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Employment

Fall 2006-present Assistant Professor, Department of Computer Science, University of Vermont

Education

2003-2006 Cornell University, Ithaca, USA
Computational Synthesis Laboratory
Sibley School of Mechanical and Aerospace Engineering and
Faculty of Computing and Information Science
Postdoctoral Associate

1999-2003 University of Zürich, Zürich, Switzerland
Department of Information Technology
Artificial Intelligence Laboratory (Prof. Dr. R. Pfeifer)
Software Engineering Group (Prof. Dr. H. Schauer)
Combined Doctoral appointment
PhD Thesis:
"Incremental Approaches to the Combined Evolution of a Robot's Body and Brain"

1998-1999 University of Sussex, Brighton, United Kingdom
Cognitive and Computing Sciences Graduate Research Centre
MSc, Evolutionary and Adaptive Systems
Graduated with Distinction
MSc Thesis:
"Evolving Heterogeneity: Implications for Agent-Based Systems and Collective Problem Solving"

1993-1997 McMaster University, Hamilton, Canada
Department of Computer Science and Systems
BSc Honours, Computer Science *Summa Cum Laude*

August 1994 Oxford University, Oxford, United Kingdom
Corpus Christi College / Detroit Mercy study abroad programme
Equivalent of 4.0 GPA in British Literature

Publications

Books

1. Pfeifer, R. and J. Bongard (2006) ***How the Body Shapes the Way We Think: A New View of Intelligence***, Boston, MA: MIT Press.

Journal Articles

2. Bongard J. C. (2008). Accelerating self-modeling in cooperative robot teams. ***IEEE Transactions on Evolutionary Computation***, DOI: 10.1109/TEVC.2008.927236
3. Bongard, J. and H. Lipson (2007) "Automated reverse engineering of nonlinear dynamical systems", ***Proceedings of the National Academy of Sciences***, 104(24): 9943-9948.
4. Bongard, J., V. Zykov and H. Lipson (2006) "Resilient Machines Through Continuous Self-Modeling", ***Science***, 314: 1118-1121.

5. Kouchmeshky, B., W. Aquino, H. Lipson and J. Bongard (2006) "Co-Evolutionary Strategy for Structural Damage Identification Using Minimal Physical Testing", ***International Journal for Numerical Methods in Engineering***, 69(5): 1085-1107.
6. Bongard, J. and H. Lipson (2005) "Active Coevolutionary Learning of Deterministic Finite Automata", ***Journal of Machine Learning Research***, 6(Oct): 1651-1678.
7. Bongard, J. and H. Lipson (2005) "Nonlinear System Identification using Coevolution of Models and Tests", ***IEEE Transactions on Evolutionary Computation***, 9(4): 361-384.
8. Pfeifer, R., F. Iida and J. Bongard (2005) "New Robotics: Design Principles for Intelligent Systems", ***Artificial Life, Special Issue on New Robotics, Evolution and Embodied Cognition***, 11(1-2): 99-120.
9. Bongard, J. and R. Pfeifer (2003) "Evolving Complete Agents Using Artificial Ontogeny", in Hara, F. & R. Pfeifer, (eds.), ***Morpho-functional Machines: The New Species (Designing Embodied Intelligence)***, Springer-Verlag, pp. 237-258.

Peer-Reviewed Conference and Workshop Publications

10. Bongard, J. (2008) "Behavior Chaining: Incremental Behavior Integration for Evolutionary Robotics", *Artificial Life XI*, MIT Press, Cambridge, MA.
11. Lungarella, M., Iida, F., Bongard, J. and Pfeifer, R. (2008) AI in the 21st century -- with historical reflections, *Proceedings of the 50th Anniversary Summit of Artificial Intelligence*, pp. 1-8.
12. Lu, Z., Rughani, A. I., Tranmer, B. I., Bongard, J. (2008) "Informative Sampling for Large Unbalanced Data Sets", 4th Workshop on Medical Applications of Genetic and Evolutionary Computation at GECCO 2008.
13. Bongard, J. (2007) "Synthesizing Physically-Realistic Environmental Models from Robot Exploration", *Advances in Artificial Life: 9th European Conference*, Springer-Verlag, Berlin, pp. 806-815.
14. Bongard, J. (2007) "Action-Selection and Crossover Strategies for Self-Modeling Machines", *Proceedings of the 9th Annual Conference on Genetic and Evolutionary Computation*, ACM Press, New York, NY, pp. 198-205.
15. Bongard, J. (2007) "Exploiting Multiple Robots to Accelerate Self-Modeling", *Proceedings of the 9th Annual Conference on Genetic and Evolutionary Computation*, ACM Press, New York, NY, pp. 214-221.
16. Lipson, H., J. Bongard, V. Zykov and E. Malone (2006) "Evolutionary Robotics for Legged Machines: From Simulation to Physical Reality", Arai, T. et al. (eds.), *Intelligent Autonomous Systems 9 (IAS-9)*, 11-18.
17. Bongard, J., V. Zykov and H. Lipson (2006) "Automated Synthesis of Body Schema using Multiple Sensor Modalities", *The Tenth International Conference on the Simulation and Synthesis of Living Systems (ALIFE10)*, 220-226.
18. Bongard, J. and H. Lipson (2005) "Automatic Synthesis of Multiple Internal Models Through Active Exploration", *AAAI Fall Symposium on Reactive to Anticipatory Cognitive Embodied Systems*, Arlington, VA, November 2005.
19. Bongard, J. and H. Lipson (2005) "'Managed Challenge' Alleviates Disengagement in Co-evolutionary System Identification", in *Proceedings of the 2005 Genetic and Evolutionary Computation Conference (GECCO)*, ACM, pp. 531-538.
20. White, P., V. Zykov and J. Bongard (2005) "Three Dimensional Stochastic Reconfiguration of Modular Robots", *Robotics: Science and Systems*, Cambridge, MA.
21. Bongard J. and Lipson H. (2005) "Reinventing the Wheel: Experiments in Evolutionary Geometry", *Late Breaking Papers of the 2005 Genetic and Evolutionary Computation Conference*, June, Washington DC.
22. Zykov, V., J. Bongard and H. Lipson (2005) "Co-evolutionary Variance Can Guide Physical Testing in

