ROBOTIC TOOLBOX

Karthik Ramagiri 1209640546
Anket Hirachand Marathe 1209671629

Note: If a link parameter has to be edited after updating, all successive parameters has to be updated again

1) Download the robotictoolbox file and unzip the contents of the folder and save it to the directory

Additional Download:

- Download it from http://www.petercorke.com/RTB/ in zip format (.zip).
- The Toolbox is tested with MATLAB R2011a.
- To install the Toolbox simply unpack the archive which will create the directory (folder) rvctools, and within that the directories robot, simulink, and common.
- Adjust your MATLABPATH to include rvctools
- Execute the startup file rvctools/startup_rvc.m and this will place the correct directories in your MATLAB path.

2) Open MATLAB

3) Add the toolbox folder to the path

4) Run the MAINFILE.m file

5) Click on the function you want to perform (Example: Click on Forward kinematics to perform forward kinematics operation)

6) Close the GUI after performing the operation

I) DESCRIPTION OF THE FRAME

In this function, the user can describe the homogenous transformation of frame B relative to frame A

1) Enter the rotation angles and the axis of rotation for rotation 1, 2 and 3 of frame B relative to frame A

2) Enter the position vector of the origin in frame A

3) Select the frame of rotation (Current frame or Fixed frame)

4) Click the Update button

5) The transformation matrix T_{BA} is displayed

II) TRANSFORMATION OPERATOR

1) Enter translation vector in frame A
2) Enter the rotation angles and the axis of rotation for rotation 1, 2 and 3 of frame B relative to frame A
3) Enter translation vector in frame B(Enter zeros if the vector is subjected only to rotation)
4) Click the Update button
5) The transformation operator is displayed

III) TRANSFORM MAPPING

1) Enter the rotation angles and the axis of rotation for rotation 1, 2 and 3 of frame B relative to frame A
2) Enter position vector of Frame B relative to A
3) Enter vector in Frame B
4) Select the frame of rotation (Current frame or Fixed frame)
5) Click the Update button
6) The transformation mapping is displayed

IV) EULER ANGLES

1) Enter the rotation matrix
2) Select the frame of rotation (Current frame or Fixed frame)
3) Click the Update button
4) Euler angles are displayed

V) FORWARD KINEMATICS

1) Enter the total number of links
2) Enter the link number
3) Enter the DH parameters numeric values only (ai alphai di thetai)
4) Click the update button after entering DH parameters of each link
5) The transformation matrix and plot is displayed
6) Use the reset button to reset the GUI

VI) FORWARD KINEMATICS (PARAMETERS)

1) Enter the initial parameters (Number of joints and the type of joint 0)
2) Enter the link parameters (Link number, length of the link, joint variable (value of di or thetai), type of the joint at the end if the link (i.e., at i))
3) Select the direction cosines of Z in previous frame
4) Click the update button after every iteration
5) The transformation matrix and the plot is displayed
6) Use the reset button to reset the GUI

VII) WORKSPACE

Note : The number of iterations for to create workspace = density^no_of_links. Hence try to keep the value below 2,00,000 to run the program quickly. Please wait for the workspace to complete

1) Enter the total number of links
2) Enter the link number
3) Enter the DH parameters numeric values only (ai alphai di thetai)
4) Click the update button after entering DH parameters of each link
5) The Workspace is displayed
6) Use the reset button to reset the GUI

VIII) INVERSE KINEMATICS

1) Enter the total number of links
2) Enter the transformation matrix
3) Enter the link number
4) Enter the DH parameters numeric values only (ai alphai di thetai)
5) Click the update button after entering DH parameters of each link
6) The joint variables are displayed
7) Use the reset button to reset the GUI

IX) DIFFERENTIAL KINEMATICS

1) Enter the total number of links
2) Enter the DH parameters numeric values only (ai alphai di thetai type of joint)
3) Click the update button after entering DH parameters of each link
4) The Jacobian matrix is displayed
5) Use the reset button to reset the GUI

X) INVERSE DIFFERENTIAL KINEMATICS

1) Enter the total number of links and end effector velocities
2) Enter the jacobian for each link
3) Click the update button after entering jacobian of each link
4) The joint velocities are displayed (in unit/second)
5) Use the reset button to reset the GUI

XI) INVERSE KINEMATICS USING JACOBIAN

1) Enter the total number of links and the position of the end effector
2) Enter the linear part of jacobian
3) Click the update button after entering jacobian of each link
4) The joint variables are displayed
5) Use the reset button to reset the GUI