

# Testing Method of Stiffening Actuators

Anson Kwan, Engineering (Robotics) Major

Mentor: Dr. Daniel Aukes, Associate Professor  
Fulton School of Engineering

## Objective & Research Question:

The goal of this project is to design a platform that can evaluate the performance of wearable robotic prototypes designed to stiffen on command for the purpose support and stabilization.

## Background:

- Millions of elderly adults around the world experience loss of stability which can lead to falls and injury
- A wearable hybrid robotic system has been proposed to assist and support elderly users via a variety of potential prototyped solutions
- Being able to model the dynamic performance is essential to understanding these prototypes
- The purpose of this test platform is to provide a generic interface to understand more about these designs

## Methods:

- Based off data collected from motion capture
  - Torque  $\cong 80.0$  Nm
  - Angular Velocity  $\cong 2.75$  rad/s
  - Power  $\cong 150$  W
- Test actuators need to be able to achieve similar performance
- Design parameters that are available to change include motor selection, gear selection and lever arm lengths.

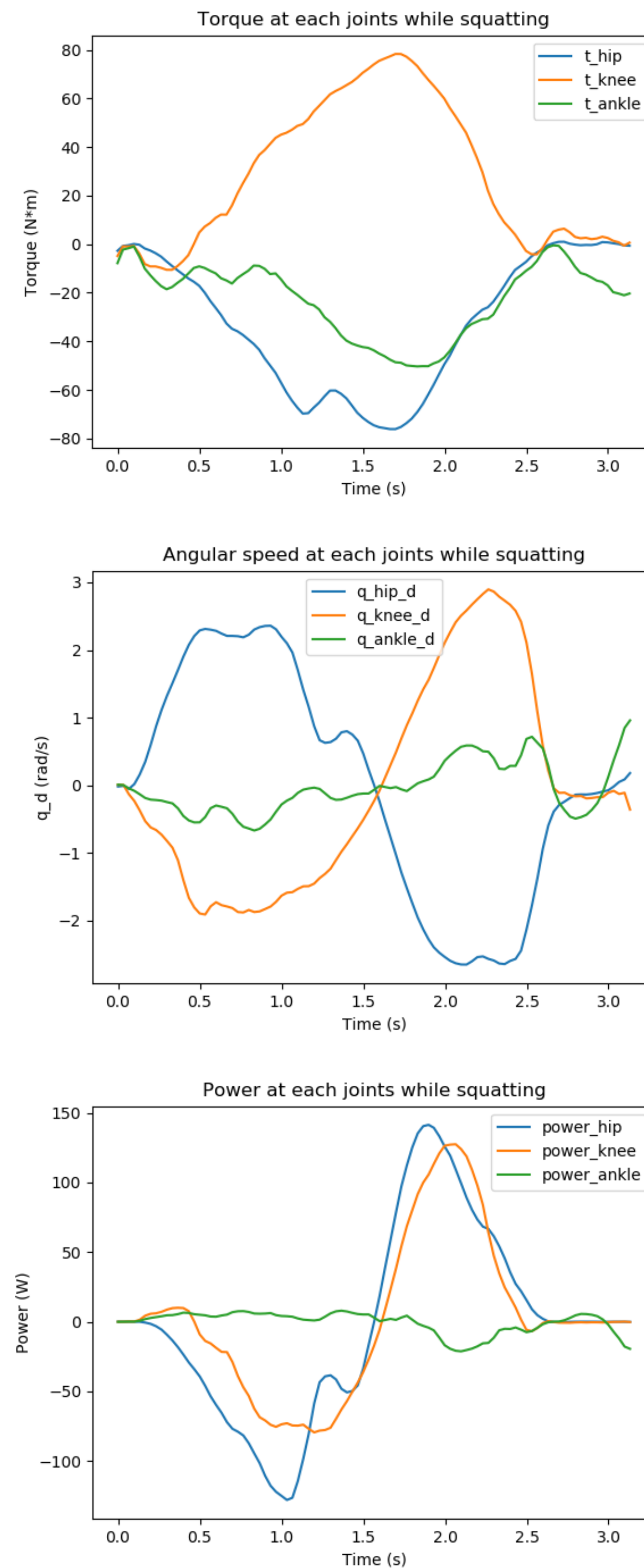


Figure 1: Squatting data collected from motion capture

## Results:

- A rotary based test bench is proposed due to its decreased friction within the system as well as its adaptability for future testing of multiple actuators with multiple degrees of freedom
- CIM was selected for the use of test bench with 70:1 gear reduction
- Future work will include obtaining and integrating components and developing a test protocol to implementation into Python



Figure 2: Calculated motor curve that will be used

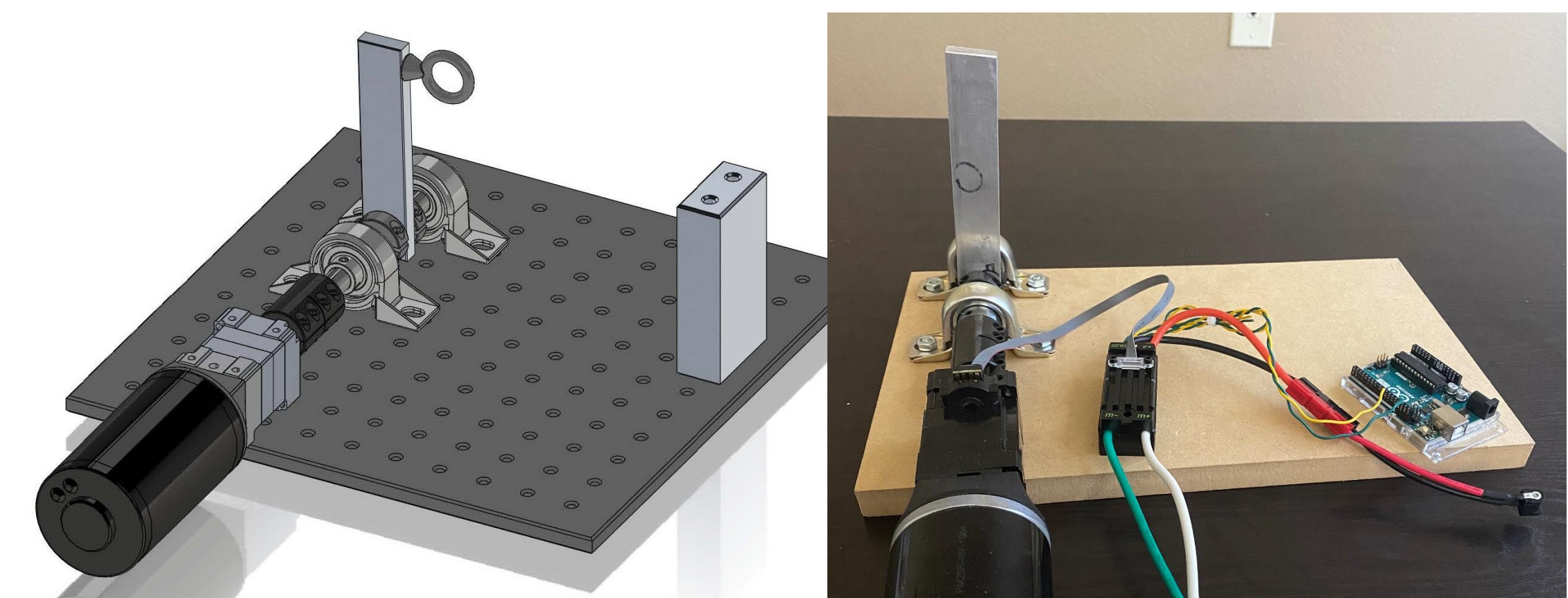


Figure 3: Proposed design (Left), Manufactured design (Right)