GUI-Based Interactive Kinematics Toolkit for Robotic Manipulators
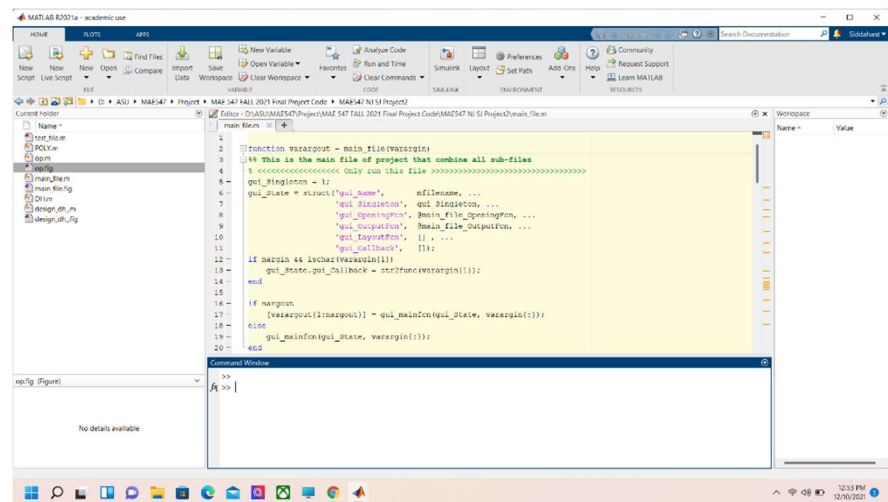
MAE 547

This "Read me" file help the user to run and utilize the toolbox in his system

Requirements: computer or laptop and MATLAB 2019 and up

First, please make sure the path set to the MAE547 NJ SJ Project 2 folder location and the folder contains a total of 9 files

1. Test_file.m
2. POLY.m
3. op.m
4. op.fig
5. main_file.m
6. main_file.fig
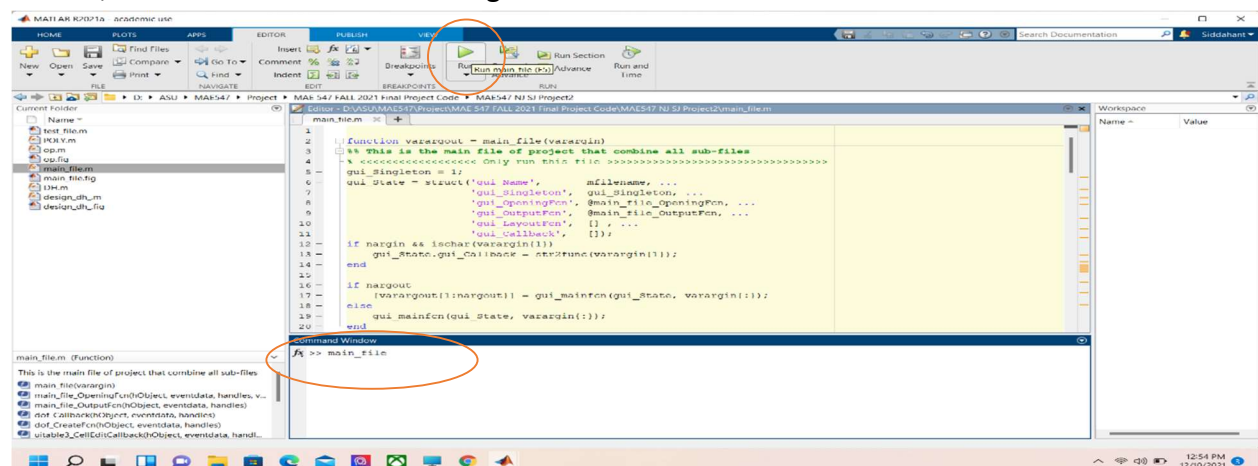7. DH.m
8. design_dh_.m
9. design_dh_.fig

Before running the main_file, please use the following command in the command window for smooth extrusion.
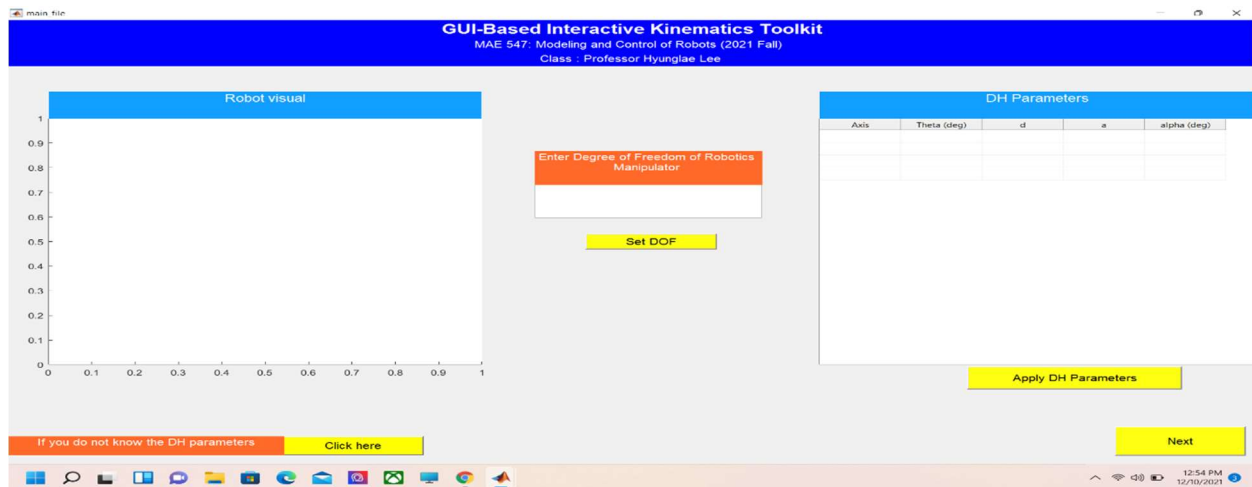
>> clear all

