Anna Nickelson

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Personal Statement

My career objective is to shape how we integrate robotics and automation in society and ensure it is being done in a way that has a positive impact on humans. My short-term objective is to bring a rigorous scientific understanding of technology into the policy writing and decision-making process and gain first-hand experience in how policy is shaped and developed. I plan to leverage this experience to better design robotic systems to account for the law, policy, ethics, and broader impacts.

Education

Oregon State University — Corvallis, OR

Ph.D. Student, Robotics — Expected Defense: June 2024

- Autonomous Multi-Objective Decision Making, advised by Dr. Kagan Tumer

Masters of Science, Robotics — Defended: Dec 2021

- Contextual Multi-Objective Path Planning, advised by Dr. William D. Smart

California Polytechnic State University — San Luis Obispo, CA

Bachelors of Science, Mathematics — Graduated: June 2012

- Focus in applied mathematics including statistics, optimization, and computer science

Work Experience

Oregon State University — Corvallis, OR

Graduate Research Assistant — Sep 2018 - Sep 2021; Mar 2022 - Current

- Research multi-objective decision making for autonomous agents, including the impact on evolutionary learning, traditional robotic decision-making frameworks, ethics, and privacy
- Awarded the Christina & Harold Merryman Graduate Fellowship for Sep 2018 - Jun 2019

Graduate Teaching Assistant — Sep 2021 - Mar 2022

- Teach and support students learning ROS1, Amazon Robomaker, Python, and fundamentals of robotics
- *Courses:* ROB 514 - Introduction to Robotics | ROB 456 - Probabilistic Robotics | ME 499 - Introduction to Python

Naval Research Laboratory — Washington, DC

Graduate Research Intern — Jun - Aug 2022

- Research multi-objective cooperative co-evolutionary learning for temporally dependent tasks, advised by Dr. Laura Hiatt

Brookings Institution — Washington, DC (remote)

Graduate Research Intern, Artificial Intelligence and Emerging Technology Initiative — Jun - Aug 2020

- Research and compose policy brief on analysis and data use for mobile robots in a healthcare setting

Dolby Laboratories, Inc. — San Francisco, CA

Associate Project Manager — Jan 2016 - Oct 2018

- Drive and manage technical training programs for internal worldwide support engineers for all new programs and products
- Coordinate inter-departmental and cross-cultural teams to deliver technical training and initiatives, up to c-suite
- Project manage and plan local and international technical and training events with budgets ranging from $500 to $300k
- Contribute as core team member managing local and international technical events ranging from $300k to $3.2M

Field Training Specialist — Mar 2015 - Jan 2016

Field Training Support Specialist — Oct 2013 - Mar 2015

Field Training & Technical Community Intern — Sep 2012 - Oct 2013

Projects

Oregon State University — Corvallis, OR

Multi-Objective Behavior Selection for Adaptive Teaming — Jun 2023 - Current

- Enable distributed multiagent systems to individually select behaviors that collectively balance multiple high-level team objectives
- Incorporate multi-objective quality diversity framework into multi-agent teaming and decision making using hierarchical evolutionary methods

Double Fiduciary Duty — Apr 2023 - Current

- Analyze ethical conundrums involved with deploying AI systems to stakeholders with conflicting values systems
- Evaluate how to design an autonomous multi-objective decision making system that balances conflicting values systems

A Multi-Objective Perspective on Privacy in Healthcare Robotics — Jun 2020 - Current

- Analyze the sub-systems in a robotic system that impact privacy for a robotic system deployed in a healthcare setting
- Propose recommendations based on multi-objective reasoning and frameworks to resolve trade-offs between functionality and patient privacy

Shaping the Behavior Space with Counterfactuals in Multi-Objective Map Elites — Mar 2022 - Jun 2023

- Incorporating counterfactual reasoning into multi-objective quality diversity to improve policy search
- Full paper accepted at the International Conference on Evolutionary Computation Theory and Applications (in press) [1]

Contextual Multi-Objective Path Planning — Mar 2020 - Sep 2022

- Incorporate context and multi-objective decision-making into traditional robotic path planning framework
- Published and presented at International Conference on Robotics and Automation (ICRA) 2023 [2]

End-to-end Analysis of AI Bias — Jan - Jun 2021

- STS analysis of the end-to-end causes of AI Bias, including problem formulation, data collection, model validation, and diversity in STEM

California Polytechnic State University — San Luis Obispo, CA

Gesture-Based Robotic Teleoperation — Sep 2011 - Jun 2012

- Create an intuitive gesture-based interface using the Microsoft Kinect for driving a remote robot
- Build a remote-controlled ground robot using Arduino UNO and xBee for communication and control

Skills

Topics	Multi-Objective Decision-Making, Ethical AI, Evolutionary Learning, Quality Diversity, Robotic Decision-Making
Technical Skills	Python (Pandas, PyTorch, NumPy, Matplotlib, etc.), ROS1 (navstack), LaTeX (Overleaf), Git, Excel, Linux
Soft Skills	Engaging Presentations, Project Management, Leadership, Communication

Presentations

Presentation Skills Seminar

Research Experience for Undergrads (REU) Program, *invited* — Jul 2019, 2020, 2021, 2023

ME 507 Best Practices for Graduate Researchers, *invited* — Nov 2022

Interviews

Interview with Kajal Gada - Pursuing Robotics Without an Engineering Background — Aug 2022

Link to interview: https://www.youtube.com/watch?v=9xKUeBhoNvY

Inspiration Dissemination - ”AI that benefits humans and humanity” — May 2022

Link to podcast: https://share.transistor.fm/s/0cde6c2e

Service and Outreach

Skype A Scientist - Friendly Scientist — Sep 2019 - Current

- Connect with 10+ K-12 classrooms around the country to engage students with technology, robots, engineering, math, and careers in STEM

AI-CARING Grant - Student Leadership Council Member — Aug 2022 - Current

- Coordinate with students and faculty across five universities to host semi-annual symposia focused on interoperability and collaboration

Oregon State University - Robotics Graduate Student Association Officer — Jun 2020 - Jun 2021

- Coordinate with faculty to provide outreach, equipment, and support to students and improve faculty-student communication

Publications

Conference Proceedings

[1] Shaping the Behavior Space with Counterfactual Agents in Multi-Objective Map Elites
Nickelson, Anna, Nicholas Zerbel, Guarav Dixit, Kagan Tumer
15th International Conference on Evolutionary Computation Theory and Applications (ECTA), in press

[2] Contextual Multi-Objective Path Planning
Nickelson, Anna, Kagan Tumer, William D. Smart
2023 IEEE International Conference on Robotics and Automation (ICRA), 2023

[3] Entropy-based Local Fitnesses for Evolutionary Multiagent Systems
Ayhan Alp Aydeniz, **Anna Nickelson**, Kagan Tumer
GECCO ’22: Genetic and Evolutionary Computation Conference, Companion Volume, 2022