Amos G. Winter, V

Noyce Career Development Assistant Professor
Department of Mechanical Engineering
Massachusetts Institute of Technology

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RESEARCH INTERESTS

Design for emerging markets and developing countries; international development; reverse innovation and cross-cultural technology transfer; biologically-inspired design; fluid, solid, granular mechanics; biomechanics; mechanical, precision machine design; medical device design; water purification; agricultural equipment; design of ocean systems.

TEACHING INTERESTS

Mechanical, machine, product design; technology for emerging markets; international development and appropriate technology; disability and assistive devices; statics and solid mechanics; manufacturing processes.

EDUCATION

Massachusetts Institute of Technology — Cambridge, MA
Ph.D., Mechanical Engineering (GPA 4.7/5.0) — Sept. 2005-Sept. 2010
Thesis: "Biologically inspired mechanisms for burrowing in undersea substrates"
Advisors: Prof. Anette "Peko" Hosoi and Prof. Alexander Slocum

Massachusetts Institute of Technology — Cambridge, MA
S.M., Mechanical Engineering (GPA 4.6/5.0) — Sept. 2003-June 2005
Thesis: "Design of fluid film journal bearings containing continuous 3D fluid pathways which are formed by wrapping a sheet containing 2D through-cut features"
Advisor: Prof. Martin Culpepper

Tufts University — Medford, MA
B.S., Mechanical Engineering, *Magna Cum Laude* (GPA 3.74/4.0) — Sept. 1999-June 2003
Thesis: "JUMBOt: A robot to compete on Battle Bots"
Advisor: Prof. Douglas Matson

University of Canterbury — Christchurch, New Zealand
Semester Abroad — Feb.-June 2003

EXPERIENCE

MIT Department of Mechanical Engineering — Cambridge, MA
Robert N. Noyce Career Development Assistant Professor — July 2012-Present
Director, Global Engineering and Research (GEAR) Lab

Global Research Innovation and Technology (GRIT) — Cambridge, MA
Co-Founder and Chief Technical Advisor — Sept. 2011-Present

Battelle Memorial Institute — Cambridge, MA
Contractor – RoboClam Project and Various Bluefin Robotics Projects — Sept. 2011-June 2012

MIT – Singapore University of Technology and Design (SUTD) International Design Center — Cambridge/Singapore
Post-Doctoral Associate – Leveraged Freedom Chair Project, Supervisor: Prof. Daniel Frey — Sept. 2010-June 2012

Indian Institute of Technology Delhi — New Delhi, India
Visiting Researcher – Leveraged Freedom Chair Project, Supervisor: Prof. Sudipto Mukherjee — Sept. 2010-June 2011

MIT Mobility Lab (M-Lab) — Cambridge, MA
Founder and Director, Project lead – Leveraged Freedom Chair — Dec. 2007-June 2012

Schlumberger-Doll Research Center Cambridge, MA
Intern – Design and Testing of Down-Hole Anchoring and Tractoring Systems Jan. 2006-June 2006

Whirlwind Wheelchair International Tanzania
Intern - Assessment of Wheelchair Technology in Tanzania, Supervisor: Marc Krizak June-Aug. 2005

Bluefin Robotics Corporation Cambridge, MA
Intern – Autonomous Underwater Vehicle Design June 2003-Aug. 2003

NASA Jet Propulsion Laboratory Pasadena, CA
Intern – Mechanical and Robotics Technologies Group June 2002-Aug. 2002

Monterey Bay Aquarium Research Institute Moss Landing, CA
Intern – Underwater Engineering June 2001-Aug. 2001

CONSULTING

Usha International Ltd Nov. 2013-Present
Okuma Fishing Oct. 2013-Present
Bluefin Robotics Corporation Jan. 2006-June 2010
Massachusetts General Hospital, working with Dr. Timothy Bhattacharyya Jan. 2006-Jan. 2008

ADVISING

PhD Students

Y. Narang, PhD in Mechanical Engineering Jan. 2014-Present
B. Peters, PhD in Mechanical Engineering Sept. 2013-Present
J. Wiens, Term-Long Research Project in Collaboration, MIT Jan. 2013-Jan. 2014
A. Banzaert, PhD in Mechanical Engineering, Co-Advised with Prof. J. Kim Vandiver, MIT Nov. 2011-Oct. 2012
P. Zimoch, Summer Research Project in Collaboration with Prof. Anette Hosoi, MIT June 2012-Aug. 2012

Masters Students

M. Arelekatti, Masters of Science in Mechanical Engineering, MIT Sept. 2013-Present
M. Buchman, Masters of Science in Mechanical Engineering, MIT Sept. 2013-Present
M. Isava, Masters of Science in Mechanical Engineering, MIT Sept. 2013-Present
S. Ricks, Masters of Science in Mechanical Engineering, MIT Sept. 2013-Present
K. Taylor, Masters of Science in Mechanical Engineering, MIT Sept. 2013-Present
K. Olesnavage, Masters of Science in Mechanical Engineering, MIT Sept. 2012-Present
N. Wright, Masters of Science in Mechanical Engineering, MIT Aug. 2012-Present
D. Dorsch, Masters of Science in Mechanical Engineering, MIT June 2012-Present
B. Judge, MIT-SUTD Dual Masters Program in Manufacturing Sept. 2011-Present
Y. Narang, Masters of Science in Mechanical Engineering, MIT Sept. 2011-May 2013
G. Tao, Masters of Science in Mechanical Engineering, Co-Advised with Prof. Daniel Frey, MIT Nov. 2011-June 2012

