Aharon Sebton

Dr. Ferat Sahin

Advanced Robotics

21 February 2022

Final Project Proposal

Topic

I am interested in enabling collaborative robots to provide greater touch device accessibility to humans with tetraplegia, arthritis, and other mobility-limiting disabilities. I would like to make it possible for an arm robot to perform actions on a touch screen that a human normally would. In the future, this could be paired with a biorobotics effort to detect cognitive load and track eye movements, so that users of an accessibility system can fully control touch screen devices without use of their arms.

Problem II

I would like to enable Sawyer to perform a variety of single and multi-touch gestures on a stationary touch-enabled device. I can first attach rubber tips to the existing bipodal gripper on Sawyer in a nonpermanent manner. The main contributions of the project will be using force analysis in conjunction with Sawyer's built-in force sensors to apply an appropriate amount of pressure to the touch screen, as well as using joint-space trajectory planning to carefully move the end effector in linear motions that are parallel to the plane of the touch screen. Force analysis calculations will be applied to Sawyer's joint force sensor readings to extract the magnitude and direction of force applied to the screen by the gripper. Python scripts will be developed to perform taps, swipes, and pinches. A script to perform a two-finger rotation may also be developed if enough time is allotted.