

Industrial Sensors Market – Global Industry Size, Share, Trends, Opportunity, and Forecast Segmented By Product (Level Sensor, Temperature Sensor, Flow Sensor, Position Sensor, Pressure Sensor, Force Sensor, Image Sensor, Gas Sensor), By Application (Energy & Power, Oil & Gas, Mining, Chemical, Manufacturing, Pharmaceutical), By Region, Competition 2018-2028

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Abstracts

Global Industrial Sensors Market was valued at USD 20.85 Billion in 2022 and is anticipated to project robust growth in the forecast period with a CAGR of 7.33% through 2028. The global Industrial sensors market is a dynamic and vital component of the Industrial industry, encompassing a wide array of sensor types that play a fundamental role in modern vehicles. These sensors enable real-time data collection and processing, contributing to enhanced safety, efficiency, and performance. As vehicles become more technologically advanced and autonomous driving capabilities evolve, the demand for Industrial sensors continues to surge. These sensors are integral to various vehicle systems, such as engine management, emissions control, driver assistance, and connectivity. With the shift towards electric and hybrid vehicles and the integration of Internet of Things (IoT) technology, the Industrial sensors market is poised for further growth and innovation, shaping the future of transportation.

Key Market Drivers

Rising Demand for Advanced Driver Assistance Systems (ADAS)

The growing emphasis on road safety and the mitigation of accidents is driving the adoption of Advanced Driver Assistance Systems (ADAS). These systems rely heavily on various Industrial sensors such as radar, LiDAR, cameras, and ultrasonic sensors to provide real-time information about the vehicle's surroundings and assist in tasks like lane departure warning, adaptive cruise control, automatic emergency braking, and parking assistance. The increasing awareness of road safety and stringent regulatory norms for vehicle safety are propelling the integration of ADAS, which in turn is fueling the demand for Industrial sensors.

Electrification and Hybridization of Vehicles

The global Industrial industry is witnessing a significant shift towards electrification and hybridization to reduce greenhouse gas emissions and enhance fuel efficiency. Electric and hybrid vehicles require a sophisticated network of sensors to monitor battery health, energy consumption, regenerative braking, and thermal management. Additionally, electric vehicles need sensors for electric powertrain components such as electric motors and power electronics. The integration of sensors ensures the optimal functioning of these vehicles, maximizing energy efficiency and maintaining performance. As governments worldwide push for stricter emission norms and consumers demand eco-friendly alternatives, the demand for Industrial sensors in electric and hybrid vehicles is set to soar.

Autonomous Driving and Connectivity

The race towards autonomous vehicles and the proliferation of connected cars are driving significant demand for Industrial sensors. Autonomous vehicles rely on an intricate combination of sensors, including LiDAR, radar, cameras, and ultrasonic sensors, to perceive their environment and navigate safely without human intervention. Moreover, connected cars require sensors for vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication, enabling real-time data exchange for traffic management, navigation, and predictive maintenance. The evolution of these technologies is pushing manufacturers to integrate more sensors into vehicles, creating a surge in demand for these components.

Stringent Emission and Fuel Efficiency Standards

Governments worldwide are imposing stringent emission regulations and fuel efficiency standards to combat environmental issues and reduce dependence on fossil fuels. Industrial sensors play a crucial role in meeting these standards by optimizing engine

performance, monitoring exhaust emissions, and enhancing fuel efficiency. Sensors such as oxygen sensors, NOx sensors, and particulate matter sensors contribute to accurate emission measurements and efficient catalytic converter operation. As Industrial manufacturers strive to meet these regulatory requirements, the demand for sensors that contribute to improved combustion efficiency, emission reduction, and overall vehicle efficiency is on the rise. Moreover, the focus on sustainable mobility is driving investments in sensor technology to enhance eco-friendly driving solutions.

