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ASX RELEASE

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ASX: NVU

Nanoveu's ECS-DoT Chip Delivers 33% Flight Time Gain in First Simulated Drone Trials

Nanoveu unlocks significant flight efficiency gains, accelerating path to real-world and heavy platform drone deployment

Highlights

- Nanoveu subsidiary, EMASS, has demonstrated a 33% increase in simulated drone flight time using its ECS-DoT chip, without modifying the drone's battery or airframe.
- ECS-DoT performed real-time "sense–think–act" control at 50 Hz in hardware-in-the-loop (HIL) tests, enabling intelligent throttle and blade-pitch optimisation through embedded AI.
- The chip's onboard surrogate models and reinforcement learning algorithms executed within a sub-milliwatt power envelope, preserving nearly all battery capacity for propulsion.
- Enhancements of surrogate model fidelity and AI control structures targeting 40–70% flight time improvement under varying mission conditions is currently underway, with additional results expected in the current quarter.
- Further simulation tests will also extend to heavier drones, leveraging validated efficiency gains to support potential deployment across a wide range of commercial drone applications.
- The Company is seeking to engage with drone technology partners to advance testing in live flight environments.

Nanoveu Limited (ASX: NVU) ("Nanoveu" or the "Company"), a technology innovator across advanced semiconductor, visualisation, and materials science applications, is pleased to announce that its wholly owned subsidiary, Embedded A.I. Systems Pte. Ltd (**"EMASS"**), has achieved a major advancement in its structured drone testing program, demonstrating a **33% increase** in simulated flight time using its ultra-low-power ECS-DoT system-on-chip (**"SoC"**)[1].

Building on its previously announced 50 Hz real-time control milestone, EMASS has now validated that its embedded AI engine can optimise flight performance in closed-loop conditions, achieving extended endurance without any modifications to the drone's airframe or battery configuration. Flight duration rose from **60 minutes to 80 minutes** on a lightweight drone model in simulation compared to a baseline model with no advanced dynamic control on propellers (i.e., the baseline model had a simple feedback loop with an altitude sensor adjusting the propellers' RPM[2] to meet the target elevation, speed, and orientation) without any battery or airframe changes.

These results mark a significant breakthrough in on-board autonomy, confirming that ECS-DoT can meaningfully extend flight time while enabling advanced capabilities such as adaptive control, energy-aware navigation and real-time optimisation without offloading computation to external systems or requiring significant extra power consumption.

As a result, ECS-DoT is positioning itself as a next-generation control solution for commercial drone applications spanning industrial inspection, logistics, precision agriculture, and defence where real-time responsiveness, edge autonomy, and power efficiency are mission-critical.

[1] Refer ASX Announcements 19 and 30 May 2025.
[2] Rotations Per Minute, a measure of a propeller's rotational speed

Technical Achievements – Real Time Intelligence at Ultra-Low Power

The endurance improvements were achieved through a combination of embedded AI models, real-time inference, and adaptive control logic all executed within ECS-DoT's sub-milliwatt power envelope. Operating within a PX4/Gazebo hardware-in-the-loop (HIL) simulation environment (Simulation of drone dynamics and flight trajectory using Gazebo and the control routine via PX4 Autopilot framework while sending the sensor data to the ECS-DoT chipset and receiving the AI-enabled control action), ECS-DoT maintained a deterministic control loop at 50 Hz executing a full "sense–think–act" cycle every 20 milliseconds, with loop-to-loop variation held under ±1 millisecond.

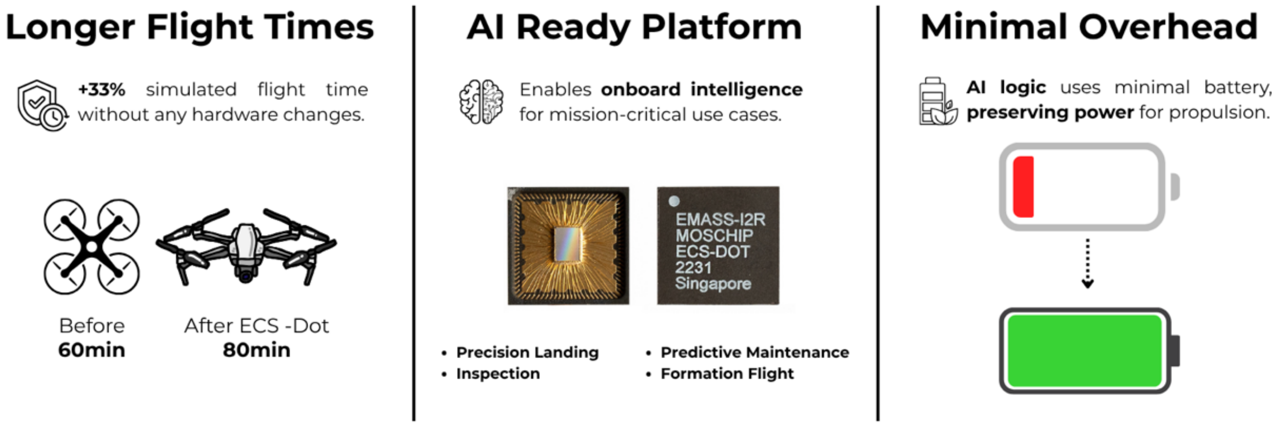
This level of responsiveness, previously demonstrated in high-performance flight controllers, was combined with advanced energy-aware decision-making enabled by two complementary AI engines:

