024): 105106. https://doi.org/10.1016/j.biosystems.2023.105106.

"German Bionic Unveils Apogee ULTRA — the World's Most Powerful Exoskeleton." German Bionic, 7 Jan. 2025, https://germanbionic.com/en/ces-2025-apogee-ultra/. Press release.

Gitlin, Jonathan M. "Linux Is Now an Option for Safety-Minded Software-Defined Vehicle Developers." Ars Technica, 23 Apr. 2024, https://arstechnica.com/cars/2024/04/linux-is-now-an-option-for-safety-minded-software-defined-vehicle-developers/.

Hancock, Alice, et al. "EU to Demand Technology Transfers from Chinese Companies." Financial Times, 19 Nov. 2024, https://www.ft.com/content/f4fd3ccb-ebc4-4aae-9832-25497df559c8.

Hill, Kashmir. "Automakers Are Sharing Consumers' Driving Behavior With Insurance Companies." The New York Times, 11 Mar. 2024, https://www.nytimes.com/2024/03/11/technology/carmakers-driver-tracking-insurance.html.

"Honda Presents World Premiere of Honda 0 Saloon and Honda 0 SUV Prototypes at CES 2025." Honda, 8 Jan. 2025, https://global.honda/en/newsroom/news/2025/c250108aeng.html. Press release.

Hu, Krystal. "BMW Taps Humanoid Startup Figure to Take on Tesla's Robot." Reuters, 18 Jan. 2024, https://www.reuters.com/business/autos-transportation/bmw-taps-humanoid-startup-figure-take-teslas-robot-2024-01-18/.

Hyundai. "Hyundai Mobis Debuts Holographic Heads-Up Display, Redefining In-Car Tech at CES 2025." PR Newswire, 8 Jan. 2025, https://www.prnewswire.com/news-releases/hyundai-mobis-debuts-holographic-heads-up-display-redefining-in-car-tech-at-ces-2025-302346500.html. Press release.

Jin, Hyunjoo, and David Shepardson. "California Sidelines GM Cruise's Driverless Cars, Cites Safety Risk." Reuters, 21 Oct. 2023, https://www.reuters.com/business/autos-transportation/california-suspends-gm-cruises-driverless-autonomous-vehicle-permits-2023-10-24/.

© 2025 Future Today Strategy Group. All Rights Reserved.

Johnson Jr., John. “New Forms of Steel for Stronger, Lighter Cars,” Knowable Magazine, 5 Aug. 2024, https://knowablemagazine.org/content/article/technology/2024/new-steel-for-stronger-lighter-cars.

Kim, Ji Woong, et al. “Surgical Robot Transformer (SRT): Imitation Learning for Surgical Tasks.” ArXiv, 17 July 2024. https://doi.org/10.48550/arXiv.2407.12998.

Kleinman, Zoe. “Electric Car Battery Charges in Under Five Minutes in Track Test.” BBC, 27 June 2024, https://www.bbc.com/news/articles/cz9dp3ye77do.

Kuthunur, Sharmila. “Near Space Labs Launches Fleet of AI-Powered Balloon Robots to Track Earth Climate Risk.” Space.com, 27 Nov. 2024, https://www.space.com/space-exploration/tech/near-space-labs-launches-fleet-of-ai-powered-balloon-robots-to-track-earth-climate-risks.

Lai, Haowen, et al. “Enabling Visual Recognition at Radio Frequency.” Proceedings of the 30th Annual International Conference on Mobile Computing and Networking, 388-403. ACM MobiCom ’24. New York, NY, USA: Association for Computing Machinery, 2024. https://doi.org/10.1145/3636534.3649369.

Lan, Yi-Chen, et al. “Interfacial Layers to Enable Recyclability of All-Solid-State Lithium Batteries.” ACS Energy Letters 9, no. 7 (12 July 2024): 3324–34. https://doi.org/10.1021/acsenergylett.4c01153.