Evolutionary System Identification", *The 2005 NASA/DoD Conference on Evolvable Hardware*, June, Washington DC, pp. 213-220.

23. Lipson, H. and J. Bongard (2004) "An Exploration-Estimation Algorithm for Synthesis and Analysis of Engineering Systems Using Minimal Physical Testing", in *Proceedings of the 2004 ASME Design Engineering Technical Conferences and Computer and Information in Engineering Conference*, Salt Lake City, UT.
24. Zykov, V., J. Bongard and H. Lipson (2004) "Evolving Dynamics Gaits on a Physical Robot", in *Late Breaking Papers for the 2004 Genetic and Evolutionary Computation Conference (GECCO)*, Seattle, WA.
25. Bongard, J. and H. Lipson (2004) "Once More Unto the Breach: Co-evolving a Robot and its Simulator", in *Proceedings of the Ninth International Conference on the Simulation and Synthesis of Living Systems (ALIFE9)*, pp. 57-62.
26. Bongard, J. and H. Lipson (2004) "Automated Robot Function Recovery after Unanticipated Failure or Environmental Change using a Minimum of Hardware Trials", in *Proceedings of the NASA/DoD Conference on Evolvable Hardware*, IEEE Computer Society, pp. 169-176.
27. Bongard, J. and H. Lipson (2004) "Automating Genetic Network Inference with Minimal Physical Experimentation Using Coevolution", in *Proceedings of the 2004 Genetic and Evolutionary Computation Conference (GECCO)*, Springer, pp. 333-345.
28. Bongard, J. and H. Lipson (2004) "Automated Damage Diagnosis and Recovery for Remote Robotics", in *Proceedings of the 2004 International Conference on Robotics and Automation (ICRA)*, Omnipress, pp. 3545-3550.
29. Bongard, J. (2002) "Evolved Sensor Fusion and Dissociation in an Embodied Agent", in *Proceedings of the EPSRC/BBSRC International Workshop on Biologically-Inspired Robotics: The Legacy of W. Grey Walter*, pp. 102-109.
30. Frutiger, D. R., Bongard, J. and F. Iida (2002) "Iterative Product Engineering: Evolutionary Robot Design", in Bidaud, P. & F. B. Amar (eds.), *Proceedings of the Fifth International Conference on Climbing and Walking Robots*, Professional Engineering Publishing, pp. 619-629.
31. Bongard, J. and R. Pfeifer (2002) "A Method for Isolating Morphological Effects on Evolved Behaviour", in Hallam, B., Floreano, D. et al (eds.), *Proceedings of the Seventh International Conference on the Simulation of Adaptive Behaviour (SAB2002)*, MIT Press, pp. 305-311.
32. Bongard, J. and R. Pfeifer (2002) "Relating Neural Network Performance to Morphological Differences in Embodied Agents", in *Proceedings of the Sixth International Conference on Cognitive and Neural Systems*, Boston, USA.
33. Bongard, J. (2002) "Evolving Modular Genetic Regulatory Networks", in *Proceedings of the IEEE 2002 Congress on Evolutionary Computation (CEC2002)*, IEEE Press, pp. 1872-1877.
34. Paul, C. and J. Bongard (2001) "The Road Less Travelled: Morphology in the Optimization of Biped Robot Locomotion", in *Proceedings of The IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2001)*, Hawaii, USA.
35. Bongard, J. and C. Paul (2001) "Making Evolution an Offer It Can't Refuse: Morphology and the Extradimensional Bypass", in J. Keleman & P. Sosik (eds.), *Proceedings of the Sixth European Conference on Artificial Life*, (Springer-Verlag), pp. 401-412.
36. Bongard, J. and R. Pfeifer (2001) "Repeated Structure and Dissociation of Genotypic and Phenotypic Complexity in Artificial Ontogeny", in *Proceedings of the 2001 Genetic and Evolutionary Computation Conference*. San Francisco, CA: Morgan Kaufmann, pp. 829-836.
37. Bongard, J. and C. Paul (2000) "Investigating Morphological Symmetry and Locomotive Efficiency using Virtual Embodied Evolution", in *From Animals to Animats: The Sixth International Conference on the Simulation of Adaptive Behaviour*. (MIT Press) pp. 420-429.
38. Bongard, J. (2000) "Reducing Collective Behavioural Complexity through Heterogeneity", in *Artificial Life VII: Proceedings of the Seventh International Conference*. (MIT Press), pp. 327-336.

