A VRML- and Java-based online robot simulation tool

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VRML as a text-based language is a powerful, nevertheless simple language to build 'virtual worlds', which include 3D objects, light sources and animations. The description of these virtual environments is a text file, usually identifiable from its '.wrl'-extension. As VRML supports animations and sensorics, the user can interact with objects in this 'virtual environment'.

A VRML browser, ordinary implemented as Web browser plugin, interpretes any '.wrl'-files, which a Web browser has downloaded via HTTP protocol from the Web. A 3D scenery is created from this file, which is presented in a rectangular area of the browser window. The 2D viewpoint into the 3D world is predefined during initialization. However, the user can change any viewpoints with the help of VRML browsers' the control panel. This allows any possible navigation through the 3D VRML world. The functionality and degree of user interaction for a VRML environments can be enhanced, if the 'External Authoring Interface' (EAI) of VRML is considered for integration of a JAVA applet. User interfaces via comfortable JAVA applets can be build in order to give access to the VRML environment and to allow higher-level modifications. Alternatively JAVA applets can be used to react on events,which occur in the VRML world. The EAI is a browser plug-in, which handles communication with applications embedded into a Web page.

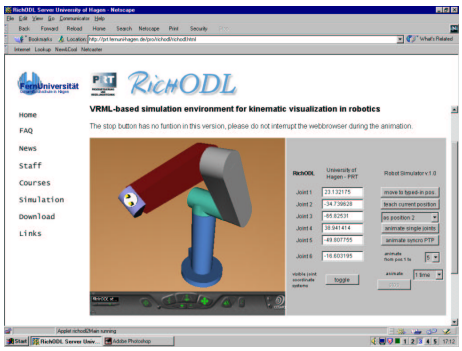

Figure 1: Web based robot simulator

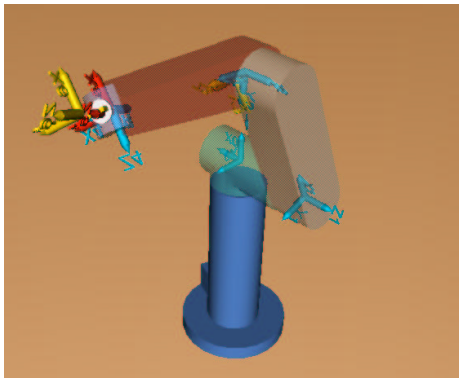

Figure 2: detailed view of the simulated PUMA 560 robot

We have developed a JAVA applet for our robotic simulation as an EAI, which provides control of a PUMA 560 robot via buttons. Especially advanced robot programming is feasible with this interface via teaching of locations in 3D virtual space and consequent initiation of a sequence of motions between teach-in locations. This control applet implements a path interpolation, which finally leads to simulation of a synchronized point-to-point motion.

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[1] http://prt.fernuni-hagen.de/pro/richodl

[2] http://www.web3d.org