Bryon Tjanaka

Ph.D. Candidate, ICAROS Lab @ USC

https://btjanaka.net • bryon.tjanaka@gmail.com • Los Angeles, USA

Research Interests

quality diversity optimization, generative modeling, reinforcement learning, human-robot collaboration, evolutionary algorithms

Education

Ph.D. Computer Science — Aug. 2020 - Present
University of Southern California • Advisor: Stefanos Nikolaidis

M.S. Computer Science — Aug. 2020 - May 2022
University of Southern California • GPA: 4.0/4.0

B.S. Computer Science — Sep. 2017 - Jun. 2020
University of California, Irvine • GPA: 4.0/4.0

Honors and Awards

NVIDIA Academic Hardware Grant (Award: NVIDIA RTX A6000)	Mar. 2022
National Science Foundation Graduate Research Fellowship	Mar. 2021
George Bekey Fellowship (USC)	Feb. 2021
USC Graduate School Fellowship for Incoming Students	Feb. 2020
Summa Cum Laude, UCI School of ICS	Jun. 2020
National Science Foundation Graduate Research Fellowship Honorable Mention	Mar. 2020
UCI Dean's Honor List	Sep. 2017 - Mar. 2020
UCI Regents' Scholarship	Sep. 2017 - Jun. 2020
UCI UROP Fellowship(s) for *Improving Molecular Simulations*	Jan. 2020, Jan. 2019
UCI UROP Honorary Fellowship for *Implications of Mall Security Robots*	Jan. 2018
Best Entrepreneurial Hack at HackUCI V hackathon	Feb. 2019
John Hollowell Composition Program Award for Best Advocacy Project, UCI School of Humanities	May 2018
2017 VEX Robotics High School World Champion	Apr. 2017
Recognition for VEX Robotics Championship, Rep. Ro Khanna, CA-17	Aug. 2017

Research and Professional Experience

Research Assistant — Aug. 2020 - Present
ICAROS Lab, University of Southern California (icaros.usc.edu), *Advisor: Stefanos Nikolaidis*

Ph.D. Research Intern — May 2023 - Sep. 2023
InstaDeep (Boston, Massachusetts, USA)

Undergraduate Researcher — Oct. 2019 - Jun. 2020
Intelligent Dynamics Lab, UC Irvine (indylab.org), *Advisor: Roy Fox*

Undergraduate Researcher — Oct. 2018 - Jun. 2020
Mobley Lab, UC Irvine (mobleylab.org), *PI: David Mobley, Graduate Mentor: Jessica Maat*

Independent Undergraduate Researcher — Oct. 2017 - Jun. 2018
Mentor: Caesar Sereseres

Software Engineering Intern, Google Ads — Jun. 2020 - Aug. 2020

Software Engineering Intern, Google Ads — Jun. 2019 - Sep. 2019

Engineering Practicum Intern, Google Assistant — Jun. 2018 - Sep. 2018
Google, Inc. (Mountain View, California, USA)

Publications

Journals

S. Zhao, **B. Tjanaka**, M. C. Fontaine, S. Nikolaidis. "Covariance Matrix Adaptation MAP-Annealing: Theory and Experiments." *ACM Transactions on Evolutionary Learning and Optimization*, vol. 5, no. 1, Article 4, March 2025. https://dl.acm.org/doi/10.1145/3665336

B. Tjanaka, M. C. Fontaine, D. H. Lee, A. Kalkar, S. Nikolaidis. "Training Diverse High-Dimensional Controllers by Scaling Covariance Matrix Adaptation MAP-Annealing." *Robotics and Automation Letters* (*RA-L*), vol. 8, no. 10, pp. 6771-6778, October 2023. Impact factor: 5.2. https://scalingcmamae.github.io

Conferences

D. H. Lee, A. V. Palaparthi, M. C. Fontaine, **B. Tjanaka**, S. Nikolaidis. "Density Descent for Diversity Optimization." *Genetic And Evolutionary Computation Conference* (*GECCO*), July 2024. Acceptance rate: 36.0%. https://dl.acm.org/doi/10.1145/3638529.3654001

S. Batra, **B. Tjanaka**, M. C. Fontaine, A. Petrenko, S. Nikolaidis, G. Sukhatme. "Proximal Policy Gradient Arborescence for Quality Diversity Reinforcement Learning." *International Conference on Learning Representations* (*ICLR*), May 2024. **Spotlight Presentation**. Acceptance rate: 5%. https://arxiv.org/abs/2305.13795

