

## Summary of the Program

Advances in robotics technology have enabled the extension of robotics from traditional industry to health-related applications such as the gerontechnology. The use of robotic and haptic-enabled robotic systems (HERS) emphasizes the older adults (OA) independence and participation as a primary goal by providing support for activities of daily living (ADL).

The *i-Robohab* Program for the Aging Population proposes robotic and HERS developed with the end-users for the end-users. It considers two main challenges in the application of HERS in a geriatric context:

- i. Robotic platforms remain a fairly uncommon technology and many people draw their ideas about robots from images in popular culture and science fiction or from limited knowledge of robotic capabilities;
- ii. Despite the need for such assistive robots and the evidence about their effectiveness, the designers need to take into account aspects of social experience that OAs utilize to apprehend the technology.

A set of scalable, age-friendly, and evidence-based HERS are designed to address ADL-related challenges, both in home and clinical settings. In accordance with the existing standards and regulations, the program moves beyond task-based interactions to offer meaningful training addressing relevant ADL. The program offers interactive platforms that can be used in clinics as well as remotely. Product and services are designed to be accessible, affordable, easy to use and non-stigmatizing.

### Smart Technologies for i-Robohab

Interdisciplinary, Interdisciplinary & Multidisciplinary R&D: Collaboration with therapists, physicians, dentists, engineers, computer science experts, nurses, clinical staff, statisticians, physicists, social scientists

#### Tech4Seniors

The first and unique of its kind in Canada

Engineering to help people live independently with dignity

Technical solutions for treatment of disabled and older adults

AAL technologies for First Nations in remote communities

## Mission of the Program

Through state-of-the-art R&D, the "*i-Robohab*" program:

- Uses mechatronics to help people to live independently with dignity
- Innovates instrumented platforms for treatment of patients and people with functional limitation
- Use technologies for off-grid community
- Contributes to improve the quality of learning by educating trainees using robotized systems

To create, communicate & advance knowledge, skills and behaviours in health, quality of life and participation in collaboration with communities through research, education & service to the people of Canada & the world

