Martin L. Demaine

Curriculum Vitæ

MIT Computer Science and Artificial Intelligence Lab
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Canadian and U.S. Citizen

Positions Held

2005–present	Angelika and Barton Weller Artist-in-Residence, Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology
2002–present	Technical Instructor, Glass Lab, Department of Materials Science and Engineering, Massachusetts Institute of Technology
2001–present	Visiting Scientist, Computer Science and Artificial Intelligence Laboratory, Massachusetts Institute of Technology
1997–2001:	Visiting Scholar, Department of Computer Science, University of Waterloo

Recent Exhibitions

1. "Computational Origami" (paper sculpture, joint work with Erik Demaine), Design and the Elastic Mind, Museum of Modern Art (MoMA), New York, Feb.–May 2008.
2. "Fluency" (glass sculpture, joint work with Erik Demaine), one-artist show, Andrew and Laura McCain Gallery, Florenceville, Canada, Feb.–Mar. 2007.
3. Hand-blown glass, Unique! 30 Years of Outstanding Crafts, Canadian Museum of Civilization, Ottawa, Canada, Oct. 2006–Aug. 2007.
4. "Junkyard Art: The Art of Recycling" (mixed-media sculpture, joint show with students), Massachusetts Institute of Technology, Cambridge, USA, Feb. 2005.
5. "Building with Books: A Bibliophile's Bedroom" (mixed-media sculpture, joint show with students), Boston Public Library, Boston, USA, Apr.–June 2004; and Massachusetts Institute of Technology, Cambridge, USA, Feb.–Mar. 2004.

Permanent Collections

My glass work is represented in private and public collections internationally. Commisions include a set of goblets for Queen Elizabeth.

1. South Australian Museum, Adelaide, Australia
2. National Gallery of Canada, Ottawa, Canada
3. Montreal Museum of Fine Arts, Montreal, Canada
4. Canadian Clay & Glass Museum, Waterloo, Canada
5. Nova Scotia Museum, Halifax, Canada
6. New Brunswick Museum, St. John
7. "Hyparhedra" (paper sculpture), Southwestern College, Winfield, Kansas, USA
8. "Topological puzzles" (wire puzzles), Elliott Avedon Museum and Archive of Games, University of Waterloo, Ontario, Canada

Teaching

Spring 2008	MIT 6.100, Experimental Glass Musical Instruments, with Erik Demaine.
IAP 2007	MIT 6.096, Knot Language: Recreating Inca Quipu/Khipu, with Erik Demaine and Jean-Jacques Quisquater.
IAP 2005	MIT IAP 6451, Junkyard Art: The Art of Recycling, with Jeff Smith, Justin Adams, and Erik Demaine.
Fall 2004	MIT 4.491, Form-Finding and Structural Optimization, with Barb Cutler, Erik Demaine, Simon Greenwold, Axel Kilian, and John Ochsendorf.
Spring 2004	MIT 4.493, 3-D Design Tools for Equilibrium: Exploring Gaudi's World, with Barb Cutler, Erik Demaine, Axel Kilian, and John Ochsendorf.
IAP 2004	MIT IAP 5804, Building with Books, with Erik Demaine, Chris Dewart, Stephanie Hartman, Wendy Jacob, and John Ochsendorf.
Spring 2003–present	MIT Glass Lab, Beginner Class.

Students

Current undergraduate students:

1. Kaitlyn Becker (Mechanical Engineering)
2. Kathryn Shroyer (Mechanical Engineering)

Thesis committees:

1. Kyle Steinfeld (Master of Architecture), defended May 2004.
2. Ken Giesecke (Master of Architecture), defended Dec. 2003.

Plenary Talks

Nov. 2007 "Mathematics Is Art", Plenary talk, 17th Annual Fall Workshop on Computational Geometry, Hawthorne, New York.

