

CURRICULUM VITAE

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Degrees

Doctor of Philosophy in Computer Science, The University of Texas at Austin, August 2004.

Master of Science in Computer Science, The University of Texas at Austin, May 1999.

Bachelor of Science *magna cum laude* in Engineering, major in Computer Science Engineering, minor in Cognitive Science, University of Pennsylvania, May 1997.

Professional Experience

Associate Professor,

Department of Electrical Engineering and Computer Science, University of Central Florida,
Since August 2011.

Sabbatical Visitor, Santa Fe Institute, Santa Fe, NM,

August 2014 to May 2015.

Assistant Professor,

Department of Electrical Engineering and Computer Science, University of Central Florida,
January 2006 to August 2011.

Postdoctoral Researcher,

Department of Computer Sciences, The University of Texas at Austin, Sep. 2004 to Dec. 2005;
Supervising Professor: Risto Miikkulainen.

Research Assistant,

Department of Computer Sciences, The University of Texas at Austin, 2000 to 2004;
Supervising Professor: Risto Miikkulainen.

Research Intern, Hewlett-Packard Laboratories, Hewlett-Packard Company, Palo Alto, CA, Summer 1999. Applied neuroevolution techniques to failure prediction. Patent granted.

Editorships and Leadership in Scholarly Societies

Founder and Editor in Chief of aigameresearch.org, a peer-reviewed repository for AI-based research-related games, since 2012.

Executive Committee of the ACM Special Interest Group for Genetic and Evolutionary Computation (ACM SIGEVO); elected in 2011 to six-year term.

Associate Editor of *Frontiers in Robotics and AI* (Evolutionary Robotics section) since 2015.

Associate Editor of *IEEE Transactions on Computational Intelligence and AI in Games* since 2008.

Editorial Board (for 6 years) of *Evolutionary Computation Journal* 2010–2016.

Publications

Note: Student co-authors are marked with an asterisk (*).

Book

1. Kenneth O. Stanley and Joel Lehman* (2015), *Why Greatness Cannot Be Planned: The Myth of the Objective*. Springer International Publishing, 141 pages, May 2015.
ACM Computing Reviews Editor's Pick January 25, 2016

Refereed Journal Articles

Accepted (To Appear)

1. Kenneth O. Stanley (Accepted 2016). Art in the Sciences of the Artificial. In: *Leonardo journal*. Cambridge, MA: MIT Press. (16 page manuscript)

In Print

2. Tim Taylor, Joshua E. Auerbach, Josh Bongard, Jeff Clune, Simon Hickinbotham, Charles Ofria, Mizuki Oka, Sebastian Risi, Kenneth O. Stanley, and Jason Yosinski (2016). WebAL Comes of Age: A Review of the First 21 Years of Artificial Life on the Web. In: *Artificial Life journal*, 22(3): 364–407. Cambridge, MA: MIT Press. (44 pages)
3. Tim Taylor, Mark Bedau, Alastair Channon, David Ackley, Wolfgang Banzhaf, Guillaume Beslon, Emily Dolson, Tom Froese, Simon Hickinbotham, Takashi Ikegami, Barry McMullin, Norman Packard, Steen Rasmussen, Nathaniel Virgo, Eran Agmon, Edward Clark, Simon McGregor, Charles Ofria, Glen Ropella, Lee Spector, Kenneth O. Stanley, Adam Stanton, Christopher Timperley, Anya Vostinar, and Michael Wiser (2016). Open-Ended Evolution: Perspectives from the OEE Workshop in York. In: *Artificial Life journal*, 22(3): 408–423, Cambridge, MA: MIT Press. (16 pages)
4. Joel Lehman, Bryan Wilders, and Kenneth O. Stanley (2016). On the Critical Role of Divergent Selection in Evolvability. In: *Frontiers in Robotics and AI*, 3(45): doi: 10.3389/frobt.2016.00045. Lausanne, Switzerland: Frontiers. (12 pages)
5. Justin K. Pugh*, Lisa B. Soros*, and Kenneth O. Stanley (2016). Quality Diversity: A New Frontier for Evolutionary Computation. In: *Frontiers in Robotics and AI*, 3(40): doi: 10.3389/frobt.2016.00040. Lausanne, Switzerland: Frontiers. (17 pages)
6. Bryan Wilder* and Kenneth O. Stanley (2015). Altruists Proliferate Even at a Selective Disadvantage within Their Own Niche. In: *PLoS ONE*, 10(6): e0128654. doi:10.1371/journal.pone.0128654. San Francisco, CA: Public Library of Science. (11 pages)
7. Joel Lehman* and Kenneth O. Stanley (2015). Investigating Biological Assumptions through Radical Reimplementation. In: *Artificial Life journal*, 21(1): 21–46. Cambridge, MA: MIT Press.
8. Bryan Wilder* and Kenneth O. Stanley (2015). Reconciling Explanations for the Evolution of Evolvability. In: *Adaptive Behavior*, 23(3): 171–179. Thousand Oaks, CA: Sage Publications.
9. Paul Szerlip* and Kenneth O. Stanley (2015). Indirectly Encoding Running and Jumping Sodarace Creatures for Artificial Life. In: *Artificial Life journal*, 21(4): 432–444. Cambridge, MA: MIT Press.

10. William Raffe, Fabio Zambetta, Xiaodong Li, and Kenneth O. Stanley (2015). An Integrated Approach to Personalized Procedural Map Generation using Evolutionary Algorithms. In: *IEEE Transactions on Computational Intelligence and AI in Games*, 7(2): 139–155. Piscataway, NJ: IEEE Press.
11. Amy K. Hoover*, Paul A. Szerlip*, and Kenneth O. Stanley (2014). Functional Scaffolding for Composing Additional Musical Voices No Access. In: *Computer Music Journal*, 38(4): 80–99. Cambridge, MA: MIT Press.
12. Joel Lehman*, Sebastian Risi*, David B D’Ambrosio*, and Kenneth O. Stanley (2013). Encouraging Reactivity to Create Robust Machines. In: *Adaptive Behavior*, 21(6): 484–500. Thousand Oaks, CA: Sage Publications.
13. David B D’Ambrosio* and Kenneth O. Stanley (2013). Scalable Multiagent Learning through Indirect Encoding of Policy Geometry. In: *Evolutionary Intelligence Journal*, 6(1): 1–26. New York: Springer.
14. Joel Lehman* and Kenneth O. Stanley (2013). Evolvability Is Inevitable: Increasing Evolvability Without the Pressure to Adapt. In: *PLoS ONE*, 8(4): e62186. doi:10.1371/journal.pone.0062186. San Francisco, CA: Public Library of Science. (9 pages)
15. Sebastian Risi* and Kenneth O. Stanley (2012). An Enhanced Hypercube-Based Encoding for Evolving the Placement, Density and Connectivity of Neurons. In: *Artificial Life journal*, 18(4): 331–363. Cambridge, MA: MIT Press.
16. Andrea Soltoggio and Kenneth O. Stanley (2012). From Modulated Hebbian Plasticity to Simple Behavior Learning through Noise and Weight Saturation. In: *Neural Networks journal*, 34: 28–41. Burlington, MA: Elsevier.
17. Julian Togelius, Georgios N. Yannakakis, Kenneth O. Stanley, and Cameron Browne (2011). Search-based Procedural Content Generation: A Taxonomy and Survey. *IEEE Transactions on Computational Intelligence and AI in Games*, 3(3): 172–186, Piscataway, NJ: IEEE Press (15 pages).
Cited by: 356 (Google Scholar)
18. Jimmy Secretan*, Nicholas Beato*, David B. D.Ambrosio*, Adelein Rodriguez*, Adam Campbell*, Jeremiah T. Folsom-Kovarik*, and Kenneth O. Stanley (2011). Picbreeder: A Case Study in Collaborative Evolutionary Exploration of Design Space. *Evolutionary Computation*, 19(3): 345–371, Cambridge, MA: MIT Press (37 pages).
Cited by: 140 (Google Scholar)
19. Jeff Clune, Kenneth O. Stanley, Robert T. Pennock, and Charles Ofria (2011). On the Performance of Indirect Encoding Across the Continuum of Regularity. *IEEE Transactions on Evolutionary Computation*, 15(3): 346–367, Piscataway, NJ: IEEE Press (22 pages).
20. Joel Lehman* and Kenneth O. Stanley (2011). Abandoning Objectives: Evolution through the Search for Novelty Alone. *Evolutionary Computation*, 19(2): 189–223, Cambridge, MA: MIT Press (35 pages).
Cited by: 366 (Google Scholar)
21. Shafaq B. Chaudhry*, Victor C. Hung*, Ratan K. Guha, and Kenneth O. Stanley (2011). Pareto-based Evolutionary Computational Approach for Wireless Sensor Placement. *Engineering Applications of Artificial Intelligence*, 24(3): 409–425, Burlington, MA: Elsevier (17 pages).

22. Sebastian Risi*, Charles E. Hughes, and Kenneth O. Stanley (2010). Evolving Adaptive Neural Networks with Novelty Search. *Adaptive Behavior*, 18(6): 470–491, Thousand Oaks, California: Sage Publications (22 pages).
23. Jason J. Gauci* and Kenneth O. Stanley (2010). Autonomous Evolution of Topographic Regularities in Artificial Neural Networks. *Neural Computation*, 22(7):1860–1898, Cambridge, MA: MIT Press (39 pages).
Cited by: 116 (Google Scholar)
24. Phillip Verbancsics* and Kenneth O. Stanley (2010). Evolving Static Representations for Task Transfer. *Journal of Machine Learning Research (JMLR)*, 11: 1737–1769, Brookline, MA: Microtome Publishing (33 pages).
25. Erin Hastings*, Ratan K. Guha, and Kenneth O. Stanley (2009). Automatic Content Generation in the Galactic Arms Race Video Game. *IEEE Transactions on Computational Intelligence and AI in Games*, 4(1): 245–263, Piscataway, NJ: IEEE Press (18 pages).
26. Kenneth O. Stanley, David B. D’Ambrosio*, and Jason J. Gauci* (2009). A Hypercube-Based Encoding for Evolving Large-Scale Neural Networks. *Artificial Life*, 15(2):185–212, Cambridge, MA: MIT Press (27 pages).
Cited by: 329 (Google Scholar)
27. Amy K. Hoover* and Kenneth O. Stanley (2009). Exploiting Functional Relationships in Musical Composition. *Connection Science Special Issue on Music, Brain, and Cognition*, 21(2&3):227 - 251, Abington, UK: Taylor and Francis (24 pages).
28. Erin Hastings*, Ratan K. Guha, and Kenneth O. Stanley (2009). Interactive Evolution of Particle Systems for Computer Graphics and Animation *IEEE Transactions on Evolutionary Computation*, 13(2): 418–432, Piscataway, NJ: IEEE Press (14 pages).
29. Kenneth O. Stanley (2007). Compositional Pattern Producing Networks: A Novel Abstraction of Development. *Genetic Programming and Evolvable Machines Special Issue on Developmental Systems*, 8(2): 131–162, New York: Springer (31 pages).
Cited by: 347 (Google Scholar)
Most cited article in *Genetic Programming and Evolvable Machines* since its year of publication (Google Scholar)
30. Kenneth O. Stanley, Bobby D. Bryant, and Risto Miikkulainen (2005). Real-time Neuroevolution in the NERO Video Game. *IEEE Transactions on Evolutionary Computation Special Issue on Evolutionary Computation and Games*, 9(6): 653–668, Piscataway, NJ: IEEE Press (15 pages).
Cited by: 364 (Google Scholar)
31. Kenneth O. Stanley and Risto Miikkulainen (2004). Competitive Coevolution through Evolutionary Complexification. *Journal of Artificial Intelligence Research*, 21: 63–100, Marina del Rey, CA: AI Access Foundation (37 pages).
Cited by: 420 (Google Scholar)
32. Kenneth O. Stanley and Risto Miikkulainen (2003). A Taxonomy for Artificial Embryogeny. *Artificial Life*, 9(2): 93–130, Cambridge, MA: MIT Press (37 pages).
Cited by: 459 (Google Scholar)
Most cited article in *Artificial Life* since its year of publication (Google Scholar)

33. Kenneth O. Stanley and Risto Miikkulainen (2002). Evolving Neural Networks through Augmenting Topologies. *Evolutionary Computation*, 10(2): 99–127, Cambridge, MA: MIT Press (28 pages).
Cited by: 1,729 (Google Scholar)
Most cited article in *Evolutionary Computation* since its year of publication (Google Scholar)
34. Adrian Agogino, Kenneth O. Stanley, and Risto Miikkulainen (2000). Online Interactive Neuroevolution. *Neural Processing Letters*, 11(1):29–37, New York: Springer (8 pages).

Articles in Books

1. Invited chapter: David B. D’Ambrosio, Jason Gauci, and Kenneth O. Stanley (2014). HyperNEAT: The First Five Years. In *Growing Adaptive Machines: Integrating Learning and Development in Artificial Neural Networks*. Springer Studies in Computational Intelligence Series, vol. 557: 159–185.
2. Invited chapter: Julian Togelius and Alex J. Champandard and Pier Luca Lanzi and Michael Mateas and Ana Paiva and Mike Preuss and Kenneth O. Stanley (2013). Procedural Content Generation: Goals, Challenges and Actionable Steps. In Lucas, Mateas, Preuss, Spronck and Togelius (editors), *Artificial and Computational Intelligence in Games* (Dagstuhl Follow-Ups series). Dagstuhl, Germany: Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik: 61–75.
3. Invited article: Kenneth Stanley (2011). Why Evolutionary Robotics Will Matter. In Doncieux, Bredeche, and Mouret (editors), *New Horizons in Evolutionary Robotics: Extended Contributions from the 2009 EvoDeRob Workshop*. Berlin: Springer-Verlag Studies in Computational Intelligence: 37–42.
4. Ryan Cornelius, Kenneth O. Stanley, and Risto Miikkulainen (2006). Constructing Adaptive AI Using Knowledge-Based NeuroEvolution. In Rabin, Woodcock, Forrester, Houlette, Orkin, and Manslow (editors), *AI Game Programming Wisdom 3*. Boston, MA: Charles River Media: 693–708.
5. Risto Miikkulainen, Bobby D. Bryant, Ryan Cornelius, Igor Karpov, Kenneth O. Stanley, and Chern Han Yong (2006). Computational Intelligence in Games. In Yen and Fogel (editors), *Computational Intelligence: Principles and Practice*. Piscataway, NJ: IEEE Computational Intelligence Society: 155–191.

Refereed Conference, Symposium, and Workshop Papers

Note: In the field of artificial intelligence (AI), publications in selective conferences are considered first-class contributions.

Accepted (To Appear)

In Print

1. Justin K. Pugh* and Kenneth O. Stanley (2016). Searching for Quality Diversity when Diversity is Unaligned with Quality. In: *Proceedings of the 14th International Conf. on Parallel Problem Solving From Nature* (PPSN-2014, Edinburgh, Scotland). New York, NY: Springer. Acceptance Rate: 50%
2. Gregory Morse*, and Kenneth O. Stanley (2016). Simple Evolutionary Optimization Can Rival Stochastic Gradient in Neural Networks. In: *Proceedings of the Genetic and Evolutionary Computation Conference* (GECCO-2016, Denver, Colorado). New York, NY: The Association for Computing Machinery (8 pages).

