Development of a Robotic System for Rehabilitation of Musculoskeletal Disorders

Objectives
- Musculoskeletal Disorders (MSD) are the leading cause of lost-time injuries in Canada.
- Annual indirect cost: $22 billion.
- MSDs are injuries to muscles, ligaments, tendons, and nerves.
- Caused by repeated actions beyond fatigue.

Traditional Therapy
One-on-one patient-therapist sessions

Future of Therapy
Allow for remote rehabilitation using remotely-controlled force-feedback devices

Phase I: Hospital-based
Robot Assisted Therapy
- A robotic arm executes controlled pre-planned motion paths in 3D space.
- The robot adjusts the resistance the patient feels.

Remote Operation
Robot Operating System (ROS)

Doctor - Patient Remote Therapy
Using remote controlled haptic devices, a doctor in their office and patient at their home, can perform rehabilitation exercises just as effectively as if done in person.

The devices can provide force feedback which allows the doctor and patient to feel a resistance if one or the other deviates from a motion path.

Phase II: Home-Based
a) Simulation
b) Replaying simulation
c) Shoulder Exercise
d) Wrist Supination

Advantages of this system:
- Provide access to therapy in remote locations.
- Increase availability of service.
- Shorten waiting time for therapy.
- Application to lateral epicondylitis.
- Experimentally evaluate the system and compare it with traditional therapy.

Conclusion
We acknowledge the support of the Natural Sciences and Engineering Research Council of Canada (NSERC).

Cette recherche a été financée par le Conseil de recherches en sciences naturelles et en génie du Canada (CRSNG).