Nanoveu Limited
ACN 624 421 085
Level 45, 108 St Georges Terrace
Perth WA, 6000 Australia
+61 8 6244 9095
www.nanoveu.com

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ASX: NVU

Second-Phase ECS-DoT Drone Trials Deliver Peak Efficiency Gains of up to 51.0% on Complex Flight Paths

Second-phase testing used more complex flight paths, representative of commercial drone operations, with efficiency gains increasing consistently with flight speed

Highlights

- **Builds on first results[1]:** Using the same controlled methodology as the first phase of live flight trials, EMASS has completed a second phase of testing with ECS-DoT on more complex flight paths and at higher speeds, recording peak cruise-efficiency gains of up to 51.0% at 7 m/s and average gains of 48.5% at 7m/s across all trajectories tested. First-phase trials recorded gains of up to 27.8% on simpler flight paths at speeds up to 6 m/s.
- **+51.0% Improvement in Cruise Energy Efficiency:** Testing recorded peak cruise-efficiency improvements of up to 51.0% at 7 m/s. These results indicate that efficiency gains scale materially as flight speeds increase toward the aerodynamic optimum.
- **Testing on Complex Flight Paths Representative of Commercial Operations:** Testing was conducted across three new, highly complex flight trajectories featuring dense zigzags, irregular polygons, and diagonal crossings. These paths are more representative of commercial drone operations than the straight-line grid patterns used in first-phase trials.
- **Largest Gains Recorded at Highest Speed on Most Complex Path:** The data indicates that ECS-DoT delivers its greatest value where conventional autopilots are least efficient. The most complex flight path tested yielded the highest peak efficiency gain of 51.0% at 7 m/s. Gains at lower speeds were smaller across all paths (+3.8% to +8.5% at 3 m/s).
- **Gains made possible with ECS-DoT:** Speed distribution analysis shows that ECS-DoT holds cruise speed tightly around the target, reducing the wide speed variance that wastes energy under standard autopilot control. The tighter the speed cluster, the greater the efficiency gain.
- **High-Performance Edge AI with Minimal Power Consumption:** ECS-DoT continues to execute continuous real-time flight optimisation while consuming less than 10 mW of total system power, enabling these flight-efficiency improvements without requiring additional battery capacity or hardware modifications.

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 results from the second phase of its live drone evaluation program. Following initial live flights that recorded gains of up to 27.8% on simpler flight paths, these latest tests utilised more complex flight paths and higher speeds, delivering peak cruise-efficiency gains of up to 51.0% in live flight conditions.

[1] Refer to ASX Announcement dated 22 June 2026.

