

IM-CLeVeR

This webpage outlines the project by giving the core information on it and by linking to more detailed information

Keywords

Humanoid developmental robotics, autonomous learning, reinforcement learning, actions hierarchies, neural networks, novelty detection, developmental and cognitive psychology, brain, dopamine.

Abstract

IM-CLeVeR aims to develop a new methodology for designing robots controllers that can: (1) cumulatively learn new efficient skills through autonomous development based on intrinsic motivations, and (2) reuse such skills for accomplishing multiple, complex, and externally-assigned tasks. During skill-acquisition, the robots will behave like children at play which acquire skills autonomously on the basis of “intrinsic motivations”. During skill-exploitation, the robots will exhibit fast learning capabilities and a high versatility in solving tasks defined by external users due to their capacity of flexibly re-using, composing and readapting previously acquired skills.

This overall goal will be pursued investigating three fundamental scientific and technological issues: (1) the mechanisms of abstraction of sensory information; (2) the mechanisms underlying intrinsic motivations, e.g. “curiosity drives” that learn to focus attention and learning capabilities on “zones of proximal development”; (3) hierarchical recursive architectures which permit cumulative learning. The study of these issues will also be fuelled by a reverse-engineering effort aiming at reproducing with bio-mimetic models the results of empirical experiments run with monkeys, children, and human adults.

The controllers proposed will be validated with challenging demonstrators based on a single humanoid robotic platform (iCub). As a main outcome, the project will significantly advance the scientific and technological state of the art, both in terms of theory and implementations, in autonomous learning systems and robots. This overall goal

will be achieved on the basis of the integrated work of a highly interdisciplinary Consortium involving leading international neuroscientists, psychologists, roboticists and machine-learning researchers.

Key details

Acronym: IM-CLeVeR

Project full title: Intrinsically Motivated Cumulative Learning Versatile Robots

Partners: [See details here](#)

Coordinator: Gianluca Baldassarre

Team Leaders: Marco Mirolli (CNR-ISTC-LOCEN), Elisabetta Visalberghi (CNR-ISTC-UCP), Eugenio Guglielmelli (UCBM-LBRB), Flavio Keller (UCBM-LDN), Peter Redgrave (USFD-Neurosc.), Kevin Gurney (USFD-Model.), Jochen Triesch (FIAS), Ulrich Nehmzow (UU), Mark Lee (AU), Juergen Schmidhuber (IDSIA-SUPSI)

Project Officer: Cécile Huet

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Work Programme Theme 3: [ICT – Information and Communication Technology](#)

Call identifier: [FP7-ICT-2007-3 Challenge 2: Cognitive Systems, Interaction, Robotics](#)

Objective: [ICT-2007.2.2 Cognitive Systems, Interaction and Robotics](#)

Start: 01/01/2009 (start of scientific work: 01/05/2009)

End: 30/04/2013

Total duration: 52 months

Total EU Funding: 5.899.884 euros

Total Budget (EU Funding + Cofunding): 7.726.783 euros

International Scientific Advisory Board:

Developmental/epigenetic robotics

Juyang Weng, Christian Balkenius

Computational neuroscience

Peter Dayan, Yael Niv, Paul Verschure

Computational modelling and developmental psychology

Claes von Hofsten, Linda B. Smith, Matthew Shlesinger

Machine learning, autonomous robotics, information-theory

Richard Sutton, Frederic Kaplan, Pierre-Yves Oudeyer, Max Lungarella, Daniel Polani

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