

# Katherine Driggs-Campbell

Assistant Professor

Dept. of Electrical and Computer Engineering | Coordinated Science Laboratory  
University of Illinois at Urbana-Champaign

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## Academic Appointments

### Assistant Professor – 2019 to present

Department of Electrical and Computer Engineering  
Affiliate Appointment in Department of Computer Science  
Coordinated Science Laboratory  
University of Illinois at Urbana-Champaign

### Postdoctoral Research Scholar – June 2017 to Dec. 2018

Department of Aeronautics and Astronautics  
Stanford University

## Education

### University of California, Berkeley, Berkeley, California

Advisor: Professor Ruzena Bajcsy  
Ph.D., Electrical Engineering and Computer Sciences – May 2017  
Thesis: *Tools for Trustworthy Autonomy: Robust Predictions, Intuitive Control, and Optimized Interaction*  
M.S., Electrical Engineering and Computer Sciences – May 2015  
Thesis: *Experimental Design for Human-in-the-Loop Driving Simulations*

### Arizona State University, Tempe, AZ

B.S.E., Electrical Engineering with Honors - May 2012  
Summa Cum Laude  
Outstanding Graduating Senior in Electrical Engineering

## Journal Publications

The (\*) indicates that the author was a graduate student supervised by Katie Driggs-Campbell at the time of the publication. The (°) indicates that the author was an undergraduate student supervised by Katie Driggs-Campbell at the time of publication.

### J1. Improving the Feasibility of Moment-Based Safety Analysis for Stochastic Dynamics.

P. Du\*, K. Driggs-Campbell, and R. Dong. Transactions on Automatic Control (TAC), Aug. 2022.

### J2. Proactive Anomaly Detection for Robot Navigation with Multi-Sensor Fusion.

T. Ji\*, A. Narenthiran Sivakumar, G. Chowdhary, K. Driggs-Campbell. IEEE Robotics and Automation Letters (RA-L), Feb. 2022.

### J3. Learning Sparse Interaction Graphs of Partially Observed Pedestrians for Trajectory Prediction.

Z. Huang\*, R. Li°, K. Shin°, K. Driggs-Campbell. IEEE Robotics and Automation Letters (RA-L), Dec. 2021.

- J4. Long-term Pedestrian Trajectory Prediction using Mutable Intention Filter and Warp LSTM.**  
Z. Huang\*, A. Hasan\*, K. Shin<sup>o</sup>, R. Li<sup>o</sup>, K. Driggs-Campbell. IEEE Robotics and Automation Letters (RA-L), Dec. 2020.
- J5. Combining Planning and Deep Reinforcement Learning in Tactical Decision-Making for Autonomous Driving.**  
C.J. Hoel, K. Driggs-Campbell, K. Wolff, L. Laine, M.J. Kochenderfer. IEEE Transactions on Intelligent Vehicles, June 2020.  
*George N. Saridis Best Transactions Paper Award Winner.*
- J6. Finding Diverse Failure Scenarios in Autonomous Systems Using Adaptive Stress Testing.**  
P. Du\*, K. Driggs-Campbell. SAE Intl. Journal of Connected and Automated Vehicles, Dec. 2019.
- J7. Robust, Informative Human-in-the-Loop Predictions via Empirical Reachable Sets.**  
K. Driggs-Campbell, R. Dong, R. Bajcsy. IEEE Transactions on Intelligent Vehicles, June 2018.
- J8. Integrating Intuitive Driver Models in Autonomous Planning for Interactive Maneuvers.**  
K. Driggs-Campbell, V. Govindarajan, R. Bajcsy. IEEE Transactions on Intelligent Transportation Systems: Special Issue on Applications and Systems for Collaborative Driving, Oct. 2017.
- J9. Semi-Autonomous Vehicular Control Using Driver Modeling.**  
V. Shia, Y. Gao, R. Vasudevan, K. Driggs-Campbell, T. Lin, F. Borrelli, R. Bajcsy. IEEE Transactions on Intelligent Transportation Systems, June 2014.
- J10. Wireless Hybrid Chemical Sensor for Detection of Environmental Volatile Organic Compounds.**  
C. Chen, F. Tsow, K. Driggs-Campbell, R. Iglesias, E. Forzani, N. Tao. IEEE Sensors Journal, May 2013.
- J11. A new sensor for the assessment of personal exposure to volatile organic compounds.**  
K. Driggs-Campbell, C. Chen, I. Negi, N. Tao, F. Tsow, E. Forzani. Atmospheric Environment, 2012.

