Automotive Software

Market Scenario

and Competitive Landscape

A CURA DI

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Disclaimer

Introduction and Methodology

“Market Scenario” is a customized and organized analysis to gather information about target markets and competitive landscape in a particular sector.

“Market Scenario” provides relevant information to identify and analyze market needs, market size and competition in the fields of interest of the customer. A technology or a product developed by the customer can be characterized according to the sectors and potentiality of application, target market, competitive advantages and potential partners of the technology. The analysis is performed with the application of technology and business intelligence tools. The research in the information providers is usually based on the use of keywords or by thematic area, according to the specific topic of interest.

The results of the assessment are data about the target or global market potential, market value and applicability of the technologies or products developed by the customer, the trends of the market of interest, the segmentation of the market (e.g., by application, geography or indication), the supply chain and the competitive advantages of products or technologies, the key players active in the market of interest and the possible direct or indirect competitors of the customer.

Context

This report provides an overview of the **automotive software market**, with reference to the trend and dynamics in the period 2023 - 2030, to the market segmentations by ICE and EV applications, by software layer, by vehicle type and by region, and to the competitive landscape in the field, especially at the European level.

1 Automotive Software

Automotive software is a collected programmable data instruction used for performing operations of computer-based in-vehicle applications. It also refers to the software used for in-vehicle embedded systems. Computer-based in-vehicle applications include telematics, infotainment, powertrain, body control and comfort, communication, advanced driver assistance systems (ADAS), and safety. The usage of software has increased in various automotive applications such as telematics, infotainment & communications systems, powertrain, body control & comfort, and ADAS & safety. Accordingly, automotive players are focusing on the safety, quality, reliability, and security of vehicle software. This will raise the demand for automotive software for efficient functioning, thereby boosting revenue growth during the forecast period.

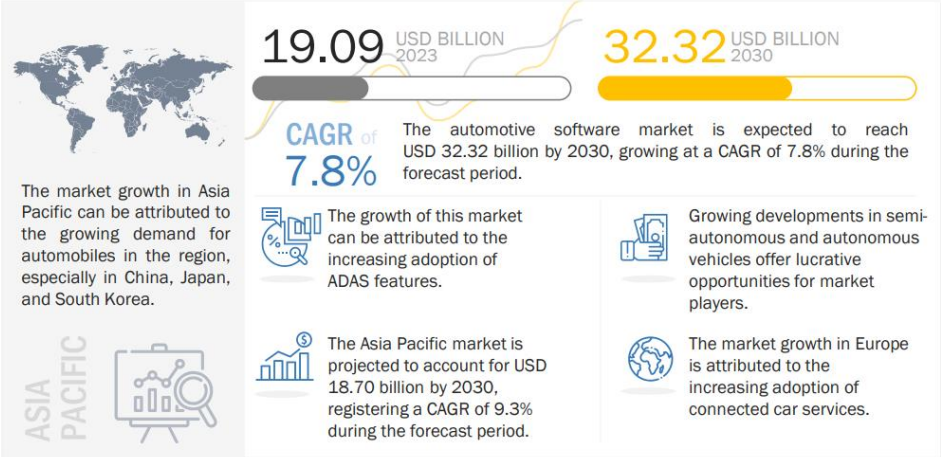
Over the last few years, various technologies have been developed in the field of driver assistance systems, and innovations, such as autonomous vehicle technology, are in the development phase. These technologies, including adaptive cruise control (ACC), lane departure warning system (LDWS), blind spot detection (BSD), and park assist, among others, have helped the automobile industry advance and promote passenger cars across the globe.

The shifting focus has created a huge opportunity for IT and other companies in the automotive ecosystem, such as International Business Machines Corporation (IBM) (US), Microsoft Corporation (US), and Cisco Systems, Inc. (US). Consumers are now looking for advanced features in vehicles, such as safety functions, telematics, navigation systems, infotainment, connectivity services, and many others. From 2025, all new Jaguar and Land Rover vehicles will be built on the NVIDIA DRIVE software-defined platform, delivering a wide spectrum of active safety, automated driving, parking systems, and driver assistance systems.

