

Matlab Homework

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1 Spaceship Exercise - 15 points

To make my own Spaceship I have used the initial file which was given to us. The makespacehsip file hand a couple of objects drawn in it. Using those as references I have changed the objects to look like a space ship. Each object that I have drawn has been carefully commented on the code using the % sign. Below I have detailed described how one of my Right tail has been made.

Algorithm 1 Piece of code from show_object_heirachy.m

```
1: % Right head
2: trf_headright_root= hgtransform('Parent', trf_root);
3: trf_scale= makehgtform('scale', [0.3,0.3,2]);
4: trf_Ry= makehgtform('yrotate', pi/2);
5: trf_T= makehgtform('translate', [0, 0.5, 0.8]);

6: % Interpret the order as BFT (left to right)
7: set(trf_headright_root, 'Matrix', trf_T*trf_Ry*trf_scale);
8: color_head_right= [0 0 0];
9: myhandles(4)= surface(X2, Y2, Z2, 'Parent', trf_headright_root,
    'FaceColor', color_head_right, 'FaceAlpha', transparency, 'EdgeColor',
    1*color_head_right, 'EdgeAlpha', transparency);
```

The first line is just a comment on which part the code is about. The second line I make a transformation object for your tail from the main root using hgtransform. Then I set about its scale, rotation and translation using the makehgtform function. After that I need to create the object so I use the function set to do that all. Finally I color it all out and have it stored in the myhandles array which has all the onjects in it.

Now that I have created all the objects in my makespaceship file I move on to my next file which is showobjectheirachy where I have combined everything(this is the file that you should run). "trf_ship1_root" is my first spaceship that I create and with respect to that I create Spaceship 2. I did not rotate Spaceship 2 as then the trajectory would be a little odd.

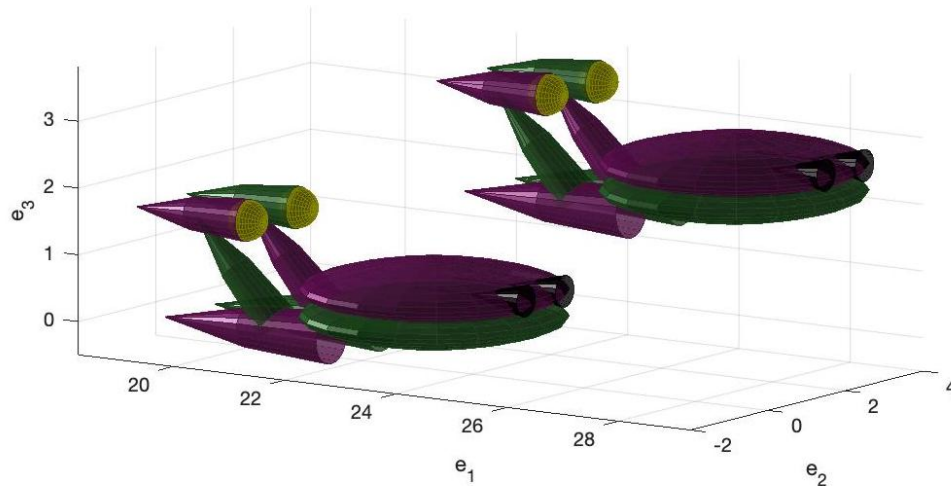


Figure 1: Spaceship Animation

1.1 changing the colour of some parts of the spaceship (1 point)

As you can see from my spaceship I have used a color of green and purple to full-fill this criteria.

1.2 adding a new structure (2 points)

I have drawn a circle in the exhaust of the spaceship to full-fill this criteria.

1.3 making the spaceship moving in a nice trajectory (2 points)

Using a for-loop at the end of the file I have made sure that both my spaceships move at the E1 trajectory.

2 Robot - 10 points

Using the Make-ScaraRobot file given to us and the various different functions I have implemented my very own Upper body part which has a fixed head and movable arms and hands. Below I have explained one of the parts of my code.

Algorithm 2 Piece of code from make_scara_robot.m

```
1: %% Orange Cylinder
2: trf_viz_link2p2= make_transform([0, -0.05, 0], pi/2, 0, 0);
3: h(6)= link_cylinder(0.015, 0.1, trf_viz_link2p2, [1, 0.54902, 0]);

4: %% Green Cylinder
5: trf_viz_link3p2= make_transform([0, 0, 0], pi/2, 0, 0);
6: h(8)= link_cylinder(0.012, 0.04, trf_viz_link3p2, [0.196078, 0.803922,
    0.196078]);

7: %% Joint 3: Orange Cylinder and Green Cylinder: Fixed
8: trf_link3_joint3= make_transform([0,-0.1,0], pi/2, 0, 0, trf_link2p2_link2);
9: plot_axes(trf_link3_joint3, 'L_3', false, axis_length);
10: make_child(trf_link3_joint3, trf_viz_link3p2);
```

The first two parts are simply creating in 2 cylinders. As in my code the joint between them is fixed I have then combined that joint with the previous joint. Finally the last part is making the green cylinder a child of the orange cylinder. This process repeats for each joint which I have explained using comments on my code.

You can find a photo of what I have tried to make in the next page. This is like a real life robot with the a head and two movable arms.

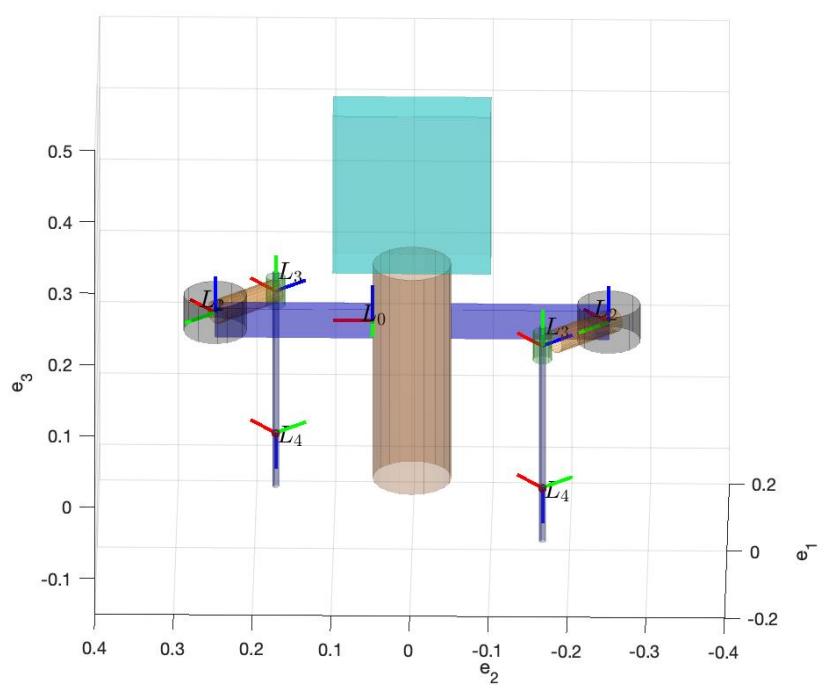


Figure 2: Robot Animation