Visiting Students

Eliott Tixier, from Lycée Condorcet June 2012-Aug. 2012

Undergraduate Theses

C. Ceri, Undergraduate Thesis in Mechanical Engineering, MIT Feb. 2013-May 2013
M. Isava, Undergraduate Thesis in Mechanical Engineering, MIT Feb. 2013-May 2013
A. Warren, Undergraduate Thesis in Mechanical Engineering, MIT Feb. 2013-May 2013
L. Kuntz, Undergraduate Thesis in Mechanical Engineering, MIT Sept. 2012-May 2013
M. Nawrot, Undergraduate Thesis in Mechanical Engineering, MIT Feb. 2012-May 2012
D. Dorsch, Undergraduate Thesis in Mechanical Engineering, MIT Feb. 2012-May 2012
B. Judge, Undergraduate Thesis in Mechanical Engineering, MIT Jan. 2011-May 2011

J. Walton, Undergraduate Thesis in Mechanical Engineering, MIT — Jan. 2011-May 2011
N. Scolnik, Undergraduate Thesis in Mechanical Engineering, MIT — Jan. 2010-May 2010
M. Bollini, Undergraduate Thesis in Mechanical Engineering, MIT — Jan. 2009-May 2009
A. Maguire, Undergraduate Thesis in Mechanical Engineering, MIT — Jan. 2009-May 2009
C. Jones, Undergraduate Thesis in Mechanical Engineering, MIT — Sept. 2008-May 2009
C. Becker, Undergraduate Thesis in Mechanical Engineering, MIT — Jan. 2008-May 2008
N. Wang, Undergraduate Thesis in Mechanical Engineering, MIT — Sept. 2007-May 2008
L. Todman, Undergraduate Thesis, Mechanical Engineering, Cambridge University, UK — Sept. 2007-May 2008

Undergraduate Researchers

C. Cheney, MIT Undergraduate Research Opportunities Program — Feb. 2013-Present
M. Farid, MIT Undergraduate Research Opportunities Program — Feb. 2013-Present
D. Dorsch, MIT Undergraduate Research Opportunities Program — May 2009-Dec. 2011
B. Judge, MIT Undergraduate Research Opportunities Program — June 2009-May 2011
R. Deits, MIT Undergraduate Research Opportunities Program — Jan. 2009-May 2011
D. DeLatte, MIT Undergraduate Research Opportunities Program — June 2008-May 2011
H. O'Hanley, MIT Undergraduate Research Opportunities Program — June 2008-May 2011
A. Lehto, MIT Undergraduate Research Opportunities Program — June 2010-Aug. 2010
X. Chen, MIT Undergraduate Research Opportunities Program — Sept. 2009-May 2010
L. Schuhrke, MIT Undergraduate Research Opportunities Program — Sept. 2009-Dec. 2009
N. Bhartiya, MIT Undergraduate Research Opportunities Program — Oct. 2009-Dec. 2009
J. Walton, MIT Undergraduate Research Opportunities Program — June 2009-Aug. 2009
D. Whited, MIT Undergraduate Research Opportunities Program — June 2009-Aug. 2009
K. Ray, MIT Undergraduate Research Opportunities Program — Jan. 2009-May 2009
F. Funnel, MIT Undergraduate Research Opportunities Program — Sept. 2008-May 2009
T. Scolnik, MIT Undergraduate Research Opportunities Program — Sept. 2007-May 2008
S. Duffley, MIT Undergraduate Research Opportunities Program — Feb. 2008-June 2007
M. Bollini, MIT Undergraduate Research Opportunities Program — Sept. 2006-May 2007
S. Sovero, MIT Undergraduate Research Opportunities Program — Sept. 2005-Dec. 2005
C. Walker, MIT Undergraduate Research Opportunities Program — June 2004-Dec. 2004
J. Sadler, MIT Undergraduate Research Opportunities Program — Mar. 2004-Dec. 2004
K. Harrison, MIT Undergraduate Research Opportunities Program — Feb. 2004-Aug. 2004

TEACHING

Original Curricula

Massachusetts Institute of Technology — Cambridge, MA
Lead Instructor, 2.007 "Design and Manufacturing 1" — Jan. 2014-Present
http://stellar.mit.edu/S/course/2/sp14/2.007/

Massachusetts Institute of Technology
Lead Instructor, 2.S999 "Global Engineering" — Sept. 2013-Present
http://stellar.mit.edu/S/course/2/fa13/2.S999/index.html

Massachusetts Institute of Technology — Cambridge, MA
Lecturer and Lab Instructor, SP.784 "Wheelchair Design in Developing Countries" — Feb.-May 2007-2010
http://web.mit.edu/sp.784/www/

