

Curriculum Vitae
Hod Lipson, Ph. D.
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Academic Positions

1/10-	Cornell	Associate Director, Mechanical & Aerospace Engineering, and Director of Graduate Studies in ME, Cornell University, Ithaca NY
2/08-	Cornell	Associate Professor, Mechanical & Aerospace Engineering, Cornell University, Ithaca NY
2/08-	Cornell	Associate Professor, Computing & Information Science, Cornell University, Ithaca NY
7/01-1/08	Cornell	Assistant Professor, Mechanical & Aerospace Engineering, Cornell University, Ithaca NY
7/01-1/08	Cornell	Assistant Professor, Computing & Information Science, Cornell University, Ithaca NY
7/01-	Cornell	Member of graduate field of Mechanical Engineering
7/01-	Cornell	Member of graduate field of Aerospace Engineering
7/01-	Cornell	Member of graduate field of Computer Science
1/05-	Cornell	Member of graduate field of Computational Biology
3/08-	Cornell	Member of graduate field of Cognitive Science
11/98-7/01	M.I.T.	Visiting Scholar and Lecturer, Mechanical Engineering Dept., Massachusetts Inst. of Technology, Cambridge MA. Advisor: Prof. Nam P. Suh
11/98-7/01	Brandeis	Postdoctoral researcher, Computer Science Dept., Brandeis University, Waltham MA. Advisor: Prof. Jordan Pollack.

Education

11/94-10/98	Technion	Israel Institute of Technology – Ph.D. Mechanical Engineering Area: CAD, AI in Design. Thesis Title: “Reconstruction of a 3D object from a single freehand sketch as means for CAD interface for conceptual design and analysis” (Advisor: Prof. M. Shpitalni)
9/85-7/89	Technion	Israel Institute of Technology – B.Sc. Mechanical Engineering, Cum Laude.

Professional Positions and Consulting

1996-1997	ASI Inc.	Consultant, developed optical calibration system for interference imaging
1994-1996	Trilogical Inc	Co-founder, wireless communication and GPS tracking. Company acquired and active to date.
1989-1994	Israel Defense Force	Lt. Cmdr. (Navy)
1987-1993	Zorba Technologies	Winterweijk, Netherland. Software & Algorithm Developer for Sheet Metal CAD/CAM Expert System.

Teaching

Fall 2009,10,11	Cornell	Foundations of Artificial Intelligence (CS4700) , Introduction to artificial Intelligence, enrollment ~120
Fall 2007,09-11	Cornell	AI Practicum: Robotics and embodied AI (CS4701) , project course in AI applications in physical robotics, enrollment 25
Fall 2009,10	Cornell	Foundations of Artificial Intelligence (CS4700) , Introduction to artificial Intelligence, enrollment ~120
Fall 2007	Cornell	AI Practicum: Robotics and embodied AI (CS473) , project course in AI applications in physical robotics, enrollment 25
Fall 2002,4,6,8	Cornell	Evolutionary Computation and Design Automation (CS750/MAE650) , Graduate course covering evolutionary computation and applications, enrolment !=~25
Spring 2001-8	Cornell	Mechanical Engineering Synthesis (MAE225) on product design process, Required Introductory Sophomore course enrolment ~120-140
Fall 2002,3,5	Cornell	Data structures and algorithms for Computational Science (CIS409/MAE409) , Advanced undergraduate / Beginning graduate course in, on algorithm design for non-CS majors, enrollment ~15
Fall 2001	Cornell	Geometric Modeling and Computer Aided Design (MAE580) , covering mathematical models of geometry and topology
Spring 2000	Brandeis	Topics in Computer Systems / Computer Aided Design and Geometric Modeling
Fall 2000	MIT	Axiomatic Design (Co-Lecturer)
1997-1998	Technion	Computational Geometry (Teaching Instructor)
1996-1997	Technion	Computer Aided Design Laboratory (Project Tutor)
1995-1997	Technion	Fluid Mechanics (Teaching Instructor)

Graduate and Postdoc Students

Current PhD Students

1. **Jonas Nubert**, 2008-present, Programmable Matter (Field: Mechanical Engineering).

2. **John Amend**, 2008-present, Programmable Phase Transition Materials (Field: Mechanical Engineering).
3. **Robert MacCurdy**, 2009-present, Machine Self Reflection (Field: Mechanical Engineering).
4. **Daniel Ly**, 2009-present, Machine Theory of Mind (Field: Mechanical Engineering).
5. **Jeffrey I. Lipton**, 2010-present, “Multi-material 3D printing of functional devices”, (Field: Mechanical Engineering).
6. **Charlie Richter**, 2010-present, “Flapping flight – modeling, design, and control”, (Field: Computational Biology).
7. **Ted Cornforth**, 2010-present, “Reverse engineering dynamical systems”, (Field: Computational Biology).
8. **Igor Lubatov**, 2010-present, “Machine learning methods in Robotics”, (Field: Mechanical Engineering).
9. **Cheryl Perich**, 2010-present, “Rapid assembly of microscale components”, (Field: Mechanical Engineering).
10. **Jason Yosinski**, 2011-present, “Deep learning for robotic systems”, (Field: Computer Science).

Graduated PhD Students

Evan Malone, 2002-2008; Multimaterial Solid Freeform Fabrication of Active Systems (Field: MAE).

Viktor Zykov, 2003-2007, Damage Diagnosis and Repair in Robotic Systems (Field: MAE)

Daniel L. Cohen, 2005-2010, 3D Printing Under Uncertainty (Field: Mechanical Engineering).

Michael Tolley, 2005-2010, Micro Self-Assembling Stochastic Robotics (Field: ME)

Michael Schmidt, 2006-2010, Co-evolutionary System Identification (Field: Computational Biology)

Jonathan Hiller, 2006-2011, Digital Manufacturing (Field: Mechanical Engineering)

Graduated Master Students

Nicholas Estevez, 2004-2006, Functional Representations for Design. Currently pursuing a Master degree in the Swedish School of Solar Energy Engineering.

David Hejelle, 2007-2009, Machine Metabolism (Field: Mechanical Engineering).

Aaron Leftensy, 2008-2010, Learning Dynamics (Field: Computer Science).

Master of Engineering Students advised

1. Todd Issacson (ME, 2003-4), 3D Printing
2. Kian Rasa (ME, 2003-4), 3D Printing of batteries
3. Evan Khun (CS, 2003-4), Evolutionary Design of @D Kinematics
4. Jonathan Schoenberg (ECE, 2003-4), Evolved strategies for “Capture the Flag”
5. Derrick Yuen (CS, 2003-4), Digital Sketching
6. Michael Chen (CS, 2003-4), Web Service for Dynamics Simulation
7. Diedrich Willers (ME, 2003-4), Modular Plunger tool for 3D Printing
8. Jeremy Weinstein (ME, 2003-4) , Modular Plunger tool for 3D Printing
9. Mytilinaios Efstathios (CS, 2003-4), Self-replicating Molecubes
10. Paul White (ME, 2003-4), Stochastically reconfigurable modular robotics
11. Christopher Johnson (ME 2003-4), Dielectrophoresis Assembly
12. Greg Studer (CS, 2004-5) Self-replicating automata
13. Mike Schmidt (CS, 2005-) Symbolic Regression
14. Keith Sheppard (CS, 2005-6) Learning Control for “Cat in the Hat” Balancing
15. Sean Williams (CS, 2005-6) Extruder Controller Design
16. Adrian Wong (2007-2008) Self-assembling 2D tiles
17. Daniel Paul Gicklhorn (2007-2008) Evolutionary robotics in Phys-X
18. Ryan Christopher Lovrien (2007-2008) GPU for fluidic tetris
19. Phelps Watson Williams (2007-2008) Molecubes Electronics
20. William Edward Kimberly (2007-2008) Amorphous fluidic robot simulation
21. James Grossmann (2008) Six-Dof 3D Printer
22. Brandon Yee (2008) 3D Sketch reconstruction
23. Clayton Chang (2008) 3D Sketch reconstruction

24. Carlos Aguilar (2008), Robotic Painter
25. Kyle Johnson (2008-9) 3D Sketch reconstruction
26. Denise Wong (2009) Vibrating particle robot
27. Gordon Michael Briggs (2009) Evolutionary Design of RF Circuits
28. Patrick James Lingane (2009-10) Locomotion dynamics of vibrating robots
29. Charles Andrew Richter (2009-10) Printable Ornithopters
30. James Francis Smith III (2009-10) Fab@home ABS Extrusion head
31. Adedamola Omotosho (2009-2010) Learning robotic painter
32. Karl Wolfgang Gluck (2009-10) Fab Studio Fab@Home software

Visiting PhD students advised

Richardo F. Mendoza, 2010, Modular robotics, (University of Southern Denmark)

Daniel Lobo, 2009, Machine Metabolism (U. Malaga, Field: CB)

Simon Fivat, 2009, Tensegrity Machines (EPFL, Field: CB)

Shu-Guang Li, 2008, Flutter Energy Harvesting (Field: MAE)

Postdocs advised

Jeff Clune, 2010-2012, Evolutionary design and modularity.

David Kou, 2010, CAD/CAM

Juan Zagal, 2008-2010, Machine Self-reflection. Now faculty in Chile.

