DESIGN OF AN INTEGRATED UNIVERSAL ROBOTIC 5 (UR-5) GRIPPER

Yi Sheng Tan

College of Engineering
Natural Sciences and Engineering Oral Presentation

Abstract: The design of robotic grippers is crucial to developing efficient and effective robotic systems. These grippers are responsible for grasping and manipulating objects, which is critical in many industrial applications. One of the primary challenges of designing a robotic gripper is ensuring that it can handle a wide range of object shapes and sizes while maintaining a firm and stable grasp. To address this challenge, this study presents a novel gripper design that utilizes systematically integrated four bar linkages, 3D printing technology, and honeycomb infills to enhance its durability and cost-effectiveness compared to existing designs. The gripper can lift objects ranging from 0.025g to 4kg, providing a more stable grasp than conventional two-finger grippers, and is powered by a single high-torque stepper motor. The gripper's unique motion mechanism enables simultaneous arm and finger movements, avoiding the use of gear systems, which reduces wear and potential slippage. Additionally, the gripper is highly affordable, costing less than $500, which is significantly cheaper than other available alternatives. Future work will include analyzing the gripper's force and path using multibody dynamic and motion analysis software, followed by experimental validation using force sensors and a Universal Robot 5 (UR-5) settings.
Keywords: Robotics, 3D-printing, Gripper

Faculty Mentor: *Dr. Yimesker Yihun*