St. Paul's School Advanced Studies Program — Concord, NH
Master Teacher, Introduction to Engineering class — June-Aug. 2006, 2007
http://web.mit.edu/awinter/www/ASPIE/index.html

Other Teaching Engagements

Massachusetts Institute of Technology — Cambridge, MA
Instructor, 2.007 "Design and Manufacturing 1" — Feb.-May. 2013

Massachusetts Institute of Technology — Cambridge, MA
Lab Instructor, 2.009 "Product Engineering Process" — Sept.-Dec. 2012

Penn State University and Arizona State University — Cambridge, MA
Team Mentor, Capstone Design Classes — Jan.-May 2012

Massachusetts Institute of Technology — Cambridge, MA
Team Mentor, 2.75 "Precision Machine Design" — Sept.-Dec. 2009

University of Michigan — Ann Arbor, MI
Team Mentor, ME450 "Design and Manufacturing III" — Jan.-Apr. 2009

Massachusetts Institute of Technology — Cambridge, MA
Lab Instructor, 2.00b/SP.778 **"**Toy Product Design" — Feb.-May 2006, 2008

Massachusetts Institute of Technology — Cambridge, MA
Lab Instructor, Trip Leader, 11.025/11.190/11.472/SP.721 "D-Lab: Development" — Feb. 2007-Jan. 2008

Massachusetts Institute of Technology — Cambridge, MA
Teaching Assistant, 2.002 "Mechanics and Materials II" — Feb.-May 2006

Massachusetts Institute of Technology — Cambridge, MA
Teaching Assistant, 2.000 "How and Why Machines Work" — Feb.-May 2005

St. Paul's School Advanced Studies Program — Concord, NH
Intern, Artificial Intelligence class — June-Aug. 2004

Tufts University — Medford, MA
Volunteer, Elementary School Engineering Outreach Program — Jan. 2001-May 2003

AWARDS

TR35, named one of the 35 innovators under the age of 35 by the MIT Technology Review — 2013
Featured talk on TED global website, "Amos Winter: The Cheap All-Terrain Wheelchair," November 20, 2012. http://www.ted.com/talks/amos_winter_the_cheap_all_terrain_wheelchair.html — 2012
Rockefeller Foundation $100k Innovation Challenge Winner — 2012
Mass Challenge Startup Competition, $100k Diamond Prize Winner, awarded to Global Research Innovation and Technology — 2012
Fast Company Magazine Innovation by Design Award, Concept Category, for Leveraged Freedom Chair — 2012
ASME/Pi Tau Sigma Gold Medal, awarded to an engineering graduate who has demonstrated outstanding achievement in mechanical engineering within ten years following receipt of the baccalaureate degree — 2012
Noyce Early Career Development Chair, MIT School of Engineering — 2012
Wall Street Journal Big Innovations of 2011 (one of seven) for the Leveraged Freedom Chair — 2011
2010 Tufts University Young Alumni Distinguished Achievement Award — 2011
Red Dot Design Award Winner for the Leveraged Freedom Chair — 2011
Nominee, Brit Insurance Designs of the Year for the Leveraged Freedom Chair, Design Museum London — 2011
R&D 100 Award for the Leveraged Freedom Chair, given by R&D Magazine for the 100 most technologically significant products of the year — 2010
R&D 100 Editors' Choice Award for the Leveraged Freedom Chair, given to the three favorite R&D 100 award winners by the magazine's editors — 2010
MIT School of Engineering Graduate Student Extraordinary Teaching and Mentoring Award, the highest honor given to a graduate student for teaching and mentoring at MIT — 2010
ASME Innovation Showcase, 1st place for the Leveraged Freedom Chair — 2010
Gold Award, Spark Awards for design, world changing category for the Leveraged Freedom Chair — 2010
Winner, Scientific American's World Changing Ideas video contest for the Leveraged Freedom Chair — 2010
Wall Street Journal Technology Innovation Awards, medical devices category, runner up for the Leveraged Freedom Chair — 2010

National Collegiate Inventors and Innovators Alliance (NCIIA) Advanced E-Teams grant for Indian trial and dissemination of the Leveraged Freedom Chair	2010
Fulbright-Nehru Student Research Fellowship to India (declined)	2010
Finalist, Lemelson-MIT Student Prize	2010
Extraordinary Stories Award, National Academy of Engineering Grand Challenge Summit	2010
MIT Department of Mechanical Engineering deFlorez Award for Design, 3rd place for the Leveraged Freedom Chair	2010
Inter-American Development Bank, $50,000 World of Solutions grant for Leveraged Freedom Chair trial in Guatemala	2009
ASME IDETC Conference, Graduate Student Mechanism Design Competition, 1st place for the Leveraged Freedom Chair	2009
ASME IDETC Conference, Robot Design Competition, 2nd place for RoboClam	2009
RESNA Student Design Competition Finalist, for the Leveraged Freedom Chair	2009
MIT Department of Mechanical Engineering deFlorez Award for Technology Innovation/Invention, 2nd place for RoboClam	2009
MIT IDEAS Competition Winner, Award for International Technology for the Leveraged Freedom Chair	2008
Hugh Hampton Young Memorial Fund Fellowship	2007-2009
National Collegiate Inventors and Innovators Alliance (NCIIA) Course Grant for Wheelchair Design in Developing Countries Class	2007
MIT Alumni Sponsored Funding Opportunities Grant for Wheelchair Design in Developing Countries class	2006
MIT Public Service Center Independent Fellowship	2006
MIT Public Service Center Independent Fellowship	2005
NSF Graduate Research Fellowship Honorable Mention	2005
MIT 2.810 "Manufacturing Processes and Systems" RC Car Race Winner	2004
Tufts Alex Elias Memorial Prize Scholarship	2003
Tufts Varsity Football Letter Winner	2001, 2002