### Peer Reviewed Conference Publications

The (\*) indicates that the author was a graduate student or postdoc supervised by Katie Driggs-Campbell at the time of the publication. The (<sup>o</sup>) indicates that the author was an undergraduate student supervised by Katie Driggs-Campbell at the time of publication. The (†) indicates equal contribution.

- C1. PeRP: Personalized Residual Policies For Congestion Mitigation Through Co-operative Advisory Systems**  
A. Hasan\*, N. Chakraborty\*, H. Chen\*, J-H Cho, C. Wu, K. Driggs-Campbell. IEEE International Conference on Intelligent Transportation Systems (ITSC), 2023.
- C2. An Attentional Recurrent Neural Network for Occlusion-Aware Proactive Anomaly Detection in Field Robot Navigation**  
A. Schreiber\*, T. Ji\*, D.L. McPherson\*, K. Driggs-Campbell. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2023.
- C3. Towards Safety of Multi-Level Human-Robot Interaction in Industrial Tasks**  
Z. Huang\*, Y. Mun\*, H. Chen\*, Y. Xie\*, Y. Niu<sup>o</sup>, X. Li\*, N. Zhong<sup>o</sup>, H. You<sup>o</sup>, D.L. McPherson\*, K. Driggs-Campbell. IEEE Conference on Automation Science and Engineering (CASE), Special Session on Cyberphysical Manufacturing Networks, 2023.
- C4. Learning Task Skills and Goals Simultaneously from Physical Interaction**  
H. Chen\*, Y. Mun\*, Z. Huang\*, Y. Niu<sup>o</sup>, Y. Xie\*, D.L. McPherson\*, K. Driggs-Campbell. IEEE Conference on Automation Science and Engineering (CASE), Special Session on Cyberphysical Manufacturing Networks, 2023.

**C5. Online Soil Property Estimation for Autonomous Earthmoving Using Physics-Infused Neural Networks**

W.J. Wagner\*, A. Soylemezoglu, D. Nottage, K. Driggs-Campbell. Conference of the International Society for Terrain-Vehicle Systems (ISTVS), 2023.

**C6. Dynamic-Resolution Model Learning for Object Pile Manipulation**

Y. Wang\*, Y. Li<sup>+</sup>, K. Driggs-Campbell, F. Li, J. Wu. Robotics: Science and Systems (RSS), 2023.

**C7. Occlusion-Aware Crowd Navigation Using People as Sensors**

Y.J. Mun\*, M. Itkina, S. Liu\*, K. Driggs-Campbell. IEEE International Conference on Robotics and Automation (ICRA), 2023.

**C8. Towards Robots that Influence Humans over Long-Term Interaction**

S. Sagheb, Y.J. Mun\*, N. Ahmadian, B. Christie, A. Bajcsy, K. Driggs-Campbell, D. Losey. IEEE International Conference on Robotics and Automation (ICRA), 2023.

**C9. Hierarchical Intention Tracking for Robust Human-Robot Collaboration in Industrial Assembly Tasks**

Z. Huang\*, Y.J. Mun\*, X. Li<sup>o</sup>, Y. Xie<sup>o</sup>, N. Zhong<sup>o</sup>, W. Liang\*, J. Geng\*, T. Chen\*, K. Driggs-Campbell. IEEE International Conference on Robotics and Automation (ICRA), 2023.

**C10. Intention Aware Robot Crowd Navigation with Attention-Based Interaction Graph**

S. Liu\*, P. Chang\*, Z. Huang\*, N. Chakraborty\*, K. Hong\*, W. Liang\*, D. L. McPherson\*, J. Geng\*, K. Driggs-Campbell. IEEE International Conference on Robotics and Automation (ICRA), 2023.

**C11. Learning Visual-Audio Representations for Voice-Controlled Robots**

P. Chang\*, S. Liu\*, D. L. McPherson\*, K. Driggs-Campbell. IEEE International Conference on Robotics and Automation (ICRA), 2023.

**C12. Structural Attention-based Recurrent Variational Autoencoder for Highway Vehicle Anomaly Detection**

N. Chakraborty\*, A. Hasan\*, S. Liu\*, T. Ji\* , W. Liang\*, D.L. McPherson\*, K. Driggs-Campbell. ACM International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2023.