Eric Schweikardt, 2008-2009, Modular Robotics. Founded roBlocks.

Kyung-Joong Kim, 2006-2009, Cognitive evolutionary robotics. Now faculty at Sejong Univ.

Nicolas Lassabe, 2008, Modular robotics (Field: CS)

Viktor Zykov, 2008, Damage Diagnosis and Repair in Robotic Systems (Field: MAE)

John Reiffel, 2006-2007, Tensegrity robotics. Now faculty at Union College.

Anupam Saxena, 2005-2007, Inference of biological networks

Sanjeev Kumar, 2004-2006, Algorithms for Musculoskeletal inference

Mark Masry, 2004-2005, Algorithms for 3D Sketch understanding.

Chandana Paul, 2004-2005, Tensegrity Robotics (now at Harvard)

Josh Bongard, 2003-2006, Co-evolutionary algorithms for system design and analysis.

Now Assistant Professor at The University of Vermont, Burlington VT

Honors and Awards Received

- Discover Magazine's 25 most important discoveries of 2009
- ASME SMASIS'09 Honored Finalist Award, 2009
- Cornell Hellenic Societies Faculty Award, 2008
- Best paper of the year award. Rapid Prototyping Journal, 2008
- Provost Distinguished Scholarship Award, 2008
- Merrill Educator Award, 2008
- ASME 2007 International Mechanical Engineering Congress and Exposition (IMECE) Best Presentation Award
- Esquire Magazine Best & Brightest 2007
- Best paper Award, Genetic and Evolutionary Computation Conference (GECCO) 2007
- Popular Mechanics Breakthrough Award, 2007
- DARPA MTO Young Faculty Award, 2007
- Outstanding Paper, Solid Freeform Fabrication SFF'06
- NSF Young Investigator CAREER award, 2006
- ENTRY 2006 "Most important innovations in robotic technology"
- Best-in-Tech 2005, MIT Technology Review (German Edition)
- Outstanding Paper, Solid Freeform Fabrication SFF'05
- Gold Medal for Human Competitive Automated Invention, GECCO 2005
- Best Paper Award, International Conference on Advanced Robotics (ICAR'05)
- National Academies "Frontiers of Engineering"
- Silver Medal for Human Competitive Automated Invention, GECCO 2004
- TIME Magazine's "Most important events of 2000"
- Biophysical Society "New and Notable", 2001
- Shaping The Future, EXPO'2000
- Fischbach Postdoctoral Scholarship, 1998-1999
- CIRP International F.W. Taylor Medal, 1997
- Charles Clore Doctoral Fellowship, 1996
- Miriam and Aaron Gutwirth Memorial Award, 1996
- 1st Prize for Academic Innovation, *ITIM 9th Israeli Conference on CAD/CAM*, Tel Aviv, 1987

Refereed Journal Publications (published or in press)

1. Brown, E., Rodenberg, N., Amend, J., Mozeika, A., Steltz, E., Zakin, M., Lipson, H., Jaeger, H. (2010) "Universal robotic gripper based on the jamming of granular material,"

- Proceedings of the National Academy of Sciences (cover)**, Vol. 107, no. 44, pp. 18809-18814.
2. Lipson H., (2011), "Self-Reflective Architecture", **Cornell Journal of Architecture**, Vol. 8, pp. 16-23
 3. Tolley, M. and Lipson, H. (2011) "On-line assembly planning for stochastically reconfigurable systems", **International Journal of Robotics Research**, in press.
 4. Hiller, J., Miller, J, Lipson, H. (2011) "Microbricks for 3D Reconfigurable Modular Microsystems", **IEEE Journal of Microelectromechanical Systems**, Accepted.
 5. Kou, X.Y., Tan, S.T., and Lipson, H., (2011) "A data-driven process for estimating nonlinear material models," **Applied Mechanics and Materials** , vol. 50-51, pp. 599-604
 6. Richter, C., and Lipson, H. (2011) "Untethered Hovering Flapping Flight of a 3D-Printed Mechanical Insect", **Artificial Life**, Vol. 17, No. 2 (in press).
 7. Li, S., Yuan, J., and Lipson, H.(2011) "Ambient wind energy harvesting using cross-flow fluttering", **Journal of Applied Physics**, 109, 026104
 8. Ballyns JJ, Cohen DL, Malone E, Maher SA, Potter HG, Wright T, Lipson H, Bonassar LJ. An Optical Method for Evaluation of Geometric Fidelity for Anatomically Shaped Tissue Engineered Constructs, **Tissue Eng Part C Methods**. 2010 Aug, 16(4):693-703.
 9. Cohen D. L., W. Lo, A. Tsavaris, D. Peng, H. Lipson, and L. J. Bonassar, "Increased mixing improves hydrogel homogeneity and quality of 3D printed constructs," **Tissue Engineering**, in press.
 10. Rieffel J., Valero Cuevas F., Lipson H., "Morphological Communication: Exploiting Coupled Dynamics in a Complex Mechanical Structure to Achieve Locomotion", **Journal of the Royal Society Interface**, Vol. 45.
 11. Kalontarov, M., Tolley M. T., Lipson, H., Erickson, D. (2010) "Hydrodynamically Driven Docking of Blocks for 3D Fluidic Assembly", **Microfluidics and Nanofluidics**, accepted.
 12. 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**, accepted.

13. Adams B., Lipson H., (2008) "A Universal Framework for Analysis of Self-Replication Phenomena", **Entropy**
14. Schmidt M., Lipson H. (2009) "Distilling Free-Form Natural Laws from Experimental Data," **Science**, Vol. 324, no. 5923, pp. 81 – 85
15. Krishnan M., Tolley M. T., Lipson H., Erickson D. (2008), "Increased Robustness for Fluidic Self Assembly", **Physics of Fluids**, 20, 073304.
16. Cohen D., Lipson H., "Geometric feedback control of discrete-deposition SFF systems", **Rapid Prototyping Journal**, accepted (in press)
17. Ballyns J. J., Cohen D. L., Malone E., Maher S. A., Potter H. G., Wright T. M., Lipson H., and Bonassar L. J. (2009), "An optical method for evaluation of geometric fidelity for anatomically shaped tissue engineered constructs," **Tissue Engineering Part C: Methods**, accepted.
18. Song H., Guimbretiere F., Hu C., Lipson H., (2008) "The ModelCraft Framework: Capturing Freehand Annotations and Edits to Facilitate the Design Process", **IEEE Transactions on Computer Human Interaction** (accepted)
19. Kim K.J., Wong A., Hod Lipson H., (2009) Automated Synthesis of Resilient and Tamper-Evident Analog Circuits without a Single Point of Failure, **Genetic Programming and Evolvable Machines** (online).
20. Tian C., Masry M., Lipson H. (2009) "Physical sketching: Reconstruction and analysis of 3D objects from freehand sketches", **Computer-Aided Design** Vol. 41, pp. 147-158
21. Krishnan M, Tolley M., Lipson H., Erickson D., (2009) "Hydrodynamically Tunable Affinities for Fluidic Assembly", **Langmuir**, Vol. 25, pp. 3769-3774
22. Rieffel J., Valero-Cuevas F., Lipson H., (2008) "Automated Discovery and Optimization of Large Irregular Tensegrity Structures", **Computers and Structures**, in press
23. Tolley M., Krishnan M., Erickson E., Lipson H., (2008) "Deterministic Non-regular Microstructures from Regular Components", **Applied Physics Letters**, 93, 254105
24. Hiller, J., Lipson, H., (2009) "Design and analysis of digital materials for physical 3D voxel printing", **Rapid Prototyping Journal**, Vol. 15, No. 2, pp. 137-149..

25. Malone E., Berry M., Lipson H. (2008) "Freeform fabrication of arbitrary geometry Zinc-Air Batteries", *Rapid Prototyping Journal*, Vol. 14, N 3, pp. 128-140
26. Lipson H. (2008) "Principles of Modularity, Regularity, and Hierarchy for Scalable Systems", *Journal of Biological Physics and Chemistry*, Vol. 7, pp. 125–128
27. van Breugel F., Regan W., Lipson H., (2008) "From Insects to Machines: A Passively Stable, Untethered Flapping-Hovering Micro Air Vehicle", *IEEE Robotics and Automation Magazine*, Vol. 15 No. 4, pp. 68-74
28. Schmidt M.D., Lipson H., (2008) "Co-evolving Fitness Predictors", *IEEE Transactions on Evolutionary Computation*, Vol. 12, No 6, pp. 736-749
29. Lipson H., (2008) "Evolutionary Synthesis of Kinematic Mechanisms", *Artificial Intelligence in Design and Manufacturing*, Vol. 22, pp. 195–205
30. Lipson H. (2007) "Evolutionary Robotics: Emergence of Communication", *Current Biology*, Vol. 17 No 9, pp. R330-R332
31. Bongard J.C., Lipson H. (2007) "Automated Reverse engineering of Nonlinear Systems", *PNAS - Proceedings of the National Academy of Sciences* . Vol. 104, no. 24, pp. 9943–9948.
32. Yim M., Shen W-M, Salemi B., Rus D., Moll M., Lipson H., Klavins E., Chirikjian G. S., (2007) "Modular Self-reconfigurable robotic systems", *IEEE Robotics and Automation Magazine*, Vol. 14 No. 1, pp. 43-52.
33. Valero Cuevas F., Anand V., Lipson H., (2007) "Beyond parameter estimation: Extending biomechanical modeling by the explicit exploration of model topology", *IEEE Transactions on Biomedical Engineering*, Vol. 54 No. 11, pp. 1951-1964
34. Malone E., Lipson H. (2007) "Fab@Home: The Personal Desktop Fabricator Kit", *Rapid Prototyping Journal*, Vol. 13, No. 4, pp. 245-255.
35. Bongard J.C., Zykov V., Lipson H. (2006) "Resilient Machines through Self-Modeling", *Science*, Vol. 314. no. 5802, pp. 1118 - 1121
36. Zykov V., Mytilinaios E., Desnoyer M., Lipson H., (2006) "Evolved and Designed Modular Robotics Systems Capable of Self -Reproduction", *IEEE Transactions on Robotics* Vol. 23 No. 2, pp. 308-319

