Robotics and Embedded Systems

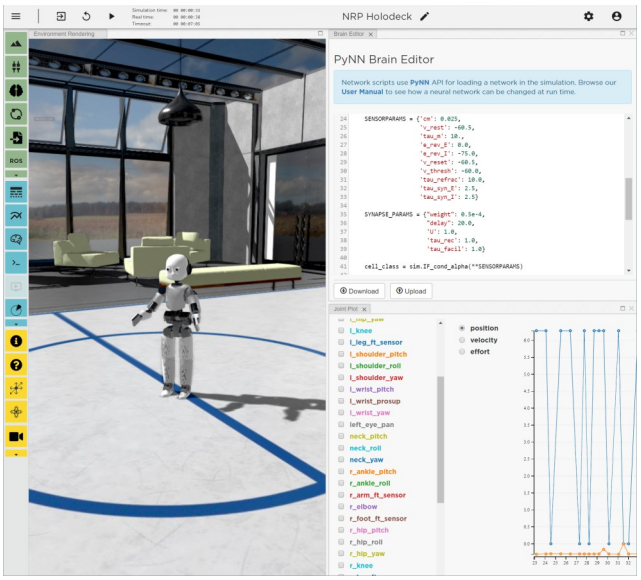
Human Brain Project

Bachelor Thesis - Master Thesis - Semester Project

Virtual Neurorobotics with Intel Loihi

BACKGROUND

The Neurorobotics Platform (NRP) [1] is an open-source cloud-based simulation environment for connecting simulated brains to simulated robots. It enables both roboticists and neuroscientists to study how biologically realistic brain models behave inside a body that interacts with its environment. Neuromorphic processors are optimized for simulating these models and outperform classic von Neumann architectures in both speed and power efficiency. Intel Loihi is on of the most recent neuromorphic hardware architectures and has a set of unique features that make it especially suited for robotics applications. The goal of this project is to make these features available in neurorobotics experiments on the NRP.



YOUR TASK

You will develop an interface between Intel Loihi and the NRP. This includes defining the data channel between the two simulations, ensuring the synchronization of the two simulation and interfacing the NRP cloud with Intel's Loihi cloud. You will verify your code in a small demo experiment on the NRP.

REQUIRED SKILLS

- Basic knowledge of neural networks
- Basic experience in programming embedded systems
- Good knowledge of Python and C/C++
- Basic experience in web frontend programming is of advantage

FURTHER READING

[1] http://www.neurorobotics.net

[2] M. Davies *et al.*, "Loihi: A Neuromorphic Manycore Processor with On-Chip Learning," *IEEE Micro*, vol. 38, no. 1, pp. 82–99, 2018.

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