Acceptance Rate: 37%

**Nominated for Best Paper Award in Complex Systems
(3 of 33 nominated)**

3. Lisa B. Soros*, Nick Cheney, and Kenneth O. Stanley (2016). How the Strictness of the Minimal Criterion Impacts Open-Ended Evolution. In: *Proceedings of the Fifteenth International Conference on the Synthesis and Simulation of Living Systems the Synthesis and Simulation of Living Systems* (ALIFE XV, Cancun, Mexico). Cambridge, MA: MIT Press (8 pages).
Acceptance Rate for Oral Presentations: 39%
4. Joshua A. Bowren*, Justin K. Pugh*, and Kenneth O. Stanley (2016). Fully Autonomous Real-Time Autoencoder-Augmented Hebbian Learning through the Collection of Novel Experiences. In: *Proceedings of the Fifteenth International Conference on the Synthesis and Simulation of Living Systems the Synthesis and Simulation of Living Systems* (ALIFE XV, Cancun, Mexico). Cambridge, MA: MIT Press (8 pages).
Acceptance Rate for Oral Presentations: 39%
5. Justin K. Pugh*, Lisa B. Soros*, Paul A. Szerlip*, and Kenneth O. Stanley (2015). Confronting the Challenge of Quality Diversity. In: *Proceedings of the Genetic and Evolutionary Computation Conference* (GECCO-2015, Vancouver, Canada). New York, NY: The Association for Computing Machinery (8 pages).
Acceptance Rate: 36%
6. Paul A. Szerlip*, Gregory Morse*, Justin K. Pugh*, and Kenneth O. Stanley (2015). Unsupervised Feature Learning through Divergent Discriminative Feature Accumulation. In: *The Twenty-Ninth AAAI Conference on Artificial Intelligence* (AAAI-2015, Austin, TX). Menlo Park, CA: AAAI Press, 2979–2985.
Acceptance Rate: 26.7%
7. Justin K. Pugh* and Kenneth O. Stanley (2014). Directional Communication in Evolved Multiagent Teams. In: *Proceedings of the Genetic and Evolutionary Computation Conference* (GECCO-2014, Vancouver, Canada). New York, NY: The Association for Computing Machinery (8 pages).
Acceptance Rate: 33%
8. Brian G. Woolley and Kenneth O. Stanley (2014). A Novel Human-Computer Collaboration: Combining Novelty Search with Interactive Evolution. In: *Proceedings of the Genetic and Evolutionary Computation Conference* (GECCO-2014, Vancouver, Canada). New York, NY: The Association for Computing Machinery (8 pages).
Acceptance Rate: 33%
Winner of the Best Paper Award in Artificial Life / Robotics / Evolvable Hardware Track (out of 35 in track)
9. Sebastian Risi and Kenneth O. Stanley (2014). Guided Self-Organization in Indirectly Encoded and Evolving Topographic Maps. In: *Proceedings of the Genetic and Evolutionary Computation Conference* (GECCO-2014, Vancouver, Canada). New York, NY: The Association for Computing Machinery (8 pages).
Acceptance Rate: 33%
10. Justin K. Pugh* and Kenneth O. Stanley (2014). Real-time Hebbian Learning from Autoencoder Features for Control Tasks. In: *Proceedings of the Fourteenth International Conference on the Synthesis and Simulation of Living Systems* (ALIFE XIV, New York, NY). Cambridge, MA: MIT

Press (8 pages).

Oral Acceptance Rate: 49.8%

11. Lisa B. Soros* and Kenneth O. Stanley (2014). Identifying Necessary Conditions for Open-Ended Evolution through the Artificial Life World of Chromaria. In: *Proceedings of the Fourteenth International Conference on the Synthesis and Simulation of Living Systems (ALIFE XIV, New York, NY)*. Cambridge, MA: MIT Press (8 pages).
Overall Acceptance Rate: 81.8%
Winner of the Best Poster Award at ALIFE 14 (out of 65 posters)
12. Paul A. Szerlip* and Kenneth O. Stanley (2014). Steps Toward a Modular Library for Turning Any Evolutionary Domain into an Online Interactive Platform In: *Proceedings of the Fourteenth International Conference on the Synthesis and Simulation of Living Systems (ALIFE XIV, New York, NY)*. Cambridge, MA: MIT Press (8 pages).
Overall Acceptance Rate: 81.8%
13. Paul A. Szerlip* and Kenneth O. Stanley (2013). Indirectly Encoded Sodarace for Artificial Life. In: *Proceedings of the 12th European Conference on Artificial Life (ECAL-2013, Taormina, Italy)*. Cambridge, MA: MIT Press.
Acceptance Rate: 48.3%
**Nominated for Best Paper Award
(8 of 267 nominated)**
14. Amy K. Hoover*, Paul A. Szerlip*, and Kenneth O. Stanley (2013). Implications from Music Generation for Music Appreciation. In: *Proceedings of the Fourth International Conference on Computational Creativity (ICCC-2013, Sydney, Australia)*. Menlo Park, CA: AAAI Press (5 pages).
Acceptance Rate: 51%
15. Gregory Morse*, Sebastian Risi, Charles R. Snyder*, and Kenneth O. Stanley (2013). Single-Unit Pattern Generators for Quadruped Locomotion. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2013, Amsterdam)*. New York, NY: The Association for Computing Machinery (8 pages).
Acceptance Rate: 35.8%
16. Justin K. Pugh* and Kenneth O. Stanley (2013). Evolving Multimodal Controllers with HyperNEAT. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2013, Amsterdam)*. New York, NY: The Association for Computing Machinery (8 pages).
Acceptance Rate: 35.8%
17. Joel Lehman, Kenneth O. Stanley, and Risto Miikkulainen (2013). Effective Diversity Maintenance in Deceptive Domains. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2013, Amsterdam)*. New York, NY: The Association for Computing Machinery (8 pages).
Acceptance Rate: 35.86%
18. Sebastian Risi and Kenneth O. Stanley (2013). Confronting the Challenge of Learning a Flexible Neural Controller for a Diversity of Morphologies. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2013, Amsterdam)*. New York, NY: The Association for Computing Machinery (7 pages).
Acceptance Rate: 35.8%

19. Andreas Lang* and Kenneth O. Stanley (2013). NeuroEvolutionary Meta-Optimization. In: *Proceedings of the International Joint Conference on Neural Networks (IJCNN 2013, Dallas, Texas)*. Piscataway, NJ: IEEE (8 pages).
Acceptance Rate: 82%
20. Sebastian Risi*, Joel Lehman*, David B. D'Ambrosio*, Ryan Hall* and Kenneth O. Stanley (2012). Combining Search-based Procedural Content Generation and Social Gaming in the Petalz Video Game. In: *Proceedings of the Artificial Intelligence and Interactive Digital Entertainment Conference (AIIDE 2012, Palo Alto, CA)*. Menlo Park, CA:AAAI (6 pages).
Acceptance Rate: 27% for papers with oral presentations
21. David B. D'Ambrosio*, Skyler Goodell*, Joel Lehman*, Sebastian Risi*, and Kenneth O. Stanley (2012). Multirobot Behavior Synchronization through Direct Neural Network Communication. In: *Proceedings of the 5th International Conference on Intelligent Robotics and Applications (ICIRA-2012, Montreal, Canada)*. New York, NY: Springer-Verlag (12 pages).
Acceptance Rate: 75%
One of 5 (out of 198) Best Paper Award Finalists.
22. Sebastian Risi* and Kenneth O. Stanley (2012). A Unified Approach to Evolving Plasticity and Neural Geometry. In: *Proceedings of the International Joint Conference on Neural Networks (IJCNN 2012, Brisbane, Australia)*. Piscataway, NJ: IEEE (8 pages).
Acceptance Rate: 65%
**Winner of the Best Student Paper Award at IJCNN.
(out of 299 papers submitted with student first authors)**
23. Joel Lehman* and Kenneth O. Stanley (2012). Beyond Open-endedness: Quantifying Impressiveness. In: *Proceedings of the Thirteenth International Conference on Artificial Life (ALIFE XIII, East Lansing, MI)*. Cambridge, MA: MIT Press (8 pages).
Acceptance Rate: 50% for all accepted papers
24. Joel Lehman*, Sebastian Risi*, David B. D'Ambrosio, and Kenneth O. Stanley (2012). Rewarding Reactivity to Evolve Robust Controllers without Multiple Trials or Noise. In: *Proceedings of the Thirteenth International Conference on Artificial Life (ALIFE XIII, East Lansing, MI)*. Cambridge, MA: MIT Press (8 pages).
Acceptance Rate: 25% for papers with oral presentations
25. Amy K. Hoover*, Paul A. Szerlip*, Marie E. Norton*, Trevor A. Brindle*, Zachary Merritt*, and Kenneth O. Stanley (2012). Generating a Complete Multipart Musical Composition from a Single Monophonic Melody with Functional Scaffolding. In: *Proceedings of the Third International Conference on Computational Creativity (ICCC-2012, Dublin, Ireland)*. Menlo Park, CA: AAAI Press (8 pages).
Acceptance Rate: 50%
26. David B. D'Ambrosio*, Joel Lehman*, Sebastian Risi*, and Kenneth O. Stanley (2011). Task Switching in Multiagent Learning through Indirect Encoding. In: *Proceedings of the International Conference on Intelligent Robots and Systems (IROS 2011, San Francisco, CA)*. Piscataway, NJ: IEEE.
Acceptance Rate: 32%
27. Amy K. Hoover*, Paul A Szerlip*, and Kenneth O. Stanley (2011). Generating Musical Accompaniment through Functional Scaffolding. In: *Proceedings of the 8th Sound and Music Computing*

Conference (SMC-2011, Padova, Italy).
Acceptance Rate: 25% accepted for oral presentation

28. Joel Lehman* and Kenneth O. Stanley (2011). Improving Evolvability through Novelty Search and Self-Adaptation. In: *Proceedings of the 2011 IEEE Congress on Evolutionary Computation (CEC-2011, New Orleans, LA)*. Piscataway, NJ: IEEE.
Acceptance Rate: 65%
29. Brian G. Woolley* and Kenneth O. Stanley (2011). On the Deleterious Effects of A Priori Objectives on Evolution and Representation. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2011, Dublin, Ireland)*. New York, NY: The Association for Computing Machinery.
Acceptance Rate: 38%
30. Sebastian Risi* and Kenneth O. Stanley (2011). Enhancing ES-HyperNEAT to Evolve More Complex Regular Neural Networks. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2011, Dublin, Ireland)*. New York, NY: The Association for Computing Machinery.
Acceptance Rate: 38%
**Nominated for Best Paper Award in Generative and Developmental Systems
(2 of 20 nominated in track)**
31. Jason Gauci* and Kenneth O. Stanley (2011). Evolving Neural Networks for Geometric Game-Tree Pruning. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2011, Dublin, Ireland)*. New York, NY: The Association for Computing Machinery.
Acceptance Rate: 38%
32. Amy K. Hoover*, Paul A Szerlip*, and Kenneth O. Stanley (2011). Interactively Evolving Harmonies through Functional Scaffolding. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2011, Dublin, Ireland)*. New York, NY: The Association for Computing Machinery.
Acceptance Rate: 38%
**Winner of the Best Paper Award in Digital Entertainment Technologies and Arts.
(out of 21 submissions in track)**
33. Joel Lehman* and Kenneth O. Stanley (2011). Evolving a Diversity of Virtual Creatures through Novelty Search with Local Competition. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2011, Dublin, Ireland)*. New York, NY: The Association for Computing Machinery.
Acceptance Rate: 38%
34. Phillip Verbancsics * and Kenneth O. Stanley (2011). Constraining Connectivity to Encourage Modularity in HyperNEAT. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2011, Dublin, Ireland)*. New York, NY: The Association for Computing Machinery.
Acceptance Rate: 38%
35. Jason Gauci* and Kenneth O. Stanley (2010). Indirect Encoding of Neural Networks for Scalable Go. In: *Proceedings of the 11th International Conf. on Parallel Problem Solving From Nature (PPSN-2010, Krakow, Poland)*. New York, NY: Springer, 354–363.
Acceptance Rate: 50%
36. Brian G. Woolley* and Kenneth O. Stanley (2010). Evolving a Single Scalable Controller for an Octopus Arm with a Variable Number of Segments. In: *Proceedings of the 11th International Conf.*

on Parallel Problem Solving From Nature (PPSN-2010, Krakow, Poland). New York, NY: Springer, 270–279.

Acceptance Rate: 50%

37. Sebastian Risi* and Kenneth O. Stanley (2010). Indirectly Encoding Neural Plasticity as a Pattern of Local Rules. In: *The 11th International Conference on Simulation of Adaptive Behavior* (SAB2010). Berlin: Springer, 533–543.

Acceptance Rate (oral): 30%

38. Sebastian Risi*, Joel Lehman*, and Kenneth O. Stanley (2010). Evolving the Placement and Density of Neurons in the HyperNEAT Substrate. In: *Proceedings of the Genetic and Evolutionary Computation Conference* (GECCO-2010, Portland, OR). New York, NY: The Association for Computing Machinery, 563–570.

Acceptance Rate: 45%

**Winner of the Best Paper Award in Generative and Developmental Systems.
(out of 20 submissions in track)**

39. Joel Lehman* and Kenneth O. Stanley (2010). Efficiently Evolving Programs through the Search for Novelty. In: *Proceedings of the Genetic and Evolutionary Computation Conference* (GECCO-2010, Portland, OR). New York, NY: The Association for Computing Machinery, 837–844.

Acceptance Rate: 45%

40. Joel Lehman* and Kenneth O. Stanley (2010). Revising the Evolutionary Computation Abstraction: Minimal Criteria Novelty Search. In: *Proceedings of the Genetic and Evolutionary Computation Conference* (GECCO-2010, Portland, OR). New York, NY: The Association for Computing Machinery, 103–110.

Acceptance Rate: 45%

41. Phillip Verbancsics* and Kenneth O. Stanley (2010) Transfer Learning through Indirect Encoding. In: *Proceedings of the Genetic and Evolutionary Computation Conference* (GECCO-2010, Portland, OR). New York, NY: The Association for Computing Machinery, 547–554.

Acceptance Rate: 45%

**Nominated for Best Paper Award in Generative and Developmental Systems
(4 of 20 nominated in track)**

42. David B. D.Ambrosio*, Joel Lehman*, Sebastian Risi*, and Kenneth O. Stanley (2010). Evolving Policy Geometry for Scalable Multiagent Learning In: *Proceedings of the Ninth International Conference on Autonomous Agents and Multiagent Systems* (AAMAS-2010, Toronto, Canada). International Foundation for Autonomous Agents and Multiagent Systems, 731–738.

Acceptance Rate: 24%

43. Erin Hastings* and Kenneth O. Stanley (2010). Interactive Genetic Engineering of Evolved Video Game Content. In: *Proceedings of the Workshop on Procedural Content Generation in Games (PCG) at the 5th International Conference on the Foundations of Digital Games* (FDG-2010, Monterey, CA). New York, NY: ACM. (4 pages)

Acceptance Rate: 84%

44. Greg Dubbin* and Kenneth O. Stanley (2010). Learning to Dance through Interactive Evolution. In: *Proceedings of the Eighth European Event on Evolutionary and Biologically Inspired Music, Sound, Art and Design* (EvoMUSART 2010, Istanbul, Turkey). New York, NY: Springer, 331–340.