PATENTS

1. Winter V, A.G., A.E. Hosoi, A.H. Slocum. "Method and Apparatus for Penetrating Particulate Substrates." Patent no. 8496410 B2, issued Jul. 30, 2013.
2. Winter V, A.G., et al. "Wheelchair with Lever Drivetrain." Patent application no. 12914986, Steptoe and Johnson LLP, Utility filed October 28, 2010.

PUBLICATIONS

Peer-Reviewed Journal Articles

1. N.C. Wright, A.G. Winter, V. "Justification for Community-Scale Photovoltaic Powered Electrodialysis Desalination Systems for Inland Rural Villages in India". (in preparation)
2. Y.S. Narang, A.G. Winter, V. "The Effects of the Inertial Properties of Above-Knee Prostheses on Optimal Stiffness, Damping, and Engagement Parameters of Passive Prosthetic Knees". (in preparation)
3. Y.S. Narang, A.G. Winter, V. "The Effects of Inertial Properties on Joint Torques and Walking Energetics for Transfemoral Amputees". (in preparation)
4. A.G. Winter, V, M.A Bollini, B.M. Judge, N.K. Scolnik, H.F. O'Hanley, S. Mukherjee, D. D. Frey. "The Design and Performance of a Novel, Lever-Propelled, All-Terrain Wheelchair for Developing Countries". (in preparation)
5. A.G. Winter, V., R.L.H. Deits, D.S. Dorsch, A.H. Slocum, A.E. Hosoi. "Razor Clam to RoboClam: Burrowing Drag Reduction Mechanisms and their Robotic Adaptation," Bioinspir. Biomim. (in press)
6. A.G. Winter, V. "Helping the Disabled Get Off-Road and On with Their LIves," DEM+ND: ASME Global Development Review. 1 (Fall): 18-23 (2013).
7. A.G. Winter, V., R.L.H. Deits, A.E. Hosoi. "Localized fluidization burrowing mechanics of *Ensis directus*," J. Exp. Biol. 215 (12): 2072-2080 (2012).
8. A.G. Winter, V., A.E. Hosoi. "Identification and Evaluation of the Atlantic Razor Clam (*Ensis directus*) for Biologically-inspired Subsea Burrowing Systems," Integr. Comp. Biol. 51 (1): 151-157 (2011).
9. S. Jung, A.G. Winter, V., A. E. Hosoi, "Dynamics of digging in wet soil," Int. J. Nonl. Mech. 46, 602 (2011).

10. A.G. Winter, A.B. Smith. "Assessing MAARDEC: A Comparison with Other Assistive Device Workshop and Disability Organization Models (*Innovations Case Discussion*: MAARDEC)." Innovations Vol. 3 No. 3 (Summer 2008): 79-81.
11. A.G. Winter, V. "Assessment of Wheelchair Technology in Tanzania." International Journal for Service Learning in Engineering Vol. 2 No. 1 (Sept. 2006): 66-77.