Research Collaborators

I have published papers with the following 78 co-authors: Timothy Abbott (Massachusetts Institute of Technology), Zachary Abel (Harvard University), Greg Aloupis (McGill University), Esther Arkin (SUNY Stony Brook), Devin Balkcom (Dartmouth College), Brad Ballinger (University of California, Davis), Nadia M. Benbernou (Massachusetts Institute of Technology), Michael Bender (SUNY Stony Brook), Therese Biedl (University of Waterloo), Prosenjit Bose (Carleton University), Kevin Buchin (Freie Universität Berlin), Maike Buchin (Freie Universität Berlin), Jonathan Buss (University of Waterloo), Eowyn Čenek (University of Waterloo), Timothy Chan (University of Waterloo), David Charlton (Boston University), Barry Cipra (Minnesota), Robert Connelly (Cornell University), Mirela Damian (Villanova U.), Erik D. Demaine (Massachusetts Institute of Technology), Vida Dujmović (McGill University), Alan Edelman (Massachusetts Institute of Technology), Dania El-Khechen (Concordia University), David Eppstein (University of California, Irvine), Sándor Fekete (TU Braunschweig), Robin Flatland (Siena College), Rudolf Fleischer (Fudan University), Greg Frederickson (Purdue U.), Erich Friedman (Stetson U.), Mohammad-Taghi Hajiaghayi (Massachusetts Institute of Technology), Robert A. Hearn (Massachusetts Institute of Technology), Michael Hoffmann (ETH Zurich), Ferran Hurtado (U. Politècnica de Catalunya), John Iacono (Polytechnic U.), Mashhood Ishaque (Tufts U.), Lars Jacobsen (U. Southern Denmark), Daniel Kane (Massachusetts Institute of Technology), Craig Kaplan (University of Waterloo), Christian Knauer (Freie Universität Berlin), Scott D. Kominers (Harvard University), Arthur Langerman (Langerman Diamonds), Stefan Langerman (Université Libre de Bruxelles), Sylvain Lazard (INRIA Lorraine), Charles E. Leiserson (Massachusetts Institute of Technology), Jeffrey Lindy (New York U.), Anna Lubiw (University of Waterloo), Henk Meijer (Queens University), Joseph Mitchell (SUNY Stony Brook), J. Ian Munro (University of Waterloo), Jelani Nelson (Massachusetts Institute of Technology), Paul Nijjar (University of Waterloo), Joseph O'Rourke (Smith College), Timo von Oertzen (U. Saarbrücken), Mark Overmars (Utrecht U.), A. Laurie Palmer (Art Inst. Chicago), Irena Pashchenko (Stanford U.), Per-Olof Persson (Massachusetts Institute of Technology), Eynat Rafalin (Google Inc.), Suneeta Ramaswami (Rutgers U.), Ares Ribó (Freie

Universität Berlin), Steven Robbins (McGill University), Tom Rodgers (Georgia), Günter Rote (Freie Universität Berlin), André Schulz (Freie Universität Berlin), Robert T. Schweller (Northwestern U.), Saurabh Sethia (SoftJin Tech.), Steven Skiena (SUNY Stony Brook), Diane Souvaine (Tufts U.), Ileana Streinu (Smith U.), Perouz Taslakian (McGill University), Csaba D. Tóth (Massachusetts Institute of Technology), Godfried Toussaint (McGill University), Ryuhei Uehara (JAIST), Helena Verrill (Louisiana State U.), Tomáš Vinař (University of Waterloo), Ming-wei Wang (University of Waterloo), Sue Whitesides (McGill University), Vincent Yeung (Massachusetts Institute of Technology).

Books

1. *Tribute to a Mathemagician* (edited with Barry Cipra, Erik D. Demaine, and Tom Rodgers), A K Peters, Nov. 2004.

Refereed Journal Articles

Most papers are available from http://martindemaine.org/papers/.

