

## Project Type \_\_\_\_\_

- Bachelor Thesis
- Master Thesis
- Research Project

## Supervisors \_\_\_\_\_

-  Ge Li
-  ge.li@kit.edu

## Difficulty \_\_\_\_\_

Algorithmic



Math



Application



# Trajectory Segmentation for Robot Manipulation Datasets

## Description

With the development of AI and ML, more researchers realized that high-quality, well-designed datasets play an equally important role as the algorithms. Some famous ones, like MNIST, ImageNet etc., either offer a training baseline or significantly increased performance of the algorithms. In the field of Robotics, especially in motion planning and movement primitives, however, such desirable dataset is hard to obtain, due to the variant robot types and learning tasks. In this project, you are going to create a robot manipulation dataset of Franka Panda® manipulator (Figure 1) while developing algorithms, e.g. trajectory segmentation, to utilize and process existing datasets, such as RoboTurk[1].



Figure 1: Franka Panda® Robot Manipulator

## Tasks

- Literature Research: Review different existing robot learning datasets and algorithms in sequence segmentation.
- API Learning: Learn the user interface of Franka Panda® Robot Manipulator and establish the communication pipelines.
- Design Tasks: Follow the research requirement, design robot Imitation Learning tasks, e.g. Catching, Obstacle Avoiding etc.
- Generate Demonstration data: Generate and collect human demonstrations in designed tasks.
- Trajectory Segmentation: For complex tasks, develop algorithms to cut long trajectories into different categories.

## Your profile

- Enthusiasm in Robotic Learning: Strong passion in the area like machine learning, robotic skills learning, big data etc.
- Good Programming Skills: Good knowledge in Python programming. Experience in ROS and other Object-Oriented-Programming like python is an advantage.
- Good English Skills: Good communication skills in writing and speaking.

## References

- [1] Ajay Mandlekar, Yuke Zhu, Animesh Garg, Jonathan Booher, Max Spero, Albert Tung, Julian Gao, John Emmons, Anchit Gupta, Emre Orbay, Silvio Savarese, and Li Fei-Fei. Roboturk: A Crowdsourcing Platform for Robotic Skill Learning Through Imitation. page 15. 00019.