Jason Yosinski

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San Francisco, CA, USA

EDUCATION

PhD in Computer Science   *2010 – 2016*
Cornell University (GPA 4.0/4.0)

B.S. in Mechanical Engineering, Minor in Control and Dynamical Systems   *2002 – 2006*
California Institute of Technology (GPA 3.8/4.0)

AWARDS, GRANTS, AND FELLOWSHIPS

- Best Student Video, AAAI Video Competition, 2016
- Best Paper, Genetic and Evolutionary Computation Conference, 2015
- CVPR Community Top Paper. $3,000 cash prize, 2015
- Winner: Best Long Video & Most Educational Video, IJCAI 2015 Video competition
- NASA Space Technology Research Fellowship, 2013 – 2015. $272,000
- Co-author of funded NSF Grant "Deep Learning UASs for High-Throughput Agricultural Disease Phenotyping," 2015. $1,100,000
- Best Poster, Artificial Life 13, the Humanities and ALife track
- Best Presentation, Artificial Life 13, Behavior and Intelligence track
- Co-author of funded DARPA grant "Matter Compiler: Visual Interaction for Rapid Exploratory Design for Manufacturing." $824,063
- Creator of first robotic entity to be interviewed on NPR
- AAAI Video Award 2012 Finalist
- NVIDIA Graduate Fellowship Finalist
- NSF Invited Attendee to International Joint Conference on Neural Networks (IJCNN)
- Cornell Graduate Student Conference Grant (ICML 2011, NIPS 2014)
- NSF Graduate Research Fellowship, Honorable Mention, 2010 and 2011
- EndlessForms.com voted one of the top 35 websites in the 3D printing industry
- Finalist in the Evolutionary Art Competition (one of four), Genetic and Evolutionary Computation Conference, 2011
- Runner up for best demo: Human Robot Collaboration using Micro-delegation, Cornell Robot Learning class, 2011
- "Outstanding Platform Presentation" Award at Chemical and Biological Defense Science and Technology Conference (2.5%)
- Study abroad at Cambridge University, 2006
- Caltech Summer Undergraduate Research Fellowship, 2005

- Member of Freshman Admissions Committee at Caltech, 2004
- Robert C. Byrd Honors Scholarship, 2002

WORK AND TEACHING

Windscape AI — Co-founder and CEO *February 2022 – present*
- Led team to develop sensing hardware, firmware, packet protocols, backend software, and machine learning models to enable turbine operations optimization.
- Raised round of funding from angels and VCs
- Interfaced with pilot customers to deploy and evaluate product

ML Collective — Co-founder and President *June 2020 – present*
- Organized research group meetings and research jams with hundreds of participants
- Co-hosted social events at NeurIPS, ICLR, and ICML conferences with hundreds of attendees
- Ran MLC Discord server with 3700+ members
- Obtained and distributed compute grant from Google

Adviser and Angel Investor *June 2017 – present*
- Invested in and/or advised seven early stage ML companies

Recursion Pharmaceuticals — Scientific Adviser and Investor *June 2017 – present*
- Helped define ML strategy and execution
- Helped develop ML pipeline leading to multiple targets in clinical trials and company IPO in April 2021

Uber AI Labs — Founding team, Researcher, Manager *March 2016 – June 2020*
- Helped start new AI research org within Uber and grow team from 14 to 120+
- Started and co-led the Deep Collective research group, publishing multiple patents and papers in the top three ML conferences
- Started AI Residency program, leading to 15+ hires across US and Canada

Geometric Intelligence — VP of Machine Learning *March 2016 – December 2016*
- Developed new machine learning models
- Demonstrated tech to Uber leading to acquisition

Google DeepMind – Intern *Summer 2015*
- Worked on various projects with Deep Learning and Robotics teams

NASA/Caltech Jet Propulsion Laboratory – Visiting Fellow *Summer 2014, Spring 2015*
- Developed Deep Visualization Toolbox
- Gave Deep Learning tutorial to machine learning group
- **Advised on how to adapt neural networks for use on various projects**

