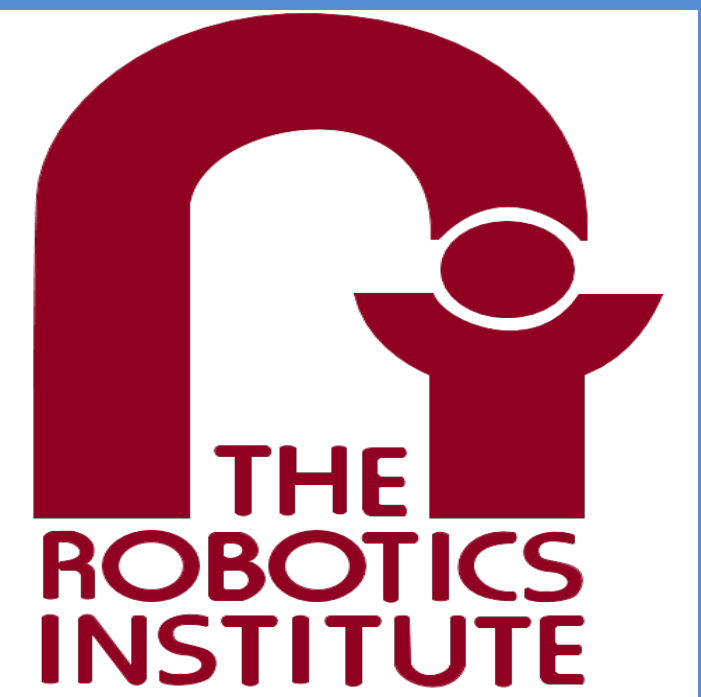


# Open - Handed Teleoperation

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## Introduction

- What type of hand should a robot have?
- While complex hands seem to surely offer greater generality, simple hands are often more practical.
- This project explores the tension between simplicity in hand design and generality in hand function with the goal of developing a simple gripper, along with control and planning techniques, to enable general purpose manipulation.

## Building Process

- First we craft the three fingers for the hand. Urethane rubber is poured in the 3d-printed finger molds, which creates the finger pads and flexure joints. A spring is also attached to allow the fingers to reset to their original positions when they move inward.
- Next we take four actuators (Dynamixel RX-24F) and fix them to the top plate of the actuator base for the hand.
- We then bring the two halves of the actuator base and the fingers together. Then we take the Power Pro Spectra Line and run it through the fingers and around the wheels of the servos, which act as pulleys.

## Function

- The Yale Open hand is the result of the collaboration between Yale, Harvard, and iRobot during the DARPA ARM challenge.
- It includes three independently driven, under actuated fingers, as well as a fourth actuator that controls abduction and adduction. This allows the hand to transition between power-grasping and precision-grasping configurations.
- Using Leap Motion software, we record different gestures that we want the hand to make, then use the software to operate the hand and make the same gestures, using the controller's vision to determine an object's position and allow the hand to grip said object.