V. Bhatt, H. Nemlekar, M. C. Fontaine, **B. Tjanaka**, H. Zhang, Y.-C. Hsu, S. Nikolaidis. "Surrogate Assisted Generation of Human-Robot Interaction Scenarios." *Conference on Robot Learning* (*CoRL*), November 2023. **Oral Presentation**. Acceptance rate: 6.6%. https://arxiv.org/abs/2304.13787

B. Tjanaka, M. C. Fontaine, D. H. Lee, Y. Zhang, N. R. Balam, N. Dennler, S. S. Garlanka, N. D. Klapsis, S. Nikolaidis. "pyribs: A Bare-Bones Python Library for Quality Diversity Optimization." *Genetic And Evolutionary Computation Conference* (*GECCO*), July 2023. Acceptance rate: 34.7%. https://pyribs.org/paper

V. Bhatt*, **B. Tjanaka***, M. C. Fontaine*, S. Nikolaidis. "Deep Surrogate Assisted Generation of Environments." *Neural Information Processing Systems* (*NeurIPS*), November 2022. Acceptance rate: 25.6%. https://dsagepaper.github.io

B. Tjanaka, M. C. Fontaine, J. Togelius, S. Nikolaidis. "Approximating Gradients for Differentiable Quality Diversity in Reinforcement Learning." *Genetic And Evolutionary Computation Conference* (*GECCO*), July 2022. Acceptance rate: 37%. https://dqd-rl.github.io

M. C. Fontaine*, Y.-C. Hsu*, Y. Zhang*, **B. Tjanaka**, S. Nikolaidis. "On the Importance of Environments in Human-Robot Coordination." *Robotics: Science and Systems* (*RSS*), July 2021. Acceptance rate: 27%. https://overcooked-lsi.github.io

Short Papers

S. Batra, **B. Tjanaka**, S. Nikolaidis, G. Sukhatme. "Quality Diversity for Robot Learning: Limitations and Future Directions." *Genetic And Evolutionary Computation Conference* (*GECCO*) *Companion*, July 2024. https://dl.acm.org/doi/10.1145/3638530.3654431

Workshops

B. Tjanaka, M. C. Fontaine, D. H. Lee, A. Kalkar, S. Nikolaidis. "Scaling Covariance Matrix Adaptation MAP-Annealing to High-Dimensional Controllers." *Southern California Robotics Symposium*, September 2023. https://scalingcmamae.github.io

B. Tjanaka, M. C. Fontaine, A. Kalkar, S. Nikolaidis. "Scaling Covariance Matrix Adaptation MAP-Annealing to High-Dimensional Controllers." *Deep Reinforcement Learning Workshop at NeurIPS 2022*, December 2022. https://scalingcmamae.github.io

B. Tjanaka, M. C. Fontaine, J. Togelius, S. Nikolaidis. "Differentiable Quality Diversity for Reinforcement Learning by Approximating Gradients." *Southern California Robotics Symposium*, September 2022. https://dqd-rl.github.io

B. Tjanaka, M. C. Fontaine, S. Nikolaidis. "Quantifying Efficiency in Quality Diversity Optimization." *Workshop on Benchmarks for Quality-Diversity Algorithms at GECCO 2022*, July 2022.

B. Tjanaka, M. C. Fontaine, J. Togelius, S. Nikolaidis. "Differentiable Quality Diversity for Reinforcement Learning by Approximating Gradients." *Workshop on Agent Learning in Open-Endedness* (*ALOE*) *at ICLR 2022*, April 2022. **Spotlight Paper.** https://dqd-rl.github.io

Software

B. Tjanaka, M. C. Fontaine, D. H. Lee, Y. Zhang, T. T. M. Vu, S. Sommerer, N. Dennler, S. Nikolaidis. "pyribs: A bare-bones Python library for quality diversity optimization." *GitHub repository*, February 2021. https://pyribs.org

Prior to Joining USC

N. Monath*, K. A. Dubey, G. Guruganesh, M. Zaheer, A. Ahmed, A. McCallum, G. Mergen, M. Najork, M. Terzihan, **B. Tjanaka**, Y. Wang, Y. Wu. "Scalable Hierarchical Agglomerative Clustering." *27th ACM SIGKDD Conference on Knowledge Discovery & Data Mining*, August 2021.

Y. Qiu, D. G. A. Smith, S. Boothroyd, H. Jang, D. F. Hahn, J. Wagner, C. C. Bannan, T. Gokey, V. T. Lim, C. D. Stern, A. Rizzi, **B. Tjanaka**, G. Tresadern, X. Lucas, M. R. Shirts, M. K. Gilson, J. D. Chodera, C. I. Bayly, D. L. Mobley, L.-P. Wang. "Development and Benchmarking of Open Force Field v1.0.0 — the Parsley Small-Molecule Force Field." *Journal of Chemical Theory and Computation*, October 2021.