Cornell University – Head Teaching Assistant *Fall 2011*

- Head TA for Foundations of Artificial Intelligence, enrollment ~85
- Held review sessions, organized class competition
- Won Outstanding TA Award

Eliot Middle School – Robotics Program Founder *September 2009 – June 2010*
- Started a pilot robotics program in the Pasadena Unified School District by partnering with a middle school Algebra I teacher, assisted by Pasadena Education Foundation grant
- Taught class of 38 eighth graders two days a week as an unpaid volunteer, advised similar programs in other schools
- Designed lesson plans, homework, and worksheets from scratch; set up http://EliotRobotics.com/ to document and serve as a template for future classes
- Designed and co-hosted final puzzle competition for several Pasadena schools; Competition shown on KLRN-TV, see http://pefstem.org/ for sample
- Program mentioned in the Pasadena Star News and on NPR, has received additional funding to allow 500+ students to participate in the 2010 – 2013 school years.

Mink Labs – Co-founder *March 2008 – June 2009*
- Co-founded startup – Mink Labs LLC – with two other Caltech classmates
- Invented and coded Voicebeep, an asynchronous voice messaging service available via browser or iPhone app, peak of about 500 users
- Wrote and submitted patent for associated server-side technology

Numerica Corporation – Research Scientist *March 2007 – April 2010*
- Invented estimator for compressive sensing with orders of magnitude lower error bounds, nearly meeting Cramér-Rao bound, resulting in paper and further funding
- Designed novel distributed database inspired algorithm for decentralized fusion of sensor data over lossy networks, presented paper on same at SPIE Optics + Photonics 2008
- Principle Investigator for completely new area – chemical/biological sensor fusion. Work resulted in award of several additional grants and conference paper
- Work awarded "Outstanding Platform Presentation" at Chemical and Biological Defense Science and Technology Conference

Caltech DARPA Grand Challenge Team *March 2004 – June 2006*
- Invented novel, accurate terrain difficulty sensor employing an Inertial Measurement Unit
- Designed and integrated path generation module with dynamic feasibility checking
- Designed, coded, and debugged many other modules, individually and via collaboration
- Taught classes on Linux and Subversion for new team members; often advised others on Linux, C++, build system, data logging, interfaces, and other issues
- Authored second most lines of code among 25 team members
- Completed Senior Thesis on one of first LADAR-based road tracking algorithms

PUBLICATIONS

For a complete, up to date list of publications and citations, see Google Scholar at https://scholar.google.com/citations?user=gxL1qj8AAAAJ

1. M Wortsman, V Ramanujan, R Liu, A Kembhavi, M Rastegari, J Yosinski, Ali Farhadi. "Supermasks in superposition." Advances in Neural Information Processing Systems (NeurIPS) 2020.

2. A Edwards, H Sahni, R Liu, J Hung, A Jain, R Wang, A Ecoffet, T Miconi, C Isbell, J Yosinski. "Estimating q (s, s') with deep deterministic dynamics gradients." International Conference on Machine Learning (ICML) 2020.

3. S Dathathri, A Madotto, J Lan, J Hung, E Frank, P Molino, J Yosinski, R Liu. "Plug and play language models: A simple approach to controlled text generation". International Conference on Representation Learning (ICLR) 2020.

4. R Turner, J Hung, E Frank, Y Saatchi, J Yosinski. "Metropolis-Hastings Generative Adversarial Networks." International Conference on Machine Learning (ICML) 2019.

5. SJ Greydanus, M Dzumba, J Yosinski. Hamiltonian Neural Networks. Advances in Neural Information Processing Systems (NeurIPS) 2019.

6. J Lan, R Liu, H Zhou, J Yosinski. "LCA: Loss Change Allocation for Neural Network Training". Advances in Neural Information Processing Systems (NeurIPS) 2019.

