

Objective

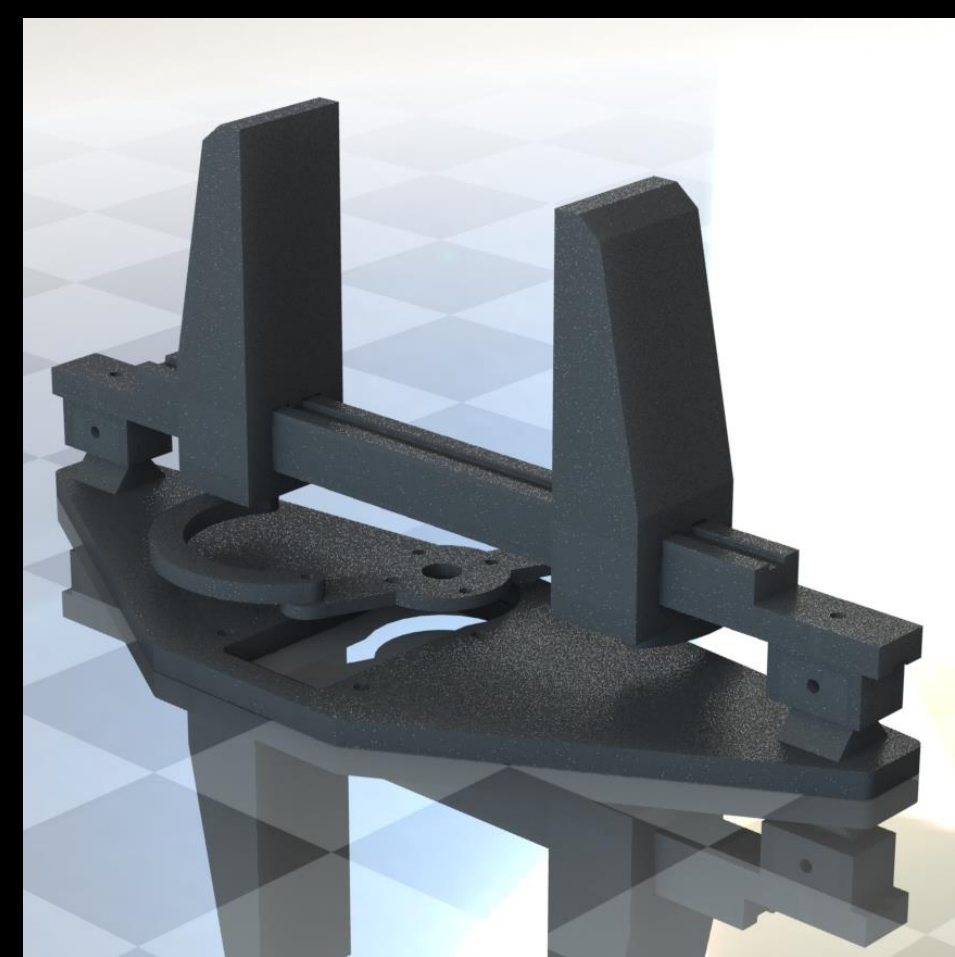
Create an interactive robot exhibit that exposes K-12 students to modern robotics technology. The robot should perform a number of sorting activities based on hand motion in free space, without direct physical contact with an actuator.

Product Details

- Trossen PhantomX Reactor Robot
 - 300° Servo Rotation
 - 4 Degrees of Freedom (DOF)
- Leap Motion 3D Motion Controller
- PLA 3D Printed Custom Gripper and Gripper Set-up

