

Case Study: Robonaut Hand

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Overview

Motivation: Robot for extra-vehicular activity (EVA) on the International Space Station

Goal: duplicate kinematics and strength of the space suited astronaut hand and wrist

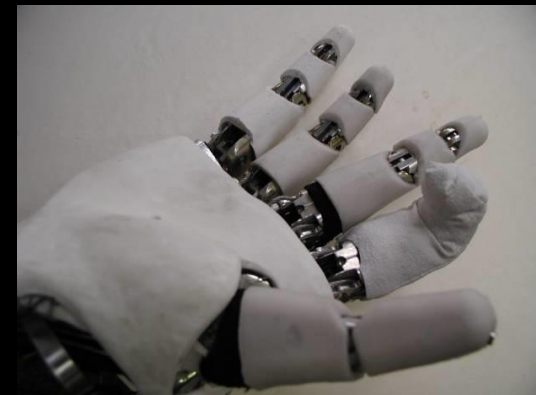
Both power grasps and dexterous grasping are needed

Max force of 20lbs and torque of 30 in-lbs to replace orbital replaceable units



Major Design Points

- (1) No tendons; leadscrew assemblies
- (2) Separation between the dextrous manipulation fingers (2) and thumb and grasping fingers (2)
- (3) Palm cupping
- (4) Grasping fingers mounted at an angle
- (5) Not backdrivable in flexion, but somewhat compliant (buckling) in extension
- (6) 5 fingers is good for teleop
- (7) foam outer material / compliance
- (8) patch based tactile sensing w/ focusing beads



Videos

http://www.youtube.com/watch?v=jOnp2M5qibs&feature=player_embedded

http://www.youtube.com/watch?v=ZbYj10RYD8c&feature=player_embedded



Force sensing
resistor technology



Quantum tunneling
composite technology

