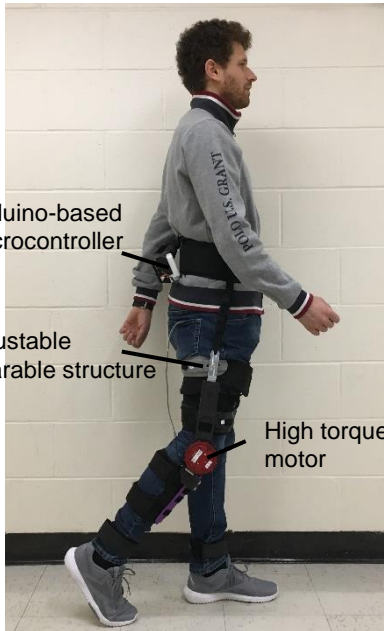


# Lightweight Knee Exoskeleton

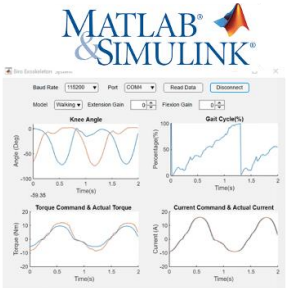


System Overview

Portable Exoskeleton Specifications	
Unilateral Mass (Kg)	2.25
Bilateral Mass (Kg)	3.7
Size (mm)	570L*127W*150D
Motor Voltage (V)	24-48
Motor Continuous Torque (Nm)	9
Motor Speed (rpm)	170
Output Peak Torque (Nm)	>25
Torque constant (Nm/A)	2.1
Gear Ratio	9:1
Range of Motion (deg)	0-160
Battery Life (hours)	>1
Wearable Structure Size	Small, <b>Medium</b> , Large, Extra Large

## Sensor and Control Description

### Master Computer Software GUI



- Visualization interface
- Tune parameters

Bluetooth  
64 Bytes  
↔  
or RS232

### Microcontroller

#### High-level Exo control



Teensy 3.6  
(180MHz)

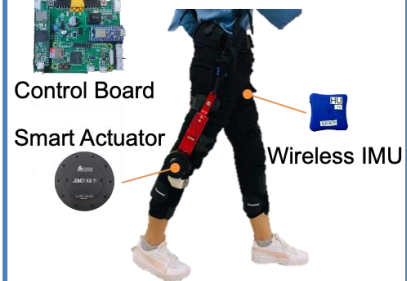


- Torque generation
- Torque control

CAN  
UART  
ADC  
↔

### Human & Robot

#### Low-level Motor Control



- Motor controller (CAN)
- Encoders (CAN)
- Wireless IMUs (UART)

## Sensor and Control Specifications

### Sensor and Control Specifications

Sensor	Motor encoder (9-axis IMU, Torque sensor)
Master Computer Communication	Bluetooth, USB (RS-232)
Microcontroller Communication	RS-232, CAN bus, SPI, I2C
Programming Platform	Arduino IDE
Control Mode	Torque/Current/Position/ Velocity Control

## Portable Exoskeleton Architecture (Teensy 3.6)