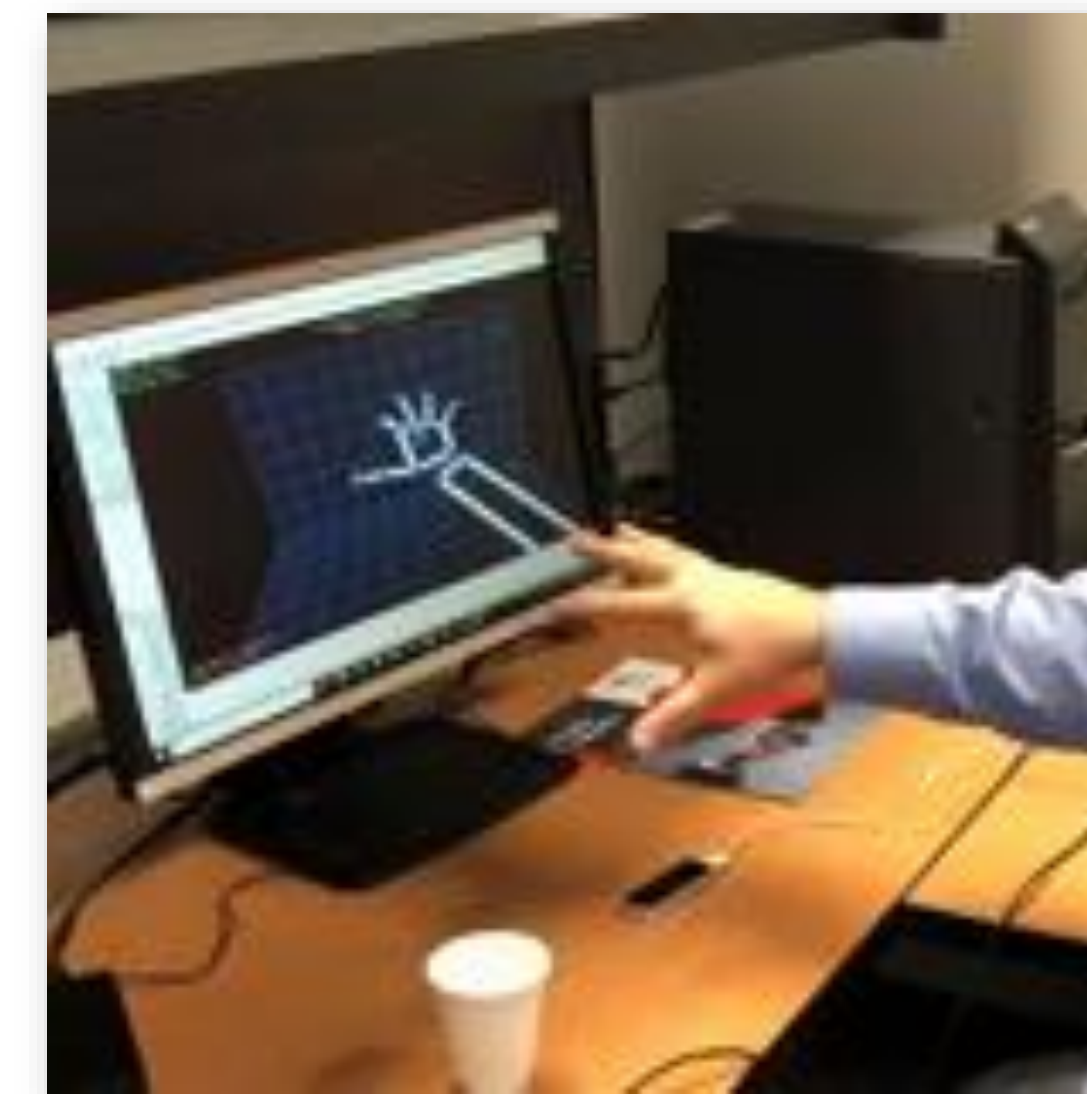
## Sensorized Gloves

- It is difficult for Occupational Therapists and Physical Therapists to evaluate stiffness or motion range of patient's joints quantitatively and objectively.
- Major drawbacks of current sensing gloves systems are:
  - ✓ Lack of rotational observability in particular directions
  - ✓ Labor intensive calibration methods: sensitive to wear
  - ✓ Lack of an absolute hand orientation estimate
  - ✓ Re-calibration to mitigate errors due to sensor displacements
  - ✓ Lack of user customization for individual subjects' hands
  - ✓ Obstruction of tactile sensing from the palmar surface of the hand
  - ✓ Contact-based sensor is a burden to the patients and as they feel artificial attachments



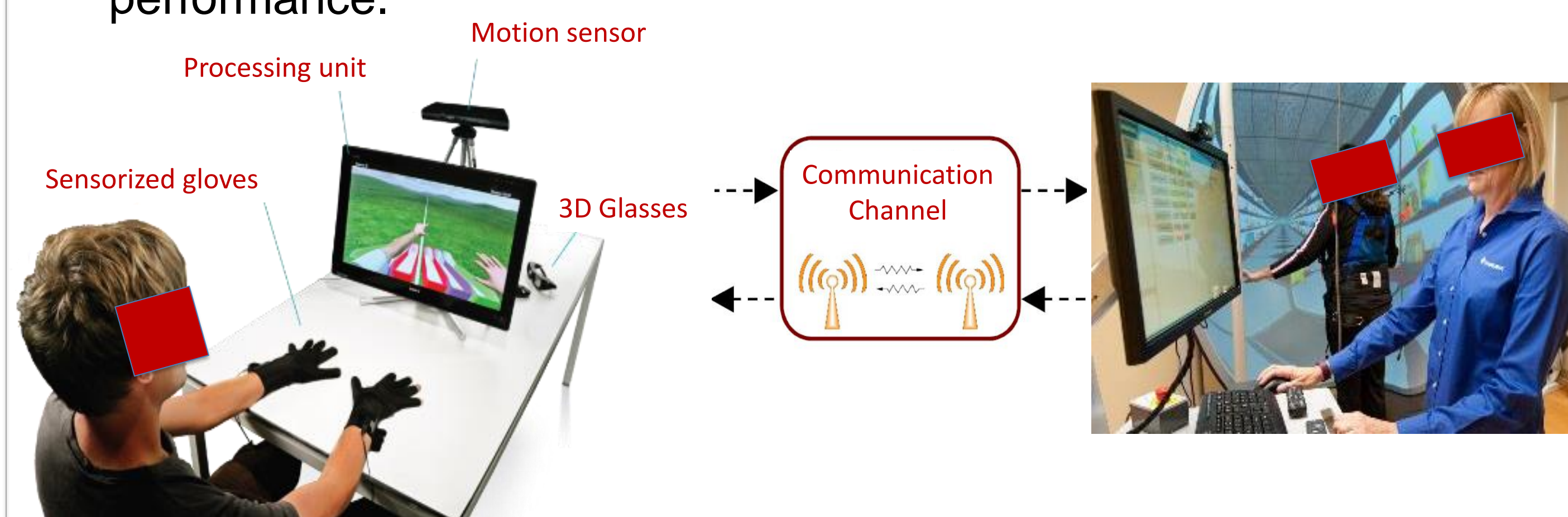
### SOLUTION

- Touchless measurement using ultrasound and visual sensing systems
- ✓ Measurements are NOT affected by the fact that most sensors touch the hands
- ✓ User customization for individual subjects' hands
- ✓ No need for an accurate alignment of sensors with the particular joint
- ✓ Patient do not feel any addition to their hands



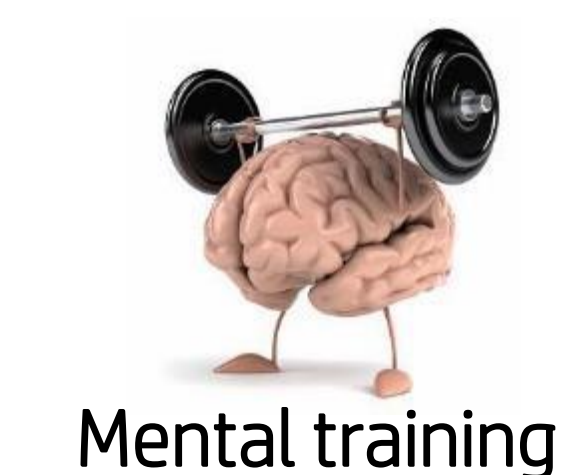
## Tele-rehabilitation

- Teleoperation induces any controllable operation of a system at a distance.
- In a teleoperated system for rehabilitation, the patient wears a sensorized gloves or a robotic arm, then communication channel transfers position, velocity, or force information to the remote clinic, and the therapist (at distance) could observe the rehabilitation task performance.