1.1 Global Market and Market Dynamics

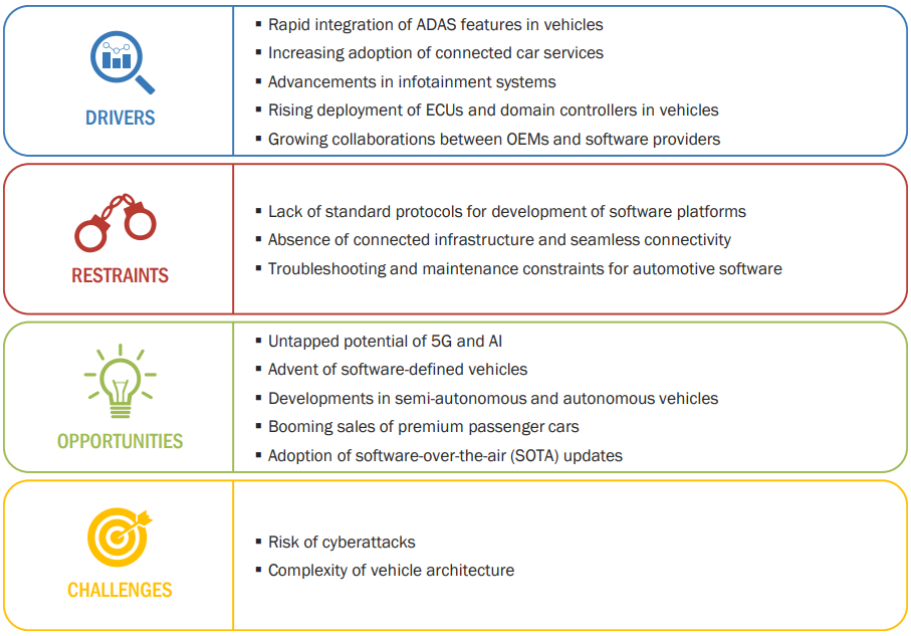
The **global automotive software market** is expected to reach the value of USD 32.32 billion by 2030, growing at a Compound Annual Growth Rate (CAGR) of 7.8% in the period 2023 – 2030 (Figure 1).

Figure 1. Global Automotive Software Market in the Period 2023 - 2030



Disrupting trends and innovations such as autonomous driving, ADAS, digital cockpit technologies, growth of connected cars, 3D map systems, sensor fusion, increasing use of artificial intelligence (AI) and machine learning (ML) in automotive software, and the growing importance of over-the-air (OTA) software updates and ECU consolidation are influencing the market for automotive software. However, factors such as cybersecurity, complexity of vehicle architecture, high cost of automotive software development, and gaps in industry standards across regions are a few major **challenges** confronted by various stakeholders of the automotive software market (Figure 2).

Figure 2. Automotive Software Market Dynamics



1.2 Market Segmentation by ICE Application

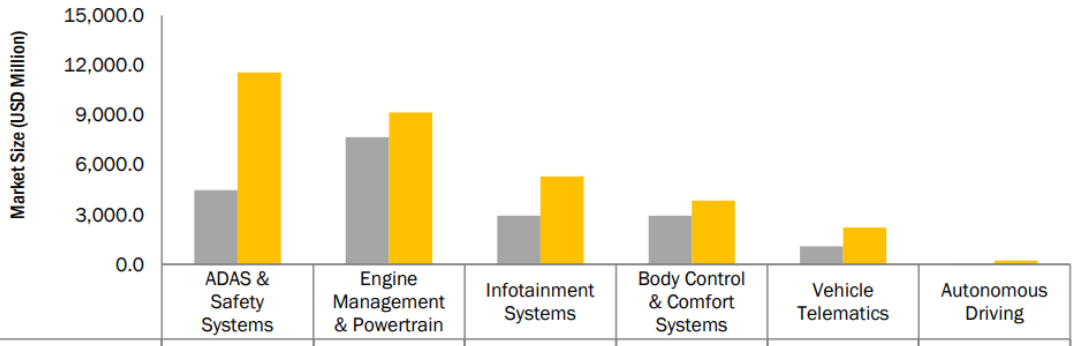
Based on **internal combustion engine** (ICE) application, the automotive software market has been segmented into: **ADAS & safety systems, autonomous driving, body control & comfort systems, infotainment systems, engine management & powertrain and vehicle telematics** (Figure 3). Automotive software is used in ICE vehicles to control and manage a wide range of systems and functions such as engine management, transmission control, braking system control, anti-lock braking system (ABS), airbag system control, and infotainment system. Automotive software now controls various aspects of the vehicle, such as engine, transmission, ADAS, powertrain, autonomous driving system, brakes, and steering. Vehicle models such as Honda City, Mercedes-Benz EQS Seda, Hyundai Ioniq 5, Audi A8, and Mahindra XUV700 require automotive-embedded software to run advanced applications effectively in a real-time environment.

