

Bernadette K. Bucher

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Research Statement: My research interests focus on increasing sample efficiency in learning methods using visual sensory data to make autonomous decisions. My current work focuses on designing intrinsic rewards for exploration in vision-based reinforcement learning methods in order to increase sample efficiency via adaptive sampling.

Education

University of Pennsylvania

Ph.D. Computer Science, Advisor: Dr. Kostas Daniilidis
M.S.E. Robotics, Advisor: Dr. Kostas Daniilidis
Fully funded through fellowships, department, and advisor

August 2018 - present
August 2018 - December 2020

Georgia Institute of Technology

15 graduate credits, School of Computer Science
Fully funded by Lockheed Martin Corporation

August 2016 - August 2018

The University of Alabama

M.A. Economics
M.A. Mathematics, Advisor: Dr. Kabe Moen
B.S. Mathematics and Economics, Advisor: Dr. Kabe Moen
Fully funded through academic scholarships

January 2012 - May 2014
August 2012 - May 2014
August 2010 - May 2014

Publications

Bernadette Bucher*, Karl Schmeckpeper*, Nikolai Matni, Kostas Daniilidis. *Adversarial Curiosity*. arXiv Preprint, 2020.

Bernadette Bucher*, Karl Schmeckpeper*, Nikolai Matni, Kostas Daniilidis. *Action for Better Prediction*. RSS Workshop on Visual Learning and Reasoning for Robotic Manipulation, 2020.

Bernadette Bucher*, Siddharth Singh*, Clélia de Mutalier, Kostas Daniilidis, Vijay Balasubramanian. *Curiosity Increases Equality in Competitive Resource Allocation*. ICLR Workshop on Bridging AI and Cognitive Science, 2020.

Sudeep Dasari, Frederik Ebert, Stephen Tian, Suraj Nair, **Bernadette Bucher**, Karl Schmeckpeper, Siddharth Singh, Sergey Levine, Chelsea Finn. *RoboNet: Large-Scale Multi-Robot Learning*. CoRL, 2019. Also at NeurIPS Workshop on Deep Reinforcement Learning, 2019.

Bernadette Bucher, Anton Arapin, Ramanan Sekar, Feifei Duan, Marc Badger, Kostas Daniilidis, Oleh Rybkin. *Perception-Driven Curiosity with Bayesian Surprise*. RSS Workshop on Combining Learning and Reasoning Towards Human-Level Robot Intelligence, 2019.

Kenneth Chaney*, **Bernadette Bucher***, Evangelos Chatzipantazis, Jianbo Shi, Kostas Daniilidis. *Unsupervised Monocular Depth and Latent Structure*. CVPR Workshop on 3D Scene Understanding for Vision, Graphics, and Robotics, 2019.

Bernadette Bucher. Mathematically Modeling the Spread of Methamphetamine Use. Masters Thesis. The University of Alabama Libraries Digital Collections, 2014. 1561337.

Industry Experience

Senior Software Engineer (September 2016 - August 2019, King of Prussia, PA)

Warfighter Solutions

Rotary and Mission Systems, Lockheed Martin Corporation

- Engineering team author for \$200+ million winning government proposal.
- Architecture team lead for internal research effort of 2 to 12 people. Executed demos for customer engagements. Transitioned technology to affiliated business capture efforts.
- Author and demo lead for multiple RFI responses to various government customers.
- Designed and developed suite of configurable digital signal processing algorithms for real-time software defined radio platforms in C++ and CUDA.
- Supported integration of algorithm software suite for different applications and waveforms across multiple programs including government contracts and internal research efforts.
- Led and supported multiple physical layer development and RF integration processes from algorithm simulation through hardware integration.
- Interviewed 50+ engineering candidates to support division staffing.

Software Engineer (January 2015 - September 2016, Gaithersburg, MD & King of Prussia, PA)

GEOINT Visualization Services

Space Systems Company, Lockheed Martin Corporation

- Designed, developed, and maintained full stack web-based mapping software.
- POC for users developing with our API to build plugins for our applications.
- Led 3 to 8 person software engineering team in planning complete sprints, ran daily scrum meetings, and wrote new stories during periods as an Agile Scrum Master.