>> close all

>> clc

Now to run the code, by either writing **main_file.m** in the command window or press the run button; both will work as shown in fig below

As running the code, the first GUI screen will pop up shown below

The program's first screen built a serial link robot based on DH parameters. In this part, enter the DOF in the given box and then press the set DOF button. Then after if the DH parameters are known, fill the DH table on the right side, then click on Apply DH Parameter and move to the next; if not, click on the bottom left button.
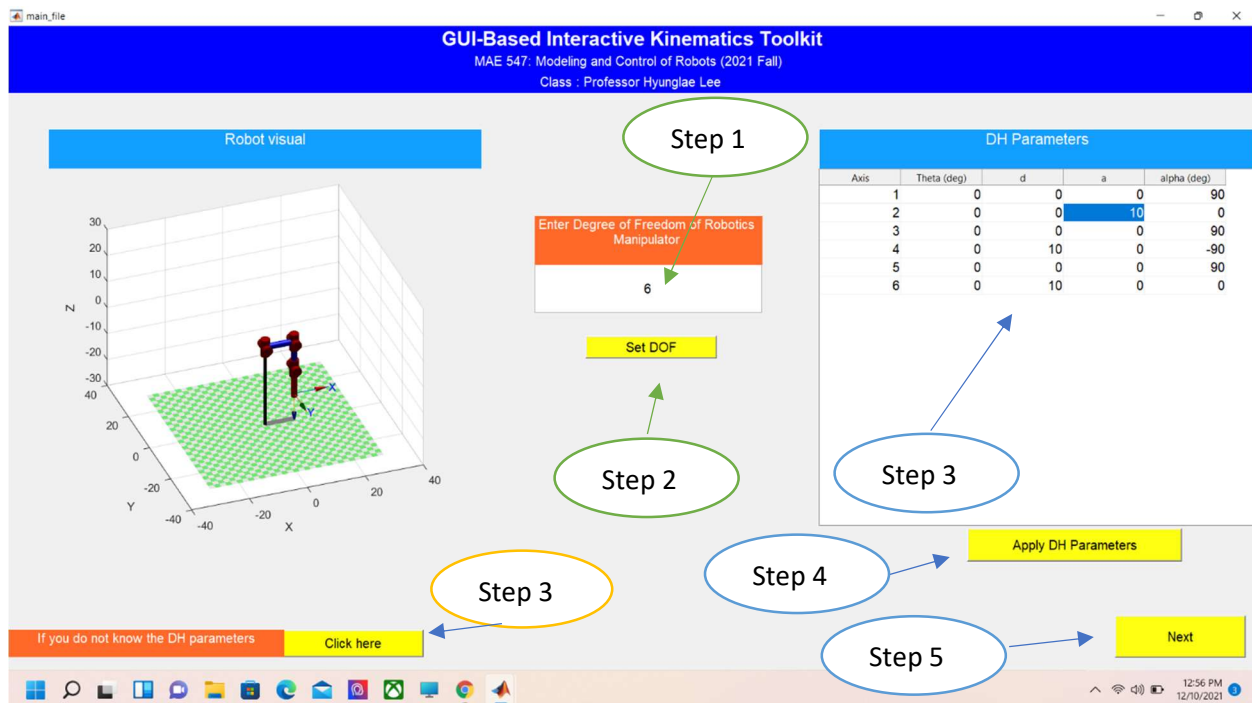
If the DH parameter is not known, we allow to build up the robot by visualizing, which allows the user to see the robot, add and remove the link or update the link parameter. Based on that, we generalized the DH parameter of the robot.
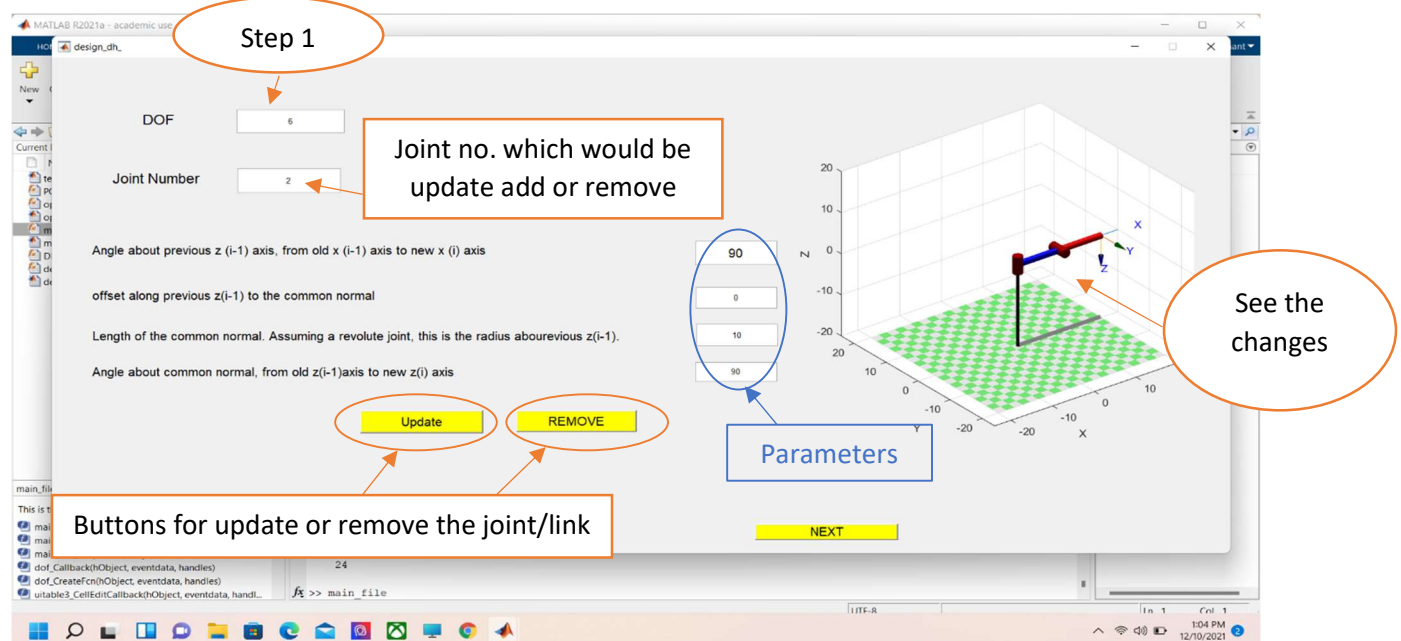
After setting up the robot, we move to the next window called operation windows op

