Nanoveu Ltd

Investment Report

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Table of Contents

About: Nanoveu Limited

Overview

Nanoveu Limited (ASX: NVU) is a Singapore-based technology company specialising in nanotechnology-driven solutions across semiconductors, visualisation, and materials science. Since its founding in 2012, Nanoveu has built a diverse portfolio targeting consumer electronics, healthcare, renewable energy, and edge computing.

Share Price: 0.047

ASX: NVU
Sector: Technology
21 May 2025

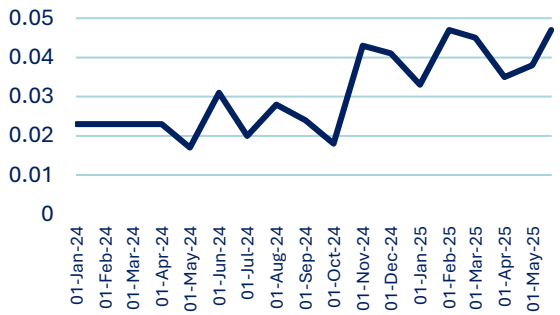
Metrics	Value
Valuation Measures	
Market Cap	AUD 37.77M
Enterprise Value	AUD 34.64M
Share Information	
Shares Outstanding	803.72M
52 week high/low (A$)	$0.017 / $0.081
% held by Board and Management	10.2 %

To support its expansion, Nanoveu has made key strategic hires:

- **Mark Goranson**, ex-Intel and Freescale executive, has been appointed CEO of Nanoveu's Semiconductor Technologies division to lead the commercialisation of ultra-low-power SoC technologies following the acquisition of Embedded AI Systems (EMASS).
- **Scott Smyser**, with 25+ years in deep tech sales, joined as VP of Sales and Marketing to drive strategic partnerships and adoption across IoT, AI, and wearable tech.

The acquisition of **EMASS**, founded by **Dr. Mohamed Sabry Aly**, brings advanced edge AI capabilities to Nanoveu. Dr. Aly remains a driving force within the company, having led the development of the high-efficiency **ECS-DOT** chipset and partnerships like the integration of ReRAM with Weebit Nano to boost scalability and power efficiency.

ASX: NVU Share price (A$)



Source: Yahoo Finance

Key Products and Technologies

EMASS – Ultra-Low-Power AI System-on-Chip (SoC): EMASS, acquired by Nanoveu, is a semiconductor platform designed for ultra-low-power edge AI processing. Its ECS-Dot chipset achieves up to 287 times greater energy efficiency compared to traditional systems, making it ideal for applications in Internet of Things (IoT) devices, wearables, and real-time 2D-to-3D conversion tasks. The technology leverages open-source RISC-V architecture and integrates Resistive Random Access Memory (ReRAM) for enhanced performance. EMASS has secured a U.S. patent for its Non-Maximum Suppression hardware block, facilitating real-time object detection with minimal power consumption.

EyeFly3D™ – Glasses-Free 3D Visualisation Platform: EyeFly3D™ is a comprehensive solution that enables glasses-free 3D experiences on digital displays. It combines advanced screen technology with sophisticated software capable of real-time monocular depth conversion, allowing users to view spatial photos and videos in 3D without the need for special glasses. The platform has been integrated with EMASS's ultra-low-power SoC, enhancing its performance and scalability. Nanoveu has secured a USD 19.73 million Heads of Agreement with Rahum Nano Tech for exclusive distribution in South Korea, with initial orders amounting to USD 850,000.

Nanoshield™ – Antiviral and Antimicrobial Coatings: Nanoshield™ is a self-disinfecting film that utilises a patented polymer embedded with cuprous nanoparticles to provide antiviral and antimicrobial protection. It is available in various forms, including mobile phone screen covers, cases, and commercial films applicable to multiple surfaces. Variants of Nanoshield™ include:

- **Nanoshield™ Marine**: Designed to prevent the accumulation and growth of aquatic organisms such as algae and barnacles on submerged surfaces like ship hulls.
- **Nanoshield™ Solar**: Developed to prevent surface debris accumulation on solar panels, thereby maintaining optimal power output. Field trials are underway in Morocco and the UAE to evaluate its performance under real-world environmental conditions.

Nanoveu's EMASS Technology: A Game-Changer in Ultra-Low Power Edge AI Computing

Overview

EMASS (Embedded AI Systems Pte Ltd), a wholly owned subsidiary of Nanoveu Limited (ASX: NVU), is a pioneering semiconductor platform designed to meet the surging global demand for ultra-low-power, high-performance edge AI processing. The technology is centered around custom-designed **System-on-Chip (SoC)** solutions that enable energy-efficient, scalable AI capabilities across a wide range of smart devices—from wearables and IoT sensors to 3D content transformation engines.

This technology underpins Nanoveu's strategic transition from a coatings-based nanotech firm to a deep-tech AI semiconductor innovator, positioning the company at the intersection of three fast-growing markets: **edge computing**, **AI inference at the device level**, and **energy-efficient chip architectures**.

Technology Overview

Ultra-Low Power System-on-Chip Design

EMASS has developed a proprietary SoC platform, ECS-Dot, which delivers industry-leading performance for edge AI tasks with ultra-low power consumption. Built on a custom RISC-V architecture and fabricated using 22nm technology, ECS-Dot targets AI workloads in power-constrained environments such as wearables, smart cameras, and IoT sensors.

Key features and technical specifications include:

- **Energy Efficiency**: Up to 12 TOPS/Watt (Tera Operations Per Second per Watt), enabling exceptional computational performance per unit of energy.
- **AI Capacity**: 30 GOPS (Giga Operations Per Second) at only 2mW power draw running at 50 MHz.
- **Die Size**: Ultra-compact 7mm^2 footprint, suitable for highly integrated applications.
- **On-Chip Memory**: 4 MB embedded memory, optimised for AI model storage and real-time execution.
- **Model Compression Support**: Capable of executing compressed AI models with less than 2-bit precision, drastically reducing memory footprint and energy requirements.
- **Versatility**: Suitable for deployment in smart rings, hearing aids, AR glasses, and other size and power-sensitive devices.

This technology positions EMASS at the forefront of embedded AI innovation. It removes the need for cloud inference, cuts latency, and reduces the risk of data transmission-related privacy concerns. By executing AI models on-device, ECS-Dot makes edge AI truly autonomous.

Integration of ReRAM Memory with Weebit Nano

In March 2025, Nanoveu Limited, through its semiconductor subsidiary EMASS (Embedded AI Systems Pte Ltd), entered into a landmark collaboration with **Weebit Nano Ltd (ASX: WBT)** a global leader in advanced semiconductor memory technologies. This strategic partnership is centered around the integration of **Weebit's Resistive RAM (ReRAM)** into EMASS's next-generation AI-enabled System-on-Chip (SoC) platforms.

ReRAM is a disruptive form of non-volatile memory (NVM) that offers superior performance over legacy memory technologies like Flash and MRAM. Its material structure allows it to achieve low energy switching, high endurance, and minimal latency, key enablers for real-time AI at the edge. The partnership aims to enhance EMASS's energy-efficient AI chips by embedding ReRAM directly on-die, creating a fully monolithic AI+Memory solution that reduces the need for external memory components and data transfers.

Key advantages of ReRAM over traditional NVM technologies include:

- **Lower power consumption** – ideal for edge AI devices operating on battery power.
- **Faster read/write operations** – enabling real-time AI inference without bottlenecks.
- **High endurance and retention** – suited for frequent read/write cycles as required in always-on devices.
- **Scalability to advanced process nodes (e.g., 22nm and 16nm)** – allowing integration with leading-edge fabrication technologies.

