Physiotherapeutic robotic neck support for treating neck injuries and motor neuron diseases

Technology #cu14310

Neck injuries, such as whiplash, and motor neuron diseases, such as ALS, can have a devastating impact on quality of life for patients. Current neck supports used as therapeutic devices are passive and stiff, limited to providing static assistance to keep the neck upright. This technology provides an active physiotherapeutic neck support that dynamically adjusts to user needs for preservation and rehabilitation of neck strength. This technology provides a more ergonomically comfortable neck support for everyday use that can also facilitate physiotherapy.

Compliant and dynamic robotic interface for full range of motion and physiotherapy strengthening

Patients that utilize neck supports are often limited in their range of motion and require separate physiotherapy for rehabilitation. This technology is a dynamic and compliant neck support that utilizes a series of springs, motors, force sensors and encoders to provide tailored resistance to support the neck. Each motor can be configured to provide a different level of resistance to conform to the muscle strength in that region. As such, the wearer is able to optimize the use of their residual strength. With this active system a custom physiotherapy exercise routine can be developed to train the neck muscles. The neck support is also compliant to allow for neck movement, unlike the rigid and uncomfortable braces that are presently in use.

This technology utilizes human-robot interfaces such as an eye-tracker system to discern trajectories of desired motion and facilitate motor compliance to support movement. The motors within the neck support allow for full range of motion.

A prototype of the technology has been tested and been shown to provide full range of motion to users.

Lead Inventor:

Sunil Agrawal, Ph.D.
Applications:

- Physiotherapy for neck injuries and motor neuron diseases (MND)
- Therapeutic device for those suffering from Dropped Head Syndrome as consequence of MNDs
- Diagnostic tool for monitoring neck muscle strength and range of motion as part of clinical evaluations

Advantages:

- Dynamic mechanical system that measures muscle strength and motion
- Actively compensates for muscle limitations
- Provides compliant support to facilitate natural movement
- Provides variable resistance training

Patent Information:

Patent Pending

Tech Ventures Reference: IR CU14310

Inventors

Sunil K. Agrawal