Alberta Health Services

Glenrose Rehabilitation Hospital

Research, Innovation & Technology Development

"Joining State-of–the-Art Research with State-of-the-Art Care"

Patrick Pilarski, PhD, BASc

- Assistant Professor, Division of Physical Medicine & Rehabilitation, Department of Medicine, Faculty of Medicine & Dentistry, University of Alberta
- Adjunct Assistant Professor, Faculty of Rehabilitation Medicine, University of Alberta
- Adjunct Assistant Professor, Department of Computing Science, Faculty of Science, University of Alberta
- Research Affiliate, Glenrose Rehabilitation Hospital

Dr. Pilarski has been actively pursuing intelligent systems and biomedical device research for more than 15 years. His research interests include adaptive rehabilitation technology, assistive robotics, real-time machine learning, artificial intelligence, human-machine interfaces and biomedical pattern analysis. These interests drive Dr. Pilarski's applied research into advanced techniques for sensorimotor control and prediction, including methods for human -device interaction and communication, long-term control adaptation and patient -specific device optimization.

Dr. Pilarski is the author and co-author of more than 40 peer-reviewed articles, and is co-inventor of multiple international patent filings involving machine intelligence for medical devices. He is Principal Investigator with the Reinforcement Learning & Artificial Intelligence Laboratory (RLAI) and the Alberta Innovates Centre for Machine Learning (AICML) at the University of Alberta.

Clinical Implications of Research

Developed methods promise to increase the speed and success with which persons with amputations can utilize powered prostheses, improve quality of life for limb deficient patients and remove key barriers to the creation of next-generation prosthetic systems. We have shown convincing initial evidence that real-time machine learning can potentially reduce the time and effort needed for users of an assistive robot to carry out daily life tasks.

Vision Statement

Our work will pioneer new ways to increase autonomy and self-sufficiency of people with amputations. With the help of adaptive rehabilitation technology, we envision a world where people who have lost limbs or motor functions will not only match, but some day exceed the abilities they had prior to their injury or illness.

Research Group Profile

- Bionic Limbs for Improved Natural Control (BLINC)
- Alberta Machine Intelligence Institute
- Reinforcement Learning and Artificial Intelligence Laboratory, University of Alberta

Select Publications

Pilarski PM, Dawson MR, Degris T, Carey JP, Chan KM, Hebert JS and Sutton RS. *"Adaptive Artificial Limbs: A Real-Time Approach to Prediction and Anticipation"*, IEEE Robotics & Automation magazine, Vol 20(1):53-64, March 2013.

Edwards AL, Dawson MR, Hebert JS, Sutton RS, Chan KM, **Pilarski PM**. *Adaptive Switching in Practice: Improving Myoelectric Prosthesis Performance Through Reinforcement Learning*, Proc. Of MEC:14: Myoelectric Controls Symposium, Fredericton, New Brunswick, August 18-22, 2014, pp.69-73.

Castellini C, Artemiadis M, Wininger A, Ajoudani A, Alimusaj M, Bicci A, Caputo B, Craelius W, Dosen S, Englehart K, Farina D, Gijsberts A, Godfrey S, Hargrove L, Ison M, Kuiken TA, Markovic M, **Pilarski PM**, Rupp R, Scheme EJ. Proceedings of the First Workshop on *Peripheral Machine Interfaces: Going Beyond Traditional Surface Electromyography.* Frontiers in Neurorobotics, Vol 8, Article 22, August 2014.

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