DEXterous and autonomous dual-arm/hand robotic manipulation with sMART sensory-motor skills: A bridge from natural to artificial cognition

Fact Sheet

Project Information

DEXMART
Grant agreement ID: 216239

Funded under
FP7-ICT

Overall budget
€ 8 124 253

EU contribution
€ 6 300 000

Coordinated by
UNIVERSITA DEGLI STUDI DI NAPOLI FEDERICO II

Closed project

Start date
1 February 2008

End date
31 January 2012

Project description

Cognitive Systems, Interaction, Robotics
Dual-arm robot including two multi-fingered redundant hands to grasp and manipulate the same objects used by human beings
The DEXMART project is focused on artificial systems reproducing human skills, which operate in unstructured real-world environments. The goal is to allow a dual-arm robot including two multi-fingered redundant hands to grasp and manipulate the same objects used by human beings. The manipulation will take
place in an \textit{unsupervised}, \textit{robust} and \textit{dependable} manner so as to allow the robot to safely \textit{cooperate} with humans for the execution of given tasks. The robot will be able to \textit{acquire knowledge} by learning new action sequences so as to create a consistent and comprehensive \textit{manipulation knowledge} base through an actual \textit{reasoning process}.

The DEXMART project is focused on artificial systems reproducing smart sensory-motor human skills, which operate in unstructured real-world environments. The emphasis is on manipulation capabilities achieved by dexterous and autonomous, and also human aware dual-arm/hand robotic systems. The goal is to allow a dual-arm robot including two multi-fingered redundant hands to grasp and manipulate the same objects used by human beings. The objects shall be allowed to have different shape, dimension and weight. The manipulation will take place in an unsupervised, robust and dependable manner so as to allow the robot to safely cooperate with humans for the execution of given tasks. The robotic system has to possess the ability to autonomously decide between different manipulation options. It has to properly and quickly react to unexpected situations and events as well as understand changes in the behaviour of humans cooperating with it. Moreover, in order to act in a changing scenario, the robot should be able to acquire knowledge by learning new action sequences so as to create a consistent and comprehensive manipulation knowledge base through an actual reasoning process. The possibility to exploit the high power-to-weight ratio of smart materials and structures will be explored aimed at the design of new hand components (finger, thumb, wrist) and sensors that will pave the way for the next generation of dexterous robotic hands.
**Coordinator Contact**

Bruno Siciliano (Prof)

**Coordinator**

**UNIVERSITA DEGLI STUDI DI NAPOLI FEDERICO II**

- **Address**: Corso Umberto I, 40, 80138 Napoli, Italy
- **Activity type**: Higher or Secondary Education Establishments
- **EU contribution**: € 797 800

**Website**

**Administrative Contact**

Bruno Siciliano (Prof.)

**Participants (8)**

**FZI FORSCHUNGSZENTRUM INFORMATIK**

- **Country**: Germany
- **EU contribution**: € 1 228 541

- **Address**: Haid Und Neu Strasse 10-14, 76131 Karlsruhe
- **Activity type**: Research Organisations

**Website**

**Administrative Contact**

Michael Flor (Dipl.)

**UNIVERSITAT DES SAARLANDES**

- **Country**: Germany
- **EU contribution**: € 819 227

- **Address**: Campus
- **Activity type**: Higher or Secondary

**Website**
DEUTSCHES ZENTRUM FUR LUFT - UND RAUMFAHRT EV

Germany
EU contribution
€ 1 160 100

Linder Hohe
51147 Koln

Website
Contact the organisation

Administrative Contact
Corinna Hahn (Ms)

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS

France
EU contribution
€ 514 096

Rue Michel Ange 3
75794 Paris

Website
Contact the organisation

Administrative Contact
ARMELLE BARELLI (Ms)

UNIVERSITA DEGLI STUDI DELLA CAMPANIA LUIGI VANVITELLI

Italy
EU contribution
€ 695 600

Viale Abramo Lincoln 5
81100 Caserta

Website
Contact the organisation

Administrative Contact
Rocco Pierri (Prof.)
ALMA MATER STUDIORUM - UNIVERSITA DI BOLOGNA

EU contribution
€ 593 977

Address
Via Zamboni 33
40126 Bologna

Website
Contact the organisation

Administrative Contact
Alessandra Villa (Dr.)

OMG PLC

EU contribution
€ 490 659

Address
Minns Business Park, West Way 14
OX2 0JB Oxford

Contact the organisation

Administrative Contact
Andrew Stoddart (Dr.)

UNIVERSITE PAUL SABATIER TOULOUSE III

EU contribution
€ 0

Address
Route De Narbonne 118
31062 Toulouse Cedex 9

Website
Contact the organisation

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