

Daniel Ludvig

Education

Doctor of Philosophy

2005-2010

Biomedical Engineering, McGill University, Montreal, Quebec, Canada

Title: Task-Dependent Modulation of Joint Stiffness

Supervisor: Prof. Robert E. Kearney

Master of Engineering

2003-2005

Biomedical Engineering, McGill University, Montreal, Quebec, Canada

Title: Voluntary Modulation of Reflex Stiffness Aided By Real-Time Feedback of Intrinsic and Reflex Stiffness

Supervisor: Prof. Robert E. Kearney

Dean's Honour List

Bachelor of Science

2000-2003

Physiology & Physics, McGill University, Montreal, Quebec, Canada

Great Distinction

Dean's Honour List

GPA: 3.96

Research Experience

Research Fellow

2014-2016

Institut de Réadaptation Gingras-Lindsay-de-Montréal, Montreal, Quebec, Canada

School of Rehabilitation, Université de Montréal, Montreal, Quebec, Canada

Developed a data mining algorithm to detect differences in reflex activity between low-back pain sufferers and healthy subjects using large noisy data sets.

Research Assistant Professor

2013-2015

Physical Medicine & Rehabilitation, Northwestern University, Chicago, Illinois, USA

Sensory Motor Performance Program, Rehabilitation Institute of Chicago, Chicago, Illinois, USA

Started independent research to investigate multi-joint lower limb mechanics during standing and locomotion. Mentored 2 students investigating shoulder stiffness and its implications in shoulder pathology.

Post-Doctoral Fellowship

2010-2014

Sensory Motor Performance Program, Rehabilitation Institute of Chicago, Chicago, Illinois, USA

Biomedical Engineering, Northwestern University, Evanston, Illinois, USA

Investigated how the mechanical properties of elbow and knee joint dynamically vary during movement. Supervised on daily basis 8 students carrying out research into human motor control.

Research Consultant**2010-2011****Institut de Recherche Robert-Sauve en Sante et Sécurité du Travail, Montreal, Quebec, Canada**

Developed an experimental paradigm and a system identification algorithm to estimate intrinsic and reflex contribution to back stiffness.

Graduate Student Research Assistant**2003-2010****Neuromuscular Control Lab, Biomedical Engineering, McGill University, Montreal, Quebec, Canada**

Investigated how humans voluntarily alter intrinsic and reflex components of ankle stiffness in a task-dependent manner.

Undergraduate Student Research Assistant**2001-2002****Meakins-Christie Laboratories, McGill University, Montreal, Quebec, Canada**

Investigated the dynamics and mechanics of muscle proteins at molecular level.

Teaching Experience**Teaching Assistant****2009****BMDE-519: Biomedical Signals & Systems, Biomedical Engineering, McGill University, Montreal, Quebec Canada**

Topics covered include: Fourier transforms, least-squares linear regression, impulse response functions, frequency response functions.

Grants, Awards, Distinctions and Fellowships**Research Grants**

NSERC Postgraduate Scholarship	2007-2009
FQRNT Doctoral Research Scholarship	2007-2008
Faculty of Medicine Internal Studentship, McGill University	2006-2007

Other Awards, Distinctions and Fellowships

Geddes Prize for Excellence in Biomedical Engineering, McGill University	2006
Recruitment Excellence Fellowship, McGill University	2005
McConnell Award, McGill University	2001 & 2002
Muriel Sykes Award, McGill University	2002
Emily Crawford Scholarship, McGill University	2002

Publications**Journal Articles**

Ludvig D, Larivière C. Trunk muscle reflexes are elicited by small continuous perturbations in healthy subjects and patients with low-back pain. *Journal of Electromyography and Kinesiology*, 2016 (under review)

- Larivière C, **Ludvig D**, Kearney R, Mecheri H, Caron J-M, Preuss R. Identification of intrinsic and reflexive contributions to low-back stiffness: medium-term reliability and construct validity. *Journal of Biomechanics*, 48 (1): 254-261, 2015.
- Ludvig D**, Perreault EJ. System Identification of Physiological Systems Using Short Data Segments. *IEEE Transactions on Biomedical Engineering*, 59:3541-9, 2012.
- Ludvig D**, Starret Visser T, Giesbrecht H, Kearney RE. Identification of Time-Varying Intrinsic and Reflex Joint Stiffness. *IEEE Transactions on Biomedical Engineering*, 58:1715-23, 2011.
- Ludvig D**, Cathers I, Kearney RE . Voluntary Modulation of Human Stretch Reflexes. *Experimental Brain Research*, 183:201-13, 2007.
- Ludvig D**, Kearney RE. Real-Time Estimation of Intrinsic and Reflex Stiffness. *IEEE Transactions on Biomedical Engineering*, 54:1875-84, 2007.