**C13. Robust Output Feedback MPC with Reduced Conservatism under Ellipsoidal Uncertainty**

T. Ji\*, J. Geng\*, and K. Driggs-Campbell. IEEE Conference on Decision and Control (CDC), 2022.

**C14. Model Learning and Predictive Control for Autonomous Obstacle Reduction via Bulldozing**

J. Wagner\*, K. Driggs-Campbell, A. Soylemezoglu. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2022.

**C15. CoCAtt: A Cognitive-Conditioned Driver Attention Dataset**

Y. Shen\*, N. Wijayarathne<sup>o</sup>, P. Sriram<sup>o</sup>, A. Hasan\*, P. Du\*, and K. Driggs-Campbell. IEEE Intelligent Transportation Systems Conference (ITSC), 2022.

**C16. Combining Model-Based Controllers and Generative Adversarial Imitation Learning for Traffic Simulation**

H. Chen\*, T. Ji\*, S. Liu\*, and K. Driggs-Campbell. IEEE Intelligent Transportation Systems Conference (ITSC), 2022.

**C17. An Interdisciplinary Approach: Potential for Robotic Support to Address Wayfinding Barriers Among Persons with Visual Impairments**

M. A. Bayles, T. Kadylak, S. Liu\*, A. Hasan\*, W. Liang\*, K. Hong\*, K. Driggs-Campbell, and W. A. Rogers. Human Factors and Ergonomics Society's International Annual Meeting (HFES), 2022.

**C18. Examining Audio Communication Mechanisms for Supervising Fleets of Agricultural Robots**

A. Kamboj<sup>o</sup>, T. Ji\*, K. Driggs-Campbell. IEEE International Conference on Robot and Human Interactive Communication (RO-MAN), 2022.

**C19. Traversing Supervisor Problem: An Approximately Optimal Approach to Multi-Robot Assistance**

T. Ji\*, R. Dong, K. Driggs-Campbell. *Robotics: Science and Systems (RSS)*, 2022.

**C20. Learning to Navigate Intersections with Unsupervised Driver Trait Inference.**

S. Liu\*, P. Chang\*, H. Chen\*, N. Chakraborty\*, K. Driggs-Campbell. *IEEE International Conference on Robotics and Automation (ICRA)*, 2022.

**C21. Off Environment Evaluation Using Convex Risk Minimization.**

P. Katdare\*, S. Liu\*, K. Driggs-Campbell. *IEEE International Conference on Robotics and Automation (ICRA)*, 2022.

**C22. Meta-path Analysis on Spatio-Temporal Graphs for Pedestrian Trajectory Prediction.**

A. Hasan\*, P. Sriram<sup>o</sup>, K. Driggs-Campbell. *IEEE International Conference on Robotics and Automation (ICRA)*, 2022.

**C23. Multi-Agent Variational Occlusion Inference Using People as Sensors.**

M. Itkina, Y.J. Mun\*, K. Driggs-Campbell, M.J. Kochenderfer. *IEEE International Conference on Robotics and Automation (ICRA)*, 2022.

**C24. Decentralized Structural-RNN for Robot Crowd Navigation with Deep Reinforcement Learning.**

S. Liu<sup>\*\*</sup>, P. Chang<sup>\*\*</sup>, W. Liang\*, N. Chakraborty<sup>o</sup>, K. Driggs-Campbell. *IEEE International Conference on Robotics and Automation (ICRA)*, 2021.

**C25. Adaptive Failure Search Using Critical States from Domain Experts.**

P. Du\*, K. Driggs-Campbell. *IEEE International Conference on Robotics and Automation (ICRA)*, 2021.

**C26. Multi-Modal Anomaly Detection for Unstructured and Uncertain Environments.**

T. Ji\*, S.T. Vuppala, G. Chowdhary, K. Driggs-Campbell. *Conference on Robot Learning (CoRL)*, 2020.

**C27. Robot Sound Interpretation: Combining Sight and Sound in Learning-Based Control.**

P. Chang\*, S. Liu\*, H. Chen<sup>o</sup>, K. Driggs-Campbell. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2020.

**C28. Online Monitoring for Safe Pedestrian-Vehicle Interactions.**

P. Du\*, Z. Huang\*, T. Ji\*, T. Liu, K. Xu\*, Q. Gao, H. Sibai, K. Driggs-Campbell, S. Mitra. *IEEE International Conference on Intelligent Transportation Systems (ITSC)*, 2020.

**C29. Monte-Carlo Tree Search for Policy Optimization.**

X. Ma, K. Driggs-Campbell, Z. Zhang, M.J. Kochenderfer. *International Joint Conference on Artificial Intelligence (IJCAI)*, 2019.

