
Christine Allen-Blanchette

Assistant Professor, Department of Mechanical and Aerospace Engineering
Assistant Professor, Center for Statistics and Machine Learning
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Professional Appointments

Princeton University

Assistant Professor, [Department of Mechanical and Aerospace Engineering](#) Princeton, NJ
Assistant Professor, [Center for Statistics and Machine Learning \(CSML\)](#) July 2022 - Present
Associated Faculty, [Department of Computer Science](#)
Postdoctoral Researcher, [Department of Mechanical and Aerospace Engineering](#) August 2019 - July 2022
Presidential Postdoctoral Research Fellow

CAB Lab

Founder and Director 2022 - Present

ML4PEARL: Machine Learning for Political Economy and Race Lab

Co-Founder and Scientific Advisor 2020 - Present

Education

University of Pennsylvania

Ph.D., [Department of Computer and Information Science](#) Philadelphia, PA
Spring 2020

Dissertation: Leveraging Symmetric Structure for Improved Learning in Convolutional Neural Networks

Advisor: Prof. Kostas Daniilidis

NSF IGERT Complex Scene Perception Fellow

Distinguished Fontaine Fellow

M.S.E., [Robotics](#)

GEM Fellow May 2013

San Jose State University

B.S. Computer Engineering San Jose, CA
August 2011

B.S. Mechanical Engineering
August 2011

David A. Brown Mechatronics Fellow

Honors, Awards and Fellowships

2023-24 CSML Research Software Engineer, Princeton University

2023 DARPA AI Forward Workshop, Invited participant

2019-22 Presidential Postdoctoral Research Fellows, Princeton University
2019-21 Provost Postdoctoral Fellow, University of Pennsylvania (declined offer)
2012-19 Fontaine Fellowship, University of Pennsylvania
2016 FOCUS Fellows, Georgia Institute of Technology
2015 NextProf Future Faculty Workshop, University of Michigan
2012-14 NSF IGERT Complex Scene Perception Fellowship, University of Pennsylvania
2012 GEM Fellowship, University of Pennsylvania
2010 Summer Undergraduate Research Fellowship, Georgia Institute of Technology
2007 David A. Brown Fellowship in Mechatronics, San Jose State University

Grants

2024 [Strategic University Research Partnership \(SURP\) Program Research Award](#)
University PI, Physics-Guided Deep Learning for Interpretable Parachute System Dynamics;
JPL-PI Clara O'Farrell

2024 [Princeton Center for Complex Materials Seed Proposal](#), Princeton University
PI, Controlling collective behaviors in bacterial active matter with graph neural networks;
Co-PI: Sujit Datta (CBE); Amount: \$60,000; Period: January 1, 2024 - December 31, 2024

2023-25 [PCI Collaboration Funding](#), Princeton University
Co-PI, More is different: Learning the organizing principles of microbial communities with graph neural networks; Co-PI: Sujit Datta (CBE); Amount: \$120,000 (Allen-Blanchette share);
Period: August 1, 2023 - August 1, 2025

2023-24 [SEAS Innovation Research Grant](#), Princeton University
PI, Discovering the structure of mechanical systems from video; Amount: \$120,000;
Period: August 1, 2023 - July 31, 2024

2023 [Keller Center Course Development Support](#), Princeton University
PI, Deep Learning and Physical Systems Course Development; Amount: \$3,360;
Period: June 1, 2022 - August 31, 2022

2020-21 [Council on Science and Technology \(CST\) Award](#), Princeton University

Publications

* indicates equal contribution, Student authors highlighted in blue

Peer-reviewed journal articles

1. [J. Mason*](#), [C. Allen-Blanchette*](#), [N.F. Zolman](#), E. Davison, N.E. Leonard, Learning to predict 3D rotational dynamics from images of a rigid body with unknown mass distribution, *Aerospace* 2023 10(11):921

