

Michael T. Tolley

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Cornell University
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Languages

- English – native language
- French – fluent written and spoken
- Spanish – conversational ability

Research Interests and Experience

- Bioinspired Robotics
- Dynamics & Control
- Microfabrication & Microfluidics
- Self-Assembly & Microassembly
- Machine Learning & Evolutionary Computation
- Programming Languages: C, C++, Java, Fortran, Turbo Pascal
- Engineering Software: Matlab, SolidWorks, Maple, Labview, MSC. ADAMS

Education

- 08/2005 - 08/2010 **M.S./Ph.D. Mechanical Engineering**
Sibley School of Mechanical and Aerospace Engineering
Cornell University, Ithaca NY
Thesis: Programmable stochastic fluidic assembly of
minimalistic components
Advisor: Prof. Hod Lipson
GPA: 3.88/4.30
- 09/2000 - 06/2005 **B. Eng. Mechanical Engineering (Honours)**
Centre for Intelligent Machines, McGill University, Montreal QC
Honours Thesis: Behaviour development for a quadrupedal
robot
Supervisor: Prof. Inna Sharf
GPA: 3.79/4.00
GRE Results: Quantitative 800/800, Verbal 610/800, Analytical
Writing 5.0/6.0

Research and Work Experience

- 08/2010 - Present **Postdoctoral Associate**
Computational Synthesis Lab, Cornell University
Supervisor: Prof. Hod Lipson
Project: 3-D Stochastic Fluidic Assembly
- 08/2005 - 12/2006 **Teaching Assistant**
Systems Engineering, Cornell University
Course: Applied Systems Engineering (SYSEN 510)
Supervisors: Prof. Peter L. Jackson, Prof. Mason Peck
Responsibilities: Office hours, coordinating graders, grading exams, point-of-contact for 60 on-campus and 20 off-campus students
- 01/2006 - 05/2006 **Teaching Assistant**
Sibley School of Mechanical and Aerospace Engineering, Cornell University
Course: System Dynamics (MAE 326)
Supervisor: Prof. Mark Psiaki
Responsibilities: Recitations, office hours, grading, point-of-contact for 80 students
- 04/2004 - 07/2005 **Undergraduate Research Assistant**
Centre for Intelligent Machines, McGill University
Supervisor: Prof. Inna Sharf
Responsibilities: Design, ordering, construction, and programming of legged robots
- 09/2004 - 04/2005 **Mechanical Engineering Tutor**
ACE Tutorials, McGill University
Responsibilities: Weekly tutorial hours and pre-exam seminars for first and second year engineering students
- 09/2001 - 08/2004 **Mechanical Engineer**
Team iSun Solar Car Project, McGill University
Responsibilities: Design, fabrication, wind tunnel testing, and maintenance of solar car mechanical systems

Honours and Awards

- 05/2007 **Natural Sciences and Engineering Research Council of Canada (NSERC) Postgraduate Scholarship – Doctoral (\$63,000 over three years)**
For academic excellence, research ability or potential, and communication, interpersonal, and leadership abilities
- 05/2006 **NSERC Postgraduate Scholarship – Masters (\$17,300)**
For academic excellence, research ability or potential, and communication, interpersonal, and leadership abilities
- 05/2005 **NSERC Undergraduate Student Research Award (\$7,000)**
For academic excellence and research aptitude
- 05/2005 **Dean’s Honour List, Faculty of Engineering, McGill University**
For a CGPA within the top 10% of graduating students in the Faculty of Engineering
- 09/2004 **David E. & Ronnie Schouela Memorial Scholarship, McGill University (\$1000)**
For academic performance in the Honours Mechanical Engineering program at McGill University
- 05/2004 **NSERC Undergraduate Student Research Award (\$5,625)**
For academic excellence and research aptitude
- 07/2003 **9th Place & Best Rookie Team Award, American Solar Challenge 2003**
Solar-powered car race from Chicago, IL to Las Angeles, CA
- 03/2002 **1st Place, Team Design Category (\$1500)**
Canadian Engineering Competition
- 02/2002 **1st Place, Team Design Category (\$1000)**
Quebec Engineering Competition
- 01/2002 **1st Place, Team Design Category (\$400)**
McGill Engineering Competition
- 09/2000 **J. W. McConnell Scholarship, McGill University (\$20,000 over four years)**
For academic standing and community and school leadership

