

Modelica Model for the youBot Manipulator

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Models and simulation tools are crucial in robotic research. Although there have been major improvements in the electronic and mechanical field, robots are still expensive equipments. The use of models and simulation tools overcome this problem. This paper presents the development of the Modelica model for the youBot manipulator. The youBot is a mobile manipulator designed to serve as the reference platform for industry, research and education [1]. Therefore, the Modelica model of the youBot manipulator is of high importance. The model was developed with a Modelica library for the manipulator's components which provides modularity, reusability and abstraction (Figure 1). This approach enables component exchange and component-based experiment of the developed model.

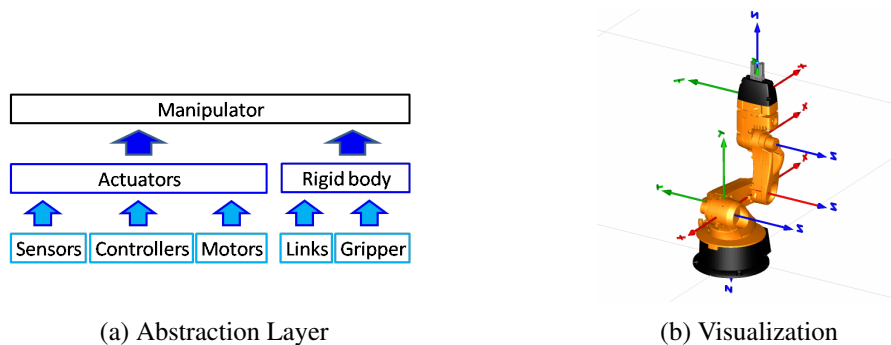


Figure 1: The youBot's Manipulator Model

A model is a representation of the actual system and the benefit of having a model only holds true when the model accuracy is known. Simulation can result in wrong conclusion when the researcher forget the limitations and condition under which the simulation is valid [2]. Therefore, a comparison test with the actual system is performed to evaluate the model accuracy and identify the major components which require further improvement. The test result shows that the model reflects the actual system within a reasonable deviation. For future work, the manipulator model is planned to be tested with other Modelica tools (OpenModelica, jModelica) and used for hardware-in-the-loop experiments. The development or design of other manipulator models is also possible through the reusability of the components library. The library is publicly available¹ to be used for education and research.

References

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¹www.youbot-store.com