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Global Automotive Radar Market: Analysis By Application, By Frequency, By Range, By Vehicle Type, By Dimensionality of Information, By Region Size and Trends with Impact of COVID-19 and Forecast up to 2028

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Abstracts

The global automotive radar market in 2022 stood at US$5.66 billion and is likely to reach US$12.12 billion by 2028. Automotive Radar, with its sophisticated object detection capabilities, stands as a linchpin in modern vehicle safety and navigation systems. As vehicles inch closer to full autonomy, the reliance on such radar technology has magnified, providing real-time insights into the vehicle's environment. It plays a pivotal role in enabling features like adaptive cruise control, ensuring safer driving by preventing potential collisions, and streamlining navigation in complex traffic scenarios.

Radar will remain an important sensor in ADAS due to its resiliency in difficult environments and comparatively lower cost to other active sensors like lidar. In the rapidly evolving landscape of the automotive industry, automotive radar technology has emerged as a beacon of innovation and safety. Its growing appeal in recent years is largely attributed to its pivotal role in enabling autonomous vehicles and bolstering advanced driver assistance systems (ADAS). Additionally, the promise of enhancing road safety by allowing vehicles to proactively respond to unforeseen on-road challenges has further elevated its significance. Such advancements are not just technological feats; they mark a transformative shift in how vehicles interact with their environment, driving profound changes in modern vehicular dynamics and user expectations. Moreover, there has been escalating investment and development in 4D or imaging radar. This technology, with its increased transmit and receive channels, enhances resolution, and object separation by capturing more simultaneous distance and velocity measurements, promises to further propel market growth. The global

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automotive radar market is projected to grow at a CAGR of 14.72% during the forecast period of 2023-2028.

Market Segmentation Analysis:

By Application: The market report has segmented the global automotive radar market into six segments namely, Intelligent Park Assist, Adaptive Cruise Control (ACC), Blind-Spot Detection (BSD), Forward Collision Warning System, Automatic Emergency Braking (AEB), and Other ADAS application. In 2022, the Intelligent Park Assist automotive radar is the largest segment, which can be attributed to its essential function in tackling the complexities of urban parking. As metropolitan areas become increasingly congested, finding suitable parking spaces becomes a significant challenge for drivers. Intelligent Park Assist provides a solution by ensuring vehicles are precisely positioned without the risk of collisions. Further, the Automatic Emergency Braking (AEB), during the forecasted period of 2023-2028, is expected to be the fastest-growing segment, owing to its proven efficacy in preventing severe accidents, growing consumer demand, potential regulatory mandates, and its pivotal role in the roadmap towards autonomous vehicles.

By Frequency: Based on the frequency, the global automotive radar market can be divided into three segments namely, 77 GHz, 24 GHz, and 79 GHz. During the forecasted period of 2023-2028, the 77 GHz segment of the market is expected to be the fastest-growing segment, owing to its superior resolution and range, combined with regulatory endorsements by global entities like the Federal Communications Commission (FCC) in the US and the European Telecommunications Standards Institute (ETSI) in Europe, which have recognized its advantages over other frequency bands.

By Range: The global automotive radar market can be divided into three segments, based on range, Short Range, Medium Range, and Long Range. In 2022, the medium-range is the largest segment, attributed to its unparalleled versatility in addressing diverse safety scenarios, bridging the gap between short-range and long-range radars. These radars cater to both urban and highway driving scenarios, making them indispensable in vehicles ranging from entry-level to luxury. During 2023-2028, the long-range automotive radar segment is poised to rapidly grow, largely due to the escalating adoption of autonomous and semi-autonomous driving systems. Their indispensability in ensuring safe distances at high speeds on highways, particularly for adaptive cruise control, further accelerates their prominence in the evolving landscape of vehicle safety and autonomy.

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By Vehicle Type: The global automotive radar market can be divided into two segments, based on vehicle type, Passenger Cars, and Commercial Vehicles. In 2022, the dominance of the passenger cars automotive radar segment can be attributed to increasing consumer emphasis on vehicle safety and the wider accessibility of advanced safety systems beyond luxury vehicles. This integration even in budget-friendly models amplifies the segment's reach. During the forecasted period of 2023 to 2028, the segment is projected to experience accelerated growth, driven by rising consumer preferences for enhanced safety and continuous advancements in the passenger car domain.

By Dimensionality of Information: The global automotive radar market can be divided into two segments, based on the dimensionality of information, Standard Radar, and 4D Radar. In 2022, the standard automotive radar segment is the largest segment, attributed to the widespread integration of essential safety features in vehicles across all segments. With rising safety consciousness among consumers and stricter regulations, even entry-level vehicles are now equipped with basic radar functions, making this segment almost ubiquitous in the automotive landscape. Further, the global standard automotive radar market can be classified on the basis of Autonomy Level, into six segment , namely, L1, L2, L2+, L3, L4, and L5. During the period of 2023-2028, the 4D automotive radar segment is poised to grow at the fastest CAGR, largely due to its unparalleled capability to detect objects in four dimensions, enhancing ADAS and autonomous driving applications, and advancements making these radars more affordable. By 2028, the 4D radar segment is poised to surpass the standard radar segment as the largest, driven by its superior capabilities in understanding the vehicular environment.

By Region: According to this report, the global automotive radar market can be divided into five major regions: North America (The US, Canada, and Mexico), Asia Pacific (China, Japan, South Korea, India, and Rest of Asia Pacific.), Europe (Germany, UK, France, Italy, and Rest of Europe), Latin America and Middle East & Africa. In 2022, North America dominates the global automotive radar market due to its robust automotive infrastructure, coupled with major auto giants emphasizing advanced radar systems integration. Regulatory bodies and consumer awareness around vehicular safety further amplify the region's leading stance in adopting cutting-edge radar technologies. Further, the US holds the largest share within North America due to its expansive automotive ecosystem anchored by Silicon Valley's technological innovations and the synergies between tech giants, universities, and automakers in advancing radar systems.