7. H Zhou, J Lan, R Liu, J Yosinski. "Deconstructing Lottery Tickets: Zeros, Signs, and the Supermask." Advances in Neural Information Processing Systems (NeurIPS) 2019.

8. R Liu, J Lehman, P Molino, FP Such, E Frank, A Sergeev, J Yosinski. "An intriguing failing of convolutional neural networks and the CoordConv solution." Advances in Neural Information Processing Systems (NeurIPS) 2018.

9. C Li, H Farkhoor, R Liu, J Yosinski. "Measuring the intrinsic dimension of objective landscapes." Advances in Neural Information Processing Systems (NeurIPS) 2018.

10. L Gueguen, A Sergeev, B Kadlec, R Liu, J Yosinski. "Faster neural networks straight from jpeg." Advances in Neural Information Processing Systems (NeurIPS) 2018.

11. C DeChant, T Wiesner-Hanks, S Chen, E Stewart, J Yosinski, M Gore, R Nelson, H Lipson. "Automated identification of northern leaf blight-infected maize plants from field imagery using deep learning." Journal of Phytopathology, Volume 107, Issue 11, 2017.

12. N Laptev, J Yosinski, LE Li, S Smyl. "Time-series extreme event forecasting with neural networks at Uber." International conference on machine learning (ICML) Time Series workshop, 2017.

13. M Raghu, J Gilmer, <u>J Yosinski</u>, J Sohl-Dickstein. "SVCCA: Singular Vector Canonical Correlation Analysis for Deep Learning Dynamics and Interpretability." Advances in Neural Information Processing Systems 30 (NIPS) 2017.

14. A Nguyen, J Clune, Y Bengio, A Dosovitskiy, <u>J Yosinski</u>. "Plug & Play Generative Networks: Conditional Iterative Generation of Images in Latent Space." IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2017.

15. Anh Nguyen, Alexey Dosovitskiy, <u>J. Yosinski</u>, Thomas Brox, and Jeff Clune. "Synthesizing the preferred inputs for neurons in neural networks via deep generator networks." Advances in Neural Information Processing Systems 27 (NIPS '16).

16. Yixuan Li, <u>J. Yosinski</u>, Jeff Clune, Hod Lipson, and John Hopcroft. "Convergent Learning: Do different neural networks learn the same representations?" International Conference on Learning Representations (ICLR). 3 May 2016.
NIPS Workshop Oral Presentation (6.7%), ICLR Oral Presentation (5.7%).

17. Sina Honari, <u>J. Yosinski</u>, Pascal Vincent, and Christopher Pal. "Recombinator Networks: Learning Coarse-to-Fine Feature Aggregation." Computer Vision and Pattern Recognition (CVPR) 2016.

18. Anh Nguyen, <u>J. Yosinski</u>, and Jeff Clune. "Innovation Engines: Automated Creativity and Improved Stochastic Optimization via Deep Learning." Proceedings of the Genetic and Evolutionary Computation Conference (GECCO). 11 July 2015.
Best Paper Award.

19. <u>J. Yosinski</u>, Jeff Clune, Anh Nguyen, Thomas Fuchs, and Hod Lipson. Understanding Neural Networks Through Deep Visualization. Deep Learning Workshop, International Conference on Machine Learning (ICML). 10 July 2015.

20. Harm de Vries and <u>J. Yosinski</u>. Can deep learning help you find the perfect match?. Deep Learning Workshop, International Conference on Machine Learning (ICML). 9 July 2015.

21. Anh Nguyen, <u>J. Yosinski</u>, and Jeff Clune. "Deep Neural Networks are Easily Fooled: High Confidence Predictions for Unrecognizable Images." The IEEE Conference on Computer Vision and Pattern Recognition (CVPR). 8 June 2015. (also previously on arXiv).
Oral Presentation (3.3%), CVPR 2015 Community Top Paper Award.