Building on Previous Results

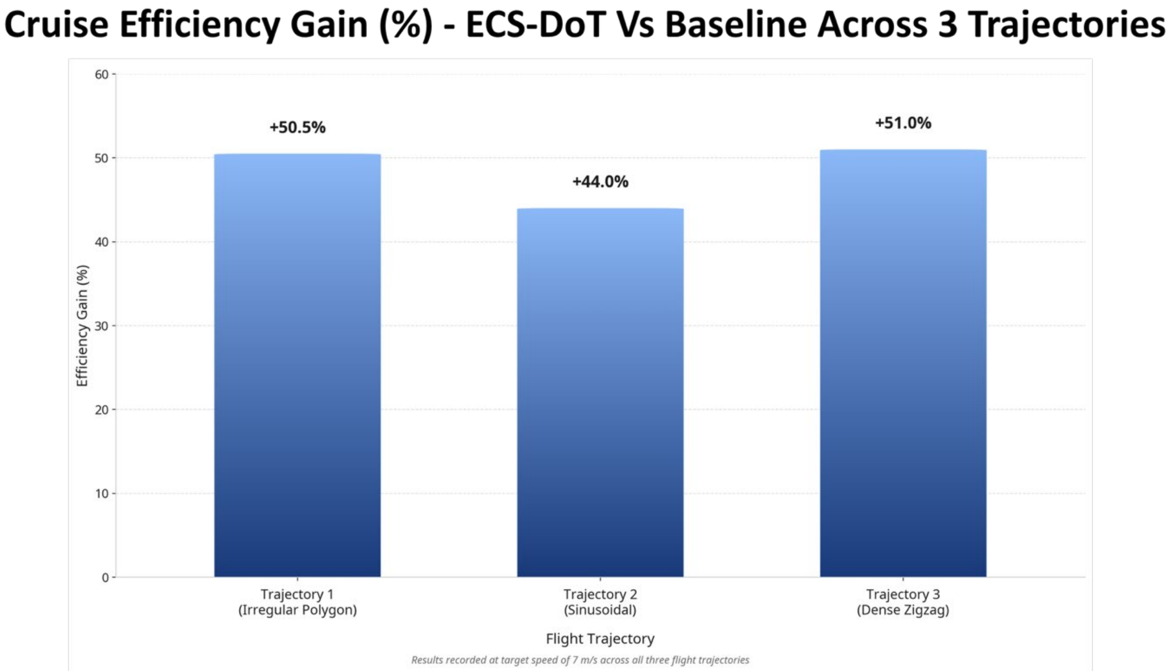

Figure 1: ECS-DoT vs Baseline - Cruise Efficiency Gain (%) at 7 m/s Across All Three Trajectories

The trial program maintained the same controlled, empirical methodology established in the first phase, isolating battery savings as the sole variable of interest across all runs:

- **Phase 1: Waypoint and Speed Selection:** Fixed, repeatable flight paths were defined and target speeds from 3 m/s to 7 m/s programmed into the drone's in-flight controller and autopilot.
- **Phase 2: Control Flight:** The drone was flown along each predetermined path under the sole control of the PX4 Autopilot, establishing the performance baseline through empirical battery discharge measurement.
- **Phase 3: Loading and Flying with ECS-DoT:** ECS-DoT was loaded onboard and configured to work alongside the PX4 Autopilot. The identical flight path and speed profile was repeated with ECS-DoT active, applying real-time speed and flight path optimisation.
- **Phase 4: Apples-to-Apples Comparison:** Flight log data from both runs was directly compared with flight path and distance held equal, producing a clean, like-for-like result.

The trial configuration remained consistent with previous testing: a total airborne mass of 2.8kg (inclusive of a 1.3kg Li-Polymer 6S battery), flying at an altitude of 3.5m. Efficiency is measured as metres travelled per watt-hour of battery energy consumed, consistent with the first-phase methodology.

Testing parameters and limitations: As with the first phase, results were recorded on a single 2.8 kg quadcopter drone platform at low altitude in controlled outdoor conditions. Results may differ on other airframe classes, at higher altitudes, with payloads, or in variable wind conditions.

New Tests with More Complex Flight Routes

The distinction in this second phase of testing was the introduction of three new flight trajectories, designed specifically to replicate the complexity of real-world commercial drone operations. Unlike the simple, three-column lawnmower patterns used in initial trials, these new paths introduced continuous direction changes, sharp angles, and dense transitions.

