MCE/EEC 647/747
Homework 1 - Spring 2019
Due 1/31/19 at the beginning of class. Email a single commented m-file for Problem 2

1. (10 pt)

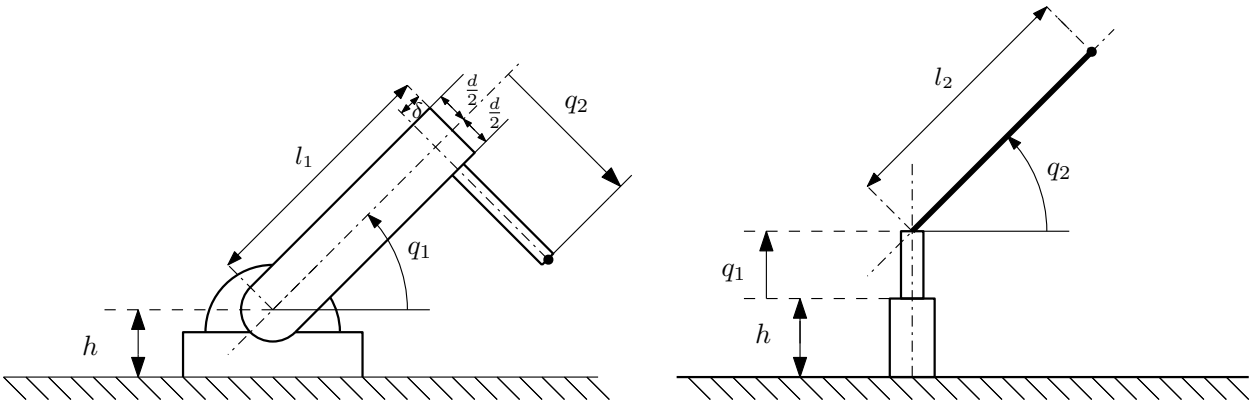
- (0 pt.) Read chapter 1 of SHV and chapter 1 of the Robotics and Automation Handbook (link to material provided in class).
- (10 pt.) Select any field of application that you find interesting (space exploration, medical, industrial, etc.). Then search for an applications-oriented article on robotics from one of the journals available through the CSU Library's Journal Finder, for example:
  - Robotica
  - IEEE Transactions on Robotics
  - International Journal of Robotics Research

  The article must be from a technical journal (no trade magazines or websites). Provide a 1-page document where you indicate the complete citation (journal, author, title of article and publication data), followed by a summary of the aims, methodology and outcomes of the paper.

2. (60 pt) The figure shows two planar manipulators of the RP and PR types. For each, write Matlab code that displays the reachable workspace for a given set of parameters. Show the shape of the reachable workspaces for the following parameter values: $l_1 = l_2 = 1,\ \delta = 0.2,\ d = 0.2,\ h = 0.5$ and $D = 0.75$.

1. RP robot: The range of motion of the prismatic link is $0 \leq q_2 \leq D$. The range of motion of the revolute joint is limited by interference between the first link and the ground and between the end effector and the ground.

b. The range of motion of the prismatic link is $0 \leq q_1 \leq D$. The range of motion of the revolute joint is limited only by intereference between the end effector and the ground.



3. (30 pt) Read chapter 2 of *Linear Algebra and Its Applications* by Strang, de-emphasizing or skipping sections 2.2, 2.4 and 2.5. Then solve the following problems:

- Set 2.1, ex. 3 (p. 82)
- Set 2.1, ex. 8 (p. 83)
- (Doctoral students only) Set 2.1, ex. 17 (p. 84)
- Set 2.3, ex. 2 (p. 110)
- Set 2.3, ex. 20 (p. 112)
- (Doctoral students only) Set 2.3, ex. 31 (p. 114)
- Set 2.6, ex. 5 (p. 149)
- Set 2.6, ex. 6 (p. 149)
- (Doctoral students only) Set 2.6, ex. 7 (p. 150)

Only 3 problems will be graded.
`https://academic.csuohio.edu/richter_h/courses/mce647/StrangCH2.pdf`