

Faculty of Engineering

Summer Research Program 2022-2023

Project Title: Robotic Grasping using Tactile Sensors from Meta

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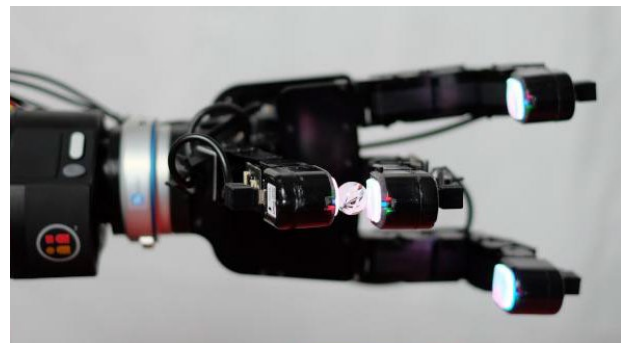
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Objective

The ability to reliably pick up objects is an important skill for robots. This project explores the use of multimodal sensor input for robotic grasping by using RGB-D cameras and tactile data from a novel tactile sensor. State-of-the-art robotic grasping techniques that use deep learning are often open-loop: they generate the grasp pose for the robot's wrist joint only - the robot then blindly closes its gripper and lifts the object up. The objective for this project is to develop a closed-loop solution by allowing refinements to the grasp, by utilizing tactile sensing.



Project Details

The hardware for this project would be a robotic arm (Universal Robots UR5) equipped with a Robotiq 2f85 gripper and the novel tactile sensor ([DIGIT from Meta](#)). State-of-the-art deep learning methods will be utilized.

The project would have 4 phases:

- 1) Data collection by grasping different objects
- 2) Train a network that estimates the probability of successful grasping from visual and tactile sensor data.
- 3) Train a network that suggests actions to improve the probability of success. The action space would be incremental changes to the robot hand pose. We will explore the use of Deep Reinforcement Learning for this network.
- 4) Evaluate our closed-loop grasping solution with real-world grasping experiments

Prerequisites

- Strong programming skills in Python or C++
- Interest in publishing the results of research in a scientific journal
- Experience with Linux and Robot Operating System (ROS) is a plus
- Experience with training Deep Neural Networks is a plus
- Hands-on experience with robots is a plus