22. Guillaume Alain, Yoshua Bengio, Li Yao, <u>J. Yosinski</u>, Eric Thibodeau-Laufer, Saizheng Zhang, and Pascal Vincent. "GSNs: Generative Stochastic Networks." Information and Inference 2016; doi: 10.1093/imaiai/iaw003.

23. Harm de Vries and <u>J. Yosinski</u>. Can deep learning help you find the perfect match?. Deep Learning Workshop, International Conference on Machine Learning (ICML). 9 July 2015.

24. <u>J. Yosinski</u>, Jeff Clune, Yoshua Bengio, and Hod Lipson. "How transferrable are

features in deep neural networks?" Advances in Neural Information Processing Systems 27 (NIPS '14).
Oral Presentation (1.2%).

25. Yoshua Bengio, Éric Thibodeau-Laufer, Guillaume Alain, <u>J. Yosinski</u>. "Deep Generative Stochastic Networks Trainable by Backprop." Proceedings of the International Conference on Machine Learning. 21 June 2014. (also previously published on *arXiv:1306.1091,* 25 October 2013.)

26. Nick Cheney, Jeff Clune, <u>J. Yosinski</u>, and Hod Lipson. "Hands-free Evolution of 3D-printable Objects via Eye Tracking." *arXiv:1304.4889.* 19 April 2013.

27. Sean Lee, <u>J. Yosinski</u>, Kyrre Glette, Hod Lipson, and Jeff Clune. "Evolving gaits for physical robots with the HyperNEAT generative encoding: the benefits of simulation." *Applications of Evolutionary Computation.* 5 April 2013.

28. Sara Lohmann, <u>J. Yosinski</u>, Eric Gold, Jeff Clune, Jeremy Blum and Hod Lipson. "Aracna: An Open-Source Quadruped Platform for Evolutionary Robotics." *Proceedings of the 13th International Conference on the Synthesis and Simulation of Living Systems (ALife).* 19 July 2012.
Best Presentation Award.

29. Jeff Clune, <u>J. Yosinski</u>, Eugene Doan, and Hod Lipson. "EndlessForms.com: Collaboratively Evolving 3D-Printable Objects Online." Presented at *13th International Conference on the Synthesis and Simulation of Living Systems (ALife).*
Best Poster Award.

30. <u>J. Yosinski</u> and Hod Lipson. "Visually Debugging Restricted Boltzmann Machine Training with a 3D Example." Presented at *Representation Learning Workshop, 29th International Conference on Machine Learning (ICML).* 1 July 2012.

31. Haocheng Shen, <u>J. Yosinski</u>, Petar Kormushev, Darwin Caldwell, and Hod Lipson. "Learning fast quadruped robot gaits with the RL power spline parameterization." *Cybernetics and Information Technologies* 12, no. 3 (2012): 66-75.

32. <u>J. Yosinski</u>, Jeff Clune, Diana Hidalgo, Sarah Nguyen, Juan Zagal, and Hod Lipson. "Evolving Robot Gaits in Hardware: the HyperNEAT Generative Encoding Vs. Parameter Optimization." *Proceedings of the 20th European Conference on Artificial Life.* Paris, France. 8-12 August 2011. pp 890-897.

33. <u>J. Yosinski</u> and Igor Labutov. "Human-robot collaboration using micro-delegation and gesture recognition." In *RGBD Workshop at Robotics: Science and Systems,* 2011.

34. <u>J. Yosinski</u> and Cooper Bills. "MAV Stabilization using Machine Learning and Onboard Sensors." Technical Report CS6780, Cornell University. 10 December 2010. Also at *arXiv:1202.4465.*

35. Scott Lundberg, Randy Paffenroth, and <u>J. Yosinski</u>. "Analysis of CBRN Sensor

Fusion Methods." *2010 13th Conference on Information Fusion (FUSION).* 26 July 2010.

