

## ECONOMY

# How Self-Driving Cars Could Change the Auto Industry

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Driverless cars have piqued human interest for centuries. Leonardo Da Vinci sketched out the plans for a hypothetical self-driving cart in the late 1400s, and mechanical autopilots for airplanes emerged in the 1930s.<sup>[1]</sup> At the New York World's Fair, visitors were introduced to the concept of a self-driving car as part of its vision of the future in General Motors ([GM](#)) Futurama exhibit.<sup>[2]</sup>

Technological advancements in GPS, digital mapping, computing power, and sensor systems have finally made it a reality. But what are the potential impacts of driverless cars on the car industry and the larger economy?

## KEY TAKEAWAYS

- The widespread adoption of driverless cars has the potential to revolutionize the economy, transform industries, and create new business opportunities.
- Driverless cars will generate employment in such sectors as software development, data analytics, and autonomous vehicle maintenance.
- Car manufacturers will need to adapt their business models to emphasize software development, AI integration, and data management.
- Increased productivity due to optimized travel time can arguably boost economic output, benefiting businesses and individuals alike.

## Understanding Automobile Automation

Before we look at impacts to the car industry and general economics, let's cover how driverless cars work. Autonomous vehicles (AVs) are equipped with sensors like LiDAR, radar, cameras, and ultrasonic sensors to provide a 360-degree view of their surroundings. These sensors enable them to detect objects, pedestrians, and road conditions in real-time.<sup>[3]</sup>

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algorithms process the data from sensors and maps, interpreting the environment, identifying objects, and making decisions. Advanced control systems operate AVs safely and precisely, controlling steering, acceleration, and braking based on AI algorithms' decisions. <sup>[4]</sup>

Testing and validation are done via simulations, closed-course testing, and real-world trials to ensure reliability and safety. By combining these technologies, AVs can detect obstacles, recognize traffic signals, navigate complex roadways, and respond to changing conditions. This makes them capable of safely transporting passengers without human intervention, thus disrupting the auto industry and economy. <sup>[5]</sup>



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The table below from the United States Environmental Protection Agency outlines the various levels of self-driving vehicles. <sup>[6]</sup>

Level	Who Does What, When
Level 1	<i>The human driver does all the driving.</i>
Level 2	<i>An advanced driver assistance system (ADAS) on the vehicle can sometimes assist the human driver with either steering or braking/accelerating, but not both simultaneously.</i>
Level 3	<i>An advanced driver assistance system (ADAS) on the vehicle can itself control both steering and braking/accelerating simultaneously under some circumstances. The human driver must continue to pay full attention ("monitor the driving environment") at all times and perform the rest of the driving task.</i>
Level 4	<i>An Automated Driving System (ADS) on the vehicle can itself perform all driving tasks and monitor the driving environment – essentially, do all the driving – in certain circumstances. The human need not pay attention in those circumstances.</i>
Level 5	<i>This is the envisioned "driverless" car. An Automated Driving System (ADS) on the vehicle can do all the driving in all circumstances. The human occupants are just passengers and need never be involved in driving.</i>

## Impact on the Automobile and Related Industries

The automobile industry has been historically slow to react to technological change. Traditional car makers have been reluctant to develop a full-featured electric car, and start-ups such as Tesla Motors ([TSLA](#)) have been founded to innovate instead. <sup>[7]</sup> If self-driving cars become prevalent, it is likely that

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Toyota (TM).

Let's look a variety of more specific impacts AVs can have on the automobile industry.

### Changes to Business Models

The emergence of autonomous vehicles can lead to a shift in the traditional business model of the auto industry. It's estimated that the 2023 autonomous vehicle market size is \$33.5 billion; it's also forecast that the industry will grow to over \$93 billion by 2028.<sup>[8]</sup>

Instead of just manufacturing and selling cars to individual consumers, automakers are exploring new revenue streams through mobility services. This includes developing autonomous ride-hailing services, car-sharing platforms, and [subscription-based models](#) where customers pay for access to a fleet of autonomous vehicles rather than owning a car. This shift may require automakers to form partnerships with tech companies and mobility service providers to deliver integrated and seamless mobility solutions.

### New Automakers

The development of autonomous technology has attracted tech giants and startups to the auto industry. Companies like Google, Tesla, and Apple are investing heavily in AV technology, creating new competition for traditional automakers.<sup>[9][10][11]</sup> As a result, automakers face a more competitive environment in the race to bring reliable and safe autonomous vehicles to the market.

### Interior Design

Autonomous vehicles offer new design possibilities since passengers will no longer need to focus on driving. Interior spaces can be reimagined to become more comfortable and provide features for productivity or entertainment. Additionally, the integration of advanced sensors and AI technology requires automakers to rethink vehicle architecture and design to optimize sensor placement and ensure maximum safety. With potential changes of how these vehicles are operated, the future of what cars may look like is evolving.