**C30. Adaptive Stress Testing with Reward Augmentation for Autonomous Vehicle Validation.**

A. Corso<sup>+</sup>, P. Du<sup>+</sup>\*, K. Driggs-Campbell, M.J. Kochenderfer. *IEEE Intelligent Transportation Systems Conference (ITSC)*, 2019.

**C31. Dynamic Environment Prediction in Urban Scenes using Recurrent Representation Learning.**

M. Itkina, K. Driggs-Campbell, M.J. Kochenderfer. *IEEE Intelligent Transportation Systems Conference (ITSC)*, 2019.

**C32. EnsembleDagger: A Bayesian Approach to Safe Imitation Learning.**

K. Menda, K. Driggs-Campbell, M.J. Kochenderfer. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2019.

**C33. Simulating Emergent Properties of Human Driving Behavior Using Multi-Agent Reward Augmented Imitation Learning.**

R. Bhattacharyya, D. Phillips, C. Liu, J. Gupta, K. Driggs-Campbell, M.J. Kochenderfer. *IEEE International Conference on Robotics and Automation (ICRA)*, 2019.

- C34. HG-Dagger: Interactive Imitation Learning with Human Experts.**  
M. Kelly, C. Sidrane, K. Driggs-Campbell, M.J. Kochenderfer. IEEE International Conference on Robotics and Automation (ICRA), 2019.
- C35. Affective Driver State Monitoring for Personalized, Adaptive ADAS.**  
V. Govindarajan, K. Driggs-Campbell, R. Bajcsy. IEEE International Conference on Intelligent Transportation Systems (ITSC), 2018.
- C36. People as Sensors: Imputing Maps from Human Actions.**  
O. Afolabi<sup>+</sup>, K. Driggs-Campbell<sup>+</sup>, R. Dong, M.J. Kochenderfer, S.S. Sastry. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2018.
- C37. Improved Robustness and Safety for Autonomous Vehicle Control with Adversarial Reinforcement Learning.**  
X. Ma, K. Driggs-Campbell, M.J. Kochenderfer. IEEE Intelligent Vehicle Symposium, 2018.
- C38. Data-Driven Reachability Analysis for Human-in-the-Loop Systems.**  
V. Govindarajan, K. Driggs-Campbell, R. Bajcsy. IEEE Conference on Decision and Control, 2017.
- C39. Optimizing Interaction Between Humans and Autonomy via Information Constraints on Interface Design.**  
T. Rezvani, K. Driggs-Campbell, R. Bajcsy. IEEE International Conference on Intelligent Transportation Systems (ITSC), 2017.
- C40. Probabilistic driver modeling: Characterizing human behavior for semiautonomous vehicles.**  
K. Driggs-Campbell, V. Shia, R. Bajcsy. Chapter 5 of Vehicle Systems and Driver Modelling: DSP, Human-To-vehicle Interfaces, Driver Behavior, and Safety. Walter de Gruyter GmbH & Co KG, 2017.
- C41. Towards Trustworthy Automation: User Interfaces that Convey Internal and External Awareness.**  
T. Rezvani, K. Driggs-Campbell, D. Sadigh, S.S. Sastry, S. Seshia, R. Bajcsy. IEEE International Conference on Intelligent Transportation Systems (ITSC), 2016.
- C42. Communicating Intent on the Road Through Human-Inspired Control Schemes.**  
K. Driggs-Campbell, R. Bajcsy. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2016.
- C43. Comparing Generalized Models of Driver Intent in Dynamic Environments.**  
K. Driggs-Campbell, R. Bajcsy. IEEE Intelligent Vehicles Symposium, 2016.
- C44. Identifying Modes of Intent from Driver Behaviors in Dynamic Environments.**  
K. Driggs-Campbell, R. Bajcsy. IEEE International Conference on Intelligent Transportation Systems (ITSC), 2015.
- C45. Improving Human-In-The-Loop Decision Making in Multi-Mode Driver Assistance Systems Using Hidden Mode Stochastic Switched Systems.**  
C. Lam, A. Yang, K. Driggs-Campbell, R. Bajcsy, S.S. Sastry. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2015.
- C46. Improved Driver Modeling for Human-in-the-Loop Vehicular Control.**  
K. Driggs-Campbell, V. Shia, R. Bajcsy. IEEE International Conference on Robotics and Automation (ICRA), 2015.
- C47. Data-driven probabilistic modeling and verification of human driver behavior.**  
D. Sadigh, K. Driggs-Campbell, A. Puggelli, W. Li, V. Shia, R. Bajcsy, A. Sangiovanni-Vincentelli, S.S. Sastry, S. Seshia. Formal Verification and Modeling in Human-Machine Systems—AAAI Spring Symposium, 2014.