“Lyft Announces New Round of Autonomous Partnerships.” Lyft, November 6, 2024. https://investor.lyft.com/news-and-events/news/news-details/2024/Lyft-Announces-New-Round-of-Autonomous-Partnerships/default.aspx. Press release.

Maisch, Marija. “New Sodium-Ion Developments from CATL, BYD, Huawei.” Energy Storage, 28 Nov. 2024, https://www.ess-news.com/2024/11/28/new-sodium-ion-developments-from-catl-byd-huawei/.

Mannes, Marie. “Exclusive: Crisis-Hit EV Battery Champion Northvolt Struggles to Hit Production Targets.” Reuters, 18 Nov. 2024, https://www.reuters.com/technology/crisis-hit-ev-battery-champion-northvolt-struggles-hit-production-targets-2024-11-18/.

“Manta Rays Inspire the Fastest Swimming Soft Robot Yet.” EurekAlert!, 4 Dec. 2024, https://www.eurekalert.org/news-releases/1066047.

McBride, Sarah. “Musk’s Neuralink Launches Study of Mind-Controlled Robotic Arm.” Bloomberg, 25 Nov. 2024, https://www.bloomberg.com/news/articles/2024-11-25/elon-musk-s-neuralink-launches-study-of-mind-controlled-robotic-arm.

Mishra, Anand Kumar, et al. “Sensorimotor Control of Robots Mediated by Electrophysiological Measurements of Fungal Mycelia.” Science Robotics 9, no. 93 (August 28, 2024): eadk8019. https://doi.org/10.1126/scirobotics.adk8019.

“Natron Energy Announces Plans for $1.4 Billion Giga-Scale Sodium-Ion Battery Manufacturing Facility in North Carolina.” Business Wire, 15 Aug. 2024, https://www.businesswire.com/news/home/20240815622233/en/Natron-Energy-Announces-Plans-for-1.4-Billion-Giga-Scale-Sodium-Ion-Battery-Manufacturing-Facility-in-North-Carolina.

“New BMW Panoramic IDrive Revolutionizes Vehicle Operation.” BMW Group, 7 Jan. 2025, https://www.press.bmwgroup.com/usa/article/detail/T0447356EN_US/new-bmw-panoramic-idrive-revolutionizes-vehicle-operation. Press release.

“Next Stop: Miami.” Waymo, 5 Dec. 2024, https://waymo.com/blog/2024/12/next-stop-miami/. Press release.

“Outlook for Electric Mobility.” IEA, https://www.iea.org/reports/global-ev-outlook-2024/outlook-for-electric-mobility.

“Perceptive Completes World’s First Fully Automated Dental Procedure on a Human Using AI-Driven Robotic System.” Business Wire, 30 July 2024, https://www.businesswire.com/news/home/20240730980575/en/Perceptive-Completes-World%E2%80%99s-First-Fully-Automated-Dental-Procedure-on-a-Human-Using-AI-Driven-Robotic-System.

Peters, Adele. “This Recycling Robot Is Saving Millions of Bottles from the Landfill.” Fast Company, 6 Mar. 2024, https://www.fastcompany.com/91047150/this-recycling-robot-is-saving-millions-of-bottles-from-the-landfill.

“Product — WeWalk Smart Cane.” WeWalk, https://wewalk.io/en/product/.

“Q2 2024 Letter to Shareholders.” General Motors Company, 23 July 2024, https://investor.gm.com/news-releases/news-release-details/q2-2024-letter-shareholders/.

“Rivian Adventure Network Opens Its First Chargers for All EVs.” Rivian, 5 Dec. 2024, https://rivian.com/newsroom/article/rivian-adventure-network-opens-its-first-chargers-for-all-evs. Press release.

Rivière, Benjamin, John Lathrop, and Soon-Jo Chung. “Monte Carlo Tree Search With Spectral Expansion for Planning with Dynamical Systems.” Science Robotics 9, no. 97 (4 Dec. 2024): eado1010. https://doi.org/10.1126/scirobotics.ado1010.

© 2025 Future Today Strategy Group. All Rights Reserved.