Peer-Reviewed Conference Articles

1. P.J. Zimoch, E. Tixier, A. Joshi, A.E. Hosoi, A.G. Winter, V. "Bio-Inspired, Low-Cost, Self-Regulating Valves for Drip Irrigation in Developing Countries." 25th International Conference on Design Theory and Methodology, ASME IDETC/CIE 2013. Paper# DETC2013-12495. (paper and oral presentation)
2. A.G. Winter, V. "Stakeholder and Constraint-Driven Innovation of a Novel, Lever-Propelled, All-Terrain Wheelchair." 25th International Conference on Design Theory and Methodology, ASME IDETC/CIE 2013. Paper# DETC2013-12588. (paper and oral presentation)
3. A.G. Winter, V, R.L.H. Deits, D.S. Dorsch. "Critical Timescales for Burrowing in Undersea Substrates via Localized Fluidization, Demonstrated by RoboClam: A Robot Inspired by Atlantic Razor Clams." 37th Mechanisms and Robotics Conference, ASME IDETC/CIE 2013. Paper# DETC2013-12798. (paper and oral presentation)
4. A. Banzaert, A.G. Winter, V. "User-Centered Design of Agricultural Waste Charcoal Cooking Fuel for Developing Countries." 18th Design for Manufacturing and the Life Cycle Conference, ASME IDETC/CIE 2013. Paper # DETC2013-12219. (paper and oral presentation).
5. A.G. Winter, V, R. Stoner, C. Fine. "The Tata Center for Technology and Design at MIT." The 2013 International Forum, American Society for Engineering Education Annual Conference.
6. A.G. Winter, V, M.A. Bollini, B.M. Judge, N.K. Scolnik, H.F. O'Hanley, D.S. Dorsch, S. Mukherjee, D.D. Frey. "Stakeholder-Driven Design Evolution of the Leveraged Freedom Chair Developing World Wheelchair." ASME IMECE 2012. Paper# IMECE2012-88881. (paper and oral presentation)
7. G.D. Tao, H.S. Cho, D. Frey, A.G. Winter, V. "Design of a Low-Cost Autoclave for Developing World Health Clinics." 9th International Conference on Design Education, ASME IDETC/CIE 2012. Paper# DETC2012-71435. (paper and oral presentation)
8. A.G. Winter, V, R.L.H Deits, D.S. Dorsch, A.E. Hosoi, A.H. Slocum. "Teaching RoboClam to Dig: The Design, Testing, and Genetic Algorithm Optimization of a Biomimetic Robot." IEEE IROS 2010. Paper # WeET11.3, 2010. (paper and oral presentation)
9. A.G. Winter, V, M.A. Bollini, D.H. DeLatte, B.M. Judge, H.F. O'Hanley, J.L. Pearlman, N.K. Scolnik. "The design, fabrication, and performance of the East African trial Leveraged Freedom Chair." 15th Design for Manufacturing and the Lifecycle Conference, ASME IDETC 2010. Paper# DETC2010-29096. (paper and oral presentation)
10. A.G. Winter, V, R.L.H. Deits, D.S. Dorsch, A.E. Hosoi, A.H. Slocum. "Multi-substrate burrowing performance and constitutive modeling of RoboClam: a biomimetic robot based on razor clams." 34th Annual Mechanisms and Robotics Conference, ASME IDETC 2010. Paper# DETC2010-29060. (paper and presentation)
11. A.G. Winter, V, M.A. Bollini, D.H. DeLatte, B.M. Judge, H.F. O'Hanley, N.K. Scolnik. "The Design and Fabrication of the East African Trial Leveraged Freedom Chair," 2010 RESNA Conference. (paper and oral presentation)
12. A.G. Winter, V, M.A. Bollini, D.H. DeLatte, H.F. O'Hanley, N.K. Scolnik. "The design and testing of a low-cost, globally-manufacturable, multi-speed mobility aid designed for use on varied terrain in developing and developed countries." 28th Biennial Mechanisms and Robotics Conference, ASME IDETC 2009. Paper# DETC2009-86808. (paper, oral presentation, student design competition poster)
13. A.G. Winter, V, A.E. Hosoi, A.H. Slocum, R.L.H. Deits. "The Design and Testing of RoboClam: A Machine used to Investigate and Optimize Razor Clam-Inspired Burrowing Mechanisms for Engineering Applications." 33rd Mechanisms and Robotics Conference, ASME IDETC 2009. Paper# DETC2009-87609. (paper, oral presentation, student design competition poster)
14. A.G. Winter, V, M.A. Bollini, D.H. DeLatte, H.F. O'Hanley, N.K. Scolnik. "The Leveraged Freedom Chair: A Wheelchair Designed for Developing Countries." Student Design Competition, 2009 RESNA Conference. (extended abstract and poster presentation)
15. A.G. Winter, V, M.A. Bollini, D.H. DeLatte, G. Jones, H.F. O'Hanley, N.K. Scolnik. "The Leveraged Freedom Chair: A Wheelchair Designed for Developing Countries." 2009 RehabMove Conference. (extended abstract and poster presentation)
16. S.E. Szczesny, A.G. Winter, V. "Design of a Gimbaled Compliant Mechanism Stage for Precision Motion and Dynamic Control in Z, θX & θY Directions." ASME DETC 2004. (paper and oral presentation)

Theses

1. A.G. Winter, V. *Biologically Inspired Mechanisms for Burrowing in Undersea Substrates.* Ph.D. Thesis, MIT Department of Mechanical Engineering, September 2010.
2. A.G. Winter, V. *Design of fluid film journal bearings containing continuous 3D fluid pathways which are formed by wrapping a sheet containing 2D through-cut features.* Masters Thesis, MIT Department of Mechanical Engineering, June 2005.

