Josh C Bongard — Curriculum Vitae

CONTACT

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APPOINTMENTS

Professor, Department of Computer Science — 2015–2017

Cyril G. Veinott Green and Gold Professor, Department of Computer Science, College of Engineering & Mathematical Sciences, University of Vermont — 2015–

Director, Vermont Advanced Computing Core — 2015–

Consultant, Xemo Corporation (spinoff company from our laboratory) — 2014–

Associate Professor, Department of Computer Science — 2012–2015
College of Engineering & Mathematical Sciences, University of Vermont

Secondary appointment in the School of Engineering, UVM — 2014–

Secondary appointment in the Neuroscience Graduate Program, UVM — 2013–

Vice chair, Vermont Complex Systems Center — 2011–2015

Assistant Professor, Department of Computer Science — 2006-2012
College of Engineering & Mathematical Sciences, University of Vermont

Director, Morphology, Evolution & Cognition Laboratory — 2006–

Postdoctoral Associate, Cornell University — 2003–2006
Advisor: Hod Lipson, Director of the Creative Machines Laboratory

Software Engineer, Computing Devices Canada — 1998

EDUCATION

Ph.D., Department of Informatics, University of Zurich, Switzerland — 1999-2003
Dissertation: *Incremental Approaches to the Combined Evolution of a Robot's Body and Brain*.
Advisor: Rolf Pfeifer, Director of the Zurich Artificial Intelligence Laboratory

M.S., Evolutionary & Adaptive Systems, University of Sussex, UK — 1998-1999
Dissertation: *Evolving Heterogeneity: Implications for Agent-Based Systems and Collective Problem Solving.*
Advisor: Inman Harvey

B.Sc., Honors Computer Science, McMaster University, Canada — 1993-1997
Graduated *Summa Cum Laude*

Study abroad program, Corpus Christi College, Oxford University, UK — 1994

CURRENT FUNDING

National Science Foundation **EAGER** award, $100,000 — 2016-2017
Scalable crowdsourced reinforcement of robot behavior.

Army Research Office award, $400,000 2016-2018
Morphological Plasticity for the Design, Control, and Deployment of Complex Engineering Systems.

NSF BIGDATA award (co-PI; PI: James Bagrow, UVM), $600,000 2014-2017
Hunch & Crunch: Iterative Crowdsourced Hypothesis Generation.

NSF INSPIRE award (co-PI; PI: Ken Livinston, Vassar College), $500,000 2013-2017
Evolvability and the emergence of modularity.

PAST FUNDING

NASA ROSES award (co-PI; PI: Kamalika Das), $300,000 2015-2017
Uncovering effects of climate variables on global vegetation.

NSF **CAREER/PECASE** award, $499,999 2010-2017
Exploring the Ultimate Mechanisms of Embodied Cognition.

DARPA MSEE award, $614,830 2011-2015
Continually Plastic Modeling of Non-Stationary Systems.

DARPA M3 award (co-PI: PI: Greg Hornby, NASA Ames), $200,000 2011-2014
Rapid Human-Computer Interactive Conceptual Design of Mobile and Manipulative Robot Systems.

Microsoft Research New Faculty Fellowship, $200,000 2007—

NSF SGER award, $192,391 2007–2009
Exploiting 'Like Me' Hypotheses for Learning Robots

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. (Translated into Chinese, Japanese, Arabic and an E-book)

ARTICLES

28. MD Wagy, JC Bongard, JP Bagrow & PDH Hines (2017)
Crowdsourcing Predictors of Residential Electric Energy Usage.
IEEE Systems Journal, PP(99):1–10.

27. D Buckingham & JC Bongard (2017)
Physical Scaffolding Accelerates the Evolution of Robot Behavior.
Artificial Life, 23(3):351-373.

26. F Corucci, N Cheney, S Kriegman, J Bongard, C Laschi (2017)
Evolutionary developmental soft robotics as a framework to study intelligence and adaptive behavior in animals and plants.
Frontiers in Robotics and AI.

25. N Livingston, A Bernatskiy, K Livingston, ML Smith, J Schwarz, JC Bongard, D Wallach & JH Long Jr (2016)
Modularity and sparsity: evolution of neural net controllers in physically embodied robots.
Frontiers in Robotics and AI.

24. T Taylor, JE Auerbach, J Bongard, J Clune, S Hickinbotham, C Ofria, M Oka, S Risi, KO Stanley, J Yosinski (2016)
WebAL comes of age: A review of the first 21 years of artificial life on the web.

Artificial Life, 22(3) 364–407.

23. C Cappelle, A Bernatskiy, K Livingston, N Livingston, J Bongard (2016)
Morphological modularity can enable the evolution of robot behavior to scale linearly.
Frontiers in Robotics and AI, in press.

22. J Bongard (2015)
Using robots to investigate the evolution of adaptive behavior.
Current Opinion in Behavioral Sciences, 6: 168–173.

21. M Wagy & J Bongard (2015)
Combining computational and social effort for collaborative problem solving.
PLoS ONE, DOI: 10.1371/journal.pone.014524.

20. D Buckingham, C Skalka, and J Bongard (2015)
Inductive machine learning for improved estimation of catchment-scale snow water equivalent.
Journal of Hydrology, 524: 311-325.

19. R Swain, A Berger, J Bongard, & P Hines (2015)
Participation and contribution in crowdsourced surveys.
PLoS ONE, DOI: 10.1371/journal.pone.0120521.

18. Bongard, J. C. & Lipson, H. (2014)
Evolved machines shed light on robustness and resilience.
Proceedings of the IEEE, **102**(5): 899–914.

17. Lu, Z. Wu, X. & Bongard, J. C. (2014)
Active learning through adaptive heterogeneous ensembling.
IEEE Transactions on Knowledge and Data Engineering, DOI: 10.1109/TKDE.2014.2304474.