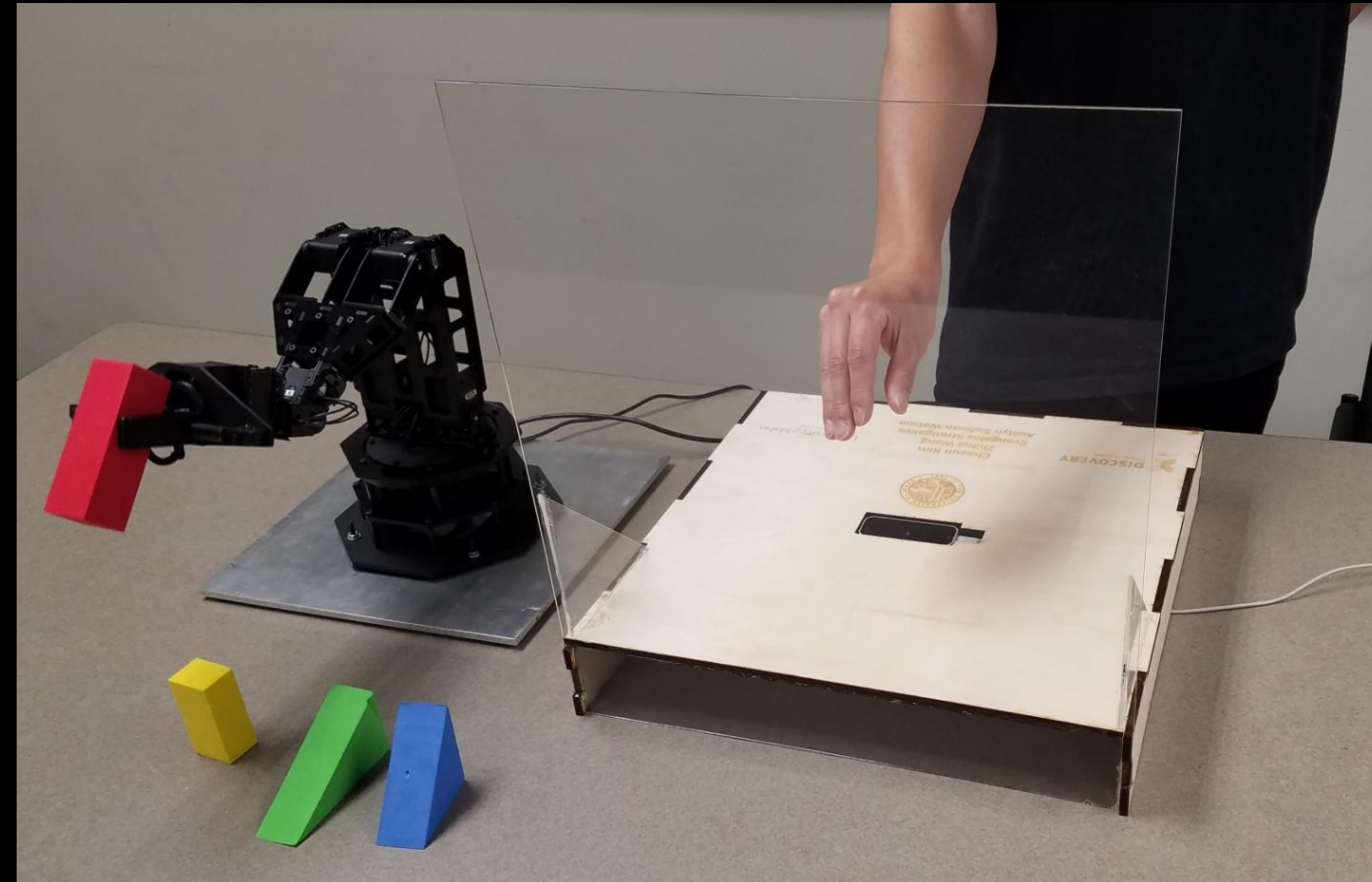
Design Alteration

- 3D Printed Gripper
- 3D Printed Faux Servo & Center-Link



Linear Range of Motion Increased from 3 cm to 10 cm, from Old (Left) to New (Right) Gripper Design