The **infotainment systems** segment is projected to reach USD 5,297.2 million by 2030, from USD 2,934.2 million in 2023. The growing demand for vehicles equipped with connectivity would boost the telematics and infotainment systems segment.

The **ADAS & safety systems** segment is expected to be the largest market, reaching USD 11,574.0 million by 2030 at a CAGR of 14.5%. Increasing electronic content to enable effective safety features is the key driver for the ADAS & safety systems segment of the automotive software market.

The **autonomous driving** segment is projected to grow at the highest CAGR of 61.0% during the forecast period.

Figure 3. Automotive Software Market, by Ice Application, 2023–2030



	ADAS & Safety Systems	Engine Management & Powertrain	Infotainment Systems	Body Control & Comfort Systems	Vehicle Telematics	Autonomous Driving
2023	4,474.3	7,658.2	2,934.2	2,939.8	1,084.8	8.0
2030	11,574.0	9,163.1	5,297.2	3,842.3	2,226.8	225.6
CAGR (2023–2030)	14.5%	2.6%	8.8%	3.9%	10.8%	61.0%

1.3 Market Segmentation by EV Application

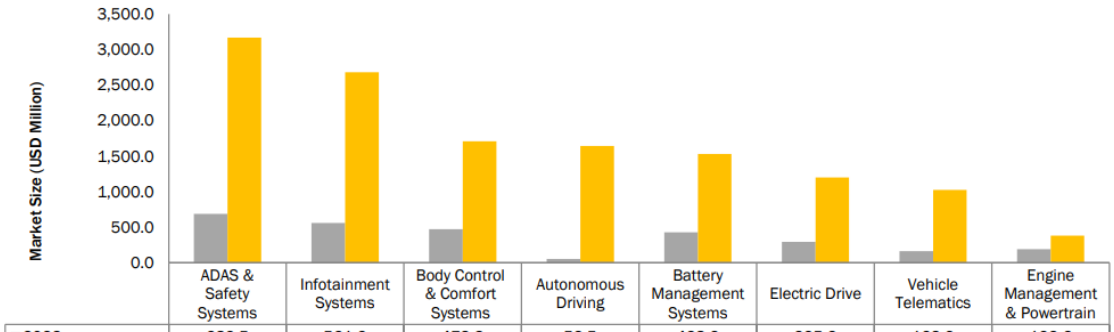
Based on **electric vehicle** (EV) **application**, the automotive software market has been segmented into: **electric drive, battery management systems, ADAS & safety systems, autonomous driving, body control & comfort systems, infotainment systems, engine management & powertrain and vehicle telematics** (Figure 4). The rising penetration of electric cars will positively influence the demand for software associated with these vehicles. Electric vehicles heavily rely on software content to ensure the efficient functioning of EV applications such as electric drive, battery management, ADAS, infotainment, body control & comfort, powertrain, vehicle telematics, and autonomous driving.