37. Valero-Cuevas F J, Yi1 JW, Brown D, McNamara R V, Paul C, Lipson H (2006) "The tendon network of the fingers performs anatomical computation at a macroscopic scale", *IEEE Transactions on Biomedical Engineering*, Vol. 54 No. 6, pp. 1161-1166.
38. Aquino W., Kouchmeshky B., Bongard J., Lipson H., (2007) "Co-evolutionary algorithm for structural damage identification using minimal physical testing", *Int. Journal for Numerical Methods in Engineering*, Vol. 69, Issue 5, Pages 1085-1107
39. Cohen D. L., Malone E., Lipson H., Bonassar L., (2006) "3D direct printing of heterogeneous tissue implants", *Tissue Engineering*, Vol. 12, No. 5: 1325-1335
40. Gondarenko A., Preble S., Robinson J., Chen L., Lipson H., Lipson M., (2006) "Spontaneous emergence of periodical patterns in a biologically-inspired simulation of photonic structures", *Physical Review Letters*, Vol. 96, 143904
41. Malone E., Lipson H. (2006) "3D printing of IPMC polymer actuators", *Rapid Prototyping*, Vol. 12, No. 5, pp.244-253
42. Lipson H., (2006) "A relaxation method for simulating the kinematics of compound nonlinear mechanisms", *ASME Journal of Mechanical Design*, Volume 128, Issue 4, pp. 719-728
43. Paul C., Valero Cuevas F. J. Lipson H. (2006) "Design and Control of Tensegrity Robots", *IEEE Transactions on Robotics*, Vol. 22 No. 5 pp. 944- 957
44. Zykov V., Mytilinaios E., Adams B., Lipson H. (2005) "Self-reproducing machines", *Nature*, Vol. 435 No. 7038, pp. 163-164
45. Bongard J. C, Lipson H., (2005) ""Active Coevolutionary Learning of Deterministic Finite Automata", *Journal of Machine Learning research (JMLR)*, Vol. 6 No. 10, pp. 1651-1678
46. Masry M., Kang D.J., Lipson H., (2005) "A Pen-Based Freehand Sketching Interface for Progressive Construction of 3D Objects", *Computers & Graphics*, Volume 29, 2005, pp. 563-575.
47. Preble S., Lipson H., Lipson M. (2005) "Two-dimensional photonic crystals designed by evolutionary algorithms", *Applied Physics Letters*, Vol. 86, p. 6111-4 **** Gold Medal for Human Competitive Automated Invention ****

48. Lipson H., Moon F.C., Hai J., Paventi C., (2005) "3D-Printing the History of Mechanisms", ***ASME Journal of Mechanical Design***, Vol. 127, pp. 1029-1033
49. Lipson H. (2005) "Homemade: The future of Functional Rapid Prototyping", ***IEEE Spectrum***, May 2005, pp. 24-31 **Feature article**
50. Bongard J., Lipson H. (2005) "Nonlinear system identification using coevolution of models and tests", ***IEEE Transactions on Evolutionary Computation***, 9(4): 361-384
51. Malone E., Rasa K., Cohen D., Isaacson T., Lashley H., Lipson H., (2004) "Freeform fabrication of 3D zinc-air batteries and functional electro-mechanical assemblies", ***Rapid Prototyping Journal***, Vol. 10, No. 1, pp. 58-69
52. Variano E. A., McCoy J. H., Lipson H, (2003) "Emergence of modularity in stable dynamical networks", ***Physical Review Letters***, Vol. 92, No 18
53. Hornby G.S., Lipson H., Pollack. J.B., 2003 "Generative Encodings for the Automated Design of Modular Physical Robots", ***IEEE Transactions on Robotics and Automation***, Vol. 19 No. 4, pp 703-719
54. Pollack, Jordan B., Hornby, Gregory S., Lipson, Hod, and Funes, Pablo. (2003) "Computer Creativity in the Automatic Design of Robots". ***Leonardo***, Journal for the International Society for Arts Sciences and Technology. Vol. 36 No. 2, pp. 115–121
55. Lipson H., Pollack J.B., Suh N.P., 2002, "On The Origin Of Modular Variation", ***Evolution*** Vol. 56 No 8, pp. 1549-1556.
56. Pollack J. B., Lipson H., Funes P., Hornby G., (2001), "Three Generations of Coevolutionary Robotics", ***Artificial Life***, Vol 7. pp. 215-223.
57. Lipson H., Pollack J. B., 2000, "Automatic design and Manufacture of Robotic Lifeforms", ***Nature*** 406, pp. 974-978
58. Lipson, H., Siegelmann, H. T., 2000, "Clustering irregular shapes using high order neurons", ***Neural Computation*** Vol. 12 No. 10, pp. 2331-2353
59. Lipson, H., Shpitalni, M., 2000, "Conceptual Design and Analysis by Sketching", ***Journal of AI in Design and Manufacturing***, Vol. 14, pp. 391-401

60. Shpitalni, M. and Lipson, H., 1996, "Identification of Faces in a 2D Line Drawing Projection of a Wireframe Object," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 18, No. 10, pp. 1000-1012
61. Lipson, H. and Shpitalni, M., 1996, "Optimization-Based Reconstruction of a 3D Object From a Single Freehand Line Drawing," *Journal of Computer Aided Design*, Vol. 28 No. 8, pp. 651-663
62. Lipson, H. and Shpitalni, M. 1997, "On the Topology of Sheet Metal Parts", *Trans. of ASME J. of Mechanical Design*, Vol. 120, No. 1, pp. 10-16
63. Shpitalni, M. and Lipson, H., 1997, "Classification of Sketch Strokes and Corner Detection Using Conic Sections and Adaptive Clustering," *Trans. of ASME J. of Mechanical Design*, Vol. 119, No. 2, pp. 131-135

Refereed Conference Proceedings

64. Neubert, J., Cantwell, A., Constantin, S., Kalontarov, M., Erickson, D., Lipson, H. (2010) "A Robotic Module for Stochastic Fluidic Assembly of 3D Self-Reconfiguring Structures", Proc. Int. Conf. on Robotics and Automation (ICRA), Anchorage AK, May 2010.
65. Tolley, M. T., Lipson, H. (2010) "Fluidic Manipulation for Scalable Stochastic 3D Assembly of Modular Robots", Proc. Int. Conf. on Robotics and Automation (ICRA), Anchorage AK, May 2010.
66. Schmidt M., Lipson H. (2009) "Symbolic Regression of Implicit Equations" Genetic Programming Theory and Practice, Vol. 7, Chapter 5, pp. 73-85.
67. Lipton, J. Cohen, D., Lipson, H. (2009) "Brick Printing: Freeform Fabrication of Modular Architectural Elements with Embedded Systems" Solid Freeform Fabrication Symposium (SFF'09), Aug 3-5 2009, Austin, TX, USA.
68. Cohen D.L., Lipton, J., Cutler, M., Coulter, D., Vesco, A., Lipson, H. (2009) "Hydrocolloid Printing: A Novel Platform for Customized Food Production" Solid Freeform Fabrication Symposium (SFF'09), Aug 3-5 2009, Austin, TX, USA.