Key Market Challenges

Complexity of Sensor Integration and Calibration

One of the primary challenges facing the global Industrial sensors market is the complexity of integrating and calibrating sensors within modern vehicles. As vehicles become more advanced and incorporate a multitude of sensors for various functions, the process of ensuring seamless communication and operation among these sensors becomes intricate. Different sensors with varying technologies and data outputs need to work together harmoniously to provide accurate information to vehicle systems and control units. Achieving this requires sophisticated calibration processes that account for factors like sensor accuracy, environmental conditions, and vehicle dynamics.

Furthermore, the increasing integration of sensors in advanced driver assistance systems (ADAS) and autonomous driving technologies amplifies the complexity. These systems demand a high degree of accuracy, reliability, and synchronization among sensors to make split-second decisions for vehicle control and safety. Ensuring precise sensor fusion and calibration is essential to prevent false alarms, misinterpretations of data, or improper functioning of safety-critical features. Addressing this challenge requires extensive research, testing, and collaboration among automakers, sensor manufacturers, and technology partners. The development of standardized communication protocols, sophisticated sensor fusion algorithms, and robust calibration methods is crucial to overcoming the complexity associated with integrating and calibrating multiple sensors within a vehicle.

Data Security and Privacy Concerns

With the increasing connectivity of vehicles and the integration of IoT technology, data security and privacy concerns have emerged as significant challenges in the Industrial sensors market. Connected vehicles generate vast amounts of data that are transmitted to external networks for various purposes, including remote diagnostics, over-the-air

updates, and navigation services. This data includes sensitive information about vehicle performance, driver behavior, and location.

Ensuring the security and privacy of this data is paramount, as any breach could compromise vehicle safety, user privacy, and even lead to cyberattacks that disrupt vehicle operation. The potential consequences of data breaches are particularly concerning in the context of autonomous vehicles, where compromised sensors or communication systems could have life-threatening implications. Manufacturers and stakeholders must invest in robust cybersecurity measures to safeguard data from unauthorized access and malicious attacks. This involves implementing encryption protocols, intrusion detection systems, secure communication channels, and continuous monitoring of connected vehicle systems. Striking the right balance between data sharing for vehicle performance optimization and safeguarding user privacy is a complex challenge that necessitates collaboration between automakers, regulators, and technology providers.

Key Market Trends

Proliferation of Advanced Driver Assistance Systems (ADAS) and Autonomous Driving

The Industrial industry is witnessing a rapid proliferation of Advanced Driver Assistance Systems (ADAS) and autonomous driving technologies, giving rise to significant market trends in the realm of Industrial sensors. ADAS technologies encompass a wide range of features such as adaptive cruise control, lane departure warning, automatic emergency braking, and parking assistance, all of which heavily rely on sensors to provide real-time data about the vehicle's surroundings. The integration of sensors like radar, LiDAR, cameras, and ultrasonic sensors is essential for accurate perception, object detection, and decision-making by the vehicle. As automakers and technology companies accelerate their efforts in developing autonomous vehicles, the demand for high-performance sensors that enable precise navigation, obstacle detection, and safe autonomous operation is driving innovation in the Industrial sensors market.

Rapid Evolution of Electric and Hybrid Vehicles

The global shift towards electrification and hybridization of vehicles is significantly influencing the Industrial sensors market. Electric and hybrid vehicles require a diverse range of sensors to monitor battery health, energy consumption, regenerative braking, thermal management, and electric powertrain components. These sensors ensure the optimal functioning of the vehicle's propulsion system, enhancing energy efficiency and

extending battery life. Moreover, the adoption of electric and hybrid vehicles is prompting the development of specialized sensors tailored to the unique challenges of electric mobility. As consumer demand for environmentally friendly transportation solutions grows and governments impose stricter emission regulations, automakers are investing in sensor technologies that support the successful integration and performance of electric and hybrid vehicles.

