

Applications

- Patient Rehabilitation
- Physical Therapy
- Cardiovascular Exercise

Advantages

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

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Market Need

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 all the normal walking joint angles. 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 do not undergo physiologically accurate rehab and training, this could lead to a delay or prevent full recovery from the injury.

Technology Summary

This is 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 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 and adjusting the footplate for better contact and, thus, keeping a more correct motion.

Technology Status

Patent pending: U.S. and foreign rights are available.

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.

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