## Conference Posters, Workshop Papers, and Technical Reports

### **W1. To Explain or Not to Explain: A Study on the Necessity of Explanations in Autonomous Driving.**

Y. Shen\*, SJ Jiang<sup>o</sup>, Y. Chen<sup>o</sup>, E. Yang<sup>o</sup>, X. Jin<sup>o</sup>, Y. Fan<sup>o</sup>, *K. Driggs Campbell*. NeurIPS Workshop on Progress and Challenges in Building Trustworthy Embodied AI (TEA), 2023.

*Best Paper Award Winner.*

### **W2. Industrial Collaborative Assembly Project: Lessons in Research and Collaboration**

T. Chen, Z. Huang, J. Motes, J. Geng, Q. M. Ta, H. Dinkel, H. Abdul-Rashid, J. Myers, Y. Mun, W. Lin, Y. Huang, S. Liu, M. Morales, N. M. Amato, K. Driggs-Campbell, T. Bretl. Spotlight presentation at ICRA 2022 Workshop on Collaborative Robots and the Work of the Future, 2022.

### **W3. Towards Co-operative Congestion Mitigation**

A. Hasan, N. Chakraborty, C. Wu, K. Driggs-Campbell. ICRA Workshop on Shared Autonomy in Physical Human-Robot Interaction: Adaptability and Trust, 2022.

### **W4. Designing a Wayfinding Robot for People with Visual Impairments**

S. Liu\*, A. Hasan\*, K. Hong, S. Yao, J. Lin, W. Liang, M. A. Bayles, W. A. Rogers, *K. Driggs-Campbell*. ICRA Workshop on Intelligent Control Methods and Machine Learning Algorithms for Human-Robot Interaction and Assistive Robotics, 2022.

### **W5. AutoPreview: A Framework for Autopilot Behavior Understanding.**

Y. Shen\*, N. Wijayarathne<sup>o</sup>, P. Du\*, S.J. Jiang<sup>o</sup>, *K. Driggs-Campbell*. ACM CHI Conference on Conference on Human Factors in Computing Systems: Late-Breaking Work, 2021.

### **W6. Building Mental Models through Preview of Robot Behaviors.**

Y. Shen\*, N. Wijayarathne<sup>o</sup>, *K. Driggs-Campbell*. HRI Workshop: The Road to a successful HRI: AI, Trust and ethicS (TRAITS), 2021.

### **W7. Variational Occlusion Inference Using People as Sensors.**

M. Itkina, Y. Mun\*, *K. Driggs-Campbell*, M.J. Kochenderfer. NeurIPS Workshop: Women in Machine Learning (WiML), 2020.

### **W8. Safe Crowd Navigation in the Presence of Occlusion.**

Y. Mun\*, M. Itkina, *K. Driggs-Campbell*. NeurIPS Workshop: Women in Machine Learning (WiML), 2020.

### **W9. Multi-Modal Anomaly Detection for Unstructured and Uncertain Environments.**

T. Ji\*, S.T. Vuppala, G. Chowdhary, *K. Driggs-Campbell*. International Conference on Digital Technologies for Sustainable Crop Production (DIGICROP), 2020.

### **W10. Evaluation of Autonomous Vehicle Policies Using Adaptive Search.**

P. Du\*, *K. Driggs-Campbell*. IROS Workshop on Benchmarking Progress in Autonomous Driving, 2020.

### **W11. Levels of Autonomy for Field Robots.**

G. Chowdhary, C. Soman, *K. Driggs-Campbell*. White Paper, 2020. Available at <https://www.earthsense.co/news/2020/7/24/levels-of-autonomy-for-field-robots>

### **W12. Using Affective Measurements of Pedestrian Gait to Improve Autonomous Vehicle Performance in Mixed Driver Settings.**

*K. Driggs-Campbell*, A. LaViers. IROS Workshop: Machines with Emotions: Affect Modeling, Evaluation, and Challenges in Intelligent Cars, 2019.