We can perform forward and inverse kinematics algorithms onto the created manipulator in this window.

To perform the Forward kinematics, we need to define the joint variable into the table given and press the forward kinematics button. After pressing the forward kinematics button, the manipulator moves and achieves desired X Y Z coordinate points with a constant velocity trajectory.
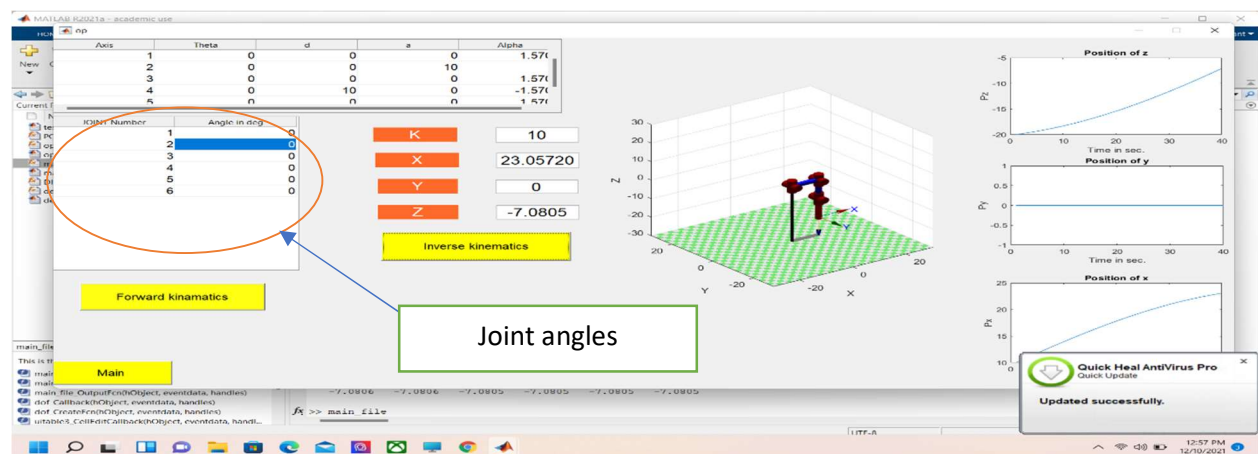
For inverse kinematics algorithm, we need to give the X Y Z points and press the inverse kinematics button,

As a result, follow the constant velocity trajectory and achieve the desired position and orientation. On the right side of the screen, we can see the behavior of the robot while following the trajectory