Popular Media

1. A. Winter. "The Right Trajectory," Mechanical Engineering Magazine, Nov. 2013.
2. A. Winter. "Constraint-Driven Innovation," Mechanical Engineering Magazine, Aug. 2013.
3. A. Winter. "Research for Development," Mechanical Engineering Magazine, May 2013.
4. A. Winter. "Stakeholder-Driven Design," Mechanical Engineering Magazine, Feb. 2013.
5. A. Winter. "Designing for the Rest of the Global Market: Engineering's New Frontier." Mechanical Engineering Vol. 133/No. 9 Sept. 2011.
6. A. Winter, J. Childs, J. Tak. "Case Study: Leveraged Freedom Chair." Core 77 Feb. 6, 2011.
7. A.G. Winter. "A Serendipitous Passion: How a Public Service Center fellowship got me hooked on international development." Technology Review May/June 2008. http://www.technologyreview.com/article/20633/page1/
8. A.G. Winter, V, R. Hotchkiss. "Mechanical Principles of Wheelchair Design." 2006. (http://web.mit.edu/awinter/Public/Wheelchair/Wheelchair%20Manual-Final.pdf)

INVITED TALKS

1. "Constraint-Driven Innovation: Creating Global Impact by Addressing Emerging Market Challenges," Boston Scientific Executive Retreat, Feb. 4, 2014.
2. "Subsea Burrowing to Developing World Irrigation: Using Biologically-Inspired Fluid Systems in Highly Constrained Environments," Fluid Dynamics Reviews Seminar, Dept. of Mechanical Engineering, University of Maryland, Dec. 13, 2013.
3. "Engineering Innovation, Research, and Entrepreneurship in Emerging Markets," ASME Webinar: Engineering for the Developing World, Nov. 21, 2013.
4. "How Academia and Social Enterprise can Impact Developing/Emerging Markets," ASME Board of Governors Meeting, Nov. 16, 2013.
5. "Reinventing Markets for Automotive Technologies," MIT @ F1, Formula 1 United States Grand Prix, Nov. 15, 2013.
6. "Emerging Technologies for Emerging Markets," EmTech, Innovators Under 35, Oct. 9, 2013.
7. "Water Work in GEAR Lab: Irrigation and Purification," MIT Water Club, Sept. 24, 2013.
8. "Innovation and Design for Emerging Markets," company-wide seminar for Mahindra, Chennai, India, Aug. 21, 2013.
9. "Solving Intractable Challenges in Developing and Emerging Markets Through the Convergence of Machine Design, Product Design, and Mechanics Research," Forum on Groundbreaking Research in Engineering Design: Fueling Growth in Emerging Markets, ASME IDETC/CIE, Aug. 6, 2013.
10. "Engineering Research in Developing/Emerging Markets," Harvard SEED Camp, July 3, 2013.
11. "Global Engineering and Research Lab," MIT Women's Technology Program, July 2, 2013.
12. "Global Engineering," MIT Global Fellows Program, June 27, 2013.
13. "Solving Intractable Challenges in Developing and Emerging Markets through the Convergence of Machine Design, Product Design, and Mechanics Research," Special Seminar in the Department of Mechanical Engineering, Stanford University, May 16, 2013.
14. "From Undersea Burrowing to Developing World Irrigation: Using Biologically-Inspired Fluid Systems in Highly Constrained Environments," Fluid Mechanics Seminar in the Department of Mechanical Science and Engineering, University of Illinois Urbana-Champaign, Apr. 19, 2013.
15. "Using Innovation, Engineering Research, and Education to Make a Social Impact in Developing and Emerging Markets," Inquiries in Engineering Education Seminar Series, sponsored by UIUC iFoundry, University of Illinois Urbana-Champaign, Apr. 18, 2013.
16. "Using Innovation, Engineering Research, and Education to Make a Social Impact in Developing and Emerging Market," Boston University Engineering and Design Club Seminar Series, Apr. 11, 2013.