16. Bevelander, K. E., Kaipainen, K., Swain, R., Dohle, S., Bongard, J. C., Hines, P. D. H. & Wansink, B. (2014)
Crowdsourcing novel childhood predictors of adult obesity.
PLoS ONE, 9(2): e87756

15. Auerbach, J. E. & Bongard, J. C. (2014)
Environmental influence on the evolution of morphological complexity in machines.
PLoS Computational Biology, 10(1): e1003399

14. Bongard, J. C. (2013)
Evolutionary robotics.
Communications of the ACM, 56(8): 74—85.

13. Bongard, J. C., Hines, P. D. H., Conger, D., Hurd, P., and Lu, Z. (2012)
Crowdsourcing predictors of behavioral outcomes.
IEEE Transactions on Systems, Man, and Cybernetics, Part A, 43(1): 176–185.

12. Bongard, J. C. (2011)
Morphological change in machines accelerates the evolution of robust behavior.
Proceedings of the National Academy of Sciences, 108(4): 1234-1239.

11. Bongard, J. C. (2011).
Innocent until proven guilty: Reducing robot shaping from polynomial to linear time.
IEEE Transactions on Evolutionary Computation, 15(4): 571—85.

10. Kaipa, K., Bongard, J., Meltzoff, A. (2010).
Self discovery enables robot social cognition: Are you my teacher?
Neural Networks, 23: 1113-1124.

9. Bongard, J. C. (2010).
The utility of evolving simulated robot morphology increases with task complexity
for object manipulation. *Artificial Life*, 16(3): 201-223.

8. Rughani, A. I., Dumont, T. M., Lu, Z., Bongard, J., Horgan, M. A., Penar, P. L., Tranmer, B. I. (2009).
Use of an artificial neural network to predict head injury outcome.
Journal of Neurosurgery, 113(3): 585–90.

7. Bongard J. C. (2009).
Accelerating self-modeling in cooperative robot teams.
IEEE Transactions on Evolutionary Computation, 13(2): 321-332.

6. Bongard, J. and H. Lipson (2007)
Automated reverse engineering of nonlinear dynamical systems.
Proceedings of the National Academy of Sciences, 104(24): 9943-9948.

5. Bongard, J., V. Zykov and H. Lipson (2006)
Resilient machines through continuous self-modeling.
Science, 314: 1118-1121.

4. 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.

3. Bongard, J. and H. Lipson (2005)
Active coevolutionary learning of deterministic finite automata.
Journal of Machine Learning Research, 6(Oct): 1651-1678.

2. Bongard, J. and H. Lipson (2005)
Nonlinear system identification using coevolution of models and tests.
IEEE Transactions on Evolutionary Computation, 9(4): 361-384.

1. 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.

BOOK CHAPTERS

7. A Cangelosi, J Bongard, MH Fischer, S Nolfi (2015)
Embodied intelligence.
Springer Handbook of Computational Intelligence, pp. 697-714

6. Bongard, J. C. (2014)
Evolving morphological computation.
Opinions and Outlooks on Morphological Computation, ISBN: 978-3-033-04515-6

5. Bongard, J. C. (2014)
Why morphology matters.
Horizons of of Evolutionary Robotics, MIT Press, pp. 125–152.

4. Icke, I., Allgaier, N. A., Danforth, C. M., Whelan, R., Garavan, H., Bongard, J. C. (2013)

A Deterministic and Symbolic Regression Hybrid Applied to Resting-State fMRI data.
Genetic Programming Theory and Practice IX, Springer.

3. Bongard, J. C. (2011)
The 'What', 'How' and the 'Why' of Evolutionary Robotics.
In Doncieux, S., Bredeche, N., Mouret, J.-B. (eds.),
New Horizons in Evolutionary Robotics (Studies in Computational Intelligence), 341: 29-35.

2. Bongard, J. C. (2011)
A Functional Crossover Operator for Genetic Programming.
Genetic Programming Theory and Practice VII, Springer, pp. 195—210

1. Bongard, J. and R. Pfeifer (2003)
Evolving complete agents using artificial ontogeny,
Morpho-functional Machines: The New Species, Springer-Verlag, pp. 237—258.

PEER-REVIEWED
CONFERENCE PUBLICATIONS

69. A Bernatskiy & JC Bongard (2017).
Choice of robot morphology can prohibit modular control and disrupt evolution.
Procs of the European Conference on Artificial Life, Nancy, France.

68. S Kriegman, N Cheney, F Corucci, JC Bongard (2017).
A minimal developmental model can increase evolvability in soft robots.
Proceedings of the Genetic and Evolutionary Computation Conference, pp 131-138.

67. C Cappelle, A Bernatskiy, J Bongard (2017).
Reducing Training Environments in Evolutionary Robotics Through Ecological Modularity.
Proceedings of the Conference on Biomimetic and Biohybrid Systems, pp 95-106.

66. M Szubert, A Kodali, S Ganguly, K Das & JC Bongard (2016)
Semantic forward propagation for symbolic regression.
Procs of the Parallel Problem Solving from Nature (PPSN) Conference, Edinburgh, UK.

65. S Kriegman, M Szubert, JC Bongard & C Skalka (2016)
Evolving spatially aggregated features from satellite imagery for regional modeling.
Procs of the Parallel Problem Solving from Nature (PPSN) Conference, Edinburgh, UK.

64. N Powell & JC Bongard (2016)
Exploring uncertainty and movement in categorical perception using robots.
Procs of the Parallel Problem Solving from Nature (PPSN) Conference, Edinburgh, UK.

63. M Szubert, A Kodali, S Ganguly, K Das & JC Bongard (2016)
Reducing antagonism between behavioral diversity and fitness in semantic genetic programming.
Procs of the Genetic and Evolutionary Computation Conference (GECCO), Denver, CO.

