ACOTUP Researcher Profile

Name of researcher: Philippe Archambault, McGill University

Degrees and professional qualifications (including fellowships):
BSc, McGill University, Physics, 1990; BSc, McGill University, Occupational Therapy, 1993; MSc, Université de Montréal, Biomedical Engineering, 1998; PhD, Université de Montréal, Neurosciences, 2003; Post-Doctoral fellowship, University of Rome 'La Sapienza', Neurosciences, 2006

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Area of research:
Dr Archambault's research focuses on the use of technology for the rehabilitation of physical disabilities. Specifically, he is involved in the development and testing of a simulator for the training of power wheelchair driving skills. This simulator works on a standard computer, is low-cost, and can be used at home or in a clinical setting. Research so far has shown that participants drive similarly in the simulator and in a real wheelchair. An ongoing project is looking at the effects of simulator-training on real power wheelchair driving skills. In other works, Dr Archambault is looking at the effectiveness of robotic-based therapy and in the use of 'exergames' to improve arm function in people with stroke.

Research related awards and honors:
- Junior 2 research fellowship, Fonds de Recherche en Santé du Québec (2013-2015)
- Hugh & Hellen McPherson Memorial salary award, McGill University (2011-2013)

Grants/funding history:
- Strauss knowledge translation grant. Knowledge translation and clinician uptake of new virtual reality based exergames for stroke rehabilitation. $12,000. Role: PI (2015-2016)
- NCE / AGE-WELL Work Package 3.2: CoPILOT, Collaborative Power Mobility for an Aging Population. $598,000. Role: co-investigators. PIs: W Miller, J Pineau. (2015-2018)
- CIHR Operating Grant. The McGill Immersive Wheelchair (miWe) simulator for the clinical assessment and at-home training of powered wheelchair driving skills. $298,000. P. Archambault (PI), P. Boissy, D Gagnon, RL Kirby, N Korner-Bitensky, W Miller, D Reid, F Routhier. (2012-2015)
- NSERC discovery grant; Design and testing of a powered wheelchair simulator. $115,000. P. Archambault (PI). (2013-2018)
- FRQNT. Ingénierie des technologies en réadaptation (INTER). $1,074,000. Role: collaborator. PI: F Michaud (U Sherbrooke).(2011-2017)

Research collaboration:
My research is interdisciplinary, as it focuses on the development, use and evaluation of technology. In the development and evaluation of our wheelchair simulator and related technologies, my main collaborators include François Routhier (engineer, U Laval), Bill Miller (OT, UBC), Dany Gagnon (PT, U de Montréal) and Joelle Pineau (computer science, McGill).

Side projects based on this research have been launched with a group of occupational therapists in Norway and with computer scientists interested in rehabilitation applications in New Zealand.

What is the most important thing in mentoring graduate students?
When mentoring graduate students, I want to encourage initiative and creativity. I believe in a collaborative approach, lead by the student, where I can provide some advice when needed. Students need to own their project, to become the expert; there is no better way to learn about research!

Most significant publications:

- Archambault, P. S., S. Ferrari-Toniolo and A. Battaglia-Mayer (2011). "Online control of hand trajectory and evolution of motor intention in the parietofrontal system." The Journal of Neuroscience **31**(2): 742-752. An important paper from my post-doctoral work published in the Journal of Neuroscience. This work compared the neural activity in the pre-motor and parietal cortex related to reaching movements with a change in direction.
- Archambault, P. S., S. Tremblay, S. Cachecho, F. Routhier and P. Boissy (2012). "Driving performance in a power wheelchair simulator." Disabil Rehabil Assist Technol **7**(3): 226-233. In this work, we compared motor and driving performance of power wheelchair driving, when performed in a simulator or in real life. We found that performance was very similar in the two environments, providing evidence that skills learned in the simulator could be transferred to real life wheelchair driving.
- Torkia, C., D. Reid, N. Korner-Bitensky, D. Kairy, P. W. Rushton, L. Demers and P. S. Archambault (2015). "Power wheelchair driving challenges in the community: a users' perspective." Disabil Rehabil Assist Technol **10**(3): 211-215. Here, we interviewed clinicians and expert wheelchair users about challenges experienced in the community by new wheelchair users. Participants identified specific activities such as navigating in a crowd, entering/exiting an elevator, as particularly difficult. This was used to develop new activities for the wheelchair simulator.

Tips would you give for new investigators:

- Find a mentor
- Be strategic about what grants you apply to; a small grant as PI may be more suited at first, in order to help you obtain more important funding (such as CIHR) later
- Plan your time well: you need to keep doing research, keep publishing papers, and apply for grants. All three are important.

Resources/supports/training programs for new investigators:
Your university, faculty or department may offer:

- Training on how to supervise graduate students
- Grant writing workshops
- Course development workshops