- **Surrogate-Driven Power Prediction**: A lightweight MLP (multi-layer perceptron) model, trained on simulation data from computational fluid dynamics and drone performance datasets, provided real-time predictions of propulsive power demand allowing the reduction of over-thrust events by ~ 25%.

- **Reinforcement Learning–Based Optimisation**: An adaptive control policy, developed using domain-randomised Proximal Policy Optimisation (PPO), continuously adjusted throttle and blade pitch to maximise energy efficiency **delivering a ~20% improvement in flight distance per watt** in closed-loop simulations.

Together, these components enabled ECS-DoT to deliver substantial endurance gains without compromising stability or responsiveness. Total AI compute overhead remained **below 1 milliwatt**, preserving virtually all battery capacity for propulsion and mission-critical sensors.

What This Means



- **Longer Missions Out of the Gate:** Flight duration rose from **60 minutes to 80 minutes** on a lightweight drone model in simulation, compared to no-advanced-control baseline configuration, without any battery or airframe changes.

- **Minimal Overhead**: All AI logic incurs negligible overhead on battery usage, leaving the battery free for propulsion.

- **AI-Ready Platform**: ECS-DoT's sub-milliwatt engine can also power real-time inspection, precision landing, predictive maintenance, and formation flight entirely on-board.

Prof. Mohamed M. Sabry Aly, Founder of EMASS, said: *"Achieving a 33% increase in flight time from 60 to 80 minutes without changing the drone's battery or airframe is a powerful validation of our embedded AI approach. Operating under 1 milliwatt, ECS-DoT delivers advanced onboard intelligence with virtually no energy trade-off. As we move into real-world testing with heavier drone platforms, we're focused on proving that this performance can scale across mission-critical use cases."*

Next Steps – From Simulation to Sky

With simulation-phase performance benchmarks now validated, the ECS-DoT program will progress through an expanded test matrix and move toward real-world deployment. The next phase of work is focused on further improving endurance gains, testing robustness across diverse operational scenarios and demonstrating performance in live drone flights.

Planned next steps include:

1. *Model Refinement*
   Enhancing surrogate model fidelity and AI-based control structures to target 40–70% flight time improvements under varying mission conditions.

2. *Extensive Simulation Validation*
   Running thousands of closed-loop trials across multiple flight profiles, including variations in payload, wind conditions, battery state, and mission complexity to ensure repeatable and resilient performance.

3. *Platform Expansion*
   Extending the testing suite to additional drone classes, including microdrones, fixed-wing aircraft, and midsize VTOLs, each with unique endurance, weight, and power constraints.

4. *Ensuring Resiliency*
   Improve system design to meet acceptable failure rates in aerial electronics systems via model and component redundancy and various fail-safe mechanisms.

5. *Phase 2 Live Flight Trials*
   Deploying ECS-DoT-equipped drones into controlled real-world environments for in-air validation, endurance benchmarking, and advanced feature demonstrations such as precision landing and formation coordination.

These steps are designed to prepare ECS-DoT for broader industry adoption, strengthen engagement with prospective drone OEMs and integrators, and support Nanoveu's strategy to position ECS-DoT as a commercially ready solution across multiple verticals, including visual technologies (including NVU's own EyeFly3D technologies), wearables, drones, smart sensors and IoT devices.

Mark Goranson, CEO of Nanoveu's Semiconductor Division, commented: *"Demonstrating a major simulated increase in flight time without altering the drone's hardware is a clear validation of ECS-DoT's real-world potential. This result proves that our ultra-low-power AI engine can deliver meaningful operational gains in energy-constrained environments. With further model refinement underway and live flight trials planned, ECS-DoT is now firmly positioned as a solution for autonomous drones and the broader edge-AI landscape. The worldwide drone market size was estimated at USD $73 billion in 2024 and is projected to reach $163 billion by 2030[3], representing a major addressable growth market for our technology."*

This announcement has been authorised for release by the Board of Directors.

-ENDS-

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[3] UAV (Drone) Market Size, share, Trends and Growth Analysis, May 2024

About Nanoveu Limited

Further details on the Company can be found at https://nanoveu.com/.

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.

EyeFly3D™ is a comprehensive platform solution for delivering glasses-free 3D experiences across a range of devices and industries. At its core, EyeFly3DTM 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.

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', 'ambition', 'anticipate', 'project', 'target', 'potential', 'likely', 'believe', 'estimate', 'expect', 'intend', 'may', 'mission', '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.