Anthropomorphic Manipulator for Remote Operation

Lute Chen, Adam Evangelista, Nuthan Hegde, Gabriel Lima, Bruno Vu
Advisor: Professor Ian Harris

SAMUELI SCHOOL OF ENGINEERING
UNIVERSITY of CALIFORNIA • IRVINE

Background

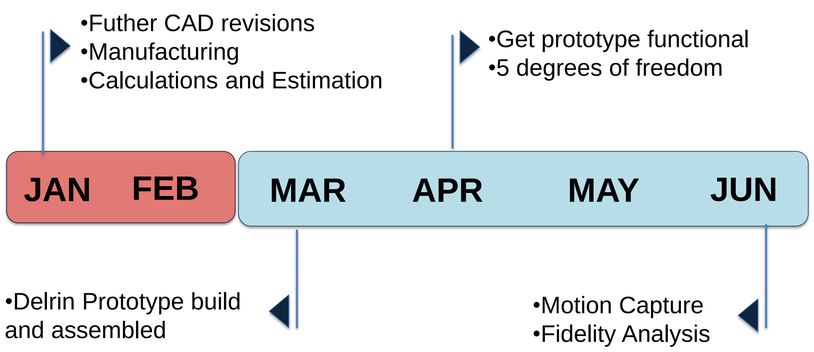
In recent years, there has been increasing interest in the mechanics and optimization of robotic manipulators, largely due to the wide range of potential applications. The design of robotic hands for dexterous grasping and manipulation can be utilized as a tool in minimally invasive surgery or prosthetics, or to reach loads in hazardous environments. By creating a robotic manipulator in form of a human hand, its capabilities and range of motion are similar to our own. Anthropomorphic manipulators are familiar and intuitive.

Objective and Requirements

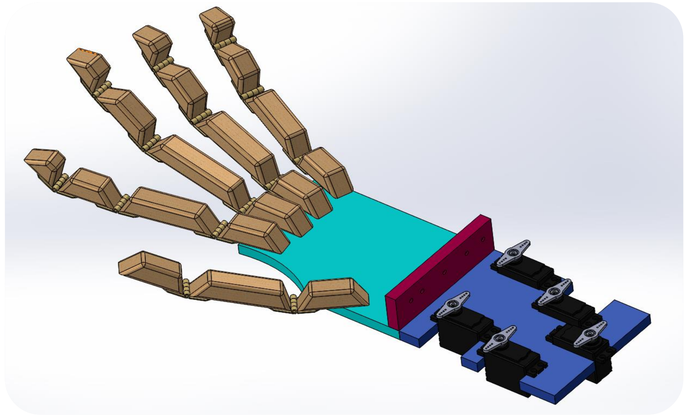
Our design aims to produce a fully functioning robotic hand actuated by the tendon-servo method and operated with an intuitive human interface device.

- High Dexterity:10 DOF, modeled after human hand
- Intuitive Human Interface: wearable glove equipped with flex sensors to produce organic movement
- Low cost: inexpensive Delrin® construction and readily available mechanical parts such as hinges and springs

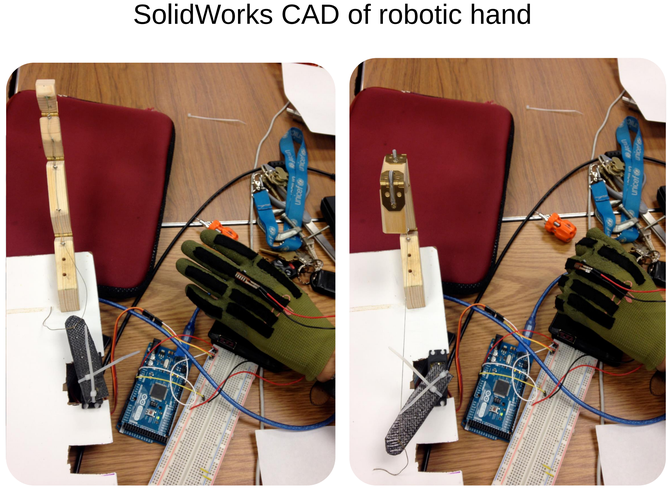
Timeline



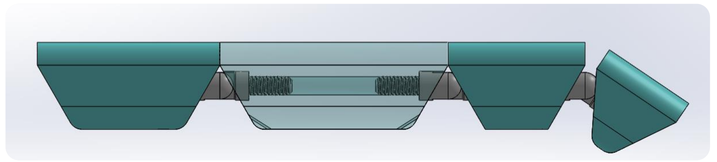
Concept and Design



SolidWorks CAD of robotic hand

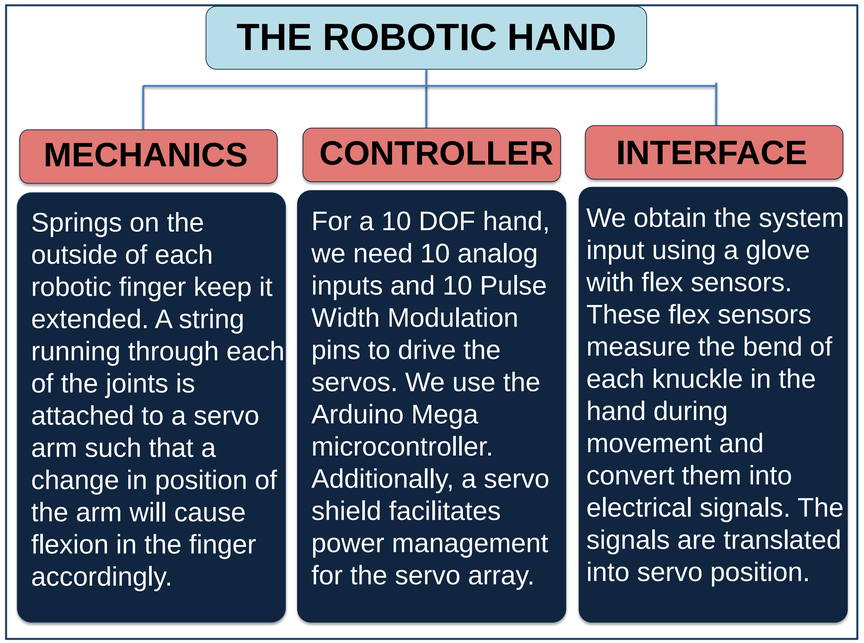


One finger proof of concept- flexion and extension



SolidWorks CAD of revised prototype (Version 2)

Components



Project Significance

Dexterous robotic hands currently on the market are expensive, costing up to $100,000. Hobby level projects that are less costly do exist, but use passive mechanics that adversely affect grasp quality and control over individual joints. Our goal is to develop a low-cost and scalable anthropomorphic manipulator that offers a higher level of dexterity than those currently commercially available.

Team Contacts

Lute Chen (ME) – lutec@uci.edu
Adam Evangelista (ME) - agevange@uci.edu
Nuthan Hegde (ME) - nhegde@uci.edu
Gabriel Lima (ME) - g91mendes@gmail.com
Bruno Vu (ME) - brunov@uci.edu
Advisor: Professor Ian Harris- harris@ics.uci.edu