



Elliptically Based Robotic Gait Trainer

Patients suffering from stroke, traumatic brain injury or spinal cord injury, often experience diminished limb motion and coordination. Existing rehabilitation techniques for patients with impaired use of the leg muscles involve either methods that passively move the limbs or devices that do not accurately replicate healthy gait kinematics. In most cases, these devices may replicate joint angles of the knee and hip during gait, however, none of these allow for ankle articulation. The ankle joint and muscles are an essential component involved in gait. Since these components do not undergo physiologically accurate rehab and training with current techniques, this could lead to a delay or prevent full recovery from the injury.

The technology

Inventors of Virginia Commonwealth University have designed a new robotic gait trainer that mimics accurate lower limb joint angles to reproduce surface walking motions. Unlike existing trainers, this gait trainer provides controlled ankle articulation along with knee and hip motion. This device is patient-powered, allowing for independent muscle control training as well as providing cardiovascular conditioning. This training may also enable patients to reestablish neuronal coordination of opposing limbs. Since the ankle articulation is controlled, gait patterns can be modified to fit patient need or provide variability during training. Testing on normal subjects has shown a greater cardiac workout when compared to users on regular elliptical devices. Thus, this device can also be used as a more efficient exercise machine. Overall, this novel device provides a low cost and effective alternative for the rehabilitation of lower limbs accurately replicating gait and providing greater cardiac and muscular training. A new addition to this device is a feature that will help reduce spasticity that is sometimes associated with stroke. The feature works by sensing a change in force measurements and adjusting the footplate for better contact and, thus, maintaining a more correct motion.

Prototypes have been extensively tested with healthy individuals and rehab patients. This research was awarded a grant from the Quest Innovation Fund; which is given to develop disruptively innovative technologies.

Benefits

- » Reproduces joint angles to mimic surface walking
- » Controlled and adjustable ankle articulation
- » Patient powered
- » Increased vascular workout
- » Low production cost compared to current gait robotics
- » Spasticity reducing closed-loop force – feedback trainer

Applications

- » Gait Rehabilitation
- » Physical Therapy
- » Cardiovascular Exercise

Patent status:

Patent issued: U.S. rights are available.
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License status:

This technology is available for licensing to industry for further development and commercialization.

Category:

Biomedical Engineering

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