BRIAN MOORE

Work Address
Université Laval
Département de génie mécanique
Pavillon Adrien-Pouliot
1065 Avenue de la médecine
Québec, Québec G1V 0A6
Canada

EDUCATION

PhD, Applied Mathematics
Research Institute for Symbolic Computation, Kepler University, Linz, Austria — Oct. 2005 - Apr. 2009
THESIS - Dynamic balancing of linkages by algebraic methods
Advisers: J. Schicho (Kepler University), C.M. Gosselin (co-, Université Laval)

Master of Science, Applied Mathematics and Computer Science
Université du Québec à Trois-Rivières, Canada, GPA: 4.18/4.33 — Jan. 1999 - Aug. 2000
THESIS - Symbolic code generation optimization and dynamic parameters estimation of mechanical systems
Advisers: P. Sicard (UQTR), J.-C. Piedboeuf (Canadian Space Agency)

Bachelor, Mathematics
Université du Québec à Trois-Rivières, Canada, GPA: 4.01/4.33 — Sep. 1995 - Dec. 1998

R&D EXPERIENCE

Postdoctoral Fellow — Jan. 2011 -
Department of Mechanical Engineering, Robotic group
Laval University, Québec, Canada

JSPS Postdoctoral Fellow — Aug. 2009 - Nov. 2010
Department of Communication and Cognitive Cybernetics
Computational Neuroscience Laboratories
Advanced Telecommunications Research Institute, Kyoto, Japan

- Investigation of redundancy parameterization for serial mechanical systems using quaternions.
- Exploration of human redundancy resolution in reaching and its modeling.
- Learning grasping and manipulation with a humanoid robotic hand using a human-guided approach.

Research Scientist — June 2006 - May 2009
J. Radon Institute for Computational and Applied Mathematics
Austrian Academy of Sciences, Linz, Austria

- Characterization of statically and dynamically balanced 4R linkages based on algebraic geometry and symbolic computation.
- Development of a geometric method for the computation of intersections of planar algebraic curves over a given domain.

- Devise algorithms for studying the ability of cable-driven mechanisms to generate wrenches.

Resident Scientist at Audi and BMW Research Centre — Feb. 2005 - Aug. 2005
MicroNova Electronic GmbH, Munich, Germany
- Software architecture design and implementation for automated testing of Electronic Control Units.

System and Application Analyst — Nov. 2003 - Nov. 2004
Concurrent Computer Corporation, Munich, Germany
- Software environment design and integration for process control, real-time simulation and testing in aerospace and automobile industry.

Modeling and Simulation Specialist — May 2000 - Oct. 2003
Canadian Space Agency, St-Hubert, Canada
- Development of symbolic/numeric software tools for the modeling and simulation of complex mechanical systems for the Canadian Space Agency's in-house multi-body dynamics simulation package. The package is used to support robotics research, astronaut training and space operations.
- Enhancement of the procedure used to estimate the dynamic parameters (mass, center of mass location and inertia) of mechanical systems.
- Development of algorithms and software tools for unstructured terrain representation, path planning and localization of mobile robots in a partially known environment.

Software developer (Part-time) — Sep. 1997 - Apr. 2001
Opal-RT-Technologies, Montreal, Canada
- In the context of a startup company, design and implementation of a software to distribute simulation models on several computers to achieve real-time performance.

AWARDS

Japan Society for the Promotion of Science (JSPS) — 2009 - 2011
Postdoctoral fellowship, 364.000 yen/month, 2 years.

Fonds de Recherche sur la Nature & Technologies du Québec — -
Postdoctoral fellowship (rank 3 out of 22), declined.

Fonds de Recherche sur la Nature & Technologies du Québec — 2007 - 2008
PhD scholarship, 20.000$/year, 2 years.

Research Institute for Symbolic Computation — 2005 - 2006
PhD scholarship, 12.000 euros/year, 1 year.

Natural Sciences & Engineering Research Council of Canada — -
PhD scholarship, 2004, declined.

Fonds de Recherche sur la Nature & Technologies du Québec — 1998 - 2000
Master scholarship, 11.000 $/year, 2 years.

LANGUAGES

French, English, German (advanced).

PUBLICATIONS

Refereed Journal

- B. Moore, J. Schicho, C.M. Gosselin: Dynamic balancing of spherical 4R linkages. Journal of Mechanisms and Robotics, 2(2), May 2010.
- S. Bouchard, C.M. Gosselin, B. Moore: On the ability of a cable-driven robot to generate a prescribed set of wrenches. Journal of Mechanisms and Robotics, 2(1), February 2010.
- C.M. Gosselin, B. Moore, J. Schicho: Dynamic balancing of planar mechanisms using toric geometry, Journal of Symbolic Computation, 44(9), p.1346-1358, September 2009.
- B. Moore, J. Schicho, C.M. Gosselin: Determination of the complete set of shaking force and shaking moment balanced planar four-bar mechanisms, Mechanism and Machine Theory, 44(7), p.1338-1347, July 2009.
- J.-C. Piedboeuf, B. Moore: On the foreshortening effects of a rotating flexible beam using different modeling methods, Mechanics Based Design of Structures and Machines, 30(1), p.83-102, 2002.

Refereed Journal (Submitted)

- B. Moore, E. Oztop: Robotic grasping and manipulation through human visuomotor learning. Robotics and Autonomous Systems.
- G. Hegedüs, B. Moore: The Minkowskian planar 4R mechanism, International electronic journal of Geometry.

