

Robotic Exoskeleton for Treatment of Crouch Gait in Children with Cerebral Palsy (CP)

Summary

Researchers at the National Institutes of Health Clinical Center (NIHCC) and Northern Arizona University (NAU) seek licensing and/or co-development research collaborations for a wearable, pediatric, robotic exoskeleton that facilitates knee extension during walking to provide motorized movement assistance and training through the gait cycle. The Robotic Exoskeleton is specifically designed for therapy of crouch gait in children with cerebral palsy (CP). The design is a customizable human-machine interface that allows an individualized assistance protocol to help preserve and enhance muscle strength and control. Early clinical results from this intervention appear promising for a condition having few effective long-term interventions.

NIH Reference Number

E-096-2016

Product Type

- Devices

Keywords

- Pediatric, cerebral palsy, Exoskeleton, Robotic Exoskeleton, Crouch gait, neurodegenerative, Northern Arizona University (NAU), National Institute of Health Clinical Center (NIHCC), Lerner

Collaboration Opportunity

This invention is available for licensing and co-development.

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Description of Technology

Crouch gait is a common disorder in pediatric cerebral palsy (CP). Effective treatment of crouch during childhood is critical to maintain mobility into adulthood. Current interventions do not alleviate crouch gait long-term for most patients. This technology relates to a powered exoskeleton designed for gait assistance. The powered assistance

may provide a physical therapy-type intervention to improve and maintain mobility.

Multiple factors contribute to crouch gait, including spasticity, contracture, muscle weakness and poor motor control. There are few effective interventions. Current treatments for crouch gait include invasive surgery, botulinum toxin injections, physical therapy/ strengthening, and orthotic bracing. Improvements are inconsistent. There is a need for new and effective interventions to preserve or augment mobility for pediatric crouch gait patients.

This robotic exoskeleton is specifically designed for treatment of crouch gait in pediatric CP patients. The wearable leg bracing system integrates robotics to provide on-demand motorized torque at the knee joint to facilitate knee extension. It contains on board sensors that track limb motion during walking and provide responsive knee extension assistance during distinct phases of the gait cycle. A customizable human-machine interface provides a personally tailored assistance strategy optimized for that individual. The assistance improves posture to make walking easier while also providing movement training to help strengthen and maintain neuromuscular function. The design is based on the architecture of a knee-ankle-foot orthosis. It is lightweight and modular. The exoskeleton assistive therapy provides the advantages of being non-invasive, individually specific and adaptable to changing needs. Early clinical results using this intervention are promising.

Potential Commercial Applications

- Pediatric ambulatory therapy cerebral palsy
- Improved mobility when Crouch gait occurs as a common gait deviation – such as is seen among ambulatory diplegic and quadriplegic patients
- Enhanced success following surgery

Competitive Advantages

- Individually tailored and customizable
- Lightweight and modular
- Adaptable to changing needs
- Noninvasive

Inventor(s)

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Development Stage

- Prototype

Publications

Zachary F. Lerner et al. [[PMID: 28324959](#)]

Zachary F. Lerner et al. [[PMID: 27479974](#)]

Patent Status

- **U.S. Provisional:** U.S. Provisional Patent Application Number US Provisional Application 62/368,926 , Filed 29 Jul 2016

Therapeutic Area

- Musculoskeletal

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