This proof-of-concept validates EMASS's **transition from MRAM to ReRAM** a pivotal decision based on the need for higher scalability, power savings, and tighter integration. By embedding Weebit's ReRAM directly into the SoC architecture, EMASS eliminates the power and performance penalties of external memory access, enabling smarter, more autonomous edge devices such as:

- Wearable health monitors (e.g., smartwatches, fitness bands, biosensors)
- Low-power IoT endpoints (e.g., smart agriculture, environmental monitoring)
- Consumer electronics with embedded AI (e.g., smart home interfaces, language assistants)

Looking ahead, Nanoveu and Weebit are exploring a **monolithic SoC roadmap** that could scale ReRAM integration into more advanced AI ASICs on 16nm FinFET and beyond. The companies are jointly positioning their platform for applications where data privacy, energy efficiency, and ultra-fast AI processing are not just desirable but mission-critical.

This strategic partnership not only enhances Nanoveu's semiconductor stack but also provides it a first-mover advantage in commercialising **AI-native memory architectures** tailored for the edge—a market projected to surpass $100 billion globally by the end of the decade.

Advanced Chip Fabrication and Strategic R&D

To advance the commercial deployment of its ultra-low-power edge AI solutions, EMASS has entered a strategic partnership with the **Center of Nanoelectronics and Devices (CND)** at the **American University in Cairo (AUC)**. This collaboration is centered around the co-development of **application-specific integrated circuits (ASICs)** using **Taiwan Semiconductor Manufacturing Company's (TSMC)** advanced **16nm FinFET process**—a globally recognised technology node that enables greater transistor density, superior power efficiency, and enhanced computational performance.

The 16nm FinFET architecture is a crucial enabler for AI chips designed to operate in **high-performance, low-power** environments. Its three-dimensional gate structure allows for:

- **Tighter transistor packing**, leading to higher logic density and more functionality within a smaller die area.
- **Lower leakage current**, minimising energy loss when devices are idle.
- **Faster switching speeds**, allowing AI models to run inference tasks with reduced latency.
- **Improved energy efficiency**, supporting always-on capabilities in edge devices.

The **joint development initiative between EMASS and CND** encompasses several integrated programs designed to accelerate innovation and practical implementation:

1. **Tape-Out of AI-Optimised ASICs**:
    - EMASS is leading the design of next-generation AI ASICs tailored for real-time inference in verticals such as **healthcare diagnostics, environmental monitoring, and wearable biosensors**.
    - These chips will feature embedded AI cores, energy-efficient memory subsystems, and power management circuits designed to run within sub-10mW power envelopes.
2. **Technical Skill Development and Knowledge Transfer**:
    - EMASS is conducting specialised bootcamps and hands-on workshops for engineers, researchers, and graduate students from AUC.
    - Training modules include SoC design methodologies, digital verification, physical layout optimisation, and AI hardware-software co-design.
3. **Localisation and Deployment for Emerging Markets**:
    - EMASS and CND are working to adapt and prototype edge AI systems that address region-specific challenges—such as low-power medical diagnostics for underserved rural areas or smart agriculture systems that optimise water usage in arid environments.
    - These localised solutions will leverage CND's regional understanding and EMASS's IP and chip design capabilities.
4. **Joint IP Development and Patent Filing**:
    - The collaboration includes pathways for the co-development and protection of intellectual property emerging from ASIC design and integration.

This partnership positions EMASS not only as a technology provider but also as a **capacity builder** in the MENA region's semiconductor and AI ecosystem. By uniting academic research with industry execution, Nanoveu aims to shorten the time-to-market for its edge AI products while cultivating a regional talent pipeline in advanced chip design.

Ultimately, this strategic alliance strengthens EMASS's global fabrication roadmap and validates its commitment to deploying **scalable, affordable, and highly efficient AI silicon** across both developed and emerging markets. It lays the groundwork for broader R&D commercialisation with potential expansion into future nodes such as 12nm and 7nm technologies.

Peer Analysis: Nanoveu vs. ASX Semiconductor Peers

Nanoveu (ASX: NVU), through its EMASS division, is emerging as a formidable player in the edge AI semiconductor landscape. When compared to its ASX-listed peers, Nanoveu demonstrates notable advantages in energy efficiency, integration capabilities, and market positioning.

Benchmark Performance

Recent benchmark tests highlight ECS-DOT's superior performance

- **Anomaly Detection**: Execution time of 1.22 milliseconds with 0.8 microjoules per inference, outperforming STMicroelectronics by up to 287 times in energy efficiency.
- **Keyword Spotting**: Execution time of 3.9 milliseconds with 3.07 microjoules per inference, delivering energy efficiency up to ten times that of Syntiant's Core chips.

Comparative Overview

Company	Ticker	Market Cap (A$M)	Technology Focus	Commercial Stage	Key Differentiators
Nanoveu	NVU	~37	Edge AI SoCs + ReRAM	Early-stage commercial	Ultra-low power AI+Memory integration
Weebit Nano	WBT	~370	ReRAM Memory IP	IP licensing, early PoCs	Advanced ReRAM technology, no AI processing
BrainChip	BRN	~465	Neuromorphic Processors	R&D / pilot partnerships	Spiking neural networks, unique AI architecture
4DS Memory	4DS	~68	MRAM Technology	R&D / licensing	MRAM focus, not AI compute
Archer Materials	AXE	~65	Quantum & Biosensors	R&D phase	Quantum computing and biosensor development

Strategic Advantages of Nanoveu

- **Integrated AI and Memory**: Nanoveu's ECS-DOT SoC uniquely combines AI processing with embedded ReRAM memory, enabling efficient on-device computation without reliance on external memory modules.
- **Energy Efficiency**: The ECS-DOT chipset operates at an average of 0.1mW, with a maximum power usage of 10mW, making it highly suitable for battery-powered devices.
- **Compact Design**: With a die size of 7mm^2 and 4MB of on-chip memory, ECS-DOT supports up to 13 million AI parameters, facilitating complex computations in space-constrained applications.
- **Market Potential**: Given the growing demand for energy-efficient edge AI solutions, Nanoveu's technology positions it well for adoption in wearables, IoT devices, and smart consumer electronics.

Peer Comparison: Energy Efficiency in AI Compute Chips

As demand grows for high-performance AI processing in power-constrained environments, energy efficiency — measured in TOPS/Watt — has become a critical metric. Nanoveu's EMASS chip demonstrates a significant lead in this area, delivering industry-leading performance per milliwatt. This positions it for competitive advantage in edge computing, wearables, IoT, and embedded AI.