The **ADAS & safety systems** segment is estimated to be the largest and projected to reach USD 3,169.9 million by 2030, at a CAGR of 24.3%. This is attributed to the increasing adoption of ADAS-equipped features in BEVs and PHEVs. ADAS relies on software to run its applications effectively. For example, automatic emergency braking (AEB) systems use software to analyze sensor data and determine whether to apply the brakes automatically to avoid a collision.

Furthermore, ADAS is increasingly integrating with other vehicle systems, such as the infotainment system, powertrain, and chassis. This integration also requires additional software to ensure all systems work together seamlessly. These factors are expected to increase the revenue growth of the ADAS & safety systems segment of the automotive software market during the forecast period.

The **autonomous driving** segment is estimated to grow at the fastest CAGR of 63.5% during the forecast period.

Figure 4. Automotive Software Market, by EV Application, 2023–2030



	ADAS & Safety Systems	Infotainment Systems	Body Control & Comfort Systems	Autonomous Driving	Battery Management Systems	Electric Drive	Vehicle Telematics	Engine Management & Powertrain
2023	689.5	561.6	473.3	52.5	428.2	295.2	163.9	192.6
2030	3,169.9	2,681.0	1,708.9	1,643.2	1,531.9	1,200.7	1,027.0	381.3
CAGR (2023–2030)	24.3%	25.0%	20.1%	63.5%	20.0%	22.2%	30.0%	10.2%

1.4 Market Segmentation by Software Layer

Based on software layer, the automotive software market has been segmented into: **operating system, middleware, and application software** (Table 1 and Figure 5). An **operating system** is a software platform that manages the hardware and software resources of a vehicle. Automotive operating systems are typically designed to be real-time systems, meaning that they must be able to respond to events promptly. This is important for safety-critical applications, such as engine control and braking systems. Linux, QNX, Android, etc., are the automotive operating systems used by different OEM brands.

Middleware is a layer of software that sits between the operating system and application software. Middleware can help to simplify the development of automotive software by providing services such as data management, security resource management, etc., in a ready-to-use form. Automotive middleware can be used to implement various vehicle features, such as advanced driver assistance systems (ADAS), infotainment systems, and vehicle-to-vehicle (V2V) communication.

Application software in automotive software implements the specific functionality of the vehicle, such as engine control, transmission control, and braking control. It is responsible for interacting with the vehicle's sensors and actuators to control its behavior. Automotive application software needs to be reliable, and it must be able to respond to events promptly. This is especially important for safety-critical applications, such as engine control and braking systems. These layers are a complex and challenging area of software development. However, they are essential for the development of modern vehicles and the new features and functionality they offer in vehicles. Together, they provide the full user experience of automotive software.

Table 1. Software Layer: in Cloud Vs. in Car

IN CLOUD			
Mapping	Telematics and Fleet Management	OEM Applications	Third-party Applications
API			
Operating System			
IN CAR			
Infotainment	Body and Comfort Control	Telematics	ADAS/Vehicle Motion, Autonomy, and Drive Control
Human-machine Interface	Application	Application	Application/Service
Application	Middleware	Middleware	Middleware
Middleware	Operating System	Operating System	Operating System
Operating System			
Services			
Operating System			

The **application software** segment is estimated to be the fastest-growing market, registering a CAGR of 8.0% during the forecast period. Demand for high-end applications such as ADAS and comfort systems will drive the growth of advanced application layers in the near future.

The **operating system** market is estimated at USD 4,034.4 million in 2023 and is projected to grow at a CAGR of 7.7% to reach USD 6,801.0 million by 2030. The operating system segment is expected to grow significantly with the rising adoption of connected car technologies.

The **middleware segment** is estimated to be USD 2,512.2 million in 2023.

