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NEUROMORPHIC AI: LEAPFROG OPPORTUNITY FOR MIDDLE EAST

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A few years ago data was called as the new oil by many. If you see today, Artificial Intelligence is the new electricity. Our lives are impacted daily, numerous times by AI in one shape or form. Its not surprising that the level of interest and investment in companies and solutions linked to AI have reached unprecedented levels in the Middle East (let alone globally) over the last 12 months. Looking 5 years ahead, which is a long time give the pace of development and deployment in the world we live, there is an interesting undercurrent developing around the potential of **Neuromorphic AI**.

So, what is Neuromorphic AI:

- To begin with Neuromorphic AI consists of artificial intelligence layered over neuromorphic computing.
- Neuromorphic AI computer simulated programs replicate the fundamental features of human brains.
- It can simultaneously receive information from multiple resources and conduct autonomous analysis in microseconds to provide an output.
- The resulting architecture, artificial neural networks (ANN), is inspired by human biological brains. AI enables adaptive learning and prediction analysis based on incoming data.

And, how is Neuromorphic AI unique:

- These features manifest as common activities that the brain carries out on a day-to-day basis, such as connectionism, parallelism, asynchrony, instant information transfer, continuous learning, sparsity, analog, and in-memory computing.
- Spiking neural networks (SNN), a framework developed under neuromorphic AI, runs multiple algorithms as neural networks do. It utilizes less data and energy than regular neural networks.
- Therefore, the technology will provide better output using real-world input and real-time data.

What makes Neuromorphic AI really exciting is the way Frost & Sullivan has been able to evaluate the growth opportunities around it using the following signals:



\$44 Billion: Cumulative Market Potential (2023-2027)

Increased demand for high-performing integrated circuits (ICs) and artificial intelligence (AI)-enabled services as well as wide use of neural architectures are key market drivers.



6133 Patents Filed (2020-2022)

An increasing number of patents filed relate to findings ways to replicate human brain activities regarding functioning and decision-making capabilities.



17+ Industries Impacted

Transportation and logistics, healthcare, agriculture and food, mining defense, security and surveillance, space, ICT, consumer electronics, retail, automotive, marine, manufacturing and packaging, government, entertainment, education, and BFSI.



~\$600 Million: Funding (2021-2022)

Tech giants and start-ups are using AI and neural network architecture to provide high-speed and energy-efficient computation to address the needs of various industrial sectors.



4 Megatrends

Nearshoring and Local Sourcing; Worsening Energy Crisis; Growth of Social Enterprises; Environmental, Social, and Governance (ESG) Going Mainstream.



Technology Disruptiveness: Game Changing

Cognitive computing, adaptive AI, and sensing will allow machines to make decisions as efficiently as humans.

Driven by the assessment Frost & Sullivan has done, Neuromorphic AI global opportunity size is anticipated to be circa **\$44 billion globally from 2023-2027**. This is a pretty healthy opportunity to dip your toes into and if anything is conservative. What is driving this is the fact that AI and machine learning (ML) tech are largely enhancing the computing power of neuromorphic chips and applications. The growing demand for different applications and ICs supports neuromorphic computing use in different industry verticals. Expanding need for enhanced decision-making with automated operations is boosting the demand for neuromorphic AI across sectors.



MIDDLE EAST

- In the Middle East, adoption can potentially pick up over the next 5-7 years as implementation of tech is accelerated through future vision programs of countries like United Arab Emirates, Kingdom of Saudi Arabia. The adoption readiness level can accelerate as Neuromorphic AI impacts diverse array of applications.



NORTH AMERICA

Largest Market

- This region is experiencing a rise in R&D investments and adoption of neuromorphic AI solutions, making it the largest market with the highest growth rate until 2027. Intel, IBM, and BrainChip are examples of companies that develop technologies and products to address different market needs.
- Application of augmented reality (AR) and Internet of Things (IoT) environments in the manufacturing, defense, automotive, and healthcare sectors is spurring growth. These sectors' use of AI and numerous edge/mobile devices will drive the growth of neuromorphic technologies.



EUROPE

- Germany, the United Kingdom, France, and Italy will drive opportunities in the neuromorphic AI market. GrayScale AI and GrAI are companies involved in advancing this technology in the domain of robotics, autonomous vehicles, AR/VR devices, and much more.
- The automotive and manufacturing industries will be the largest adopters of neuromorphic AI. The technology will support robotics; lack of human labor is a challenge that only robots can address.



