

DEXMART Newsletter No. 2 – May 2010

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
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Introduction

This is the second newsletter relating to DEXMART, a large-scale integrating project which is funded under the European Community's 7th Framework Programme. The project started on February 1, 2008 and has a duration of four years. The DEXMART consortium consists of 8 partners from Italy, Germany, France and Great Britain; please see www.dexmart.eu/index.php?id=6747.

DEXMART has the ambition to fill the gap between the use of robots in industrial environments and the use of future robots in everyday human and unstructured environments, contributing to reinforce European competitiveness in all those domains of personal and service robotics where dexterous and autonomous dual-hand manipulation capabilities are required.

Research domains

DEXMART is a highly interdisciplinary project, which combines the following four research domains:

- Observation, interpretation, learning and modelling
- Task planning and coordination
- Feedback control
- New robotics technologies

To gain insight into the research activities of DEXMART, please refer to www.dexmart.eu/index.php?id=6748 where you can download a background video and find further dissemination materials.

Project objectives

DEXMART will contribute to the development of robotic systems endowed with dexterous and human-aware dual-arm/hand manipulation skills for objects, operating with a high degree of autonomy in unstructured real-world environments. These are the main objectives of the project:

- allow a dual-arm robot including two multi-fingered redundant hands to grasp and manipulate the same objects (different shape, dimension and weight) used by human beings;
- manipulation will take place in unsupervised, robust and dependable manner so as to allow the robot to safely cooperate with humans for the execution of given tasks;
- robotic system able to autonomously decide between different manipulation options and to learn new action sequences aimed at creating a consistent and comprehensive manipulation knowledge base;
- possible exploitation of high power-to-weight ratio of smart materials and structures, aimed at design of new hand components (finger, thumb, wrist) and sensors for next generation of dexterous robotic hands.

Dissemination

As the DEXMART project strives for the dissemination of its results and achievements to the general public and scientific community, its partners have participated in large fairs, such as the Hannover Fair in April 2010, or conferences, such as CogSys in January 2010, or other major science dissemination events such as Futuro Remoto in November 2009, over the last two years where they presented and demonstrated their work. The partners also make sure to attend as many workshops, exhibitions and conferences as possible to raise awareness of the project. They attended, for instance, the conferences Humanoids 2009, IROS 2009, ICRA 2009 – to just mention a few – and will do the same in the future. At the AUTOMATICA trade fair 2010, the project is presented in a booth with practical demonstrations. For further information on the attendance of DEXMART partners at fairs and conferences, please see: <http://www.dexmart.eu/index.php?id=6752>.

In 2009, an interesting cooperation has been established with two other projects funded under ICT Challenge 2: Cognitive Systems, Interaction, Robotics, i.e. GRASP and HANDLE. The coordinators of these projects met in October 2009 to discuss joint activities. Two major outcomes of this meeting were: 1) the organization of a joint workshop at the RSS conference in June 2010 and 2) the decision to open GRASP's summer school to post-docs and students from DEXMART and HANDLE.

Progress achieved so far

After the first project year, which ended on January 31, 2009, first promising results were achieved by the consortium. The second project year ended on January 31, 2010 and the project has continued to produce encouraging results that serve the project's progress. Please see <http://www.dexmart.eu/index.php?id=11205> for a more detailed description of such progress.

Special highlights, illustrating the work done during the project period, can be found under the following links:

http://www.focus.de/wissen/videos/helfende-roboterhand-enorm-kraftvoll-und-dennoch-feinfuehlig_vid_16744.html

<http://wwwiaim.ira.uka.de/users/srsr/share/SensoryEnvironment.mov>

<http://wwwiaim.ira.uka.de/users/srsr/share/ExecutionOfThePourInActivity.mov>

Other interesting videos supporting the work of the project and featuring the robotic hand in action can be found on the DEXMART website under <http://www.dexmart.eu/index.php?id=11489>, i.e. a video about tactile sensors, the above videos about sensory environment and the execution of the pour-in activity, as well as the "Potato Lifter", the "Beer Robot" and the "Finger Module".