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ASX: NVU

USA Patent Granted for Next-Generation Vision AI Hardware
EMASS's Revolutionary NMS architecture streamlines real-time object detection, delivering faster and more cost-effective AI solutions for edge devices

Patent Highlights (Pub. No.: US 2024/0296670 A1)

- The patent, exclusively licensed to EMASS, covers a novel Non-Maximum Suppression (NMS) hardware block that measures only 0.06 mm^2—over 90% smaller than typical solutions—designed to reduce the costs and complexity of EMASS's proprietary chip technology.
- The NMS can handle up to 10,000 bounding boxes per second while operating under 1 mW, significantly extending device battery life and slashing energy costs. Bounding boxes are digital frames that isolate distinct objects within an image or video. For example, they can distinguish individual human faces in security footage or highlight specific items in a retail setting.
- The patented technology has the potential to streamline real-time object detection for vision applications running "at the edge", enabling faster, and more cost-effective AI.
- Embedded AI Systems Pte. Ltd. (EMASS) has previously secured a long-term, exclusive license from Nanyang Technological University (NTU), which currently holds a 3.5% interest in EMASS.
- Upon the pending acquisition of 100% of EMASS, NTU's stake will convert to 6,038,442 Nanoveu shares.

Nanoveu Limited ("Nanoveu" or the "Company") (ASX: NVU) is pleased to announce the grant of a key U.S. patent, exclusively licensed to protect EMASS's specialized solutions for real-time object detection and tracking. This patent addresses a critical challenge in Vision AI known as Non-Maximum Suppression (NMS)—the process of identifying only the most relevant objects while filtering out duplicates or overlaps.

NMS is integral to Vision AI, guiding applications like smart security systems, autonomous navigation, and augmented reality to prioritize clarity and accuracy. EMASS's hardware-accelerated approach runs these computations on dedicated hardware ("on edge") rather than general-purpose processors. This shift reduces latency, cuts energy use, and shrinks the overall footprint, setting new standards for efficiency.

By embedding advanced NMS directly into hardware, EMASS technology speeds up object detection while also lowering power consumption—vital for edge devices like drones, smart cameras, and autonomous robots. With this innovation, EMASS technology has the potential to help advance the adoption of Vision AI across diverse markets, enabling smarter homes, safer cities, and more sustainable operations.
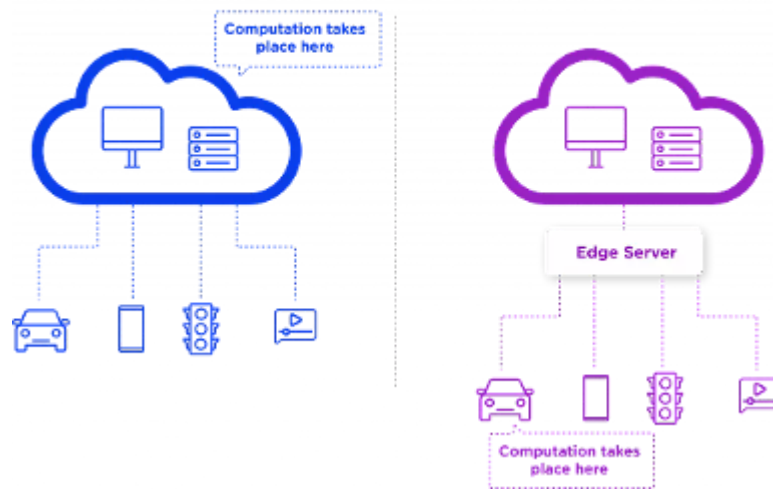
Cloud Computing vs Edge Computing

Figure 1: Cloud vs Edge Computing, emphasizing that all computations for edge devices are performed locally on the device itself where high computational capability is required in a low-power environment

Unparalleled Efficiency and Speed:

Unlike standard NMS methods that struggle under real-time conditions, EMASS's patented design can track multiple objects simultaneously with lower energy draw. The result is a Vision AI system capable of performing complex tasks, such as identifying several moving objects at once, all in real time and with minimal power usage. This has the potential to unlock new opportunities for augmented reality, smart homes, and wearable AI products.

"This patented architecture represents a leap forward in how Vision AI can be deployed on edge platforms," said Mohamed M. Sabry Aly, EMASS Founder. "By outperforming traditional GPU and software solutions in power, speed, and size, we're enabling smarter, faster, and more sustainable AI solutions for real-world applications."

