

Prototyping Environment for Robot Manipulators

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Abstract

Prototyping is an important activity in engineering. Prototype development is a good test for checking the viability of a proposed system. Prototypes can also help in determining system parameters, ranges, or in designing better systems. We are proposing a prototyping environment for electro-mechanical systems, and we chosen a 3-link robot manipulator as an example. In Designing a robot manipulator, the interaction between several modules (S/W, VLSI, CAD, CAM, Robotics, and Control) illustrates an interdisciplinary prototyping environment that includes different types of information that are radically different but combined in a coordinated way. This environment will enable optimal and flexible design using reconfigurable links, joints, actuators, and sensors. Such an environment should have the right “mix” of software and hardware components for designing the physical parts and the controllers, and for the algorithmic control for the robot modules (kinematics, inverse kinematics, dynamics, trajectory planning, analog control and computer (digital) control). Specifying object-based communications and catalog mechanisms between the software modules, controllers, physical parts, CAD designs, and actuator and sensor components is a necessary step in the prototyping activities. In this report a framework for flexible prototyping environment for robot manipulators is proposed along with the required sub-systems and interfaces between the different components of this environment.

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