Acceptance Rate: 44%

45. Julian Togelius, Georgios N. Yannakakis, Kenneth O. Stanley, and Cameron Browne (2010). Search-based Procedural Content Generation. In: *Proceedings of the 2nd European event on Bio-inspired Algorithms in Games (EvoGAMES 2010, Istanbul, Turkey)*. New York, NY: Springer, 141–150.
Acceptance Rate: 60%
46. Erin Hastings*, Ratan Guha, and Kenneth O. Stanley (2009). Evolving Content in the Galactic Arms Race Video Game. In: *Proceedings of the IEEE Symposium on Computational Intelligence and Games (CIG'09)*. (Milan, Italy). Piscataway, NJ: IEEE, 241–248.
Acceptance Rate: 68%
Winner of the Best Paper Award.
(out of 76 submissions)
47. Sebastian Risi*, Sandy D. Vanderbleek*, Charles E. Hughes, and Kenneth O. Stanley (2009). How Novelty Search Escapes the Deceptive Trap of Learning to Learn. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2009, Montreal)*. New York, NY: The Association for Computing Machinery, 153–160.
Acceptance Rate: 41%
Winner of the Best Paper Award in Artificial Life, Evolutionary Robotics, Adaptive Behavior, Evolvable Hardware.
(out of 42 submissions in track)
48. Georgios C. Anagnostopoulos, Michael Georgiopoulos, Veton Z. Kepuska, Kenneth O. Stanley, Alison Morrison-Shetlar, Pat Lancey, Paula Krist, and Tace Crouse (2009). The AMALTHEA REU Program: Activities, Experiences & Outcomes of a Collaborative Summer Research Experience in Machine Learning. In: *Proceedings of the American Society of Engineering Education 2009 Annual Conference and Exposition (ASEE 2009, Austin, TX)*.
Acceptance Rate: 89%
49. Jason Gauci* and Kenneth O. Stanley (2008). A Case Study on the Critical Role of Geometric Regularity in Machine Learning. In: *The Twenty-Third AAAI Conference on Artificial Intelligence (AAAI-2008, Chicago)*. Menlo Park, CA: AAAI Press, 628–633.
Acceptance Rate: 24%
50. Jimmy Secretan*, Nicholas Beato*, David B. D'Ambrosio*, Adelein Rodriguez*, Adam Campbell*, and Kenneth O. Stanley (2008). Picbreeder: Evolving Pictures Collaboratively Online. In: *Proceedings of the Computer Human Interaction Conference (CHI 2008, Milan)*. New York, NY: The Association for Computing Machinery, 1759–1768.
Acceptance Rate: 22%
Cited by: 148 (Google Scholar)
51. Amy K. Hoover*, Michael P. Rosario*, and Kenneth O. Stanley (2008). Scaffolding for Interactively Evolving Novel Drum Tracks for Existing Songs. In: *Proceedings of the Sixth European Workshop on Evolutionary and Biologically Inspired Music, Sound, Art and Design (EvoMUSART 2008, Naples, Italy)*. New York, NY: Springer, 412–422.
Acceptance Rate: 32%
Winner of the Best Paper Award.
(out of 31 submissions)
52. David D'Ambrosio* and Kenneth O. Stanley (2008). Generative Encoding for Multiagent Learning. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2008, Atlanta)*.

New York, NY: The Association for Computing Machinery, 819–826.

Acceptance Rate: 44%

**Winner of the Best Paper Award in Generative and Developmental Systems.
(out of 13 submissions in track)**

53. Joel Lehman* and Kenneth O. Stanley (2008). Exploiting Open-Endedness to Solve Problems Through the Search for Novelty. In: *Eleventh International Conference on the Simulation and Synthesis of Living Systems* (Artificial Life XI, Winchester, UK), 329–336.
Acceptance Rate (among both submitted papers and submitted abstracts combined): 35% (our submission is a full paper)
Cited by: 239 (Google Scholar)
54. David D’Ambrosio* and Kenneth O. Stanley (2007). A Novel Generative Encoding for Exploiting Neural Network Sensor and Output Geometry. In: *Proceedings of the Genetic and Evolutionary Computation Conference* (GECCO-2007, London). New York, NY: The Association for Computing Machinery, 974–981
Acceptance Rate: 46%
**Nominated for Best Paper Award in Generative and Developmental Systems.
(3 of 24 nominated in track)**
55. Jason Gauci* and Kenneth O. Stanley (2007). Generating Large-Scale Neural Networks through Discovering Geometric Regularities. In: *Proceedings of the Genetic and Evolutionary Computation Conference* (GECCO-2007, London). New York, NY: The Association for Computing Machinery, 997–1004
Acceptance Rate: 46%
Cited by: 113 (Google Scholar)
56. Erin Hastings*, Ratan Guha, and Kenneth O. Stanley (2007). NEAT Particles: Design, Representation, and Animation of Particle System Effects. In: *Proceedings of the IEEE Symposium on Computational Intelligence and Games (CIG’07)*. (Honolulu, HI). Piscataway, NJ: IEEE, 154–160.
Acceptance Rate: 52%
57. Kenneth O. Stanley, Bobby D. Bryant, Igor Karpov, Risto Miikkulainen (2006). Real-Time Evolution of Neural Networks in the NERO Video Game. In: *Proceedings of the Twenty-First National Conference on Artificial Intelligence* (AAAI-2006, Boston, MA). Menlo Park, CA: AAAI Press, 1671–1674.
Nectar track acceptance rate: 38%
58. Chern Han Yong, Kenneth O. Stanley, Risto Miikkulainen, and Igor V. Karpov (2006). Incorporating Advice into Neuroevolution of Adaptive Agents. In: *Proceedings of the Artificial Intelligence and Interactive Digital Entertainment Conference* (AIIDE 2006, Marina Del Rey, CA). Menlo Park, CA: AAAI Press, 96–104.
Acceptance Rate: 43%
59. German A. Monroy, Kenneth O. Stanley, Risto Miikkulainen (2006). Coevolution of Neural Networks using a Layered Pareto Archive. In: *Proceedings of the Genetic and Evolutionary Computation Conference* (GECCO-2006, Seattle, WA). New York, NY: The Association for Computing Machinery.
Acceptance Rate: 46%
60. Nate Kohl, Kenneth Stanley, Risto Miikkulainen, Michael Samples, and Rini Sherony (2006). Evolving a Real-World Vehicle Warning System. In: *Proceedings of the Genetic and Evolutionary Computation Conference* (GECCO-2006, Seattle, WA). New York, NY: The Association for Computing

Machinery.

Acceptance Rate: 46%

61. Thomas D'Silva, Roy Janik, Michael Chrien, Kenneth O. Stanley, and Risto Miikkulainen (2005). Retaining Learned Behavior During Real-time Neuroevolution. In: *Proceedings of the Artificial Intelligence and Interactive Digital Entertainment Conference (AIIDE 2005, Marina Del Rey, CA)*. Menlo Park, CA: AAAI Press.
62. Kenneth O. Stanley, Nate Kohl, Rini Sherony, and Risto Miikkulainen (2005). Neuroevolution of an Automobile Crash Warning System. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2005, Washington D.C)*. New York, NY: The Association for Computing Machinery.
Acceptance Rate: 46%
63. Shimon Whiteson, Peter Stone, Kenneth O. Stanley, Risto Miikkulainen, and Nate Kohl (2005). Automatic Feature Selection in Neuroevolution. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2005, Washington D.C)*. New York, NY: The Association for Computing Machinery.
Acceptance Rate: 46%
64. Kenneth O. Stanley, Bobby D. Bryant, and Risto Miikkulainen (2005). Evolving Neural Network Agents in the NERO Video Game. In: *IEEE Symposium on Computational Intelligence and Games (CIG'05) (Colchester, UK)*, 182–189.
Acceptance Rate: 52%
Winner of the Best Paper Award at CIG'05
(out of 54 papers submitted)
Cited by: 161 (Google Scholar)
65. Kenneth O. Stanley and Risto Miikkulainen (2004). Evolving A Roving Eye for Go. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2004, Seattle, WA)*. New York, NY: Springer-Verlag.
Acceptance Rate: 50%
66. Joseph Reisinger, Kenneth O. Stanley, and Risto Miikkulainen (2004). Evolving Reusable Neural Modules. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2004, Seattle, WA)*. New York, NY: Springer-Verlag.
Acceptance Rate: 50%
67. Kenneth O. Stanley, Bobby D. Bryant, and Risto Miikkulainen (2003). Evolving Adaptive Neural Networks with and without Adaptive Synapses. In: *Proceedings of the 2003 Congress on Evolutionary Computation (CEC 03, Canberra, Australia)*. Piscataway, NJ: IEEE.
Acceptance Rate: 65.5%
68. Kenneth O. Stanley and Risto Miikkulainen (2003). Achieving High-Level Functionality through Complexification. In: *2003 AAAI Spring Symposium on Computational Synthesis (Stanford, CA)*, 226–232. Menlo Park, CA: AAAI Press.
Acceptance Rate: 50%
69. Kenneth O. Stanley and Risto Miikkulainen (2002). Efficient Reinforcement Learning through Evolving Neural Network Topologies. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2002, New York, NY)*, 569–577. San Francisco, CA: Kaufman.

Acceptance Rate: 49%

**Winner of the Best Paper Award in Genetic Algorithms
(out of over 100 papers submitted)**

Cited by: 237 (Google Scholar)

70. Kenneth O. Stanley and Risto Miikkulainen (2002). Continual Coevolution through Complexification. In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2002, New York, NY)*, 113–120. San Francisco, CA: Kaufman.

Acceptance Rate: 49%

71. Kenneth O. Stanley and Risto Miikkulainen (2002). Efficient Evolution of Neural Network Topologies. In: *Proceedings of the 2002 Congress on Evolutionary Computation (CEC 02, Honolulu, HI)*, 1757–1762. Piscataway, NJ: IEEE.

Acceptance Rate: 54%

Cited by: 121 (Google Scholar)

Non-Competitive Workshops and Symposia

In Print

Lisa B. Soros* and Kenneth O. Stanley (2016). Is Evolution Fundamentally Creative? In: *Proceedings of the Second Workshop on Open-Ended Evolution (OEE2) at the Fifteenth International Conference on Artificial Life (ALIFE XV, Cancun, MX)*. Cambridge, MA: MIT Press (3 pages).

Kenneth O. Stanley and Lisa B. Soros* (2016). The Role of Subjectivity in the Evaluation of Open-Endedness. In: *Proceedings of the Second Workshop on Open-Ended Evolution (OEE2) at the Fifteenth International Conference on Artificial Life (ALIFE XV, Cancun, MX)*. Cambridge, MA: MIT Press (3 pages).

Justin K. Pugh*, Lisa B. Soros*, and Kenneth O. Stanley (2016). Searching for Quality Diversity When Diversity is Unaligned with Quality. In: *Genetic and Evolutionary Computation Conference Poster Proceedings (GECCO-2016, Denver, Colorado)*. New York, NY: The Association for Computing Machinery (2 pages).

Paul A. Szerlip* and Kenneth O. Stanley (2014). A Proposed Infrastructure for Adding Online Interaction to Any Evolutionary Domain In: *Proceedings of the Artificial Life and the Web (WebAL-1) Workshop at the Fourteenth International Conference on Artificial Life (ALIFE XIV, New York, NY)*. Cambridge, MA: MIT Press (2 pages).

Kenneth O. Stanley and Brian G. Woolley* (2014). On the Importance of Novelty to Interactive Evolution In: *Proceedings of the Artificial Life and the Web (WebAL-1) Workshop at the Fourteenth International Conference on Artificial Life (ALIFE XIV, New York, NY)*. Cambridge, MA: MIT Press (short abstract).

Sebastian Risi, Joel Lehman, David B. D'Ambrosio, and Kenneth O. Stanley (2014). Automatically Categorizing Procedurally Generated Content for Collecting Games. In: *Proceedings of the Workshop on Procedural Content Generation in Games (PCG) at the 9th International Conference on the Foundations of Digital Games (FDG-2014, Fort Lauderdale, FL)*. New York, NY: ACM (7 pages).

Kenneth O. Stanley (2014). The Case for Evolution in Engineering Brains. In: *2013 AAAI Symposium on How Should Intelligence be Abstracted in AI Research: MDPs, Symbolic Representations, Artificial Neural Networks, or -----?* (Arlington, VA), Menlo Park, CA: AAAI Press (1 page).

- Joel Lehman*, Sebastian Risi*, and Kenneth O. Stanley (2012). On the Benefits of Divergent Search for Evolved Representations. In: *Proceedings of the EvoNet 2012 Workshop at the Thirteenth International Conference on Artificial Life (ALIFE XIII, East Lansing, MI)*. Cambridge, MA: MIT Press (4 pages).
- Kenneth O. Stanley (2006). Exploiting Regularity Without Development. In: *Proceedings of the AAAI Fall Symposium on Developmental Systems*. (Washington, D.C.), 49–56. Menlo Park, CA: AAAI Press.
- Kenneth O. Stanley (2006). Comparing Artificial Phenotypes with Natural Biological Patterns. In: *Proceedings of the Genetic and Evolutionary Computation Conference Workshop Program (GECCO-2006, Seattle, WA)*. New York, NY: The Association for Computing Machinery.
- Igor V. Karpov, Thomas D. Silva, Craig Varrichio, Kenneth O. Stanley, Risto Miikkulainen (2006). Integration and Evaluation of Exploration-Based Learning in Games. In: *IEEE Symposium on Computational Intelligence and Games (CIG'06)* (Reno, NV), 39–44.
- Joseph Reisinger, Kenneth O. Stanley, and Risto Miikkulainen (2005). Towards an Empirical Measure of Evolvability. In: *Proceedings of the Genetic and Evolutionary Computation Conference Workshop Program (GECCO-2005, Washington D.C)*. New York, NY: The Association for Computing Machinery.
- Kenneth O. Stanley, Joseph Reisinger, and Risto Miikkulainen (2004). Exploiting Morphological Conventions for Genetic Reuse. In: *Proceedings of the Genetic and Evolutionary Computation Conference Workshop Program (GECCO-2004, Seattle, WA)*. New York, NY: Springer-Verlag.
- Kenneth O. Stanley and Risto Miikkulainen (2002). The Dominance Tournament Method of Monitoring Progress in Coevolution. In: *2002 Genetic and Evolutionary Computation Conference Workshop Program (GECCO-2002, New York, NY)*, 242–248. San Francisco, CA: Kaufman.

Non-Refereed Publications

- Kenneth O. Stanley (2003). Learning Concept Drift with a Committee. Technical Report AI-00-285, Department of Computer Sciences, University of Texas at Austin. 14 pages.
Cited by: 142 (Google Scholar)

Other Publications

- Jimmy Secretan*, Nicholas Beato*, David B. D'Ambrosio*, Adelein Rodriguez*, Adam Campbell*, and Kenneth O. Stanley (2008). Picbreeder: Collaborative Interactive Evolution of Images *Leonardo* (Transactions Section), 41(1): 98–99, Cambridge, MA: MIT Press (2 pages).
Note: This article is a short two-page transaction notice announcing the Picbreeder experiment.

Demonstrations

- Paul A. Szerlip*, Amy K. Hoover* and Kenneth O. Stanley (2012). A Computer-Assisted Approach to Composing with MaestroGenesis. In: *Proceedings of 1st International Workshop on Musical Metacreation (MUME 2012) at the Artificial Intelligence and Interactive Digital Entertainment Conference (AIIDE-2012, Palo Alto, CA)*. Menlo Park, CA: AAAI Press.

Paul A. Szerlip*, Amy K. Hoover* and Kenneth O. Stanley (2012). Demo: MaestroGenesis: Computer-Assisted Musical Accompaniment Generation. In: *Proceedings of the Third International Conference on Computational Creativity Demonstration Program (ICCC-2012, Dublin, Ireland)*. Menlo Park, CA: AAAI Press.

Erin Hastings*, Ratan Guha, and Kenneth O. Stanley (2009). Demonstrating Automatic Content Generation in the Galactic Arms Race Video Game. In: *Proceedings of the Artificial Intelligence and Interactive Digital Entertainment Conference Demonstration Program (AIIDE 2009, Palo Alto, CA)*, 189–190. Menlo Park, CA: AAAI Press.

