Adaptive Modular Architecture for Rich Motor Skills

Fact Sheet

Project Information

AMARSi
Grant agreement ID: 248311
Project website
Status
Closed project
Funded under
FP7-ICT
Overall budget
€ 9 208 448
EU contribution
€ 6 997 978
Coordinated by
UNIVERSITAET BIELEFELD
Germany

Start date
1 March 2010
End date
28 February 2014

Project description

Cognitive Systems and Robotics
Richness of biological motor behavior in robotic systems
The motor skills of today’s robots still must be qualified as poor. The AMARSi Integrated Project aims at a qualitative jump toward biological richness of robotic motor skills. To achieve this goal, a number of innovative scientific concepts and interdisciplinary research methods will be implemented.
Acquiring rich motor skills will change the role of robots in our human’s society in two fundamental ways. First, such robots will be much more versatile than today, with greatly expanded ranges of practical usages. And second, the naturalness and
compliance of their motor behavior will make them blend into the everyday routines of human society, physically safe and psychologically acceptable.

Compared to animals and humans, the motor skills of today's robots still must be qualified as poor. Their behavioural repertoire is typically limited to a narrow set of carefully engineered motor patterns that operate a rigid mechanics and lack situated adaptivity, learnability and dynamical fusion of motor primitives into complex, task-oriented behavioural patterns. The AMARSi Integrated Project aims at a qualitative jump toward biological richness of robotic motor skills, a jump to complex, task-oriented interaction sequences between a robot and a human caretaker. It comprises leading groups from robot engineering, compliant mechanics, morphological computing, human motor research; biomechanics, theoretical biology, machine learning. The project deploys:

- coordinated and simultaneous development of compliant mechanics, pervasive learning and dynamical-systems based control architectures, centered on the concept of adaptive modules;
- mutually informing research in human motor behavior and robotics;
- reliance on compliant mechanics and morphological computing for flexibility, computational and motoric speed, safety and damage-robust learning;
- novel learning paradigms (unsupervised, reinforcement and imitation) drawing from principles of reservoir computing;
- control architectures based on dynamical (neural) systems throughout, also on the higher cognitive levels.

Robotic demonstration with a compliant version of the iCub robot and a compliant quadruped Cheetah platform will manifest progress. The robots will engage in an interaction with a human caretaker at the level of a young child playing open-ended in a cluttered and rough environment. Hardware and software solutions will be made publicly available as open sources. Ultimately, the naturalness of such compliant robots will let them blend into the everyday routines of human society, physically safe and psychologically acceptable.

Programme(s)

Topic(s)

Call for proposal

FP7-ICT-2009-4

Funding Scheme

CP - Collaborative project (generic)
Coordinator Contact

Jochen STEIL (Prof.)

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Activity type
Higher or Secondary Education Establishments

EU contribution
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Participants (9)

TECHNISCHE UNIVERSITAET GRAZ

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EU contribution
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Higher or Secondary Education Establishments

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UNIVERSITEIT GENT

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EU contribution
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<td>Germany</td>
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