

Untethered High Torque Hip Exoskeleton



Exoskeleton Specifications	
Property	Value
Gear Ratio	9:1
Nominal Torque	10 Nm
Peak Torque	30 Nm
Nominal Speed	170 RPM
Bilateral Mass (without battery)	2.4 kg
Bilateral Mass (with battery)	3.2 kg
Flexion/Extension Abduction/Adduction	130°/40° 90°/60°
Battery Voltage	24 V
Battery Life	1.5 hour

Architecture of Sensor, Communication, Control

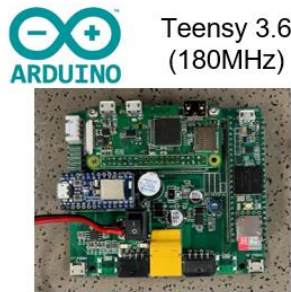
Any Controller
High-level Exo control



- Torque generation

Bluetooth
64 Bytes
↔
or RS232

Microcontroller
Middle-level Exo control



- Torque control

CAN
UART
ADC
↔

Human & Robot
Low-level Motor Control



- Motor controller (CAN)
- Wireless IMUs (UART)
- Torque Sensors (ADC)

Sensor and Control Specifications

Sensing	Motor encoder, 9-axis IMU, Torque Sensor
Control Platform	MATLAB Simulink Real-time, Arduino Teensy
API Support	MATLAB, C/C++, Python
Upper Computer Communication	Bluetooth, USB (RS-232)
Lower Computer Communication	RS-232, CAN bus, SPI, I ² C

Portable Exoskeleton Architecture (Teensy 3.6)