Kenneth O. Stanley, Igor Karpov, Risto Miikkulainen, and Aliza Gold (2006). Real-time Interactive Learning in the NERO Video Game. In: *Proceedings of the Twenty-First National Conference on Artificial Intelligence Demonstration Program (AAAI-2006, Boston, MA)*. Menlo Park, CA: AAAI Press.

Kenneth O. Stanley, Igor Karpov, Risto Miikkulainen, and Aliza Gold (2006). The NERO Video Game. In: *Proceedings of the Artificial Intelligence and Interactive Digital Entertainment Conference Demonstration Program (AIIDE 2006, Marina Del Rey, CA)*. Menlo Park, CA: AAAI Press.

Kenneth O. Stanley, Ryan Cornelius, Risto Miikkulainen, Thomas D’Silva, and Aliza Gold (2005). Real-time Learning in the NERO Video Game. In: *Proceedings of the Artificial Intelligence and Interactive Digital Entertainment Conference Demonstration Program (AIIDE 2005, Marina Del Rey, CA)*. Menlo Park, CA: AAAI Press.

Videos

Erin Hastings*, Ratan Guha, and Kenneth O. Stanley (2009). Galactic Arms Race (GAR): Automatic Content Generation In a Multiplayer Online Video Game. *Proceedings of the Twenty-First International Joint Conference on Artificial Intelligence AI Video Competition (IJCAI-2009, Pasadena, CA)*.

Jeff Balogh*, Greg Dubbin*, Michael Do*, and Kenneth O. Stanley (2007). Dance Evolution. In: *Proceedings of the Twenty-Second National Conference on Artificial Intelligence AI Video Competition (AAAI-2007, Vancouver, BC, Canada)*. Menlo Park, CA: AAAI Press.

Best Student Video Award

Patents and Invention Disclosures

Patents Granted:

1. Stanley, K.O., Risi, S., Lehman, J., Hoover, A.K., and D’Ambrosio, D. (Patent Granted March 17, 2015). Generating Flower Images and Shapes with Compositional Pattern Producing Networks. United States Patent 8,982,149.
2. DeBoer, Scott M. and Stanley, K. O. (Patent Granted December 3, 2013). Systems and Methods for Inducing Effects in a Signal. United States Patent 8,600,068.
3. Rosario, M. and Stanley, K. O. (Patent Granted June 21, 2011). System and Method for Evolving Music Tracks. United States Patent 7,964,783.
4. Sherony, R., Miikkulainen, R., Stanley, K. O., and Kohl, N. (Patent Granted November, 2009). Crash Prediction Network with Visual Input for Vehicle. United States Patent 7,613,569.

5. Sherony, R., Miikkulainen, R., Stanley, K. O., and Kohl, N. (Patent Granted July, 2009). Crash Prediction Network With Graded Warning for Vehicle. United States Patent 7,565,231.
6. Stanley, K. O., Miikkulainen, R. (Patent Granted July, 2009). Method and Apparatus for Providing Real-time Machine Learning to Computer-controlled Agents Used in Video Games. United States Patent 7,559,843.
7. Evan Kirshenbaum, Kenneth O. Stanley, and Bin Zhang (Patent Granted January, 2006). Deriving a genome representation for evolving graph structure weights. United States Patent 6,988,089. Hewlett-Packard Corporation.

Patents Pending:

1. Erin Hastings* and Kenneth O. Stanley (Provisional Patent Pending since 2009; Utility since 2010). *Evolving Content for Computer Games*. University of Central Florida.

Grants and Funding

Total Funding: \$2,395,569

Total Funding as PI: \$2,355,269

Total Funding as Co-PI: \$40,300

1. **NXP Software B.V.**, “RF: Neuroevolution for Audio Processing, Recognition, and Classification Tasks,” July 2016 – December 2017, **\$30,137**. (sole PI)
2. **SoarTech**, “SoarTech HyperNEAT Collaboration,” September 2014 – April 2015, **\$32,000**. (sole PI)
3. **National Science Foundation (NSF)**, *Robust Intelligence Program*, “RI: Small: Neuroevolution of Brain-Inspired Computational Models Over Vast Timescales,” July 2014 – June 2017 (no-cost extension to 2018), **\$472,542**. (sole PI)
4. **Global Institute for Scientific Thinking (GIST)**, Unrestricted Gift to Lab (February 2014) **\$100,000**. (sole PI)
5. **Global Institute for Scientific Thinking (GIST)**, Unrestricted Gift to Lab (January 2014) **\$39,000**. (sole PI)
6. **US Army Research Office (ARO)**, “Training a Multiagent Hive Brain for Coordinated Operations (4.4.2),” September 2011 - September 2014 (granted December 2013), **\$85,859 (third increment out of \$355,859 total)**. (sole PI)
7. **Florida Space Institute (FSI)**, “SRI: Single-Unit Pattern Generators for Robust Robot Locomotion,” July 2013 - July 2014, **\$56,009**. (sole PI)
8. **Global Institute for Scientific Thinking (GIST)**, Unrestricted Gift to Lab (December 2012) **\$10,000**. (sole PI)

9. **US Army Research Office (ARO)**, “Training a Multiagent Hive Brain for Coordinated Operations (4.4.2),” September 2011 - September 2014 (granted December 2012),
\$120,000 (second increment out of \$355,859 total). (sole PI)
10. **DoD Defense University Research Instrumentation Program (DURIP)**, “Hardware-Assisted Large-Scale Neuroevolution for Multiagent Learning,” August 2012 - August 2013,
\$201,500 (20% Credit; \$40,300). (one of five co-PIs led by Prof. Mingjie Lin)
11. **Global Institute for Scientific Thinking (GIST)**, Unrestricted Gift to Lab (2011)
\$11,600. (sole PI)
12. **US Army Research Office (ARO)**, “Training a Multiagent Hive Brain for Coordinated Operations (4.4.2),” September 2011 - September 2014 (granted September 2011),
\$150,000 (first increment out of \$355,859 total). (sole PI)
13. **Defense Advanced Research Projects Agency (DARPA) Computer Science Study Group Phase 3**, “Real-world Scalable Multiagent Learning for Coordinated Operations,” August 2011 - August 2012,
\$249,347. (sole PI)
Note: The DARPA CSSP is a highly selective Early Career Award.
14. **Global Institute for Scientific Thinking (GIST)**, Unrestricted Gift to Lab (2011)
\$85,500. (sole PI)
15. **Global Institute for Scientific Thinking (GIST)**, Unrestricted Gift to Lab (2010)
\$17,000. (sole PI)
16. **National Science Foundation (NSF), CreativeIT Program**, “Pilot: Assisted Musical Composition through Functional Scaffolding,” August 2010 – August 2013,
\$295,229. (sole PI)
17. **Xtructure Corporation**, Unrestricted Gift to Lab (2010),
\$10,000. (sole PI)
18. **Defense Advanced Research Projects Agency (DARPA) Computer Science Study Group Phase 2**, “Scalable Heterogeneous Multiagent Teams through Learning Policy Geometry,” May 2009 – May 2011,
\$424,605. (sole PI)
Note: The DARPA CSSP is a highly selective Early Career Award.
19. **Defense Advanced Research Projects Agency (DARPA) Computer Science Study Group Phase 1**, “Machine Learning and Control through Neuroevolution,” January 2008 – December 2008,
\$99,980. (sole PI)
Note: The DARPA CSSP is a highly selective Early Career Award.
20. **Toyota USA Foundation**, Unrestricted Gift to Lab (2008),
\$45,000. (sole PI)
21. **Toyota USA Foundation**, “Predicting Vehicle Behavior in Traffic 2,” January 1st 2008 – June 1st 2008,
\$12,686. (sole PI)
22. **Dr. Charles Bailey**, Unrestricted Gifts to Lab (2008),
\$26,850. (sole PI; separate gifts received in April, May, and August)

23. **Toyota USA Foundation**, “Predicting Vehicle Behavior in Traffic,” June 1st 2007 – September 30th 2007,
\$28,225. (sole PI)

Also: One student (Amy Hoover) was awarded a **NSF Graduate Research Fellowship** (GRF; deferred to begin in 2011) and another (Phillip Verbancsics) has a **Science, Mathematics And Research for Transformation (SMART) DoD fellowship**.

Funded (Prior to UCF)

Fellowship and Funded Project Proposal: *Neuroevolution-based Video Game*. IC2 Institute Digital Media Collaboratory, October 2003 to August 2005.

Proposal delivered at the 2nd Annual Game Development Workshop on Artificial Intelligence. Based on the proposal, the IC2 Institute at the University of Texas committed to fund and support the development of the pioneering neuroevolution-based video game NERO.

Invited Talks and Presentations

“New Directions in Open-Ended Evolution.” **Invited Keynote at Genetic Programming Theory and Practice XV (workshop)**, Ann Arbor, MI, May 19, 2017.

“Novelty as a Proxy for Curiosity.” **Invited Talk at Designing for Curiosity Workshop at CHI 2017**, Denver, CO, May 7, 2017.

“Why Success Can’t Always Be Planned.” **Invited Talk for the Institutional Investor US Institute CFO Forum**, Chicago, IL, April 26, 2017. *The forum hosts CFOs of major asset management firms.*

“Why Success Cannot Always Be Planned.” **Invited Keynote for the Defined Contribution (DC) Institute Senior Delegate Roundtable**, New York City, NY, January 20, 2017. *The roundtable hosts leaders in the DC investment industry.*

“Why Greatness Cannot Be Planned: The Myth of the Objective.” **Invited Talk at Design Technology Orlando**, Orlando, FL, September 7, 2016.

“Why Greatness Cannot Be Planned: The Myth of the Objective.” **Invited Talk at Joint Special Operations University (JSOU) Workshop on Alternatives in Unconventional Warfare and the Gray Zone Concept**, Tampa, FL, August 23, 2016.

“Designing around Unpredictable AI.” **Invited Talk at Florida Interactive Entertainment Academy**, Orlando, FL, July 14, 2016.

“New Methods for Searching Design Spaces.” **Invited Talk (by Skype) to Autodesk**, Various worldwide locations, May 31, 2016.

Banff International Research Station Workshop. **Invited Participant at Banff International Research Station Workshop on Computational Modeling in Games**, Banff, Canada, May 15–20, 2016.

“Beyond Objective Optimization: The Quest for Open-Endedness.” **Invited Talk at the University of Louisville Dept. of Computer Science**, Louisville, KY, April 8, 2016.

“New Opportunities for Search Algorithms in Physical Design.” **Invited Talk (by Skype) at Centre for Information Technology and Architecture, The Royal Danish Academy of Fine Arts, Schools of Architecture, Design and Conservation**, Copenhagen, Denmark, February 12, 2016.

“Artificial Intelligence.” **Invited Talk (by Skype) at Cary Academy, a private high school in Cary, North Carolina (in Research Triangle)**, Cary, North Carolina, December 8, 2015.

“Why Greatness Cannot Be Planned: The Myth of the Objective.” **Invited Talk at TTI/Vanguard Conference on Collaboration and the Workplace of the Future**, Washington, D.C., September 30, 2015. *From the organizers: TTI/Vanguard is the advanced technology conference series for senior-level executives. We introduce, discuss, and evaluate emerging and breakthrough technologies on the two-to-five-year horizon.*

The Youtube video of this talk (at <https://www.youtube.com/watch?v=dXQPL9GooyI>) has been viewed over 12,000 times.

“Special Workshop on Advances in Novelty Search in Evolutionary Computation.” **Invited Talk at Sentient Corporation**, San Francisco, CA, August 7, 2015.

Book signing and talk for *Why Greatness Cannot Be Planned: The Myth of the Objective*, Collected Works Bookstore, Santa Fe, NM, June 16, 2015.

“The Dangers of Learning from Data.” **Distinguished Speaker at IBM Research**, IBM Research - Almaden, San Jose, CA, May 14, 2015.

“Confronting the Corrupting Influence of Objectives on Representation.” **Invited Talk at Google DeepMind**, Google DeepMind, London, UK, April 23, 2015.

“The Myth of the Objective.” **Invited Talk at the Reinventing the Grid: Designing Resilient, Adaptive and Creative Power Structures Workshop**, Santa Fe Institute, Santa Fe, NM, April 14, 2015.

“Reinterpreting Natural Evolution as an Explorer with No Objective.” **Invited Talk at the University of New Mexico Seminar in Interdisciplinary Biology and Biological Science**, Albuquerque, NM, February 25, 2015.

Dagstuhl Seminar. **Invited Participant at Dagstuhl Seminar on Artificial and Computational Intelligence in Games: Integration**, Dagstuhl, Germany, January 25–30, 2015.

“The Myth of the Objective: Why the Greatest Achievements Cannot Be Planned.” **Invited Talk at the University of New Mexico**, Albuquerque, NM, January 15, 2015.

“Innovation Without Objectives.” **Invited Talk at Sandia National Laboratories**, Albuquerque, NM, December 3, 2014.

“Complex Divergent Systems: The Essential Role of Divergence in the Evolution and Discovery of Complexity.” **Invited Talk at the Santa Fe Institute**, Santa Fe, NM, October 22, 2014.

Invited Panelist for the IEEE World Congress on Computational Intelligence (WCCI) Evolutionary Multi-criterion Optimization (EMO) Panel, Beijing, China, July 10, 2014.

“How Innovative New Games Can Reinvigorate the Field of Computational Intelligence.” **Invited Talk at the 2014 IEEE World Congress on Computational Intelligence (WCCI) (Plenary for the 2014 IEEE Congress on Evolutionary Computation, one of three joint conferences at WCCI)**, Beijing, China, July 8, 2014.

“Single-Unit Pattern Generators for Robust Robot Locomotion.” **Invited Talk at the Florida Space Institute**, Orlando, FL, March 26, 2014.

Invited Talk on artificial intelligence preceding a showing of the Steven Spielberg emovie *A.I. Artificial Intelligence* at the Enzian Theatre. (Part of the Science on Screen initiative sponsored by the Alfred P. Sloan Foundation.) Orlando, FL, January 18, 2014.

AAAI Fall Symposium 5-minute plenary presentation, representing “How Should Intelligence be Abstracted in AI Research: MDPs, Symbolic Representations, Artificial Neural Networks, or _____?” November 15, 2013.

“The Problem with Objectives.” **Invited Keynote at the 16th Portuguese Conference on Artificial Intelligence (EPIA-2013)**, Angra do Heroismo, Azores, Portugal, September 9–13, 2013.

“Why Computers Need Humans and Humans Need Computers to Make Search Work.” **Invited Keynote for University of Vermont Computer Science Research Day**, Burlington, VT, September 6, 2013.

“The Case for Releasing the Research-based Game.” **Invited Keynote at the Foundations of Digital Games Conferene (FDG-2013)**, Chania, Crete, Greece, May 14–17, 2013.

“Evolving Large-Scale Artificial Neural Networks with HyperNEAT.” **ACM Distinguished Lecture at the University of Arkansas**, Fayetteville, AK, January 31, 2013.

“The Case for Evolution in Engineering Brains.” **Invited talk for the New Frontiers in Cognitive, Evolutionary, and Computational Models of the Mind Meeting (Part 2) at Michigan State University**, East Lansing, Michigan, January 15, 2013.

“Discovery Without Objectives.” **Joint ACM Distinguished Lecture & RMIT/NICTA Big Picture Seminar**, Melbourne, Australia, August 8, 2012.

“Content Generation – The New Frontier for AI in Games.” **ACM Distinguished Lecture at RMIT University**, Melbourne, Australia, August 6, 2012.

