Robwork Assignment 3
Group 1

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1 Introduction

In this assignment the robot Denso VS-6556 has been analyzed, DH parameters has been found from a datasheet of the Denso and a RobWork XML device file has been constructed, making it possible to simulate a Denso robot in RobWork-Studio. The specification and a 3D model of the robot was provided beforehand. The 3D model was split into several components, dividing it into base, joints and end-effector, all of which were included in the simple RobWork skeleton device file created from the DH parameters.

2 Problem description

The task was to create a device file enabling simulation of a Denso VS-6556 robot in Robwork. We had a data specification sheet of the Denso robot, .obj 3D model, and .mtl file which is a description of the material of the .obj model. The task was to find DH-parameters and create a RobWork XML file, load it, and simulate it in RobWork. The .obj model can't be loaded as it is but needs to be split up into separate components representing the links between the joints and saved in the .ac format(AC3D) before RobWork can load the new models. Then to make use of collision detection between links, new 3D collision models had to be created and added to the device file.

3 Robot model

The robot Denso 6556 has six joints, all of which are of the revolute type.

1. Construction of the DH parameters based on the data sheet of the Denso 6556, six joints in all. According to these parameters, an xml file was created and joint degree limitations were added.

2. The object file was split into joint objects and saved as separate objects by using the AC3D software[1].

3. In the XML file, frames were placed and the objects of joints were included.

4. The position and rotation of objects was tweaked according to RPY and offset because each shape were saved and loaded without regard to other shapes and aligned by hand.

5. The XML was loaded into RobWork and simulated, small corrections of shapes placement were neccessary.

6. Simple collision ascii .stl models were created and included into the XML file to simulate collision between joints.

4 Conclusion

The Denso VS-6556 was imported successfully into RobWorkStudio using the specification and the model. The model was split up properly and the model was tested with various angles to see if the joints, parameters, graphics and collision functioned correctly, which they all did. Depending on the correlation between links and corresponding collision models, collisions sometimes occurred preemptively. The simple collision models could easily be improved to better represent the actual links, thereby reducing faulty collisions, as every collision model save one uses a single box encompassing the link to detect collisions. This was deemed sufficient for the assignment based on the existing model samples and their collision models or lack thereof.

References

[1] Inivis. AC3D 3D Design Software. http://www.inivis.com/.

[2] John J. Craig. *INTRODUCTION TO ROBOTICS Mechanics and Control Third Edition*. Pearsons Prentice Hall, 2005.