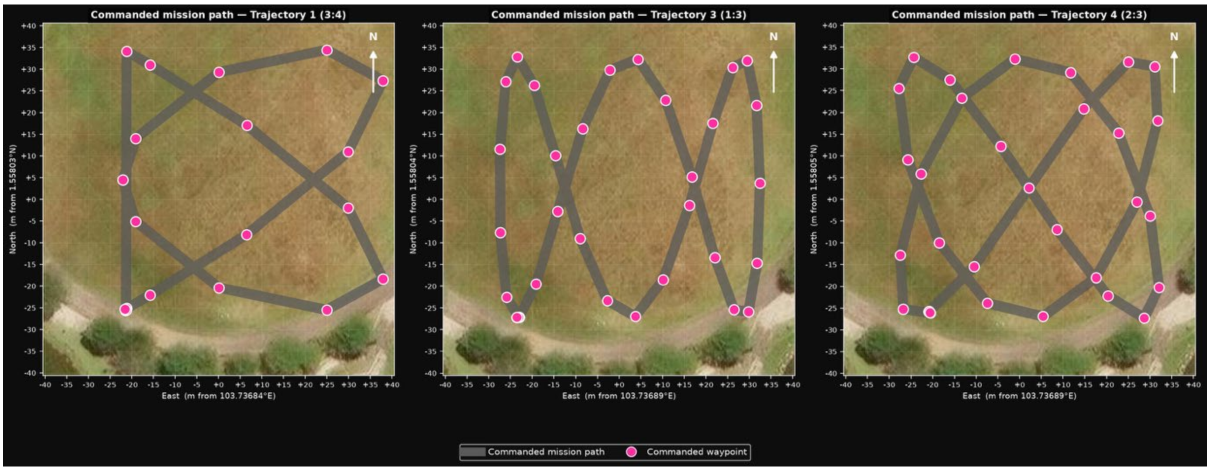

Figure 2: The Three Complex Flight Trajectories Tested: Trajectory 1 (Irregular Polygon), Trajectory 2 (Sinusoidal), and Trajectory 3 (Dense Zigzag) with Commanded Waypoints

The three trajectories tested were:

- Trajectory 1: An irregular polygon with diagonal crossings, featuring sharp angular turns and highly non-linear segments.
- Trajectory 2: A sinusoidal or zigzag pattern, requiring repeated S-curves and continuous direction reversals across the flight area.
- Trajectory 3: A dense zigzag with diagonal crossings, representing the most complex path tested, with continuous, rapid transitions.

These routes are highly indicative of the paths flown during urban reconnaissance, precision agriculture spraying, and complex infrastructure inspection, where drones rarely fly in straight, uninterrupted lines.

Why This Resulted in Even Better Performance

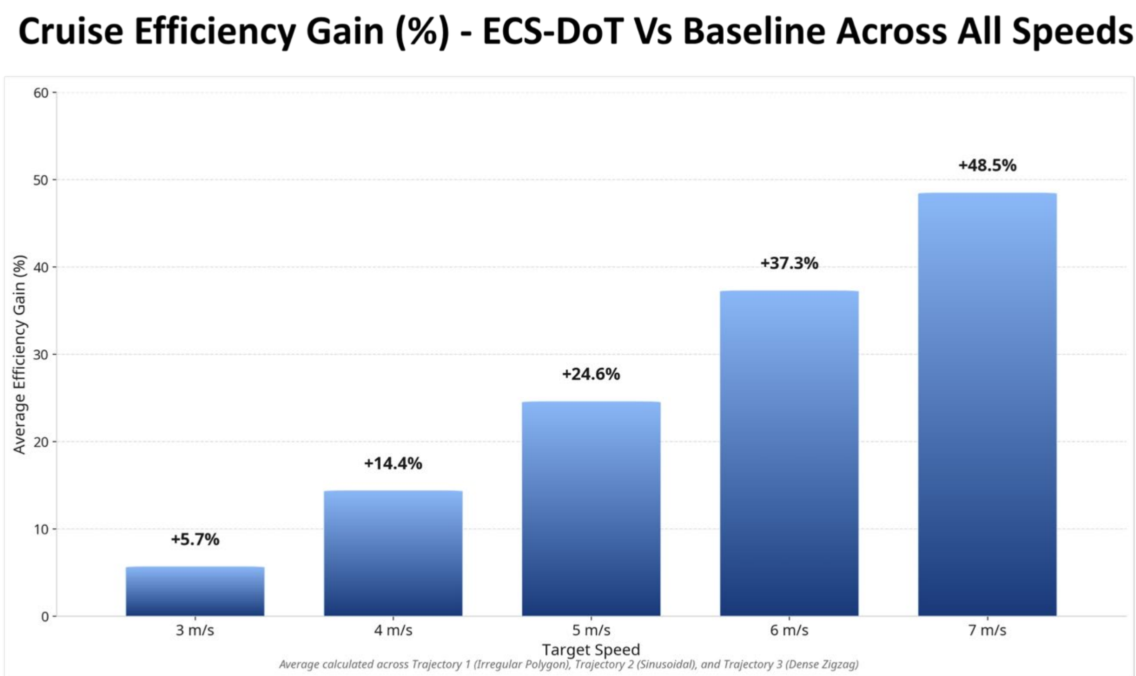

Figure 3: ECS-DoT vs Baseline: Average Cruise Efficiency Gain (%) Across All Three Trajectories at Each Target Speed from 3 to 7 m/s

The results from these complex flight paths demonstrate a material improvement in energy efficiency, with the figure above showcasing average efficiency gains increasing consistently with flight speed across all three trajectories, from +5.7% at 3 m/s up to +48.5% at 7 m/s. Performance gains also peaked at +51.0% over the baseline autopilot.

