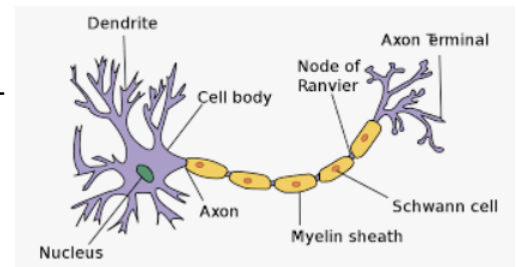


Bachelor Thesis, Master Thesis, Praktikum Elektrotechnik

Robot Control with Embodied Learning Rules in Spiking Neural Networks

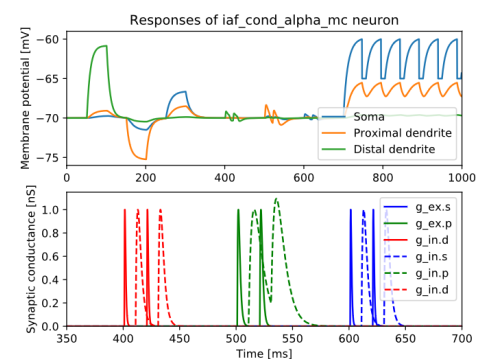
BACKGROUND

While robot task solving has been implemented with Artificial Neural Networks successfully on various examples, the utilized neuron models and learning rules only represent fairly basic properties of biological neural networks. Spiking Neural Networks in contrast implement many additional properties of biological neurons and hereby offer a large variety of possible learning behaviors. Learning rules such as STDP, dopamine and voltage based weight adaptation are still to be explored for application in robotic contexts.



YOUR TASK

Your task will be the exploration of a specific learning rule for spiking neural networks within the neural network simulator NEST. For this purpose properties promising for robotic tasks shall be investigated in STDP, dopamine or voltage based neural networks. Afterwards a spiking neural network shall be implemented and connected to a simulated robot in the Neurorobotics Platform. The investigated learning behavior shall be implemented and examined on a robotic task such as goal reaching, motion generation, conditioning or similar.



REQUIRED SKILLS

- Python
- Experience with Machine Learning / Deep Learning
- Experience in Spiking Neural networks or NEST is a plus

FURTHER READING

www.nest-simulator.org
www.neurorobotics.net

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