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**Bio-Inspired Learning Demonstration with Synaptic Resistive Memory Devices** SEYOUNG KIM, TAYFUN GOKMEN, MARK RITTER, IBM T J Watson Res Ctr — Simple two-terminal semiconductor memory devices which can mimic the functions of biological synapses has recently opened up exciting opportunities for enabling native implementation of brain-inspired computing. Here, we demonstrate in hardware that a biologically-inspired architecture employing a novel resistive memory technology used to implement a simple learning algorithm that imitates some features of the sensorimotor stage of cognitive development of a newborn baby. Actuation and sensing were indicated by spiking neurons, and the associations between neurons were learned in a HfOx-based resistive memory array using a local rule. The system essentially realize a biased random walk algorithm using a fully connected spiking sensorimotor network and can be generalized to solve other optimization problems by redefining the input and output functions of the neurons. This demonstrates a new approach to solve classical problems with resilient, adaptive, and fault-tolerant non-Von Neumann architecture.

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