Flight log analysis indicates two scaling factors for ECS-DoT: gains increase with speed across all trajectories, and the largest gains were recorded on the most complex path at the highest speed. At 6 m/s, the speed common to both phases of live testing, gains on the complex paths (+33.2% to +40.7%) exceeded the +27.8% recorded on the simpler first-phase paths. The figure below shows the full cruise efficiency comparison across all three trajectories and all tested speeds.

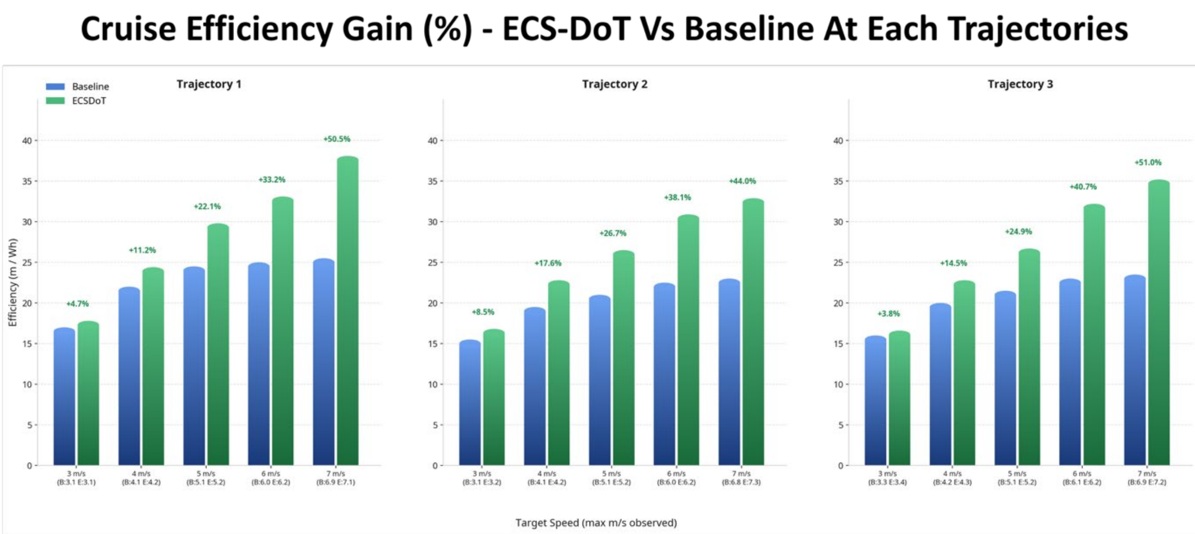

Figure 4: ECS-DoT vs Baseline: Cruise Efficiency (m/Wh) Across All Three Trajectories and All Tested Speeds from 3 to 7 m/s

The table below summarises the peak efficiency gains achieved across the three trajectories at the highest tested speed of 7 m/s:

Trajectory	Path Description	Peak Efficiency Gain (at 7 m/s)
Trajectory 1	Irregular polygon with diagonal crossings	**+50.5%**
Trajectory 2	Sinusoidal / repeated S-curves	**+44.0%**
Trajectory 3	Dense zigzag with diagonal crossings	**+51.0%**

The mechanism driving these gains is adaptive and optimal speed control. Conventional autopilots struggle with complex paths, constantly decelerating into turns and over-accelerating out of them, creating a wide speed variance that wastes significant energy.