62. N Cheney, JC Bongard, V SunSpiral & H Lipson (2016)
On the difficulty of co-optimizing morphology and control in evolved virtual creatures.
15th Intl Conference on the Simulation and Synthesis of Living Systems (ALife 2016), Cancun, MX.

61. F Corucci, N Cheney, H Lipson, C Laschi & JC Bongard (2016)
Material properties affect evolution's ability to exploit morphological computation
in growing soft-bodied creatures.
15th Intl Conference on the Simulation and Synthesis of Living Systems (ALife 2016), Cancun, MX.

60. J Anetsberger & JC Bongard (2016)
Robots can ground crowd-proposed symbols by forming theories of group mind.
15th Intl Conference on the Simulation and Synthesis of Living Systems (ALife 2016), Cancun, MX.

59. M Wagy & JC Bongard (2016)
Social contribution in the design of adaptive machines on the web.
15th Intl Conference on the Simulation and Synthesis of Living Systems (ALife 2016), Cancun, MX.

58. McAndrew, T. C., Bongard, J. C., Danforth, C. M., Dodds, P. S., Hines, P. D., & Bagrow, J. P. (2016).
What we write about when we write about causality: Features of causal statements across large-scale social discourse.
ASONAM 16

57. M Wagy & JC Bongard (2015)
Crowdseeding: a novel approach for designing bioinspired machines.
Fourth Intl Conf on Biomimetics and Biohybrid Systems (Living Machines 2015), Barcelona, Spain.

56. K Zieba & JC Bongard (2015)
An embodied approach for evolving robust visual classifiers.
Procs of the Genetic and Evolutionary Computation Conference, Madrid, Spain.

55. A Yousefi, JC Bongard & C Skalka (2015)
A Genetic Programming approach to cost-sensitive control in resource constrained sensor systems.
Procs of the Genetic and Evolutionary Computation Conference, Madrid, Spain.

54. N Cheney, JC Bongard & H Lipson (2015)
Evolving soft robots in tight spaces.
Procs of the Genetic and Evolutionary Computation Conference, Madrid, Spain.

53. JC Bongard, A Bernatskiy, K Livingston, N Livingston, J Long & M Smith (2015)
Evolving robot morphology facilitates the evolution of neural modularity and evolvability.
Procs of the Genetic and Evolutionary Computation Conference, Madrid, Spain.

52. Wagy, M., Bongard, J. C. (2014)
Collective Design of Robot Locomotion.
Procs of the 14th Intl Conf on the Synthesis and Simulation of Living Systems, New York City.
Acceptance rate: 49.8%. Citations: 4

51. Bernatskiy, A., Hornby, G., Bongard, J. C. (2014)
Improving Robot Behavior Optimization by Combining User Preferences.
Procs of the 14th Intl Conf on the Synthesis and Simulation of Living Systems, New York City.
Acceptance rate: 49.8%. Citations: 3

50. Icke, I., Bongard, J. C. (2013)
Improving Genetic Programming Based Symbolic Regression Using Deterministic Machine Learning.
Procs of the IEEE Congress on Evolutionary Computation, Cancun, MX.
Citations: 9

49. Icke, I., Bongard, J. C. (2013)
Modeling Hierarchy using Symbolic Regression.
Procs of the IEEE Congress on Evolutionary Computation, Cancun, MX.
Citations: 0

48. Celis, S., Hornby, G. S., Bongard, J. C. (2013)
Avoiding Local Optima with User Demonstrations and Low-level Control.
Procs of the IEEE Congress on Evolutionary Computation, Cancun, MX.
Citations: 8

47. Bongard, J. C., Hornby, G. S. (2013)
Combining Fitness-based Search and User Modeling in Evolutionary Robotics,
Procs of the Genetic and Evolutionary Computation Conference, pp. 159-166.
Acceptance rate: 36%. Citations: 16

46. Auerbach, J. E., Bongard, J. C. (2012)
On the Relationship Between Environmental and Mechanical Complexity in Evolved Robots.
ALife XIII, pp. 309-316, DOI: 10.7551/978-0-262-31050-5-ch041.
Acceptance rate: 50%. Citations: 17

45. Auerbach, J. E., Bongard, J. C. (2012)
On the Relationship Between Environmental and Morphological Complexity in Evolved Robots,
Procs of the Genetic and Evolutionary Computation Conference, pp. 521-528.
Acceptance rate: 36%. Citations: 35

44. Hornby, G. S., Bongard, J. C. (2012)
Accelerating Interactive Evolutionary Algorithms through Comparative and Predictive User Models,
Procs of the Genetic and Evolutionary Computation Conference, DOI: 10.1145/2330163.2330196.
Acceptance rate: 36%. Citations: 10

43. Hornby, G. S., Bongard, J. C. (2012)
Learning Comparative User Models for Accelerating Human Computer Collaborative Search.
Procs of the Evolutionary and Biologically Inspired Music, Sound, Art and Design Conf, pp. 117-128.
Citations: 6

42. Auerbach, J. E., Bongard, J. C. (2011)
Evolving Complete Robots with CPPN-NEAT: The Utility of Recurrent Connections,
Procs of the Genetic and Evolutionary Computation Conference, pp. 1475–1482, ACM: NY, USA
Acceptance rate: 38%
Citations: 15

41. Bongard, J. C. (2011)
Spontaneous Evolution of Structural Modularity in Robot Neural Network Controllers,
Procs of the Genetic and Evolutionary Computation Conference, pp. 251–258, ACM: NY, USA.
Acceptance rate: 38%
Citations: 16

40. Bongard, J. C. (2011)
Morphological and Environmental Scaffolding Synergize when Evolving Robot Controllers,
Procs of the Genetic and Evolutionary Computation Conference, pp. 179–186, ACM: NY, USA
Acceptance rate: 38%
Citations: 14

39. Auerbach, J. E., Bongard, J. C. (2010)
Dynamic Resolution in the Co-Evolution of Morphology and Control,
Procs of the 12th Intl Conf on the Synthesis and Simulation of Living Systems.
Citations: 33

