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Robotics RRAM Reflex Platform Validated for Biological-Grade Speed and Intelligence

Direct benchmarking demonstrates orders of magnitude efficiency in reflex intelligence for next- generation robotics compared to digital edge AI

Key Highlights

- **From validation to benchmarking:** Directly benchmarked its RRAM Reflex Platform against state-of-the-art edge AI building on prior confirmation of sub-µs reflex latency,
- **Sub-microsecond reflexes:** Validated reflex loops completed in <1 µs, exceeding biological-grade requirements.
- **Ultra-low power efficiency:** Each reflex confirmed at ~1 nJ per inference, with standby leakage negligible in the nW–µW range.
- **Transformative performance:** Demonstrated orders-of-magnitude faster responses and dramatically lower energy consumption than leading digital edge AI systems.
- **Unified single fabric:** Unlike digital systems that split sensing, conversion, and compute, RRAM collapses the entire reflex loop into one substrate, removing bottlenecks.

Melbourne, Australia, 1 October 2025: dorsaVi Limited (ASX: DVL) dorsaVi ("the Company"), a leader in FDA-approved wearable sensor technologies and motion intelligence, is pleased to announce a major technical breakthrough in its evaluation program via Artimis Labs. This latest milestone extends the Company's earlier engineering validation[1], demonstrating that memory is no longer the bottleneck in achieving biological-grade reflexes.

By benchmarking directly against state-of-the-art edge AI systems, dorsaVi has shown that its RRAM Reflex Platform delivers orders-of-magnitude gains in both speed and efficiency. These results confirm that the technology has progressed beyond feasibility, achieving validated sub-microsecond reflex latency and nanojoule-level energy use, and is now positioned for real-world integration.

With engineering validation complete and benchmark superiority confirmed, the next updates will focus on robotic evaluation and commercial translation.

[1] Refer to ASX Announcement 17 September 2025

Gernot Abl, Chairman of dorsaVi, commented: "This validation is a pivotal milestone for dorsaVi. We have proven that reflex-grade intelligence can be achieved at sub-microsecond latency and nanojoule energy levels. This positions RRAM not simply as a memory, but as the nervous system for next-generation robotics and biomedical systems. With further robotic evaluation results due imminently, the transformational potential of this technology is only beginning to be realised."

Comparative Benchmark: RRAM Reflex Platform vs Edge AI Reflex

To illustrate this breakthrough, dorsaVi has directly benchmarked its RRAM Reflex Platform against today's best-in-class digital edge AI systems. The results highlight a step-change in both latency and energy consumption, with RRAM compressing the entire reflex loop into a single fabric while digital systems remain bound by Analog to Digital conversion (ADC), bus transfers, and sequential processing. The comparative analysis below makes clear how this advantage translates into biological-grade reflexes at a fraction of the cost.

Category	*RRAM Reflex Platform*	*Edge AI Baseline*	*Advantage*
Sensor Input	*Direct sensing (taxels), no ADC (~0.25 nJ)*	*Requires ADC (128 µs, 0.1–0.2 µJ)*	*Removes conversion bottleneck*
Compute	*In-memory crossbar, 250 ns, 0.1 nJ*	*Core inference ~1 ms, 1–4.8 µJ*	*~1000× faster, 10,000× lower energy*
Data Transfer	*In-place (none)*	*SPI/I²C 50–200 µs*	*Eliminates transfer delays*
Output Read	*100 ns, 0.4–0.7 nJ*	*Included in inference*	*Faster, lower energy*
Wake / Standby	*200 ns, nW–µW leakage*	*Sub-mW always-on*	*Ultra-low draw, instant readiness*
Total Latency	***< 1 µs***	***~1.3 µs***	***Breakthrough speed advantage***
Total Energy	***~1.0 nJ***	***1.1–5.0 µJ***	***Breakthrough efficiency advantage***

Figure 1: Comparative analysis of RRAM Reflex Platform and digital Edge AI, highlighting breakthroughs in latency and energy efficiency.

Notes on Units

- ***nJ (nanojoule):*** *one-billionth of a joule (10^{-9} J)*
- ***µJ (microjoule):*** *one-millionth of a joule (10^{-6} J), equal to 1000 nJ*
- ***µs (microsecond):*** *one-millionth of a second, 1000× faster than a millisecond (ms)*

This comparative analysis makes clear that dorsaVi's RRAM Reflex Platform not only surpasses current digital edge AI but also redefines design rules for robotics and human–machine systems. Where edge AI responds in milliseconds, RRAM delivers reflexes in microseconds, a thousandfold improvement that can mean the difference between stability and failure in the real world.

Reflex Intelligence Demonstrated

dorsaVi's latest evaluation confirms that intelligence is no longer constrained to central processors. With RRAM, decision-making happens directly in the fabric of the system, enabling reflexes that are both faster and adaptive.

At the core of this demonstration is a compact two-layer neural network designed to mimic a biological reflex arc. It ingests 128 tactile and thermal features from a robotic "skin," processes them through 32 hidden neurons, and outputs four direct reflex commands such as release grip, tighten grip, stabilize wrist, and recoil from heat.

This operation requiring ~4,224 computations is completed in real time within the RRAM fabric, without reliance on central processing. Just as the human spinal cord bypasses the brain to trigger protective reflexes, the platform creates a distributed nervous system for machines, delivering safety-critical responses instantly at the "skin and joints."