Scheffler, Ian. "Touching the Future: Mastering Physical Contact With New Algorithm for Robots." Penn Engineering, 8 Oct. 2024, https://ai.seas.upenn.edu/news/touching-the-future-mastering-physical-contact-with-new-algorithm-for-robots/.

Shin, Won Dong, et al. "Fast Ground-to-Air Transition With Avian-Inspired Multifunctional Legs." Nature 636, no. 8041 (December 2024): 86–91. https://doi.org/10.1038/s41586-024-08228-9.

Shiraki, Maki, et al. "How Nissan and Honda's $60 Billion Merger Talks Collapsed." Reuters, 12 Feb. 2025, https://www.reuters.com/markets/deals/inside-collapse-nissan-hondas-60-billion-mega-deal-2025-02-12/.

Štefančič, Aleš, et al. "Converting the CHF3 Greenhouse Gas into Nanometer-Thick LiF Coating for High-Voltage Cathode Li-Ion Batteries Materials." ChemSusChem, 16 Dec. 2024, https://doi.org/10.1002/cssc.202402057.

"Sony Honda Mobility Introduces AFEELA 1 at CES 2025." Afeela, 6 Jan. 2025, https://www.shm-afeela.com/en/news/2025-01-06_5/. Press release.

"Toyota and Joby Complete First Air Taxi Flight in Japan." Joby, 4 Nov. 2024, https://www.jobyaviation.com/news/toyota-joby-complete-first-air-taxi-flight-japan/. Press release.

Tran-Ngoc, Phuoc Thanh, et al. "Intelligent Insect—Computer Hybrid Robot: Installing Innate Obstacle Negotiation and Onboard Human Detection onto Cyborg Insect." Advanced Intelligent Systems 5, no. 5 (2023): 2200319. https://doi.org/10.1002/aisy.202200319.

"Unity Partners With Mazda to Transform In-Cabin Car Experience," Business Wire, 6 Mar. 2024, https://www.businesswire.com/news/home/20240306534030/en/Unity-Partners-with-Mazda-to-Transform-In-Cabin-Car-Experience. Press release.

"US20200160172 Controlling Agents Using Scene Memory Data." https://patentscope.wipo.int/search/en/detail.jsf?docId=US295247803&_cid=P12-M7MVAN-00079-1.

"US20210021132 Energy Management Device, Hydrogen Utilization System, Non-Transitory Computer Readable Medium, and Energy Management Method." https://patentscope.wipo.int/search/en/detail.jsf?docId=US315293928&_cid=P12-M7MUQL-85810-1.

"US20220366725 Engagement Detection and Attention Estimation for Human-Robot Interaction." https://patentscope.wipo.int/search/en/detail.jsf?docId=US378638640&_cid=P12-M7MV4G-95869-1.

"US20240054773 Techniques to Increase Inference Accuracy." https://patentscope.wipo.int/search/en/detail.jsf?docId=US422371310&_cid=P12-M7MV54-96233-1.

"US20240127261 Load Profile Based Removal of Greenhouse Emissions." https://patentscope.wipo.int/search/en/detail.jsf?docId=US427662474&_cid=P12-M7MURH-86398-1.

"US20240220937 Ingest and Deploy Maintenance Services for an Autonomous Vehicle." https://patentscope.wipo.int/search/en/detail.jsf?docId=US432851910&_cid=P12-M7MU8X-72747-1.

"US20240236627 Using a Blockchain to Determine Trustworthiness of Messages Between Vehicles Over a Telecommunications Network." https://patentscope.wipo.int/search/en/detail.jsf?docId=US433561412&_cid=P22-LZJTZE-44205-2.

"US20240239532 Techniques for Launching And Landing a Drone From the Interior of a Vehicle." https://patentscope.wipo.int/search/en/detail.jsf?docId=US435542644&_cid=P12-M7MVCC-01330-1.

"US20240249292 Carbon Footprint Determination for Manufacturing a Vehicle." https://patentscope.wipo.int/search/en/detail.jsf?docId=US435749029&_cid=P12-M7MUSN-87196-1.