38. Lu, Z., Wu, X., Zhu, X., Bongard, J. (2010)

Ensemble Pruning via Individual Contribution Ordering,
The 16th ACM SIGKDD Conference on Knowledge Discovery and Data Mining.
Citations: 46

37. Auerbach, J. E., Bongard, J. C. (2010)
Evolving CPPNs to Grow Three Dimensional Structures.
Procs of the Genetic and Evolutionary Computation Conference, Portland, OR.
Acceptance rate: 45%. Citations: 34

36. Bongard, J. C. (2010)
A Probabilistic Functional Crossover Operator for Genetic Programming.
Procs of the Genetic and Evolutionary Computation Conference, Portland, OR.
Acceptance rate: 45%. Citations: 8

35. Bongard, J. C., Hornby, G. S. (2010)
Guarding Against Premature Convergence while Accelerating Evolutionary Search.
Procs of the Genetic and Evolutionary Computation Conference, Portland, OR.
Acceptance rate: 45%. Citations: 24

34. Lu, Z., Wu, X., Bongard, J. (2010)
Adaptive Informative Sampling for Active Learning.
Procs of The SIAM Conference on Data Mining (SDM 2010), Columbus, Ohio, USA
Citations: 5

33. Lu, Z., Wu, X., Bongard, J. C. (2009)
Active Learning with Adaptive Heterogeneous Ensembles.
Procs of the Intl Conf on Data Mining, Miami, FL.
Citations: 11

32. Kaipa, K., Bongard, J. C., Meltzoff A. N. (2009)
Combined Structure and Motion Extraction from Visual Data Using Evolutionary Active Learning.
Procs of the Genetic and Evolutionary Computation Conference, Montreal Canada.
Acceptance rate: 41.4%. Citations: 1

31. Auerbach, J., Bongard, J. C. (2009)
Evolution of Functional Specialization in a Morphologically Homogeneous Robot,
Procs of the Genetic and Evolutionary Computation Conference, Montreal Canada.
Acceptance rate: 41.4%. Citations: 7

30. Auerbach, J., Bongard, J. C. (2009)
How Robot Morphology and Training Order Affect the Learning of Multiple Behaviors,
IEEE Congress on Evolutionary Computation, Trondheim, Norway.
Citations: 20

29. Bongard, J. (2008)
Behavior Chaining: Incremental Behavior Integration for Evolutionary Robotics.
Artificial Life XI, MIT Press, Cambridge, MA.
Citations: 42

28. Bongard, J. (2007)
Synthesizing Physically-Realistic Environmental Models from Robot Exploration,
Advances in Artificial Life: 9th European Conference, Springer-Verlag, Berlin, pp. 806-815.
Citations: 4

27. Bongard, J. (2007)
Action-Selection and Crossover Strategies for Self-Modeling Machines,
Procs of the Genetic and Evolutionary Computation Conf, ACM Press, New York, NY, pp. 198-205.
Acceptance rate: 46.1%. Citations: 7

26. Bongard, J. (2007)
Exploiting Multiple Robots to Accelerate Self-Modeling,
Procs of the Genetic and Evolutionary Computation Conf, ACM Press, New York, NY, pp. 214-221.
Acceptance rate: 46.1%. Citations: 3

25. Lipson, H., J. Bongard, V. Zykov and E. Malone (2006)
Evolutionary Robotics for Legged Machines: From Simulation to Physical Reality,
Procs of the Intelligent Autonomous Systems Conf (IAS-9), pp. 11—18.
Citations: 42

24. Bongard, J., V. Zykov and H. Lipson (2006)
Automated Synthesis of Body Schema using Multiple Sensor Modalities,
ALIFE X, pp. 220—226.
Citations: 27

23. 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.
Citations: 7

22. Bongard, J. and H. Lipson (2005)
'Managed Challenge' Alleviates Disengagement in Co-evolutionary System Identification,
Procs of the Genetic and Evolutionary Computation Conference, ACM, pp. 531-538.
Acceptance rate: 46.1%. Citations: 21

21. White, P., V. Zykov and J. Bongard (2005)
Three Dimensional Stochastic Reconfiguration of Modular Robots,
Robotics: Science and Systems, Cambridge, MA.
Citations: 157

20. Bongard J. and Lipson H. (2005)
Reinventing the Wheel: Experiments in Evolutionary Geometry,
Late Breaking Papers of the Genetic and Evolutionary Computation Conf, Washington DC.
Citations: 2

19. Zykov, V., J. Bongard and H. Lipson (2005)
Co-evolutionary Variance Can Guide Physical Testing in Evolutionary System Identification,
Procs of the NASA/DoD Conf on Evolvable Hardware, June, Washington DC, pp. 213-220.
Citations: 10

18. Lipson, H. and J. Bongard (2004)
An Exploration-Estimation Algorithm for Synthesis and Analysis
of Engineering Systems Using Minimal Physical Testing,
Procs of the ASME Design Engineering Conferences, Salt Lake City, UT.
Citations: 17

17. Zykov, V., J. Bongard and H. Lipson (2004)
Evolving Dynamic Gaits on a Physical Robot,
Late Breaking Papers for the Genetic and Evolutionary Computation Conf, Seattle, WA.

