

Sam Kriegman

Curriculum Vitae

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[Google Scholar Profile](#)

APPOINTMENTS

2020– **Postdoctoral Associate**, University of Vermont

2011–2014 Actuary, Chubb Insurance

EDUCATION

2016–2020 **Ph.D.**, Computer Science, University of Vermont, USA
[Design for an Increasingly Protean Machine](#).
Advisor: Josh Bongard

2014–2016 **M.S.**, Statistics, University of Vermont, USA

2006–2010 **B.S.**, Applied Mathematics, Ohio University, USA

AWARDS

2021 [The Cozzarelli Prize](#), National Academy of Sciences

2020 Computer Science Graduate Award, University of Vermont
[Top 10 Most Influential BioTech Projects](#), Project Management Institute
[Beazley Designs of the Year](#), The Design Museum

PATENTS

pending Engineered Multicellular Organisms.

INVITED TALKS

Mar, 2021 “Living Robots”. *The Int’l Workshop on Embodied Intelligence*, Breakout Session: Kinds of Intelligence.

Mar, 2021 “Xenobots in a nutshell”. IT University of Copenhagen.

Mar, 2021 “How to evolve your robot”. Guest lecture for Introduction Soft Robotics, Yale University.

Oct, 2020 “[Living deepfakes](#)”. Guest lecture for MIT Media Lab Deepfakes course (MAS.S60).

May, 2020 “[Design for soft robot blocks](#)”. *IEEE International Conference on Soft Robotics (RoboSoft)*.

Apr, 2020 “[Computer designed organisms](#)”. *Artificial Life Virtual Seminar Series*.

June, 2019 “[Shapeshifting robots](#)”. *Robotics: Science and Systems (RSS)* in Freiburg, Germany.

INTERVIEWS

to appear “[Xenobots](#)”. *Bloomberg Moonshot*

Feb, 2021 “[Evolving robot forms](#)”. *Time Horizons Podcast*

Sep, 2020 “[Tiny, Programmable, Living Robots](#)”. *Constant Wonder*

Apr, 2020 “[Soft Robotics with Sam Kriegman](#)”. *IEEE Soft Robotics Podcast*

Mar, 2020 “Xenobots”. *Futureproof*
 Feb, 2020 “Living Robots”. *TalkSport Radio*
 Jan, 2020 “UVM researchers develop tiny living robots”. *WCAX (CBS 3)*
 Jan, 2020 “UVM aids in creating living robots”. *WPTZ (NBC 5)*
 Jan, 2020 “Forscher haben erstmals ‘lebende’ Mini-Roboter erschaffen”. *Die Welt*

SELECTED MEDIA COVERAGE

Dec, 2020 “The big scientific breakthroughs of 2020”. *The Week*
 Dec, 2020 “The 10 Most Spectacular Scientific Advances of 2020”. *La Razón (Spain)*
 Dec, 2020 “Part Robot, Part Frog: Xenobots Are the First Robots Made From Living Cells”. *Discover Magazine*
 Nov, 2020 “The Xenobot Future Is Coming – Start Planning Now”. *Wired*
 Apr, 2020 “Meet the Xenobots: Virtual Creatures Brought to Life”. *New York Times*
 Feb, 2020 “Giant Moon rocket, living robots and quantum computer – January’s best science images”. *Nature*
 Feb, 2020 “Tiny machines made from the stem cells of frogs”. *The Intelligence (Economist Radio)*
 Jan, 2020 “The religious, moral, and ethical implications of Xenobots”. *BBC Radio 4 Sunday*
 Jan, 2020 “A research team builds robots from living cells”. *The Economist*
 Jan, 2020 “Scientists use stem cells from frogs to build first living robots”. *The Guardian*
 Jan, 2020 “Meet the xenobot: world’s first living, self-healing robots created from frog stem cells”. *CNN*
 Jan, 2020 “Scientists create first living, self-healing robots (on-air with Fredricka Whitfield)”. *CNN*
 Jan, 2020 “Scientists at UVM, Tufts create ‘living robots’”. *Boston Globe*
 Jan, 2020 “How tiny ‘biobots’ could enter bodies to clean arteries and administer drugs”. *The Times*
 Jan, 2020 “Living robots created as scientists turn frog cells into ‘entirely new life-forms’”. *The Telegraph*
 Jan, 2020 “Living robots”. *BBC World Service*
 Jan, 2020 “Tiny ‘xenobots’ made from cells could heal our bodies and clean the environment”. *Fox News*
 Jan, 2020 “Xenobots: 1st living robots made from stem cells”. *ESPN*
 Jan, 2020 “Xenobot”. *Wikipedia*