"US20240351200 Cobot Model Generation Based on a Generic Robot Model." https://patentscope.wipo.int/search/en/detail.jsf?docId=US441474921&_cid=P12-M7MTN8-57485-1.

"US20240386747 Scene Authentication." https://patentscope.wipo.int/search/en/detail.jsf?docId=US443005522&_cid=P12-M7MULD-81873-1.

Wissa, Aimy A. "Bird-Inspired Leg Enables Robots to Jump into Flight." Nature 636, no. 8041 (December 2024): 48–49. https://doi.org/10.1038/d41586-024-03845-w.

"World's Longest Cargo Sail Ship Launches." Logistics UK. 13 Feb. 2025, https://logistics.org.uk/logistics-magazine-portal/logistics-magazine-features-listing/auto-restrict-folder/13-02-25/world-s-longest-cargo-sail-ship-launches.

Yong-Jun, Cho. "Hyundai Made a Big Bet on Touch Screens in Cars. Here's Why It's Going Back to Buttons." Korea JoongAng Daily, 7 Nov. 2024, https://koreajoongangdaily.joins.com/news/2024-11-07/business/industry/Hyundai-made-a-big-bet-on-touch-screens-in-cars-Heres-why-its-going-back-to-buttons/2172220.

Zewe, Adam. "A Faster, Better Way to Train General-Purpose Robots." MIT News, 28 Oct. 2024, https://news.mit.edu/2024/training-general-purpose-robots-faster-better-1028.

© 2025 Future Today Strategy Group. All Rights Reserved.

ABOUT FUTURE TODAY STRATEGY GROUP

© 2025 Future Today Strategy Group. All Rights Reserved.

ABOUT US

Future Today Strategy Group is a consulting firm specializing in strategic foresight, a data-driven practice for developing plausible future scenarios to inform today's decisions. As organizations across the globe grapple with an increasingly volatile and uncertain business climate, FTSG provides clarity through long-term strategic planning. Its team of subject matter experts combines best-in-class trends and technology research with actionable strategies to generate business impact. In the two decades since its founding, FTSG has become the preeminent foresight advisory to Fortune 500 companies, world governments, and other major organizations – empowering leaders to make better decisions about the future, today.

CONTACT US

For an introductory conversation to learn how FTSG can assist your organization with its strategic planning and foresight needs, please contact:

inquiries@ftsg.com

ftsg.com

+1 267 342 4300

SOCIAL

Linkedin

@Future-Today-Strategy-Group

© 2025 Future Today Strategy Group. All Rights Reserved.

The names of companies, services, and products mentioned in this report are not necessarily intended as endorsements by FTSG or this report's authors.

FTSG's 2025 Tech Trends Report relies on data, analysis, and modeling from a number of sources, which includes sources within public and private companies, securities filings, patents, academic research, government agencies, market research firms, conference presentations and papers, and news media stories. Additionally, this report draws from FTSG's previous reports and newsletters. FTSG's reports are occasionally updated on the FTSG website.

FTSG advises hundreds of companies and organizations, some of which are referenced in this report. FTSG does not own any equity position in any of the entities listed in this presentation.

Any trademarks or service marks used in this report are the marks of their respective owners, who do not endorse the statements in this report. All rights in marks are reserved by their respective owners. We disclaim any and all warranties, expressed or implied, with respect to this report.

© 2025 Future Today Strategy Group. All rights reserved.

This report and its contents are proprietary intellectual property of Future Today Strategy Group (FTSG). While internal sharing within organizations is permitted, no part of this report may be modified, published, or commercially distributed without the prior written permission of Future Today Strategy Group.

When citing or referencing this report, please use the following attribution: "Future Today Strategy Group 2025 Tech Trends Report" with appropriate reference to FTSG as the source.

For permission requests regarding commercial use, please contact:
inquiries@ftsg.com

© 2025 Future Today Strategy Group. All Rights Reserved.

FTSG