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Neuromorphic Chip Market Report by Offering (Hardware, Software), Application (Image Recognition, Signal Recognition, Data Mining), End Use Industry (Aerospace and Defense, IT and Telecom, Automotive, Medical, Industrial, Consumer Electronics, and Others), and Region 2024-2032

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Abstracts

The global neuromorphic chip market size reached US$ 3.1 Billion in 2023. Looking forward, IMARC Group expects the market to reach US$ 10.8 Billion by 2032, exhibiting a growth rate (CAGR) of 14.45% during 2024-2032. The market is experiencing robust growth driven by the growing demand for energy-efficient solutions to minimize carbon footprint and maintain sustainability, advancements in artificial intelligence (AI), increasing focus on faster processing speed, and ongoing research in neuromorphic computing.

Neuromorphic Chip Market Analysis:
Market Growth and Size: The market is witnessing robust growth, driven by the increasing demand for AI-driven applications, along with the rising focus on neuromorphic computing.
Technological Advancements: Continuous research and development (R&D) activities are leading to enhanced neuromorphic chip designs and capabilities, which are bolstering the market growth. In addition, these advancements are crucial for maintaining the competitiveness and relevance of neuromorphic chips.
Industry Applications: Neuromorphic chips find applications in the medical and automotive sectors. Their versatility makes them valuable across a wide range of sectors, contributing to market expansion.
Geographical Trends: North America leads the market, driven by favorable government

initiatives. However, Asia Pacific is emerging as a fast-growing market due to the rising need for energy-efficient computing solutions.
Competitive Landscape: Companies are focusing on improving chip architectures, enhancing energy efficiency, increasing processing power, and exploring new materials and fabrication techniques.
Challenges and Opportunities: While the market faces challenges, such as the complexity of neuromorphic chip design, it also encounters opportunities in the increasing focus on the Internet of Things (IoT) and edge computing.
Future Outlook: The future of the neuromorphic chip market looks promising, with the rising use of neuromorphic chips in advancing brain-computer interfaces (BCIs). The increasing focus on quantum computing is anticipated to propel the market growth.

Neuromorphic Chip Market Trends:
Advancements in artificial intelligence (AI)

The rising usage of AI applications across various industries is contributing to the growth of the market. In line with this, AI encompasses machine learning (ML), deep learning, natural language processing (NLP), and computer vision. Moreover, neuromorphic chips can mimic the neural networks of the brain, which is particularly suitable for AI tasks. Besides this, traditional central processing units (CPUs) and graphics processing units (GPUs) face challenges with the energy demands and parallel processing requirements of AI, while neuromorphic chips excel in these areas. Furthermore, the increasing utilization of AI in the healthcare, finance, and automotive sectors is propelling the market growth. Apart from this, the growing demand for high-performance neuromorphic chips in several applications is offering a positive market outlook.

Growing focus on energy-efficiency

The increasing focus on energy-efficiency is supporting the growth of the market. In line with this, neuromorphic chips inspired by the energy-efficient operation of the human brain are designed to perform complex computations with minimal power consumption. This is valuable for devices operating on batteries or in remote locations, such as the Internet of Things (IoT) devices and drones. Moreover, the growing need for energy-efficient processing solutions on account of the rising number of interconnected devices is positively influencing the market. Apart from this, neuromorphic chips can perform tasks with reduced power requirements that assist in maintaining sustainability in the environment while reducing carbon footprint. In addition, neuromorphic chips benefit in the development of sustainable and long-lasting smart devices, which is bolstering the

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market growth.

Increasing demand for faster processing speed

Traditional computing architectures are limited by sequential processing, whereas neuromorphic chips process information at a fast speed and mimic the distributed computing of the brain. In line with this, these chips allow for lightning-fast data processing and decision-making, which is contributing to the growth of the market. Furthermore, the rising demand for neuromorphic chips in applications, such as autonomous vehicles, robotics, and defense systems, to provide real-time responses, is supporting the market growth. Apart from this, these chips can handle complex tasks, which makes them suitable for various applications.

Neuromorphic computing research

Ongoing research and development (R&D) activities in the field of neuromorphic computing are propelling the growth of the market. Apart from this, key players are enhancing chip design, improving neural network models, and exploring new applications. The synergy between neuroscience, computer science, and semiconductor technology is resulting in more efficient and capable neuromorphic chips. Furthermore, researchers are working on developing hardware and software that can mimic the functions of the brain and enable tasks like pattern recognition, learning, and decision-making. In addition, they are focusing on creating efficient computing solutions with applications in AI, robotics, and healthcare.

Neuromorphic Chip Industry Segmentation:
IMARC Group provides an analysis of the key trends in each segment of the market, along with forecasts at the global, regional, and country levels for 2024-2032. Our report has categorized the market based on offering, application, and end use industry.

Breakup by Offering:
Hardware
Software

Software accounts for the majority of the market share

The report has provided a detailed breakup and analysis of the market based on the offering. This includes hardware and software. According to the report, software represented the largest segment.

