MIRRORSEED PROJECT

Sustainable Neuromorphic AI
for Earth & Space

Revolutionizing AI: Safe. Preventive. Resonant. Compatible. Economical. Sustainable. Analog. Scalable.

Patent Pending • Licensing Available (Non-Exclusive & Exclusive)

Overview

The Symbolic Resonance Array (SRA) is a concept-stage neuromorphic architecture that replaces conventional digital AI systems with an analog, matter-based computing framework. The prototype uses vanadium dioxide (VO_2) phase-transition crystals to encode symbolic information through resonance modes, operating without silicon logic or software. This enables ultra-low-power, symbol-driven processing. Unlike conventional silicon processors, the SRA leverages natural VO_2 phase transitions to perform computation without complex circuitry, reducing production and operational costs. Its microwatt-scale power profile offers efficiency gains of multiple orders of magnitude compared to CMOS processors in symbolic reasoning tasks.

Why Now?

Current AI systems rely heavily on silicon-based digital processors with high energy demands, complex supply chains, and scaling limits. As mission hardware moves toward greater autonomy and edge deployment, there is an urgent need for architectures that are:

- **High efficiency:** Capable of running at microwatt-scale energy budgets.
- **Low cost:** Simplified design lowers both fabrication and operational expenses.
- **Scalable:** Adaptable from laboratory prototypes to distributed mission systems. The SRA addresses these requirements directly, offering an energy-efficient, scalable, and economical alternative to digital AI systems.

Key Features

- Fully analog, non-silicon architecture.
- VO_2 tapered crystal pillars encode symbolic resonance.
- No floating-point math or software logic required.

- Intrinsically resistant to thermal runaway and adversarial code injection.
- Energy efficient (microwatt-scale operation).
- Supports symbolic learning, analog feedback, and resonance-based modeling.
- Scalable from laboratory prototypes to distributed systems.

Advantages

- **Efficiency:** Operates at microwatt-scale power budgets.
- **Scalability:** Adaptable for both research and applied systems.
- **Cost:** Simplified architecture lowers fabrication and operational expenses.
- **Resilience:** Reduced vulnerability to conventional software-based attacks and failure modes.
- **Supply Chain:** Independent of silicon-based manufacturing constraints.

Potential Applications

- Edge AI for low-power symbolic computation.
- Safety-critical autonomous systems.
- Biologically inspired synthetic cognition research.
- Consciousness modeling and affective computing.

Contact & Licensing

Multiple non-exclusive use licenses and one exclusive manufacturing license are available. Patent pending under U.S. provisional filing. Contact: Theresa M. Kelly, Inventor — info@mirrorseed.org