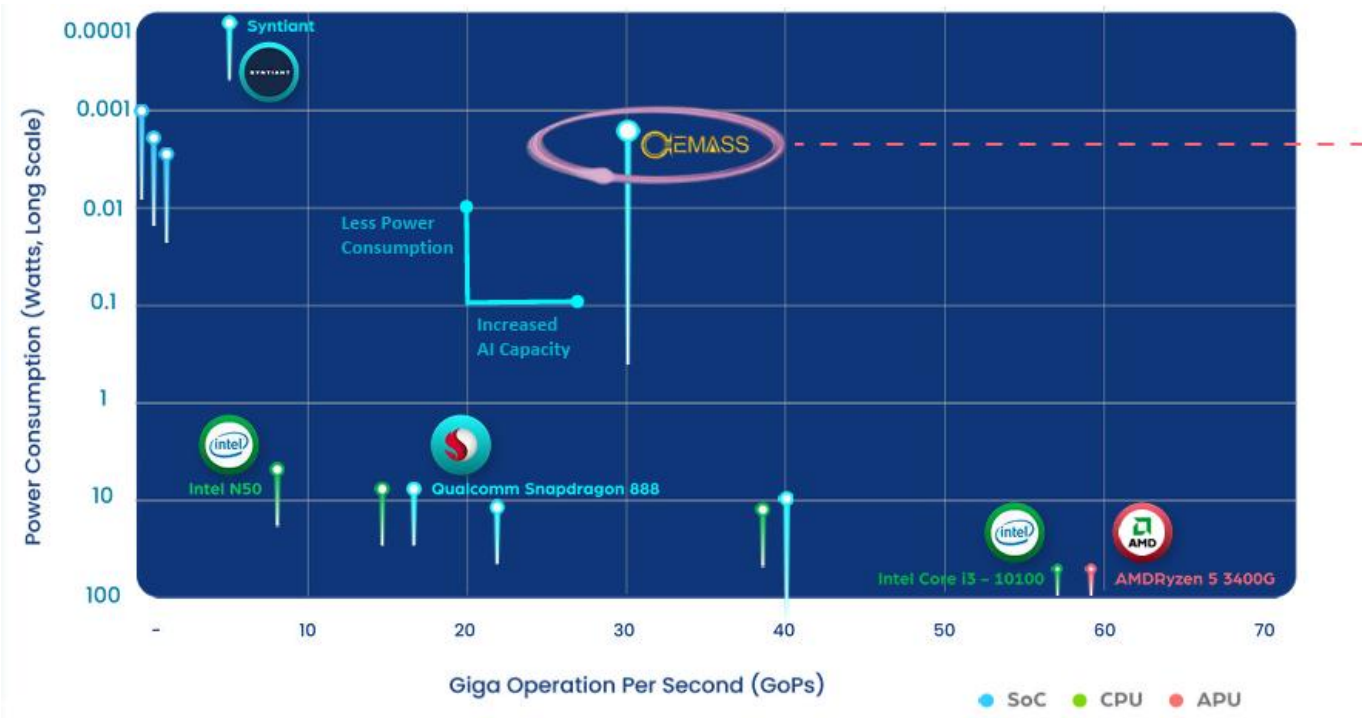
Technical Comparison: EMASS vs Industry Peers

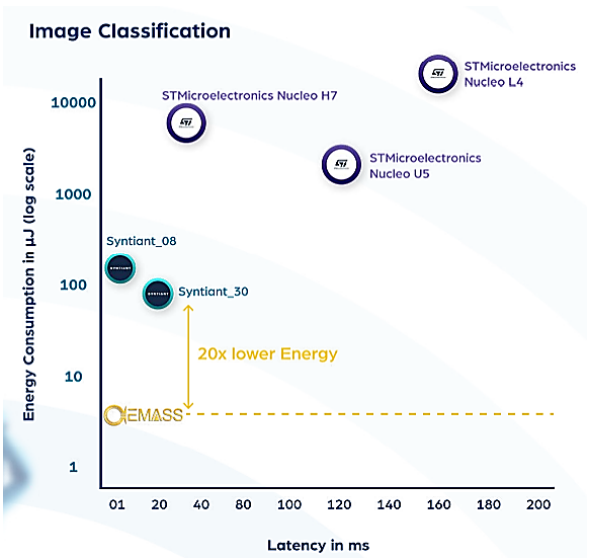
Company	Chip	Chip Type	Target Applications	Performance per Watt (TOPS/W)	Typical Power Consumption	Peak AI Performance
Nanoveu	EMASS	SoC	Wearables, IoT, Drones, Embedded AI	3 – 15	0.1 – 10 milliwatts	~30 Giga Ops/sec (GoPs)
AMD	Ryzen 5 3400G	APU	General-purpose computing	~0.91	65 Watts	~59 Tera Ops/sec (ToPs)
Intel	Processor N50	CPU	Chromebooks, Basic AI	~0.53	75 Watts	~40 ToPs
ARM	Cortex-A53	CPU	Smartphones, IoT	~0.0019	7.5 Watts	~14 GoPs
Qualcomm	Snapdragon 888	SoC	Mobile, Embedded AI	~2.1	8 Watts	~17 ToPs
Broadcom	BCM2712	CPU	Robotics, Industrial Automation, Edge Compute	~3.2	12 Watts	~38 ToPs
MediaTek	Helio P60	SoC	Smartphones, AI Acceleration	~4	10 Watts	~40 ToPs
Marvell	Octeon TX2	SoC	5G Infrastructure, Data Centers	~0.67	30 Watts	~20 ToPs

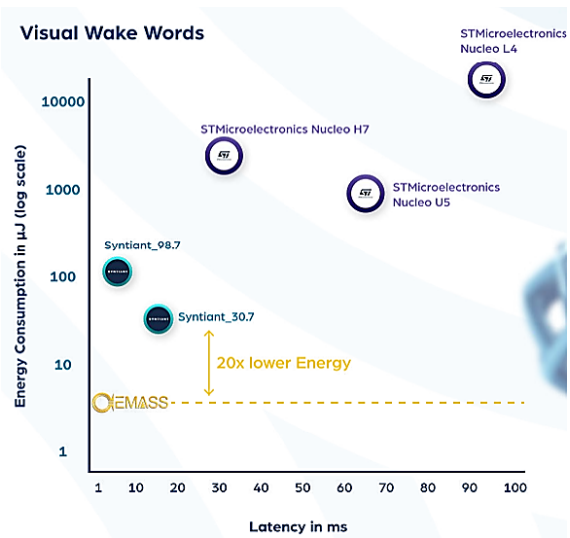
Detailed Comparative Insights

- **EMASS delivers unmatched energy efficiency**, achieving up to **15 TOPS/W** (Tera Operations per Second per Watt) with a typical power consumption range of just **0.1 to 10 milliwatts**. This enables high-performance AI inference on devices with strict power and thermal constraints — such as smart glasses, health wearables, IoT nodes, and micro-drones. No other commercially available chip in this segment combines such low power consumption with scalable AI throughput.
- In contrast, **mainstream processors like AMD's Ryzen 5 3400G and Intel's Processor N50** consume **65W and 75W respectively**, representing a **power draw that is 6,000 to 75,000 times higher** than EMASS. Despite this, their energy efficiency metrics remain well below 1 TOPS/W, making them unsuitable for applications where battery life and passive cooling are essential.

- **ARM Cortex-A53**, although widely deployed in mobile and IoT applications due to its low cost and compact architecture, achieves just **0.0019 TOPS/W** — a level of efficiency that is **three to four orders of magnitude lower than EMASS**. While sufficient for basic tasks, it lacks the capability to support modern AI workloads without rapid battery drain or external power.
- **MediaTek Helio P60 and Broadcom BCM2712** perform better than legacy CPUs on a TOPS/W basis (at ~4 and ~3.2 TOPS/W respectively), but are still primarily designed for **mid-tier smartphones and industrial embedded systems**, where power is less constrained. Their **10–12W power requirements** still disqualify them from the most energy-sensitive applications targeted by EMASS.
- **Overall, EMASS is purpose-built for edge AI tasks where latency, energy efficiency, and miniaturisation are critical design constraints.** It enables AI workloads to run continuously on small form-factor devices without requiring active cooling, external battery packs, or cloud dependence. This opens up new markets in **always-on ambient computing**, **on-device intelligence**, and **offline inferencing**, where traditional chip architectures cannot compete.







Peer Comparison: AI Computation Efficiency at the Edge

The demand for high-performance AI computation at the edge — where devices operate under severe power, thermal, and size constraints — is growing rapidly across industries such as wearables, smart infrastructure, healthcare, and IoT. Nanoveu's **EMASS** chip is designed to meet these needs with a best-in-class combination of power efficiency, inference capability, and scalability. This section compares EMASS to other low-power AI chips commonly used in edge deployments.