Publications

Refereed Journal Publications

1. Kalontarov M., **Tolley, M. T.**, Lipson H., Erickson, D. (2010) "[Hydrodynamically Driven Docking of Blocks for 3D Fluidic Assembly](#)", *Microfluidics and Nanofluidics*, 9, pp. 551-558.
2. **Tolley M. T.**, Kalontarov M., Neubert J., Erickson D., Lipson H. (2010) "[Stochastic Modular Robotic Systems: A Study of Fluidic Assembly Strategies](#)", *IEEE Transactions on Robotics*, 26, pp. 518-530.
3. Krishnan M., **Tolley M. T.**, Lipson H., Erickson D. (2009) "[Hydrodynamically Tunable Fluidic Affinities for Fluidic Assembly](#)", *Langmuir*, 25, pp. 3769-3774.
4. **Tolley M. T.**, Krishnan M., Erickson D., Lipson H. (2008) "[Dynamically Programmable Fluidic Assembly](#)", *Applied Physics Letters*, 93, 254105. ** Also in *Virtual Journal of Nanoscale Science & Technology*, vol. 19, 2 **
5. Krishnan M., **Tolley M. T.**, Erickson D., Lipson H. (2008) "[Increased Robustness for Fluidic Self Assembly](#)", *Physics of Fluids*, 20, 073304. ** Also in *Virtual Journal of Nanoscale Science & Technology*, vol. 18, 5 **

Refereed Conference Publications

6. **Tolley M. T.**, Lipson H., (2010) "[Fluidic Manipulation for Scalable Stochastic 3D Assembly of Modular Robots](#)", Proc. IEEE International Conference on Robotics and Automation (ICRA), Anchorage AK, May 2010, pp. 2473-2478.
7. **Tolley M. T.**, Hiller J., Lipson H., (2009) "[Evolutionary Design and Assembly Planning for Stochastic Modular Robots](#)", Proc. Int. Conf. on Intelligent Robots and Systems (IROS), Evolutionary Design of Robots Workshop, St. Louis MO, Oct. 2009, pp. 73-78.
8. **Tolley M. T.**, Erickson D., Lipson H. (2009) "Fluidic Assembly of Programmable Matter", Cornell Engineering Research Conference (CERC), Ithaca NY, April 2009.
9. Krishnan M., **Tolley M. T.**, Lipson H., Erickson D. (2008) "Dynamically Tunable Affinities for Fluidic Self Assembly", Am. Inst. of Chem. Engineers (AIChE) Annual Meeting, Philadelphia PA, Nov. 2008, 485e.
10. **Tolley M. T.**, Krishnan M., Lipson H., Erickson D. (2008) "[Advances Towards Programmable Matter](#)" Proc. Int. Conf. Miniaturized Systems for Chemistry and Life Sciences (μ TAS), San Diego CA, Oct. 2008, pp. 653-655.

11. Chung M., Malone E., **Tolley M. T.**, Chepaitis A. J., Lipson H., (2008) "[Object Augmentation for the Visually Impaired Using RP](#)", Proc. Solid Freeform Fabrication (SFF) Symp., Austin TX, Aug 2008.
12. **Tolley M. T.**, Baisch A., Krishnan M., Erickson D., Lipson H. (2008) "[Interfacing Methods for Fluidically-Assembled Microcomponents](#)", Proc. IEEE Int. Conf. Micro Electro Mechanical Systems (MEMS), Tucson AZ, Jan 2008, pp. 1073-1076.
13. Krishnan M., **Tolley M. T.**, Lipson H., Erickson D. (2007) "[Directed Hierarchical Self Assembly - Active Fluid Mechanics at the Micro and Nanoscales](#)", Proc. ASME Int. Mechanical Engineering Cong. and Expo. (IMECE), Seattle WA, Nov. 2007, 41784. ** Best Presentation Award **
14. **Tolley M. T.**, Zykov V., Lipson H., Erickson D. (2006) "[Directed Fluidic Self-Assembly of Microscale Tiles](#)" Proc. Int. Conf. Miniaturized Systems for Chemistry and Life Sciences (μ TAS), Tokyo, Japan, Oct. 2006, pp. 1552-1554.