1. "Staged Self-Assembly: Nanomanufacture of Arbitrary Shapes with $O(1)$ Glues" (joint work with Erik D. Demaine, Sándor P. Fekete, Mashhood Ishaque, Eynat Rafalin, Robert T. Schweller, and Diane L. Souvaine), *Natural Computing*, to appear. Special issue of selected papers from DNA 2007.
2. "Sand Drawings and Gaussian Graphs" (joint work with Erik D. Demaine, Perouz Taslakian, and Godfried T. Toussaint), *Journal of Mathematics and the Arts*, volume 1, number 2, pages 125–132, June 2007.
3. "Jigsaw Puzzles, Edge Matching, and Polyomino Packing: Connections and Complexity" (joint work with Erik D. Demaine), *Graphs and Combinatorics*, volume 23 (Supplement), pages 195–208, 2007. Special issue on Computational Geometry and Graph Theory: The Akiyama-Chvatal Festschrift.
4. "Puzzles, Art, and Magic with Algorithms" (joint work with Erik D. Demaine), *Theory of Computing Systems*, volume 39, number 3, pages 473–481, June 2006. Special issue of selected papers from FUN 2004.
5. "Morpion Solitaire" (joint work with Erik D. Demaine, Arthur Langerman, and Stefan Langerman), *Theory of Computing Systems*, volume 39, number 3, pages 439–453, June 2006. Special issue of selected papers from FUN 2004. Translated into Portuguese: "Cinco-em-linha solitário", *Boletim da Sociedade Portuguesa de Matemática* 54:125–142, May 2006.
6. "The Helium Stockpile: A Collaboration in Mathematical Folding Sculpture" (joint work with Erik D. Demaine and A. Laurie Palmer), *Leonardo*, volume 39, number 3, pages 233–235, June 2006.
7. "Hinged Dissection of Polyominoes and Polyforms" (joint work with Erik D. Demaine, David Eppstein, Greg N. Frederickson, and Erich Friedman), *Computational Geometry: Theory and Applications*, volume 31, number 3, pages 237–262, June 2005. Special issue of selected papers from CCCG'99.
8. "When Can You Fold a Map?" (joint work with Esther M. Arkin, Michael A. Bender, Erik D. Demaine, Joseph S. B. Mitchell, Saurabh Sethia, and Steven S. Skiena), *Computational Geometry: Theory and Applications*, volume 29, number 1, pages 23–46, Sept. 2004. Special issue of selected papers from the 10th Annual Fall Workshop on Computational Geometry, 2000.
9. "Solitaire Clobber" (joint work with Erik D. Demaine and Rudolf Fleischer), *Theoretical Computer Science*, volume 313, number 3, pages 325–338, Feb. 2004. Special issue of selected papers presented at the Schloss Dagstuhl Seminar on Algorithmic Combinatorial Game Theory, 2002.
10. "Pushing Blocks is Hard" (joint work with Erik D. Demaine, Michael Hoffmann, and Joseph O'Rourke), *Computational Geometry: Theory and Applications*, volume 26, number 1, pages 21–36, Aug. 2003. Special issue of selected papers from the 13th Canadian Conference on Computational Geometry, 2001.
11. "Palindrome Recognition Using a Multidimensional Tape" (joint work with Therese C. Biedl, Jonathan F. Buss, Erik D. Demaine, Mohammadtaghi Hajiaghayi, and Tomáš Vinař), *Theoretical Computer Science*, volume 302, number 1–3, pages 475–480, June 2003.
12. "Hinged Dissection of the Alphabet" (joint work with Erik D. Demaine), *Journal of Recreational Mathematics*, volume 31, number 3, pages 204–207, 2003.
13. "Enumerating Foldings and Unfoldings between Polygons and Polytopes" (joint work with Erik D. Demaine, Anna Lubiw, and Joseph O'Rourke), *Graphs and Combinatorics*, volume 18, number 1, pages 93–104, 2002.

14. "Balanced k-Colorings" (joint work with Therese C. Biedl, Eowyn Čenek, Timothy M. Chan, Erik D. Demaine, Rudolf Fleischer, and Ming-Wei Wang), *Discrete Mathematics*, volume 254, pages 19–32, 2002.
15. "A Note on Reconfiguring Tree Linkages: Trees can Lock" (joint work with Therese Biedl, Erik Demaine, Sylvain Lazard, Anna Lubiw, Joseph O'Rourke, Steve Robbins, Ileana Streinu, Godfried Toussaint, and Sue Whitesides), *Discrete Applied Mathematics*, volume 117, number 1–3, pages 293–297, 2002.
16. "Locked and Unlocked Polygonal Chains in Three Dimensions" (joint work with T. Biedl, E. Demaine, S. Lazard, A. Lubiw, J. O'Rourke, M. Overmars, S. Robbins, I. Streinu, G. Toussaint, and S. Whitesides), *Discrete & Computational Geometry*, volume 26, number 3, pages 269–281, Oct. 2001.
17. "Polygons Cuttable by a Circular Saw" (joint work with Erik D. Demaine and Craig S. Kaplan), *Computational Geometry: Theory and Applications*, volume 20, number 1–2, pages 69–84, Oct. 2001. Special issue of selected papers from CCCG 2000.
18. "Folding Flat Silhouettes and Wrapping Polyhedral Packages: New Results in Computational Origami" (joint work with Erik D. Demaine and Joseph S. B. Mitchell), *Computational Geometry: Theory and Applications*, volume 16, number 1, pages 3–21, 2000. Special issue of selected papers from CGC'98.