Integration of Connectivity and IoT Technology

The integration of connectivity and Internet of Things (IoT) technology is a significant trend in the Industrial industry, and it is having a profound impact on the Industrial sensors market. Connected vehicles enable real-time data exchange between vehicles, infrastructure, and the cloud, contributing to enhanced safety, convenience, and efficiency. These vehicles require sensors that facilitate vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication, allowing for features such as real-time traffic updates, predictive maintenance, and remote diagnostics. Moreover, the influx of data generated by connected cars necessitates advanced sensor technology for accurate data collection, analysis, and utilization. As Industrial manufacturers focus on creating seamless connectivity experiences for consumers, the demand for sensors that enable reliable and secure data transmission is expected to increase, shaping the direction of the Industrial sensors market.

Segmental Insights

Product Insights

Image sensors take light as an input and convert it to an electrical signal. The image sensor takes the parameters of the light it receives, such as color and brightness, and passes it through the processing circuitry to be turned into an image.

The sensor constitutes a PN junction, and when it is struck by incident light, it begins to produce electron-hole pairs and thus conducts current. This makes up the pixels within the image sensors, which further make up the images. The sensors are being widely adopted for enhancing industrial equipment in terms of Industrial while consuming little power.

For instance, in March 2021, Toshiba Electronic Devices & Storage Corporation released the 'TCD2726DG,' a lens reduction type CCD linear image sensor for A3 multifunction printers that perform high-Industrial scanning. The new sensor contains a

timing generator circuit and a smaller CCD driver pin count to prevent increased electromagnetic interference (EMI), which is a negative side effect of a faster clock rate. Customers' EMI and timing adjustment work, as well as the number of peripheral parts, are reduced, making system development easier. Also, the need for digital transformation continues to grow in different fields of industrial equipment. This has accelerated the adoption of cameras for a variety of applications, driving the demand for (complementary metal-oxide-semiconductor) CMOS image sensors with higher imaging performance.

The vendors in the market are also combining image sensors and 3D cameras for a better offering. For instance, SICKs Ranger 3 - 3D camera uses CMOS image sensor M30 to create a 3D profile with reduced on-chip data.

Regional Insights

Asia Pacific plays a significant role in the global Industrial Sensors market. Asia Pacific industrial sensors market is primed to capture more than 60% industry share by 2032. The region may emerge as a major revenue hub for this industry owing to supportive government initiatives, such as subsidies and incentive programs, along with regulations that assist the producers of renewable energy, expediting the construction of new solar and wind power plants in Asian countries. In July 2022, the Japanese government provided a subsidy of 92.9 billion yen (~USD 680 million) to Kioxia Corp. and Western Digital Corp. for a semiconductor production facility to secure smooth domestic chip production.

Key Market Players

NXP Semiconductors NV

DENSO Corporation

Robert Bosch GmbH

Texas Instruments Inc.

Aptiv PLC (Delphi Automotive)

CTS Corporation

Maxim Integrated Products Inc.

Infineon Technologies AG

Analog Devices Inc.

Sensata Technologies Holding PLC

Report Scope:

In this report, the Global Industrial Sensors Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Global Industrial Sensors Market, By Application :

Energy & Power

Oil & Gas

Mining

Chemical

Manufacturing

Pharmaceutical

Global Industrial Sensors Market, By Product :

Level Sensor

Temperature Sensor

Flow Sensor

Position Sensor

Pressure Sensor

Force Sensor

Image Sensor

Gas Sensor

Global Industrial Sensors Market, By Region:

North America

United States

Canada

Mexico

Asia-Pacific

China

India

Japan

South Korea

Indonesia

Europe

Germany

United Kingdom

France

Russia

Spain

South America

Brazil

Argentina

Middle East & Africa

Saudi Arabia

South Africa

Egypt

UAE

Israel

Competitive Landscape

Company Profiles: Detailed analysis of the major companies presents in the Global Industrial Sensors Market.

Available Customizations:

Global Industrial Sensors Market report with the given market data, Tech Sci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

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