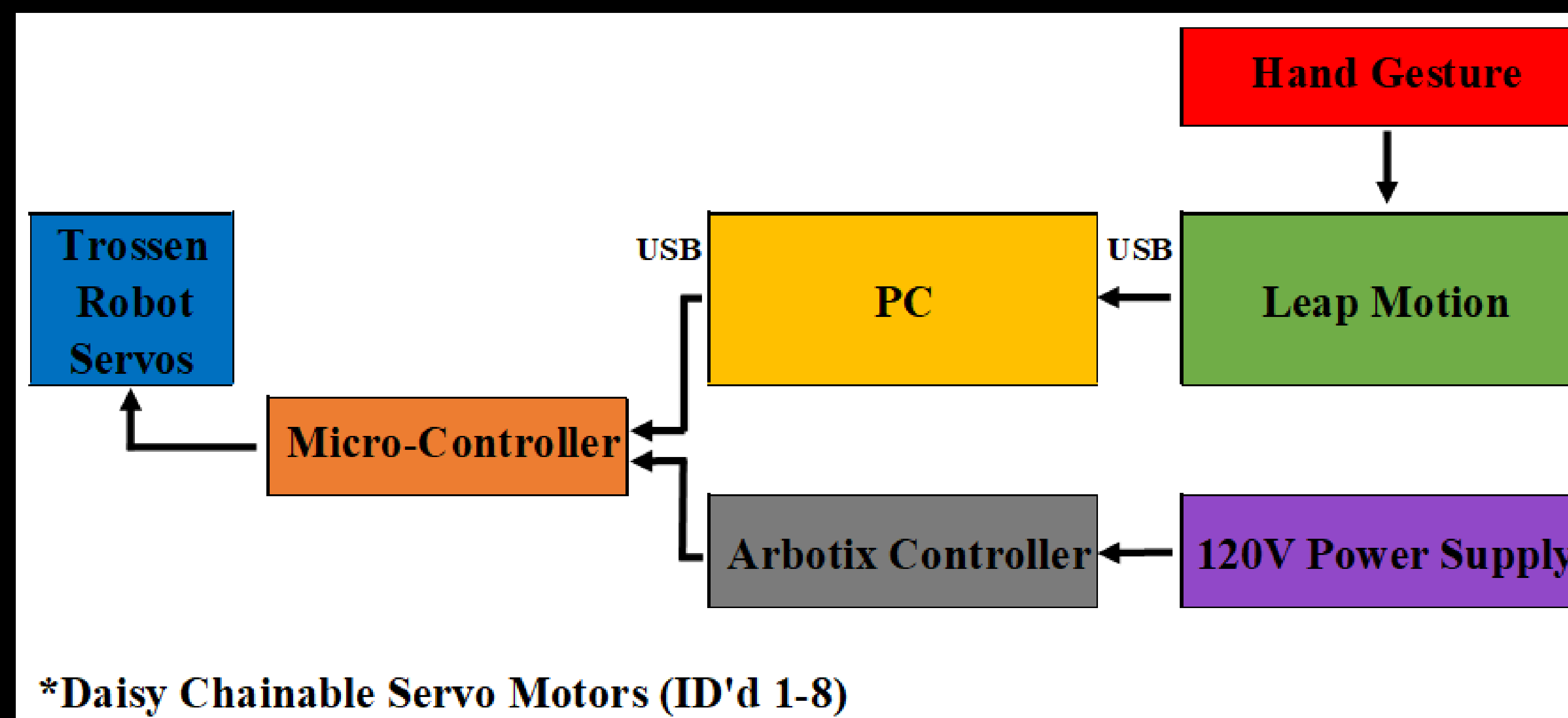
Design Solution



Full Set-Up with Robot Arm, Leap Motion, Desktop PC, and Leap Motion Control Volume, including User Input

- Arduino/C++ Integration
- Inverse Kinematic Looping
- Infinite Impulse Response (IIR) Filtering (to improve reaction time & decrease damping)

Data Flow Diagram



*Daisy Chainable Servo Motors (ID'd 1-8)

Depiction of Data Flow from Hand Gesture to Robot Arm

Product Requirements

- Motion-Controlled Robot Arm
- Fun & Educational
- Activities-Based
- Repeatable Results
- Durable & Maintainable Design

Servo-Motor DOF



- (1) Base Servo Rotate (2) & (3) Shoulder Lateral
- (4) & (5) Elbow Lateral (6) Wrist Lateral
- (7) Opt. Wrist Rotation (8) Gripper Actuation

Acknowledgements

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