69. Mookerjee, A., Cohen, D.L., Peng, D.H., Bonassar, L.J., Lipson, H. (2009) "A Study of Variable Stiffness Alginate Printing for Medical Applications" Solid Freeform Fabrication Symposium (SFF'09), Aug 3-5 2009, Austin, TX, USA.
70. Lipton, J. Cohen,D., Heinz,M., Lobovsky, M., Parad,W., Bernstien, G., Li,T., Quartiere,J., Washington,K., Umaru,A., Masanoff,R., Granstein, J., Whitney,J., Lipson,H., (2009) "Fab@Home Model 2: Towards Ubiquitous Personal Fabrication Devices" Solid Freeform Fabrication Symposium (SFF'09), Aug 3-5 2009, Austin, TX, USA.
71. Zagal, J.C., Lipson, H. (2009) "Resilient Behavior through Controller Self-Diagnosis, Adaptation and Recovery", Performance Metrics for Intelligent Systems Workshop (PerMIS'09), Sept 21-23 2009, National Institute of Standards and Technology, Gaithersburg, Maryland USA.
72. Kim K. J., Lipson, H. (2009) "A robotic theory of mind in simulation", Performance Metrics for Intelligent Systems Workshop (PerMIS'09), Sept 21-23 2009, National Institute of Standards and Technology, Gaithersburg, Maryland USA.
73. Tolley, M. T., Hiller, J., Lipson, H. (2009) "Evolutionary Design and Assembly Planning for Stochastic Modular Robots ", Proc. IEEE/RSJ Int. Conf. Intelligent Robots and Systems (IROS), Exploring New Horizons in Evolutionary Design of Robots Workshop, Oct. 11-15 2009, St. Louis, MO, USA, pp. 73-78.
74. Hiller, J., Lipson, H. (2009) "Fully Recyclable Multi-Material Printing " Solid Freeform Fabrication Symposium (SFF'09), Aug 3-5 2009, Austin, TX, USA.
75. Hiller, J., Lipson, H. (2009) "Design Automation for Multi-Material Printing" Solid Freeform Fabrication Symposium (SFF'09), Aug 3-5 2009, Austin, TX, USA.
76. Hiller, J., Lipson, H. (2009) "STL 2.0: A Proposal for a Universal Multi-Material Additive Manufacturing File Format" Solid Freeform Fabrication Symposium (SFF'09), Aug 3-5 2009, Austin, TX, USA.
77. Grossman, J., Parad, W., Lipson, H., (2009) "Design and Construction of a 6-DoF Fabrication Platform" Solid Freeform Fabrication Symposium (SFF'09), Aug 3-5 2009, Austin, TX, USA.

78. Alonso M.P., Malone E., Moon F.C., Lipson H. (2009) "Reprinting the Telegraph: Replicating the Vail Register using Multi-materials 3D Printing" Solid Freeform Fabrication Symposium (SFF'09), Aug 3-5 2009, Austin, TX, USA.
79. Amend, J.R., Jr., Lipson, H. (2009) "Shape-Shifting Materials for Programmable Structures" Proceedings of the 11th International Conference on Ubiquitous Computing: Workshop on Architectural Robotics (UbiComp Archibots 2009), Sept. 30 - Oct 3, Orlando, FL, USA.
80. Zagal J.C., Lipson, H. (2009) "Towards Self-Reflecting Machines: Two-Minds in One Robot", Proceedings of the 10th European Conference on Artificial Life, ECAL 2009
81. Li S., Lipson H., (2009) "Vertical-Stalk Flapping-Leaf Generator For Parallel Wind Energy", Proceedings of the ASME/AIAA 2009 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, SMASIS2009, "**Best Student Paper Award**" in "Bio-inspired Smart Materials and Structures" symposium and "**Honored Finalist Award**" on overall.
82. Kim K.J., Lipson H. (2009) "Towards a Theory of Mind in Simulated Robots", Genetic and Evolutionary Computation Conference (GECCO'09), Montreal Canada, Late Breaking Paper.
83. Zagal J., Lipson H., (2009) "Self-Reflection in Evolutionary Robotics: Resilient Adaptation with a Minimum of Physical Exploration", Genetic and Evolutionary Computation Conference (GECCO'09), Montreal Canada, Late Breaking Paper.
84. Schmidt M.D., Lipson H. (2009) "Solving Iterated Functions Using Genetic Programming", Genetic and Evolutionary Computation Conference (GECCO'09), Montreal Canada, Late Breaking Paper.
85. Schmidt M.D., Lipson H. (2009) "Incorporating Expert Knowledge in Evolutionary Search: A Study of Seeding Methods", Genetic and Evolutionary Computation Conference (GECCO'09), Montreal Canada.
86. Schmidt M.D., Lipson H. (2009) "Discovering a Domain Alphabet", Genetic and Evolutionary Computation Conference (GECCO'09), Montreal Canada.

87. Schmidt M.D., Lipson H. (2009) "Symbolic Regression of Implicit Equations", Genetic Programming Theory and Practice (GPTP'09), Ann Arbor, MI.
88. Hiller, J., Lipson, H., (2009) "Multi Material Topological Optimization of Structures and Mechanism", Genetic and Evolutionary Computation Conference (GECCO'09)
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98. Cohen D.L., Tsavaris A., Lo W., Bonassar LJ, Lipson H. (2008), "Improved Quality of 3D-Printed Constructs Through Enhanced Mixing of Alginate Hydrogels", Proceedings of the 19th Annual Solid Freeform Fabrication Symposium, Austin TX, Aug 2008.
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Other conference papers

184. Studer G, Lipson H., (2005) "Spontaneous emergence of self-replicating, competing cube species in physical cube automata", GECCO Late Breaking Paper.
185. Schmidt M., Lipson H., (2005) "Co-evolution of Fitness Maximizers and Fitness Predictors", GECCO Late Breaking Paper.
186. Bongard J.B., Lipson H., (2005) "Reinventing the Wheel: Experiments in Evolutionary Geometry", GECCO Late Breaking Paper.
187. Anand V., Lipson H., Valero Cuevas F.J., (2005) "Blind Inference of Nonlinear Cable Network Topology from Sparse Data", GECCO Late Breaking Paper.
188. Lipson H. (2004) "How to Draw a Straight Line Using a GP: Benchmarking Evolutionary Design Against 19th Century Kinematic Synthesis", GECCO Late Breaking Paper, GECCO 2004. **Silver Medal for Human Competitive Automated Invention**
189. Timm R. W., Lipson H., (2004) "Periodicity Emerges from Evolved Energy-Efficient and Long-Range Brachiation", *Proceedings of Genetic and Evolutionary Computation Conference*, Late Breaking Paper, GECCO'04.
190. Lipson H. (2004) "Principles of Modularity, Regularity, and Hierarchy for Scalable Systems", *Genetic and Evolutionary Computation Conference (GECCO'04) Workshop on Modularity, regularity and Hierarchy*

Theses

191. Lipson H., (1998) *An Interface For 3D Conceptual Design Based On Freehand Sketching. Ph.D. Thesis*, Mechanical Engineering Department, Technion – Israel Institute of Technology

Books

Monographs and Textbooks, and large reports

192. Lipson H., Kurman M., (2010) "Factory@Home: The Emerging Economy of Personal Fabrication" Report Commissioned by the Whitehouse Office of Science & Technology Policy
193. Lipson H., Bongard J. (2007) *Co-evolutionary Methods in System Design and Analysis*, Cambridge University Press, (contracted, in preparation). Target publication date: Dec 2009

Edited Books

194. Lipson H., Thierens D., et al., (Eds.): Genetic and Evolutionary Computation Conference, GECCO 2007, Proceedings, London, England, UK, July 7-11, 2007. ACM 2007, ISBN 978-1-59593-697-4
195. Beyer H.-G., O'Reilly U.-M., Lipson H., Blum C., Dasgupta D., Foster J.A., Banzhaf W., De Jong E., Pelikan M., Raidl G., Deb K., Zitzler E., Arnold E., Tyrrell A., Cantu-Paz E., Soule T., Llorca X., Watson J.-P., Bonabeau E., Manicoridis S. (Eds.): Genetic and Evolutionary Computation Conference, GECCO 2005, Proceedings, Washington DC, USA, June 25-29, 2005. ACM 2005, ISBN 1-59593-010-8
196. Lipson H, Antonsson E.K., Koza J.R., (Eds.) Computational Synthesis: From basic building blocks to high level functionality, Papers from 2003 AAAI Symposium, March 24-26, 2003, Stanford CA, AAAI Press, ISBN 1-57735-179-7.

Book Chapters

197. Lipson H. (2008) "The Inevitable Magic of Artificial Life," in Pfeifer R., (Ed.) *The Rediscovery of Intelligence*, pp. 114-115
198. Lipson H. (2007) "Curious and Creative Machines," in Pfeifer R., Bongard J.B., Lungarella (Eds.) *50 Years of AI*, Festschrift, LNAI 4850, pp. 316-320
199. Lipson H. (2005) "Evolutionary Design and Evolutionary Robotics", *Biomimetics*, CRC Press (Bar Cohen, Ed.), pp. 129-155
200. Lipson H., (2002) "Towards Synthetic Evolution of Nanostructures", in Chakraborty T., (Ed.) *Nano-Physics & Bio-Electronics - A new Odyssey*, pp. 341-352

201. Pollack, Jordan B., Lipson, Hod, Ficici, Sevan G., Funes, Pablo, Hornby, Greg and Watson, Richard A. (2001). "Evolutionary Techniques in Physical Robots," in *Creative Evolutionary Systems*, Peter J. Bentley and David W. Corne (eds). Morgan-Kaufmann, 2001, pp. 511-520
202. Lipson H., H. T. Siegelmann, (2000), "High Order Eigentensors as Symbolic Rules in Competitive Learning", in S. Wermter, R. Sun (Eds.) *Hybrid Neural Systems*, Springer, LNCS 1778, pp. 286-297
203. Shpitalni M., Lipson H., (1998), "Product Development and CAD/CAM", in F.L.Krause, Ed., *Product Modeling*, Verlag, Berlin

Book reviews

204. Lipson H., 2001, "Uncontrolled Engineering: A review of *Evolutionary Robotics*", *Artificial Life* 7/4, pp. 419-424, book review.

Patents

1. H. Lipson, L. J. Bonassar, D. L. Cohen, and E. Malone, inventors; Cornell Research Foundation, Inc., assignee. "Modular fabrication systems and methods." Patent No. US 7,625,198. 2009.