Figure 5. Automotive Software Market, by Software Layer, 2023–2030

	Application Software	Operating System	Middleware
2023	12,552.7	4,034.4	2,512.2
2030	21,538.0	6,801.0	3,990.1
CAGR (2023–2030)	8.0%	7.7%	6.8%

1.5 Market Segmentation by Vehicle Type

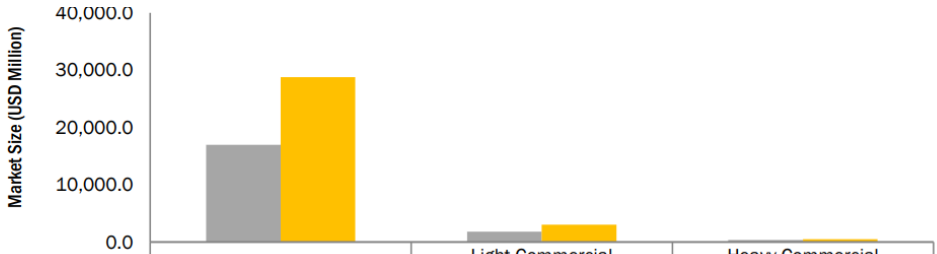
In this part of segmentation, three types of vehicles are considered: **passenger cars, light commercial vehicles, and heavy commercial vehicles** (Figure 6). **Passenger cars** are road vehicles designed and constructed primarily for the carriage of passengers. The passenger car segment is expected to dominate the automotive software market during the forecast period. In terms of value, the automotive software market for passenger cars is expected to grow at a CAGR of 7.9% during the forecast period. As connected technology is more prevalent in passenger vehicles, they have more software content than commercial vehicles.

Light commercial vehicles are typically used for shorter-distance transportation of goods or people, such as delivery vans, pickup trucks, and minibuses, while **heavy commercial vehicles** are widely used for longer-distance transportation of heavy goods, such as tractortrailers, dump trucks, and cement mixers.

The automotive software market for **light commercial vehicles** is expected to record a CAGR of 7.6% during the forecast period. Light commercial vehicles are typically used for short-haul transportation of goods and passengers. These vehicles help businesses transport goods and passengers efficiently and cost-effectively. Light commercial vehicles are largely equipped with automotive software to support ADAS features such as automatic emergency braking and lane departure warning. Telematics and fleet management systems also rely on automotive software to track vehicles and optimize operations. With increased demand for technologically advanced light commercial vehicles, the market for automotive software will grow rapidly in the forecasted period.

The **heavy commercial vehicles** segment of the automotive software market is expected to grow significantly, subject to the increasing requirement for autonomous driving, over-the-air (OTA) software updates, telematics, and connected vehicle technology. Heavy commercial vehicles are designed for transporting goods over long distances. These vehicles are used across transportation, construction, and agriculture industries. As heavy commercial vehicles become more complex and technologically advanced, automotive software enables new features and improves safety, efficiency, and performance. Hence, software-based electronics applications will be largely used. This increase in demand for heavy commercial vehicles with advanced services will support the market growth for automotive software.

Figure 6. Automotive Software Market, by Vehicle Type, 2023–2030



	Passenger Cars	Light Commercial Vehicles	Heavy Commercial Vehicles
2023	16,959.8	1,803.8	335.6
2030	28,801.5	3,021.1	506.6
CAGR (2023–2030)	7.9%	7.6%	6.1%

1.6 Market Segmentation by Region

The automotive software market has been segmented into five regions: **Asia Pacific, Europe, North America, Latin America and the Rest of the World** (Figure 7). The automotive industry has witnessed significant transformations in the last few years with respect to developments related to autonomous and semi-autonomous vehicles. In developed countries such as the US, Germany, and the UK, regulations for safety systems encourage the shift toward the adoption of improved technologies in these vehicles. Level 3 autonomous vehicles are expected to be prevalent in the global automotive market by 2030. Currently, Level 2 vehicles are the most widely adopted autonomous vehicles. Automotive software technology has tremendous market potential, and to achieve this, automotive players and software integrators must work together to deliver an innovative, secure, and seamless connected experience. Several OEMs from the US, Japan, South Korea, Germany, and China are planning to launch Level 3 autonomous vehicles in the coming years. Thus, the demand for automotive software will likely increase in the foreseeable future for the proper functioning of advanced features in L3 autonomy. Additionally, the substantial growth in global vehicle production and demand for medium and premium segment vehicles has also increased due to the rise in per capita income; improved standard of living, along with