Other Conference Papers

15. **Tolley M. T.**, Krishnan M., Erickson D., Lipson H. (2008) "Approaches to dynamically programmable self-assembly", Proc. of Foundations of Nanoscience (FNANO), Snowbird, UT, April 2008.

Book Chapters

16. **Tolley M. T.**, Hiller J. and Lipson H. (2010) "Evolutionary Design and Assembly Planning for Stochastic Modular Robots," in Bredeche, N., Doncieux, S. and Mouret J.-B. (Eds.), New Horizons in Evolutionary Robotics: post-proceedings of the 2010 EvoDeRob workshop (in press). Berlin, Germany: Springer.

Colloquia Talks

1. Dynamics, Systems and Controls Seminar, Cornell University, "Deterministic Non-Regular Microstructures from Regular Components", September 2007.
2. SiGMA Student Seminar Series, Cornell University, "Directed Fluidic Assembly of Microscale Tiles", November 2006.
3. Dynamics, Systems and Controls Seminar, Cornell University, "Programmable Micro-scale Fluidic Self-Assembly", March 2006.

Press and Media Coverage

Robots Podcast: [Programmable Matter](#), August 27, 2010.

Professional Activities

Membership

IEEE (Institute of Electrical and Electronics Engineers), since 2009.

Conference Organization

Session Chair, Cornell Engineering Research Conference, Cornell University, April 2010.

Publication Reviewing

1. Robotica
2. IEEE International Conference on Robotics and Automation (ICRA)
3. International Conference on the Simulation and Synthesis of Living Systems (ALIFE)
4. IEEE Transactions on Automation Science and Engineering
5. Rapid Prototyping Journal
6. Proceedings of the IEEE

Leadership and Project Management Activities

08/2007 - 04/2008 **Undergraduate Student Research Advisor**
Cornell University
Student: Marilyn Chung
Project: Object Augmentation for the Visually Impaired Using
Rapid Prototyping

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Cornell University
Student: Marilyn Chung
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Rapid Prototyping

09/2006 - 12/2007 **Intramural Team Captain, Ice Hockey**
Cornell University

05/2006 - 08/2006 **Cornell Nanofabrication Facility (CNF) Research Experience for Undergraduates (REU) Mentor**

Cornell University

CNF REU Students:

- Suraj Kabadi (Advanced Fabrication of Electroactive Nanowell Sensors)
- Andrew Baisch (Patterning of Electrical Circuits on Fluidic Assembly Microtiles)

09/2003 - 04/2005 **Student Society Representative**

Engineering Undergraduate Society (EUS) and Student Society of McGill University (SSMU)

- Represented engineering students with voting rights on both councils, and multiple committees

01/2002 - 04/2005 **Engineering Competition Team Leader**

McGill University

- Organized team of four engineering students to compete at annual engineering competitions and the school, provincial and national levels

09/2000 - 04/2005 **Intramural Team Captain, Ultimate Frisbee and Innertube Waterpolo**

McGill University

- Led Ultimate Frisbee team to win Division A championships in 2003 and 2004

09/2002 - 04/2003 **Peer Tutor**

Science Undergraduate Society, McGill University

- Volunteered to tutor first year science students in Physics and Calculus

Other Activities

10/2007 - Present **Ithaca Adult Hockey Association**

Ice Hockey League, B Division

Ithaca, New York

05/2006 - Present **Ithaca Area Ultimate Alliance**

Ultimate Frisbee League, Competitive and Co-ed Divisions

Ithaca, New York