The War Amps

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MILITARY, VETERAN AND FAMILY HEALTH RESEARCH-IN-ACTION | THE WAR AMPS – CIMVHR RESEARCH INITIATIVE

Advanced Virtual Training System for Multi-Articulating Prosthesis Control

Principal Investigator:
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A person's myoelectric prosthetic arm and hand resting on a table.

Plain Language Summary

What do we already know?

- One of the most severe and disabling military injuries is arm amputation.
- Technological advances have led to prosthesis that can replace elbow, wrist, and hand movements and provide multiple grasp patterns.
- Most persons with upper limb loss do not fully utilize these capabilities, leading them to abandon their prostheses. Inadequate training on the control and device components is a significant contributor to lack of use.
- Clinical studies demonstrate that individuals who undergo prosthesis training are better able to complete tasks and manage more complex functions of their prosthesis.

What did we do/what are we planning to do?

- We have developed a virtual reality (VR) system that allows people to use the muscle signals in their arm to control a prosthetic limb while performing simulated functional tasks in a virtual home environment.
- Next, virtual training options will be enhanced by adding multi-grasp hand patterns and adding more virtual environments.

Why is this research important?

- This research addresses a significant gap in training for individuals with upper limb loss using advanced prosthetic devices.
- By developing an accessible, immersive VR platform, training effectiveness and prosthetic control can be enhanced, ultimately helping Veterans and civilians with upper limb loss regain independence and improve quality of life.

What did we find? What do we hope to find?

- Initial tests on participants without limb loss showed that the system can replicate functional tasks with realistic movement and control. We hope to find that the system will also effectively simulate the control of a multi-articulating prosthetic limb using muscle signals for persons with limb loss.

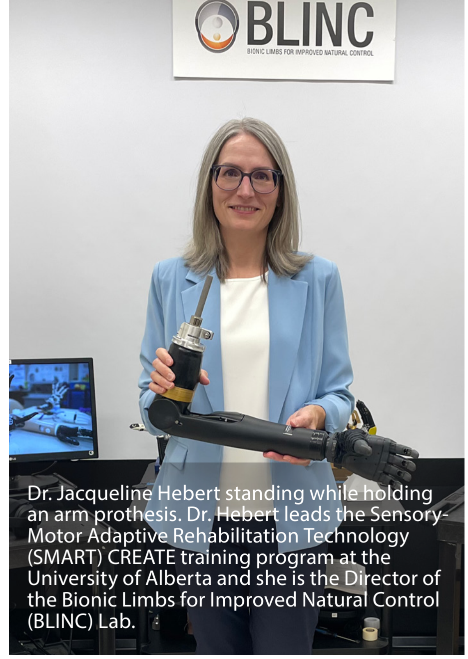
- We hope to find that, by refining the system with additional multi-grasp patterns and more complex virtual environments, users with upper limb loss will experience significant improvements in their ability to control advanced prosthetic devices.

What does this mean?

- This research has the potential to revolutionize prosthesis training for military personnel, Veterans and families.
- The implementation of VR training removes geographic and logistical barriers to accessing intensive, high quality prosthesis training. This means faster, more effective rehabilitation, improved quality of life, and potentially a return to active duty or other meaningful employment.
- This technology could also relieve families of the caregiving burden, as their loved ones gain greater independence and functional capability through better prosthetic control.

Where do we go from here?

- Future research should focus on expanding and refining VR training systems for prosthesis control to accommodate more advanced prosthetic technologies and diverse user needs.
- Future studies should examine how immersive training affects psychological factors like phantom limb pain, prosthesis embodiment, and user confidence.
- Integrating VR-based prosthesis training into standard rehabilitation programs for Veterans and civilians is recommended. Governments and healthcare institutions should explore funding VR training technologies as part of routine care for those with upper limb loss, in both clinical and home settings.
- Fostering collaboration between healthcare providers, prosthetic manufacturers, and tech developers is recommended to improve rehabilitation outcomes.



Dr. Jacqueline Hebert standing while holding an arm prosthesis. Dr. Hebert leads the Sensory-Motor Adaptive Rehabilitation Technology (SMART) CREATE training program at the University of Alberta and she is the Director of the Bionic Limbs for Improved Natural Control (BLINC) Lab.

Suggested citation for this document:

Hebert, J. 2024/10/11. A CIMVHR Plain Language Summary of An Advanced Virtual Training System for Multi-Articulating Prosthesis Control. Canadian Institute for Military and Veteran Health Research, Kingston, ON. Retrieved from: https://cimvhr.ca/funding-awards/

Funding for this research has been provided by The War Amps - CIMVHR Research Initiative. Dr. Jacqueline Hebert is a Professor in the Division of Physical Medicine and Rehabilitation, Department of Medicine at the University of Alberta, the Director of the Bionic Limbs for Improved Natural Control (BLINC) Lab, and a CIMVHR Fellow. Dr. Hebert's research focuses on advanced sensory-motor prostheses and functional outcome assessments for upper and lower limb amputation.

The War Amps

The War Amps was founded by amputee war veterans returning home from the First World War. Peer support, self-help and practical assistance are common threads that have been retained in the modern-day organization that developed from their efforts.

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