39. Bongard, J. (2000) "The Legion System: A Novel Approach to Evolving Heterogeneity for Collective Problem Solving", in R. Poli, W. Banzhaf et al (eds.), *Genetic Programming: Third European Conference*. (Springer-Verlag) pp. 25-37.
40. Bongard, J. (1999) "Coevolutionary Dynamics of a Multi-Population Genetic Programming System", in Floreano, D., J.-D. Nicoud & F. Mondada (eds.), *Proceedings of the Fifth European Conference on Artificial Life*. (Springer-Verlag) pp. 316-321.

Grants and Awards

Bongard J. (2007) New Faculty Fellowship, Microsoft Award, \$200,000, 2007—
Bongard J. (2007) "Exploiting 'Like Me' Hypotheses for Learning Robots", NSF, \$192,391, 2007-2009
Rizzo, D., Eppstein, M., Bongard, J., Goodnight, C., Stevens, L., Hoffman, J. Molofsky, J. (2007) "Complex Systems Modeling for Environmental Problem Solving", NSF, \$6,750,000, 2007-2010.

Experience

External reviewer: The Austrian Science Fund (FWF), Austria's national scientific funding body
Member, Editorial Board: Evolutionary Computation Journal (MIT Press)
Ad hoc reviewer: Journal of Machine Learning Research, IEEE Transactions on Evolutionary Computation, IEEE Transactions on Robotics, Artificial Life, Adaptive Behavior, IEEE Transactions on Systems, Man, and Cybernetics, Journal of Neurorobotics, Neural Computation, PLoS ONE
Co-organizer: "The 50th Anniversary Summit of Artificial Intelligence: Trends and Challenges in the 21st Century", Monte Verita, Switzerland, summer 2006

Teaching

Instructor: *Software Engineering, Human-Computer Interaction*, University of Vermont Computer Science Department
Advisor: Zhenyu Lu, current PhD student.
Mentor: Over 20 undergraduate and graduate student projects at Cornell, 2003-present.
Leader: Student workshop on embodied Artificial Intelligence, University of Ilmenau, 2002.
Organizer and Instructor: MIGROS Summer Course on Robotics and Artificial Intelligence, Zurich, 2002.

Selected Invited Talks

- **Invited attendance**, National Academy of Engineering's U.S. Frontiers of Engineering Symposium (September 2008)
- Telluride Neuromorphic Cognition Engineering Workshop (June 2008)
- Woods Hole Workshop on Computational Neuroscience (June 2008)
- **Keynote address**, Genetic Programming Theory and Practice (May 2008)
- Capo Caccia Workshop toward Cognitive Engineering (April 2008)
- Department of Cognitive and Neural Systems, Boston University (January 2008)
- National Science Foundation's *Future Challenges for the Science of Learning* workshop (August 2007)
- Department of Information Technology, University of Zurich, Switzerland (2004)
- EPSRC Network on Evolvability in Biological and Software Systems Symposium, Hertfordshire, UK (2003)
- Division of Cell Biology, Biozentrum, University of Basel, Switzerland (2002)
- AI Lab, Massachusetts Institute of Technology, Boston (2002)
- Marine Biological Laboratory, Woods Hole, MA (2002)
- Center for Research in Cognitive Science, Sussex, UK (2002)

Media

Nature News: "Injured Robot Learns to Limp" (November 2006)
Science News: "New Robot Shrugs Off Injury" (November 2006)
MIT Technology Review: "Robotic Recovery" (November 2006)
Discovery Channel: "Self-Aware Robots" (November 2006)
Forbes: "New Robot Can Sense Damage, Recover" (November 2006)
USA Today: "New Robot Can Sense Damage and Compensate" (November 2006)
Scientific American: "Resilient Robot Hobbles Along, Even if Injured" (November 2006)
Die Zeit: "The GOLEM in the machine" (January 2007)
New Scientist: "'Animals' grown from an artificial embryo" (August 2002)

Scholarships and Prizes

- 2008** Recipient of the UVM College of Engineering and Mathematical Sciences
Milt Silveira Junior Faculty Award (\$2K prize)
- 2007** One of *MIT Technology Review's* TR35: The Top 35 Young Innovators under 35
- 2007** Microsoft New Faculty Fellowship (\$200K prize)
- 2002** Best Paper Award, Seventh Intl. Conf. on the Simulation of Adaptive Behaviour (SAB-2002)
- 1999** Santa Fe Institute Complex Systems Summer School alumnus
- 1993-1997** McMaster University Dean's Honour List

Professional References

1. Prof. Dr. Hod Lipson

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3. Andrew N. Meltzoff

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5. Prof. Dr. Wilkins Aquino

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6. Dr. Inman Harvey

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