

Modular, Full-Body Exoskeleton

Modular exoskeleton system encompassing four innovative designs, providing a comprehensive solution for individuals with motor disabilities. It is lightweight & cost-effective while being practical for long-term, home-based use.

Case ID:
ID2023-002

IP Position:
Patent Pending

Development Status:
TRL 6-7: Representative model or prototype system, which is tested in a relevant environment.

Opportunity
Partners sought for development and prototype testing.

Category(s):
Assistive Technology, Medical Device, Mobility Aid, Wearable Robotics, Elderly Care, Biomechanics, Orthopedic Device

Keywords:
Exoskeleton, Hip Assistive Device, Rehabilitation, Motor Disabilities, Mobility Enhancement, Lightweight Design, High Torque

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2.0

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Technology Overview

- An integrated modular, full-body exoskeleton system designed to enhance overall mobility, consisting of lower limb assistance with variable stiffness, a flexible spine for natural movement, an adaptable lower limb exoskeleton with soft actuators, and a lightweight upper limb exoskeleton featuring a single motor and gimbal-style mechanism.
- Collectively provides comprehensive and customizable mobility solutions for individuals with physical disabilities or conditions, fostering independence, rehabilitation, and improved daily life activities.
- Utilizing advanced materials and a compact control system, it aims to significantly improve mobility and comfort at an affordable cost, potentially revolutionizing home-based rehabilitation and assistance.

Key Features & Benefits

- **Efficient Control and Lightweight Design:** Smart control mechanisms, such as advanced gyro-accelerometers for overall motion tracking, combined with lightweight materials like PLA, TPU, PETG, and carbon fiber minimize complexity, allowing for practical daily use and effective rehabilitation.
- **Adaptability and Adjustability:** System offers adaptability through modular design, accommodating various body types and sizes, while adjustable components such as length, stiffness, and joint positioning cater to individual user needs.
- **Cost-Effectiveness:** By leveraging 3D printing and affordable materials, this exoskeleton offers an accessible solution, potentially reducing the financial burden of assistive devices.

Potential Applications

- **Rehabilitation and Physical Therapy:** Assists individuals recovering from spinal cord injuries, strokes, or other traumatic incidents, offering targeted support during the recovery process in regaining mobility and strength.
- **Activities of Daily Living (ADLs):** Supports users in performing essential tasks such as walking, standing up, and sitting down, enhancing their independence.
- **Chronic Condition Management:** Helps elderly individuals with chronic conditions maintain mobility and quality of life, reducing the risk of complications related to inactivity.
- **Home-Based Assistance:** Provides a practical solution for long-term home use, potentially reducing the need for constant caregiver support and promoting a more self-sufficient lifestyle.

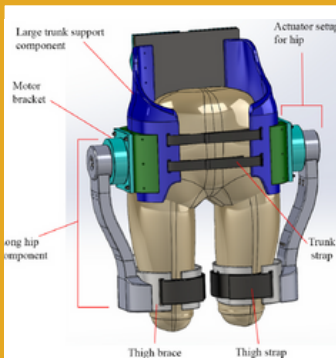


Fig 1. Hip Exoskeleton



Fig 2. Upper Limb Exoskeleton

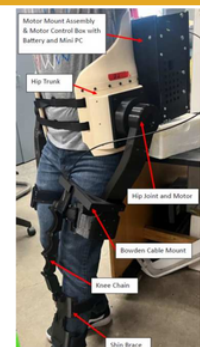


Fig 3. Combined Knee and Hip Exoskeleton