Fall 2025

EECE/ME 4523 Mechatronics

HW06b: Basic Pub Sub

[65 pts]

This assignment builds on top of HW05b Inv Kinematics and will only focus on the top-pick portion of those. The goal of this HW will be for you to publish the joint angles generated as you perform your top-pick routine and then in turn publish them in ROS format. You will also create a subscriber that catches these messages and displays them in Matlab format.

Objectives

1. Create and use a MATLAB class that encapsulates all ROS communication interfaces.
2. Publish joint states to a topic /matlab_joint_states of type sensor_msgs/JointState.
3. Subscribe to the same topic and process received data.
4. Demonstrate modular design by separating publishers, subscribers, and motion functions into individual files.
5. Verify that your published messages are correctly received and displayed in a reordered format.

Provided Files

Along with this homework description, you are given a .zip file containing:

- **hw_06b_ros_pub_sub.m [10 pts]**
  Main script that handles logic and sequence for the task.

- **ros_class_handle.m [10 pts]**
  Defines a MATLAB class encapsulating ROS publishers, subscribers, and robot model setup for modular communication. Best way to do it in matlab.
- **load_top_pick_joint_data.m [5 pts]**
  Loads previously saved joint configuration data from the top-pick motion.
- **top_pick.m [10 pts]**
  Generates the top-pick cartesian sequence using inverse kinematics and trajectory data.
- **traj_gen.m [15 pts]**
  Produces smooth joint trajectories between poses, publishes them, and displays the robot moving.
- **pub_matlab_joints.m [15 pts]**
  subscriber callback that will print the re-ordered joint angles.

TODO

1. No need to rename any files.

2. Code all files to get seamless performance.
3. Code should include one publisher and one subscriber with callback.

Deliverables

Fully coded m-files for all files provided.

A video that shows your output similar to:
https://youtu.be/LOmc4M7Ul2M

Note

Work individually. Do not view anyone else's code or use code-generating tools. Write your own solution.

- 3 videos showing the three skills.