ASIA-PACIFIC

Fastest-growing Market

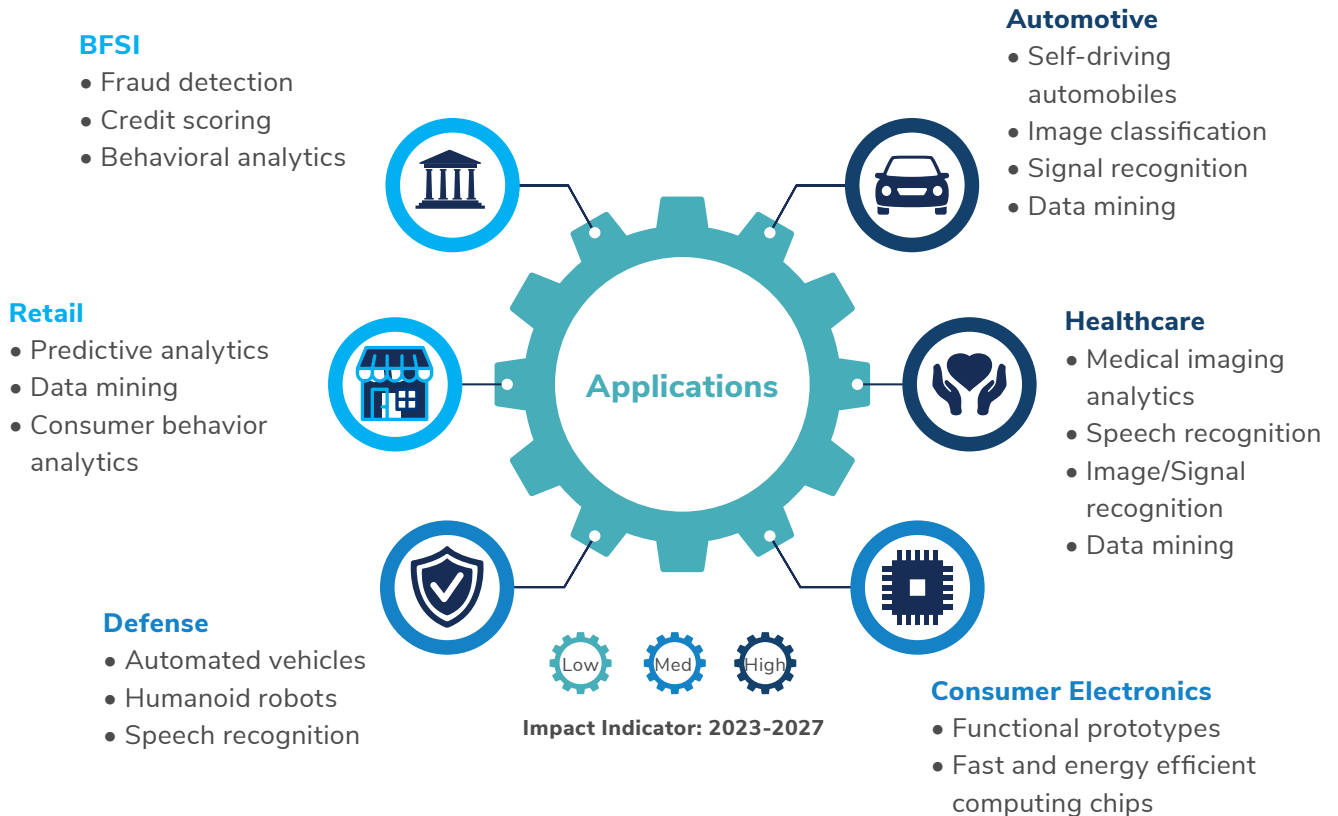
- China, Japan, South Korea, India, Vietnam, and Bangladesh are some of the countries that will experience rapid growth in neuromorphic AI due to rising demand for automation in the automotive and military sectors.
- Asia-Pacific is a hub of high technological advancements with large data centers, rising use of smart electronic devices, and increasing adoption of AI/ML applications. These are key factors driving adoption of neuromorphic AI.

Now, to also understand what is the actual technology of focus within the current Neuromorphic AI development community, Frost & Sullivan evaluated the **6133 patents** filed between 2020-2022 and found the following tech themes (Intellectual Property Classifications) of dominance:

- Artificial intelligence devices
- Graphical elements
- Image processing
- Signal processing
- Data processing
- Synapsis
- Optimizing neural networks
- Network of neurosynaptic core

As seen, patent themes relate to the replication of circuits and electricity flow in human brains. Middle East companies investors and Govt agencies can look at deeply in the above. Driving activity, investment around these tech themes will ensure the Middle East is in line to maximise value from the growth opportunities in Neuromorphic AI.

Multiple sectors could be the driving Neuromorphic AI as processing information is paramount. Frost & Sullivan sees the following sectors impacted:



In summary, for the Middle East, the growth of Neuromorphic AI will come from:

1. High investments from private investors, family offices, companies and the public sector will drive technology advancements.
2. Start-ups striving to build simplified and energy-efficient chips/software that respond with human speed.
3. The trigger a new wave of AI applications and revolutionize all major sectors of the world.
4. Distinctive advantage to adopt the technology to meet respective vision goals.





About Frost & Sullivan

For over six decades, Frost & Sullivan has provided actionable insights to corporations, governments and investors, resulting in a stream of innovative growth opportunities that allow them to maximize their economic potential, navigate emerging Mega Trends and shape a future based on sustainable growth.

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About GITEX Global 2023

GITEX Global, the world's largest tech show, returns to Dubai World Trade Centre from 16-20 October 2023. Under the overarching theme "The year to imagine AI in everything," the event will bring together global tech experts, seasoned investors, world-class leaders, and prominent developers from 176 countries. GITEX Global 2023 will gather over 170,000 trade buyers, 6,000 exhibitors, and 1,400 speakers. Following the record-breaking success of the 42nd edition in 2022, the flagship event will launch three new co-located shows this year: GITEX Impact, Future Urbanism EXPO, and SuperBridge Summit Dubai. Attendees are also going to access the conference agenda and exhibition halls of industry-defining events, such as Ai Everything and Global DevSlam. In 2023, GITEX Global will also inspire the world's largest start-up and investors event, Expand North Star, to grow even further, taking place for the first time from October 15-18, at the iconic Dubai Harbour.

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