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ASX RELEASE **17 February 2026**

ASX: NVU

Nanoveu Secures Exclusive Evaluation License to Autonomous Drone Swarm Technologies

Four complementary inventions to unlock multi drone GPS-free navigation and coordination in complex environments

Highlights

- Nanoveu secures exclusive global licensing rights from Nanyang Technological University, Singapore (NTU Singapore) to four advanced autonomous navigation and formation control inventions.
- Innovations combine onboard vision and ultra-wide-band (UWB) technologies to enable multi-drone swarm functions in GPS-absent/constrained settings.
- Integration with EMASS' ECS-DoT ultra-low-power control engine and AIoT roadmap to advance Nanoveu towards a complete drone autonomy stack (endurance + navigation + swarm intelligence), with applicability to emerging autonomous ecosystems.
- IP has the potential to dramatically expand Nanoveu's technology solutions for the rapidly growing drone market, targeting logistics, industrial, and consumer use cases.
- EMASS ongoing live drone trials program on track for completion this quarter, building on successful Phase-2 hardware-in-the-loop (HIL) campaign averaging flight endurance gains of 60% (quadcopters), 58% (hexacopters), and 57% (octocopters) achieved without changing batteries, propulsion, or airframes.
- The global drone autonomy and swarm robotics market is projected to exceed US$35 billion by 2030[1], driven by autonomous logistics, and industrial automation.

Nanoveu Limited (ASX: NVU, OTCQB: NNVUF) (Nanoveu or the Company), a technology company specialising in advanced semiconductor, visualisation, and materials sciences, is pleased to announce that it has entered into an exclusive evaluation license agreement - with the option to convert to an exclusive worldwide license - with Nanyang Technological University, Singapore (NTU Singapore), for four inventions in autonomous localisation and formation-control technologies (see Appendix A). Initially designed for multi-robot systems, the inventions reduce cost and deployment complexity by removing dependence on GNSS/GPS or dense external infrastructure. This approach mitigates the inherent limitations of GPS-based navigation, particularly in degraded, cluttered or GPS-denied environments.

Unlike traditional approaches, the NTU Singapore inventions avoid common trade-offs: GPS can be unavailable or unreliable indoors, underground or in urban canyons and is vulnerable to jamming/spoofing; LiDAR adds cost, power draw and calibration/weight burdens; and multi-anchor ultra-wideband (UWB) requires extensive fixed beacons and site setup. By using onboard cameras (standard and depth-sensing), precise UWB radio ranging, and a single-anchor UWB method, the portfolio delivers high-precision, GPS-free localisation and formation control while reducing hardware, infrastructure and time to deploy.

[1] Swarm Robots Market Size and Share | Statistics – 2030, NMXT

Figure 1: Illustration of GPS-free drone-swarm localisation and formation control.

NTU Portfolio Overview

The four inventions provide complementary approaches to localisation and swarm coordination[2]:

1. **Monocular vision–based relative localisation** (camera-only).
2. **Range-based localisation using a rotating UWB tag** (paired with a fixed tag).
3. **Leader–follower formation control using RGB-D** with limited FOV.
4. **Single-anchor UWB–assisted 3D localisation** (infrastructure-light).

Invention	What it is	Why it matters	NVU fit
Monocular vision–based relative localisation	Uses a single onboard camera per robot to estimate relative position/orientation within a group (no GPS/LiDAR).	Lowest hardware cost/weight; scales well to swarms as each robot brings its own sensing.	Vision-only mode that pairs with ECS-DoT low-power control for ultra-light platforms and large formations.
Range-based relative localisation via rotating UWB tag	One robot carries a rotating UWB tag; another carries a fixed tag. Rotation modulates the signal to improve range/bearing over time.	Resilient in clutter, low-light, smoke/dust, or GPS-jammed spaces, without deploying a grid of anchors.	Adds radio-ranging modality for indoor/underground/contested sites; complements vision.
Leader–follower formation control using RGB-D (limited FOV)	Follower uses an RGB-D (colour + depth) camera, optionally with a rotatable depth sensor, to keep the leader in view and maintain formation.	Direct distance cues enable smooth spacing, path keeping, and obstacle handling with minimal external infrastructure.	Drops into convoy, inspection, and perimeter-patrol workflows; mixes with monocular/UWB modes for hybrid fleets.
Single-anchor UWB-assisted 3D localisation	Achieves 3D position using one fixed UWB anchor plus a rotating tag and a two-stage estimator.	Infrastructure-light vs multi-anchor layouts allowing faster setup, easier redeployments, lower cost.	Ideal for rapid deployments (pop-up logistics hubs, temporary worksites, forward operating bases).