Invited Talks, Keynotes, and Colloquia

1. Invited Speaker, "Biologically Inspired Robotics", USA Science & Engineering Festival (USASEF), Washington DC, April 27, 2012
2. Invited Speaker, "Distilling Natural Laws from Data", Signal processing and inference for the physical sciences, Royal Society, London UK, March 26, 2012
3. Invited Plenary, "Additive fabrication of integrated components", Design Modeling Symposium, Berlin, Germany, October 11, 2011
4. Invited Speaker, "Do biological systems have Hamiltonians?", New Frontiers in Systems Biology, Rehovoth, Israel, Oct 3, 2011
5. Invited Plenary, "Digital Materials", NAE US Frontiers of Engineering, Palo Alto, CA, September 20, 2011

6. Invited Speaker, "Machine Science", Acceleration Discovery: Human Computer Symbiosis 50 Years On, Park City, UT, July 25, 2011
7. Invited Speaker, "Reverse Engineering Stochastic Systems", Uncertainty in Artificial Intelligence (UAI11), Barcelona, Spain, July 16, 2011
8. Invited Plenary, "Reverse Engineering Dynamical Systems", International Conference on Complex Systems (ICCS 2011), Cambridge MA, June 27, 2011
9. Invited Speaker, "Digital Materials", Foresight's 25th Anniversary Conference, Palo Alto, CA, June 25, 2011
10. Keynote Speaker, "Analysis by Synthesis", 2011 IEEE Congress on Evolutionary Computation (CEC 2011), New Orleans, LA, June 7, 2011
11. Invited Speaker, "Bioinspired Robotics", World Science Fest (WSF11), New York NY, June 5, 2011
12. Invited Plenary, "Soft Robotics", European Commission Future and Emerging Technologies (FET11), Budapest Hungary, May 5, 2011
13. Colloquium Speaker, "Reverse Engineering Dynamical Systems", University of Chicago Computation Institute, Chicago IL, March 7, 2011
14. Keynote Speaker, "Self Reflective Systems", Int. Workshop on Self Organizing Systems, Karlsruhe, Germany, February 24, 2011
15. Invited Speaker, "Bioprinting", American Association for the Advancement of Science (AAAS11), February 21, 2011
16. Invited Speaker, "Self Reflective Robotics", American Association for the Advancement of Science (AAAS11), February 19, 2011
17. Invited Speaker, "The Limits of Science", Science on Saturday Lecture Series, Princeton Plasma Physics Laboratory, January 29, 2011
18. Colloquium Speaker, "Self Reflective Machines", Psychology Dept., Indiana University, Bloomington IN, January 24, 2011
19. Colloquium Speaker, "Distilling Natural Laws from Experimental Data", Physics Dept., Weizmann Inst, of Science, Rehovoth, Israel, Dec 30, 2010
20. Colloquium Speaker, "Digital Materials", Pixel Club, Computer Science Dept., Technion - Israel Inst. of Technology, Haifa Israel, Dec 28, 2010
21. Invited Seminar, "Reverse Engineering Dynamical Systems", Los Alamos National Labs, Albuquerque NM, Dec 8, 2010

22. Keynote Speaker, "Mining Dynamical Systems - From Cognitive Robotics to Computational Biology", European Conference on Machine Learning (ECML 2010), Barcelona, Spain, September 22, 2010
23. Invited Speaker, "Automating Science", Philosophical Society of Washington, Washington DC, September 10, 2010.
24. Colloquium Speaker, "Analysis by Synthesis", Computer Science Dept, École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland, September 5, 2010
25. Keynote Speaker, "Analysis by Synthesis", 9th International Conference on Evolvable Systems (ICES 2010), York, UK, September 6, 2010
26. Plenary Speaker, "Soft Evolutionary Robotics", 12th International Conference on the Synthesis and Simulation of Living Systems (ALIFE XII), Odense, Denmark, August 20, 2010
27. Invited Speaker, "Rapid Assemblers", Fab6, Amsterdam, Netherland, August 18, 2010
28. Invited speaker, "Automating Scientific Discovery", Princeton Institute for Advanced Studies, Princeton NJ, 15 April 2010
29. Invited speaker and panelist, "Self Reflective Architecture", Columbia Graduate School of Architecture, New York NY, 12 April 2010
30. Invited Speaker, "3D Printing for biological applications," in Biofabrication: Biomedical Application of Rapid Prototyping, University of South Carolina, Charleston SC, March 19, 2010
31. Keynote Speaker, "The Robotic Scientist" IEEE Aerospace Conference, Big Sky MT, March 8, 2010
32. Colloquium Speaker, "A factory in your classroom", University of Virginia School of Education "Tea and Technology" seminar Series, Charlottesville VA, March 4, 2010
33. Invited Plenary Speaker, "The Robotic Scientist", Simposium Internacional de Sistemas Computacionales y Tecnologías de Información (SISCTI '10), Monterrey, Mexico, February 26, 2010
34. Invited Speaker, "The robotic Scientist", The Perimeter Institute, Waterloo ON, Canada, February 3, 2010
35. Invited Plenary Speaker, "Automated Design and Control of experiments", 16th Lab Automation Conf., Palm Springs CA, January 25, 2010

36. Invited Speaker, "The robotic Scientist", Foresight Institute, Palo Alto, CA, January 16, 2010
37. Invited keynote speaker, "A factory in your classroom", National Tech Leadership Summit, Punahou School, Honolulu HI, January 7-8, 2010
38. Colloquium Speaker, "Self reflective Systems", Harvard Graduate School of Architecture, Cambridge MA, November 12, 2009
39. Invited Speaker, "Robot Evolution", Quantum to Cosmos Festival, The Perimeter Institute, Waterloo ON, Canada, October 22, 2009
40. Invited Keynote Speaker, "Reverse Engineering Dynamical Systems", Fourteenth Portuguese Conference on Artificial Intelligence, EPIA 2009, Aveiro, Portugal, October 12, 2009
41. Invited Keynote Speaker, "From Analog to Digital 3D printing", Fourth International Conference on Advanced research in Virtual and Rapid Prototyping, VRAP 2009, Leiria, Portugal, October 10, 2009
42. Invited Colloquium, "Self-reflective and self-fabricating robotic systems", Robotics Institute, Tufts University, Boston MA, September 24, 2009
43. Invited Keynote Speaker, "Self-reflective Systems", European Conference on Artificial Life (ECAL 2009), Budapest, Hungary, September 14, 2009
44. Invited talk, "Self-reflective machines", Idea City '09, Toronto, Canada, June 18, 2009
45. Invited talk, "Bioinspired Robotics", Emerging Technologies Pavilion, International Robots, Vision & Motion Control exhibition, June 10, Chicago IL, 2009
46. Invited Seminar, "3D Printing for Tissue Engineering Applications", South Carolina bioengineering symposium, Columbia SC, April 14, 2009
47. Invited speaker, The Goldstein Lecture Series, "Self-Reflection and Self-Fabrication in robotic systems", Technion, Israel Institute of Technology, Haifa, Israel, March 25, 2009
48. Invited Seminar, "Self-Reflection and Self-Fabrication in robotic systems", Ben Gurion University, Be'er Sheva, Israel, March 24, 2009
49. Invited Seminar, "Robotic self-reflection and self-assembly", Robotics Institute, Carnegie Mellon University, Pittsburg PA, February 6, 2009
50. Invited Beckman Series Speaker, "Mining experimental data for dynamical invariants, from cognitive robotics to computational biology", Caltech, Pasadena CA, Nov 20, 2008

51. Invited Colloquium, "Mining experimental data for dynamical invariants, from cognitive robotics to computational biology" Department of Computer Science, Austin TX, Nov 7, 2008
52. Invited Colloquium, "Evolutionary Robotics" Computer Science Dept, Wells College, Aurora NY, October 31, 2008
53. Keynote presentation, "A Factory in Your Kitchen: On multi-material 3D-printing and the future of personal fabrication" International Workshop on Microfactories, Northwestern University, Evanston Illinois, October 6, 2008
54. Invited Colloquium, "Mining freeform natural laws in dynamical data" Department of Biological Statistics and Computational Biology, Cornell University, October 1, 2008
55. Invited Colloquium, "Mining freeform natural laws in dynamical data" Department of Biological Statistics and Computational Biology, Cornell University, October 1, 2008
56. Invited SHARP Seminar Speaker, "What do robots dream of? On cognitive machines and other self-modeling systems", NYU, NY, Sep 24, 2008
57. Invited CS/BME Colloquium Speaker, "Mining experimental data for dynamical invariants – from robotics to biomechanics and computational biology", USC, Los Angeles CA, Sep 8, 2008
58. Invited talk, Foundation of Nanoscience 2008, "Dynamically reprogrammable self-assembly at macro and micro scales", Snowbird, Utah, April 2008
59. Invited Colloquium, Santa Fe Institute, "Mining experimental data for physical laws", Santa Fe, NM, March 2008
60. Invited talk, "The future of personal fabrication", University of Pennsylvania Wharton School of management, Philadelphia PA, January 2008
61. Invited talk, NSF Engineering Research and Innovation Annual Meeting, Top advances and Emerging Areas, "Resilient machines", January 2008, Knoxville TN
62. Invited talk and panel, NSF Engineering Research and Innovation Annual Meeting, "Working with the Media", January 2008, Knoxville TN
63. Invited presentation, Light in Winter 2008, "What do robots Dream of", January 2008, Ithaca NY
64. Colloquium Speaker, Chicago University, Physics Dept, "Cognitive Robotics and other self-modeling systems", December 2007
65. Colloquium Speaker, Delaware University Biomechanics Dept Colloquium, "Biologically inspired robotics", November 2007

