Columbia Technology Ventures

Cable-driven exoskeleton for effective physical rehabilitation

Technology #cu14309

This technology is a simple, lightweight cable-driven exoskeleton that can be used for physical rehabilitation and gait training.

Unmet Need: Lightweight robotics for guided gait rehabilitation

Gait training for patients with neural impairments or other movement disorders typically requires long hours with a trained therapist. While robotics have emerged as a promising alternative, current models suffer from bulky designs that can lead to misalignment with the patient’s joints and a restricted range of motion.

The Technology: Simple, cable-driven exoskeleton for gait training in adult and pediatric patients

This technology is a cable-driven exoskeleton that offers a lightweight, robotic alternative without limiting the patient’s range of motion and reduces the risk of injury due to improper alignment. The device is composed of lightweight adapters that attach to the patient’s legs. Externally supported cables are routed through these adapters and work to support the patient while driving the leg’s range of motion. Strategically placed sensors enable data to be collected from the tension, angle of movement, and the patient’s overall performance during use to better assist in improving gait rehabilitation. This simplified system reduces unnecessary stress on the joints and the risk of injury due to incorrect alignment with the exoskeleton, and can be adapted for patients of different ages, weights, and states of mobility.

This exoskeleton design has been tested with human subjects using a treadmill to demonstrate the ability to accurately track a prescribed ankle path.
Applications:

- Gait rehabilitation device for stroke or spinal cord injury
- Gait rehabilitation device for cerebral palsy patients
- Gait re-training technology for healthy individuals with non-ideal gaits due to habit or surgery (e.g. ACL reconstruction, etc.)
- Physical rehabilitation device for patients with various neural impairments
- Prevention of osteoarthritis
- Research tool to investigate differences in gaits between individuals
- Pediatric rehabilitation

Advantages:

- Eliminates need to align the exoskeleton with the patient, eliminating the risk of injury due to misalignment
- Does not restrict range of motion by including rigid links or mechanical joints
- Incorporates lightweight cuffs on the limbs to reduce mass and inertia on the patient
- Sensors and externally supported cables and to assess movement parameters
- Allows for natural degrees-of-freedom of human motion

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Patent Information:

Patent Pending (US 20170027803)

Related Publications:


Tech Ventures Reference:

- IR CU14305, IR CU14308, IR CU14309
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