[2] Refer to Annexure Table

Together, the four inventions aim to provide complementary, GPS-free localisation and coordination methods, including camera-only vision, rotating-tag UWB ranging, and depth-assisted leader–follower formation, that can be mixed and matched to suit real world conditions.

Integrated with Nanoveu's ECS-DoT ultra-low-power control engine and AIoT roadmap, they hold the potential to enable a complete autonomy stack (endurance + navigation + swarm intelligence) for aerial and ground robotics across, logistics and industrial inspection, with applicability to emerging autonomous ecosystems. As part of this development, the Company will explore minimal sensor utilisation to minimise power consumption and improve payload capacity.

NVU's Managing Director, Alfred Chong commented: *"This option significantly advances Nanoveu's vision of becoming a platform leader in Edge-Ai enabled autonomous systems. By combining NTU's world-class localisation technologies with our AIoT and ECS-Dot edge AI control engine, we will aim to enable drone and robotic swarms to operate with precision in environments where GPS cannot, representing a major step in addressing emerging markets for autonomous mobility and next-generation drone ecosystems."*

Enhancing ECS-DoT's applicability for drones

The NTU portfolio seeks to strengthen ECS-DoT's value by adding infrastructure-light localisation and formation control that work where GPS is unable. ECS-DoT already delivered sub-milliwatt, 50 Hz closed-loop control in simulation that extends drone flight time without hardware changes. Layering NTU's methods on top would allow additional endurance to translate into reliable positioning and coordinated behaviours turning saved energy into more missions completed rather than idle hover time.

- **Deterministic control + robust pose:** Monocular vision (camera-only) and rotating-tag UWB provide complementary relative-position signals that ECS-DoT could fuse or arbitrate against, preserving tight control even in low-light, dust, or texture-poor scenes.

  Example: In a dim aisle, optical features drop; the follower briefly prioritises UWB range/bearing from the rotating tag to hold spacing through the turn, then hands back to vision when texture returns.

- **Infrastructure-light deployment**: Single-anchor UWB 3D cuts site setup versus multi-anchor grids, aligning with ECS-DoT's "drop-in" philosophy allowing faster bring-up, less gear, lower cost.

  Example: A new warehouse bay is activated by placing one tripod anchor at the dock door; drones localise in 3D within minutes with no ceiling-grid install, no site survey.

- **Formation behaviours at milliwatt budgets:** RGB-D leader–follower supplies direct distance cues so ECS-DoT could maintain spacing and path-keeping while staying within a milliwatt-class compute envelope.

  Example: During a cycle-count sweep, the leader slows near an end-cap; the follower's depth cue keeps a fixed 1.5 m gap, preventing overlap in barcode scans while staying under the milliwatt budget.

- **Scale via multi-chip partitioning:** As behaviours grow (control, VIO, avoidance), workloads can be split across multiple ECS-DoT chips to keep timing deterministic, and endurance gains intact.

  Example: A mid-size airframe runs ECS-DoT #1 for 50 Hz control, ECS-DoT #2 for monocular VIO, and ECS-DoT #3 for avoidance/path-planning, preserving endurance while adding richer behaviours.