Systems Integration and Test Engineer (September 2014 - January 2015, Gaithersburg, MD)

Integrated Exploitation Capabilities

Information Systems and Global Solutions, Lockheed Martin Corporation

- Evaluated image processing algorithms for technology assessment of existing software.
- Developed and maintained C++ and Java based software products on an Agile team.

Selected Presentations

Improving Predictive Models with Curiosity. Invited speaker. University of Pennsylvania, GRASP Student Seminar Series, April 2020.

Perception-Driven Representations for Autonomous Robotics. Invited speaker. Massachusetts Institute of Technology, CSAIL, Robotics Seminar, November 2019.

Geometric Deep Learning. Invited speaker. University of Alabama, Department of Mathematics, Applied Mathematics Seminar, April 2019.

Error Correcting Codes. Invited speaker. Lockheed Martin Corporation, Rotary and Mission Systems, Warfighter Solutions Lunch and Learn Series, September 2017.

Digital Demodulation. Invited speaker. Lockheed Martin Corporation, Rotary and Mission Systems, Warfighter Solutions Lunch and Learn Series, March 2017.

Mathematics Careers in Digital Signals Processing. Invited speaker. Villanova University, Department of Mathematics, Association of Women in Mathematics, February 2017.

Modeling Illicit Drug Use: How Does Methamphetamine Use Spread Through Urban and Rural Populations? Poster presentation. Joint Mathematics Meetings, January 2014.

The Navier-Stokes Equations: A Survey of Progress and Problems. Invited speaker. University of Alabama, Department of Mathematics, Mathematics Seminar, November 2013.

Infectious Disease Modeling and the Spread of Methamphetamine Use. Invited speaker. University of Alabama, Department of Mathematics, Pi Mu Epsilon, October 2013.

Selected Honors and Awards

Haidas and Chryssikou Fellowship	2020-2021
Rising Stars Executive Mentoring Program, Lockheed Martin Corporation	2018-2019
Special Recognition Award, Lockheed Martin Corporation	2017
New Business Capture Award, Lockheed Martin Corporation	2017
2 Spot Awards, Lockheed Martin Corporation	2016-2017
10+ Peer Awards, Lockheed Martin Corporation	2015-2018
Outstanding Presenter Award, Joint Mathematics Meetings	2014
Double Major with Distinction Award	2014
Faculty Excellence Award in Economics	2013
Analytic Excellence in Business Award	2013
Special Achievement Award in Economics	2012
University of Alabama Presidential Scholarship	2010-2014
University of Alabama Engineering Scholarship	2010-2012

Selected Teaching and Outreach

Head Teaching Assistant Automata, Computability and Complexity (CIS 262) <i>Dr. Jean Gallier, University of Pennsylvania</i>	January 2020 - May 2020
Team Mentor, George Washington Carver High School <i>FIRST Tech Challenge</i>	August 2019 - February 2020
Teaching Assistant Advanced Topics in Machine Perception (CIS 680) <i>Dr. Jianbo Shi, University of Pennsylvania</i>	August 2019 - December 2019
Mentor, Research and Engineering Apprenticeship Program <i>Army Engineering Outreach Program</i>	June 2019 - August 2019
Volunteer Teacher <i>Cool Careers in Cybersecurity for Girls Workshop</i>	December 2014
Lab Instructor, Mathematics Technology Learning Center <i>The University of Alabama</i>	January 2013 - May 2014

Selected Research and Leadership Experience

GRASP Lab Student Advisory Committee, University of Pennsylvania	2020-present
Vice President, Pi Mu Epsilon, University of Alabama Chapter	2013-2014
REU in Modeling and Industrial Applied Mathematics, NC State University	2013
REU in Algorithmic Combinatorics on Words, UNC at Greensboro	2012
Coxswain, University of Alabama NCAA Division I Women's Rowing Team	2010-2013