Design and Kinematic Modeling of a Multi-DOF Upper-Limb Prosthetic Hand

Project Description:

This project focuses on the design, modeling, and preliminary implementation of a multi-degree-of-freedom (Multi-DOF) prosthetic hand that mimics natural upper-limb movements. The aim is to develop a 3D-printed, anthropomorphic hand capable of performing basic grasping and wrist motions using tendon-driven or linkage-based actuation. Comprehensive kinematic modeling will be performed using Denavit–Hartenberg (D-H) parameters to analyze and simulate the hand's motion, enabling both forward and inverse kinematics. The design will prioritize modularity and ergonomics, allowing future integration with biomedical sensors such as EMG, EEG, and ultrasound for advanced control systems. This project forms the foundational phase for intelligent prosthesis research and will serve as a practical platform for testing real-time control strategies in later stages.

Requirements:

- **CAD Design** – Fusion 360, 3D Printing
- **Kinematic Modeling** – D-H Parameters, Robotics Toolbox
- **Control Hardware** – Arduino, Teensy, Servo Motors

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