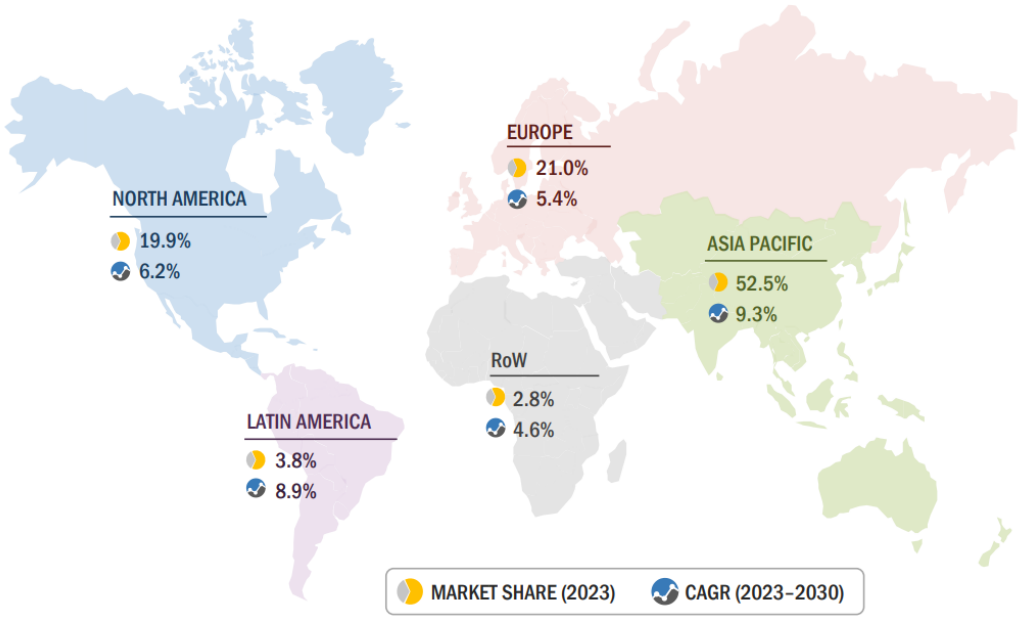
the rising concerns over safety and comfort features, is driving the demand for high-tech software to support advanced vehicle applications.

Asia Pacific is expected to hold the largest market share by 2030, registering a CAGR of 9.3%. Increasing penetration of connected services in Asia Pacific, coupled with rising adoption of ADAS features by Indian OEMs, is estimated to drive the automotive software market in the region.

In **North America**, the US is projected to be the largest market for automotive software, with a CAGR of 5.4% during the forecast period.

Europe is expected to hold the second-largest market share, reaching USD 5,800.5 million by 2030. With the increasing stringency of safety and security regulations, Europe presents a big opportunity for the automotive software market.

Figure 7. Automotive Software Market, by Region, 2023–2030



1.6.1 Focus on: Europe

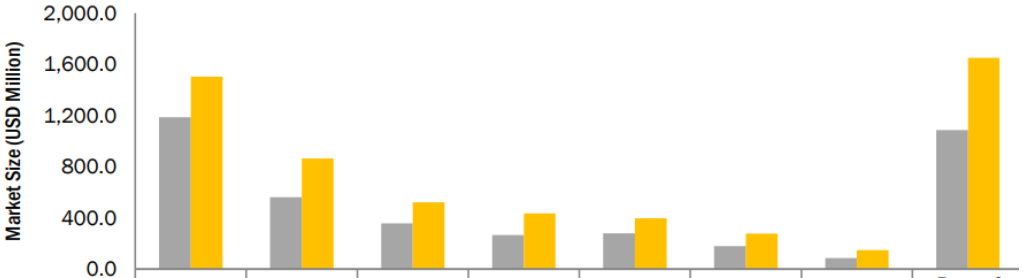
Europe covers France, Germany, Italy, the UK, Spain, Russia, Turkey and the Rest of Europe (Belgium, Austria, the Netherlands, Sweden, Hungary, Poland, Romania and Slovakia). The region is home to the top Tier I suppliers in the automotive sector, such as Continental AG (Germany), Robert Bosch GmbH (Germany) and ZF Friedrichshafen AG (Germany). The presence of these companies would contribute to the growth of European automotive software during the forecast period.

