# Quantum Sensors - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts 2019 - 2029

Market Report | 2024-02-17 | 120 pages | Mordor Intelligence

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**Report description:**

The Quantum Sensors Market size is estimated at USD 0.69 billion in 2024, and is expected to reach USD 1.26 billion by 2029, growing at a CAGR of 12.90% during the forecast period (2024-2029).

Key Highlights
-The utility of quantum sensors is primarily found in industries such as automotive, military and defense, space, and healthcare. For instance, the applications of quantum sensors in the military and defense industry range from delivering highly accurate positioning data and detecting submarines in the world's oceans. Similarly, these sensors are becoming an essential part of the automobile industry. Their ability to provide highly accurate measurements makes them increasingly used for precision navigation in automobiles.
-One typical application of quantum sensors is Photosynthetic Photon Flux (PPF) measurement over plant canopies in outdoor environments, greenhouses, and growth chambers. Light is an essential element of photosynthesis, impacting numerous factors, including plant form, structure, and reproduction. Therefore, the PAR meter is a quantum sensor widely used for measuring active photosynthetic radiation, thus driving the market.
-Another major factor driving the studied market is the surging government investment in quantum research to gain economic and military advantage. The National Strategic Overview for Quantum Information Science released by the United States defined quantum sensing as leveraging quantum mechanics to enhance the fundamental accuracy of measurements and enabling new regimes or modalities for sensors and measurement. Such new capabilities would afford clear military advantages and positively influence the market globally.
-However, one of the crucial challenges facing the development of quantum sensors is the requirement for a deeper understanding of the underlying quantum mechanics that govern their operation as quantum sensors largely depends on the unique properties of quantum systems, such as superposition and entanglement, for achieving their remarkable sensitivity. In

addition to this, the need for robust and reliable quantum systems that can withstand the rigors of real-world applications is also a significant challenge for market studied becuase many quantum sensors rely on delicate quantum states that can be easily disrupted by environmental factors such as magnetic fields, temperature fluctuations, and even cosmic rays.
-Various types of quantum sensors, such as atomic clocks, magnetic, PAR quantum, and gravity sensors, are being used and are witnessing extreme commercial acceptance. However, the high cost of deployment and high maintenance costs could hinder the market's growth during the forecast period.
-?The advancements in quantum technology resulted in advanced devices with enhanced functionality. Healthcare diagnostics, environmental monitoring, food quality monitoring, security and defense, industrial safety and quality control, and potentially transportation are some of the significant and disruptive vital applications.
-For example, quantum plasmonic sensors can be widely used in chemical detection, blood protein analysis, and atmospheric sensing due to considerably less noise. Quantum sensors with nitrogen-vacancy (NV) diamonds have the potential to detect COVID-19. However, the technology needs further adaptation and testing and may be available in the coming years.

Quantum Sensors Market Trends

Military and Defense Application Segment is Expected to Hold Significant Market Share

- Military and defense are significantly investing in quantum sensors as they provide accurate data to detect submarines worldwide. They also enable military personnel to detect underground structures or nuclear materials due to their expected extreme sensitivity to environmental disturbances.
- In addition, the sensitivity of quantum sensors could similarly enable militaries to detect electromagnetic emissions, thus increasing electronic warfare capabilities and potentially assisting in locating concealed adversary forces. They also provide alternative positioning, navigation, and timing options that theoretically allow militaries to continue to operate at full performance in GPS-degraded or GPS-denied environments.
- Quantum cryptography and lithography are other applications in which the military and defense industry is significantly investing. The growing advancement in laser, photonics, and optical technologies further expands the market's scope. The increasing adoption of UAV and robotic technologies in the sector may create massive deployment opportunities for quantum sensors.
- According to the International Federation of Robotics, military robotics-worldwide spending is expected to cross USD 16.5 billion by 2025. With the increase in defense expenditure, wireless sensors are an emerging technology area with many applications within the defense industry. The rising demand for quantum sensors in unmanned systems is expected to surge the market's growth. The military modernization programs carried out in various countries will support market growth.

Asia-Pacific is Expected to Register Fastest Growth

- In the region, China is investing in quantum sensors and conducting research to develop new quantum sensing devices, which could be applicable in various fields. Over the next few years, quantum technology is expected to have significant implications for future military operations. China is focused on utilizing this technology for its military applications and aims to become a leader in quantum information science.
- For instance, Chinese scientists have created a single-photon quantum radar, which takes advantage of entanglement between photon pairs, capable of detecting targets up to 100 km away with high accuracy. This test offers an initial overview of the scope of quantum technology in military applications, which may drive the quantum sensor market.
- Scientists across the region are making astounding breakthroughs in atomic clocks, quantum sensors, quantum communication

networks, and quantum computers through experimental and theoretical research. In November 2022, China launched its lab module called Mengtian as a part of its ambitious space station currently under construction. Mengtian is set to carry the world's first space-based set of cold atomic clocks consisting of a rubidium clock, a hydrogen clock, and an optical clock.
- Furthermore, India is investing USD 1 billion in various programs over the next five years to advance its capabilities in quantum information and meteorology, quantum applications and materials, and quantum communications. It is also planning to develop a quantum computer with about 50 qubits by 2026, joining many countries, such as Australia and Israel, looking to drive broader adoption of the nascent technology.
- All these investments and research activities in Asian countries are expected to drive the quantum sensor market over the forecast period.

Quantum Sensors Industry Overview

The quantum sensors market is competitive with the presence of major players like AOSense Inc., Apogee Instrument Inc., M Squared Laser Limited, Muquans SAS, and Robert Bosch GmbH. Players in the market are adopting strategies such as partnerships, mergers, investments, and acquisitions to enhance their product offerings and gain sustainable competitive advantage.

- December 2022 - The first generation of quantum technology was developed by AOSense, a company that can produce advanced products for quantum gravimetry (see Gravity Measurement). AOSense has developed and will continue to develop quantum sensors for precision navigation in close collaboration with NASA's Goddard Space Flight Center. In the freshly emerging and quickly developing field of quantum sensing and technology, AOSense was also mentioned as a marketplace company under "Applications and systems" on the QED-C website: QED-C Marketplace: AOSense Inc.
- November 2022 - Glasgow-based M Squared made public a prototype of the first commercial neutral atom quantum computer in the United Kingdom. The National Quantum Technologies Showcase is a gathering that highlights the advancements in technology brought about by the UK National Quantum Technologies Programme, a USD1 billion partnership between businesses, academia, and government.

Additional Benefits:

- The market estimate (ME) sheet in Excel format
- 3 months of analyst support

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