



Advancing Neuromorphic Computing Application Development

Intel Labs releases Kapoho Point development board and updates to Lava framework and sponsors new INRC projects

Sept. 28, 2022 -- Intel Labs is leading efforts to advance neuromorphic computing with its [Loihi 2](#) second-generation research chip and the open-source Lava software framework released last year. As part of Intel's goal of bringing neuromorphic technology to commercial applications, Intel Labs is providing new tools for developers to take the next step in the development process including Kapoho Point, an 8-chip Loihi 2 board that can be stacked for large-scale workloads and connect directly to low-latency event-based vision sensors.

In addition, Intel Labs is releasing updates to the open-source Lava framework to enable programmable neurons, integer-valued spikes, convolutional networks, and [continual learning](#). As of the latest Lava release (v0.5), these features allow Kapoho Point to run deep learning applications up to 12x faster, with 15x lower energy, compared to the same workloads on Loihi 1 systems¹. Additionally, Intel has launched eight Intel-sponsored university projects through the Intel Neuromorphic Research Community ([INRC](#)).

Next Generation Neuromorphic Systems Delivered to Community Members

Kapoho Point, a Loihi 2-based board, is a compact system ideal for use in small form factor devices and applications ranging from drones to satellites and smart cars. The board can enable AI models with up to one billion parameters or solve optimization problems with up to eight million variables, while providing gains of [over 10x in speed and 1,000x lower energy](#) than state-of-the-art CPU solvers. Kapoho Point can scale to solve even larger problems by stacking multiple boards.

Air Force Research Laboratory (AFRL) was the first member of the research community to receive Kapoho Point and is using it to perform in-house research on spiking neural network-based learning and on problems that require real-time optimization. "Because AFRL's missions are in the air and in space, mobile platforms have limited space, weight and power budgets," said Dr. Qing Wu, senior scientist for Processing and Exploitation. "Neuromorphic computing technology offers us the best computing solution to run AI algorithms in the environment."

Neuromorphic Development Made More Accessible Through Lava

¹ Loihi 2 SDNN results based on Lava v0.5 benchmarks in September, 2022 of 9-layer PilotNet DNN inference workload implemented as a sigma-delta neural network on Loihi 2 compared to the same network implemented with SNN rate-coding on Loihi 1. Equivalent DNN op counts calculated from a conventional DNN implementation with the same topology and same number of 8-bit parameters. See Bojarski, Mariusz et al. "End to end learning for self-driving cars." arXiv preprint arXiv:1604.07316 (2016).

About Intel

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Enhancements to the Lava software framework - an open, modular, and extensible framework for neuromorphic algorithm development - include improvements to enable the Loihi 2 feature set, such as programmable neurons, graded events, and continual learning.

The Lava software framework is available for free download on [GitHub](https://github.com).

Neuromorphic Ecosystem Projects

The Intel Neuromorphic Research Community (INRC) has launched eight sponsored university projects, including, George Mason University, Queensland University of Technology, Graz University of Technology, University of Zurich UZH, Brown University, Pennsylvania State University, University of Waterloo and the University of Göttingen.

Research projects include adaptive robot localization, decoding neural spikes from wireless biosensors for brain-computer interfacing, neuromorphic Bayesian optimization, auditory feature detection, and innovative brain-inspired architectures and algorithms.

Since its inception in 2018, the INRC has grown to include more than 180 members including university labs, government agencies, and leading companies around the world including Accenture, Lenovo, Logitech and Mercedes-Benz.

What's Next? Intel Labs will continue to create new tools for developers to make it even easier to build real-world applications and support community research.

For more information, visit: intel.com/neuromorphic

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