Breakdown of Results by Trajectory and Speed

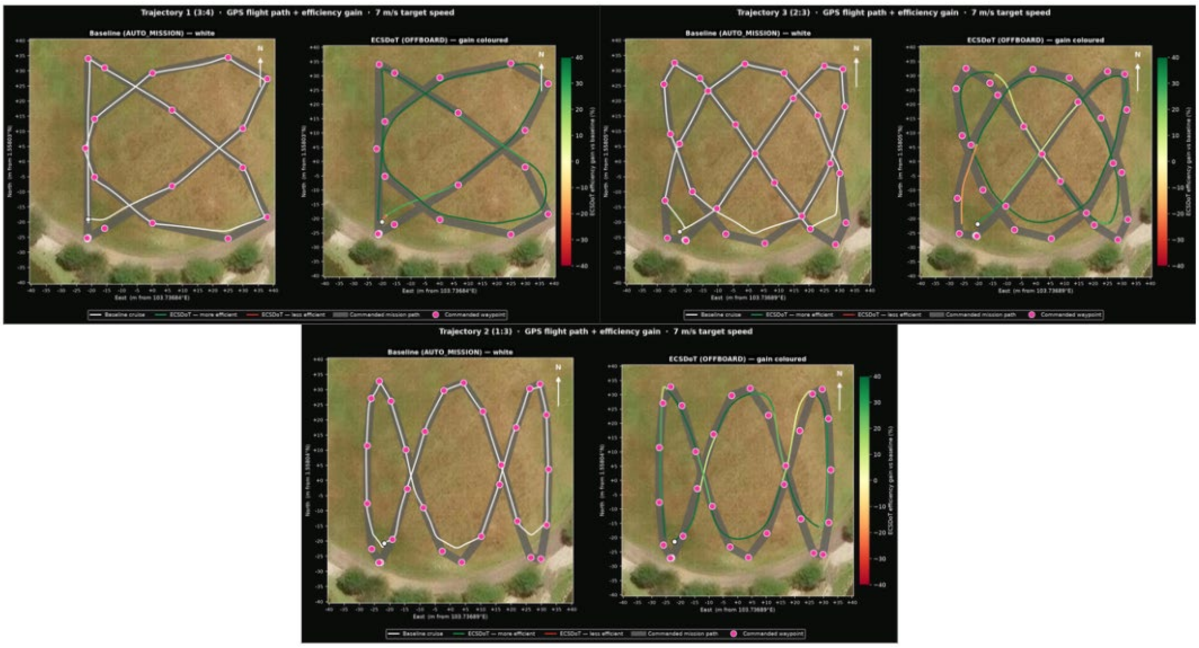

Figure 5: GPS Flight Path Efficiency Overlays at 7 m/s: Baseline (White) vs ECS-DoT Gain (Colour-Coded) Across All Three Trajectories

The chart above captures the full picture of efficiency gains across every trajectory and at 7m/s. ECS-DoT outperformed the baseline autopilot across all three trajectories, and the performance gap widens sharply as speed increases.

Trajectory 1:

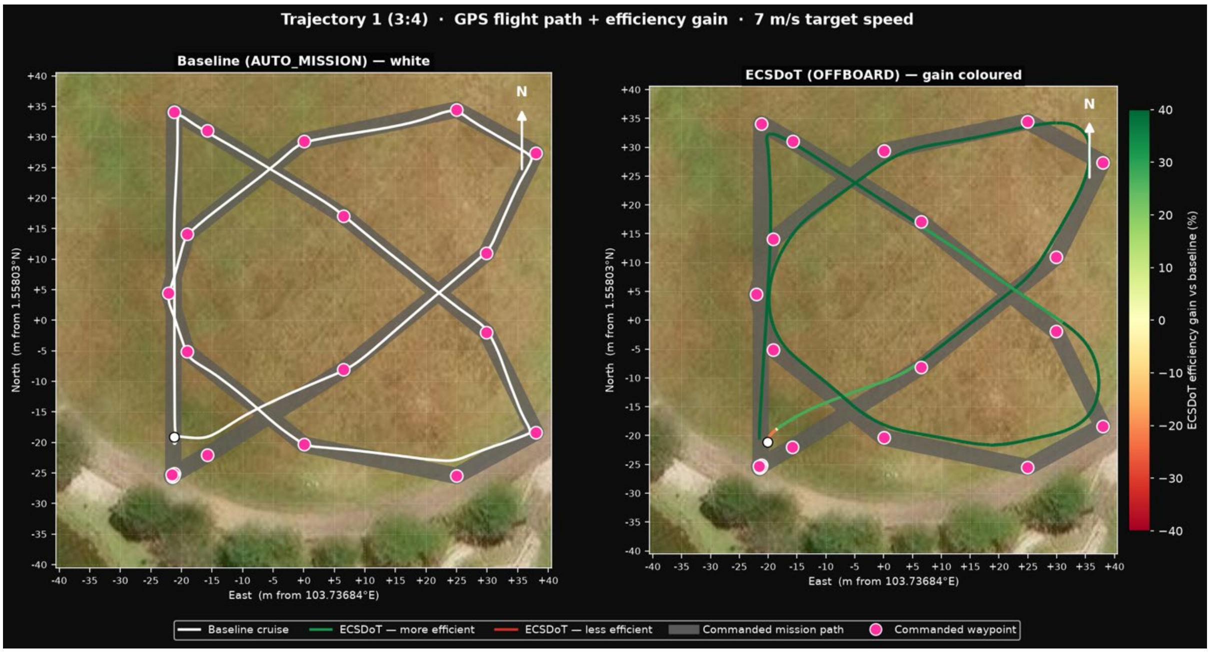

Figure 6: GPS Flight Path Efficiency Overlay: Trajectory 1 (Irregular Polygon) at 7 m/s, Baseline (White, Left) vs ECS-DoT Efficiency Gain (Colour-Coded, Right)

Trajectory 1 establishes the baseline for complex-path performance. At lower speeds the gains are present but modest, growing materially from 5 m/s onward and reaching a peak of +50.5% at 7 m/s.

Target Speed	3m/s	4m/s	5m/s	6m/s	7m/s
Efficiency Gain	**+4.7%**	**+11.2%**	**+22.1%**	**+33.2%**	**+50.5%**

The diagonal crossings and sharp angular turns of this path create frequent deceleration and reacceleration events, where ECS-DoT's real-time optimisation delivers the greatest advantage.

Trajectory 2:

Figure 7: GPS Flight Path Efficiency Overlay: Trajectory 2 (Sinusoidal) at 7 m/s, Baseline (White, Left) vs ECS-DoT Efficiency Gain (Colour-Coded, Right)

Trajectory 2 introduces continuous, flowing direction changes across the full flight area. The sinusoidal structure means there are virtually no straight legs, so every segment involves a directional transition, making this the most continuous turn loaded test of ECS-DoT's capabilities.

Target Speed	3m/s	4m/s	5m/s	6m/s	7m/s
Efficiency Gain	**+8.5%**	**+17.6%**	**+26.7%**	**+38.1%**	**+44.0%**

The gains on this trajectory are consistently higher than Trajectory 1 at every speed from 3 m/s to 6 m/s, reflecting the near-continuous turn load.

Trajectory 3:

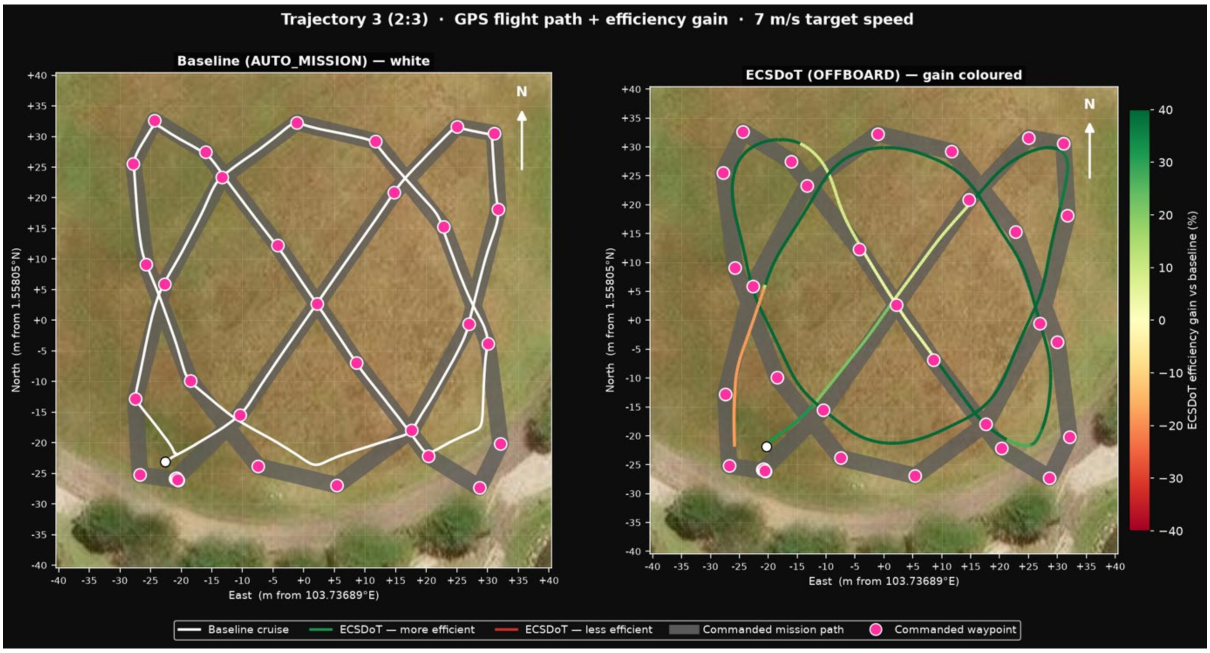

Figure 8: GPS Flight Path Efficiency Overlay: Trajectory 3 (Dense Zigzag) at 7 m/s, Baseline (White, Left) vs ECS-DoT Efficiency Gain (Colour-Coded, Right)

Trajectory 3 is the most complex path tested and produces the headline result: a +51.0% efficiency gain at 7 m/s. The combination of dense zigzag legs and diagonal crossings creates the highest concentration of transitions, turns, and direction changes of any trajectory tested.

Target Speed	3m/s	4m/s	5m/s	6m/s	7m/s
Efficiency Gain	**+3.8%**	**+14.5%**	**+24.9%**	**+40.7%**	**+51.0%**

The jump from +40.7% at 6 m/s to +51.0% at 7 m/s indicates that, on the most complex path tested, the baseline autopilot's speed variance is greatest, while ECS-DoT's tight real-time control delivers its maximum advantage.

These results show that ECS-DoT's value proposition scales directly with the operational demands placed on the drone.

Mechanism: Real-Time Onboard Speed Optimisation

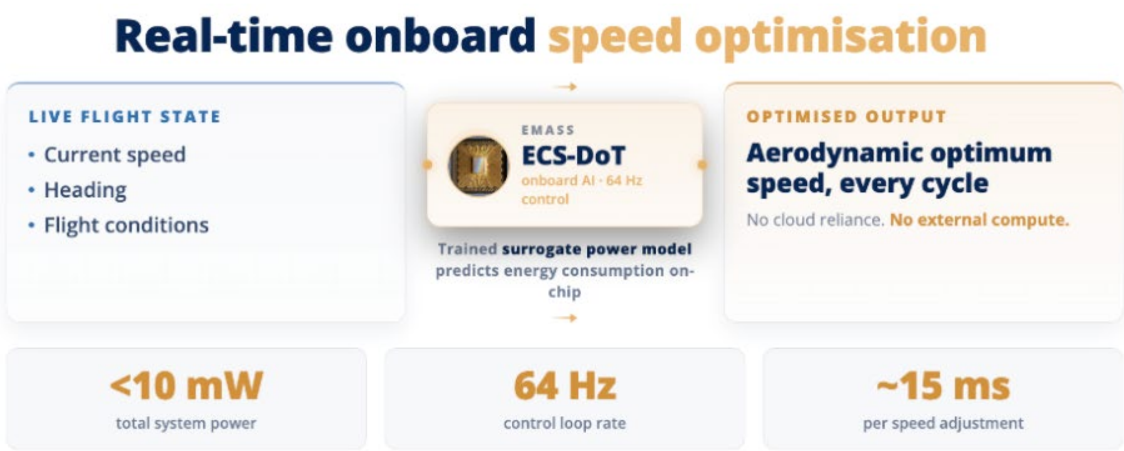

Figure 9: Conceptual image showcasing how ECS-DoT enables speed optimisation

These gains are achieved through ECS-DoT's low power budget combined with its proprietary onboard AI, which executes continuous real-time flight optimisation.

