

Spintronics Market – Global Industry Size, Share, Trends, Opportunity, and Forecast, 2018-2028 - By Device Type (By Metal-based Devices (Giant Magneto Resistance-based Device (GMRs), Tunnel Magneto Resistance-based Device (TMRs), Spin-transfer Torque Device, and Spin-wave Logic Device), By Semiconductor-based Device (Spin Diode, Spin Filter, Spin Field-effect Transistor (FETs)), By Application (Electric Vehicle and Industrial Motor, Data Storage/MRAM, Magnetic Sensing, and Other Applications), By Industry (Consumer Electronics, Automotive, Industrial, Healthcare, and Information Technology (IT) & Telecom), and By Region, Competition

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Abstracts

The global spintronics market is predicted to proliferate during the forecast period due to the growing adoption of internet of things (IoT) devices by enterprises to meet the need for growing businesses. Globally vendors are making significant product innovations by integrating technologies such as artificial intelligence (AI), Internet of Things (IoT), and machine learning (ML) to cater to customer needs and market requirements. The rising demand for spintronics in electronic devices, increasing penetration of electric vehicles, and growing need for higher data transfer speed are propelling the growth of the global spintronics market. Businesses are gradually offering customers with seamless digital

experiences. This is driving the interest for high velocity spintronic gadgets for information. Manufacturers of spintronic devices are concentrating on several aspects, including the use of innovative materials, low-power electronics, and miniaturization. The demand for new applications of spintronics is increasing, as researchers are finding new ways to use spintronics to create new and innovative devices. The growing demand for faster and more efficient electronic devices and increasing investments in research and development are proliferating the growth of the global spintronics market. Additionally, to maintain high business continuity and maximize connectivity, enterprises are increasingly considering more reliable and secure solutions. The rising adoption of electric vehicles and the growing need for high-performance computing are also contributing to the growth of the market. As the demand for IoT devices continues to grow, the demand for spintronics-based components is also expected to grow. This will create new opportunities for companies that develop and manufacture spintronics-based components during the forecast period.

Spintronics, also known as magnetoelectronic, is the study of the intrinsic spin of electrons in solid-state devices. The spin of an electron is a fundamental property that is analogous to its charge. In contrast to charge-based electronics, spintronics uses the electrons' quantum mechanical spin to store, process, and transmit data. The transport of electron charge carriers is essential for conventional electrical and semiconductor devices, while spintronics examines the effects of spin-charge coupling in metallic systems on the effectiveness of data storage and transport. As a result, there are more opportunities to increase the effectiveness and speed of electronic gadgets while consuming less power. Electronics, computer technology, and information storage may be completely changed by it. Currently, spintronics is most often used in data storage devices such as hard drives and magnetoresistive random-access memory (MRAM).

However, it also has potential uses in improved sensors, quantum computing, and transistors and computers of the next generation. Spintronics offers a technique to control and alter the spins of electrons to manufacture qubits and conduct quantum computing. In addition to applications in data storage, memory, and computing, the distinctive characteristics of spintronics provide possibilities for novel applications such as spintronic sensors, quantum cryptography, and quantum computing. This is because spintronics makes it possible to manipulate quantum bits (qubits), which is crucial for processing quantum information, and helps make quantum gates, which are fundamental parts of quantum computers. Moreover, spintronics is important as it offers several advantages over traditional electronics, including energy efficiency, higher storage density, enhanced speed and performance, improved durability, versatility, and many more. Spintronic systems are of particular interest in the field of quantum

computing and neuromorphic computing. The recent introduction of large-scale magnetic memory manufacture has led to the development of several spintronic products such as Spin torque transfer magnetic random-access memory (STT-MRAM), Magnetoresistive random access memory (MRAM), Spin Hall magnetoresistive random access memory (SHMRAM) and others that are starting to hit the market.

Increasing Adoption of IoT-Based Devices

The increasing adoption of IoT-based devices is a major trend that is transforming the way businesses and consumers operate. With the advent of new technologies, the adoption of IoT-based devices is growing exponentially. For instance, as of January 1, 2022, there were 14.4 billion connected IoT devices across the world. This number is expected to grow to 27 billion by 2025. Manufacturers across the world in the IoT devices are increasingly using spintronics-based components, such as spin valves and magnetic tunnel junctions, to improve their performance and efficiency. As the IoT devices are enabling high-bandwidth connectivity, improving customer experience, cost reduction, and improving the production line. Therefore, the demand for integrating IoT-based devices in the products are proliferating by wide range of industries, including manufacturing, healthcare, retail, and transportation. This high transition of IoT devices requires spintronics to overcome the challenges, such as limited battery life and low data processing capabilities. Spintronic devices integrated with IoT are helpful to address these challenges by providing IoT devices with longer battery life, faster data processing speeds, and increased energy efficiency. Furthermore, the development of novel spintronics-based diagnostic and therapeutic tools is being done with the help of IoT devices. The early diagnosis and treatment of illnesses using these technologies has the potential to enhance healthcare. Spintronics is becoming increasingly popular among organizations that are eager to improve durability and enhance security. Therefore, the increasing adoption of IoT-based devices is expected to drive the growth of the global spintronics market during the forecast period.

