Reilly Raab

EXPERIENCE

Graduate Student Researcher (PhD) Sept 2019 – Mar 2024
UC Santa Cruz *Santa Cruz, CA*

Doctoral research developing safe AI/ML systems for high-stakes decisions while accounting for dynamical feedback.
- Dissertation: "*Machine Learning and the Multiagent Alignment Problem*".

- Applied natural gradient descent to model adaptive populations according to evolutionary game theory.
  - First author: "*Unintended Selection: Persistent Qualification Rate Disparities and Interventions*"
    - **NeurIPS (2021)** • **Spotlight Paper Award** • Top 50 review score of $\sim$ 9100 submissions
  - First author: "*Conjugate Natural Selection*", arXiv preprint (2023).
- Developed constraint-violation bounds for ML systems subject to adversarial distribution shift.
  - Co-first author: "*Fairness Transferability Subject to Bounded Distribution Shift*"
    - **NeurIPS (2022)**
- Established novel theoretical safety guarantees using online reinforcement learning.
  - Co-first author: "*Long-Term Fairness with Unknown Dynamics*"
    - **NeurIPS (2023)** • Highlighted Paper and Best Paper Runner-Up: ICLR RTML Workshop (2022)
- Formulated constrained optimization programs to sequentially adapt ML policies.
  - First author: "*Fair Participation via Sequential Policies*"
    - **AAAI (2024)**

Software Developer Oct 2016 – Aug 2018
Breadware, Inc. *Reno, NV*

Rapid prototyping services for the internet-of-things (IoT).

- Joined during startup phase (< 15 employees).
- Wrote software to automate electronic design tasks, circuit board layout (Python).
- Designed system to generate netlists and firmware from modular specification (Python, C).
- Implemented web-based testing of user-logic for embedded devices in simulated environments (JavaScript).

Teaching Assistant and Residential Mentor Summer 2015 | Summer 2016
The Summer Science Program *Socorro, NM | Boulder, CO*

Non-profit instructing advanced, international high school students in astronomy, orbital mechanics, programming.

- Alumnus of program (student in 2010).
- Supervised teams on research projects (orbit determination for near-Earth asteroids).
- Guided telescope operations, graded homework, designed supplementary challenges.
- Gave supplementary lectures on variational calculus.

SKILLS

Expertise: Machine Learning, Constrained Optimization, Signal Processing, Scientific Computing.
Background: {Vector, Variational, Stochastic} Calculus, Game Theory, Information Theory, Linear Algebra.
Programming: Python (incl. NumPy, SciPy, Scikit-Learn, Gym), C, JavaScript, Domain-Specific Languages.
Tooling: GNU/Linux, Git, Continuous Integration, Virtual Environments, Containerized Builds.

EDUCATION

PhD, Computer Science and Engineering Sept 2019 – Mar 2024
University of California, Santa Cruz *Santa Cruz, CA*
- ARCS Scholar (Northern California) • Dean's Fellow • Regents Fellow • Dissertation Year Fellow

BSc, Physics Sept 2011 – June 2015
University of California, Santa Barbara (College of Creative Studies) *Santa Barbara, CA*
- Distinction in the Major • High Honors • Multiple Education Abroad Scholarships