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Research at a Glance

Project:
Embodied Closed-Loop Learning in Neurorobotics

Supervisors:
Prof. Dr.-Ing. habil. Alois Knoll (TUM)
Prof. Henry Markram (EPFL)

Start of doctoral project at GSB:
May 2016
Project Description:
Neurorobotics is an interdisciplinary field of research at the intersection of robotics and neuroscience. Its main goal is to connect realistic simulations of biological nervous systems to robotic embodiments. While the early beginnings of this field date back to the 1950s, the technology for simulating realistic models of the brains of humans and animals has not been available so far. Currently, the European Human Brain Project, one of two large-scale flagship research initiatives which have been selected by the European Commission to receive funding for a total duration of ten years, is developing highly realistic large-scale simulations of the human brain.
The Neurorobotics Subproject will provide the tools and the theory to connect these brain simulations to both simulated and physical robotic bodies, thereby enabling researchers and engineers from robotics and neuroscience to setup and study the interaction of brains and bodies. In my project, I will be using these tools to investigate how the tight coupling of brain and body in closed-action perception loops can be leveraged to develop learning techniques which teach the simulated brain to exhibit the desired behavior. Compared to traditional methods from machine learning and robot control, this approach promises to yield new techniques for controlling complex biomimetic robotic systems with human-like performance.

Selected Publications


Research Projects

The Human Brain Project
EU
SP 10 Neurorobotics
Web I www.humanbrainproject.eu
Web I www.neurorobotics.net