

# In-Contact Manipulation Dataset

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# Create a Dataset of In-contact Manipulation Tasks: Underwater Robotic Arm

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- Create a dataset that describes robotic motion underwater.
  - Spatial trajectory of where the arm is traveling.
  - The speed of the arm as it moves.
  - The forces involved in getting to the endpoint.
- Future of Dataset.
  - Describing robot motion with words.



# My Goals for the Summer

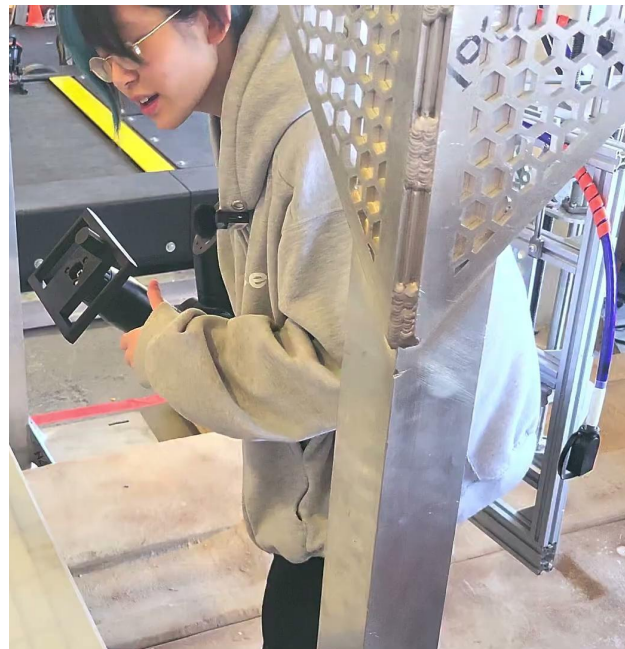
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- Help create a motion: speech dataset problem definition.
- Set up and control the robotic arm with Move-it and/or Franka\_ros (the plugin used with ROS to control the arm).
- Help out with calculating the embedded force data from the sensors featured in the Franka Research 3 robotic arm.
- Find a way to use the obtained data to know when the robotic arm is in contact with an object.



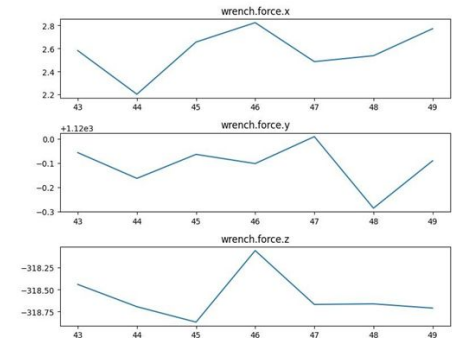
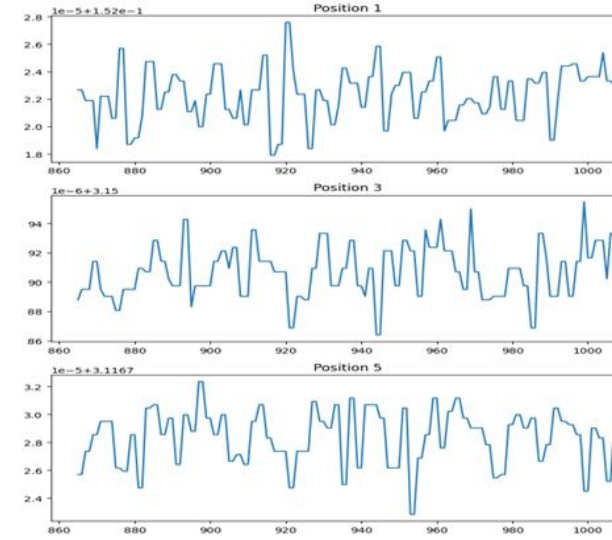
# Procedure for Creating Dataset

- Trials are conducted with test participants.
  - Participants are given a single task and context cues.
  - Both good and bad examples are collected.
- The participant will then demonstrate how to complete the task in words and actions.
  - Speech data is then collected from the participant's task description.
  - Perception data is collected from the participant's demonstration.
- After the demonstration, the participant guides the robot arm to complete the task.
  - Joint state and joint velocity data is collected.
  - Force torque data during the task is collected.
- The robot arm replays the motion to complete the task and the participant is asked to describe the motion again and rate the effort.
  - Speech data of the participant's description of the task is collected.



# Criteria for Success

- Controlling the arm with software.
  - Successfully set up the robotic arm and configure the necessary software (MoveIt or proprietary software).
  - Demonstrate the ability to execute basic movements (e.g., joint movements, predefined trajectories) using the chosen software.
  - Create clear documentation of the setup and configuration process, including any troubleshooting steps taken.
- Calculating Force Features.
  - Collect force data from the robotic arm sensors during manipulation tasks.
  - Ensure the extracted features are accurate and consistent across multiple trials.
- Detecting Contact.
  - Develop an algorithm to detect when the robotic arm is in contact with an object based on force data.
  - Test the robustness of the algorithm with various objects and environmental conditions.
- Learning and Development.
  - Develop new skills related to robotic manipulation, software tools, data analysis, and algorithm development.



Any  
Questions  
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