Project Acronym:	GRASP
Project Type:	IP
Project Title:	Emergence of Cognitive Grasping through Introspection, Emulation and Surprise
Contract Number:	215821
Starting Date:	01-03-2008
Ending Date:	28-02-2012

Deliverable Number:	D9
Deliverable Title :	First version of the simulator, core architecture and the representation standards
Type:	PU
Authors	B. León, G. Puche, A. Morales, S. Ulbrich, T. Asfour and R. Dillmann
Contributing Partners	UJI, UniKarl

Contractual Date of Delivery to the EC:	31-08-2009
Actual Date of Delivery to the EC:	31-08-2009

Chapter 1

Executive summary

The main purpose of work package 6 during the first two years is the development of a robot simulator aimed to grasping and manipulation interaction between robot hands and objects. This simulator will be part of the core of the *predict-act-perceive* loop, and will be a key tool in several experiments.

This document describes the first version of the simulator. As a open source software project the simulator consists of a set of public source code repositories, documentation web-pages, installation guides, tutorials and examples. Hence, thi s document summarizes and lists all the Internet related resources. The detailed description of the internals and specifications of the tool can be retrieved by following the different web links.

1.1 Web resources

The main entry point for accessing the simulator is this address:

http://wikis.itec.uka.de/grasp/wiki/GRASP_Simulator

The simulator is based on OpenRAVE, and make use of its modular and expandable architecture. Documentation and additional information about OpenRAVE is here:

http://openrave.programmingvision.com

Our work has consisted in improving OpenRAVE in several key features. First of all we have modified OpenRAVE in order to integrate PAL (Physics Abstraction Layer) which allows to switch between physics engines.

http://sourceforge.net/apps/mediawiki/pal

To use PAL we implemented two new plugins for OpenRAVE, *palplugin* and *paltask*.

http://wikis.itec.uka.de/grasp/wiki/Palrave_plugin
http://wikis.itec.uka.de/grasp/wiki/Paltask_plugin

We adopt COLLADA 1.5 as the xml-based file format to store robot and object models in addition to the native OpanRAVE file format.

http://www.khronos.org/collada/

In order to do this we have modified the OpenRAVE core to embed a COLLADA format parser. Moreover we have added several robot related tags to the COLLADA 1.5 specification to include robot semantics in this standard format.

http://wikis.itec.uka.de/grasp/wiki/OpenRAVE_COLLADA_features

These features are going to be extended in order to include information about sensors and actuators in future. A discussion on how this will be done can be found here:

http://openrave.programmingvision.com/index.php?title=Started:COLLADA

Finally, a robot editor has been implemented to allow the creation and completion of new robot models. This editor consists of a collection of plugins for the widely used 3D modeller *blender*.

http://wikis.itec.uka.de/grasp/wiki/Robot_Editor

Since the simulator is still a project in development the contents of some the referred url's might be updated and modified in the future.