36. <u>J. Yosinski</u> and Randy Paffenroth. "Nonlinear Estimation for Arrays of Chemical Sensors." *Signal and Data Processing of Small Targets (SPIE 2010).* Orlando, Florida. 5-9 April 2010. Proc. SPIE Vol. 7698, 769809.

37. Scott Lundberg, Randy Paffenroth, and <u>J. Yosinski</u>. "Algorithms for Distributed Chemical Sensor Fusion." *Signal and Data Processing of Small Targets (SPIE 2010).* Orlando, Florida. 5-9 April 2010. Proc. SPIE Vol. 7698, 769806.

38. <u>J. Yosinski</u>, Nicholas Coult, and Randy Paffenroth. "Network-centric Angle Only Tracking." *Signal and Data Processing of Small Targets (SPIE 2009).* San Diego, California. 2-6 August 2009. Proc. SPIE Vol. 7445, 74450O.

39. <u>J. Yosinski</u> and R. Paffenroth. "A Distributed Database View of Network Tracking Systems." *Signal and Data Processing of Small Targets (SPIE 2008).* Orlando, Florida. 16-20 March 2008. Proc. SPIE Vol. 6969, 696915.

GRANTED US PATENTS

Provisional patents not listed. For a complete, up to date list of patents, see Google Scholar at <u>https://scholar.google.com/citations?user=gxL1qj8AAAAJ</u>

1. T Doutre, DG Purdy, <u>J Yosinski</u>. Image quality scorer machine. US Patent 10,916,003 Granted 2021.

2. L Gueguen, AI Sergeev, R Liu, <u>J Yosinski</u>. Leveraging JPEG discrete cosine transform coefficients in neural networks. US Patent 10,839,564. Granted 2020.

3. AC DeChant, H Lipson, RJ Nelson, MA Gore, T Wiesner-Hanks, E Stewart, <u>J Yosinski</u>, S Chen. Methods and systems for pattern characteristic detection. US Patent 10,747,999. Granted 2020.

4. <u>J Yosinski</u>, C Li, R Liu. Generating compressed representation neural networks having high degree of accuracy. US Patent 10,726,335. Granted 2020.

SELECTED INVITED TALKS

Silicon Slopes, University of Maryland February Fourier Talks, Auto.AI conference, SF Data Institute, ReWork Deep Learning Summit, Uber x Harvard Summer Camp, MIT Lincoln Lab, UIUC, Samsung AI is Changing the World, Draper University, Open Data Science Conf (ODSC), Intel Panel on AI, Stanford, Science meets Engineering of Deep Learning Workshop @ NeurIPS 2019, MSR Redmond, Maker Faire, Union College,

Expanding Your Horizons, Caltech JPL, Nervana Systems, Caltech, UCLA, UC Berkeley, Cambridge University, IROS BLCCLR Workshop, Memorial Sloan Kettering Cancer Center, Vicarious, University of Massachusetts Amherst, New York AI, Magic Leap.