The region is among the largest markets for passenger cars, particularly premium cars (C segment and above). The high volume of premium car sales can be attributed to the high purchasing power of European buyers. The European Commission supports global technological harmonization and provides funding for R&D to strengthen the competitiveness of the EU automotive industry and preserve its global technological leadership. There is a drift from conventional systems to advanced connected systems in vehicles to meet stringent vehicle safety norms. This will positively impact the demand for vehicles with automotive software in the future.

The market growth in the region can also be attributed to the 15 mandatory new safety features in cars, vans, trucks, and buses in 2022 by the European Union to protect passengers, pedestrians, and cyclists. These advanced technologies help improve safety and minimize collisions and hazardous situations risks. The implementation of more safety features in vehicles will increase the number of ECUs, which, in turn, will drive the software market in the region.

The **European market segmentation by country** is reported in the following Figure.

Figure 8. Europe: Automotive Software Market, by Country, in the Period 2023 – 2030



	Germany	Spain	France	Turkey	UK	Italy	Russia	Rest of Europe
2023	1,186.9	561.1	358.0	265.4	278.6	179.7	85.8	1,087.2
2030	1,503.3	864.7	522.7	435.4	396.5	277.7	148.7	1,651.5
CAGR (2023–2030)	3.4%	6.4%	5.6%	7.3%	5.2%	6.4%	8.2%	6.2%

Germany is expected to have a sizeable market for automotive software among all the European countries. The most significant factors supporting the growth of the automotive software market in Germany are the penetration of premium passenger car brands with high-end software applications and government mandates regarding safety. The high sales of premium vehicles, such as the Mercedes-Benz S-Class, BMW 7 Series, Mercedes-Benz G-Class Audi A8, and Audi S8, are expected to drive the automotive software market in Germany during the forecast period.

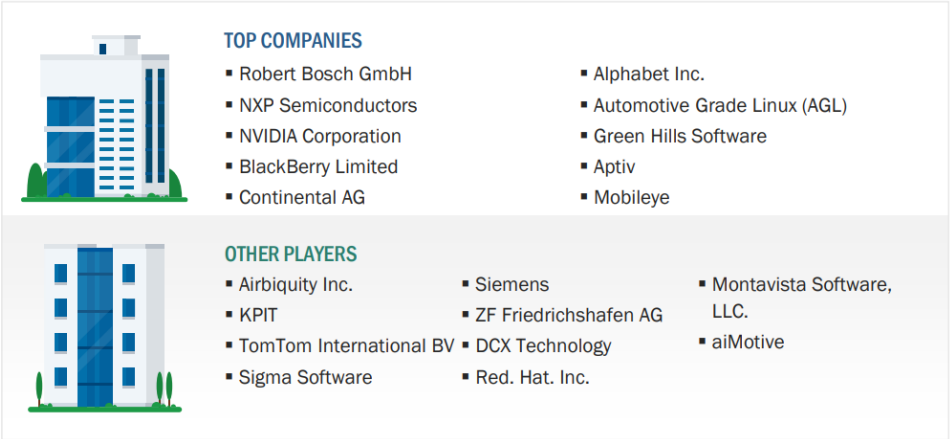
ADAS and safety applications will have the largest market in Germany, subject to the mandates for safety features such as driver drowsiness detection, driver monitoring system, emergency driver assistance, and forward collision. In July 2021, as per Congress.Gov (US), Germany implemented legislation (Autonomous Driving Act) that allows driverless vehicles on public roads. This act enables vehicles with autonomous driving capabilities. The provision regarding autonomous driving corresponds to Level 4 of the SAE driving automation levels.

