

NRI: FND: COLLAB: AN OPEN-SOURCE ROBOTIC LEG PLATFORM THAT LOWERS THE BARRIER FOR ADVANCED PROSTHETICS RESEARCH



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www.opensourceleg.com

[open access Nature BME publication](#)

Introduction

Motivation

- Many researchers studying control of robotic prosthetic legs
- Difficult to compare results across platforms
- Substantial investment of time and resources

Goal

- Common hardware platform for control comparison
- Lower the barrier to entry
- Enables investigations in the lab, community, and at home

Control

- A new custom Raspbian OS has been developed with software packages, libraries, and drivers required for controlling the OSL
- A Python PIP package that provides helper functions and classes to facilitate numerical computation, data visualization, and high-level control of the Open-source leg



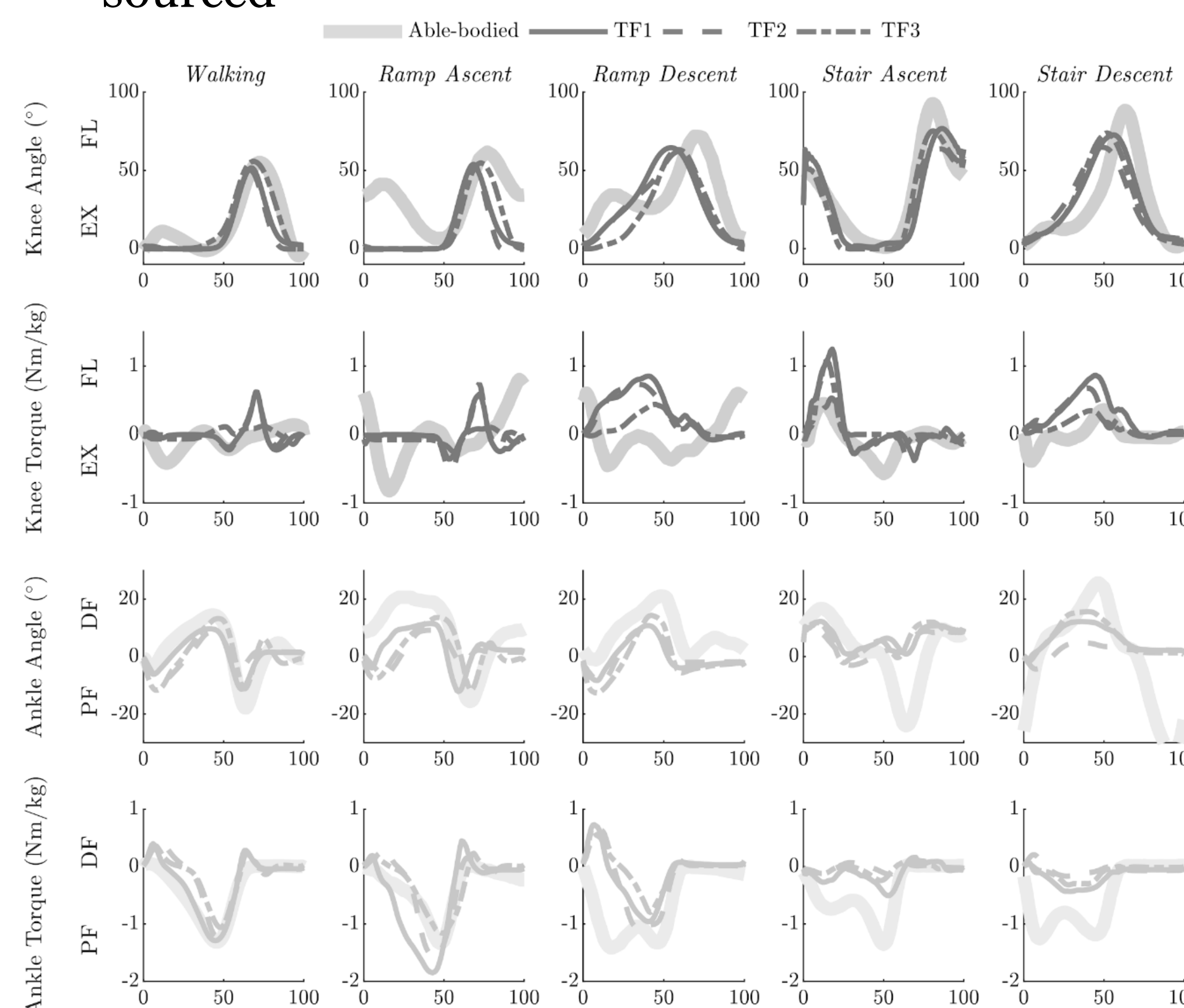
```
~ % pip install oslcontrol
```

- A beginner-friendly walking controller script based on Finite State Machines posted on the Open-source leg website