Increasing Demand for Spintronics in Electronic Devices

The industrial and telecommunication industries are constantly looking for ways to improve the performance of their electronic devices. Spintronics has the potential to revolutionize a wide range of industries. As spintronics technology is still in its early stages of development, it has the potential to revolutionize the electronics industry. Spintronic devices are offering significant improvements in performance over traditional semiconductor devices, such as faster switching speeds, lower power consumption, and longer battery life. Manufacturers are working on ways to lower the power requirements

of CPUs and other electrical components to improve the battery efficiency of laptops, cellphones, and electric vehicles. Manufacturers, including Qualcomm, Intel, and Samsung, are working on spintronics technology with the aim of using it in CPU cache memory to lower power consumption by up to 80% compared to currently used cache memory. Similarly, the way MRAM's spintronics technology outperforms DRAM in terms of speed and power consumption. When silicon consumption in current electronic technology hits its maximum saturation level, the use of spintronics technology will develop significantly. This will bring in a new era of electronic devices with significantly improved transfer rates and battery life. Therefore, spintronics is a promising new technology that has the potential to revolutionize the electronics industry. As the demand for spintronics devices continues to grow, the spintronics industry is expected to experience significant growth in the coming years. Additionally, because spintronics technology is less expensive, faster, and uses less power, it will revolutionize the electronics sector. Thus, the high demand for spintronics in electronic devices are proliferating the growth of the global spintronics market during the forecast period.

Increasing Demand for Faster Data Transfer and More Storage Capacity in Compact Size

Spintronics technology uses the electrons' charge, spin, and magnetic moment, as it is significantly quicker than conventional electronic technology. The speed at which data can be transported has surpassed. The existing technology, which solely employs the charge of electrons, makes it challenging to boost data transfer speed. Spintronics technology has shown to be a more effective replacement for current electrical technology since MRAM, which is faster than DRAM, is now commercially available. Currently, hard disc drives (HDD), flash memories, and dynamic random-access memory (DRAM) are the primary technologies for storing digital data. The primary drawback with HDDs is that they cannot operate without the mechanical motion of its two essential parts, a storage disc, and a read/write head. Mechanical motion increases energy consumption slows down operations, and lowers reliability. In contrast, spintronics has aided in accelerating data transmission speed and increasing storage capacity in HDDs, which has improved their sluggish performance. Therefore, the increasing demand for faster data transfer and more storage capacity in compact size is attributed to the growth of the global spintronics market during the forecast period.

Market Segmentation

Based on device type, the market is segmented into metal-based devices and semiconductor-based devices. Based on metal-based devices, the market is further

divided into giant magneto resistance-based devices (MGRs), tunnel magneto resistance-based device (TMRs), spin-transfer torque device, and spin-wave logic device. Based on semiconductor-based device, the market is further divided into spin diode, spin filter, and spin field-effect transistor (FETs). Based on application, the market is segmented into electric vehicle and industrial motor, data storage/MRAM, magnetic sensing, other applications. Based on industry, the market is segmented into consumer electronics, automotive, industrial, healthcare, and information technology (IT) & telecom.

Company Profiles

NVE Corporation, Crocus Technology International Corporation, Avalanche Technology, Synopsys Inc. (QuantumWise), Everspin Technologies Inc., TDK Corporation, Infineon Technologies AG, Allegro MicroSystems Inc., Qnami GmbH, and Spin Memory Inc. are among the major players that are driving the growth of the global spintronics market.

Report Scope:

In this report, the global spintronics market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Spintronics Market, By Device Type:

Metal-based Devices

Giant Magneto Resistance-based Device (GMRs)

Tunnel Magneto Resistance-based Device (TMRs)

Spin-transfer Torque Device

Spin-wave Logic Device

Semiconductor-based Device

Spin Diode

Spin Filter

Spin Field-effect Transistor (FETs)

Spintronics Market, By Application:

Electric Vehicle and Industrial Motor

Data Storage/MRAM

Magnetic Sensing

Other Applications

Spintronics Market, By Industry:

Consumer Electronics

Automotive

Industrial

Healthcare

Information Technology (IT) & Telecom

Spintronics Market, By Region:

Asia-Pacific

China

Japan

India

Australia

South Korea

North America

United States

Canada

Mexico

Europe

United Kingdom

Germany

France

Spain

Italy

Middle East & Africa

Israel

Qatar

Saudi Arabia

UAE

South America

Brazil

Argentina

Colombia

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the global spintronics market.

Available Customizations:

With the given market data, TechSci 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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