IRCCyN French Research Institute Relies on Adams-Simulink Co-Simulation for Comprehensive Understanding of Robot Behavior

Adams-Simulink Co-Simulation plays an important role in validating the theoretical work on hidden Robot Models

NEWPORT BEACH, CA--(July 27th, 2016) – MSC Software Corporation today announced that the Research Institute in Communications and Cybernetic of Nantes (IRCCyN), a scientific institution linked to the French National Centre for Scientific Research (CNRS), is using Adams multibody dynamics simulation software to validate theoretical works done on a visual servoing system to control a parallel robot based on observation of the legs.

The vast majority of robots are controlled through the use of encoders that measure joint rotation. But even when encoders with very high levels of accuracy are used, the ability of robots to move to an absolute XYZ position and ABC orientation is limited by deflection, thermal expansion and manufacturing variation. Some applications, such as placement of a disk drive read head, require very higher levels of positioning accuracy that can only be achieved with a very expensive, special purpose robot. This challenge is being addressed with visual servoing technology that uses a vision system to acquire an image that determines the relative positions of the robot end-effector and the target. Visual servoing can achieve placement accuracies of just a few microns without requiring a very expensive robot.

Complications arise where it is not possible for the vision system to acquire an image of the end-effector. The alternate approach is to acquire an image of the legs of the robot and use them to control the end-effector position. The visual servoing based on the leg observation is equivalent to controlling another “hidden robot” in the controller, and this concept fully explained the initial possible non-convergence of the observed robot to the desired position and orientation.

IRCCyN used Adams simulations to validate this concept of a “hidden robot model” to improve visual servoing accuracy. The hidden robot is a virtual robot whose kinematics represents the mapping between the leg direction space and the end-effector position and orientation space. IRCCyN researchers decided to attempt to determine a general method to define the hidden robot model for any type of parallel robot controlled by visual servoing based on observation of the legs.

“Adams simulations have played an important role in validating our theoretical work on hidden robot models,” said Sébastien Briot, Researcher at IRCCyN. “The integration of Adams with Simulink through Adams/Controls eliminated the need for us to write complex equations for predicting the dynamics of parallel robots. It also provided graphical results that gave us a better understanding of robot behavior.”
About IRCCyN
The Research Institute in Communications and Cybernetic of Nantes (IRCCyN) is a scientific institution linked to the French National Centre for Scientific Research (CNRS). Its purpose is to innovate in several fields, among which include robotics, automatic control, production theory and image processing. For more information about IRCCyN, please visit: http://www.irccyn.ec-nantes.fr/fr/

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