Citations: 61

16. Bongard, J. and H. Lipson (2004)
Once More Unto the Breach: Co-evolving a Robot and its Simulator,
Procs of the Intl Conf on the Simulation and Synthesis of Living Systems (ALIFE9), pp. 57-62.
Citations: 37

15. Bongard, J. and H. Lipson (2004)
Automated Robot Function Recovery after Unanticipated Failure
or Environmental Change using a Minimum of Hardware Trials,
Procs of the NASA/DoD Conference on Evolvable Hardware, IEEE Computer Society, pp. 169-176.
Citations: 32

14. Bongard, J. and H. Lipson (2004)
Automating Genetic Network Inference with Minimal Physical Experimentation Using Coevolution,
Procs of the Genetic and Evolutionary Computation Conf, Springer, pp. 333-345.
Acceptance rate: 50%. Citations: 28

13. Bongard, J. and H. Lipson (2004)
Automated Damage Diagnosis and Recovery for Remote Robotics,
Procs of the International Conf on Robotics and Automation (ICRA), Omnipress, pp. 3545-3550.
Citations: 35

12. Bongard, J. (2002)
Evolved Sensor Fusion and Dissociation in an Embodied Agent,
Procs of the EPSRC/BBSRC Intl Workshop on Biologically-Inspired Robotics, pp. 102-109.
Citations: 8

11. Frutiger, D. R., Bongard, J. and F. Iida (2002)
Iterative Product Engineering: Evolutionary Robot Design,
Procs of the Fifth Intl Conf on Climbing and Walking Robots, pp. 619-629.
Citations: 16

10. Bongard, J. and R. Pfeifer (2002)
A Method for Isolating Morphological Effects on Evolved Behaviour,
Procs of the Seventh Intl Conf on the Simulation of Adaptive Behaviour (SAB2002), pp. 305-311.
Citations: 48

9. Bongard, J. and R. Pfeifer (2002)
Relating Neural Network Performance to Morphological Differences in Embodied Agents,
Procs of the Sixth Intl Conf on Cognitive and Neural Systems, Boston, USA.
Citations: 1

8. Bongard, J. (2002)
Evolving Modular Genetic Regulatory Networks,
Procs of the IEEE Congress on Evolutionary Computation (CEC2002), IEEE Press, pp. 1872-1877.
Citations: 204

7. Paul, C. and J. Bongard (2001)
The Road Less Travelled: Morphology in the Optimization of Biped Robot Locomotion,
Procs of the IEEE/RSJ Intl Conf on Intelligent Robots and Systems (IROS2001), Hawaii, USA.
Citations: 74

6. Bongard, J. and C. Paul (2001)

Making Evolution an Offer It Can't Refuse: Morphology and the Extradimensional Bypass,
Procs of the Sixth European Conf on Artificial Life, Springer-Verlag, pp. 401-412.
Citations: 58

5. Bongard, J. and R. Pfeifer (2001)
Repeated Structure and Dissociation of Genotypic and Phenotypic Complexity in Artificial Ontogeny,
Procs of the Genetic and Evolutionary Computation Conf, Morgan Kaufmann, pp. 829-836.
Citations: 166

4. Bongard, J. and C. Paul (2000)
Investigating Morphological Symmetry and Locomotive Efficiency using Virtual Embodied Evolution,
Procs of the Sixth Intl Conf on the Simulation of Adaptive Behaviour, MIT Press, pp. 420-429.
Citations: 74

3. Bongard, J. (2000)
Reducing Collective Behavioural Complexity through Heterogeneity,
Artificial Life VII, MIT Press, pp. 327-336.
Citations: 5

2. Bongard, J. (2000)
The Legion System: A Novel Approach to Evolving Heterogeneity for Collective Problem Solving,
Procs of the Third Euro Conf on Genetic Programming, Springer-Verlag, pp. 25—37.
Citations: 37

1. Bongard, J. (1999)
Coevolutionary Dynamics of a Multi-Population Genetic Programming System,
Procs of the Fifth Euro Conf on Artificial Life, Springer-Verlag, pp. 316-321.
Citations: 5

MINIMALLY-REVIEWED PUBLICATIONS

19. JC Bongard (2016)
Evolving soft robots. *Soft Robotics* 3(2): 43-44. Editorial.

18. A Larson, A Bernatskiy, C Cappelle, K Livingston, N Livingston,
J Long, J Schwarz, M Smith & JC Bongard (2016)
Recombination hotspots promote the evolvability of modular systems.
Procs of the Genetic and Evolutionary Computation Conference (GECCO 2016). Poster.

17. Bongard, J. C. (2016)
I, For One.
Invited Response to the 2016 Edge Question:
"What do you consider the most interesting [scientific] news?"

16. Bongard, J. C. (2015)
Manipulators and Manipulanda.
Invited Response to the 2015 Edge Question:
"What do you think about machines that think?"

15. JP Bagrow, S Desu, MR Frank, N Manukyan, L Mitchell, A Reagan, EE Bloedorn, LB Booker,
LK Branting, MJ Smith, BF Tivnan, CM Danforth, PS Dodds, JC Bongard (2013).
Shadow networks: Discovering hidden nodes with models of information flow.
arXiv preprint arXiv: 1312.6122

14. Hornby, G. S. & Bongard, J. C. (2013).
Accelerating Interactive Evolutionary Algorithms through User Modeling.
International Conference on Intelligent User Interfaces.

13. Celis, S., Bongard, J. C. (2012)
Not All Physics Simulators Can Be Wrong in the Same Way.
Genetic and Evolutionary Computation Conference, pp. 659-660.

12. Beliveau, P., Hornby, G. S., Bongard, J. C. (2012)
Interactive Simulated Robot Construction and Controller Evolution.
Genetic and Evolutionary Computation Conference, pp. 627- 628.

11. Bongard, J. C., Beliveau, P., Hornby, G. S. (2012)
Avoiding Local Optima with Interactive Evolutionary Robotics.
Genetic and Evolutionary Computation Conference, pp. 1405—1406.

10. Bongard, J. C. (2011)
How evolution shapes the way roboticists think.
Procs of the 2nd European Future Technologies Conf and Exhibition (FET 11), 7: 8-10.

9. Bongard, J. (2011).
Morphogenetic robotics recapitulates artificial ontogeny.
Newsletter of the Autonomous Mental Development Technical Committee. 8(2): 3-4.

