October 9, 2008

Learning Motor Skills in Humans and Humanoids

Stefan Schaal
Computer Science, Neuroscience, and Biomedical Engineering
University of Southern California, Los Angeles, USA
ATR Computational Neuroscience Laboratories, Kyoto, Japan

ABSTRACT OF THE TALK

Skillful and goal-directed interaction with a dynamically changing world is among the hallmarks of human perception and motor control.

Understanding the mechanisms of such skills and how they are learned is a long standing question in both neuroscience and technology. This talk develops a general framework of how motor skills can be learned.

At the heart of our work is a general representation of motor skills in terms of movement primitives as nonlinear attractor systems, the ability to generalize a motor skill to novel situations and to adjust it to sudden perturbations, and the ability to employ imitation learning, trial-and-error learning, and model-based learning to improve planning and control of a motor skill. Our framework has close connections to known phenomena in behavioral and neurosciences.

We evaluate our approach in various studies with anthropomorphic and humanoid robots.