Technical Comparison: EMASS vs AI Inference Peers

Company	Software Optimisation	Target Application	AI Performance per Watt (Avg/Peak)	Power Consumption (Avg/Peak)	AI Performance	Max AI Parameters
Nanoveu	Yes	3D Vision, Health Monitoring, Wearables, Smart Infra	3 / 15 TOPs	0.1 mW / 10 mW	30 GOPs	13 million
Maxim Integrated	No	Medical, Patches, Wearable Devices	1.6 / 64 GOPs	50 mW / 2 W	3.2 GOPs	3.5 million
Himax	No	Vision, Speech, Gesture, Retail, Agriculture	40 / 320 GOPs	2.5 mW / 20 mW	0.8 GOPs	500 K
Syntiant	No	Smart Home, Smart Watches	0.1 / 1 TOPs	7 mW / 30 mW	6.4 GOPs	7 million
Ambiq	No	Smart Watches, Fitness, Voice Remote	240 / 133 GOPs	1 mW / 1.8 mW	0.24 GOPs	1 million
ETA Compute	No	Vision	200 GOPs	2 mW	0.4 GOPs	256 K

Nanoveu EMASS: Leading in AI Performance per Watt

- **AI efficiency**: Delivers **up to 15 TOPS/W**, significantly above all other listed competitors. Peak efficiency is achieved with just **10 milliwatts** of power consumption — a critical feature for always-on, low-battery devices.
- **Throughput**: Provides **30 GOPs sustained AI performance**, making it one of the few chips that combines high throughput with ultra-low energy requirements.
- **Model capacity**: Supports up to **13 million parameters**, allowing for more sophisticated models than many peers with less than 1 million parameter support.

Detailed Comparative Insights:

- **Maxim Integrated** offers higher peak GOPs per watt but operates at significantly higher average power (50 mW to 2 W), limiting its deployment to patch-based or wearable medical applications where battery size is less constrained.
- **Himax** delivers high peak efficiency (320 GOPs/W), but only achieves **0.8 GOPs total performance**, with limited capacity (500K parameters), making it suitable for simpler AI tasks.
- **Syntiant and Ambiq** focus on voice and basic sensor processing but offer **lower total AI throughput** and limited scalability.
- **ETA Compute**, though efficient in static vision tasks, lacks the software optimisation layer and operates within limited architectural constraints (0.4 GOPs and 256K parameters).

Leadership and Execution

Nanoveu has significantly enhanced its semiconductor leadership bench to support the commercialisation and global scaling of its EMASS technology platform. At the forefront of this leadership strategy is the appointment of **Mark Goranson** as **Chief Executive Officer of Nanoveu Semiconductor Technologies**, the dedicated semiconductor division overseeing EMASS.

Mark Goranson brings over **36+ years of high-impact leadership** experience in the global semiconductor industry. He spent **18 years at Intel Corporation**, where he held a range of technical and commercial leadership roles in **chip manufacturing, engineering, and market delivery**. Beyond Intel, Mark served in senior roles at **ON Semiconductor**, **Freescale Semiconductor**, and **TE Connectivity**, giving him an expansive view of the global semiconductor supply chain—from fabrication and packaging to commercial partnerships and OEM integration.

His background includes:

- Deep expertise in **semiconductor fabrication**, **packaging**, and **product commercialisation**
- Leadership in scaling operations across North America, Europe, and Asia
- Proven capability in aligning **go-to-market strategy** with next-generation chip platforms
- Development and execution of licensing and revenue growth plans for both startups and established enterprises

Mark holds a **Bachelor of Science in Physics/Electronics** from **New Mexico University**, providing him with a strong academic foundation in both theoretical and applied electronics.

At Nanoveu, he is responsible for:

- Leading EMASS's transition from R&D to scalable commercial deployment
- Establishing silicon foundry and packaging partnerships for high-volume production
- Driving OEM adoption across verticals including consumer electronics, healthcare, and smart IoT infrastructure

Mark Goranson

Mark Goranson is joined by **Dr. Mohamed Sabry Aly**, the **Founder and Chief Architect of EMASS**, who continues to spearhead the R&D and long-term innovation roadmap. Dr. Aly is a globally respected semiconductor researcher and system designer whose career spans **academic, government, and commercial breakthroughs** in chip design and AI acceleration.

His career milestones include:

- Leading a **US$25 million chip design initiative** in Singapore focused on AI ASIC development for medical applications.
- Contributing to **DARPA's US$75 million Electronics Resurgence Initiative**, where he was part of a research group at Stanford University exploring emerging nanodevice architectures for AI and defense.
- Holding multiple patents in **hardware accelerators**, **low-power memory**, and **edge AI optimisation**.

Dr. Aly's technical vision underpins the EMASS architecture and product evolution, while Goranson's commercial acumen ensures that EMASS can reach global markets with a credible go-to-market engine.

Together, the leadership duo combines deep technical roots with operational maturity, giving Nanoveu a competitive edge in executing its edge AI semiconductor roadmap. Their combined efforts are focused on:

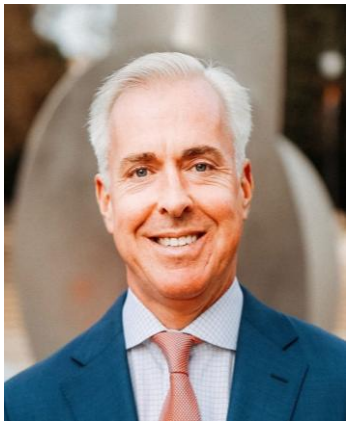
- Delivering AI+Memory SoCs tailored to real-world use cases.
- Scaling production partnerships with TSMC and other advanced nodes.
- Building a defensible IP moat through continuous innovation and targeted patent filings.

Dr. Mohamed Sabry Aly

Scott Smyser was recently appointed as **Vice President of Sales and Marketing** for Nanoveu's Semiconductor Technologies division. With over **25 years of global experience** in deep tech and semiconductor sales, Scott brings a proven track record of driving commercialisation strategies and revenue growth across emerging and established markets. He has held senior leadership positions at **VTI Technologies**, **Si-Ware Systems**, **Rockley Photonics**, and **Atomica**, where he led go-to-market efforts for advanced sensor technologies, photonics-based chips, and micro-electromechanical systems (MEMS) solutions.

At Nanoveu, Scott's mandate is to **accelerate the commercial rollout** of the company's **ultra-low-power AI chipsets**, particularly the ECS-DOT platform developed under the EMASS banner. His deep industry relationships and domain expertise in enterprise sales will be key in securing strategic **partnerships with OEMs**, **licensing agreements**, and **early design wins** across high-growth verticals including **Internet of Things (IoT), edge AI, wearable health technologies, and smart energy systems**.

By embedding strong commercial leadership into the semiconductor division, Nanoveu is positioning itself to **transform from a technology developer into a market-ready solution provider**. Scott's appointment strengthens the company's ability to articulate its unique value proposition to industry partners, build scalable revenue streams, and navigate complex enterprise sales cycles—an essential step as Nanoveu moves toward monetising its next-generation AI+ReRAM SoC platforms.



Scott Smyser

Strategic Positioning and Path to Monetisation

Nanoveu's EMASS chip is uniquely positioned at the intersection of **low-cost edge AI compute** and **next-generation memory innovation**. Designed to address the growing need for ultra-low-power AI processing in constrained environments such as wearables, smart sensors, and autonomous devices, EMASS delivers performance, affordability, and efficiency in a single compact package.

Unlike traditional chip players relying on expensive cutting-edge fabs, Nanoveu's strategy is built around *design-led innovation*—leveraging intelligent architecture, proprietary software, and memory breakthroughs to bypass the cost curve of leading-edge semiconductors. This approach enables Nanoveu to target a **US$7–10 average selling price (ASP)**, dramatically lowering the barrier for widespread OEM adoption across high-volume applications.