“Evolving Robot Teams through Multiagent HyperNEAT.” **Invited talk for EvoDevoRobo Workshop at GECCO-2012**, Philadelphia, PA, July 8, 2012.

“Discovery Without Objectives.” **Invited Tak for TaMaRa Lab at INSERM**, Paris, France, May 22, 2012.

“Novelty Search and Open-Ended Evolution.” **Invited Tak for Fabelier Group at the Centre de Recherche Interdisciplinaire**, Paris, France, May 21, 2012.

“How AI Can Change the Way We Play Games.” **Invited talk at the ACM International Conference on Computing Frontiers Special Session Artificial Intelligence in Games**, Cagliari, Italy, May 16, 2012.

Dagstuhl Seminar. **Invited Participant at Dagstuhl Seminar on Artificial and Computational Intelligence in Games**, Dagstuhl, Germany, May 6–12, 2012.

“Player-Driven Automated Content Generation for Video Games.” **Invited talk at Electronic Arts Tiburon**, Orlando, FL, May 1, 2012.

“Evolving Artificial Neural Networks for Video Games.” **ACM Distinguished Speaker Invited talk at Oakland University**, Auburn Hills, Michigan, March 9, 2012.

- “Crowdsourcing Evolutionary Computation in Picbreeder and Galactic Arms Race.” **Invited talk at the Hands-on Experiments, Scientific Discovery Games and Citizen Science Learning through Research for All Workshop**, Paris, France, July 11, 2011.
- “Novelty Search and the Problem with Objectives.” **Invited talk at the Genetic Programming Theory and Practice Workshop (GPTP-2011)**, Ann Arbor, MI, May 12, 2011.
- “How Letting Go of Objectives Helps Creativity and Discovery.” **Invited talk at the Rhode Island School of Design (RISD)**, Providence, RI, April 22, 2011.
- “Searching Without Objectives: To Achieve Our Highest Goals, We Must Be Willing to Abandon Them.” **Invited keynote at SPLASH 2010 (formerly called OOPSLA)**, Reno, NV, October 21, 2010.
From the organizers: “SPLASH is the new name for OOPSLA, a top tier conference in the area of programming, systems, languages and applications, sponsored by SIGPLAN and SIGSSOFT. SPLASH expects approximately 700 participants, and is hosting several colocated conferences as well.”
- “Evolutionary Complexity Research Group Overview.” **Invited talk for UCF Prospective Undergraduate Students**, Orlando, FL, March 5, 2010
- “Evolutionary Complexity Research Group Overview.” **Invited talk for the UCF Bioinformatics Research Group**, Orlando, FL, February 15, 2010
- “Evolutionary Complexity Research Group Research Overview.” **NAVAIR**, Orlando, FL, November 2, 2009.
- “Abandoning Objectives and the Search for Novelty.” **Invited Plenary for the Exploring New Horizons in Evolutionary Design of Robots Half-day Workshop at the 2009 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2009)**, St. Louis, MO, October 11, 2009.
- “Compositional Pattern Producing Networks: Abstracting Local Interaction and Growth Out of Development.” **Invited talk at the 13th Evolutionary Biology Meeting at Marseilles**, Marseille, France, September 22, 2009.
- “Galactic Arms Race and Automatic Content Generation.” **Valve Software**, Bellevue, WA, March 6, 2009.
- “Abandoning Objectives and the Search for Novelty.” **Invited talk for the UCF Artificial Intelligence Forum**, Orlando, FL, February 12, 2009.
- “A Novel Biological Abstraction for the Encoding and Evolution of Form and Neural Structure.” **Invited talk for *Machines and Organisms Seminar Series* at Cornell University**, Ithaca, NY, December 4, 2008.
- “Abstracting Biological Development to Evolve Large-Scale Artificial Neural Networks.” **Invited Plenary for the 18th International Conference on Artificial Neural Networks (ICANN 2008)**, Prague, Czech Republic, September 6th, 2008.
- “Evolutionary Computation, Neuroevolution, and NEAT.” **Burnett Honors College Summer Institute**, Orlando, FL, July 25, 2008.
- “NeuroEvolution of Augmenting Topologies (NEAT) Open Source Software.” **Second Open-Source Software for Applied Genetic and Evolutionary Computation (SoftGEC) Workshop, Genetic and Evolutionary Computation Conference (GECCO-2008)**, Atlanta, GA, July 12, 2008.

- Various Topics and Panels, **2007 DARPA Information Science and Technology (ISAT) study group**, Arlington, VA, Boston, MA, and Berkeley, CA (several meetings), Winter and Spring, 2007.
- “NeuroEvolution of Augmenting Topologies (NEAT) Open Source Software.” **Open-Source Software for Applied Genetic and Evolutionary Computation (SoftGEC) Workshop, Genetic and Evolutionary Computation Conference (GECCO-2007)**, London, U.K., July 7, 2007.
- “Multi-agent Evolution in The NERO Video Game.” **Evolutionary Computation and Multi-Agent Systems and Simulation (ECoMASS) Workshop, Genetic and Evolutionary Computation Conference (GECCO-2007)**, London, U.K., July 7, 2007.
- “Neural Networks and Evolutionary Computation in Video Games.” **Electronic Arts**, Vancouver, BC, Canada, June 18, 2007.
- “Practical Issues in Evolving Neural Network Controllers for Video Game Agents.” Invited tutorial for **IEEE Computational Intelligence and Games Symposium**, Honolulu, HI, April 1, 2007.
- “Neural Networks and Evolutionary Computation in Video Games.” **Electronic Arts**, Orlando, FL, February 1, 2007.
- “NERO.” **Google Zeitgeist Science Fair, Google Headquarters**, Mountain View, CA, October 3-5, 2006.
From Google’s description of Zeitgeist: “...over 400 of the world’s top business and creative minds will take an in-depth look at the signs of the times that impact arenas such as marketing, advertising, and technology.”
- “Real-time Neuroevolution of Augmenting Topologies for Interactive Simulations.” **Environmental Technics Corporation ADMS Innovation Center**, Orlando, FL, July 31, 2006
- “NERO.” **Burnett Honors College Summer Institute**, Orlando, FL, July 28, 2006
- “Complexification in Coevolution,” **AAAI Fall Symposium on Coevolutionary and Coadaptive Systems**, Arlington, Virginia, November 4, 2005.
- “Neuroevolution of an Automobile Crash Warning System,” **Toyota Higashifuji Technical Center**, Mishuku, Japan, September 27, 2005.
- “A Taxonomy of Developmental Systems,” **Scalable, Evolvable, Emergent Design and Developmental Systems (SEEDS) Workshop, Genetic and Evolutionary Computation Conference (GECCO-2005)**, Washington D.C, June 26, 2005.
- “NERO.” **Experimental Gameplay Workshop, Game Developers Conference (GDC 2005)**, San Francisco, CA, March 10, 2005
- “Complexification and Artificial Embryogeny.” **Crowley Davis Research Inc.**, Eagle, Idaho, December 7, 2004.
- “Applications of NeuroEvolution of Augmenting Topologies.” **Computer Science Department, University of Trondheim, Norway**, September 27, 2004.
- “Efficient Evolution of Neural Networks through Complexification.” **Cognitive Science Seminar Series, University of California, San Diego**, November 20, 2003.
- “Efficient Evolution of Neural Networks through Complexification.” **Computer Science Department, University of California, Los Angeles**, November 17, 2003.

“Competitive Coevolution of Complexifying Neural Networks for Video Games.” **2nd Annual Game Development Workshop on Artificial Intelligence, Interactivity, and Immersive Environments**, Austin, TX. August 21, 2003.

“Neuroevolution: Can Artificial Brains Be Evolved?” **Forum for Artificial Intelligence, University of Texas at Austin**. March 10, 2000.

Recognition and Awards

Nominated for Best Paper Award in Complex Systems (3 of 33 nominated), *Genetic and Evolutionary Computation Conference* (GECCO-2016, Denver, Colorado), for Morse, G. and Stanley, K., Simple Evolutionary Optimization Can Rival Stochastic Gradient in Neural Networks..

ACM Computing Reviews Editor’s Pick, January 25th, 2016, for the book *Why Greatness Cannot Be Planned: The Myth of the Objective* by Stanley, K. and Lehman, J.

IBM Research Distinguished Speaker, May 14th, 2015 at IBM-Almaden in San Jose, CA

Santa Fe Institute Sabbatical, 2014-2015

Best Poster Award at ALIFE 14 (out of 65 posters), *Fourteenth International Conference on the Synthesis and Simulation of Living Systems* (ALIFE XIV, New York, NY), for Soros, L. and Stanley, K., Identifying Necessary Conditions for Open-Ended Evolution through the Artificial Life World of Chromaria.

Best Paper Award in Artificial Life / Robotics / Evolvable Hardware Track at GECCO-2014 (out of 35 in track), *Genetic and Evolutionary Computation Conference* (GECCO-2014, Vancouver, Canada), for Woolley, B. and Stanley, K., A Novel Human-Computer Collaboration: Combining Novelty Search with Interactive Evolution.

2014 UCF Reach for the Stars Award, in recognition of highly successful research and creative activity accomplished by early-career university professionals.

One of 8 (out of 267) Best Paper Award Nominees, *12th European Conference on Artificial Life* (ECAL-2013, Taormina, Italy), for Szerlip, P. and Stanley, K., Indirectly Encoded Sodarace for Artificial Life.

2013 UCF CECS Dean’s Research Professorship Award, in recognition of research and mentorship.

UCF UPE (Honor Society for the Computing and Information Disciplines) Honorary Faculty Member Induction. Honorary/faculty selection is done by the UPE officers and UPE members. April 11, 2013.

One of 5 (out of 198) Best Paper Award Finalists, *2012 International Conference on Intelligent Robotics and Applications* (ICIRA 2012, Montreal, Canada), for D’Ambrosio, D., Goodell S., Lehman, J., Risi, S., and Stanley, K., Multirobot Behavior Synchronization through Direct Neural Network Communication.

Best Student Paper Award (out of 299 papers submitted with student first authors), *2012 International Joint Conference on Neural Networks* (IJCNN 2012, Brisbane, Australia), for Risi, R. and Stanley, K., A Unified Approach to Evolving Plasticity and Neural Geometry.

2011-2012 UCF Research Incentive Award (RIA), in recognition of outstanding research efforts.

ACM Distinguished Speaker, 2011–2014 (completed 3-year term).

Best Paper Award in Digital Entertainment Technologies and Arts (out of 21), *Genetic and Evolutionary Computation Conference* (GECCO-2011, Dublin, Ireland), for Hoover, A., Szerlip, P., and Stanley, K., Interactively Evolving Harmonies through Functional Scaffolding.

Nominated for Best Paper Award in Generative and Developmental Systems (2 of 20 nominated), *Genetic and Evolutionary Computation Conference* (GECCO-2011, Dublin, Ireland), for Risi, S. and Stanley, K., Enhancing ES-HyperNEAT to Evolve More Complex Regular Neural Networks.

Elected member of the Executive Committee of the ACM Special Interest Group for Genetic and Evolutionary Computation (ACM SIGEVO), 2011–2017.

2010-2011 UCF Teaching Incentive Program (TIP) Award, in recognition of outstanding teaching performance.

Best Paper Award in Generative and Developmental Systems (out of 20), *Genetic and Evolutionary Computation Conference* (GECCO-2010, Portland, OR), for Risi, S. and Stanley, K., Evolving the Placement and Density of Neurons in the HyperNEAT Substrate.

Nominated for Best Paper Award in Generative and Developmental Systems (4 of 20 nominated), *Genetic and Evolutionary Computation Conference* (GECCO-2010, Portland, OR), for Verbancsics, P. and Stanley, K., Task Transfer through Indirect Encoding.

Finalist, 2010 Indie Game Challenge (Las Vegas, NV), for the Galactic Arms Race Video Game created at UCF to demonstrate novel AI technology.
12 finalists chosen out of more than 250 independent games submitted.

Best Paper Award in Computational Intelligence and Games (out of 76), *IEEE 2009 Symposium on Computational Intelligence and Games* (CIG'09, Milan, Italy), for Hastings, E., Guha, R., and Stanley, K., Evolving Content in the Galactic Arms Race Video Game.

Best Paper Award in Artificial Life, Evolutionary Robotics, Adaptive Behavior, Evolvable Hardware (out of 42), *Genetic and Evolutionary Computation Conference* (GECCO-2009, Montreal, Canada), for Risi, S., Vanderbleek, S., Hughes, C., Stanley, K., How Novelty Search Escapes the Deceptive Trap of Learning to Learn.

Best AI in an Independent Game (Editor's Pick), *2009 AIGameDev.com Awards for Game AI* for the Galactic Arms Race Video Game.

DARPA Computer Science Study Panel (11 panelists selected for early career award, 2008).

Best Paper Award in Generative and Developmental Systems (out of 13), *Genetic and Evolutionary Computation Conference* (GECCO-2008, Atlanta, GA), for D'Ambrosio, D. and Stanley, K., Generative Encoding for Multiagent Learning.

Best Paper Award in Evolutionary Music and Art (out of 31), *Sixth European Workshop on Evolutionary and Biologically Inspired Music, Sound, Art and Design* (EvoMUSART 2008, Naples, Italy), for Hoover, A. and Stanley, K., Scaffolding for Interactively Evolving Novel Drum Tracks for Existing Songs.

Outstanding Graduate Teaching Award, presented to Kenneth O. Stanley on April 14, 2008 by the School of Electrical Engineering and Computer Science at the University of Central Florida.

Best Student Video Award, *Twenty-Second Conference on Artificial Intelligence (AAAI-07)*, for Balogh, J., Dubbin, G., Do, M., and Stanley K. (supervisor), Dance Evolution.

Nominated for Best Paper Award in Generative and Developmental Systems (3 out of 24 nominated), *Genetic and Evolutionary Computation Conference (GECCO-2007, London, UK)*, for D'Ambrosio, D. and Stanley, K., A Novel Generative Encoding for Exploiting Neural Network Sensor and Output Geometry.

Winner, Independent Games Festival Student Showcase, Middleware Category, 2006 Game Developers Conference (GDC'06, San Jose, CA), for the NERO video game. Recognizes "outstanding student-created independent PC games."

Best Paper Award in Computational Intelligence and Games (out of 54), *IEEE 2005 Symposium on Computational Intelligence and Games (CIG'05, Colechester, UK)*, for Stanley, K., Bryant, B., and Miikkulainen, R., Evolving Neural Network Agents in the NERO Video Game.

Best Paper Award in Genetic Algorithms (out of over 100), *Genetic and Evolutionary Computation Conference (GECCO-2002, New York, NY)*, for Stanley, K. and Miikkulainen, R., Efficient Reinforcement Learning Through Evolving Neural Network Topologies.