8. Bongard, J. (2009).
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IEEE Computer, 42(4): 95—98.

7. Lu, Z., Bongard, J. C. (2009)
Exploiting Multiple Classifier Types with Active Learning.
Genetic and Evolutionary Computation Conference (GECCO 2009), Montreal Canada.

6. Bongard, J. C. (2009)
The Impact of Jointly Evolving Robot Morphology and Control on Adaptation Rate.
Genetic and Evolutionary Computation Conference (GECCO 2009), Montreal Canada.

5. Bongard, J. (2008).
Probabilistic Robotics Book Review.
Artificial Life, 14(2): 227—229.

4. Bongard, J. (2008)
Embodied cognition: the other morphology.
The Neuromorphic Engineer, DOI: 10.2417/1200812.1420.

3. 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.

2. Lu, Z., Rughani, A. I., Tranmer, B. I., Bongard, J. (2008)
Informative Sampling for Large Unbalanced Data Sets,
Fourth Workshop on Medical Applications of Genetic and Evolutionary Computation at GECCO 2008.

1. Conduit, R., Adami, C., Lipson, H., Zykov, V. and Bongard, J. (2007).
To sleep, perchance to dream.

Science, 315: 1219-1220.

SERVICE

EDITORSHIPS	Associate Editor, *Frontiers in Robotics and AI*	2014–
	Review Editorial Board, *Evolutionary Robotics*	2014–
	Associate Editor, *Soft Robotics*	2013–
	Action Editor, *Neural Computation*	2011–
	Academic Editor, *Public Library of Science (PLoS) ONE*	2011–
	Guest Associate Editor, *PLoS Computational Biology*	2013–
TREASURER	International Society for Artificial Life	2014–
MEMBERSHIP	University of Vermont STEM Leadership Council	2014–
	13th Intl Conf on the Simulation of Adaptive Behavior, program committee	2014
	13th Intl Conf on Parallel Problem Solving from Nature, program committee	2014
	Genetic and Evolutionary Computation Conference, program committee	annually
	Living Machines Conference, program committee	annually
	Artificial Life Conference, program committee	biennially
	European Conference on Artificial Life Conference, program committee	biennially
	Living Machines Conference, program committee	annually
	Genetic and Evolutionary Computation Conference, track chair	2013
	Congress on Evolutionary Computation (CEC), program committee	2013
	National affiliate, University of Iowa *DeLTa* center	2013–
	Federation of American Scientists (FAS) board of sponsors	2011–
	Institute of Electrical and Electronics Engineers (IEEE)	2007–
	Association for Computing Machinery (ACM)	2006–

REVIEWER

Science
Nature
Proceedings of the National Academy of Science (PNAS)
Nature Communications
PLoS ONE
PLoS Computational Biology
Neural Computation
Journal of Machine Learning Research (JMLR)
IEEE Transactions on Evolutionary Computation
IEEE Transactions on Robotics
Artificial Life
Adaptive Behavior
IEEE Transactions on Systems, Man and Cybernetics
Journal of Neurorobotics

PANELIST	The EC Flagship Initiative 'Human Brain Project' proposal reviewing	2013
	National Institutes of Health (NIH) proposal reviewing	2010
	National Science Foundation (NSF) proposal reviewing (about once/year)	2006–
INTERNAL	Director of the Vermont Advanced Computing Core (UVM's supercomputer)	2015–
	Vice Chair, Vermont Complex Systems Center	2011–2015
	UVM STEM Leadership Council Member	2013–
OUTREACH	∼10 presentations to K-12 students per year. Representative sample below.	
	Presentation to ∼30 Abenaki Nation high school students	August, 2016

	Governor's Institute of Vermont presentations (∼100 students)	2012–2017
	Burlington High School presentation on robotics.	2014—2017
	Waldorf School (grades 7 through 12), Toronto	Feb, 2016
	Steelesview Public School, Toronto (grades 2 and 3)	Feb, 2016
	Governor's Institute of Vermont summer program guest instructor	2007–2013
	Boy Scouts of America guest instructor	Dec, 2013
	Reddit AMA ("Ask Me Anything")	Aug, 2013
	Hour of Code visitor, Browns River Middle School	2013, 2014
TEACHING	*Evolutionary Robotics*	2010–
	Human Computer Interaction	2007–present
	Software Engineering	2006/07/08
	Embodied Cognition	2009
ADVISING		
POSTDOCS	**Zahra Mahoor**	2017–
	Marcin Szubert	2015–2017
	Ilknur Icke	2012–2013
	Kaipa Krishnanand	2008–2010
PHD'S	**Mikaela Cruz** (Electrical Engineering)	2017–
	Joshua Powers (Computer Science)	2017–
	Sam Kriegman (Computer Science)	2016–
	Collin Cappelle (Computer Science)	2015–
	Anton Bernatskiy (Computer Science)	2013–
	Roman Popov (Computer Science)	2013–
	Mark Wagy (Computer Science)) Dissertation: *Enabling machine science through distributed human computing*.	2013–2016
	Joshua Auerbach (Computer Science)) Dissertation: *The evolution of complexity in autonomous robots*.	2009–2013
	Zhenyu Lu (Computer Science) Dissertation: *Active learning with adaptive heterogeneous ensembles*.	2006–2011
MASTERS STUDENTS	Nate Powell (Statistics) Dissertation: *The role of Uncertainty in Categorical Perception Utilizing Statistical Learning in Robots*.	2015–2016
	Sam Kriegman (Co-advising; statistics) Dissertation: *Evolving spatially aggregated features from satellite imagery for regional modeling.*	2015–2016
	Afsoon Yousefi-Zowj (Computer Science)	2014–2015