Peer-reviewed archival conference articles

1. [Y. Yang*](#), [B. Feng*](#), [K. Wang](#), N.E. Leonard, A. Busso Dieng, [C. Allen-Blanchette](#), Behavior-inspired neural networks for relational inference, *Artificial Intelligence and Statistics (AISTATS)*, 2025
2. [F. O'Mahony*](#), [Y. Yang*](#), [C. Allen-Blanchette](#), Learning color equivariant representations, *International Conference on Learning Representations (ICLR)*, 2025

3. **C. Allen-Blanchette**, Hamiltonian GAN, *Proceedings of the 6th Annual Learning for Dynamics & Control Conference (L4DC)*, 2024 PMLR 242:1662-1674
4. C. Esteves, Y. Xu, **C. Allen-Blanchette**, K. Daniilidis, Equivariant multi-view networks, *International Conference on Computer Vision (ICCV)*, 2019 pp. 1568-1577. (Oral)
N.B. 25% acceptance (1077/4304) (187 short orals and 1077 posters)
5. C. Esteves, **C. Allen-Blanchette**, A. Makadia, K. Daniilidis, Learning SO(3) equivariant representations with spherical CNNs, *European Conference on Computer Vision (ECCV)*, 2018 pp. 54-70 (Oral)
N.B. 31.8% acceptance (776/2439) (59 orals and 717 posters)
6. C. Esteves, **C. Allen-Blanchette**, X. Zhou, K. Daniilidis, Polar transformer networks, *International Conference on Learning Representations (ICLR)*, 2018 pp. 4403-4412
N.B. 32.0% acceptance (314/981)
7. S. Leonardos, **C. Allen-Blanchette**, J. Gallier, The exponential map for the group of similarity transformations and applications to motion interpolation, *IEEE International Conference on Robotics and Automation (ICRA)*, 2015 pp. 377-382
N.B. 41% acceptance (932/2275)

Peer-reviewed workshop articles

1. **F. O'Mahony, Y. Yang, C. Allen-Blanchette**, Color equivariant network, *IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR)*, 2024 Workshop: EquiVision
2. **M. Coleman**, O. Russakovsky, **C. Allen-Blanchette**, Y. Zhu, Discrete diffusion reward guidance methods for offline reinforcement learning, *International Conference on Machine Learning (ICML)*, 2023 Workshop: Sampling and Optimization in Discrete Space
3. **J. Mason***, **C. Allen-Blanchette***, N.F. Zolman, E. Davison, N.E. Leonard, Learning interpretable dynamics from images of a freely rotating 3D rigid body, *Association for the Advancement of Artificial Intelligence (AAAI)*, 2022 Symposium on Knowledge-Guided AI
4. **C. Allen-Blanchette**, S. Veer, A. Majumdar, N.E. Leonard, LagNetViP: A Lagrangian neural network for video prediction, *Association for the Advancement of Artificial Intelligence (AAAI)*, 2020 Symposium on Physics-Guided AI

Patents

1. M. Rodnick, and **C. Allen-Blanchette**, [Systems and methods for dynamic alignment beam calibration](#), U.S. Patent No. 9,269,529, 23 Feb. 2016
2. M. Rodnick, and **C. Allen-Blanchette**, [Systems and methods for calibrating end effector alignment using at least a light source](#), U.S. Patent No. 8,954,287, 10 Feb. 2015
3. M. Rodnick, and **C. Allen-Blanchette**, [Systems and methods for calibrating end effector alignment in a plasma processing system](#), U.S. Patent No. 8,751,047, 10 Jun. 2014
4. M. Rodnick, and **C. Allen-Blanchette**, [Arrangements and methods for determining positions and offsets, U.S. Patent](#) No. 8,860,955, 14 Oct. 2014

Research Experience

University of Pennsylvania
Graduate Researcher, [GRASP Laboratory](#)