Teaching Assistant Service Commendation, Department of Computer Sciences, The University of Texas at Austin, December 1999

Tau Beta Pi National Engineering Honor Society, 1996-97

Vice President, Eta Kappa Nu Electrical Engineering and Computer Science Honor Society, University of Pennsylvania Chapter, 1996-97

Golden Key National Honor Society, 1996-97

Magna Cum Laude Graduate, University of Pennsylvania, 1997

Students Supervised

At University of Central Florida

Graduate Students Graduated:

- Paul Szerlip (Ph.D.; graduated August 2015). Dissertation Title: *Worldwide Infrastructure for Neuroevolution: A Modular Library to Turn Any Evolutionary Domain into an Online Interactive Platform.*
- Amy Hoover (Ph.D.; graduated August 2014). Dissertation Title: *Functional Scaffolding for Musical Composition: A New Approach in Computer-Assisted Music Composition.*
- Brian Woolley (Ph.D.; graduated August 2012). Dissertation Title: *Novelty-Assisted Interactive Evolution of Control Behaviors.*
- Joel Lehman (Ph.D.; graduated August 2012). Dissertation Title: *Evolution through the Search for Novelty.*

- Sebastian Risi (Ph.D.; graduated May 2012). Dissertation Title: *Towards Evolving More Brain-Like Artificial Neural Network*.
- Phillip Verbancsics (Ph.D.; graduated December 2011). Dissertation Title: *Effective Task Transfer through Indirect Encoding*.
- David D'Ambrosio (Ph.D.; graduated May 2011). Dissertation Title: *Multiagent Learning through Indirect Encoding*.
- Jason Gauci (Ph.D.; graduated December 2010). Dissertation Title: *Exploiting Geometry in Learning for Tactical and Strategic Decision Domains*.
- Erin Hastings (Ph.D.; co-advisor with Prof. Ratan Guha; graduated August 2009). Dissertation title: *Interactive Evolution of Computer Graphics Content*.
- Adelein Rodriguez (Masters; co-advisor with Prof. Annie Wu; graduated December 2007). Thesis title: *A NEAT Approach to Genetic Programming*.

Undergraduate Honors Students Graduated:

- Skyler Goodell (RAMP student; graduated 2013; won 2nd place in Showcase of Undergraduate Research Excellence (SURE) for entry on *Multirobot Behavior Synchronization through Hive Brain Neuroevolution*)
- Randal S. Olson (Honors in the Major Thesis; passed April 2010). Title: *A Step Toward Evolving Biped Walking Behavior Through Indirect Encoding*.
- Greg Dubbin (Honors in the Major Thesis; passed April 2009). Title: *Dance Evolution: Interactively Evolving Neural Networks to Control Dancing Three-Dimensional Models*.
- Amy Hoover (Honors in the Major Thesis; passed November 2008). Title: *NEAT Drummer: Computer-Generated Drum Tracks*.

Current Advising (Ph.D.):

- Jonathan Brant (graduation expected 2019).
- Navid Kardan (graduation expected 2018).
- Greg Morse (graduation expected 2018).
- Justin Pugh (graduation expected 2017).
- Lisa Soros (graduation expected 2017).

Visitors:

- Antonis Liapis (Spring 2013, Ph.D. student at ITU Copenhagen, Denmark)
- Andreas Lang (Fall 2012, undergraduate at University of Geneva)

Habilitation Reviewer and Committee Member for: Jean-Baptiste Mouret at INRIA (passed June 2015)

Dissertation Committee Member for: Abigail Fuentes (Dr. Lin), Rouhollah Rahmatizadeh (Dr. Boloni), Mahdi M. Kalayeh (Dr. Shah), Bo Kang (Dr. LaViola), Ping Ge (graduated 2016; Dr. Zhang), Haroon Idrees (graduated 2014; Dr. Shah), Jun Ding (Dr. Hu and Dr. Li), Yang Yang (graduated 2013; Dr. Shah), Hector Lugo-Cordero (Dr. Guha) Rizwan Ashraf (Dr. DeMara), Omar Oreifej (graduated 2013; Dr. Shah), Vladimir Reilly (graduated 2013; Dr. Shah), John Tanner (Dr. Gomez), Ruben

Ramirez Padron (Dr. Gonzalez), Nazar Khan (graduated 2013; Dr. Tappen), Syed Z. Masood (graduated 2012; Dr. Tappen), Gautham Anil (graduated 2012; Drs. Wu and Wiegand), Hansen Schwartz (graduated 2011; Dr. Gomez), Elena Erbiceanu (Dr. Hughes), Saad Ali (graduated 2007; Dr. Shah), Benjamin Inden (graduated 2007; I am external committee member for his Ph.D. under Peter F. Stadler at University of Leipzig, Germany), Victor Hung (graduated 2010; Dr. Gonzalez), Linus Luotsinen (graduated 2007; Dr. Boloni), Christopher Sentelle (graduated 2014; Dr. Georgipoulos) Gary Stein (graduated 2009; Dr. Gonzalez)

Masters Thesis Committee Member for: Hector Lugo-Cordero (graduated 2017; Dr. Guha), Heman Mohabeer (External, University of Mauritius, for transfer to Ph.D.)

Undergraduate Honors Thesis Committee Member for: Gary Williams (passed provisionally November 2008)

At the University of Texas at Austin (pre-faculty)

Co-supervised 4 senior undergraduate students (with Prof. Miikkulainen) and a team of undergraduate programmers:

- NERO Programming Team, 10/2003-12/2005. Over a dozen undergraduates worked on the NERO project as volunteer programmers under my supervision.
- Ryan Cornelius, since 9/2004.
Independent study project, *Initializing NEAT from a Finite State Machine*.
- Joseph Reisinger, 1/2003-5/2004.
Honors thesis project, *Modular NEAT*. Winner of a CRA Outstanding Undergraduate Awards Honorable Mention, a VIGRE grant from the Department of Mathematics, and a UROP award from the Department of Computer Sciences.
- Kennon Ballou, 5/2001-8/2001.
Independent study project, *Species-Specific Variable Mutation Rates in NEAT*.
- Timothy Andersen, 9/2001-5/2002.
Independent study project and Honors thesis project, *Neuro-Evolution through Augmenting Topologies Applied To Evolving Neural Networks To Play Othello*.

Teaching

Summary of Performance:

- Average percentage of students answering *Very Good* or *Excellent* on Overall Evaluation over whole UCF career: 95.4%
- Since tenure: 97.56%
- Awarded UCF TIP (teaching incentive program) Award (2010-2011) in recognition of outstanding teaching performance.
- Awarded Outstanding Graduate Teaching Award by School of Electrical Engineering and Computer Science (2008)

New Courses Developed:

- CAP 4053 AI for Game Programming (originally taught as Special Topics: AI for Game Programming in Spring 2008)

- CAP 6616 Neuroevolution and Generative and Developmental Systems

Note: On sabbatical at the Santa Fe Institute Fall 2014 and Spring 2015.

Graduate:

- Neuroevolution and Generative and Developmental Systems (CAP 6616; Fall 2015)
- Neuroevolution and Generative and Developmental Systems (CAP 6616; Fall 2013)
- Neuroevolution and Generative and Developmental Systems (CAP 6616; Fall 2012)
- Neuroevolution and Generative and Developmental Systems (CAP 6616; Fall 2010)
- Neuroevolution and Generative and Developmental Systems (CAP 6616; Fall 2009)
- Neuroevolution and Generative and Developmental Systems (CAP 6616; Fall 2008)
- Neuroevolution and Generative and Developmental Systems (CAP 6616; Fall 2007)
- Machine Learning (CAP 5610; Spring 2007)
- Special Topics in NeuroEvolution and Developmental Encoding (CAP 6938; Spring 2006, Fall 2006)

Undergraduate:

- AI for Game Programming (CAP 4053; Spring 2014)
- AI for Game Programming (CAP 4053; Spring 2012)
- AI for Game Programming (CAP 4053; Spring 2011)
- AI for Game Programming (CAP 4053; Spring 2010)
- AI for Game Programming (CAP 4053; Spring 2009)
- AI for Game Programming (CAP 4938 Special Topics; Spring 2008)
- Machine Learning II (EEL 4817; co-taught with Prof. Ronald DeMara and Prof. Michael Georgiopoulos; Spring 2007)
- Machine Learning I (EEL 4818; co-taught with Prof. Ronald DeMara and Prof. Michael Georgiopoulos; Fall 2006) Contributed 5 lectures.

Informal Seminars:

- *Evolutionary Complexity Research Group*, meeting most weeks since January 2006.

Other Educational Contributions

- **Educational Component of NSF Grant “RI: Small: Neuroevolution of Brain-Inspired Computational Models Over Vast Timescales”** (2014–2017) includes students from underrepresented groups in computer science research (3 undergraduates currently participating, 1 underrepresented, 1 high school student).
- **Educational Component of NSF Grant “Pilot: Assisted Musical Composition through Functional Scaffolding”** (2010-2013) included 5 undergraduate students from the music department between 2010–2013 in a computer science research experience integrating music with AI technology developed through the supporting grant (with assistance recruiting students from the UCF Music Department).

- **Guest Lecture** for Prof. Mason Cash's Philosophy of Cognitive Science class, February 11, 2014.
- **Educational Partnership with Electronic Arts (EA):** Visitors from EA spoke to my *AI for Game Programming* (CAP 4053) course in 2008 and 2009
- **Participating Faculty:** NSF Advances of Machine Learning in Theory & Applications (NSF AMALTHEA) Summer Program for Undergraduates at UCF (organized by Drs. Georgios C. Anagnostopoulos and Michael Georgiopoulos). (Summer 2008)
- **Guest Lecturer:** Burnett Honors College Summer Institute (2006, 2008)

Service and Professional Activities

Service to the Department, College, and University:

Note: During 2014-2015 sabbatical and 2016-2017 leave of absence ongoing university service was paused

Committees:

- Hiring Committee (2015-16),
- Cumulative Progress Evaluation Subcommittee for Assistant Professor (2016),
- Chair of CS Website Committee (2013),
- Faculty Research Council (University Level) (2011–2014),
- Research Incentive Award Committee (College Level) (2012-2013,2013-2014),
- Research Incentive Award Committee (University level) (2013-2014),
- CS Division Executive Committee (2012-2016),
- Annual Evaluation Standards Committee (2012),
- Graduate and Research Committee (2006–2009,2010–2014),
- Curriculum Oversight and Review Committee (2008-2012),
- Hillman Award Committee (2010),
- EECS IAB Awards Committee (2009),
- Intelligence Systems and Machine Learning Committee (2007–2011),
- Fellowship Committee for UCF I2 Lab Fellowship (2006).

Presentation to CS Senior Design (2016)

Proposal Reviewer for UCF PI (university and college programs to help PIs) (2015,2016)

Faculty Mentor for Prof. Petros Xanthopoulos (IEMS) (2014-)

Chosen by VP of Research and Commercialization to Join Meeting Group for External Consultants Reviewing University Research and Graduate Education (2016)

UCF Promotional Talks for Applying or Admitted Students:

- July 16, 2012: Showcase for underrepresented minority high school students: presentations and demos

- March 24, 2012: Scholar's Day Mini Lecture on "Evolving Artificial Brains on Computers" to admitted students
- December 17, 2011: Research Presentation on "The Evolutionary Complexity Research Group" to High School Students

Senior Design Reviewer for CPE (2009), EE (2010), CPE (2011), EE(2012), CPE and CS (2014,2016)

Service to the Profession:

Program Committee Member for

- *The Genetic and Evolutionary Computation Conference (GECCO-2017),*
- *NIPS 2017 Workshop on Continual Learning and Deep Networks*
- *The Thirtieth AAAI Conference on Artificial Intelligence (AAAI-2016),*
- *The Genetic and Evolutionary Computation Conference (GECCO-2016),*
- *The GECCO Virtual Creatures Competition (2016),*
- *ALIFE 16: The fifteenth international conference on the synthesis and simulation of living systems (ALIFE-2016),*
- *The Twenty-Eighth AAAI Conference on Artificial Intelligence (AAAI-2014),*
- *2014 IEEE Conference on Computational Intelligence and Games (CIG'14),*
- *ALIFE 14: The fourteenth international conference on the synthesis and simulation of living systems (ALIFE-2014),*
- *2013 IEEE Conference on Computational Intelligence and Games (CIG'13),*
- *12th European Conference on Artificial Life (ECAL-2013),*
- *2013 IEEE Congress on Evolutionary Computation (CEC-2013),*
- *The Genetic and Evolutionary Computation Conference (GECCO-2013),*
- *The Eighth Annual AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE-2012),*
- *The 13th International Conference on the Synthesis and Simulation of Living Systems (Alife-2012),*
- *The Genetic and Evolutionary Computation Conference (GECCO-2012),*
- *First Conference on Biologically Inspired Music, Sound, Art and Design (EvoMUSART-2012),*
- *2011 International Joint Conference on Neural Networks (IJCNN-2011),*
- *IEEE WCCI 2012 Special Session on Computational Intelligence and Games,*
- *The 24th International Florida Artificial Intelligence Research Society (FLAIRS-2011),*
- *2011 IEEE Conference on Computational Intelligence and Games (CIG'11),*
- *The Genetic and Evolutionary Computation Conference (GECCO-2011),*
- *The Twenty-Second International Joint Conference on Artificial Intelligence (IJCAI-2011),*
- *2011 IEEE Congress on Evolutionary Computation (CEC-2011),*
- *2010 IEEE Conference on Computational Intelligence and Games (CIG'10),*
- *The Eleventh International Conference on the Simulation of Adaptive Behavior (SAB-2010),*
- *The Genetic and Evolutionary Computation Conference (GECCO-2010),*

- *8th European Event on Evolutionary and Biologically Inspired Music, Sound, Art and Design (EvoMUSART 2009)*,
- *2009 IEEE Symposium on Computational Intelligence and Games (CIG'09)*,
- *Twenty-first International Joint Conference on Artificial Intelligence (IJCAI-09) Video Competition*,
- *Twenty-first International Joint Conference on Artificial Intelligence (IJCAI-09)*,
- *7th European Workshop on Evolutionary and Biologically Inspired Music, Sound, Art and Design (EvoMUSART 2009)*,
- *2009 IEEE Congress on Evolutionary Computation (IEEE CEC 2009) Special Session on Evolutionary Development*,
- *AAAI-08 AI Video Competition*,
- *2008 IEEE Symposium on Computational Intelligence and Games (CIG'08)*,
- *European Conference on Complex Systems (ECCS'07)*,
- *The Twenty-Second National Conference on Artificial Intelligence (AAAI-2007)*,
- *Fourth International Symposium on Neural Networks (ISSN 2007)*,
- *Genetic and Evolutionary Computation Conference (GECCO-2006)*,
- *Genetic and Evolutionary Computation Conference Complexity through Development and Self-Organizing Representations (CODESOAR) Workshop (2006)*,
- *AAAI Fall Symposium on Developmental Systems (2006)*,
- *Genetic and Evolutionary Computation Conference (GECCO-2005)*, and
- *Genetic and Evolutionary Computation Conference (GECCO-2004)*.

Reviewer for

- *Applied Soft Computing (2013)*,
- *Artificial Intelligence (2010)*,
- *Artificial Life (2004,2012)*,
- *BioSystems Journal (2001)*,
- *The Computer Journal (2010)*,
- *Book Chapter in Dagstuhl AI/CI in Games Seminar Follow-up Volume (Creative Commons license) (2013)*,
- *Evolutionary Computation (2010, three in 2012, two in 2013, 2014, two in 2015)*,
- *Evolutionary Intelligence (2008,2014)*,
- *Elsevier Applied Soft Computing (2013)*,
- *Genetic Programming and Evolvable Machines (2006 Special Issue on Developmental Systems, 2008, 2013, 2017)*,
- *IEEE Transactions on Computational Intelligence and AI in Games (twice in 2011,twice in 2016)*,
- *IEEE Transactions on Cybernetics (twice in 2015)*,
- *IEEE Systems, Man and Cybernetics - Part B (2003, 2007)*,

- *IEEE Transactions on Evolutionary Computation* (2003, 2005, 2006, 2008, 2009, 2010, 2012, 2013, 3 times in 2016, 3 times in 2017),
- *IEEE Transactions on Image Processing* (2006, 2007),
- *IEEE Transactions on Neural Networks* (2007),
- *Information Fusion Journal* (2004, 2005),
- *International Journal of Neural Systems* (2005),
- *Journal of Autonomous Agents and Multi-Agent Systems (JAAMAS)*, (2011, 2012, twice in 2014),
- *Journal of the Franklin Institute*, (2011),
- *JMLR* (2004, 2005, 2007),
- *Machine Learning* (2009),
- *Nature Communications* (2017),
- *Neural Computation* (2002, 2003),
- *Neural Networks* (2010, three times in 2011, 2012),
- *PLOS Computational Biology* (2014, 2015, 2016),
- *PLOS ONE* (two in 2013, twice in 2016),
- *Scholarpedia* (2016),
- Book Chapter in *Springer Book on Foundations of Computational Intelligence* (2008),
- Book Chapter in *Springer's Series in Studies in Computational Intelligence* (2007),
- *Theory in Biosciences* (2007,2015,2016).