Commercialisation and Revenue Strategy

Nanoveu is pursuing a three-tiered monetisation roadmap to scale its EMASS chip platform:

1. Licensing of Core IP and Chip Architectures to OEMs

Nanoveu's primary revenue stream will come from licensing its proprietary EMASS architecture and IP to original equipment manufacturers (OEMs), embedded systems providers, and device makers. This model offers:

- **High-margin, low-CAPEX scalability** by avoiding capital-intensive chip production.
- **Faster time-to-market** for licensees who can integrate EMASS IP into their own SoCs or ASICs.
- **Cross-sector appeal**, allowing expansion into diverse markets such as medical wearables, consumer electronics, and industrial automation.

Licensing discussions are already underway with select global OEMs and semiconductor ecosystem partners, validating market interest.

2. Direct Chip Sales and SoC Module Commercialisation

Nanoveu will also generate revenue from direct sales of EMASS chips and pre-integrated **System-on-Chip (SoC) modules** tailored for plug-and-play deployment by developers and integrators.

These modules are optimised for use cases such as:

- Smart glasses and AR headsets
- Health diagnostics and biometric monitoring
- Mobile robotics and UAV navigation

To streamline adoption, Nanoveu offers complete **developer toolkits**, SDKs, and **reference designs**, allowing partners to accelerate prototyping and reduce engineering friction.

The EMASS chips are manufactured at **22nm technology nodes**, striking an optimal balance between cost-efficiency and energy performance. Each chip is packaged at 10mm x 10mm and operates on a **0.8V supply**, making it ideal for battery-operated and heat-sensitive devices.

3. Strategic Joint Ventures for Vertical Value Capture

To capture more value and demonstrate EMASS in real-world deployments, Nanoveu plans to engage in strategic joint ventures with industry partners in select high-growth domains:

- **Medical technology**: continuous health monitoring, anomaly detection in biosignals
- **Smart infrastructure**: AI-enabled vision systems, predictive maintenance sensors
- **Autonomous platforms**: compact AI chips for drones, robots, and AGVs

These partnerships open doors to recurring revenue through **device sales**, **data analytics services**, or **AI-as-a-Service platforms** powered by EMASS-enabled hardware.

Competitive Differentiation: Technology and Execution Edge

1. ReRAM-Powered In-Memory Computing: At the core of Nanoveu's technology leadership is its adoption of in-memory computing, enabled through Resistive RAM (ReRAM) integration. By embedding compute and memory functions onto a single chip die, EMASS significantly reduces the energy losses traditionally associated with moving data between separate CPU and memory components. This design not only lowers power consumption but also improves latency and shrinks the overall chip footprint—critical for edge applications like wearables and autonomous sensors.

Compared to Flash and MRAM technologies, ReRAM offers markedly faster read speeds in the range of 20–30 nanoseconds, versus several microseconds for legacy alternatives. Wake-up times are also dramatically reduced—down to just 1–2 microseconds, as opposed to tens or hundreds of milliseconds for Flash-based solutions. Moreover, ReRAM enables higher memory density at 22nm and is more compatible with standard CMOS manufacturing, making it an ideal choice for cost-effective yet high-performance AI chips.

Initially, EMASS incorporated MRAM, but the shift to ReRAM came after recognising the latter's superior performance and reduced sensitivity to external magnetic fields. The current EMASS architecture includes 16 megabits of ReRAM and only 1 megabit of SRAM, demonstrating Nanoveu's focus on memory efficiency and minimal reliance on volatile components.

2. Durability through Proprietary Resilience Mechanisms: While ReRAM delivers speed and energy advantages, its endurance has been a known limitation—typically capped at one million write cycles. Nanoveu has proactively addressed this with a suite of proprietary resilience techniques designed to maximise the operational lifespan of its chips. These mechanisms include dynamic wear-leveling algorithms, fine-grained compute integration, error-correcting codes (ECC), and memory management optimised for minimal write fatigue. Collectively, these innovations allow EMASS to support high-frequency AI workloads such as image recognition, deep learning inference, and real-time signal processing without degradation in performance or reliability.

3. Efficient AI Execution via Software-Driven Compression: Beyond hardware, EMASS's competitive strength lies in how it handles AI inference through sophisticated software design. Nanoveu has developed dynamic compression strategies that significantly reduce the memory requirements of AI models. This involves intelligently shrinking the bit representation of neural network weights—sometimes compressing standard 8- or 16-bit weights down to as little as 1 bit, or even embedding multiple weights within a single bit through advanced encoding.

To preserve inference accuracy, EMASS decompresses the model weights just before computation, ensuring that the AI engine processes them at full 8-bit resolution. Unlike conventional architectures, the decompressed data is sent directly to the compute engine rather than being buffered in working memory. This bypass of SRAM storage not only accelerates execution but also conserves energy, a critical factor for edge devices. A dedicated hardware block—Nanoveu's custom-built AI weight decompressor—enables this real-time data path within the chip architecture.

4. Proven Leadership with Deep Semiconductor Expertise: Nanoveu's ability to execute on a complex, high-technology roadmap is underpinned by a leadership team with decades of experience in global semiconductor development. Executives include former leaders from Intel, Honeywell, and other top-tier technology companies. Their backgrounds span commercial SoC launches, global licensing strategies, and high-volume semiconductor supply chains—ensuring that the company's strategic decisions are grounded in deep industry knowledge and operational expertise.

This leadership track record significantly de-risks Nanoveu's growth ambitions, particularly as it prepares to scale its EMASS platform into global edge AI markets.

5. Strategic Collaborations in Fabrication and Research: EMASS's development is strengthened by partnerships with leading research institutions and foundry partners such as TSMC. These collaborations provide access to cutting-edge semiconductor processes and AI model optimisation frameworks, supporting the transition to more advanced technology nodes in the future, including the potential migration to 16nm. By working alongside both academic and industrial partners, Nanoveu accelerates innovation while reducing technical and manufacturing risks.

6. Intellectual Property Strength and Long-Term Moat: To protect its innovations and create a defensible market position, Nanoveu is building a comprehensive portfolio of patents. These filings span critical areas such as energy-efficient chip architecture, ReRAM-memory integration techniques, and inference-optimised compression algorithms. This growing IP base not only reinforces Nanoveu's competitive moat but also enhances its strategic value in the eyes of potential acquirers, investors, and partners seeking differentiated, defensible technology platforms in the semiconductor industry.

Commercial Applications and Market Opportunity

The EMASS platform from Nanoveu is strategically positioned at the intersection of multiple high-growth market verticals, where the need for localised AI processing, energy efficiency, and compact system integration is increasingly vital. With its unique combination of AI compute and ReRAM memory integrated into a single ultra-low-power System-on-Chip (SoC), EMASS addresses performance and energy constraints that are critical to the next generation of edge devices.