### Interconnectivity

AVs generate massive amounts of data through their sensors and AI systems. This data is invaluable for improving autonomous algorithms, enhancing safety, and optimizing traffic flow. Though the extent of how this [big data](#) can be used is still evolving, consider how city municipalities can acquire and leverage this data to better understand traffic flows, driving tendencies, and ways to improve their cities.<sup>[12]</sup>

### Automotive Supply Chain

The transition to autonomous vehicles may impact the automotive supply chain. Automakers may need to collaborate with new suppliers for specialized AV components, such as advanced sensors and AI processors. Additionally, AV technology may require changes in manufacturing processes, [quality control](#),

## Government Regulation

The introduction of autonomous vehicles presents complex regulatory challenges. Governments and policymakers must create a clear legal framework and standards to govern AV operations, safety testing, liability, data privacy, and [cybersecurity](#). Keep in mind that approximately 1.3 million people die each year as a result of road traffic crashes due to traditional means of driving.<sup>[13]</sup> Harmonizing regulations across regions and countries will be essential to facilitate the development and deployment of autonomous vehicles on a global scale.

## Auto Insurance

Driverless car-makers promise their products will be safe and reduce accidents. Drunk driving will become a thing of the past as inebriated passengers will be chauffeured by their mechanical Hobsons. As a result, the incidence of hazard might fall dramatically – seriously impacting [car insurance](#) companies such as Allstate ([ALL](#)), GEICO ([BRK.A](#)), and Progressive ([PGR](#)). Since there presumably would be fewer accidents, the cost of insurance would plummet along with insurance companies' bottom lines.<sup>[14]</sup>

### FAST FACT

*In a 2023 survey by AAA, 68% of individuals surveyed noted they are afraid of partially-automated vehicle technology, up 13% from last year.<sup>[15]</sup>*

## Impact on the Greater Economy

In addition to disrupting the auto industry, AVs can have widespread and deep impact to the global economy. Here's a brief list of potential repercussions of the evolution of driverless cars.

## Employment

The advent of autonomous vehicles has raised concerns about job displacement for professional drivers. Occupations such as truck drivers, taxi drivers, and delivery drivers may face job disruptions as AVs become more widespread. However, new job opportunities will also emerge, such as overseeing AV fleet operations, maintenance, and software development. The auto industry will need to manage this transition and potentially invest in retraining programs for affected workers.

## Environments and Consumption

Safer driving and optimized traffic flow can also reduce fuel consumption and emissions, contributing to [ESG benefits](#) and potentially transforming the automotive industry's sustainability efforts. Autonomous vehicles can be programmed to optimize driving patterns, maintain consistent speeds, and avoid aggressive acceleration or braking, leading to smoother traffic flow and improved fuel efficiency. Autonomous cars can also employ eco-friendly driving strategies, such as predictive cruising and route planning.<sup>[4]</sup>

## Consumer Tendencies

Uber-like app, then there would be no need for that user to own their own car, let alone multiple cars. A decentralized fleet of driverless cars, therefore, could be shared by many needing rides. Though this may negatively impact car sales, the need to never drive again may free consumer resources (time and money) to be spent otherwise.

### Urban Development

Driverless cars could prompt changes in urban development and infrastructure planning. Reduced demand for parking spaces and increased emphasis on mobility services may lead to the repurposing of parking lots and garages for other uses. Cities may need to adapt their transportation infrastructure to accommodate autonomous vehicles, which could result in both public and private investment opportunities. <sup>[16]</sup>

### Corporate Productivity

With autonomous vehicles handling the driving, commuters and businesses can utilize travel time more efficiently. Passengers can work, relax, or engage in other activities during their journeys, leading to increased productivity. Businesses may also benefit from improved logistics and delivery processes, reducing operational costs and enhancing overall economic output.

### Are Driverless Cars Safe?

Driverless cars are designed with multiple safety systems, redundancies, and fail-safe mechanisms to minimize risks. The technology aims to significantly reduce accidents caused by human error, which account for a large percentage of road crashes. <sup>[4]</sup> Extensive testing and validation processes are conducted to ensure the safety and reliability of autonomous vehicles, though the full extent of how reliable these driverless cars is yet to be fully determined.

### What Role Does Artificial Intelligence Play in Driverless Cars?

Artificial intelligence is the driving force behind autonomous vehicles. AI algorithms process sensor data, recognize patterns, identify objects, and make real-time decisions on how to navigate safely. The continuous learning capability of AI enables AVs to improve their performance through data analysis and experience.

### What Are the Challenges Facing Driverless Car Adoption?

Key challenges to driverless car adoption include regulatory and legal frameworks, safety concerns, public acceptance, cybersecurity, and data privacy. Additionally, the integration of autonomous technology with existing transportation infrastructure and vehicles presents technical and logistical challenges. <sup>[4]</sup>

### What Are the Privacy Concerns With Driverless Cars?

Driverless cars collect vast amounts of data from their sensors and cameras, which raises privacy concerns. Ensuring transparent data management, data anonymization, and robust cybersecurity measures are crucial to address these privacy issues and gain public trust in the technology. <sup>[4]</sup>

### The Bottom Line

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to disrupt the automobile and related industries, seriously hurting the bottom line of those companies who are not quick to adapt. At the same time, the benefits to society and the macroeconomy will be positive and significant. There will, however, be a smaller few who become displaced by the new technology and will not benefit from the larger societal gains.

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