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Software includes specialized programming tools, libraries, and frameworks designed to work seamlessly with the hardware. Software solutions facilitate the development, programming, and optimization of applications that leverage neuromorphic chips. They often provide neural network modeling and simulation capabilities to help developers harness the full potential of the hardware. In addition, middleware software acts as an intermediary between the hardware and higher-level applications. It provides essential functionalities, such as data management, communication, and interface integration, making it easier for developers to integrate neuromorphic chips into various systems and applications.

Hardware includes the physical hardware components, such as the neuromorphic chips themselves. These chips are designed to mimic the behavior of the neural networks of the human brain, enabling energy-efficient processing. Hardware offerings can vary in terms of chip designs, sizes, and processing capabilities, catering to different applications and performance requirements. It also encompasses development kits and platforms that enable developers and researchers to work with neuromorphic chips. These kits typically include the necessary hardware components, software tools, and documentation for building and testing applications using neuromorphic technology.

Breakup by Application:

Image Recognition
Signal Recognition
Data Mining

Image recognition holds the largest market share

A detailed breakup and analysis of the market based on the application have also been provided in the report. This includes image recognition, signal recognition, and data mining. According to the report, image recognition accounted for the largest market share.

Neuromorphic chips are widely used in image recognition tasks, including image classification. They provide enhanced processing and analyzing images in real-time, making them ideal for applications, such as object recognition, facial recognition, and scene classification. In surveillance systems, neuromorphic chips play a crucial role in detecting and identifying objects or individuals in security footage. Their ability to process video streams efficiently and recognize patterns is highly valuable in security

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applications. Moreover, image recognition is vital for autonomous vehicles to perceive their surroundings. Neuromorphic chips enable real-time analysis of camera feeds, helping vehicles make split-second decisions, detect obstacles, and navigate safely.

In signal recognition, these chips can process audio signals for applications, such as speech recognition and audio classification. They can analyze complex audio data in real-time, which is essential for voice assistants and communication devices. Besides this, signal recognition in radar and sonar systems involves identifying and tracking objects in the environment. Neuromorphic chips enable rapid signal analysis, helping in applications like military surveillance and marine navigation.

In data mining, these chips assist in identifying patterns and trends within large datasets. It involves predictive modeling to forecast future trends or outcomes. Neuromorphic chips can analyze historical data and make predictions based on learned patterns, aiding companies in decision-making. In the financial industry, data mining with neuromorphic chips is used for risk assessment, fraud detection, and algorithmic trading.

Breakup by End Use Industry:

Aerospace and Defense
IT and Telecom
Automotive
Medical
Industrial
Consumer Electronics
Others

The report has provided a detailed breakup and analysis of the market based on the end use industry. This includes aerospace and defense, IT and telecom, automotive, medical, industrial, consumer electronics, and others.

In the aerospace and defense industry, neuromorphic chips are used to enhance the autonomy of unmanned aerial vehicles (UAVs). They enable real-time image processing, sensor fusion, and decision-making, making UAVs more capable in surveillance, reconnaissance, and combat situations. In addition, neuromorphic chips play a pivotal role in radar and signal processing systems, aiding in the identification and tracking of objects, missiles, and threats.

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IT and telecom neuromorphic chips contribute to network optimization by efficiently managing data traffic, identifying patterns in network behavior, and enhancing overall network performance. This results in improved data transmission and reduced latency. These chips are also used in data centers to optimize power consumption and improve the efficiency of data processing and storage.

In the automotive sector, neuromorphic chips are integrated into advanced driver assistance systems (ADAS) to enable features like lane departure warning, adaptive cruise control, and automated parking. They process sensor data in real-time, enhancing vehicle safety and automation. Neuromorphic chips are crucial for autonomous vehicles, where they process data from sensors like cameras and radar, enabling vehicles to make split-second decisions, detect obstacles, and navigate safely.

Neuromorphic chips assist in medical imaging applications, such as magnetic resonance imaging (MRI), computed tomography (CT) scans, and X-rays, by increasing image processing and analysis. They aid in early diagnosis and treatment planning. These chips play a significant role in brain-computer interfaces (BCIs), allowing patients with disabilities to control devices and interact with computers using their brain signals.

Moreover, neuromorphic chips are employed in industrial automation, where they optimize manufacturing processes by analyzing sensor data, monitoring equipment performance, and ensuring quality control. In industrial settings, these chips are used for predictive maintenance, identifying potential equipment failures before they occur, reducing downtime, and minimizing operational costs.
In consumer electronics, neuromorphic chips enhance the capabilities of smartphones and wearables by enabling artificial intelligence (AI)-driven features like voice recognition, image processing, and augmented reality (AR) applications. They are also integrated into smart home devices, improving the performance of voice assistants and enhancing security systems by enabling real-time image and sound analysis.