Why Reflexes Matters

Robotics has long lacked the ability to execute split-second reflexes, the kind of automatic responses that protect the human body before the brain has time to think. Advanced edge AI chips remain limited by analog-to-digital conversion (ADC), bus transfers, and sequential processing, typically resulting in latencies of 0.3–1.3 milliseconds and energy costs of 1–5 microjoules per inference.

By contrast, dorsaVi's RRAM Reflex Platform collapses sensing, memory, and compute into a single fabric. Pressure and temperature inputs are sensed directly by RRAM taxels (tactile pixels, the building blocks of an electronic skin), processed in parallel within crossbars, and output as reflex actions, all in under one microsecond and at around one nanojoule of energy.

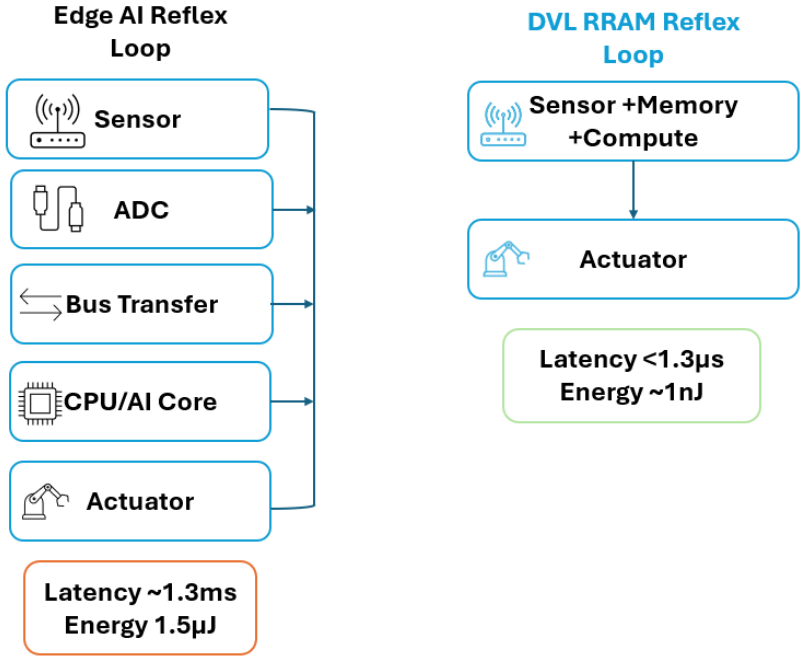

Figure 2: To illustrate the unification of RRAM Reflex Loop compared to Edge AI

What makes this transformational is not simply performance gains, but a new design paradigm. RRAM merges sensing, memory, and compute into a single reflex fabric. Non-volatility ensures loops remain armed even in deep sleep, while parallelism enables thousands of operations in the time it takes digital systems to move a single packet. By collapsing the entire sense–compute–act chain, dorsaVi's RRAM Reflex Platform sets a new benchmark for how machines can safely and intelligently interact with the physical world.

While digital edge AI will remain critical for high-level reasoning, compute-in-memory (CIM) enabled by RRAM delivers what silicon logic cannot, reflex intelligence at the speed of nature.

The advantages translate directly into practical outcomes such as:

- **Robotic grippers** that release fragile objects before damage occurs.
- **Prosthetic limbs** that recoil from excessive heat or force to protect wearers.
- **A distributed "nervous system,"** with RRAM reflex tiles embedded across skins and joints, allowing local, autonomous reflexes that reduce dependence on central processors and conserve system power

This release has been authorised for lodgement by the Company's Board of Directors.

- ENDS –

For further information about dorsaVi, please contact:

Gernot Abl
Chairman
+61 419 802 653
Email: ga@dorsaVi.com

About dorsaVi

dorsaVi Ltd (ASX: DVL) is an ASX company focused on developing innovative motion analysis device technologies for use in clinical applications, elite sports, and occupational health and safety. dorsaVi believes its wearable sensor technology enables, for the first time, many aspects of detailed human movement and position to be accurately captured, quantified, and assessed outside a biomechanics lab, in both real-time and real situations for up to 24 hours. dorsaVi's focus is on two major markets:

- **Workplace:** dorsaVi enables employers to assess risk of injury for employees as well as test the effectiveness of proposed changes to OHS workplace design, equipment or methods based on objective evidence. dorsaVi works either directly with major corporations, or through an insurance company's customer base with the aim of reducing workplace compensation and claims. dorsaVi has been used by major corporations including London Underground, Vinci Construction, Crown Resorts, Caterpillar (US), Boeing, Monash Health, Coles, Woolworths, Toll, Toyota, Orora, Mineral Resources and BHP Billiton.

- **Clinical:** dorsaVi is transforming the management of patients with its clinical solutions (ViMove+) which provide objective assessment, monitoring outside the clinic and immediate biofeedback. The clinical market is broken down into physical therapy (physiotherapists), hospital in the home and elite sports. Hospital in the home refers to the remote management of patients by clinicians outside of physical therapy (i.e. for orthopaedic conditions). Elite sports refer to the management and optimisation of athletes through objective evidence for decisions on return to play, measurement of biomechanics and immediate biofeedback to enable peak performance.

Further information is available at www.dorsaVi.com