Book Section

- B. Moore, J. Schicho: Two methods for force balancing of Bennett linkages. In Andrés Kecskeméthy and Andreas Müller, Editors, Proceedings of Computational Kinematics (CK 2009), Springer, p. 241-248, 2009.
- J.-C. Piedboeuf, J. Kövecses, B. Moore and R. L'Archevêque: Symofros: A virtual environment for modeling, simulation and real-time implementation of multibody system dynamics and control, Virtual Nonlinear Multibody Systems, 2003 Kluwer Academic Publisher, p. 317-324.

Conference Publications

- B. Moore, E. Ugur, E. Oztop: Biologically inspired robot grasping through human-in-the-loop robot control, IROS 2010 Workshop on grasp planning and task learning by imitation, Taipei, Taiwan, October 2010.
- B. Moore, E. Oztop: Redundancy parametrization for flexible motion control, ASME IDETC 2010, Montreal, Canada, August 2010.
- K. Azizian, P. Cardou, B. Moore: On the boundaries of the wrench-closure workspace of planar parallel cable-driven mechanisms, ASME IDETC 2010, Montreal, Canada, August 2010.
- P. Allard, S. Gemme, R. L'Archevêque, B. Moore, É. Dupuis: Autonomous rover navigation in partially known terrain, 7th International Symposium on Artificial Intelligence, Robotics and Automation in Space, Nara, Japan, May 2003.
- B. Moore, J. Kövecses and J.-C. Piedboeuf: Symbolic model formulation for dynamic parameters identification. Eccomas Thematic Conference on Computational Multibody Dynamics, Lisbon, Portugal, July 1-4, 2003.

- B. Moore, J.-C. Piedboeuf, L. Bernardin: Maple as an automatic code generator?, Maple Summer Workshop, Waterloo, Canada, July 2002.
- J.-C. Piedboeuf, J. Kövecses, B. Moore and R. L'Archevêque: Symofros: A virtual environment for modeling, simulation and real-time implementation of multibody system dynamics and control, Virtual Nonlinear Multibody Systems, NATO Advanced Study Institute, Prague, June 23- July 3, 2002.
- M. Lambert, B. Moore, M. Ahmadi: Essential real-time and modeling tools for robot rapid prototyping, 6th International Symposium on Artificial Intelligence, Robotics and Automation in Space, Montreal, Canada, June 2001.

Technical Reports

- G. Hegedüs, B. Moore: The Minkowskian planar 4R mechanism, Technical Report, arXiv:1010.5668, 2010.
- B. Moore: Dynamic balancing of linkages by algebraic methods, PhD thesis, Research Institute for Symbolic Computation, Johannes Kepler University, Linz, Austria, April 2009.
- B. Jüttler, B. Moore: A Quadratic Clipping Step with Superquadratic Convergence for bivariate Polynomial Systems, FSP Report No. 78, October 2008.
- B. Moore, R. Vajda: Some experiments using quantifier elimination to prove the non-existence of dynamically balanced spherical linkages, Technical Report 2008-10, SFB F013, September 2008.

SELECTED TALKS

2010

- Biologically inspired robot grasping through human-in-the-loop robot control, IROS 2010 Workshop on grasp planning and task learning by imitation, Taipei, Taiwan, October 2010.
- Redundancy parametrization for flexible motion control, ASME IDETC 2010, Montreal, Canada, August 2010.
- Biologically inspired robot grasping, ATR Computational Neuroscience seminar, July 2010.

2009

- Two methods for force balancing of Bennett linkages, Computational Kinematics, Duisburg, Germany, May 2009.

2008

- Application of symbolic computation to robotics: from design of dynamically balanced mechanisms to the real-time simulation of complex mechanical systems, ATR Computational Neuroscience Laboratories, Kyoto, Japan, October 2008.
- Dynamic balancing of mechanisms, Applications of Computer Algebra, Hagenberg im Mühlkreis, Austria, July 2008.
- Dynamic balancing of planar mechanisms using toric geometry, 79th Annual Meeting of the International Association of Applied Mathematics and Mechanics, Bremen, Germany, March-April 2008.

2007

- Computing roots of polynomials using bivariate quadratic clipping, MACIS 2007 - Second International Conference on Mathematical Aspects of Computer and Information Sciences, Paris, France, December 5-7, 2007.

- Determination of the complete set of statically balanced planar four-bar mechanisms, Workshop on Computational Methods for Algebraic Spline Surfaces, Strobl, Austria, September 2007.
- Computing intersections of planar algebraic curves using bivariate quadratic clipping, Conference on Geometry Theory and Application, Vorau, Austria, June 2007.
- Static balancing of parallel mechanisms, MEGA 2007: Effective Methods in Algebraic Geometry, Strobl, Austria, June 2007.
- Static balancing of parallel mechanisms, IMA Annual Program Year Workshop: Non-Linear Computational Geometry, Minneapolis, USA, June 2007.

PROMOTING SCIENCE

- In the context of the the *JSPS Science Dialogue* program, I gave a talk in a Japanese high school untitled **Robotics: today and tomorrow** (2010). *http://www.moorebrian.com/sciencedialogue.html*.
- One week project where I thought high school student about mathematics and robotics in Austria. During the project, a Lego mindstorm robot arm mounted on a mobile robot was designed, built and controlled by the students in order to write a word with a pen. *Projektwoche Angewandte Mathematics 2009*. In German. *http://www.projektwoche.jku.at/2009/projekt2009_proj03.shtml*.