RoboRat

As scaling technology faces critical limits and Moore's law ends, academic and industrial research labs are turning to neuromorphic engineering for developing the next generation of brain-inspired computing technologies. Neuromorphic electronic chips harness some of the outstanding properties of biological neural systems. Using parallel components makes them ideally suited for processing large numbers of data streams simultaneously. The synchronous and data-driven nature of the chips, enable neuromorphic electronics to utilize power only when necessary. Combining the best features of analog and digital circuits, they are compact in size and require an ultra-low power to operate.

New IoT Start-up

Researchers in the Institute of Neuroinformatics (INI) at ETH Zurich and the University of Zurich have pioneered the development of this technology founding a new start-up company, AI-CorTeX (http://www.ai-ctx.com). The company has already raised over one million USD in capital funding to promote the adoption of “Dynamic Neuromorphic Asynchronous Processor (DYNAP)” chips that they designed. They anticipate developing the next generation of neuromorphic processors that add cognitive abilities to Internet-of-Things devices and big-data processing systems.

Digital Lab Rat

In addition, INI researchers – thanks to the support of European Research Council (ERC) Starting and Consolidator Grants - are now interfacing neuromorphic sensors and processors with robots to build autonomous cognitive agents. Dr. Yulia Sandamirskaya uses computational neuroscience tools developed to understand how neural networks give rise to cognitive behavior in animals and humans. At the ETH Pavilion in Davos during the World Economic Forum Annual Meeting 2018, members of the INI research team will demonstrate a simple prototype “RoboRat” showing how a brain-like computing device can generate intelligent animal-like behavior using an artificial neural network that does not require a computer to run. The neuromorphic technology demonstrated anticipates a revolution in low-power computing for enabling small and efficient, but powerful computing devices for smart sensory systems, neuro-prosthesis, and assistive robots.

Background

Established more than 30 years ago, the research field of Neuromorphic Engineering emulates the biophysics of biological neurons with the physics of Silicon in micro-electronic circuits. The technology serves as a means to study biological neural processing systems and develop neuromorphic sensors.

Contacts

Institute of Neuroinformatics
ETH Zurich and University of Zurich

Professor Giacomo Indiveri
Neuromorphic Cognitive Systems and AI-CorTeX
giacomo.indiveri@ini.ethz.ch

Dr. Yulia Sandamirskaya,
Neuromorphic Cognitive Robots
ysandamirskaya@ini.ethz.ch