The **Rest of Europe** covers Belgium, Austria, the Netherlands, Sweden, Hungary, Poland, Romania, and Slovakia for market analysis. A rise in vehicle production and rapid installation of connected services in these countries will drive the market for automotive software. The increasing focus of OEMs on software development and testing would further boost the demand for automotive software in the region. The autonomous driving segment is expected to show significant growth in the forecasted period. This is typically owing to the inclination towards self-driving technology in the Rest of Europe. For instance, in December 2022, a Scania AB self-driving truck was on a motorway in Sodertalje, Sweden. Swedish truck maker Scania became the first in Europe to pilot autonomous vehicles while delivering commercial goods. Additionally, the region is home to companies such as NXP Semiconductor (Netherlands), TomTom International BV (Netherlands), and AiMotive (Hungary). These companies offer automotive software for applications such as ADAS, infotainment, and vehicle telematics in vehicles. These parameters are expected to drive the segment growth in the Rest of Europe.

1.7 Competitive Landscape

Major players operating in the automotive software market include: BlackBerry Limited (Canada), NVIDIA Corporation (US), Automotive Grade Linux (US), Robert Bosch GmbH (Germany), Continental AG (Germany) and Alphabet Inc. (US), among others (Figure 9).

Figure 9. Key Players in the Automotive Software Market



Europe is expected to be a promising market for automotive software. This region is home to some of the top Tier I suppliers in the automotive sector. The presence of such companies would contribute to the growth of European automotive software during the forecast period. Additionally, the presence of automotive OEMs such as Volkswagen (Germany), Mercedes-Benz Group AG (Germany), Renault (France), Stellantis NV (Netherlands), and AB Volvo (Sweden) offers growth opportunities for the automotive software market in the region, as these automotive OEMs provide advanced ADAS features in their vehicle models. These ADAS features heavily rely on automotive software. Thus, advancements in vehicle models with ADAS and safety features will support the market growth of automotive software in the European region in the near future.

The main **European players** active in the market are further described in the following Table.

Table 2. European Players in the Automotive Software Market

Company	Location	Description	Website
aiMotive	Hungary	Automotive technology company that offers automated driving solutions. The company delivers an integrated portfolio of tools and embedded solutions that enable customers to rapidly develop and deploy production automated driving features, combining in-house expertise with aiMotive modular capabilities	Home - aiMotive
Continental	Germany	Under the Automotive segment, the company offers software solutions and services, including ADAS software, infotainment software, cyber security solutions and over-the-air updates	Continental Automotive | Homepage

Company	Location	Description	Website
NXP Semiconductors	The Netherlands	Through its Automotive segment, the company offers automotive software tools such as AUTOSAR, S32 System, Android Auto, and Apple CarPlay for i.MX, which helps in secure vehicle networking, electric vehicle control and body and others	Automotive, IoT & Industrial Solutions | NXP Semiconductors
Robert Bosch	Germany	The company provides automotive software support through its Mobility Solutions segment. These include driver assistance systems, connected vehicle technology, and other software and hardware solutions for the automotive industry	Home Appliances Global Website | Bosch
Siemens	Germany	The company offers optimized real-time operating systems in the Digital Industries segment. Nucleus RTOS is a reliable and fully optimized real-time operating system used in industrial systems, automotive applications, medical devices and airborne systems	Siemens
TomTom International	The Netherlands	The company provides automotive software for navigation in vehicles known as TomTom navigation software. It delivers a high-quality end-user experience and can be implemented across a broad range of brands, car lines and regions	TomTom — Maps and Location Technology
ZF Friedrichshafen	Germany	Technology company specializing in automotive safety, software, e-mobility, vehicle motion control, automotive components and systems, off-highway components and systems, automated driving and digitalization	Homepage ZF Friedrichshafen AG - ZF

2 Sources

MarketsandMarkets Knowledge Store - Multisectoral database that collects market research reports in various technological fields and designed to process some information interactively. More than 1,200 market reports are published each year (https://www.mnmks.com/). The information presented are contained in the report "*Automotive Software Market – Forecast to 2030*", published in November 2023.

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