**Global Research Outreach\_2025\_Call for Proposal**

**Theme: New Computing**

**- Sub-Theme: Memory-Centric Autonomous Agent Computing**

Autonomous agents such as mobile robots, drones, and wearable systems must perceive, adapt, and act in real-world environments with limited connectivity to centralized infrastructure. This shift from cloud-assisted to autonomous cognition demands a new computing paradigm where memory is not just a passive store, but an active substrate for reasoning and learning. Autonomous agent systems must process incoming signals in context, store meaningful experiences, and reuse them for behavior modulation—all while operating under tight energy and memory constraints.

To this end, we seek innovations that span the algorithm–architecture–device stack, enabling agents to represent and evolve their own memory in a scalable, low-power, and semantically meaningful way. Of particular interest are techniques that enable agents to organize, adapt, and reason over episodic memory under physical constraints. This includes computational frameworks for managing context-aware memory, algorithms that semantically fuse redundant interaction history, and mechanisms for autonomously evolving abstract concepts from concrete experiences.

We also welcome research on low-power hybrid memory systems, device-level innovations for in-memory learning, and Monolithic 3D integration technologies that support these capabilities physically and architecturally—enabling compact, efficient memory-centric processing in autonomous agent systems. We are mostly interested in fundamental research that solves problems arising in the above areas, such as but not limited to:

* Computational frameworks for representing and managing episodic and context-aware memory in resource-constrained, mobile agents
* Algorithms that fuse overlapping or redundant episodic memories into compact semantic representations, supporting adaptive memory evolution
* Low-power heterogeneous memory architectures that combine diverse memory technologies (e.g., SRAM, DRAM, NVRAM) to support memory-centric reasoning and efficient spatio-temporal data access in autonomous agent systems
* Device innovations for in-memory learning and persistent storage
* Cross-layer co-design of memory, compute, and sensing using Monolithic 3D integration (e.g., MIVs, thermal-aware design, vertical memory-logic stacking, heterogeneous NVM-on-logic, 3D vs. planar benchmarking)

※ *The topics are not limited to the above examples and the participants are*

*encouraged to propose the original idea.*

※ *Funding: Up to USD 150,000 per year*