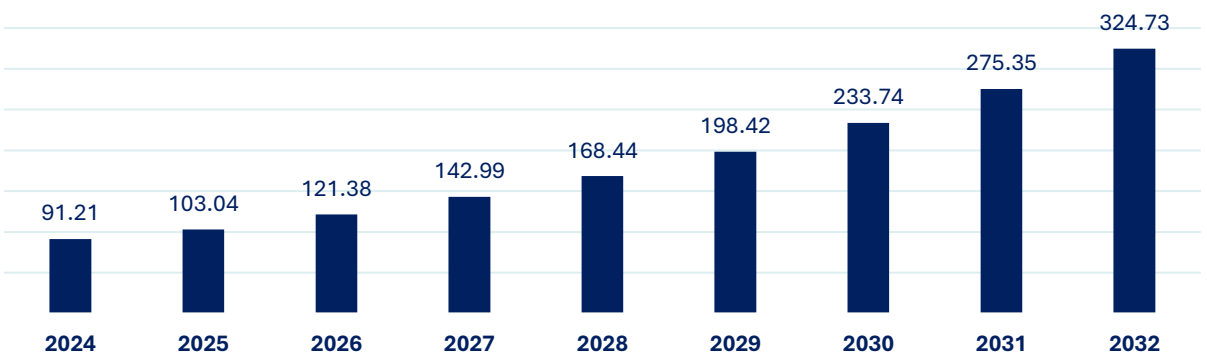
Sector	Application Examples	Market Size by 2030
Wearable Health Tech	Smart rings, biosensors, continuous health tracking, wearables	$233B+
IoT Devices	Smart lighting, automation, environmental sensing, anomaly detection, Industrial Sensors	$181B+
Spatial Computing	Real-time 2D-to-3D conversion, immersive video, smart eyewear	$286B+
Edge AI	On-device NLP, AI-enhanced cameras, voice recognition, translation	$151B+
Drones	Smart Infrastructure Inspection, Autonomous Precision Landing, Swarm Intelligence & Coordination, Predictive Maintenance	$163B+

Wearable Health Tech

The global wearable medical devices market was valued at USD 91.21 billion in 2024 and is projected to expand to USD 324.73 billion by 2032, growing at a CAGR of 17.8% over the forecast period. In 2024, North America accounted for 46.09% of the global market share, maintaining its position as the leading regional market. According to a 2023 article by mHealth Intelligence, approximately 40% of U.S. adults use healthcare-related mobile applications, while 35% actively use wearable healthcare devices—highlighting the increasing adoption of digital health technologies among consumers.

EMASS's compact, low-power SoC is ideal for next-generation biometric monitoring wearables such as smart rings, medical patches, or in-ear sensors. The SoC enables continuous on-device analytics for metrics like ECG, heart rate variability, SpO2, and sleep patterns—without draining battery life or requiring constant cloud connectivity. Embedded ReRAM ensures fast memory access and long retention, perfect for devices where size and energy are limited.

The Global Wearable Medical Devices Market Size (USD Bn)



Source: Fortune Business Insights

IoT Devices

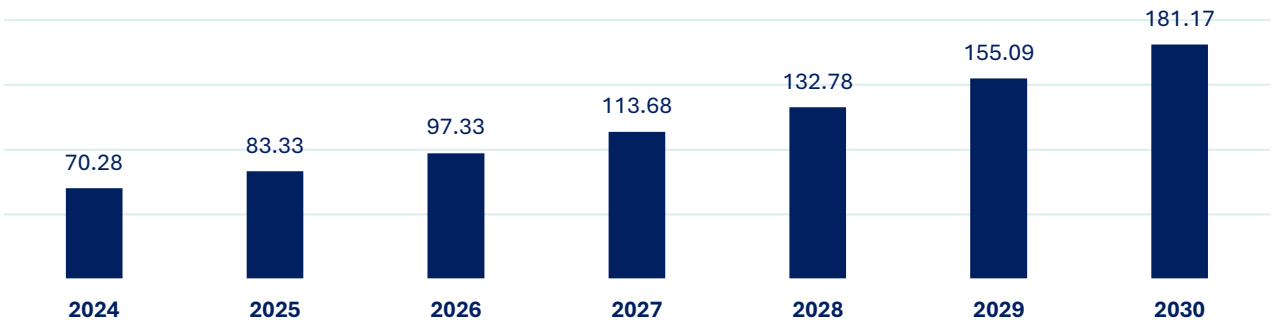
The global Internet of Things (IoT) devices market was valued at USD 70.28 billion in 2024 and is projected to grow to USD 181.17 billion by 2030, reflecting a compound annual growth rate (CAGR) of 16.8% from 2025 to 2030. The market is expected to reach USD 83.33 billion in 2025 as the adoption of IoT accelerates across industries.

This robust expansion is driven by technological convergence, particularly the rise of 5G connectivity, edge computing, and the growing need for real-time data analytics. These innovations are transforming operational efficiency across sectors like healthcare, manufacturing, and smart infrastructure, while enabling the creation of intelligent, connected products and services.

North America led the global IoT devices market in 2024, capturing over 34% market share, bolstered by widespread adoption of smart consumer electronics, increasing deployment of IoT-enabled systems, and a mature telecom infrastructure. The ongoing rollout of 5G across the region is expected to further accelerate device connectivity and data transmission, reinforcing North America's dominant position in the global IoT landscape.

In the smart home and industrial IoT domain, energy efficiency and autonomous operation are essential. EMASS supports edge AI use cases like real-time environmental monitoring, anomaly detection (e.g., water leaks, gas levels), and predictive maintenance—empowering devices to take immediate action without sending data to cloud servers. This results in lower latency, enhanced privacy, and greater resilience to connectivity issues.

The Global Internet of Things (IoT) Devices Market Size (USD Bn)

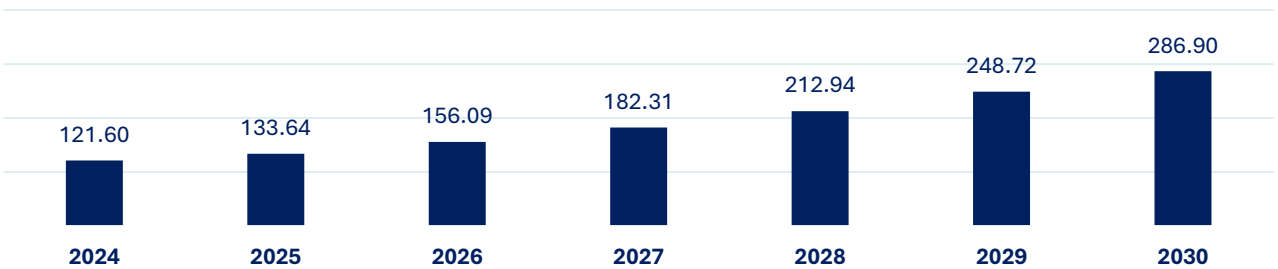


Source: Grand View Research

AR/VR and Spatial Computing

The global spatial computing market was valued at USD 121.6 billion in 2024 and is projected to reach approximately USD 286.9 billion by 2034, growing at a compound annual growth rate (CAGR) of 9.9% over the forecast period. This growth is primarily driven by the increasing demand for immersive digital experiences in areas such as gaming, virtual collaboration, industrial simulation, and education. As these applications require low-latency, real-time spatial awareness and interaction, technologies like EMASS are well-positioned to meet these demands. EMASS enables on-device 2D-to-3D transformation and real-time depth estimation within AR headsets and smart glasses. Its ultra-low power consumption supports longer device operation and reduced heat generation, both of which are essential for extended wear and seamless user experiences in next-generation spatial computing environments.

