MECH4000J/ELEC4010M Robotic Manipulation and Mobility 2017/2018 Spring
Project #2 - Robotic grasping Report DUE 15 May

Project policy: Work individually. This is not a group project. Upload your report to Canvas due 11:59am, 15 May. Late reports can be turned in until 11:59am on 17 May with a 25% penalty. After that, no reports will be accepted. Extensions are available for certain conflicts including illness (email the instructor). You MUST turn in your own write ups. Failure to do so constitutes plagiarism and may nullify your score.

Write MATLAB software for finding quality grasps on planar parts, modeled as a polygon, with two and three point contacts with friction by implementing the following requirements:

1. Ask the user to input the shape of a polygonal object of interest, for example, a sequence of vertices of the polygon.
2. Visualize the shape of the polygon connecting the vertices, with the right aspect ratio.
3. Ask the user to input the coefficient of friction.
4. Find all the grasps of two frictional contact points that can be in force-closure by doing the following:
    a. Consider possible contact points in the interior of each edge (for example, by dividing each edge of the polygon into, let's say, 10 segments). However, exclude the vertices of the polygon in that a point contact on the vertices might not be stable.
    b. For each pair of such contact points, check if it is possible to attain force-closure by making contact at the points. Establish the set of all force-closure grasps.
    c. Come up with a way of visualizing the collection of the grasps.
    d. Come up with a quality measure that can rank the grasps.
5. Find all the grasps of three frictional contact points that can be in force-closure by doing the following:
    a. See 4-a.
    b. See 4-b (here you need to consider triples, not pairs of contact points).
    c. See 4-c.
    d. See 4-d.

Instructions for writing the report:

- Use the LaTeX or MS Word template available here: https://www.iros2018.org/call-for-papers
- Append your code to the report.
- Max. two pages in length (excluding the code).

Remark: Interview sessions may be scheduled during the examination period.