Philadelphia, PA
September 2012 - May 2013

Invited Talks

2024

1. Princeton Plasma Physics Lab, Computational Sciences Department Seminar, Oct 31
Symmetry Preserving Neural Networks
2. Princeton University, [AI for Accelerating Invention](#), Aug 29
Behavior-Inspired Neural Networks
3. University of Southern California, [Autonomous Networks Research Group](#), June 26
Hamiltonian GAN
4. Air Force Research Lab, [Autonomy Capability Team ACT3](#), June 11
Learning with Physical Priors
5. University of Maryland, [Maryland Robotics Center](#), May 3
Learning Hamiltonian Dynamics from Video
6. University of California San Diego, [Control Seminar](#), April 12
Learning Hamiltonian Dynamics from Video

2023

1. Princeton University, [Princeton Optimization Seminar](#), Dec 7
Learning Hamiltonian Dynamics from Video
2. Princeton University, [Creative Convergence: At the Crossroads of Dance, Ecology, Neuroscience, and Control Engineering](#), Oct 27
Learning Hamiltonian Dynamics from Video
3. [University of Washington, AI Institute in Dynamical Systems](#), May 5
Video modeling with Lagrangian/Hamiltonian neural networks

2022

1. [Boston University, Center for Information & Systems Engineering \(CISE\)](#), Feb 11
Leveraging Dataset Structure for Neural Network Prediction

2021

1. [Lawrence Livermore National Laboratory, Center for Advanced Signal and Image Sciences \(CASIS\)](#), Aug 4
Leveraging Dataset Symmetries in Neural Network Prediction
2. University of Pennsylvania, Matni Lab, May 10
GIRL: A Generative Model of Image Representations and Learned Lie Invariants

2020

1. UC Berkeley, SemiAutonomous Seminar, Oct 9
Learning & Leveraging Dataset Symmetries in Neural Network Prediction

2. [University of Pennsylvania, Foundations of Image Processing: Workshop on Equivariance and Data Augmentation](#), Sept 4
LagNetViP: A Lagrangian Neural Network for Video Prediction
3. [University of Florida, Nonlinear Controls and Robotics Seminar](#), Sept 16
LagNetViP: A Lagrangian Neural Network for Video Prediction
4. [University of Pennsylvania, Kod*lab](#), Aug 31
LagNetViP: A Lagrangian Neural Network for Video Prediction

2018-2019

1. Princeton University, Jan 31, 2019
Equivariant Filtering in CNNs
2. [University of Pennsylvania, Kod*lab](#), June 26, 2018
Equivariant Filtering in CNNs

Conference Talks

2024

1. **Keynote** at the New York University, [NYC Computer Vision Day](#), April 1
Representing color as a symmetry
2. **Keynote** at the Microsoft Research Project Green Workshop, March 17
Towards structured representations in deep models and policies: symmetries, compactness, and vector homomorphisms
Configuration-space discovery with structured self-supervised learning

2023

1. [Waseda University, International Council for Industrial and Applied Mathematics \(ICIAM\)](#), Aug 25
[Workshop on Learning Dynamical Systems by Preserving Symmetries, Energies, and Variational Principles](#)
Learning video models with Lagrangian/Hamiltonian neural networks
2. [Society for Industrial and Applied Mathematics Conference on Computational Science and Engineering \(SIAM CSE\)](#), March 3
[Workshop on Structure-preserving model reduction for Lagrangian and Hamiltonian systems](#)
Learning Dynamics from Images Using Lagrangian/Hamiltonian Structure

2022

1. [Society for Industrial and Applied Mathematics Conference on Mathematics of Datascience \(SIAM MDS\)](#), Sept 30
[Workshop on Exploiting Hamiltonian Structure in Learning Dynamical System Models for Prediction and Control](#)
Leveraging Hamiltonian Structure to Learn Rigid Body Dynamics from Images
2. [Society for Industrial and Applied Mathematics Conference on Mathematics of Datascience \(SIAM MDS\)](#), Sept 26
[Workshop on Learning Dynamical Systems by Preserving Symmetries, Energies, and Variational Principles](#)
Leveraging Dataset Symmetries in Neural Network Prediction