Teaching

Teaching Assistant, USC CSCI 360 (Introduction to Artificial Intelligence) — Jan. 2022 - May 2022
Teaching Assistant, USC CSCI 545 (Introduction to Robotics) — Aug. 2021 - Dec. 2021

Mentorship

Henry Chen (undergraduate, ICAROS Lab) — Oct. 2023 - Present
  Awarded USC Provost's Undergraduate Research Fellowship — Apr. 2024
Steve Vott (undergraduate, ICAROS Lab) — Oct. 2023 - Sep. 2024
David H. Lee (undergraduate, ICAROS Lab) — Jun. 2022 - Present
  Awarded USC Provost's Undergraduate Research Fellowship — Sep. 2022
Aniruddha Kalkar (master's, ICAROS Lab) — May 2022 - Dec. 2022
Melissa Lorenzo-Mendez (high school, USC SHINE – viterbik12.usc.edu/shine) — Jun. 2022 - Aug. 2022
Bridget Bell (undergraduate, ICAROS Lab) — Mar. 2022 - May 2022
Vincent Vu (undergraduate, ICAROS Lab, USC URAP grant) — Nov. 2021 - Sep. 2022
Yuecheng Li (master's, ICAROS Lab) — Sep. 2021 - Apr. 2022
Raymond Dion Walker II (high school, USC SHINE – viterbik12.usc.edu/shine) — Jun. 2021 - Aug. 2021
Sam Sommerer (undergraduate, ICAROS Lab) — Aug. 2020 - Apr. 2021
Kai Malloy (Fulbright scholarship applicant, awarded semifinalist) — Aug. 2020

Leadership & Service Activities

Organizer, USC Robotics Seminar (UROS) — Jan. 2023 - May 2023
Digital Officer / Webmaster, USC Viterbi Graduate Student Association (vgsa.usc.edu) — Aug. 2020 - Feb. 2023
Webmaster, SoCal Graduate Pathways to STEM (vgsa.usc.edu/gps) — Oct. 2020, May 2022, Apr. 2023
Panel Moderator, USC Beyond the Ph.D. Conference (sites.usc.edu/beyondphd/) — Oct. 2022
Senator, USC Graduate Student Government (gsg.usc.edu) — Aug. 2020 - May 2021
Internal Vice President / Competitor, ACM UC Irvine Chapter (acm-uci.org) — Sep. 2017 - Feb. 2020
Speaker / Volunteer, Google Girl-Powered VEX Robotics Workshop — Jul. 2017, Aug. 2018, Jun. 2019, Aug. 2024

Reviewing

Conferences: Genetic And Evolutionary Computation Conference (GECCO), International Conference on Learning Representations (ICLR), Conference on Neural Information Processing Systems (NeurIPS)
Journals: Journal of Machine Learning Research (JMLR), ACM Transactions on Autonomous and Adaptive Systems (TAAS), Autonomous Robots (AURO), IEEE Transactions on Evolutionary Computation (TEVC)

Panels

USC Graduate School External Fellowship Boot Camp — Sep. 2024
Viterbi External Graduate Fellowship Information Session — Sep. 2023
UCI Undergraduate Research Symposium Alumni Panel — May 2022
USC SURE (viterbigradadmission.usc.edu/sure) Ph.D. Panel — Jun. 2021, Jul. 2023
UCI WICS (wics.ics.uci.edu) Grad School Panel — Apr. 2021

Presentations

Improving Molecular Simulations through Force Field Development and Computational Techniques
  2019 UCI Undergraduate Research Symposium
Implications of Mall Security Robots on Privacy of Shoppers
  2018 UCI Undergraduate Research Symposium

Invited Talks

"Building a Modern Business Card with Eleventy," 2021 11ties (hosted by Jamstack Toronto) — Nov. 2021

Selected Projects

pyribs: A bare-bones Python library for quality diversity optimization (pyribs.org)
Associated with: Research Assistant at ICAROS Lab
Pyribs is an ongoing project to develop a library of quality diversity algorithms that is simple, flexible, and accessible. Pyribs has grown to become one of the most popular QD software libraries, with over 200 stars on GitHub and appearances in over 40 publications. Its users include: Autodesk Research, Imperial College London Adaptive & Intelligent Robotics Lab, New York University Game Innovation Lab, Huawei Noah's Ark Lab, Ludwig Maximilian University of Munich Chair of Statistical Learning and Data Science, Southwestern University Department of Mathematics and Computer Science, University of Trento Distributed Intelligence and Optimization Lab, Lenia Research.

Languages

English (fluent), Mandarin (proficient)