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Perspective

Controllable Hydraulic Joint Coupling in a Wearable Robot

Marsh Glenn*

Department of Mechatronics, University of Sao Paulo, Sao Paulo, Brazil

ABOUT THE STUDY

ROBOTIC options for giving physical therapy to individuals who have suffered a neurological impairment such as a stroke or spinal cord injury will be accessible soon. Approaches include mechanizing traditional therapies in which a therapist assists a patient with movement, activating motor adaptation and aftereffects through exposure to novel force fields, and exercising normative movement patterns against strategically placed or timed loads. Robots can provide high dosage with precise, precisely tailored therapies, as well as online diagnostic functions, to assist motor function recovery. Rehabilitation robots are often powered by geared motors capable of matching human torque and must be ground mounted to maintain their weight [1].

Underexplored for application in rehabilitation robotics are technologies that passively route electricity from available sources for delivery to the weak or dis-coordinated limbs of a patient. Routing power from stronger joints to weak joints is the same as establishing limitations between them. Cobot technology, employed in the realm of robotics to enforce endpoint mobility limitations, presents a feasible answer. A cobot is a passive robot that works with a human operator to provide motion guidelines (virtual fixtures) in a shared workspace. Traditionally, the cobot streamlines manual chores for humans, allowing them to focus on adjusting speed rather than motion direction while pushing against the guides [2]. A cobot has Continuously Variable Transmissions (CVTs) to allow the operator to change the direction of travel, but it lacks drive motors. These cobots ensure safe interaction while guiding patient-generated motion due to their inherent passivity [3].

The capacity to modify the transmission limitation would allow for the coordination of motions between joints. To coordinate a powerful knee and an impaired ankle, for example, the connection between the joint angles must be modified on the fly (while walking). To achieve this flexibility, the transmission ratio must be changeable. We offer two approaches to accomplish this flexibility: a hydraulic transformer with changeable transmission ratio or digital hydraulics with valves and sets of multiple cylinders spanning each joint [4].

A wearable cobot capable of restricting joint motions would be even better for therapy than a ground-mounted cobot engaging with its user *via* a single end-effector. Wearable cobot ideas include and These joint limits could be utilized to encourage favorable motion synergies or offer resistance pressures when the patient tries to deviate from a confined manifold. A wearable cobotic exoskeleton that connects joints may span several limbs of a stroke patient's paretic and nonparetic limbs to enable therapeutic paradigms in which the motions of the limbs are coupled. By "teaming" good joints with deficient joints, bimanual therapy would be facilitated. Bimanual therapy is gaining popularity due to the potential benefits of task-specific and functional therapy for activities that require both hands to be coordinated [5].

CONCLUSION

In its current state of development, cobot technology cannot support therapies based on self-assist or power routing across the body. The CVTs used to realize cobots are based on guided rolling contacts, which have the disadvantage of being bulky and heavy in their realization. Because the ability to hold weights without slipping is directly proportional to the forces communicated across the rolling contacts, the requirement for high contact forces has resulted in structurally stronger and, as a result, heavier cobot designs. A lightweight variable transmission system is required to really enable wearability.

REFERENCES

1. Brinson L. One-dimensional constitutive behavior of shape memory alloys: Thermomechanical derivation with non-constant material functions and redefined martensite internal variable. J Intell Mater Syst Struct. 1993;4:229-242.
2. Khoo ZX, An J, Chua CK, Shen YF, Kuo CN, Liu Y. Effect of heat treatment on repetitively scanned SLM NiTi shape memory alloy. Materials. 2019;12:77.
3. Van Humbeeck J. Shape memory alloys: A material and a technology. Adv Eng Mater. 2001;3:837-850.
4. Bisi MC, Stagni R, Houdijk H, Gnudi G. An EMG-driven model applied for predicting metabolic energy consumption during movement. J Electromyogr Kinesiol 2011.07.003.

Correspondence to: Marsh Glenn, Department of Mechatronics, University of Sao Paulo, Sao Paulo, Brazil, E-mail: marshgle2034@edu.br

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5. Besier TF, Fredericson M, Gold GE, Beaupre GS, Delp SL. Knee muscle forces during walking and running in patellofemoral pain patients and pain-free controls. J Biomech. 2009:42(7):898-905.