

Here is the information regarding your final project for MAE 547:

- 1- Please form groups of five by Thursday 10/10/19 (one student from each team should email the name of team members to the grader ygovada@asu.edu by 11:59pm on 10/10/19).
- 2- The project deadline is Tuesday 12/3/19 (one student from each team should email the entire package including the codes and the final report to the grader by 11:59pm on 12/3/19).
- 3- In this project you are supposed to create a robotics package in Matlab (all the codes should be written in Matlab and you can use any of the robotics toolbox commands).
- 4- Make the following two assumptions in your calculations: all of the joints are either revolute or prismatic and all of the links are straight.
- 5- For any part that requires DH parameters you should give the user the option to either input the DH parameters directly or provide you with the information (number of joints, types of joints, lengths of links, z-axis of each joint) such that you can calculate the DH parameters.
- 6- The following topics should be covered in the GUI you will develop in Matlab:
 - a. Homogenous matrix transformation (description of a frame, transformation mapping, transformation operator)
 - b. Euler angles (angles to rotation matrix and inverse problem)
 - c. Forward kinematics (finding Denavit-Hartenberg parameters and transformation matrices, making the robotic arm and animating the transformations given the DH parameters)
 - d. Workspace (finding 3D operational space of robotic arms)
 - e. Inverse kinematics (finding joint parameters given end-effector pose)
 - f. Differential kinematics (finding Jacobian matrix and singularities of robotic arms)
 - g. Inverse differential kinematics and inverse kinematics using Jacobians
 - h. Manipulator dynamics (find the equations of motion for a manipulator and plot joints positions and velocities)
 - i. Bonus (15 pts): Manipulator control (motion control and force control)
- 7- You should try to develop an interactive and intuitive GUI that user can easily choose the topic of interest, input/modify any parameters needed, and view the plotted/animated results (similar to the toolboxes provided in Matlab).
- 8- In your final report, please make sure you write the contribution of each team member, a description of different parts of your project, how to run your code, and how to use the GUI. In addition, please cite any code/information you have used in your project (cite anything in your package that you did not code up yourself).
- 9- Please put all of the files for your final project in one zipped folder and email it to the grader by 11:59pm on 12/3/19.