2021

1. [IEEE Conference on Decision and Control \(CDC\): Workshop on Robust Deep Learning-based Control](#), Dec 12
Leveraging Dataset Symmetries in Neural Network Prediction

Guest Lectures

2024

1. Princeton University, [CSML Wintersession: What is Machine Learning and Can it AID My Research?](#), Jan 17
Learning Hamiltonian Dynamics from Video

2023

1. Princeton University, COS 597R guest lecture, Dec 4
Learning Hamiltonian Dynamics from Video
2. Princeton University, SML 301 guest lecture, April 12
Video modeling with Lagrangian/Hamiltonian neural networks

Presentations

- | | |
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| 2020 | LagNet: Lagrangian Neural Networks, Princeton Neuroscience Institute |
| 2020 | LagNet: Lagrangian Neural Networks, Princeton University |
| 2018 | 3D Object Classification, NSF-IUCRC ROSE-HUB, Minneapolis, MN |
| 2017 | Equivariant networks, NSF-IUCRC ROSE-HUB, Denver, CO |
| 2014 | Motion Interpolation in SIM(3), GEM Annual Board Meeting and Conference, San Diego, CA |

Teaching Experience

Princeton University

1. MAE 542: Advanced Dynamics, Instructor (Fall 2022 & 2023)
This course introduces students to principles and methods for formulating and analyzing mathematical models of physical systems; Newtonian, Lagrangian, and Hamiltonian formulations of particle and rigid body dynamics; canonical transformations; integrable and nonintegrable systems.
2. MAE 432/576: Special Topics: Deep Learning and Physical Systems, Instructor (Spring 2021 & 2023)
This course introduces students to geometric deep learning through reading and coding assignments. Reading assignments are disseminated through a mock conference on EasyChair, where students act as peer reviewers and respond to the reviews of other students. Programming assignments are disseminated through GitHub Classroom, where students review each other's code in code reviews.
3. Reading Seminar: Machine Learning and Dynamical Systems - Reinforcement Learning, Instructor (Fall 2020)
4. Reading Seminar: Machine Learning and Dynamical Systems - Graph Neural Networks, Instructor (Summer 2020)

University of Pennsylvania

1. Machine Perception (graduate course), Teaching Assistant (Spring 2018)
2. Course in College Teaching, Trainee (Spring 2017)
3. [edX Robotics: Vision Intelligence and Machine Learning](#), Teaching Assistant & Course Developer (Summer 2017)
4. [Research Experience for Teachers \(RET\)](#) - Linear Algebra, Instructor (Summer 2016)
5. Computer Organization and Design (undergraduate course), Teaching Assistant (Spring 2014)
6. Introduction to Cognitive Science (undergraduate course), Teaching Assistant, (Fall 2013)

San Jose State University

1. Robotics, Teaching Assistant - Curriculum Design (Summer 2007, Spring 2007, 2007 AY)
2. Robotics, Teaching Assistant - Course Developer (Summer 2006)

Professional Service

Program chair

2024 Learning for Dynamics & Control Conference (L4DC), *Oxford, England*

Area chair

2023 Learning for Dynamics & Control Conference (L4DC), *Philadelphia, PA*

Workshop co-organizer

- 2025 Structure-preserving machine learning for physical applications
SIAM Computational Science and Engineering, Fort Worth, TX
- 2024 Equivariant Robotics: The Role of Symmetry Across Perception, Estimation, and Control
International Conference on Intelligent Robots and Systems (IROS) 2024, Abu Dhabi, UAE
- 2024 Equivariant Vision: From Theory to Practice
Computer Vision and Pattern Recognition (CVPR) 2024, Seattle, WA
- 2022 Learning Dynamical Systems by Preserving Symmetries, Energies, and Variational Principles,
SIAM Conference on Mathematics of Data Science, *San Diego, CA*
- 2021 Robust Deep Learning-Based Control, IEEE Conference on Decision and Control (CDC), *Virtual*