Breakup by Region:
North America
United States
Canada
Asia-Pacific
China
Japan
India
South Korea

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Australia
Indonesia
Others
Europe
Germany
France
United Kingdom
Italy
Spain
Russia
Others
Latin America
Brazil
Mexico
Others
Middle East and Africa

North America leads the market, accounting for the largest neuromorphic chip market share

The market research report has also provided a comprehensive analysis of all the major regional markets, which include North America (the United States and Canada); Asia Pacific (China, Japan, India, South Korea, Australia, Indonesia, and others); Europe (Germany, France, the United Kingdom, Italy, Spain, Russia, and others); Latin America (Brazil, Mexico, and others); and the Middle East and Africa. According to the report, North America accounted for the largest market share due to the rising usage of AI applications in various sectors. In addition, the increasing development of advanced neuromorphic chips is bolstering the growth of the market. Apart from this, favorable government policies for tech innovation are contributing to the market growth in the region.

Asia Pacific stands as another key region in the market, driven by the rising number of electronics manufacturing hubs, particularly in countries like China, South Korea, and Taiwan. In addition, the integration of neuromorphic chips into a wide range of electronics, including smartphones, smart home devices, and wearables is bolstering the market growth. Apart from this, the escalating demand for neuromorphic chips in edge computing and real-time AI processing is strengthening the market growth.

Europe maintains a strong presence in the market, with the increasing focus on

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advancing artificial intelligence (AI) and neuromorphic computing. In line with this, the thriving semiconductor industry, along with the rising focus on energy-efficient and sustainable technologies, is supporting the market growth. Furthermore, neuromorphic chips offer energy-efficient computing solutions that resonate with sustainability goals and environmental regulations in Europe. Moreover, the increasing employment of neuromorphic chips in advanced driver assistance systems (ADAS) and autonomous vehicles is impelling the market growth.

Latin America exhibits the growing potential in the neuromorphic chip market on account of the rising focus on advanced technologies. In line with this, favorable government initiatives are contributing to the market growth.

The Middle East and Africa region show a developing market for neuromorphic chips as countries like the United Arab Emirates (UAE) are investing in artificial intelligence (AI) and semiconductor technologies. In addition, governing agencies in the region are undertaking several initiatives to promote AI and technology innovation, which is bolstering the market growth.

Leading Key Players in the Neuromorphic Chip Industry:
The key players in the market are investing in research and development (R&D) activities to design and advance neuromorphic chips by improving chip architectures, enhancing energy efficiency, increasing processing power, and exploring new materials and fabrication techniques. Apart from this, many companies are offering customized neuromorphic chip solutions as per the specific industry needs, such as healthcare, automotive, and aerospace. Moreover, manufacturers are developing and optimizing software tools, libraries, and frameworks that facilitate the integration of neuromorphic chips into various applications. In line with this, various companies are conducting rigorous testing and quality assurance processes to meet industry standards and expectations of individuals.

The market research report has provided a comprehensive analysis of the competitive landscape. Detailed profiles of all major companies have also been provided. Some of the key players in the market include:

Applied Brain Research Inc.
BrainChip Holdings Ltd.
General Vision Inc.
GrAI Matter Labs
Hewlett Packard Enterprise Development LP

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HRL Laboratories LLC
Intel Corporation
International Business Machines Corporation
Qualcomm Technologies Inc.
Samsung Electronics Co. Ltd.
SK hynix Inc.

(Please note that this is only a partial list of the key players, and the complete list is provided in the report.)

Latest News:
February 2021: International Business Machines Corporation (IBM) launched an energy-efficient AI chip built with 7nm technology. The AI hardware accelerator chip supports a variety of model types while achieving leading-edge power efficiency. The low-power AI hardware accelerator is being targeted at applications ranging from cloud-based model training to shifting training closer to the edge deployments and data closer to edge network sources.
January 2022: BrainChip announced the commercialization of its Akida Neural Networking Processor, which is used for Internet of Things (IoT) and various edges. That is a neuromorphic AI chip, which can give ultra-low power and performance benefits over conventional approaches. It can support on-chip training and inference and various sensor inputs, such as vision, audio, olfactory, and smart transducer applications. BrainChip is targeting applications, including smart home, smart health, smart city, and smart transportation.
March 2020: Intel Corp. launched Pohoiki Springs, a powerful self-contained neuromorphic system that assists in scaling research related to neuromorphic. The system will be available to members of the Intel Neuromorphic Research Community via the cloud using Intel’s Nx SDK and community-contributed software components, giving them a tool to scale up their neuromorphic research and explore ways to accelerate workloads that run slowly on conventional architectures.

Key Questions Answered in This Report

1. What was the size of the global neuromorphic chip market in 2023?
2. What is the expected growth rate of the global neuromorphic chip market during 2024-2032?
3. What are the key factors driving the global neuromorphic chip market?
4. What has been the impact of COVID-19 on the global neuromorphic chip market?
5. What is the breakup of the global neuromorphic chip market based on the offering?

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6. What is the breakup of the global neuromorphic chip market based on the application?
7. What are the key regions in the global neuromorphic chip market?
8. Who are the key players/companies in the global neuromorphic chip market?

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Contents

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7 MARKET BREAKUP BY APPLICATION

8 MARKET BREAKUP BY END USE INDUSTRY

9 MARKET BREAKUP BY REGION

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List Of Tables

LIST OF TABLES

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List Of Figures

LIST OF FIGURES

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