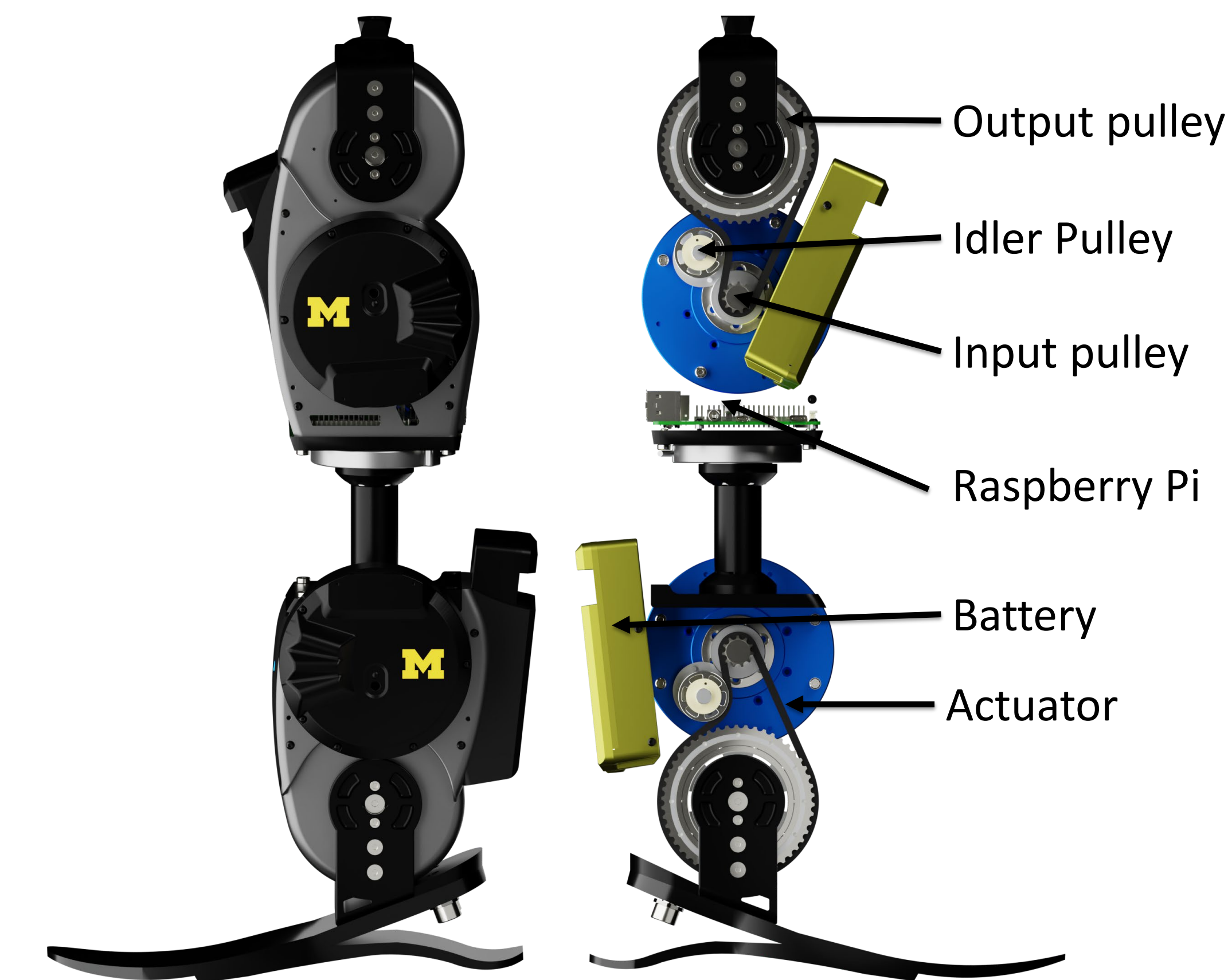
Clinical Testing

Demonstration of use

- Clinical testing in hospital setting
- 3 individuals with above-knee amputations successfully navigated through ambulation circuit
 - Controller parameters and biomechanical data open sourced



Design



- New design of modular knee-ankle prosthesis
- Knee and ankle have identical design / components
- Mass: 2250 g for knee and ankle (each)
- Total gear ratio: ~42:1
- Selectable Series Elasticity
- External actuator gear ratio: 9:1
- Internal one-stage belt gear ratio: 4.7:1
- Tensioning mechanism: Idler with adjustable position
- Battery solution with onboard BMS
- Resolved design and control challenges
- Eased assembly and maintenance

Current Users



Northwestern



UNIVERSITY of WASHINGTON



Imperial College London