Performance Metrics:

- Smaller is Better: Occupies only 0.06 mm², a fraction of traditional NMS hardware's footprint.
  - In wearable devices like fitness trackers or AR glasses, where every millimetre counts, this compact design integrates seamlessly without added bulk or battery drain.
  - In IoT sensors for smart homes, it enables smaller, more affordable devices featuring advanced Vision AI capabilities, such as real-time motion detection for enhanced security or optimized energy management.
  - Compared to conventional NMS hardware that can exceed 1 mm², EMASS's approach cuts chip size by over 90%, perfect for applications like smart security cameras or autonomous drones.
- Big Power, Tiny Drain: Consumes less than 1 mW, extending battery life in portable devices and reducing operational costs for fixed installations, all while maintaining top-tier AI performance.
- Speed Meets Precision: Processes up to 10,000 bounding boxes per second, ensuring real-time, high-resolution object tracking and detection. This lightning-fast processing means

quicker insights, improved safety, and enhanced user experiences.

Figure 2: Example of Bounding Boxes used in the context of Vehicle Detection

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Real-World Vision AI Applications supported by EMASS' NMS:
- Smart Surveillance: Enhance security with efficient, real-time object tracking and facial recognition, enabling instant alerts and improved monitoring in busy or high-risk areas.
- Autonomous Vehicles & Robotics: Ensure faster, more reliable navigation, detecting obstacles rapidly to prevent collisions and enabling more accurate, efficient machine decision-making.
- Augmented Reality (AR) & Virtual Reality (VR): Delivers seamless and responsive interactions, making immersive environments more engaging and believable.

Sustainability Advantages for EMASS NMS:
- Ultra-low-power operation can reduce energy consumption in battery-powered devices.
- Chipset has a tiny silicon footprint which lowers manufacturing costs and carbon impact.
- On-device processing cuts reliance on power-hungry data centers and network bandwidth, improving security and reducing latency.

Mohamed M. Sabry Aly, Founder of EMASS, commented *"Securing this U.S. patent reinforces EMASS's commitment to efficient, edge-focused AI," said Mohamed M. Sabry Aly, Founder of EMASS. "By streamlining NMS at the hardware level, we enable faster, smaller, and more sustainable solutions. This milestone not only validates our approach, but also accelerates our ability to deliver transformative products to markets that demand high performance and minimal resource use."*

What's Next?
To confirm the technology's transformative potential, EMASS will:
- Conduct compatibility integration tests across various hardware and software ecosystems.
- Publish a comprehensive report detailing energy consumption, latency, and accuracy.
- Advance scoping applications in healthcare monitoring and IoT-driven smart city systems.

This announcement has been authorised by the Board of Directors of Nanoveu Limited.

Further information:

Alfred Chong
Managing Director and CEO
t: +65 6557 0155
e: info@nanoveu.com

About Nanoveu Limited

Nanoveu is a company specialising in advanced films and coatings. https://www.nanoveu.com/.

Further details on the Company can be found at https://wcsecure.weblink.com.au/pdf/NVU/02656570.pdf.

 EyeFly3D™

The EyeFly3D™ platform is a comprehensive solution for delivering glasses-free 3D experiences across a range of devices and industries. At its core, EyeFly3D™ combines advanced screen technology, sophisticated software for content processing, and now, with the integration of EMASS's ultra-low-power SoC, powerful hardware.

Nanoshield™ - is a self-disinfecting film that uses a patented polymer of embedded Cuprous nanoparticles to provide antiviral and antimicrobial protection for a range of applications, from mobile covers to industrial surfaces. Applications include:

> *Nanoshield™ Marine*, which prevents the growth of aquatic organisms on submerged surfaces like ship hulls, and

> *Nanoshield™ Solar*, designed to prevent surface debris on solar panels, thereby maintaining optimal power output.

EMASS (to be acquired by Nanoveu, subject to shareholder approval[1])

EMASS is a pioneering technology company specialising in the design and development of advanced systems-on-chip (SoC) solutions. These SoCs enable ultra-low-power, AI-driven processing for smart devices, IoT applications, and 3D content transformation. With its industry-leading technology, EMASS will enhance Nanoveu's portfolio, empowering a wide range of industries with efficient, scalable AI capabilities, further positioning Nanoveu as a key player in the rapidly growing 3D content, AI and edge computing markets.

Forward Looking Statements

This announcement contains 'forward-looking information' that is based on the Company's expectations, estimates and projections as of the date on which the statements were made. This forward-looking information includes, among other things, statements with respect to the Company's business strategy, plans, development, objectives, performance, outlook, growth, cash flow, projections, targets and expectations and related expenses. Generally, this forward-looking information can be identified by the use of forward-looking terminology such as 'outlook', 'anticipate', 'project', 'target', 'potential', 'likely', 'believe', 'estimate', 'expect', 'intend', 'may', 'would', 'could', 'should', 'scheduled', 'will', 'plan', 'forecast', 'evolve' and similar expressions. Persons reading this announcement are cautioned that such statements are only predictions, and that the Company's actual future results or performance may be materially different. Forward-looking information is subject to known and unknown risks, uncertainties and other factors that may cause the Company's actual results, level of activity, performance, or achievements to be materially different from those expressed or implied by such forward looking information.

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[1] ASX Announcement 15 October 2024