Palm Pad



Pad Attached



Gears Connected



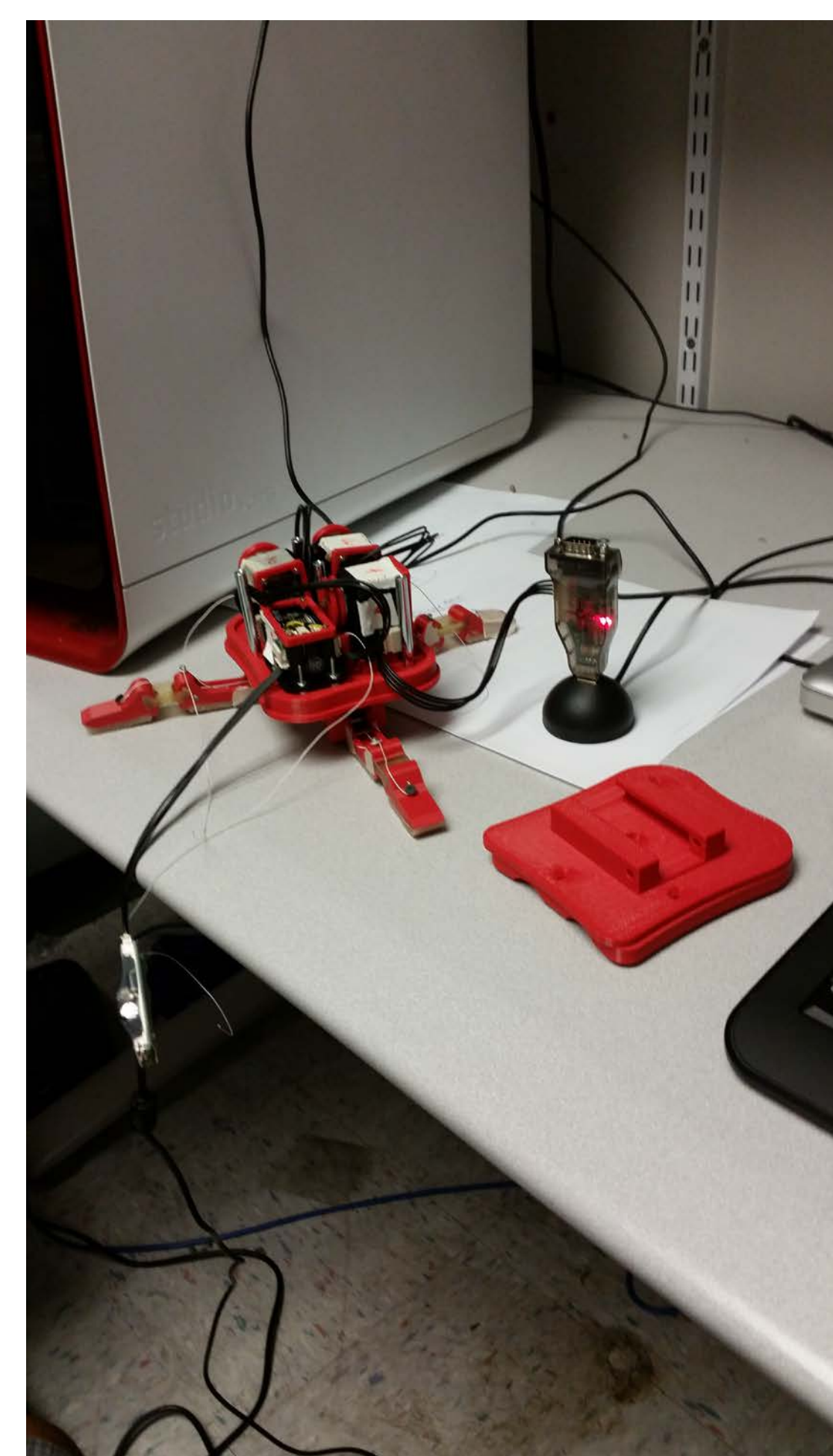
Urethane-Molded Fingers



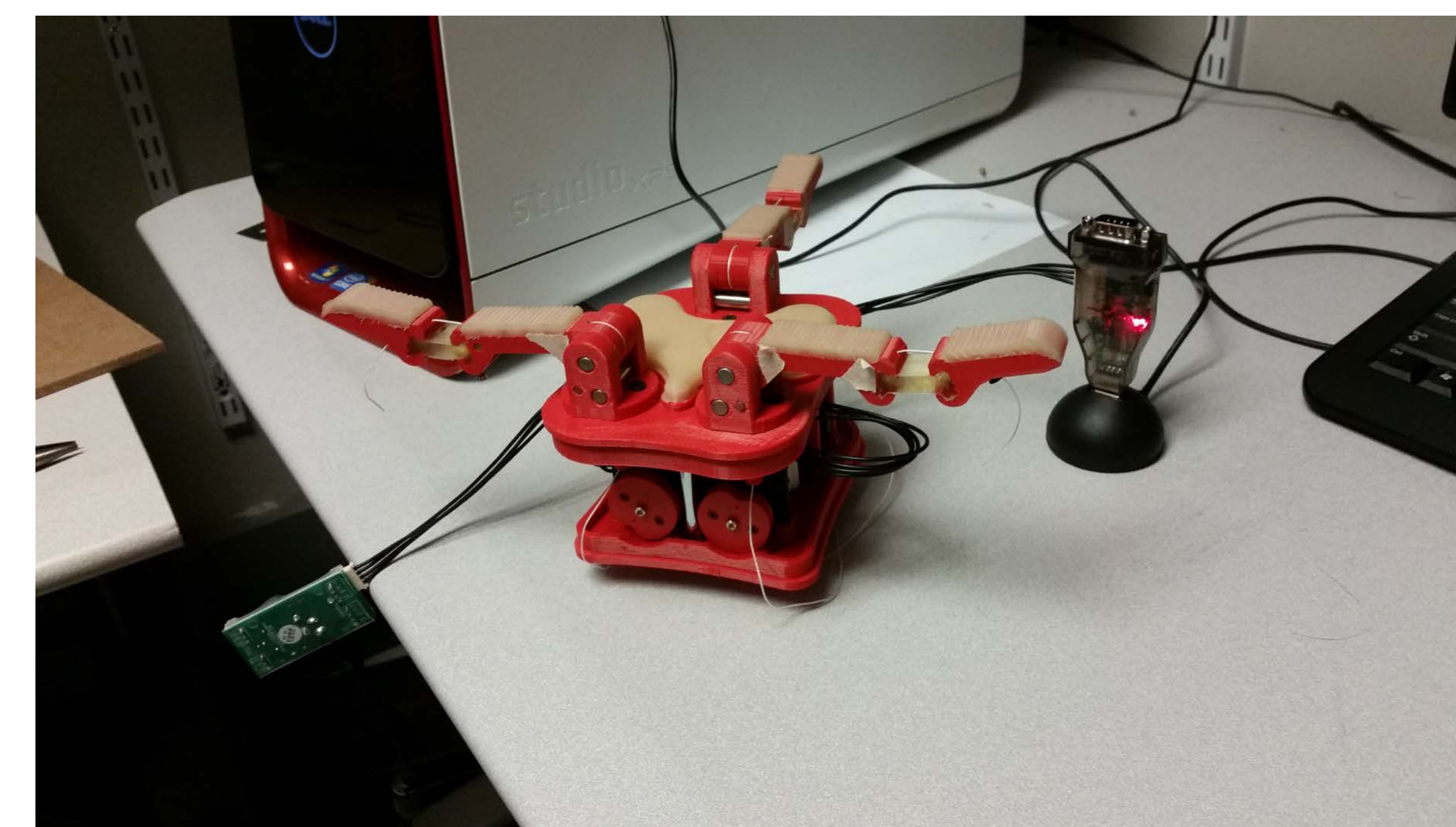
Pivot-Flexure Fingers



Dynamixel Servos



Fingers Attached



Fully Assembled