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The Asia Pacific automotive radar market is expected to grow at the fastest CAGR from 2023 to 2028, driven by the region's status as an automotive manufacturing nexus, particularly China's vast production scale and Japan's and South Korea's technological advancements in vehicular safety and innovation. Further, India's automotive radar market is poised for rapid growth from 2023 to 2028, primarily driven by government safety initiatives and the expanding IT sector enabling advanced tech integrations in vehicles.

Global Automotive Radar Market Dynamics:

Growth Drivers: The Advanced Driver Assistance Systems (ADAS) industry stands at the cusp of a vehicular safety revolution. By offering groundbreaking features such as automated emergency brakes and adaptive cruise control, ADAS elevates vehicles' safety quotient to unprecedented levels. As countries and international bodies tighten vehicular safety regulations, the reliance on radar technologies intensifies. These radars, capable of precise object detection and distance calculation, play a critical role in ensuring the reliability of ADAS functions. Further, the market is expected to grow owing to the rising disposable income, rapid urbanization, growth in autonomous vehicles, increased vehicle electrification, reduction in manufacturing costs, vehicle connectivity, increasing popularity of shared mobility, etc. in recent years.

Challenges: The automotive radar market faces challenges due to inconsistencies in regulatory and frequency band allocation across nations. Different countries have varied regulations for radar frequencies, lacking a universal standard. This forces manufacturers to create multiple product versions, increasing production complexities and costs. Such fragmented guidelines hinder the streamlined development and global deployment of radar technologies, impeding the market's potential growth. Additionally, other factors like technological limitations and interference, etc. are other challenges to the market.

Market Trends: Integration with other sensor technologies is pivotal for the automotive industry's evolution. As vehicles advance towards greater autonomy, sophisticated perception systems become essential. Merging radar with LiDAR and cameras creates a comprehensive detection system: radar gauges distances and velocities effectively in challenging weather, LiDAR offers 3D mappings, and cameras provide detailed imaging. This fusion ensures precise and holistic perception, crucial for safe navigation in intricate settings. With a rising focus on autonomous driving, this positions automotive radars for increased demand from 2023-2028. More trends in the market are believed to

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grow the automotive radar market during the forecasted period, which may include advancements in Artificial Intelligence (AI) and Machine Learning (ML), advancement in mmWave radar technology, the emergence of 4D Radar Systems, Expansion of Level 4 and 5 Autonomy, integration in the non-luxury segment, diversification of radar applications, insurance incentives, MIMO (Multiple Input, Multiple Output) technology, adoption of Silicon Germanium (SiGe) and Complementary Metal-Oxide-Semiconductor (CMOS) in radar chips, increasing R&D and collaboration, etc.

Impact Analysis of COVID-19 and Way Forward:

The COVID-19 pandemic significantly impacted the automotive radar industry, creating disruptions in supply chains, decreasing demand, and stalling R&D efforts. Crucially, government measures, such as France's Automotive Sector Support Plan and the US's CARES Act, played a pivotal role in cushioning the industry's setbacks. These interventions injected capital, providing a lifeline during uncertain times. While the sector grappled with unprecedented challenges, its inherent value in ensuring vehicle safety remained undiminished. This emphasis on safety, combined with supportive governmental measures, has fostered resilience, paving the way for a notable recovery in the automotive radar domain.

After the pandemic, the industry is undergoing transformation, emphasizing remote diagnostics to ensure safety, fostering strategic partnerships to leverage combined expertise, and amplifying electrification efforts. These shifts are opening avenues for inventive solutions and paving the way for sustainable and robust growth in the sector.

Competitive Landscape and Recent Developments:

The Global Automotive Radar Market is characterized by a consolidated landscape, dominated by key players such as Robert Bosch GmbH, Continental AG, and Denso Corporation. These industry leaders, with their expansive R&D and established manufacturing capabilities, have set high entry barriers for newcomers. However, mergers and acquisitions, like the notable BorgWarner and Delphi Technologies union, signify strategic moves to fortify market positions. Additionally, long-standing collaborations, such as Continental AG's with BMW and Autoliv Inc.'s with Volvo, emphasize the importance of industry relationships, fostering innovations tailored to automakers' evolving needs.

Further, key players in the automotive radar market are:

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Robert Bosch GmbH

Continental AG

DENSO Corporation

BorgWarner Inc. (Delphi Technologies)

STMicroelectronics N.V.

Valeo S.A.

NXP Semiconductor N.V.

Infineon Technologies AG

Texas Instruments

Analog Devices, Inc.

Magna International Inc.

Veoneer Inc.

The automotive radar market, marked by its consolidated nature, is witnessing an uptick in mergers and acquisitions. A notable instance is the 2020 merger between BorgWarner and Delphi Technologies. With an impressive valuation at around US$3.53 billion, this union highlights strategic endeavors companies are undertaking to fortify their market stance. Further complementing this market's dynamics are strategic partnerships. Renowned entities like Continental AG and BMW have joined hands to foster advancements in ADAS, encompassing radar systems. Similarly, the collaboration between Autoliv Inc. and Volvo concentrates on cutting-edge safety systems, whereas DENSO's collaboration with Toyota delves into a wide spectrum of automotive innovations. Such partnerships not only empower automakers to leverage the expertise of veteran radar industry stalwarts but also facilitate these radar corporations to align their innovations with the evolving requirements of auto

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