

Robots that exceed human capabilities

Aude Billard

École polytechnique fédérale de Lausanne

Amphi 24

4, place Jussieu
75005 Paris
Metro Jussieu

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The design of humanoids is driven by our admiration for humans' motor and cognitive capabilities, which guides the design of similar competences in robots. While humanoid robots are far from reproducing the complexity of human cognition, for some skills robots do better than humans. Thanks to their powerful motors and the speed of computation of their computer-driven circuits, robots can beat humans in precision and reactivity.

This talk will give an overview of several approaches developed at LASA to endow robots with the ability to react extremely rapidly in the face of unexpected changes in the environment. We use human demonstrations to guide the design of the controller's parameters to modulate the compliance and to determine the range of feasible paths. A review of these algorithms will be accompanied with illustrations of their implementation for controlling uni-manual and bi-manual manipulation. I will conclude by showing some examples of super-human capabilities for catching objects with a dexterity that exceeds that of human beings.

Aude Billard is head of the Learning Algorithms and Systems Laboratory (LASA) at the School of Engineering at the EPFL. She received her Ph.D. from the University of Edinburgh in 1998. Her research on human-robot interaction and robot learning from human demonstration was featured in numerous premier venues (BBC, IEEE Spectrum, Wired) and received numerous best paper awards. She was the recipient of the Intel Corporation Teaching Award, the Swiss National Science Foundation Career Award, and the Outstanding Young Person in Science and Innovation Award from the Swiss Chamber of Commerce. She served as an elected member of the Administrative Committee of the IEEE Robotics and Automation Society from 2006-2011.

contact : colloquium@lip6.fr
<http://www.lip6.fr/colloquium/>
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