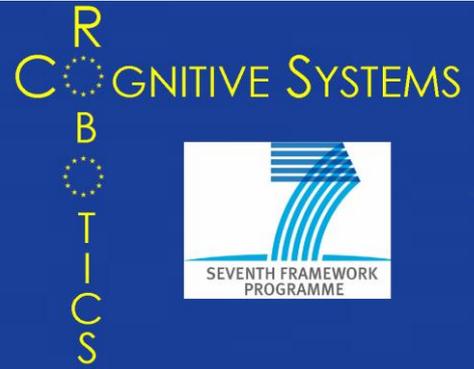




EUROPEAN
COMMISSION

Community Research



Large-scale integrating project

Deliverable D7.7
Organisation of final dissemination workshop

Project acronym: DEXMART
Project full title: DEXterous and autonomous dual-arm/hand robotic manipulation with sMART sensory-motor skills: A bridge from natural to artificial cognition
Grant agreement no: FP7 216239
Project web site: www.dexmart.eu



Due date: 31 January 2012	Submission date: 31 January 2012
Start date of project: 1 February 2008	Duration: 48 months
Lead beneficiary: UNINA	Revision: 0

Nature: O	Dissemination level: PU
R = Report P = Prototype D = Demonstrator O = Other	PU = Public PP = Restricted to other programme participants (including the Commission Services) RE = Restricted to a group specified by the consortium (including the Commission Services) CO = Confidential, only for members of the consortium (including the Commission Services)

Introduction

Within the scope of training activities planned in WP7 “Dissemination, Training and Exploitation”, yearly workshops were foreseen for the duration of DEXMART. This included three internal workshops in the first three years of the project (one in each reporting period) and one final dissemination workshop during the last year of the project. The workshops generally dealt with relevant scientific topics, specifically relating to DEXMART activities and/or also to the wider fields of robotics and cognitive sciences. Internal presenters from the DEXMART consortium and external experts presented scientifically related topics at these workshops.

This document gives an overview of all workshops held in DEXMART, and primarily deals with the final dissemination workshop which took place on 26 October 2011 during the HUMANOIDS conference in Bled.

The overview of workshop activities with additional information is available on the DEXMART website under <http://www.dexmart.eu/index.php?id=10989>.

Overview of previous workshops

First internal workshop

The first internal workshop of the DEXMART project took place on 15 September 2008 at CNRS-LAAS in Toulouse, France, within the scope of the 1st Progress Meeting. It dealt with task planning issues and approximately 20 young researchers participated in the event.

The following presentations were given:

Title	Speaker
The capability map for robot arms and applications	Franziska Zacharias, DLR
Planning motions and manipulation tasks for complex robotic systems	Nicola Simeon, CNRS
Planning issues for human-robot interactive manipulation	Rachid Alami, CNRS

Second internal workshop

The second internal workshop of the DEXMART project was planned for 19 April 2010 within the scope of the 2nd Review Meeting at UNIBO in Bologna, Italy. It should have dealt with stochastic control issues.

Unfortunately, the workshop had to be cancelled due to flight disruptions in Europe caused by the eruption of the volcano Eyjafjallajökull in Iceland.



The following presentations were to be given:

Title	Speaker
Simulation-based planning and design for robotic systems with intermittent contact	Jeff Trinkle, Rensselaer Polytechnic Institute (RPI)
Motor skills learning for Robotics	Jan Peters, Max Planck Institute for Biological Cybernetics (MPI)
Probabilistic inference methods for control and relational planning in Robotics	Marc Toussaint, Berlin University of Technology

Third internal workshop

The third internal workshop of the DEXMART project took place on 6 October 2010 within the scope of the 3rd Progress Meeting at USAAR in Saarbrücken, Germany. It dealt with actuation and sensing in robotics.

The following eleven keynote presentations divided into sessions on “Actuation”, “Sensing” and “Prosthetics” were given, three of which covered DEXMART research activities.

Title	Speaker
The DLR hand-arm system – an example of electromechanical actuation abilities	Markus Grebenstein, DLR
Enhanced flexible fluidic actuators for biologically inspired lightweight robots with inherent compliance	Immanuel Gaiser, KIT-IAI
Twisted string actuation – History, principle and performance	Chris May, USAAR-LPA
Piezo motors – A suitable drive for artificial limbs?	Hartmut Janocha, USAAR-LPA
Gripping mechanism based on self-sensing shape-memory actuators	Kenny Pagel, Fraunhofer IWU
Hydrostatically coupled dielectric elastomer actuators: New opportunities for hand rehabilitation	Federico Carpi, Centro E. Piaggio
Natural and intuitive exchanges of objects between humans and robots	Daniel Sidobre, CNRS-LAAS
Development of angular, force and tactile sensors for tendon-driven robotic hands	Salvatore Pirozzi, SUN