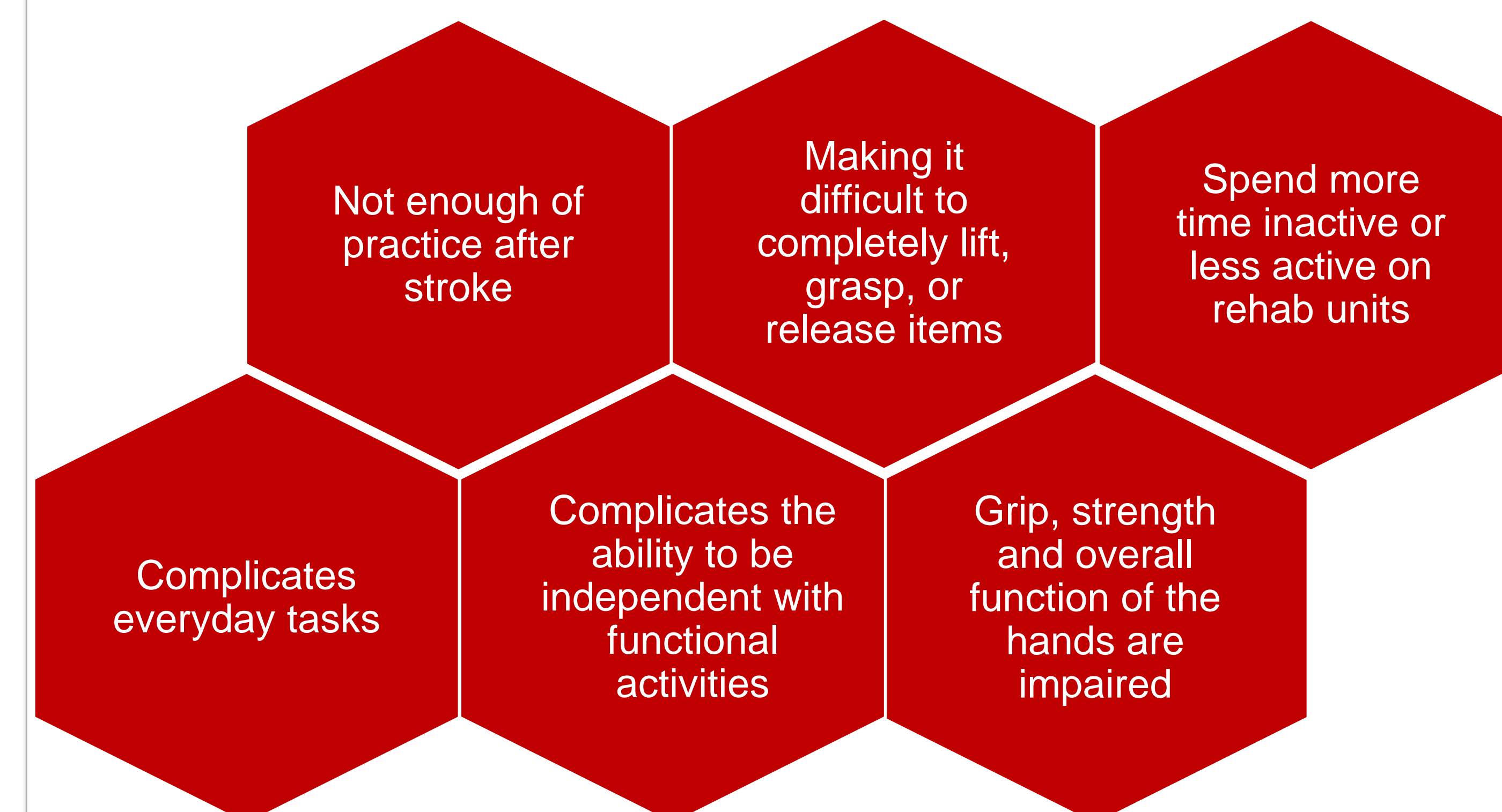


## Haptic Sleeve

- One solution for the treatment of patients is to use robotics technology to:
  - ✓ Improve movement in patients with physical impairment
  - ✓ Help therapists apply flexible, scheduled, and consistent therapy for long period of time
  - ✓ Help therapists have great flexibility in performing various scenarios
  - ✓ Be combined with virtual reality (VR) - sense of sight – and add extra features to the system



PLUS



## Application in Remote Communities

### Auditor General: Remote First Nations communities health care lacking

JESSE WINTER Updated: April 28, 2015