	Dissertation: *A Genetic Programming approach to cost-sensitive control in wireless sensor networks*.	
	Karol Zieba (Computer Science) Dissertation: *Evolving multi-modal sensors*.	2014–2015
	David Buckingham (Computer Science) Dissertation: *Inductive learning of snowpack distribution models for improved estimation of areal snow water equivalent*.	2012–2014
	Christopher Pierce (Computer Science; project option.)	2012–2014
	Somdeb Chatterjee (Computer Science) Dissertation: *Crowdsourcing predictors for modeling behavioral outcomes*.	2010–2012
	Yunfei Zhao (Computer Science; project option.)	2010–2012
	Peter Hurd (Computer Science; project option.)	2008–2010
UNDERGRAD THESES	Ari Larson (Computer Science)	2015–2016
	Mariko Totten (Computer Science)	2014–2015
	Timothy Rizvanov (Computer Science)	2013–2014
	Fritz Davenport (Computer Science)	2013–2014
	Alex Berger (Business administration)	2013–2014
PHD DEFENSE COMMITTEE MEMBER	Thomas McAndrew, UVM	2016
	Emily Cody, UVM	2016
	Morgan Frank, UVM	2014
	Nicholas Chaumont, Keck Graduate Institute, USA	2014
	Ahmed Hamed, UVM	2014
	Jesse van den Kieboom, EPFL, Switzerland	2014
	Eitan Pechenik, UVM	2013
	Song Wang, UVM	2013
	Karim Chichakly, UVM	2013
	Nicolas Allgaier, UVM	2013
	Thierry Buecheler, University of Zurich, Switzerland	2012
	Sylvain Koos, UPMC, France	2011
	Peter Duerr, EPFL, Switzerland	2010
OTHER	Jake Williams (MSc qualifying exam committee member)	2013

INVITED TALKS

Nov, 2017	ShanghAI Lecture Series	Invited
Sept, 2017	IEEE/RSJ Intl. Conference on Intelligent Robots and Systems (IROS)	**Keynote**
Sept, 2017	Santa Fe Institute Working Group on Morphological Computation	Invited
June, 2017	Human Brain Project workshop on embodied cognition (Geneva, CH)	Invited
Feb, 2017	Santa Fe Institute Workshop on "Evolution and Restraint of Malicious Behavior in Complex Systems"	Invited
Oct, 2016	Presentation on "Speaking to a general audience" for the UVM IGERT Smart Grid graduate students	Invited
Sept, 2016	ASME Smart Materials, Adaptive Structures and Intelligent Systems Conference (Stowe, VT)	Invited
Sept, 2016	Santa Fe Institute Short Course on Innovation (Austin, TX)	Invited
Sept, 2016	Parallel Problem Solving from Nature conference. (University of Stirling, Edinburgh)	**Keynote**
May, 2016	Trusted autonomous systems. (ACFR, University of Sydney, Australia)	Invited
May, 2016	Trusted autonomous systems. (Intl. Symp. on Trusted Autonomous Systems, Australia)	**Keynote**

Mar, 2016	Some philosophical implications of evolutionary robotics. (UPitt HPS Annual Lecture Series)	Invited
Feb, 2016	Evo devo robo. (University of Toronto Cognitive Science Symposium)	Invited
Dec, 2015	ShanghAI lecture (simulcast to classrooms in Europe and Asia)	Invited
Dec, 2015	New Jersey Institute of Technology (host: Gal Haspel, biology)	Invited
Nov, 2015	UVM Honors College Plenary Lecture	Invited
May, 2015	Factory of Imagination lecture, Denmark (500 attendees)	**Keynote**
Feb, 2015	ShanghAI lecture (simulcast to classrooms in Europe and Asia)	Invited
Nov, 2014	Cornell Univeristy (host: Robert Shepherd, engineering)	Invited
Sept, 2014	University of Maryland workshop on soft robotics	Invited
Aug, 2014	Scifoo (hosts: Nature, Google, O'Reilly Media, Digital Science)	Invited
July, 2014	Workshop on Artificial Life and the Web at ALife conference	Invited
July, 2014	International Society for Artificial Life (ISAL) Summer School	Invited
June, 2014	DARPA Biological Technologies Office	Invited
June, 2014	Neural Systems & Behavior Summer School, Woods Hole Marine Biology Lab	Invited
May, 2014	EPFL, Lausanne, Switzerland (host: Auke Ispeert)	Invited
Mar, 2014	National STEM Conference (Concept Schools), Cleveland, OH	**Keynote**
Mar, 2014	Air Force Research Laboratories (AFRL), Rome, NY	Invited
Dec, 2013	ShanghAI lecture (simulcast to 15 classrooms in Europe and Asia)	Invited
Nov, 2013	National Autonomous University of Mexico (host: Carlos Gershenson)	Invited
Oct, 2013	University of Iowa Delta Center (host: Mark Blumberg, psychology)	Invited
Sept, 2013	eSMC neuroscience/robotics graduate summer school (host: Andreas Engel)	Invited
Sept, 2013	Evolutionary Biology lecture, University of Zurich (host: Andreas Wagner	Invited
Aug, 2013	Gordon Research Conference on Neuroethology (host: Heather Eisten, biology)	Invited
July, 2013	Soft Robotics Workshop at ETH, Zurich (host: Fumiya Iida, robotics)	**Keynote**
June, 2013	Evolution Meeting, SSE Presidential Symposium (host: Richard Lenski, biology)	Invited
June, 2013	Evolution Meeting, Education Symposium (host: George Gilchrist, NSF)	Invited
Mar, 2013	University of Texas at Austin (host: Dana Ballard, Computer Science)	Invited
Nov, 2012	Vassar College (host: John Long, biology)	Invited
Nov, 2012	Harvard University (host: Radhika Nagpal, engineering)	Invited
June, 2012	Tufts University (host: Michael Levin, biology)	Invited
Apr, 2012	Tufts University (host: Barry Trimmer, biology)	Invited
Jan, 2012	University of Southern California (host: Francisco Valero-Cuevas, bioengineering)	Invited
Dec, 2011	Castleton State College, Vermont	Invited
Nov, 2011	Global ShanghAI Lecture series (telecast from Vermont)	Invited
Oct, 2011	TEDx presentation, University of Vermont	Invited
July, 2011	Woods Hole Workshop on Computational Neuroscience (host: Terrence Sejnowski)	Invited
May, 2011	European Future and Emerging Technologies (FET) Conference, Budapest, HU	**Keynote**
Mar, 2011	Annual lecture, Simon Fraser University, Canada (host: Bernard Roitbert)	Invited
Jan, 2011	Cognitive Dynamical Systems Workshop, Salk Institute (host: T. Sejnowski)	Invited
Nov, 2010	Defense Sciences Research Council (DSRC), Washington, DC	**Keynote**
Oct, 2010	Michigan State University (host: Charles Ofria, computer science)	Invited
Sept, 2010	Perception & Action Workshop, Sante Fe Institute	Invited
Sept, 2010	Evolutionary Studies Seminar Series, Binghamton University	Invited
Sept, 2010	Intl Workshop on Guided Self-Organization, Indiana University	Invited
Sept, 2010	Rensselaer Polytechnic Institute (host: Brent Fajel, cognitive science)	Invited
Jan, 2010	Advancement of Artificial Cognitive Systems, ETH, Zurich	**Keynote**
Oct, 2009	University of Massachusetts, Amherst	Invited