Live Drone Testing Program Progressing

Nanoveu has progressed from simulation to live, on-air validation of its ECS-DoT technology using an open-source, modular platform suited to controlled and repeatable trials. This phase is focused on confirming that the sub-milliwatt, 50 Hz closed-loop control demonstrated in simulation can be achieved in real operating conditions and on assessing endurance uplift under natural variability.

In parallel, EMASS is using the same test environment to explore GPS-free indoor autonomy with a minimal sensor suite (for example, monocular camera and IMU), evaluating how ECS-DoT can support on-device visual-inertial odometry, lightweight obstacle avoidance and real-time path planning within a tight power budget.

These activities build on the Phase 2 drone evaluation program, where ECS-DoT delivered material endurance improvements across multiple multirotor classes in more than 300 hardware-in-the-loop campaigns using industry-standard environments. Those results reinforced ECS-DoT's role as a chip- and software-level efficiency layer that can extend time-on-task without battery or airframe changes.

To broaden the test envelope, Nanoveu has also engaged a US-based specialist drone technology group to support validation on additional platforms and configurations. This work is underway and intended to inform subsequent phases of the ECS-DoT program, including further additional OEM and partner evaluations, as milestones are met.

Next Steps

With licensing now secured, NVU will advance toward:

1. **Integration with ECS-DoT** →Combining energy-efficient AI control with GPS-free navigation into a unified drone flight platform, initially through development of a bespoke daughterboard.
2. **OEM Engagement** → Expanding discussions with global drone manufacturers and avionics suppliers, positioning NVU as a turnkey autonomy partner.
3. **Live Field Trials** → Incorporating NTU technologies into Phase 3 ECS-DoT real-world flight programs to validate combined navigation and endurance gains.
4. **IP Expansion and Consolidation** → Filing additional patents around integrated swarm autonomy frameworks, building long-term defensibility and global licensing potential.

Key Transaction Terms

Nanoveu has secured an exclusive evaluation license with NTUitive, NTU's innovation and enterprise company, granting exclusive evaluation rights, and subject to exercise, a worldwide license to the portfolio of advanced autonomous navigation and formation control technologies. The license introduced and assigned through the Company's corporate advisor 62 Capital Pty Ltd, initially provides for an evaluation-only period until September 2026, requires the provision of data to NTUitive and NTUitive retains ownership of the Licensed Innovation.

The Company has agreed to issue 5 million performance rights to 62 Capital Pty Ltd. One-third of the performance rights will vest on the Company achieving a 20-day volume-weighted average price (VWAP) of each of $0.10, $0.15, and $0.20 respectively, and will have an expiry 5 years from the date of issue. The performance rights are otherwise on standard terms.

If Nanoveu exercises its option to an exclusive worldwide license, the parties have a month to negotiate a definitive license, on commercially reasonable terms as follows:

- License: Exclusive, worldwide, drone swarms for indoor and outdoor surveillance applications
- Typical expenses to Access and Maintain Patent Family through NTU which will include:
  - (a) S$50,000 at signing of a license agreement;
  - (b) S$85,000 on or before 18 September 2026,
  - (c) Annual payment: S$50,000 during the License Period thereafter for a period up to 7 years.
  - (d) Patent costs: Nanoveu to reimburse reasonable patent prosecution and maintenance costs at signing of license agreement.

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

-ENDS-

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Appendix A – NTU Intellectual Property

IP No.	Invention (official title from NTU)	Status	Patent application no.
1	Monocular Vision-Based Relative Localisation Method For Multiple Robots Using On-Board Sensors Only	Copyright	—
2	Range-Based Relative Localisation Method For Multiple Robots Via An On-Board Rotating Ultra-Wideband Tag	US patent application	18/998,391
3	Leader-Following Formation Control Method For Mobile Robots Using Only RGB-D Camera With Limited FOV	China & US applications	202480024151.2, 19/472,617
4	Single Rotating Ultra-Wideband Anchor-Assisted Three-Dimensional Robotic Localisation	Know-how	—

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, 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.

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.