The Global Spatial Computing Market Size (USD Bn)



Source: Prophecy Market Insights

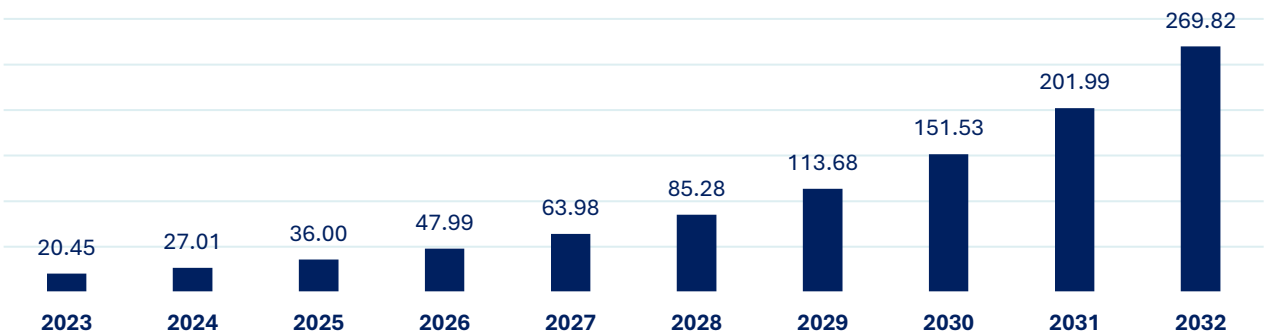
Edge AI

The global edge AI market was valued at USD 20.45 billion in 2023 and is projected to grow to USD 269.82 billion by 2032, representing a compound annual growth rate (CAGR) of 33.3% over the forecast period. The market is expected to reach approximately USD 27.01 billion in 2024, fuelled by the proliferation of connected devices and increasing demand for real-time, low-latency processing.

As smartphones, tablets, and embedded systems become more reliant on on-device AI capabilities, there is a growing need for processors that can efficiently handle AI tasks without compromising battery life. EMASS addresses this need with its ultra-low-power SoCs, which can execute compressed AI models efficiently and support a wide range of applications, including real-time language translation, AI-enhanced photography, voice recognition, and on-device search.

By eliminating the need for cloud-based processing, EMASS enables faster response times, enhanced data privacy, and energy savings, making AI features accessible even on mid-range devices. This dramatically expands the total addressable market for OEMs and positions EMASS as a strategic enabler in the rapidly scaling edge AI ecosystem.

The Global Edge AI Market Size (USD Bn)

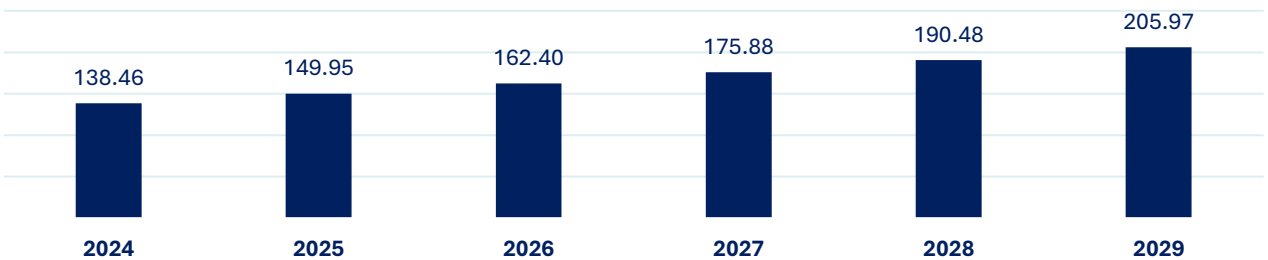


Source: Fortune Business Insights

System-on-Chip (SoC)

The global System-on-Chip (SoC) market is projected to grow from USD 138.46 billion in 2024 to USD 205.97 billion by 2029, at a compound annual growth rate (CAGR) of 8.3% during the forecast period. This growth is driven by the increasing demand for energy-efficient and compact devices in mobile, IoT, and wearable technology sectors. SoCs offer higher processing power in smaller forms, making them ideal for these applications. Advancements in AI and machine learning are also propelling the development of AI-optimised SoCs, particularly for on-device processing in AI PCs and smartphones, enhancing privacy and battery life even in areas with limited connectivity. In the automotive industry, the adoption of SoCs is rising due to their ability to integrate multiple functions into a single chip, essential for applications like Advanced Driver-Assistance Systems (ADAS), autonomous driving, and infotainment systems. The increasing use of electronics in vehicles for powertrain control and autonomous features is creating a surge in demand for automotive-grade SoCs with enhanced safety and performance features.

The Global System-on-Chip (SoC) Market Size (USD Bn)

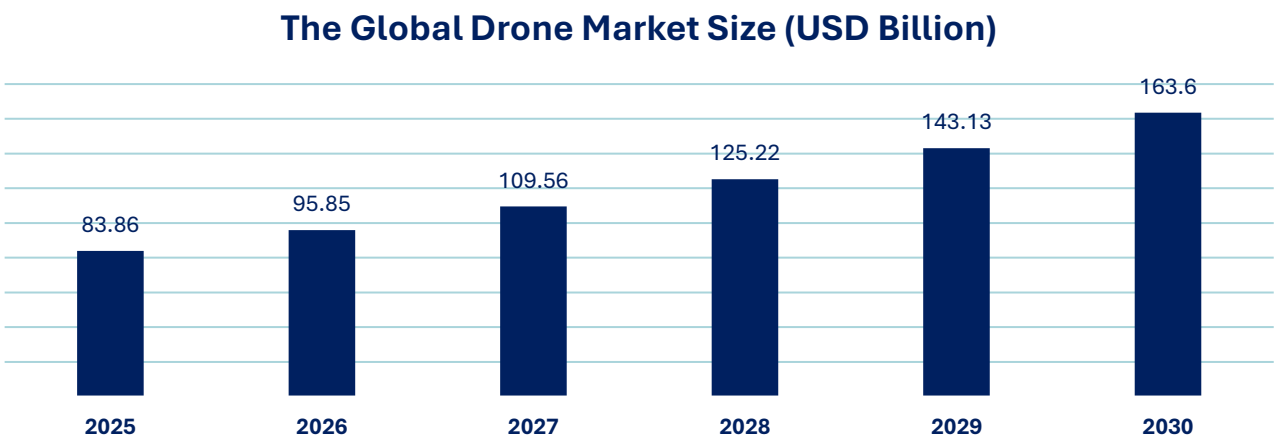


Source: Markets and Markets

Drones

The global drone industry is undergoing a rapid transformation driven by advancements in autonomous systems, AI-enabled hardware, and growing demand across commercial, defence, and consumer sectors. Nanoveu's ECS-DoT chip is uniquely positioned to capitalise on this growth as a next-generation embedded AI solution optimised for ultra-low-power use cases.

According to industry forecasts, the global drone market is projected to grow at a compound annual growth rate (CAGR) of 14.3% from 2025 to 2030, reaching an estimated USD 163.60 billion by 2030.



Source: Grand View Research

Key Drivers Behind Market Expansion

- **Infrastructure & Asset Inspection**: Increasing adoption of drones in infrastructure maintenance, especially for oil & gas pipelines, power grids, telecom towers, and railways, is pushing demand for intelligent onboard AI systems.
- **Logistics & Delivery**: Major logistics players like Amazon, UPS, and DHL are actively piloting drone-based delivery systems, requiring autonomous landing, flight extension, and real-time decision-making capabilities.
- **Emergency Response & Public Safety**: Governments and NGOs are increasingly deploying UAVs in disaster response, wildfire monitoring, search and rescue missions, and real-time surveillance. Edge AI capabilities reduce dependence on unstable connectivity in remote or hazardous regions.
- **Agriculture & Environmental Monitoring**: Drones are being integrated into precision agriculture workflows to detect crop stress, soil health, irrigation patterns, and pest infestations using onboard thermal and multispectral sensors.
- **Defense & Border Security**: Tactical drones with embedded AI are being used for surveillance, reconnaissance, and patrols in conflict-prone or high-risk areas without requiring persistent satellite or cloud connectivity.

UAV Shipment Growth & Hardware Trends

- Global **UAV shipments are projected to surpass 7.5 million units annually by 2029**, indicating a growing need for scalable, energy-efficient components like ECS-DoT that can be integrated into commercial and industrial drone fleets.
- The trend is moving away from bulky, cloud-reliant AI modules toward **lightweight edge processing chips** that can deliver faster inference, reduce data latency, and operate independently in bandwidth-limited environments.