Book Chapters

- Perreault EJ, Hargrove L, **Ludvig D**, Lee H, Sensinger J. Considering Limb Impedance in the Design and Control of Prosthetic Devices, in *Neuro-Robotics*. vol. 2, P. Artemiadis, Ed., 59-83, 2014.

Peer Reviewed Conference Papers

- Lipps D, Baillargeon E, **Ludvig D**, Perreault EJ. System identification of multidimensional shoulder impedance during volitional contractions. *17th IFAC Symposium on System Identification*, 2015. (Invited paper)
- Ludvig D**, Perreault EJ. The Dynamic Effect of Muscle Activation on Knee Stiffness. *36th Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 15591562, 2014. (Invited paper)
- Ludvig D**, Perreault EJ. Task-Relevant Adaptation of Musculoskeletal Impedance during Posture and Movement. *American Control Conference*, 4784-4789, 2014. (Invited paper)
- Ludvig D**, Antos SA, Perreault EJ. Joint Impedance Decreases during Movement Initiation. *34th Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 3304–3307, 2012.
- Ludvig D**, Pfeifer S, Hu X, Perreault EJ. Time-Varying System Identification for Understanding the Control of Human Knee Impedance. *16th IFAC Symposium on System Identification*, 2012. (Invited paper)
- Ludvig D**, Perreault EJ. Interpretation of Non-Parametric Estimates of Time-Varying Systems. *American Control Conference*, 2012.
- Ludvig D**, Perreault EJ. Estimation of Joint Impedance Using Short Data Segments. *33rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 4120-3, 2011.
- Ludvig D**, Perreault EJ, Kearney RE. Efficient Estimation of Time-Varying Intrinsic and Reflex Stiffness. *33rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 4124-7, 2011.
- Ludvig D**, Kearney RE. Intrinsic, Reflex and Voluntary Contributions to Task-Dependent Joint Stiffness. *32nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 4914-7, 2010.
- Ludvig D**, Kearney RE. Estimation of Joint Stiffness with a Compliant Load. *31st Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 2967-70, 2009.

Starret Visser T, **Ludvig D**, Kearney RE. Performance Evaluation of an Algorithm for the Identification of Time-Varying Joint Stiffness. *31st Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 3995-8, 2009.

Ludvig D, Zhao Y, Kearney RE Control of an Unstable Load Using Visual Feedback. *30th Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 2489-92, 2008.

Zhao Y, **Ludvig D**, Kearney RE. Closed-Loop System Identification of Ankle Dynamics Using a Subspace Method with Reference Input as Instrumental Variable. *American Control Conference*, 619-24, 2008.

Ludvig D, Kearney RE. Real-Time Estimation of Intrinsic and Reflex Stiffness. *28th Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 292-5, 2006.

Giesbrecht HI, Baker MJ, **Ludvig D**, Wagner R, Kearney RE. Identification of Time-Varying Intrinsic and Reflex Joint Stiffness. *28th Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 288-91, 2006.

Baker MJ, Zhao Y, **Ludvig D**, Wagner R, Kearney RE. Time-Varying Parallel-Cascade System Identification of Ankle Stiffness from Ensemble Data. *26th Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 4688-91, 2004.

Ludvig D, Baker MJ, Cathers I, Kearney RE Task-Dependence of Ankle Stretch Reflex. *25th Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 1487-90, 2003.

Conference Presentations

Society for Neuroscience	2005, 2007, 2008, 2011, 2013
IEEE Engineering in Medicine and Biology Society	2006, 2008-2012, 2014
American Control Conference	2012, 2014
IFAC Symposium on System Identification	2012
Society for the Neural Control of Movement	2009

Service

Reviewer for Grant Proposals

Technology Foundation STW (Netherlands),	2015
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Reviewer for Journal Publications

IEEE Transactions on Biomedical Engineering	
Experimental Brain Research	
Journal of Biomechanics	
IEEE Transactions on Neural Systems and Rehabilitation Engineering	
Journal of Electromyography and Kinesiology	

Organizer of Conference Sessions

IEEE Engineering in Medicine & Biology Conference	2014
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Associate Editor of Conference Proceeding

IEEE Engineering in Medicine & Biology Conference	2014
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Reviewer for Conference Submissions

IEEE Engineering in Medicine & Biology Conference	2012–2016
IEEE EMBS Conference for Neural Engineering & Rehabilitation	2011–2015

Other Interests

Hockey Blogger

2015-

Created analytics focused hockey blog that can be read at <http://dlhockeystats.wordpress.com>

Professional Memberships

IEEE Engineering in Medicine and Biology Society
Society for Neuroscience
International Society of Electromyography and Kinesiology

References

Robert E. Kearney (Master's & Ph.D. Supervisor)

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Biomedical Engineering Department
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