Oct, 2009	Evolutionary Robotics Workshop at the IEEE IROS Conference	Invited
Sept, 2009	Union College, Schenectady, NY (host: John Rieffel, computer science)	Invited
May, 2009	McMaster Origins Institute, Canada	Invited
Mar, 2009	University of California San Diego (annual lecture; host: T. Sejnowski)	**Keynote**
Mar, 2009	Salk Institute (host: T. Sejnowski)	Invited
Feb, 2009	Hughes Research Laboratories, Malibu, CA	Invited
Feb, 2009	Pragyan technical festival, India (telecast from Vermont)	Invited
Oct, 2008	Dartmouth College (host: Tanzeem Choudhury)	Invited
Oct, 2008	McMaster University, Canada (host: Simon Haykin)	Invited
Sept, 2008	NAE's Frontiers of Engineering Symposium, New Mexico	Invited
June, 2008	Telluride Neuromorphic Engineering Workshop	Invited
June, 2008	Woods Hole Workshop on Computational Neuroscience	Invited
May, 2008	Genetic Programming Theory and Practice, University of Michigan	**Keynote**
Apr, 2008	Cognitive Engineering Workshop, Sardinia, IT	Invited
Jan, 2008	Boston University (host: Steven Grossberg)	Invited
Oct, 2007	Elder Education Enrichment program, Vermont	Invited
Oct, 2007	IBM T. J. Watson Research Center (host: Kerry Bernstein)	Invited
Aug, 2007	National Science Foundation *Science of Learning Workshop*	Invited
2004	AI Lab, University of Zurich, Switzerland	Invited
2003	EPSRC Workshop on Evolvability, Hertfordshire, UK	Invited
2002	Biozentrum, University of Basel, Switzerland	Invited
2002	Massachussets Institute of Technology (host: Rodney Brooks)	Invited
2002	Woods Hole Marine Biological Laboratory (host: Jelle Atema)	Invited
2002	Cognitive Science Department, University of Sussex, UK	Invited

SELECTED MEDIA COVERAGE

May, 2016	"Reddit Brings a UVM Evolutionary Robotics Class to the World". *Seven Days*
Dec, 2014	"Could A.I. be the end of the human race?" *RT America*
Dec, 2013	"Beware. Scientists are Creating Machines That Can Evolve on Their Own" *Smithsonian Magazine*
July, 2013	"Are Robots The Future Of Human Evolution?" *Through the Wormhole*
Feb, 2011	"Bringing Up Robots" *American Scientist*
Jan, 2011	"Artificial intelligence based on Darwin's idea" *Boston Globe*
June, 2008	"When Robots Live Among Us" (cover article) *Discovery Magazine*
Sept, 2007	" 'Self-aware' space rovers would be speedy explorers" *Scientific American*
Nov, 2007	"Six Ideas that Will Change the World" *Esquire*
Jan, 2007	"The GOLEM in the machine" *Die Zeit*
Nov, 2006	"Injured Robot Learns to Limp" *Nature News*
Nov, 2006	"New Robot Shrugs Off Injury" *Science News*
Nov, 2006	"Robotic Recovery" *MIT Technology Review*
Nov, 2006	"Self-Aware Robots" *Discovery Channel*
Nov, 2006	"New Robot Can Sense Damage, Recover" *Forbes*
Nov, 2006	"New Robot Can Sense Damage and Compensate" *USA Today*

Nov, 2006 "Resilient Robot Hobbles Along, Even if Injured" *Scientific American*

Aug, 2002 " 'Animals' grown from an artificial embryo" *New Scientist*

SCHOLARSHIPS AND PRIZES

2016 International Society of Artificial Life Education & Outreach Award
International Society of Artificial Life Best Paper of the Decade Award
2015 Awarded the Cyril G. Veinott Green and Gold Professorship of Computer Science
2014 STEM Innovation Award (awarded by the Concept Schools)
2013 Scientist of the Year, IEEE Green Mountain Section
2010 Presidential Early Career Award for Scientists and Engineers (CAREER/PECASE)
2008 UVM College of Engineering and Mathematical Sciences
Milt Silveira Junior Faculty Award
2007 One of *MIT Technology Review*'s TR35: Top 35 Young Innovators Under 35
Microsoft New Faculty Fellowship
2002 Best Paper Award, Seventh Intl Conf on the Simulation of Adaptive Behavior
1999 Sante Fe Institute Complex Systems Summer School alumnus
1993–1997 McMaster University Dean's Honour List