Professional Societies:

- ACM SIGEVO (formerly ISGEC; since 2001)
- International Society for Artificial Life (ISAL; since 2009)
- American Association for Artificial Intelligence (since 2000)
- IEEE/IEEE Computational Intelligence Society (since 2011)

International Society for Artificial Life Merit Awards Committee Member 2016 and 2017.

Technical Committee Member of *IEEE CIS Technical Committee on Games* since 2011.

Technical Committee Vice Chair of *IEEE CIS Technical Committee on Games* 2011–2013.

Task Force Chair of *IEEE Task Force on Computational Intelligence in Video Games* 2007–2012.

Co-Chair of the *AAAI-2010 AI Video Competition*, held at AAAI-2010.

Workshop Co-Chair of the *Workshop on Procedural Content Generation in Games (PCG-2014)* at FDG 2014.

Workshop Co-Chair of the *Workshop on Procedural Content Generation in Games (PCG-2010)* at FDG 2010.

Senior Program Committee Member for the *Digital Games Research Association (DiGRA)* and the *Foundations of Digital Games conferences (FDG) joint conference (DiGRA/FDG-2016)*

Track Co-Chair of the *Artificial Life / Robotics / Evolvable Hardware Track* at the Genetic and Evolutionary Computation Conference (GECCO-2014).

Track Co-Chair and Co-Founder of the new *Generative and Developmental Systems Track* at the Genetic and Evolutionary Computation Conference (GECCO-2007, 2008, and 2009).

Organizer of the *Generative and Developmental Systems Tutorial* at the *Genetic and Evolutionary Computation Conference (GECCO 2008, 2009, 2010, 2012, 2013, 2014)*

Organizer of the *Evolving Neural Networks Tutorial* at the *Genetic and Evolutionary Computation Conference (GECCO 2012)*

Organizer of the *Generative and Developmental Systems Workshop* at the *Genetic and Evolutionary Computation Conference (GECCO 2009)*

Organizer of the *Practical Issues in Evolving Neural Network Controllers for Video Game Agents Tutorial* at the *IEEE Symposium on Computational Intelligence and Games (2007, 2009)*

Organizer of the *Advanced Coevolution Tutorial* (with Anthony Bucci, Edwin De Jong, Sevan Ficici, and Paul Wiegand) at the *Genetic and Evolutionary Computation Conference (GECCO, 2006 and 2007)*

Invited VIP Member of AIGameDev.com website for AI game programming community (2008)

Discussion Panels

- Understanding Coevolution Workshop, *Genetic and Evolutionary Computation Conference (GECCO-2002, New York, NY), July 2002.*
- Panel on Novel Uses of AI in Video Games, *2nd Annual Game Development Workshop on Artificial Intelligence, Interactivity, and Immersive Environments*, August, 2003. (Proposed a neuroevolution-based video game)
- Coevolution Discussion Forum, *Genetic and Evolutionary Computation Conference (GECCO-2005, Washington D.C.), June 2005.*

Task Force Member of *IEEE Task Force on Coevolution* since 2003

Editorial Service and Leadership in Scholarly Societies

Founder and Editor in Chief of aigameresearch.org, a peer-reviewed repository for AI-based research-related games.

Executive Committee of the ACM Special Interest Group for Genetic and Evolutionary Computation (ACM SIGEVO); elected in 2011 to six-year term.

Associate Editor of *Frontiers in Robotics and AI* (Evolutionary Robotics section) since 2015.

Associate Editor of *IEEE Transactions on Computational Intelligence and AI in Games* since 2008

Editorial Board (for 6 years) of *Evolutionary Computation Journal* 2010–2016.

Other External Professional Service Activities

International Society for Artificial Life Awards Committee in 2016

External Tenure and Promotion Letter Writer three times in 2016

Proposal Evaluator for Israel Science Foundation in 2017

NSF (Information and Intelligent Systems) Panelist in 2014

Proposal Evaluator for the United States- Israel Binational Science Foundation (BSF) in 2013

Proposal Evaluator for Czech National Science Foundation

Proposal Evaluator for French National Research Agency (ANR) in 2012

Proposal Evaluator for the Army Research Office (ARO) in 2011

European Research Area Network (ERA-NET) Complexity-NET Panelist in 2010

NSF (Information and Intelligent Systems) Panelist in 2009

DARPA ISAT Study Group in 2007

Early Professional Activities

Co-Chair of the *Forum for Artificial Intelligence* at the University of Texas at Austin. 1/2001-5/2002.
Planned and organized all aspects of talk series with invited speakers every two weeks.

Impact and Publicity

NEAT is the primary machine learning technique used to obtain **the most accurate measurement to date of the top quark at the Fermilab Tevatron particle accelerator**; reported in a top physics journal: T. Aaltonen, et al. (over 100 authors). Measurement of the top quark mass with dilepton events selected using neuroevolution at CDF. *Physical Review Letters* 102:152001 (2009).

NEAT is the featured method (given 54 pages) in the final chapter of the book: *AI Techniques for Game Programming*, by Mat Buckland, Premier Press, 2002.

19 publicly available software versions of NEAT have been produced by independent programmers:

- *Java NEAT* (released 6/02) by Ugo Vierucci, available at:
[http://www.cs.utexas.edu/users/nn/soft-view.php?RECORD_KEY\(Software\)=SoftID&SoftID\(Software\)=5](http://www.cs.utexas.edu/users/nn/soft-view.php?RECORD_KEY(Software)=SoftID&SoftID(Software)=5)
- *Windows NEAT* (released 9/02) by Mat Buckland, available at:
[http://www.cs.utexas.edu/users/nn/soft-view.php?RECORD_KEY\(Software\)=SoftID&SoftID\(Software\)=6](http://www.cs.utexas.edu/users/nn/soft-view.php?RECORD_KEY(Software)=SoftID&SoftID(Software)=6)
- *Matlab NEAT* (released 8/03) by Christian Mayr, available at:
[http://www.cs.utexas.edu/users/nn/soft-view.php?RECORD_KEY\(Software\)=SoftID&SoftID\(Software\)=23](http://www.cs.utexas.edu/users/nn/soft-view.php?RECORD_KEY(Software)=SoftID&SoftID(Software)=23)
- *Delphi NEAT* (released 1/04) by Mattias Fagerlund, available at:
<http://www.hypeskeptic.com/Mattias/DelphiNEAT/>
- *SharpNEAT* (released 4/04) by Colin Green, available at:
<http://sharpneat.sourceforge.net/>
- *ANJI: Another NEAT Java Implementation* (released 9/04) by Derek James and Philip Tucker, available at: <http://anji.sourceforge.net/>
- *NEAT4J* (released 9/06) by Matt Simmerson, available at: <http://neat4j.sourceforge.net/>

- *NEAT Python* (released 5/08) by Cesar G. Miguel and Carolina Feher da Silva, available at: <http://code.google.com/p/neat-python/>
- *Encog NEAT* (released 6/10) by Jeff Heaton Research, available at: <http://www.heatonresearch.com/encog>
- *ObjectiveNEAT* (released 1/12) by Ben Trehella, available at: <https://github.com/opposable/Objective-NEAT>
- *XNET NEAT* (released 2/12) by Michael Roberts, available at: <http://xstructure.github.com/xnet-public/>
- *MultiNEAT* (released 9/12) by Peter Chervenski, available at: <http://multineat.com/>
- *NEAT Visualizer SFML* (released 2/13) by Eric Laukien, available at: <http://sourceforge.net/projects/neatvisualizers/>
- *RubyNEAT* (released 4/13) by Fred Mitchell, available at: <http://rubyneat.com>
- *UnityNEAT* (released 9/14) by Daniel Jallo, available at: <https://github.com/lordjesus/UnityNEAT>
- *AccNEAT* (accelerated NEAT; released 10/14) by Sean Dougherty, available at: <https://github.com/sean-dougherty/accneat>
- *NEATEvolve.lua* (released 6/15) by SethBling, available at: <http://pastebin.com/ZZmSNaHX>
- *NEAT Go* (released 7/15) by Scott Hummer, available at: <https://github.com/rqme/neat>
- *NEAT-Ex* (released 12/15) by Stuart Hunt, available at: <https://gitlab.com/onnoowl/Neat-Ex>
- *NEAT-Lisp* (released 12/16) by Dmitrii Korobeinikov, available at: <https://github.com/meatich/NEAT>
- *Another NEAT Go* (released 1/17) by Jin Yeom, available at: <https://github.com/whitewolf-studio/neat>

Derek James founded (in August 2003) and continues to run an active **NEAT Users Group** (messages have been posted every month since inception) with over **600 registered members** from around the world at: <http://groups.yahoo.com/group/neat>

Over **100,000** NERO software downloads since 6/2005 (see <http://www.nerogame.org>)

Over **10,000** GAR software downloads since 7/2009.

An updated version of GAR later sold over **2,500 copies commercially**.

Interviews:

- 3/20/17: Quartz article, “Researchers are using Darwin’s theories to evolve AI, so only the strongest algorithms survive.” <https://qz.com/933695/researchers-are-using-darwins-theories-to-evolve-ai-so-only-the-strongest-algorithms-survive/>
- 2/6/17: Aidpreneur podcast with Stephen Ladek. <http://aidpreneur.com/tor146-how-ai-and-machine-learning-prove-the-journey-is-more-important-than-the-destination-with-dr-kenneth-stanley/>
- 1/6/16: Fox News 35 Orlando Morning News. Live interview on the future of AI.
- 12/28/15: The David Packman Show. “Should We Fear AI and Robotics?”
Video at <https://www.youtube.com/watch?v=3aT0e9SvWQM>
- 12/21/15: Reddit AMA (Ask Me Anything; about 1,000 points)
https://www.reddit.com/r/IAmA/comments/3xqcrk/im_ken_stanley_artificial_intelligence_professor/?sort=confidence
- 10/24/15: Computer Science Teacher’s Association (CSTA).
Interview text at <http://blog.csta.acm.org/2015/11/04/artificial-intelligence-art-and-collaboration-interview-with-dr-kenneth-stanley-ucf/>

- 3/28/15: PBS interview on Report from Santa Fe about our new book, *Why Greatness Cannot Be Planned: The Myth of the Objective*. Video available at:
<http://reportfromsantafe.com/episodes/view/293/ken-stanley-author-why-greatness-cannot-be-planned-the-myth-of-the-objective/>
- 3/24/15: Public Radio interview on Santa Fe Radio Cafe about our new book, *Why Greatness Cannot Be Planned: The Myth of the Objective*. Audio available at:
<http://www.santaferadiocafe.org/science/2015/03/24/ken-stanley/>
- 7/15/12: Live Online Video Interview on AIGameDev.com. Title: *PETALZ: Where Artificial Evolution Meets User-Generated Content*.
- April 2010 issue: Game Developer magazine (in print), volume 17, number 4. Interview on Galactic Arms Race on page 52.
- 2/19/10: G4TV (Cable TV Channel) about Galactic Arms Race. Video at:
http://g4tv.com/videos/44479/Indie_Game_Challenge_Awards_Part_3/
- 2/20/09: Central Florida Future. Interviewed for article on Galactic Arms Race.
- 12/11/08: aigamedev.com (AI for Game Development Website). Interviewed about our video game project, *Galactic Arms Race*, which evolves its own spaceship weapons systems. Transcript at: <http://aigamedev.com/interviews/galactic-arms-race>
- 9/30/06: biota.org (Artificial Life Community Website) Biota.org keeps an archive of recorded podcast interviews with prominent individuals in the artificial life community.
- 5/23/05: KXAN News Austin (channel 36) about NERO. Partial transcript posted on the web:
<http://www.kxan.com/Global/story.asp?S=3381601&nav=0s3caC93>

Press Coverage and Reviews of our 2015 book *Why Greatness Cannot Be Planned: The Myth of the Objective*:

- Harvard Business Review (HBR) 3/17/16:
<https://hbr.org/2016/03/how-overfocusing-on-goals-can-hold-us-back>
- ACM Computing Reviews 1/15/16:
http://www.computingreviews.com/review/review_review.cfm?review_id=144103&listname=highlight
- IEEE Spectrum 12/22/15:
<http://spectrum.ieee.org/at-work/innovation/planning-for-greatness>
- Genetic Programming and Evolvable Machines review December 2015 issue:
<http://link.springer.com/article/10.1007%2Fs10710-015-9250-8>
- Leonardo review August 2015 issue:
<http://leonardo.info/reviews/aug2015/stanley-vlader.php>
- FiveThirtyEight major national media coverage 7/23/15:
<http://fivethirtyeight.com/features/stop-trying-to-be-creative/>
- Journal of Humanistic Mathematics review July 2015 issue:
<http://scholarship.claremont.edu/cgi/viewcontent.cgi?article=1286&context=jhm>
- PBS interview on Report from Santa Fe 3/28/15:
<http://reportfromsantafe.com/episodes/view/293/ken-stanley-author-why-greatness-cannot-be-planned-the-myth-of-the-objective/>
- Public Radio Interview on Santa Fe Radio Cafe 3/24/15:
<http://www.santaferadiocafe.org/science/2015/03/24/ken-stanley/>

Press Coverage of *Evolvability is Inevitable: Increasing Evolvability Without the Pressure to Adapt* by Joel Lehman and Kenneth O. Stanley, in PLoS ONE journal. (This article generated significant media interest in April 2013.)