66. Invited Plenary Address, "Emergent Self Models in Machines", Epigenetic Robotics 2007, November 2007, Rutgers NJ
67. Colloquium Speaker, Cornell University Cognitive Science Colloquium., "Biologically inspired robotics", October 2007
68. Invited seminar, "Biologically inspired robotics", Free University of Brussels CS Dept., Brussels, Belgium, Sep 2007
69. Invited seminar, "Emergent Self Models in Machines", University of Malaga CS Dept., Malaga, Spain, Sep 2007
70. I Invited Speaker, "Multimaterial Freeform Fabrication", Symposium on Digital Fabrication, MIT, Cambridge MA, May 2007
71. Invited Plenary Address, "Emergent Self Models in Machines", Annual meeting of The Human Behavior and Evolution Society, May 2007, Williamsburg, Virginia
72. Colloquium Speaker, Carnegie Mellon University, Mechanical Engineering Dept., "Biologically inspired robotics", February 2007
73. Invited 4-lecture series, "Evolutionary Robotics", Spring school on cognitive science and artificial intelligence, Günne at Lake Möhne, Germany, March 2007
74. Invited plenary speaker, "Robotics Innovations", TED / Technology & Design, Monterey, CA, March 2007
75. Invited Speaker, "Machine Minds", International Symposium on Creating Brain-Like Intelligence, Honda Research Institute Europe, Hohenstein, Germany, February 2007
76. Invited talk, "Reverse engineering biological networks", Computational & Theoretical Biology Symposium, Rice University, December 2006
77. Colloquium, "Biologically Inspired Robotics", Computer Science Dept, Harvard University, November 2006
78. Invited speaker, "Biologically Inspired Robotics", Evolving Life Life Evolving, Namur, Belgium, December 2006
79. Colloquium Speaker, "Biologically Inspired Robotics", Mechanical & Aerospace Engineering Dept, Vanderbilt University, October 2006
80. Invited Colloquium Speaker, "Emergent Self-models in Machine Minds", Sage Center, University of California at Santa Barbara, October 2006
81. Invited Keynote Speaker, "Evolutionary Robotics", Dana-Farber Cancer Institute Annual retreat, Boston, October 2006.
82. Invited Speaker, "Multimaterial Freeform Fabrication", Symposium on Digital Fabrication, Pretoria, South Africa, June 2006
83. Invited Speaker, "Evolutionary Robotics and Evolutionary Design ", 50th Anniversary Summit of Artificial Intelligence, Monte Verita, Switzerland, July 2006

84. Invited Keynote Speaker, "Biologically Inspired Robotics", Robocup 2006, Bremen, Germany, June 2006
85. Invited Keynote Speaker, "Co-evolutionary Learning in Embodied Cognitive Agents", Artificial Life X, Bloomington, Indiana, USA June 2006
86. Invited Keynote Speaker, "Co-evolutionary embedded systems", The 9th International Conference on Intelligent Autonomous Systems (IAS-9), Tokyo Japan, March 2006
87. Invited Speaker and Panelist, "Automating Discovery", W.M.Keck Institute Roundtable on future directions in science, Los Angeles CA, May 2006
88. Colloquium Speaker, "Biologically Inspired Robotics: From evolving to Self-Replicating Machines", College of Engineering, University of Vermont, April 2006
89. Colloquium Speaker, "Automating Discovery", Department of Pharmacology, University of Texas, Feb 2006
90. Special Seminar Speaker, "Biologically Inspired Robotics: From evolving to Self-Replicating Machines", Mechanical Engineering Department, Indian Institute of Technology (IIT) Kanpur, January 2006
91. Invited Presenter and Panelist, "Science & Technology Revolutions", Renaissance Weekend, Charleston SC, Dec 2005
92. Invited Plenary Keynote Speaker, "Print Anything: The future of rapid prototyping", Annual retreat, Lexmark Inc., Lexington, KY, Nov 2005
93. Invited Colloquium, "Co-evolutionary Methods in System Design and Analysis", Exxon-Mobile Upstream Research Company, Huston TX, Nov 2005
94. Invited Colloquium, "Evolving Engineering Systems", Rockefeller University, New York NY, Nov 2005
95. Invited Speaker, "3D Printing Functional Systems", Symposium on Digital Fabrication, Tromso, Norway, August, 2005
96. Invited Plenary Speaker, "Evolving Engineering Systems", Int. Conference of Systems Biology, Boston MA, October 2005
97. Invited Plenary Speaker, "Biologically Inspired Robotics", Robotics festival and exhibition, Venice, Italy, July 2005
98. Invited Speaker, DARPA/ISAT workshop "Beyond Video", Institute for Defense Analyses, Alexandria VA, June 2005
99. Invited speaker, Microsoft Faculty Summit, "3D Tablet Application", Redmond WA, June 2005
100. Invited Speaker, "Coevolutionary methods in Locomotion", Locomotion Workshop, Robotics Science and Systems, MIT, June 2005

101. Invited Speaker, “Stochastically reconfiguring systems”, Modular robotics Workshop, Robotics Science and Systems, MIT, June 2005
102. Invited Colloquium Speaker, “Biology and Machines”, Physics Dept, Technion – Israel Institute of Technology, December, 2004
103. Invited Lecturer, “Computational Evolution” (Three lectures series), Winter school in theoretical physics, Hebrew University of Jerusalem, December, 2004
104. Invited colloquium speaker, “Evolved Engineering Systems”, Dept. of Ecology and Evolutionary Biology, Michigan State University, October, 2004
105. Invited Seminar, “Co-evolution for model inference”, Seminar Series in Bioinformatics, Weisman Inst of Science, October, 2004
106. Invited Speaker, DARPA-sponsored workshop on Parallel Assembly, Lansdowne, VA, June 2004
107. Invited speaker, “Innovation in evolutionary processes”, In Search of Innovation – A Complex Adaptive Systems Perspective, Santa Fe, NM, June, 2004
108. Invited Colloquium Speaker, “Modularity, Regularity and Hierarchy in Evolved Systems”, Dept. of Ecology and Evolutionary Biology, Cornell University, March 29, 2004
109. Invited speaker, Founders workshop, “Innovation in evolutionary processes”, Santa Fe Institute for Complex Systems, Santa Fe, NM, USA, Jan 15 2004
110. Invited plenary speaker, Meeting of the National Academies, “Modularity, Regularity and Hierarchy in Evolved Engineering Systems”, Irvine, CA, USA, Nov 15 2003
111. Invited speaker, Microsoft Faculty Summit, “3D Ink”, Redmond WA, June 28, 2003
112. Invited speaker, “Design Automation for Complex Systems”, Advanced Systems Office of the NASA Office of Space Flight, NASA JPL, Jan 14, 2003
113. Invited speaker, Mechanical Engineering Colloquium series, California Institute of Technology, May 7, 2002
114. Invited plenary speaker, NASA Workshop on Revolutionary Aerospace Systems Concepts For Human/Robotic Exploration Of The Solar System, Hampton VA, November 2001
115. Invited speaker, Workshop on Nanophysics and Bio-Electronics, Dresden, Aug 20-24, 2001
116. Invited speaker, “Evolutionary Design”, Boston University, May 2001
117. Invited speaker, “Evolutionary Design”, Cornell University, May 2001
118. Invited speaker, “Evolutionary Design”, University of Illinois at Urbana Champaign, Apr 2001

119. Invited speaker, "Evolutionary Design", University of Washington, Apr 2001
120. Invited speaker, "Evolutionary Design", Stanford University, Apr 2001
121. Invited speaker, "Evolutionary Design", UC Berkeley, Berkeley, CA, March 2001
122. Invited speaker, "Evolutionary Design", MIT, Cambridge, MA, Feb 2001
123. Invited speaker, "Evolutionary Design", Harvard University, Cambridge, MA, Feb 2001
124. Invited speaker, "Evolutionary Design", Rice University, Austin, TX, Jan 2001
125. Invited speaker, "Evolutionary Design", Tufts University, Medford, MA, Jan 2001
126. Invited speaker, "Evolutionary Design", Northwestern University, Chicago IL, Jan 2001
127. Invited Colloquium, "Evolutionary Design", Dartmouth College - Hanover, NH, Jan 2001
128. Invited plenary speaker, ("New and Notable") Annual Biophysical Society meeting, February 20, 2001, Boston, MA, USA
129. Invited Talk, "Evolutionary Robotics", IEEE Robotics and Automation, Boston Chapter, 2001
130. Invited Speaker, International Firefighting robot competition, Trinity College, Hartford, CT, 2001
131. Plenary speaker, Volen Center for Complex Systems Annual Retreat, February 21, 2001, Woods Hole, MA, USA
132. Colloquium Speaker, "Automated Design and Fabrication of Robotic Lifeforms", Mechanical Engineering Department, Technion, Israel, Jan 2001
133. Invited talk, EXPO'2000 Shaping the future, Hannover, Germany, Aug 1-3, 2000
134. Plenary talk, "Automated Design Concepts, Methods, and Algorithms", CIRP Design Seminar, Haifa Israel, May 16, 2000
135. Invited talk, "High order Neurons", Workshop on Hybrid Neural Systems, NIPS 98, Breckenridge, CO, December 4-5, 1998