PUBLICATIONS

18. S Kriegman, A-M Nasab, D Blackiston, H Steele, M Levin, R Kramer-Bottiglio, J Bongard. (2021). [Scale invariant robot behavior with fractals](#). *preprint*, in review.
17. D Blackiston, E Lederer, S Kriegman, S Garnier, J Bongard, M Levin. (2021). A new cellular platform for the development of synthetic living machines. *embargoed*, in press.
16. D Shah, J Powers, L Tilton, S Kriegman, J Bongard, R Kramer-Bottiglio. (2021). [A soft robot that adapts to environments through shape change](#). *Nature Machine Intelligence*, 3, 51-59.
15. D Shah, B Yang, S Kriegman, M Levin, J Bongard, R Kramer-Bottiglio. (2020). [Shape Changing Robots: Bioinspiration, Simulation, and Physical Realization](#). *Advanced Materials*, 2002882.
14. J Powers, R Grindle, S Kriegman, L Frati, N Cheney, J Bongard. (2020). [Morphology dictates learnability in neural controllers](#). *Artificial Life Conference Proceedings*, 52-59.
13. S Kriegman, A-M Nasab, D Shah, H Steele, G Branin, M Levin, J Bongard, R Kramer-Bottiglio. (2020). [Scalable sim-to-real transfer of soft robot designs](#). *IEEE Conference on Soft Robotics (RoboSoft)*, 359-366, 10.1109/RoboSoft48309.2020.9116004.

12. S Kriegman*, D Blackiston*, M Levin, J Bongard. (2020).
[A scalable pipeline for designing reconfigurable organisms.](#)
Proceedings of the National Academy of Sciences, 117(4): 1853-1859.
 (A perspective article on this work by P. Ball can be found [here](#).)
11. S Kriegman. (2019).
[Why virtual creatures matter.](#)
Nature Machine Intelligence, 1(10): 492-492.
10. D Matthews, S Kriegman, C Cappelle, J Bongard. (2019).
[Word2vec to behavior: morphology facilitates the grounding of language in machines.](#)
IEEE/RSJ Conference on Intelligent Robots and Systems (IROS)
9. S Kriegman, S Walker, D Shah, M Levin, R Kramer-Bottiglio, J Bongard (2019).
[Automated shapeshifting for function recovery in damaged robots.](#)
Robotics: Science and Systems (RSS), 10.15607/RSS.2019.XV.028
 (A perspective article on this work by H. Hauser can be found [here](#).)
8. S Kriegman, N Cheney, J Bongard. (2018).
[How morphological development can guide evolution.](#)
Nature Scientific Reports, 8(1): 13934.
7. S Beaulieu, S Kriegman, J Bongard. (2018).
[Combating catastrophic forgetting with developmental compression.](#)
Genetic and Evolutionary Computation Conference (GECCO), 386-393.
6. S Kriegman, N Cheney, F Corucci, J Bongard. (2018).
[Interoceptive robustness through environment-mediated morphological development.](#)
Genetic and Evolutionary Computation Conference (GECCO), 109-116, 10.1145/3205455.3205529.
5. J Powers, S Kriegman, J Bongard. (2018).
[The effects of morphology and fitness on catastrophic interference.](#)
Artificial Life Conference Proceedings, 606-613.
4. S Kriegman, C Cappelle, F Corucci, A Bernatskiy, N Cheney, J Bongard. (2017).
[Simulating the evolution of soft and rigid-body robots.](#)
Genetic and Evolutionary Computation Conference (GECCO), 1117-1120.
3. F Corucci, N Cheney, S Kriegman, J Bongard, C Laschi. (2017).
[Evolutionary developmental soft robotics as a framework to study intelligence and adaptive behavior.](#)
Frontiers in Robotics and AI, 4(34).
2. S Kriegman, N Cheney, F Corucci, J Bongard. (2017).
[A minimal developmental model can increase evolvability in soft robots.](#)
Genetic and Evolutionary Computation Conference (GECCO), 131-138, 10.1145/3071178.3071296.
1. S Kriegman, M Szubert, J Bongard, C Skalka. (2016).
[Evolving spatially aggregated features from satellite imagery for regional modeling.](#)
Parallel Problem Solving from Nature (PPSN), 707-716.

ADVISING

2020– [Sida Liu](#), Master’s, Complex Systems, UVM.
 2018– [David Matthews](#), Undergraduate, Computer Science, UVM.

SERVICE

EDITORSHIPS

2020– Review Editorial Board, *Frontiers Robotics and AI*