A sensitive skin for mobile robots	Markus Fritzsche, Fraunhofer IFF
ROBOSKIN – Skin-based technologies and capabilities for safe, autonomous and interactive robots	Giorgio Cannata, DIST
Sensing and actuation of a transradial hand prosthesis	Christian Cipriani, ARTS

The third internal workshop concluded with a robotics live session in which around eight technical displays representing the forefront of robotic actuation and sensing technologies were shown and demonstrated. Almost all of the 72 mostly individually invited persons participated and the workshop can clearly be considered a success and one of DEXMART’s highlights.

Final dissemination workshop

Within the scope of the 3rd Review Meeting, the Consortium evaluated various possibilities on where to hold the final dissemination workshop of the DEXMART project. HUMANOID 2011 was finally chosen on the basis of its date quite near to the end of the project’s duration so that significant results could be presented and its attraction to a wide scientific community to give DEXMART the best possible audience.

Consequently, the Consortium filed an application with HUMANOID 2011 for a half-day workshop “The DEXMART Project for Advanced Bimanual Manipulation” at the end of May 2011. The goal of the workshop was to present the principal results of the project during the last four years to the scientific community of people working in the field of grasping and dual arm/hand manipulation. The Consortium was trustful that the achievement of the research objectives of the project would have an important impact towards the realisation of a robust and versatile behaviour of artificial systems in open-ended environments providing intelligent response in unforeseen situations, and enhancing human-machine interaction.

The topics proposed to be discussed at the workshop included:

- development of original approaches to interpretation, learning, and modelling, from the observation of human manipulation at different levels of abstraction;
- development of original approaches to task planning, coordination and execution so as to confer to the robotic system self-adapting capabilities and reactivity to changing environment and unexpected situations, also in the case of humans cooperating with it;
- design of effective control strategies for a dual-hand/arm robot manipulator that can be easily parameterised so as to preserve smoothness during the transitions at the contact with objects;
- design and development of new actuators, as well as new mechanical structures and materials, able to overcome the limitations of current manipulation devices;
- development of meaningful benchmarks for dual-hand manipulation.



The presentations were to be accompanied by videos illustrating the experimental results on the available set-ups, including the new DEXMART hand at University of Bologna, the humanoid Rolling Justin at DLR, the dual-arm system at FZI, and the mobile manipulator Jido with the KUKA lightweight arm at CNRS-LAAS.

At the beginning of August 2011, the Consortium received a notification that the proposed half-day workshop was accepted by HUMANOIDS 2011.

The fourth and final internal workshop of the DEXMART project took place in the morning of 26 October 2011. In addition to five presentations given by members of the DEXMART consortium on the results and achievements made in DEXMART over the past 3.5 years, it was a great pleasure to have contributions from two external speakers, Prof. Michael Beetz (Technische Universität München) and Prof. Oussama Khatib (Stanford University) on their work done regarding cognitive manipulation and human-robot interaction. Presentations contained a large number of videos showing dexterous and autonomous manipulation, as well as robots interacting with humans.

The following presentations were given:

Title	Speaker
Cognition-based everyday manipulation	Michael Beetz, Technische Universität München
DEXMART: Main achievements, discussion of open problems and research trends in the field	Bruno Siciliano, UNINA
Programming by demonstration - a planning based approach	Rainer Jäkel, FZI
Observation and execution	Christoph Borst, DLR
Human-robot interaction	Daniel Sidobre, CNRS-LAAS
Grasping and control of multifingered hands	Luigi Villani, UNINA
Innovative technologies for the next generation of robotic hands	Gianluca Palli, UNIBO
Robots and the human	Oussama Khatib, Stanford University

The workshop was a success with up to 50 participants at peak times. In addition to the presentations, information on the research done in DEXMART was made available in a well-prepared poster series consisting of six posters relating to the different research areas that are addressed in DEXMART:

- The *Capability Map*: A tool that supports robot design and manipulation planning
- Planning models: Generation from observation and reasoning



- From observation to low-level trajectory generation
- Bidule: A tool to study the exchange of objects
- New technologies and feedback control of DEXMART robotic hand
- Grasping and control of multi-fingered hands

The final dissemination workshop was also a good opportunity to collect the results of the project which are soon to be published into the volume “Advanced Bimanual Manipulation” of the Springer Tracts in Advanced Robotics (STAR) Series edited by the coordinator.

Snapshots from the workshop are enclosed below.