Recent Contributed Talks (since July 2009)

1. Contributed presentation "A robotic theory of mind in simulation", "A robotic theory of mind in simulation", Performance Metrics for Intelligent Systems Workshop (PerMIS'09), National Institute of Standards and Technology, Gaithersburg, Maryland USA, Sept 21-23 2009

2. Contributed presentation " Towards a Theory of Mind in Simulated Robots", Genetic and Evolutionary Computation Conference, Montreal Canada, July 12, 2009
3. Contributed presentation "From analog to Digital 3D printing", Rapid Manufacturing Conference, Loughborough, UK, July 8, 2009

Professional Activities

Membership

ASME (American Association of Mechanical Engineering), Member, since 2000

IEEE (Institute of Electrical and Electronic Engineers), Member, since 1998

AAAI (American Association of Artificial Intelligence), Member, Since 2002

ACM (Association of Computing Machinery), Member, since 2005

Conference Organization

1. **Co-organizer**, Workshop on Modular Robotics, IROS, August 2008
2. **General Chair**, ACM Genetic and Evolutionary Computation Conference (GECCO) 2007, (Expected ~600 participants) Largest annual conference on evolutionary computation.
3. **Co-organizer**, Workshop on Self Replication, Indiana University, June 2006
4. **Co-organizer**, Workshop on Modular Robotics, U. of Pennsylvania, June 2006
5. **Area Chair**, Robotics Science and Systems '06, U. of Pennsylvania, June 2006 (expected ~300 participants)
6. **Track Chair**, Genetic and Evolutionary Computation Conference, Seattle WA, June 2006 (expected 600 participants)
7. **Track Chair**, Genetic and Evolutionary Computation Conference, Washington DC, June 2005 (600 participants)
8. **Co-Chair**, Workshop on Modularity, Regularity and Hierarchy in Evolutionary Computation, June 2004, Seattle, WA (55 Participants).
9. **Co-Chair**, AAAI Symposium on Computational Synthesis, March 24-26, 2003, Stanford CA (60 Participants).
10. **Co-organizer**, ALife VII Workshop on Co-evolution of Bodies and Brains, Aug 3, 2000 Reed College, Portland Oregon

Reviewer, Program and Editorial Committees

11. **Editorial Committees:** Artificial Intelligence in Design (AID), Artificial Life (ALIFE), Genetic and Evolutionary Computation (GECCO), Solid Modeling (SM), Frontiers in Evolutionary Algorithms (FEA)
12. **Reviewer:** Computer Aided Design, ASME Journal of Computing and Information Science (AJCIS), ASME Journal of Mechanical Design (AJMD), IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), IEEE Transaction on Evolutionary Computation, Artificial Life, Journal of Computer Integrated Manufacturing, International Journal of Computer Vision (IJCV), Computer Vision and Image Understanding (CVIU), Computer Graphics, Others...

Grants and awards

(First name listed is PI, following (if any) are Co-PIs)

1. Lipson H. (2011) "Rapid Assemblers", DARPA M3 2011-2014, \$950,000
2. Bull G., French J., Berry R., Lipson H. (2010) "The FabLab classroom: Preparing Students for the Next Industrial Revolution", NSF 2010-2013, \$250,000
3. Bull G., Berry R., Lipson H. (2010) "Fab@School – A Digital Fabrication Laboratory for the Classroom", Motorola Foundation Innovation Generation, \$250,000, 2010-2011
4. Bull G., Berry R., Lipson H. (2010) "Fab@School – A Digital Fabrication Laboratory for the Classroom", MacArthur Reimagining Learning Competition, \$185,000, 2010-2011
5. McLean J., Wkiswo J., Lipson H., (2009) "Elucidation of Leukocyte and Macrophage Biomarker Signature from Drugs of Abuse", NIH, \$2,700,000, 2009-2011
6. Lipson H., Suel G., (2009) "Distilling natural laws from experimental data", NSF, \$600,000, 2009-2012
7. Wikswo J., Lipson H., Jenkins J.W., (2009) "Automated Characterization of the Interaction Dynamics between Toxic Chemicals and Biological Agents", DTRA, \$2,499,762, 2009-2013

8. Moon F.C, Lipson H., Sachse W., Williams C.H. Garcia E.G, Pratt K. (2008), "Vibro-Wind Technology: Alternative Wind Energy Systems for Buildings", Cornell CCSF, \$100,000, 2008-2009.
9. Lipson H., Erickson D., Jaeger H., (2008), "Hierarchical programmable self-assembly", DARPA MTO, \$2,500,000, 2008-2011.
10. Hornby G., Lipson H., Pollack J.B., (2008), "Co-evolution of designers and critics", NSF Creative IT, \$800,000, 2008-2011.
11. Rus D., Lipson H., Yim M., Klavins E., (2007), "The reconfigurable Factory", NSF EFRI, \$2,000,000, 2007-2011.
12. Bonassar L., Butcher J, Lipson H (2007) "Multidisciplinary Approach for Engineered Heart Valves Using Novel Biomaterials," Morgan Tissue Engineering, \$96,000 2007-2008
13. Bonassar L, Garcia E, Lipson H (2007) "Engineering Biological Interfaces Towards Enhanced Prosthetic Integration," AFOSR, \$205,469, 2006-2008
14. Lipson H. (2007) "A Modular Reconfigurable Robotic Platform for Research in Machine Resiliency and Adaptation", Microsoft Gift, \$105,000 2007-2008
15. Lipson H. (2007) "A Modular Reconfigurable Platform for Robotics Education", Festo AG & Co. KG, \$89,000 2007-2008
16. Lipson H. (2007) "A 1-MegaVoxel 3D Digital Printer for Multi-material Desktop Microfabrication", DARPA MTO Young Faculty Award, \$150,000 2007-2008
17. Bongard J., Lipson H. (2006) "Automatic Probing and Modeling of Nonlinear Biological Networks: Toward Automated Systems Biology", Microsoft Corp., \$178,000 2006-2007
18. Lipson H., Erickson D. (2006) "SGER: Hierarchical Microfabrication: Actively Programmable Multi-level Fluidic Self-Assembly", NSF, \$130,000 2006-2007
19. Campbell M., Garcia E., Lipson H., Psiaki M., Huttonlocker D., Selman B. (2007) "Team Cornell: Autonomous Vehicle for Operations in Urban Environments", DARPA, 2006-2007, \$1,000,000

20. Lipson H. (2006) "CAREER: Algorithms For Design Of Active Fault-Tolerant Systems", NSF, \$400,000 2006-2011
21. Lipson H. (2005) "ITR: Sketching for Conceptual Visualization, Simulation, and Learning", NSF, \$365,000 2005-2007
22. Valero Cuevas F.C., Lipson H. (2004) "Structure & function of the fingers' tendinous apparatus", NIH, \$1,100,000 2004-2008
23. Lipson H., Hornby G. (2004) "Evolutionary algorithms for recovery of physical robot functionality in unanticipated conditions", NASA, \$474,394 2004-2006
24. Lipson H., (2004) "In-Situ Self-Repair and Adaptation for Autonomous Vehicles", NASA GSRP 2-Year Graduate Research Fellowship, 2004-2005
25. Saylor J. M., Lipson H., Moon F. (2004) "A Digital Library of Printable Machines", The Institute for Museum and Library Services (IMLS), \$499,710, 2004-2006
26. Lipson H., Alon U., (2004) "Computational Methods for Automatic Inference of Biological Networks", The National Academies, \$75,000, 2004-2005
27. Lipson H., (2003) "Embedded Systems for Evolutionary Robotics", Microsoft unrestricted gift, \$25,000, 2003-2004
28. Lipson H, Valero Cuevas F, Garcia E. (2003-2007) "Biologically Inspired Hexapod Platform With Decentralized Neurocontrol And Adaptive Morphology", \$200,000, U.S. Department of Defense
29. Lipson H., (2002) "3D Digital Sketching", Microsoft unrestricted gift, \$116,000, 2002-2004
30. Saylor J.M., David Henderson, Hod Lipson, Francis Moon, (2002) "Kinematic Models for Design Digital Library", National Science Foundation, \$725,000 2002-2004.
31. Lipson H, (2002) "Autonomous Self-Extending Machines for Accelerating Space Exploration", NASA Institute for Advanced Concept (NIAC), \$75,000, 2002-2003.
32. Pollack J.B., Lipson H. (2001) "Complexity in automatically designed robotics", DOE – U.S. Department of Energy, \$526,000 2002-2004

33. Pollack J.B., Lipson H., (1999) "Fully automated design and construction of throwaway robots", DARPA – U.S. Defense Advanced Research Projects Administration, \$952,000 1999-2002.