17. "Using Engineering Science and Technology Creation to Impact Emerging Markets," MIT Mechanical Engineering Alumni Breakfast, Mar. 18, 2013.
18. "Leveraging Stakeholder-Driven Design, University Partnerships, and Engineering Research to Create Assistive Technologies in Developing Countries," International Society for Prosthetics and Orthotics World Congress, Hyderabad, India, Feb. 7, 2013.
19. "Global Engineering and Research," company-wide seminar for Mahindra, Chennai, India, Jan. 11, 2013.
20. "Making a Social Impact through Engineering Research, Science, and Innovation," MIT Info Group Luncheon, Dec. 19, 2012.
21. "Design for Reverse Innovation," MIT-Tata Center for Frugal Engineering Proseminar, Dec. 6, 2012.
22. "Razor Clam to RoboClam: Creating Biologically Inspired Subsea Burrowing Systems," Northeastern University Marine Science Center Seminar 2012 Fall Seminar Series, Nov. 29, 2012.
23. "Making a Social Impact through Engineering Research, Science, and Innovation," ASME Social Meetup for Early Career Engineers, 2012 ASME International Mechanical Engineering Congress and Exposition, Nov. 11, 2012.
24. "The Global Engineering and Research (GEAR) Lab," Society for Women Engineers – Engineering For Change Connect Event, 2012 Society for Women Engineers Annual Conference, Nov. 9, 2012.
25. "Engineering, Science, and Social Entrepreneurship in Emerging Markets," Keynote talk for the The Indus Entrepreneurs (TiE) Boston Forum for Social Entrepreneurs, Oct. 27, 2012.
26. "Global Engineering and Research Lab," Overview of research activities, presented to Sir Ratan Tata, Chairman of the Tata Group, Oct. 25, 2012
27. Infinite Innovation, Vision of the Future Section, Inauguration Symposia for MIT President L. Rafael Reif, Sept. 19, 2012.
28. "Science, Technology, and Social Entrepreneurship in Emerging Markets," American Society of Mechanical Engineers Board of Governors Meeting, July 19, 2012.
29. "The Leveraged Freedom Chair: a Collaboration Between MIT, Pinnacle Industries, and Jaipur Foot," Presentation to the Chief Minister of Madhya Pradesh, July 10, 2012.
30. "The Leveraged Freedom Chair: Using Science, Engineering, and Stakeholder-Driven Design to Reinvent the Wheelchair in the Developing World," TEDxBoston, June 22, 2012. http://tedxtalks.ted.com/video/TEDxBoston-Amos-Winter-The-Leve
31. "Biologically Inspired Subsea Burrowing Systems," Battelle Day at MIT, June 1, 2012.
32. "Biologically Inspired Systems for Subsea Burrowing," 10th International Mine Warfare Technology Symposium, May 8, 2012.
33. "Designing for Highly Constrained Environments: from the Deep Sea to the Developing World," Hatsopoulos Microfluids Laboratory 10th Anniversary Celebration, Faculty Alumni Talks, April 4, 2012.
34. "Global Engineering: Technological Opportunities for Commercial, Social, and Scientific Impact in the Developing and Developed World," Continuum Global Staff Meeting, Feb. 6, 2012.
35. "Global Engineering: Technological Opportunities for Commercial, Social, and Scientific Impact in the Developing and Developed World," Harvard Kennedy School Center for International Development, Friday Speaker Series, Nov. 18, 2011.
36. "The Leveraged Freedom Chair: Using Stakeholder Feedback and Engineering Research to Reinvent the Wheelchair in the Developing World," ASME IMECE Congress, Track 22-3-4 Global Outreach: Volunteering in Developing Communities, Nov. 15, 2011.
37. "Global Engineering: Technological Opportunities for Commercial, Social, and Scientific Impact in the Developing and Developed World," Brief to Dr. Jeffery Wadsworth, CEO, Battelle Memorial Institute, Nov. 11, 2011.
38. "Global Design in Highly Constrained Environments," Mechanical Engineering Departmental Seminar Series, University of Rhode Island, Sept. 23, 2011.
39. "Razor Clam to RoboClam: Biologically Inspired Mechanisms for Subsea Burrowing," Society for Integrative and Comparative Biology (SICB) annual meeting, Bioinspiration: Applying Mechanical Design to Experimental Biology symposium, Jan. 3, 2011.
40. "Design and Implementation of the Leveraged Freedom Chair: Innovating and Commercializing Appropriate Technology." Indian Institute of Technology Delhi, Department of Mechanical Engineering, Innovation Training Workshop, Dec. 13, 2010.
41. "Razor Clam to RoboClam: Burrowing Drag Reduction Mechanisms and their Robotic Adaptation," The Robotics Institute, Carnegie Mellon University, Foundations of Robotics Seminar, Nov. 10, 2010.
42. "Design and Implementation of the Leveraged Freedom Chair: Example of Commercializing Appropriate Technology," Lemelson Foundation Recognition and Mentoring Program summit, Indonesia, Oct. 29, 2010.

43. "The Leveraged Freedom Chair and Technology in the Developing World," Future of Technology Conference, Taubman College of Architecture and Urban Planning, University of Michigan, Sept. 24, 2010.
44. "The MIT Mobility Lab and the Leveraged Freedom Chair (LFC)," ASME Engineering for the Developing World Summit, National Academy of Sciences, Mar. 16, 2010.
45. "The Leveraged Freedom Chair: A Developing Country Wheelchair," World Health Innovation and Technology Congress, Extremely Affordable Health Innovations, Nov. 10, 2009.
46. "Biologically-Inspired Methods for Burrowing and Anchoring into Undersea Substrates," Tufts University Department of Mechanical Engineering Seminar Series, Oct. 29, 2009.
47. "Biologically-Inspired Mechanisms for Burrowing and Anchoring in Undersea Substrates," Naval Underwater Warfare Center, weekly seminar series, July 6, 2009.
48. "Projects and programs from the MIT Mobility Lab," Young Leaders for Social Change section, Unite for Sight Global Health and Innovation Summit, Yale University, April 18, 2009.
49. "Biologically Inspired Mechanisms for Burrowing and Anchoring," poster presentation and RoboClam demonstration, Battelle Board of Directors Annual Meeting, Columbus, OH, Feb. 4, 2009.
50. "Wheelchair Programs at MIT," Pan African Wheelchair Builders Association Congress, Moshi, Tanzania, September 19, 2007.
51. "Biologically Inspired Mechanisms for Burrowing and Anchoring," poster presentation, Battelle National Security Division Internal R&D Conference, Columbus, OH, June 13, 2007.
52. "Wheelchair Design in Developing Countries," Friday Speaker Series at the Sustainable International Development Programs, Heller School for Social Policy and Management, Brandeis University, February 16, 2007.
53. "Redesigning the Wheelchair," presentation at the MIT International Development Forum, April 24, 2006.
54. "Robots that operate in extreme environments: deep sea AUVs and BattleBots," presentation for elementary school students at Camp Robotech, Nashua, NH, August 6, 2003.
55. Guest speaker during Access Exeter, a summer program for high school students, Cambridge, MA, June 25, 2003.
56. "Using LEGOs to Teach Engineering Principles to Elementary School Students," Elementary school teacher training at the Monterey Bay Aquarium Research Institute, Moss Landing, CA, June 28, 2001.