- Top story at Science Daily (claims 16 million hits per month) 4/26/13: “Computer Scientists Suggest New Spin On Origins of Evolvability: Competition to Survive Not Necessary?”
<http://www.sciencedaily.com/releases/2013/04/130426115612.htm>
- Phys.org 4/26/13: “Computer scientists suggest new spin on origins of evolvability.”
<http://phys.org/news/2013-04-scientists-evolvability.html>
- i09.com 4/29/13: “Can evolution still happen without competition?”
<http://io9.com/can-evolution-still-happen-without-competition-484353547>
- KurzweilAI 4/30/13: “A new spin on origins of evolvability: survival of the evolvable.”
<http://www.kurzweilai.net/a-new-spin-on-origins-of-evolvability-survival-of-the-evolvable>

HyperNEAT Press Coverage:

HyperNEAT, an algorithm for evolving large-scale neural networks that I co-invented, is mentioned in the following articles:

- The UK Telegraph (Telegraph.co.uk) 8/6/10: “Computer-simulated life forms evolve intelligence.”
<http://www.telegraph.co.uk/science/evolution/7928804/Computer-simulated-life-forms-evolve-intelligence.html>
- NewScientist.com 8/4/10: “Artificial life forms evolve basic intelligence.”
<http://www.newscientist.com/article/mg20727723.700-artificial-life-forms-evolve-basic-intelligence.html?full=true>

Galactic Arms Race received worldwide media coverage after its release:

- Slashdot 7/8/09: “Experimental Video Game Evolves Its Own Content.”
<http://games.slashdot.org/story/09/07/08/1419242/Experimental-Video-Game-Evolves-Its-Own-Content>
- Gamasutra 7/27/09: “Analysis: The Game Design Lessons Of Permadeath.”
http://www.gamasutra.com/php-bin/news_index.php?story=24468
- All Your Game Are Belong to Us 7/31/09: “GAR Galactic Arms Race.”
<http://allyougamearebelongtous.blogspot.com/search/label/shooters>
- Armchair Arcade 7/12/09: “Applying evolutionary algorithms to gameplay to increase variety.”
<http://armchairarcade.com/neo/node/2741>
- Crispy Gamer 7/8/09: “Galactic Arms Race: changing content generation in online games.”
<http://www.crispygamer.com/news/index.php/2009-07-08/galactic-arms-race-changing-content-generation-in-online-games/>
- Offworld 7/9/09: “Thinking: Galactic Arms Race, ‘Space Diablo’ with AI-designed, evolving weapons.”
<http://www.offworld.com/2009/07/its-thinking-galactic-arms-rac.html>
- Blue’s News 7/9/09: “The Evolving Galactic Arms Race.”
<http://www.bluesnews.com/s/99826>
- Central Florida Future 2/19/09: “Student develops NEAT video game.”
<http://www.centralfloridafuture.com/student-develops-neat-video-game-1.1487037>

- PC Games Hardware (German) 7/9/09: “Revolution oder Evolution: Galactic Arms Race von US-Forschern.”
<http://www.pcgameshardware.de/aid,689544/Revolution-oder-Evolution-Galactic-Arms-Race-von-US-Forschern/Spiele/News/>
- PC Games (German) 7/9/09: “Galactic Arms Race: Revolutionieren US-Forscher die Welt der Computerspiele?”
<http://www.pcgames.de/aid,689464/Galactic-Arms-Race-Revolutionieren-US-Forscher-die-Welt-der-Computerspiele/PC/News/>
- Le Monde (French) 12/9/09: “Des jeux video sur mesure.”
http://www.lemonde.fr/technologies/article/2009/12/09/des-jeux-video-sur-mesure_1277579_651865.html

NERO received worldwide media coverage after its release:

- Slashdot 6/27/05: “AI researchers produce new kind of PC game.”
<http://games.slashdot.org/article.pl?sid=05/06/27/2129214&tid=206&tid=10>
- GarageGames News 6/27/05: “University of Texas uses Torque for AI game experiment.”
<http://www.garagegames.com/news/8129>
- Gamasutra 7/12/05: “Round-Up: NERO Fiddles, Germans Write, Pixel Corps.”
http://www.gamasutra.com/php-bin/news_index.php?next=5926&st=6927
- University of Texas Dept. of Computer Sciences Promotional Media, 6/2005: “Meet Dr. Kenneth Stanley and his virtual robots who learn.”
http://oea.cs.utexas.edu/imagine/ken_stanley/index.html
- University of Texas Featured Project 7/21/05: “Neural networks research produces NERO, a game in which characters get smarter.”
<http://www.utexas.edu/research/projects/nero.html>
- MIT Technology Review Blog by Brad King 6/28/05: “UT Game Group Unveils AI Project.”
http://king.trblogs.com/archives/2005/06/ut_game_group_u.html
- American Assoc. for Artificial Intelligence (AAAI) video games page: Untitled paragraph on NERO.
<http://www.aaai.org/AITopics/html/video.html>
- Generation5 6/25/05: “NeuroEvolving Robotic Operatives (NERO).”
<http://www.generation5.org/news.asp?Action=Full&ID=766>
- MSNBC Blog 6/30/05: “What are friends for?” Article mentions NERO.
<http://www.msnbc.msn.com/id/8382695/>
- Nano News Press Releases 6/29/05: “The New Genre of Video Games.”
<http://www.thenanotechnologygroup.org/index.cfm?Content=88&PressID=194>
- Belgium; Tweakers.net 6/28/05: “Wetenschappers ontwikkelen nieuw computerspel.”
<http://www.tweakers.be/nieuws/37837?t=1119994875>
- France; ZDNet “Innovons” Blog 6/28/05: “NERO.”
<http://blogs.zdnet.fr/index.php/2005/06/28/nero/>
- Germany; Computer Magazine “ct” (in print) 7/2005: “Intelligenter spielen für die Wissenschaft (Playing more intelligently for science),” p.59.
<http://www.heise.de/ct/>
- Germany; PC Action Magazine (in print) 9/2005: “NERO,” p.128.
<http://www.pcaction.de/>

- Germany; 4players.de 6/28/05: “Nero macht euch zum Militar-Ausbilder.”
http://www.4players.de/4players.php/dispnews/PC-CDROM/Aktuelle_News/43212.html
- Germany; Golem.de IT News 6/28/05: “Spiel von KI-Forschern: Roboter ausbilden und kmpfen lassen.”
<http://www.golem.de/0506/38899.html>
- Germany; Windows mobile News 6/30/05: “NERO: Neuro Evolving Robotic Operatives.”
<http://www.pocketpc-salzburg.at/modules.php?name=AvantGo&file=print&sid=742>
- Hungary; Tech-tudomány 6/28/05: “Neveljen robothadsereget!”
<http://index.hu/tech/szoftver/nero0628/>
- Latvia; Fizmati 6/29/05: “Studenti rada jauna tipa speli.”
http://www.fizmati.lv/zinas/datorika/studenti_rada_jauna_tipa_speli/
- Netherlands; Gamer.nl 7/3/05: “Train kunstmatige intelligentie in gratis RTS NERO.”
<http://www.gamer.nl/nieuws/26841>
- Portugal; Nogome 7/2005: “Project NERO: jogos.”
<http://www.nogome.com/nogome/archives/001130.php>
- Russia; All-Games.ru 7/4/05:
<http://www.all-games.ru/news/2005/07/04/nn6892.html>
- Russia; IGROMANIA (in print) 8/2005:
<http://www.igromania.ru/>
- UK; Games Digest 7/2005: “AI researchers show off new game type.”
http://www.games-digest.com/2005/07/ai_researchers_.html
- UK; Guardian Unlimited Blog 6/28/05: “New game genre invented by boffins?”
http://blogs.guardian.co.uk/games/archives/2005/06/28/new_game_genre_invented_by_boffins.html#more
- UK; Personal Computer World 7/1/05: “Gaming revolution as players train computers.”
<http://www.pcw.co.uk/vnunet/news/2139176/games-artificial-intelligence>

Software Released

Real-Time Autoencoder-Augmented Hebbian Learning (RAAHN) includes source code for the algorithm and a driving simulator for real-time experimentation. The algorithm is from the 2016 ALIFE paper, *Fully Autonomous Real-Time Autoencoder-Augmented Hebbian Learning through the Collection of Novel Experiences*. Supervised (with help from Ph.D. student Justin Pugh) the creation of software package by Joshua Bowren (Undergraduate Student).
Available at: <http://eplex.cs.ucf.edu/software.html>

Limited Evaluation Evolutionary Algorithm (LEEA). Includes C# implementation of the algorithm from the 2016 best-paper-nominated 2016 GECCO paper, *Simple Evolutionary Optimization Can Rival Stochastic Gradient Descent in Neural Networks*. Code is included for experiments in three different domains. Released Summer 2016. Supervised the creation of software package by Greg Morse (Ph.D. Student).
Available at: <http://eplex.cs.ucf.edu/software.html>

Unsupervised Feature Learning through Divergent Discriminative Feature Accumulation includes an implementation of the DDFA algorithm that was introduced in the 2015 AAAI paper, *Unsupervised*

Feature Learning through Divergent Discriminative Feature Accumulation. The algorithm is implemented in C# and the package contains experiments for both the MNIST and CIFAR-100 domains. Released Spring 2015. Supervised creation of software package by Greg Morse, Paul Szerlip, and Justin Pugh (Ph.D. Students).

Available at: <http://eplex.cs.ucf.edu/software.html>

Quality Diversity Maze Simulator contains a maze simulator designed for experiments to test quality diversity (QD) algorithms. Experimental setups are included. Released Spring 2015. Supervised creation of software package by Justin Pugh (Ph.D. Student).

Available at: <http://eplex.cs.ucf.edu/software.html>

Indirectly Encoded Sodarace (IESoR) in Javascript/C# contains code for interacting with a custom environment for evolved two-dimensional creatures. The code is lightweight, allowing users to browse evolved creatures directly through their web browser. Released Summer 2013. Supervised creation of software package by Paul Szerlip (Ph.D. Student). Available at: <http://eplex.cs.ucf.edu/software.html>

Quadruped Environment C# includes an ODE-based quadruped simulator and experiments with three different HyperNEAT-based neural architectures for control of the quadruped. One of these experiments is based on a new type of neuron called a Single-Unit Pattern Generator. Released Spring 2013. Supervised creation of software package by Gregory Morse (Ph.D. Student). Available at: <http://eplex.cs.ucf.edu/software.html>

ES-HyperNEAT C# is a public implementation of the evolvable-substrate HyperNEAT (ES-HyperNEAT) algorithm in C#. It is built upon the HyperSharpNEAT-Compatible Multiagent Simulator and Experimental Platform. ES-HyperNEAT is an extension of the original HyperNEAT method for evolving large-scale artificial neural networks. While in the original HyperNEAT the human user had to decide the placement and number of hidden neurons, ES-HyperNEAT can determine the proper density and position of hidden neurons entirely on its own while still preserving the advances introduced by the original HyperNEAT. Released Spring 2012. Supervised creation of software package by Sebastian Risi (Ph.D. Student). Available at: <http://eplex.cs.ucf.edu/software.html>

MaestroGenesis generates musical accompaniment for existing MIDI compositions through a breeding process similar to animal breeding. The result is that amateur musicians and non-musicians can create accompaniment without any musical expertise. The algorithm inside MaestroGenesis is called Functional Scaffolding for Musical Composition (FSMC), which builds on a prior approach called NEAT Drummer. Released Spring 2012. Supervised creation of software package by Paul Szerlip and Amy Hoover (Ph.D. Students). Available at: <http://eplex.cs.ucf.edu/software.html#maestrogenesis>

Retina Problem with HyperNEAT C# contains a C# implementation of the Retina Left and Right problem (introduced by Clune et al.), a HyperNEAT in C# library that includes an implementation of the Link Expression Output (LEO), and a visualizer for the Retina Left and Right solutions produced by HyperNEAT. Released Spring 2011. Supervised creation of software package by Phillip Verbancsics (Ph.D. Student). Available at: <http://eplex.cs.ucf.edu/software.html>

OctopusArm Simulator and Experimental Platform extends the ANJI neuroevolution platform to support the evolution of connective CPPNs through HyperNEAT that describe the connectivity pattern of the scaleable octopus arm controller ANN. Also can simulate a multi-segment octopus arm for testing with other methods. Released Spring 2011. Supervised creation of software package by Brian Woolley (Ph.D. Student). Available at: <http://eplex.cs.ucf.edu/software.html#OctopusArm>

HyperSharpNEAT-Compatible Multiagent Simulator and Experimental Platform is an extensible single- and multiagent experimental platform. It contains an updated implementation of HyperSharpNEAT that is a modification of the SharpNEAT package by Colin Green. The package includes an implementation of the room-clearing experiments described in our AAMAS 2010 paper. Released Fall 2010. Supervised creation of software package by David D'Ambrosio, Joel Lehman, and Sebastian Risi (all Ph.D. students) as part of DARPA-funded project. Available at:
<http://eplex.cs.ucf.edu/software.html#multiagentSim>

Keepaway HyperNEAT C# software is a unique version of HyperNEAT written in C# that includes a RoboCup Keepaway experiment and a new version of the classic RoboCup server written also in C# for maximum training speed. Released Summer 2010. Supervised creation of software package by Phillip Verbancsics (Ph.D. student). Available at: <http://eplex.cs.ucf.edu/software.html#keepaway>

Galactic Arms Race (GAR) video game demonstrates novel AI technology invented at UCF called content-generating NEAT (cgNEAT). Released July 2009. The game generates its own new content (particle system weapons) based on player actions. Research on GAR won three awards (listed below). Available at: <http://gar.eecs.ucf.edu/>

- **Finalist, 2010 Indie Game Challenge** (Las Vegas, NV), 12 finalists chosen out of more than 250 independent games submitted.
- In 2010, undergraduate student Derek Janssen, who contributed to the GAR project, won a \$50,000 scholarship to the Guildhall video game Masters program based on his contributions to GAR (see press release at <http://www.smu.edu/News/2010/guildhall-scholarship-winner-25may2010.aspx>).
- **Best AI in an Independent Game (Editor's Pick)**, 2009 *AIGameDev.com Awards for Game AI*.
- **Winner of the Best Paper Award in Computational Intelligence and Games at CIG-2009** (out of 76 submissions).

Novelty Search C++ software implements the novelty search algorithm introduced by Joel Lehman and Kenneth O. Stanley. Released Spring 2008. Supervised creation of software package by Joel Lehman (Ph.D. student). Available at:
<http://eplex.cs.ucf.edu/software.html#noveltysearch>

HyperSharpNEAT (Hypercube-based NeuroEvolution of Augmenting Topologies software extended from Colin Green's original SharpNEAT source code). Released Winter 2007. Last update (v1.0) December 2007. Supervised creation of software package by David D'Ambrosio (Ph.D. student). Available at: http://eplex.cs.ucf.edu/index.php?option=com_content&task=view&id=17&Itemid=32

Dance Evolution software for interactively evolving three-dimensional dancers that can dance to MIDI songs. Released November 2007. Supervised creation by three undergraduates: Greg Dubbin, Jeff Balogh, and Michael Do. Available at:
http://eplex.cs.ucf.edu/dance_evolution/

Picbreeder website for collaborative interactive evolution of images. Released August 2007. Continually updated. Supervised creation interactive online service by team of five graduate students: Jimmy Secretan, Nick Beato, Adam Campbell, David D'Ambrosio, and Adelein Rodriguez. Available at:
<http://picbreeder.org>

HyperNEAT (Hypercube-based NeuroEvolution of Augmenting Topologies) software for evolving highly complex large-scale neural networks. Released Spring 2007. Last update (v1.0) April 2007. Supervised creation of software package by Jason Gauci (Ph.D. student). Available at: http://eplex.cs.ucf.edu/index.php?option=com_content&task=view&id=17&Itemid=32

NEAT Particles software for interactively evolving particle effects for movies, video games, and simulations. Released Spring 2007. Last update (v1.0) April 2007. Supervised creation of software package by Erin Hastings (Ph.D. student). Available at: http://eplex.cs.ucf.edu/index.php?option=com_content&task=view&id=17&Itemid=32

rtNEAT (Real-time NeuroEvolution of Augmenting Topologies) Software for evolving neural network topologies and weights in real-time interactive games and simulations. Released Spring 2006. Available at: <http://www.cs.utexas.edu/users/nn/keyword?rtNEAT>

NERO (NeuroEvolving Robotic Operatives) video game software using real-time NEAT (rtNEAT) as its core AI technology. The player can train virtual robots to perform tasks in real time. Released June 2005. Available at: <http://www.nerogame.org>

Winner, Independent Games Festival Student Showcase, Middleware Category, 2006 Game Developers Conference (GDC'06, San Jose, CA), recognizes "outstanding student-created independent PC games."

NEAT (NeuroEvolution of Augmenting Topologies) software for evolving neural network topologies and weights. Released Summer 2001. Last update (v1.1) July 2002. Available at: [http://www.cs.utexas.edu/users/nn/soft-view.php?RECORD_KEY\(Software\)=SoftID&SoftID\(Software\)=4](http://www.cs.utexas.edu/users/nn/soft-view.php?RECORD_KEY(Software)=SoftID&SoftID(Software)=4)