ECS-DoT achieves this performance while consuming less than 10 mW of total system power. The onboard AI executes control decisions at 64 Hz, adjusting drone speed approximately every 15 milliseconds, enabling continuous cycle-by-cycle energy optimisation.

Crucially, ECS-DoT utilises an onboard surrogate power model. A trained AI model predicts energy consumption for the drone's current speed, heading, and flight conditions, allowing ECS-DoT to identify and hold the aerodynamic optimum for each specific flight path without cloud reliance or external computation.

Translating Results into Commercial Drone Use-cases

The EMASS ECS-DoT solution is most applicable during tight turns, acceleration, and deceleration, which are the most energy-intensive and most common phases of modern commercial drone operations. The table below outlines how this translates across key use cases.

Drone Use Case	Typical Baseline Flight Time	Most Representative Trajectory
Urban Reconnaissance and Surveillance	20-30 min	Trajectory 1 (Irregular Polygon) - tight angular turns, variable headings
Precision Agriculture - Crop Spraying	10-15 min per tank	Trajectory 3 (Dense Zigzag) - repeated short legs with dense turns, mirroring lawnmower spray patterns
Precision Agriculture - Multispectral Surveying	25-40 min	Trajectory 3 (Dense Zigzag) - systematic back-and-forth passes with frequent direction reversals
Defence - Perimeter Surveillance	30-45 min	Trajectory 2 (Sinusoidal) - continuous boundary-trace with flowing directional transitions
Last-Mile Delivery	20-35 min	Trajectory 1 (Irregular Polygon) - point-to-point routing with angular waypoint transitions

Dr. Mohamed M. Sabry Aly, Director and Founder of EMASS, commented: *"When we published our first live flight results, we were clear that 27.8% was a starting point, not a ceiling. These latest results support that. Flying more complex, real-world flight paths at higher speeds, we are now seeing gains of up to 51.0%. The mechanism is the same; ECS-DoT holds the drone tighter to its aerodynamic optimum than any conventional autopilot can, at under ten milliwatts of power. What changes with more complex paths is that the baseline gets worse, and ECS-DoT does not. That gap is where the value lives."*

Dr Tan Chee How, CEO of Spinoff Robotics, a wholly owned subsidiary of Nanoveu, also commented: *"A 51.0% efficiency gain on a real-world flight path is not an incremental improvement. It is a fundamental shift in what is achievable through software and AI control alone. The drone industry has spent years chasing endurance through hardware. What this data shows is that the bigger gains were always in the control layer. ECS-DoT is now demonstrating that on the most demanding paths operators actually fly, not simplified test grids."*

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

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Nanoveu Media
Alfred Chong, Nanoveu MD and CEO
P: +65 6557 0155
E: info@nanoveu.com

About Nanoveu Limited

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

EMASS (Embedded A.I. Systems Pte. Ltd.), is a fabless semiconductor company specialising in ultra-low-power, AI-enabled system-on-chip (SoC) solutions for always-on sensing and intelligent processing at the edge. Its ECS-DoT architecture enables real-time AI inference at milliwatt-level power, supporting next-generation applications across drones, wearables, hearables, smart devices, industrial IoT, robotics and autonomous systems.

Spinoff (Spinoff Robotics Pte Ltd), is a Singapore-based aerial robotics company that designs and builds proprietary drone platforms. Its two current platforms are ALICE, a tethered aerial system engineered for high-payload, extended-duration operations with resistance to GPS and radio-frequency jamming and spoofing, and METRON, a camera-based 3D measurement system delivering millimetre-level precision with AI-driven deviation detection. Both platforms have been validated in commercial deployments with Tier-1 Singaporean customers. Spinoff Robotics provides airframe and sensing capabilities complementing its ECS-DoT edge-AI silicon for major drone market applications.

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.