Reviewer

1. Physica D: Nonlinear Phenomena (2023 & 2024)
2. National Science Foundation (NSF) Panelist (2023)
3. Artificial Intelligence and Statistics (AISTATS)
4. International Conference on Machine Learning (ICML)
5. Conference on Computer Vision and Pattern Recognition (CVPR)
6. International Conference on Learning Representations (ICLR)
7. European Conference on Computer Vision (ECCV), High-quality Review Award 2020
8. Conference on Neural Information Processing Systems (NeurIPS)
9. Winter Conference on Applications of Computer Vision (WACV)
10. Asian Conference on Computer Vision (ACCV)

DEI and Outreach

N.B. Out of the 15 students I have advised at Princeton, 8 have been URM students

Invited Talks

- 2024 University of Southern California, [National Action Council for Minorities in Engineering \(NACME\) Artificial Intelligence - Machine Learning Intensive Summer Bootcamp](#), July 3
Learning with Physical Priors
- 2023 **Distinguished Speaker** at the Princeton University NSBE Chapter's Fall Zone Conference, October 28

Leveraging Dataset Structure for Neural Network Prediction

Teaching

University of Southern California

[National Action Council for Minorities in Engineering \(NACME\)](#) / [Apple Artificial Intelligence Machine Learning \(AIML\) Intensive Summer Bootcamp](#), Instructor (Summer 2024)

This program is an all expense paid, 8-week summer bootcamp for minoritized undergraduate students in computer science and engineering (16 students). Over the course of the program, students attend lectures and complete lab assignments from 9am to 5pm every work day. I taught the Deep Learning Module (15 Lectures).

University of Kentucky

National Action Council for Minorities in Engineering (NACME) / Google Applied Machine Learning Intensive (AMLI) Bootcamp, Instructor (Summer 2021 & 2022)

This program is an all expense paid, 8-week summer bootcamp for minoritized undergraduate students in computer science and engineering (17 students in 2021, 19 students in 2022). Over the course of the program, students attend lectures and complete lab assignments from 9am to 5pm every work day. I taught the Deep Learning Module (15 Lectures).

Mentorship

N.B. URM recruitment and retention activities are noted here (e.g., academic and social advising, recommendation letters)

Takiya Eastmond, Undergraduate at Morgan State University (current)

Madison Hobbs, Undergraduate at Harvey Mudd (now MS student at MIT)

Jasmine M. DeHart, PhD student advised by Christan Grant at University of Florida

Jazzmin Robinson, Undergraduate at George Mason University (now PhD student at UMD)

Diego Patino, Postdoctoral Fellow at Drexel (now Assistant Professor at UTA)

Matthew Coleman, Undergraduate at Princeton University (now Robotics Engineer at LANL)

Promise Ekpo, Masters student at Princeton University (now PhD student at Cornell)

Felix O'Mahony, Undergraduate at Oxford/Princeton

Zyaire Howard, Undergraduate at University of Illinois Urbana-Champaign

Outreach

2024	University of Southern California, National Action Council for Minorities in Engineering (NACME), Graduate School Myths, Panelist, July 3
2022	Princeton University, Council on Science and Technology (CST), Women in STEM, Panelist, September 21
2018	University of Delaware, AMP Graduate Degrees for Minorities in Engineering (GEM) GRAD Lab, Why Graduate School? Panelist, April 6
2017	Massachusetts Institute of Technology, Data for Black Lives Conference, Ask a Data Scientist - Panelist, November 17-19
2017	University of Pennsylvania, DataRescue Philly, Seeder/Sorter, January 14
Summer 2016	University of Pennsylvania, Research Experience for Teachers (RET), Mentor
Spring 2015	University of Pennsylvania, iPraxis, Coding Scientist

Fall 2014

University of Pennsylvania, West Philly Tutoring Project (WPTP), Math Tutor (4th grade)

Professional Experience

BAE Systems

Software Engineering Intern

Developed software emulators for vehicle components

Santa Clara, CA

June 2009 - April 2010

Lam Research

Mechatronics Intern

Developed techniques for improved silicon wafer centering

Fremont, CA

July 2007 - August 2008