Educational grants

34. Lipson H., (2002) "Electronic Workflow in Engineering Synthesis Courses", Cornell CIT, \$20,000 2002-2003

Outreach talks

1. Presentation to the Puerto Rico Alliance For Minority Participation, "Biologically Inspired Robotics", Nov 2009
2. Presentation to high School summer program, "Biologically Inspired Robotics", July 20, 2009
3. CCMR outreach presentation, "A factory in your kitchen", May 29, 2009
4. Ithaca High School Talk on Robotics, May 14, 2009
5. Lecture for Contemporary Physics for Teachers program, Center for Nanoscale Systems, Cornell University, July 2008
6. Lecture for the High School students enrolled in Exploration in Engineering, Cornell University, July 14, 2008
7. Presentation on adaptive robotics at the Ithaca Science Center, Feb 2007, Syracuse, NY
8. Presentation on adaptive robotics to high school students, Nottingham High, Feb 2007, Syracuse, NY
9. Talk at Manufacturers Association of Central New York (Syracuse), "Custom Fabrication", January 2006
10. CCMR Fun talk for summer REUs, "How to send physical objects over the Internet", July 2005
11. Talk at NY Center for Economic Growth (Albany), "3D Printing", March 2005
12. "Entertaining Science", NY City, Aug 2003, Cornelia Café, Nov 2003

13. Talk and demonstrations for high-school girls at the CURIE Academy, Minority & Women's Programs in Engineering, July 15, 2002
14. Talk and demonstrations for high-school children at the Jisan Research Institute, Pasadena, CA, May 7, 2002
15. Competition Judge, Lego robot competition for primary and middle school children, Boston Science Museum, MA, 2001
16. Robot exhibition (and permanent collection), London Science Museum, UK.
17. Robot exhibition, Boston Science Museum, MA
18. Interactive evolve-at-home web project, over 120,000 unique visitors, 30,000 active participants worldwide.
19. Covered by various children/popular books on robotics (e.g. "Robots among us")

Outreach via Press and media coverage

(Full documents available at <http://ccsl.mae.cornell.edu/presslist>)

20. Alternative Energy online: Energy Harvesting 'Piezo-tree' Concept
21. Wired Magazine: Download Your Own Robot Scientist by Brandon Keim
22. Singularity Hub: Eureqa - Software to Replace Scientists by Aaron Saenz
23. Physorg: Eureqa, the robot scientist (w/ Video) by Lin Edwards
24. Technovelgy: Eureqa Artificially Intelligent Computer Scientist by Bill Christensen
25. NeoTeo (Spanish): Eureqa: Software que deduce leyes científicas by Ariel Palazzesi
26. Discover News (China): Eureqa程序：可替代大脑演算的机器人程序
27. Heise Online (Germany): Wissenschafts-KI zum Download
28. Hack A Day: Eureqa Discovers Equations by Gerrit Coetzee
29. Seed Magazine: Our Adapting Future by Miles Kemp [pdf]
30. An Optimist's Tour of the Future: How can you find the truth? by Mark Stevenson [pdf]
31. RapidToday: STL 2.0 May Replace Old, Limited File Format, October 30, 2009 [pdf]
32. Q2C Festival Waterloo, Canada, October 22: The Agenda with Steve Paikin: Robotics Revolution and the Future of Evolution

33. Q2C Festival, Waterloo, Canada, October 21: Science in the Pub: So We're All Gonna Be Robots Now?
34. •Radio TICAL: Making Machines that Can Learn, Podcast Interview with Hod Lipson by Michael Simkins
35. TEDBlog: World Science Festival 2009 report: Battlestar Galactica: Cyborgs on the Horizon by Matthew Trost
36. EyeOnTechnology: Cornell Professor Creates Auto-Learning Entities by CG Masi [pdf]
37. Galactica Sitrep: Evolutionary Robotics and Battlestar Galactica: an Interview with Hod Lipson by Sam J. Miller
38. Forbes/Wolfe Emerging Tech Report: The Awakening of the Artificial Mind, May 2009
Wired Magazine: Computer Program Discovers Laws of Physics by Brandon Keim
39. New York Times: Hal, Call Your Office: Computers That Act Like Physicists by Kenneth Chang
40. The Cornell Chronicle: Move over, Newton: Scientifically ignorant computer derives natural laws from raw data by Bill Steele
41. Nature News: Physics by numbers by Philip Ball
42. ScienceDaily: Being Isaac Newton: Computer Derives Natural Laws From Raw Data by Bill Steele
43. Physics World: Algorithm discovers physical laws by Edwin Cartlidge
44. NSF: Maybe Robots Dream of Electric Sheep, But Can They Do Science? by Joshua Chamot
45. NSF: Teleconference with Cornell University professor Hod Lipson, doctoral student Michael Schmidt and reporters
46. The Telegraph: Robot discovers laws of Newton in hours by G.S. Mudur
47. Reuters: Robot scientists can think for themselves by Ben Hirschler
48. PhysOrg: Researchers Wanted: Humans Need Not Apply? by PhysOrg.com
49. ScienceNOW: Robotic Scientists Make First Discoveries by Constance Holden
50. USA Today: Robots act as scientists without assistants by Dan Vergano

51. Digg Frontpage: Being Isaac Newton: Computer derives natural laws from data submitted by lekahe
52. Dail News & Analysis: In a first, machines crack science puzzles by Sci/Tech
53. Dziennik (Poland): Roboty potrafią myśleć jak uczeni by Magdalena Salik
- 54.
55. GearLog: Scientists Develop Thinking Robot posted by Jamie Lendino
56. The Independent: Robot scientists 'can think for themselves' by Reuters
57. Red Orbit: Robot Scientists Mark Advancement For Artificial Intelligence by redOrbit staff
58. Nature Blog: Rise of the machines - April 03, 2009 by Daniel Cressey
59. ITextreme (Hungary): Az első robot kutató, mely új tudományos felfedezést tett by MaxRay
60. aeiou (Portugal): "Adão" é um robô e faz experiências científicas by Life
61. Publico (Portugal): Investigadores dizem ter criado máquinas capazes de formular teorias científicas by Reuters
62. Le Scienze (Italy): Adam e Co.: i primi robot che fanno ricerca by Eng & Tech
63. Novosti (Russia): Robots investigadores realizan primeros descubrimientos by Latest News
64. Techno-Science (France): Des robots peuvent-ils raisonner comme des scientifiques? by News
65. Abril (Brazil): Robôs cientistas conseguem pensar sozinhos by Ben Hirschler
66. MyTech (Italy): Scienza, creati robot scienziati che ragionano da soli by Ben Hirschler
67. 生物通 (Hong Kong): 本期《自然》《科学》精选 by Biology pass
68. El Mundo (Spain): Adán y Eva, los nuevos científicos robóticos by Rosa Tristan
69. The Gazette: Watch out scientists, a robot may replace you by Ben Hirschler
70. RTVE (Spain): El próximo Newton podría ser un robot by News
71. RIAN (Russia): Ученые роботы совершили первые открытия by Science & Tech
72. Estadao (Brazil): Cientistas criam robôs que fazem descobertas científicas by Reuters
73. Que.es (Spain): Adán y Eva, los primeros 'robots' científicos by Tech news

74. Diario (Portugal): Criado robô que faz descobertas científicas by Tech
75. Softpedia: Algorithm Draws Scientific Laws from Experiment Data by Tudor Vieru
76. Spiegel (Germany): Computer entdeckt selbständig Naturgesetze by People & Tech
77. Heise (Germany): Adam entdeckt Naturgesetze. Adam ist ein Programm. by News
78. HardOCP: Computer Program Deduces Laws of Physics by Terry
79. Programmazione (Italy): Leggi di natura scoperte con il computer by Paolo Raviola
80. Krone (Austria): Software erkennt Naturgesetze by Hardware & Software
81. Inovacao Tecnologica (Brazil): Robô Cientista 2: novo robô poderá descobrir leis fundamentais da física by Robotica
82. Examiner: Program self-discovers laws of physics without knowledge of them by Harold Nolte
83. The Guardian: 'Eureka machine' puts scientists in the shade by working out laws of nature by Ian Sample
84. Cornell Daily Sun: What's Next? Super Computers and teh Future of Journalism by Cody Gault
85. The Inquirer: Meet the scientists behind the robo-scientists by Wendy Grossman
86. Correio de Manha (Portugal): Robôs realizam experiências by Technology News
87. Interia (Poland): Komputer zamiast naukowca by Mariusz Blonski
88. Watertown Daily Times: Robots in science by News
89. Wirtualna Polska (Poland): Maszyna odkrywa prawa natury by Heise Online
90. Tendencias Informáticas (Spain): Desarrollan una aplicación informática capaz de explicar leyes físicas naturales by Pablo Javier Piacente
91. Punto Informatico (Italy): HAL 9000 ha il camice bianco by Alfonso Maruccia
92. TVNZ (New Zeland): Smart robots may replace scientists by Reuters
93. Heise Online (Germany): Software entdeckt Naturgesetze by News
94. NyTeknik (Sweden): Vetenskapsmän får konkurrens av robotar by Anders Wallerius
95. Die Presse (Germany): Prof. Dr. Roboter analysiert vollautomatisch by Jurgen Langenbach
96. Science Podcast, AAAS: Science Podcast: Automating Science [mp3]

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