

SFB/TR 8 Spatial Cognition / IQN Video Conference

Jürgen Sturm

Universität Freiburg
Department of Computer Science
Autonomous Intelligent Systems

"Body Scheme Learning from Self-Perception"

Truly autonomous systems require the ability to monitor and adapt their internal body scheme throughout their entire lifetime. In this paper, we present an approach allowing a robot to learn from scratch and maintain a generative model of its own physical body through self-observation with a single monocular camera. We represent the robot's internal model as a compact Bayesian network, consisting of local models that describe the physical relationships between neighboring body parts. We introduce a flexible Bayesian framework that allows to simultaneously select the maximum-likely network structure and to learn the underlying conditional density functions. Changes in the robot's physiology can be detected by identifying mismatches between model predictions and the self-perception. To quickly adapt the model to changed situations, we developed an efficient search heuristic that starts from the structure of the best explaining memorized network and then replaces local components where necessary. In experiments carried out with a real robot equipped with a 6-DOF manipulator as well as in simulation, we show that our system can quickly adapt to changes of the body physiology in full 3D space, in particular with limited visibility, noisy and partially missing observations, and without the need for proprioception

Freitag, 25. Juli 2008
informelle Kaffeerunde: 15:15
Vortragsbeginn: 15:30

- Rotunde Cartesium,
Enrique-Schmidt-Str. 5
Universität Bremen
- Geb. 106, Raum 04 007,
Universität Freiburg

Kontakt:

Prof. C. Freksa, Ph.D.
freksa@informatik.uni-bremen.de
0421 – 218 - 64230