CONFERENCE PRESENTATIONS AND POSTERS

1. A.G. Winter, V. "The Mechanics of Localized Fluidization Burrowing," presentation, 66th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Pittsburgh, PA, November 25, 2013.
2. A.G. Winter, V, R. Stoner, C. Fine. "The Tata Center for Technology and Design," poster presentation, International Forum, American Society for Engineering Education Annual Conference, Atlanta, GA, June 22, 2013.
3. P. Zimoch, E. Tixier, A.E. Hosoi, A. Winter. "Bio-inspired, low-cost, self-regulating valves for drip irrigation in developing countries," presentation, 65th Annual Meeting of the American Physical Society Division of Fluid Dynamics, San Diego, CA, November 18, 2012.
4. A.G. Winter, V, et al. "The design, testing, and performance of RoboClam, a robot inspired by the burrowing mechanisms of Atlantic razor clams (*Ensis directus*)," presentation, 62nd Annual Meeting of the American Physical Society Division of Fluid Dynamics, Minneapolis, MN, November 22, 2009.
5. A.G. Winter, V, A.E. Hosoi, "Drag reducing fluidization mechanisms employed by burrowing razor clams (*Ensis directus*)," poster presentation, Dynamics Days 2009, San Diego, CA, January 10, 2009.
6. A.G. Winter, V, A.E. Hosoi, "Drag reduction mechanisms employed by burrowing razor clams (*Ensis directus*)," presentation, 61st Annual Meeting of the American Physical Society Division of Fluid Dynamics, San Antonio, TX, November 23, 2008.
7. A.G. Winter, V, et al. "Leveraged Freedom Chair: A Wheelchair Designed for Developing Countries," poster presentation, Bioengineering Applications to Address Global Heath, Duke University, November 6-7, 2008.
8. A.G. Winter, V. "Biologically Inspired Mechanisms for Burrowing and Anchoring in Soft Undersea Substrates," poster presentation, A Day of Locomotion, Harvard University, October 16, 2007.
9. A.G. Winter, V. "Wheelchair Design in Developing Countries," presentation at the MIT Small-Talks Student Seminar Series, October 4, 2006.
10. A.G. Winter, V. "Fluid Film Bearings Requiring No Precision Machining Processes, Formed by Wrapping 2D sheets," poster presentation, ASPE 19th Annual Meeting 2004.
11. A.G. Winter, V. "Building a LEGO ROV using the Mindstorms Robotics Kit," Monterey Bay Aquarium Research Institute intern presentations, Moss Landing, CA, August 23, 2001.

ORGANIZATION MEMBERSHIP

Pi Tau Sigma International Mechanical Engineering Honor Society	2012-Present
Society for Integrative and Comparative Biology	2010-Present
American Physical Society	2009-Present
Rehabilitation Engineering and Assistive Technology Society of North America	2009-Present
American Society of Mechanical Engineers	2004-Present
Sigma Xi: The Scientific Research Society	2004-Present
Tau Beta Pi Engineering Honor Society	2003-Present

ACADEMIC AND PROFESSIONAL ACTIVITIES

Internal Service at MIT

Tata Center for Technology and Design, Proseminar Speaker Series Organizer	2013
Tata Center for Technology and Design, Program Committee	2013-Present
DeFlorez Design Compeittion Judge	2013
MISTI Global Seed Funds Grant Reviewer	2012
Tata Center for Technology and Design, Core Faculty	2011-Present
MIT Graduate Resident Tutor in New House Residence	2005-2010
MIT Hobby Shop Advisory Committee Member	2008-2010
MIT 2.007 “Design and Manufacturing I” contest judge	2004-2008
MIT Graduate Student Council Student Life Grant Review Committee	2007
MIT IDEAS Competition Rowing Wheelchair Advisor	2006

External Service

ASME Engineering for Global Development Conference Programming Committee	2013-Present
Organized Forum on Groundbreaking Research in Engineering Design: Fueling Growth in Emerging Markets, 2013 ASME IDETC/CIE	2013
NSF Workshop: Research in Materials and Manufacturing for Extreme Affordability (RIMMEA)	Mar. 2011
ASME Engineering for Global Development Committee	2011-Present
RESNA SIG-17 “International Appropriate Technology” Chair	2011-2013
ASME Engineering for Change Advisory Committee	2010-Present
ASME Engineering for the Developing World Summit	Mar. 2010
National Society of Black Engineers Program Assistant	2005
National Society of Black Engineers Program Assistant	2005
St. Paul’s School FIRST Robotics Team Volunteer	2005

Journal Referee

Bioinspiration & Biomimetics	2013
ASME Journal of Mechanical Design	2012-2013
Experimental Mechanics	2011