Behavioral experiments with brain-body models. Cerebellar models in manipulations tasks.

Eduardo Ros.

Department of Computer Architecture and Technology

Abstract:

We evaluate the capability of a spiking cerebellar model embedded in different loop architectures to control a robotic arm (three degrees of freedom) using a biologically-plausible approach. The implemented spiking network relies on synaptic plasticity (long-term potentiation and long-term depression) to adapt and cope with perturbations in the manipulation scenario: changes in dynamics and kinematics of the simulated robot. Furthermore, the effect of several degrees of noise in the cerebellar input pathway (mossy fibers) was assessed depending on the employed control architecture. The implemented cerebellar model managed to adapt in the three control architectures to different dynamics and kinematics providing corrective actions for more accurate movements. With these schemes we can also evaluate the potential role of distributed adaptation mechanisms at different synaptic sites.