Refereed Book Chapters

19. "The Complexity of Dyson Telescopes" (joint work with Erik D. Demaine, Rudolf Fleischer, Robert A. Hearn, and Timo von Oertzen), in *Games of No Chance III*, to appear.
20. "Sliding-Coin Puzzles" (joint work with Erik D. Demaine), in *Tribute to a Mathemagician*, pages 63–72, 2004, A K Peters.
21. "Fold-and-Cut Magic" (joint work with Erik D. Demaine), in *Tribute to a Mathemagician*, pages 23–30, 2004, A K Peters.
22. "The Complexity of Clickomania" (joint work with Therese C. Biedl, Erik D. Demaine, Rudolf Fleischer, Lars Jacobsen, and J. Ian Munro), in *More Games of No Chance*, R. J. Nowakowski, ed., pages 389–404, 2002, Cambridge University Press. Collection of papers from the MSRI Combinatorial Game Theory Research Workshop, Berkeley, California, July 24–28, 2000.
23. "Phutball Endgames are Hard" (joint work with Erik D. Demaine and David Eppstein), in *More Games of No Chance*, R. J. Nowakowski, ed., pages 351–360, 2002, Cambridge University Press. Collection of papers from the MSRI Combinatorial Game Theory Research Workshop, Berkeley, California, July 24–28, 2000.
24. "Coin-Moving Puzzles" (joint work with Erik D. Demaine and Helena A. Verrill), in *More Games of No Chance*, R. J. Nowakowski, ed., pages 405–431, 2002, Cambridge University Press. Collection of papers from the MSRI Combinatorial Game Theory Research Workshop, Berkeley, California, July 24–28, 2000.

Refereed Conference Publications

Conference papers that have been accepted as journal articles or book chapters are only listed above (so each paper is listed once).

25. "Hinged Dissections Exist" (joint work with Timothy G. Abbott, Zachary Abel, David Charlton, Erik D. Demaine, and Scott D. Kominers), in *Proceedings of the 24th Annual ACM Symposium on Computational Geometry*, to appear, College Park, MD, June 2008.
26. "Locked and Unlocked Chains of Planar Shapes" (joint work with Robert Connelly, Erik D. Demaine, Sándor Fekete, Stefan Langerman, Joseph S. B. Mitchell, Ares Ribó, and Günter Rote), in *Proceedings of the 22nd Annual ACM Symposium on Computational Geometry*, pages 61–70, Sedona, AZ, June 2006.
27. "Hinged Dissection of Polypolyhedra" (joint work with Erik D. Demaine, Jeffrey F. Lindy, and Diane L. Souvaine), in *Proceedings of the 9th Workshop on Algorithms and Data Structures*, Lecture Notes in Computer Science 3608, pages 205–217, Waterloo, Canada, Aug. 2005.
28. "Recent Results in Computational Origami" (joint work with Erik D. Demaine), in *Origami^3: Proceedings of the 3rd International Meeting of Origami Science, Math, and Education*, pages 3–16, Monterey, CA, Mar. 2001, A K Peters. Translated into Japanese in a book of selected papers from OSME 2001, Morikita Publishing Co., 2005, 3–16.

29. "Polyhedral Sculptures with Hyperbolic Paraboloids" (joint work with Erik D. Demaine and Anna Lubiw), in *Proceedings of the 2nd Annual Conference of BRIDGES: Mathematical Connections in Art, Music, and Science*, pages 91–100, Winfield, KS, July 1999.
30. "Metamorphosis of the Cube" (joint work with Erik Demaine, Anna Lubiw, Joseph O'Rourke, and Irena Pashchenko), in *8th Annual Video Review of Computational Geometry, Proceedings of the 15th Annual ACM Symposium on Computational Geometry*, pages 409–410, Miami Beach, FL, June 1999.
31. "Folding and One Straight Cut Suffice" (joint work with Erik D. Demaine and Anna Lubiw), in *Proceedings of the 10th Annual ACM-SIAM Symposium on Discrete Algorithms*, pages 891–892, Baltimore, MD, Jan. 1999.
32. "Folding and Cutting Paper" (joint work with Erik D. Demaine and Anna Lubiw), in *Revised Papers from the Japan Conference on Discrete and Computational Geometry*, Lecture Notes in Computer Science 1763, pages 104–117, Tokyo, Japan, Dec. 1998.
33. "Planar Drawings of Origami Polyhedra" (joint work with Erik D. Demaine), in *Proceedings of the 6th Symposium on Graph Drawing*, Lecture Notes in Computer Science 1547, pages 438–440, Montréal, Canada, Aug. 1998.