Australian Market Momentum

Australia is a standout emerging market for drone adoption:

- **Drone activity is forecast to rise 40x by 2043**, according to industry consultancy Scyne Advisory.
- Key adoption areas include **infrastructure monitoring**, **mining operations**, **agriculture**, and **emergency services**, sectors that value autonomous operations and extended battery life—core features enabled by ECS-DoT.

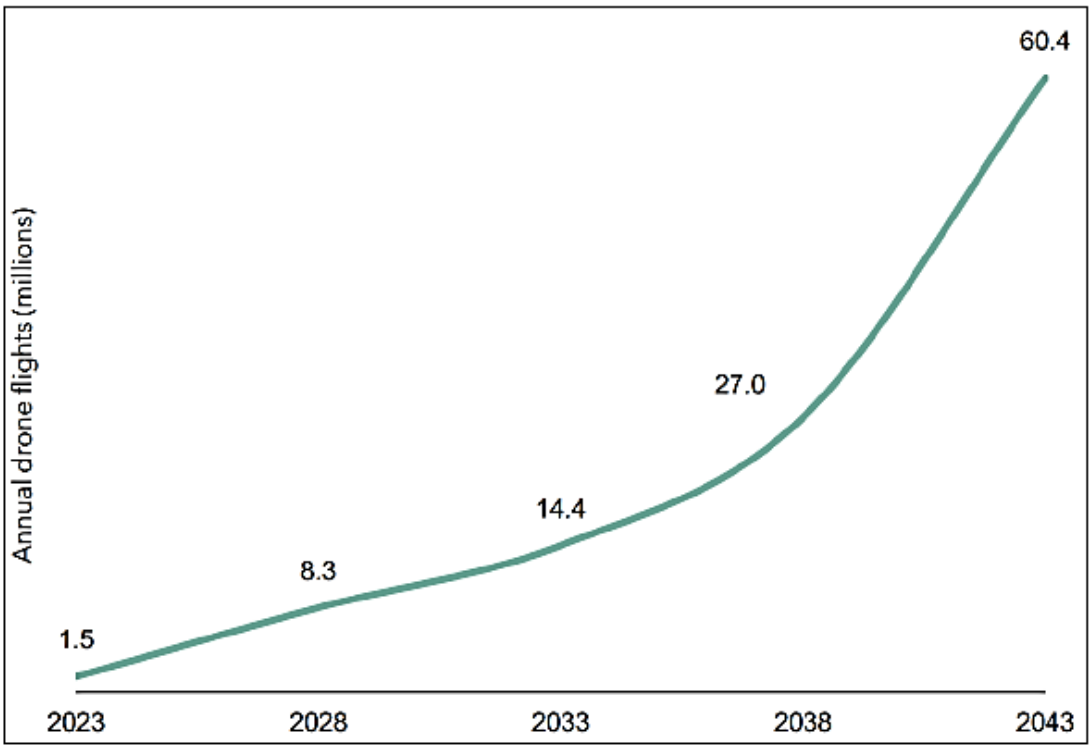


Figure 2: Predicted number of annual drone flights in Australia, 2023-2043[3]

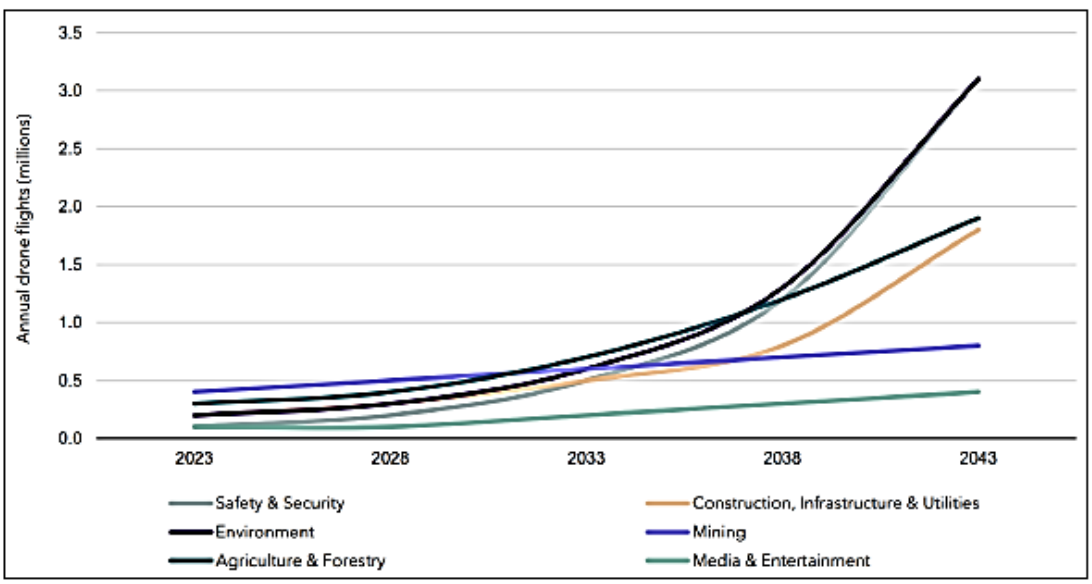


Figure 3: Drone flights in Australia per industry group excluding transport and logistics[3]

Conclusion: Why Nanoveu Ltd (ASX: NVU) Is a Strong Opportunity

Nanoveu Ltd (ASX: NVU) is emerging as a key player at the intersection of edge AI, wearable technology, and ultra-low-power semiconductor innovation. The company's transformation into a deep-tech semiconductor innovator is anchored by its proprietary **EMASS System-on-Chip (SoC)** platform — a solution designed to power the next generation of intelligent, battery-efficient edge devices.

EMASS delivers a unique combination of **industry-leading energy efficiency** (up to 15 TOPS/W), compact form factor, and integrated AI + ReRAM memory architecture. This positions Nanoveu at the forefront of high-demand markets such as smart health devices, autonomous sensors, spatial computing, and IoT systems — all of which are scaling rapidly as AI moves from the cloud to the device level.

Nanoveu's commercial strategy is comprehensive and designed for scalability:

- **Licensing of EMASS IP** to original equipment manufacturers (OEMs), enabling high-margin recurring revenues;
- **Direct chip and SoC module sales**, supported by toolkits and SDKs that simplify adoption;
- **Strategic joint ventures** in sectors such as digital health, smart infrastructure, and mobile robotics — accelerating market access and ecosystem development.

The company is well differentiated by several competitive advantages:

- **Monolithic compute + memory integration** using ReRAM for efficient, on-device AI execution;
- **Advanced fabrication and R&D partnerships** with industry leaders like TSMC and Weebit Nano;
- **A leadership team with decades of semiconductor success**, including senior roles at Intel, Freescale, and ON Semiconductor;
- **A growing IP portfolio** that strengthens defensibility and enhances strategic value.

Importantly, Nanoveu is currently trading at a **modest market capitalisation (~A$37 million)** — significantly lower than many of its ASX-listed semiconductor peers. This presents a strong **valuation entry point**, especially when considering the company's differentiated technology stack, near-term commercial pipeline, and exposure to multiple global megatrends in AI and edge computing.

With a clear monetisation strategy, high-value partnerships, and accelerating market traction, Nanoveu is well-positioned to deliver long-term shareholder value. Its EMASS platform enables AI that is efficient, secure, and always-on — creating a foundational layer for the future of edge intelligence.

For investors seeking early exposure to disruptive semiconductor innovation with significant upside potential, Nanoveu Ltd offers a compelling and timely opportunity.

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