SELECTED PRESS

- How AI detectives are cracking open the black box of deep learning. **Science**, 2017.
- The tiny changes that can cause AI to fail. **BBC**, 2017.
- Simple Pictures That State-of-the-Art AI Still Can't Recognize. **Wired**, 1/5/15.
- How to Fool a Computer With Optical Illusions. **The Atlantic**, 12/15/14.
- AI work discussed in "Virtual reality — How the metaverse will change filmmaking." George Bloom, **TEDxHollywood**. 7/25/14.
- Robot featured in "Outrageous Acts of Science," Season 2, Episode 12: "Hackaverse." **The Science Channel**, 5/17/14.
- With Evolved Brains, Robots Creep Closer To Animal-Like Learning. **Fast Company**, 2/1/13.
- 3D Printing Powered by Thought. **BBC**, 7/22/13.
- Language Processing, **NSF Newsletter**, 1/23/12.
- Crowdsourced evolution of 3D printable objects. **Slashdot**, 9/22/11.
- First "chatbot" conversation ends in argument. **BBC**, 9/8/11.
- Robot-To-Robot Chat Yields Curious Conversation. **NPR All Things Considered**, 9/2/11.
- What Computers Talk About When We Aren't Listening. **Wall Street Journal Tech Europe**, 8/30/11.
- Cornell's Creative Machines Lab Lets Chatbots Interact. **Slashdot**, 8/30/11.
- Two Chatbots Face Off To Discuss God And Unicorns. **Gizmodo**, 8/30/11.
- Cornell Proves Robots Are Not So Genius, Mostly Just Silly. **The Atlantic Wire**, 8/29/11.
- AI chatbots engage in an awkward showdown, bring laughs. **Yahoo News**, 8/29/11.
- Chatbots engage in conversation, decreasing fear that we will soon be overrun by robot overlords. **Washington Post**, 8/29/11.
- Chatbot Tries to Talk to Itself, Things Get Weird. **IEEE Spectrum**, 8/29/11.
- When Two Computers Start Talking, Unicorns Ensue. **Forbes.com**, 8/29/11.
- Now anyone can design and evolve 3-D printable objects interactively. **Kurzweil AI**, 8/26/11.
- 3-D Design Simplified. **MIT Technology Review**, 8/25/11.
- Intelligent Design: Users Power Evolution in 3-D Web Printing. **Innovation on MSNBC.com**, 8/24/11.
- Evolve your own objects for 3D printing. **New Scientist**, 8/20/11.
- Breed 3-D Printable Objects, No Technical Know-How Needed. **Y-Combinator Hacker News**, 8/18/11.
- Endless Forms uses the Web to breed 3-D printable objects. **Cornell Chronicle**,

8/17/11 and **Communications of the ACM**, 8/23/11.
- Geek Squad reigns supreme at Pasadena Unified robot competition. **Pasadena Star News**, 5/21/10.
- Competition up for educational funding. **NPR Marketplace Morning**, 1/19/10.
- Schools race for piece of federal grant. **NPR Marketplace Morning**, 1/18/10.
- Fun with robots is teaching Eliot Middle School students math, computing skills. **Pasadena Star News**, 11/26/09.

SERVICE

Note: as of 2016 this section is no longer kept up to date.

- Reviewer for conferences:
  - International Conference on Learning Representations (ICLR) 2016.
  - Neural Information Processing Systems (NIPS) 2015.
  - International Conference on Machine Learning (ICML) Deep Learning workshop, 2015.
  - Genetic and Evolutionary Computation Conference (GECCO) 2015.
  - International Conference on Learning Representations (ICLR) 2015.
  - AAAI Conference on Artificial Intelligence, 2014.
  - Genetic and Evolutionary Computation Conference, 2013 (tracks: Evolutionary Combinatorial Optimization and Metaheuristics, Ant Colony Optimization and Swarm Intelligence, Generative and Developmental Systems, and Artificial Life/Robotics/Evolvable Hardware).
  - Artificial Life, 2012.
  - International Conference on Intelligent Robots and Systems (IROS) 2011.
- Reviewer for journals:
  - IEEE Transactions on Pattern Analysis and Machine Intelligence, 2015.
  - IEEE Transactions on Cybernetics, 2013.
- Conference organization
  - Program Committee, Artificial Life/Robotics/Evolvable Hardware (ALIFE), GECCO 2013.

OTHER LEADERSHIP AND ACTIVITIES

Designed/Built Own House — Learned and assumed the role of architect, structural engineer, framer, plumber, mason, and electrician in constructing a house with my family while in High School.

Avery House Council — Transitioned my Caltech dorm into Avery House, the first new House in 46 years. Penned the new House Constitution. Negotiated with and persuaded initially opposed students and administrators.

Avery House Social Team Director — Initiated and planned weekly meetings and events, delegated work, encouraged House members to participate.

Other — Member of Caltech Freshmen Admissions Committee, Caltech Diversity Committee, Study Abroad at University of Cambridge