Other Publications

34. "Vertex Pops and Popturns" (joint work with Greg Aloupis, Brad Ballinger, Prosenjit Bose, Mirela Damian, Erik D. Demaine, Robin Flatland, Ferran Hurtado, Stefan Langerman, Joseph O'Rourke, Perouz Taslakian, and Godfried Toussaint), in *Proceedings of the 19th Canadian Conference on Computational Geometry*, pages 137–140, Ottawa, Canada, Aug. 2007.
35. "On Rolling Cube Puzzles" (joint work with Kevin Buchin, Maike Buchin, Erik D. Demaine, Dania El-Khechen, Sándor Fekete, Christian Knauer, André Schulz, and Perouz Taslakian), in *Proceedings of the 19th Canadian Conference on Computational Geometry*, pages 141–144, Ottawa, Canada, Aug. 2007.
36. "Disjoint Segments have Convex Partitions with 2-Edge Connected Dual Graphs" (joint work with Nadia M. Benbernou, Erik D. Demaine, Michael Hoffmann, Mashhood Ishaque, Diane L. Souvaine, and Csaba D. Tóth), in *Proceedings of the 19th Canadian Conference on Computational Geometry*, pages 13–16, Ottawa, Canada, Aug. 2007.
37. "Deflating The Pentagon" (joint work with Erik D. Demaine, Diane L. Souvaine, and Perouz Taslakian), in *Abstracts from the Kyoto International Conference on Computational Geometry and Graph Theory*, to appear, Kyoto, Japan, June 2007.
38. "Wrapping the Mozartkugel" (joint work with Erik D. Demaine, John Iacono, and Stefan Langerman), in *Abstracts from the 20th European Workshop on Computational Geometry*, pages 14–17, Graz, Austria, Mar. 2007. Invited to special issue of *Computational Geometry: Theory and Applications*.
39. "Deflating The Pentagon" (joint work with Erik D. Demaine, Diane L. Souvaine, and Perouz Taslakian), in *Abstracts from the 20th European Workshop on Computational Geometry*, pages 10–13, Graz, Austria, Mar. 2007.
40. "Curves in the Sand: Algorithmic Drawing" (joint work with Mirela Damian, Erik D. Demaine, Vida Dujmović, Dania El-Khechen, Robin Flatland, John Iacono, Stefan Langerman, Henk Meijer, Suneeta Ramaswami, Diane L. Souvaine, Perouz Taslakian, and Godfried T. Toussaint), in *Proceedings of the 18th Canadian Conference on Computational Geometry*, pages 11–14, Aug. 2006.
41. "Dynamic Ham-Sandwich Cuts of Convex Polygons in the Plane" (joint work with Timothy Abbott, Erik D. Demaine, Daniel Kane, Stefan Langerman, Jelani Nelson, and Vincent Yeung), in *Proceedings of the 17th Canadian Conference on Computational Geometry*, pages 61–64, Windsor, Canada, Aug. 2005. Invited to special issue of *Computational Geometry: Theory and Applications*.
42. "Building Blocks and Excluded Sums" (joint work with Erik D. Demaine, Alan Edelman, Charles E. Leiserson, and Per-Olof Persson), *SIAM News*, volume 38, number 1, pages 1, 4, 6, Jan. 2005.
43. "Puzzles, Art, and Magic with Algorithms" (joint work with Erik D. Demaine), in *Proceedings of the 15th Annual International Symposium on Algorithms and Computation*, Lecture Notes in Computer Science 3341, pages 1, Hong Kong, China, 2004.
44. "Folding Paper Shopping Bags" (joint work with Devin J. Balkcom and Erik D. Demaine), in *Abstracts from the 14th Annual Fall Workshop on Computational Geometry*, pages 14–15, Cambridge, MA, Nov. 2004.

45. "Tighter Bounds on the Genus of Nonorthogonal Polyhedra Built from Rectangles" (joint work with Therese Biedl, Timothy M. Chan, Erik D. Demaine, Paul Nijjar, Ryuhei Uehara, and Ming-wei Wang), in *Proceedings of the 14th Canadian Conference on Computational Geometry*, pages 105–108, Lethbridge, Canada, Aug. 2002.
46. "The CCCG 2001 Logo" (joint work with Erik D. Demaine and Anna Lubiw), in *Proceedings of the 13th Canadian Conference on Computational Geometry*, pages iv–v, Waterloo, Canada, Aug. 2001.
47. "PushPush and Push-1 are NP-hard in 2D" (joint work with Erik D. Demaine and Joseph O'Rourke), in *Proceedings of the 12th Annual Canadian Conference on Computational Geometry*, pages 211–219, Fredericton, Canada, Aug. 2000.
48. "Hiding Disks in Folded Polygons" (joint work with Therese C. Biedl, Erik D. Demaine, Anna Lubiw, and Godfried T. Toussaint), in *Proceedings of the 10th Canadian Conference on Computational Geometry*, Montréal, Canada, Aug. 1998.
49. "Unfolding Some Classes of Orthogonal Polyhedra" (joint work with Therese Biedl, Erik Demaine, Anna Lubiw, Mark Overmars, Joseph O'Rourke, Steve Robbins, and Sue Whitesides), in *Proceedings of the 10th Canadian Conference on Computational Geometry*, Montréal, Canada, Aug. 1998.