### **W13. Occupancy Grid Prediction in Cluttered, Dynamic Environments.**

M. Itkina, *K. Driggs-Campbell*, M.J. Kochenderfer. NeurIPS Workshop: Women in Machine Learning (WiML), 2018.

**W14. Human-Centered Approach to Autonomy: Driver Modeling for Smart Vehicles.**

*K. Driggs-Campbell, V. Govindarajan, R. Bajcsy. IROS Workshop: Perspectives on Analysis and Design of Human-Centered Robotics, 2016.*

**W15. Decisions for Autonomous Vehicles: Integrating Sensors, Communication, and Control.**

*K. Driggs-Campbell, V. Shia, R. Bajcsy. ACM International Conference on High Confidence Networked Systems (HiCoNS) at CPS Week, 2014.*

**W16. Experimental Design for Human-in-the-Loop Driving Simulations.**

*K. Driggs-Campbell, G. Bellegarda, V. Shia, S. S. Sastry, R. Bajcsy. Technical Report – Available on arXiv:1401.5039, 2014.*

**W17. Probabilistic driver models for semiautonomous vehicles.**

*K. Driggs-Campbell, V. Shia, R. Vasudevan, F. Borrelli, R. Bajcsy. Digital Signal Processing for In-Vehicle Systems, 2013.*

**W18. Measurement of TVOC and BC with a lab-on-a-cell phone and sensor technology for personal exposure assessment.**

*J.M. Delgado-Saborit, B. Macias, R. Harrison, K. Driggs-Campbell, C. Chen, F. Tsow, E. Forzani, N. Tao. X2012 – International Conference on the Science of Exposure Assessment, 2012.*

## Invited Talks & Panels

- **On Smart, Collaborative Workcells in Next Generation Factories**
  - Invited Participant: NSF Workshop on Industry 4.0 and Collaborative Robotics, July 2023
- **Towards Trustworthy Autonomy: Inference and Prediction for Safe Interaction**
  - Invited Talk: FISITA Intelligent Safety Conference China, July 2023
- **Increasing the Level of Autonomy of Agricultural Robotics**
  - Invited Talk: IEEE CLOUD Symposium on the Distributed Computing Continuum, July 2023
- **Robust Navigation for Agricultural Robots via Anomaly Detection**
  - Invited Talk: CDA and 4H Digital Ag Workshop Series, June 2023
  - Invited Talk: PhenoRob Seminar Series, University of Bonne, April 2022
- **Towards Occlusion-Aware Autonomy Using People as Sensors**
  - Invited Talk: IV Symposium Workshop on Socially Interactive Autonomous Mobility, June 2023
  - Invited Talk: Autonomy Talks, ETH, Feb. 2023
  - Invited Talk: IROS Workshop on Behavior-Driven Autonomous Driving in Unstructured Environments, Oct. 2022
- **Understanding Human Attention and Communication Preferences in Highly Automated Vehicles**
  - Invited Talk: State Farm, Feb. 2023
- **Representing Interactions for Robot Navigation**
  - Invited Talk: NeurIPS Workshop on Robot Learning, Dec. 2022
  - Invited Talk: IIIT Allahabad Workshop on Human-Robot Interaction, Nov. 2022
- **Failure Identification for Semi- and Unstructured Robots (with human-centered applications)**
  - Invited Talk: NeurIPS Workshop on Progress and Challenges in Building Trustworthy Embodied AI (TEA), Dec. 2022
- **Tools for Interactive Autonomy: Modeling, Prediction, and Inference**
  - Invited Talk: Nuro Technical Seminar, July 2022

- **Fantastic Failures and Where to Find them: Considering Safety as a Function of Structure**
  - Invited Talk: Stanford AI Safety Seminar, June 2022
  - Invited Talk: NeurIPS Workshop on Machine Learning for Autonomous Driving (ml4AD), Dec. 2021
  - Invited Talk: MIT Robotics Seminar, Oct. 2021
- **Inference and Prediction for Safe Interaction**
  - Invited Talk: ACC Workshop on Human-Autonomy Interaction and Integration, June 2022
  - Invited Talk: 4<sup>th</sup> Workshop on Long-term Human Motion Prediction (ICRA), May 2022
- **Human-Centered Autonomy: From Fluid Interaction to Intuitive Design**
  - Invited Talk: Northwestern University Data Analytics Exchange, May 2022
- **Two Tough Navigation Problems: Robot Planning and Career Paths**
  - Keynote: Illinois Scholars Undergraduate Research Banquet, April 2022
- **Hey, I'm Walkin' Here! (how to help robots safely navigate among us)**
  - Illinois Saturday Engineering for Everyone, March 2022
- **Introducing CyMaN: A Joint Effort in Resilient Manufacturing and Collaborative Workspaces**
  - Invited Talk: ZJU-UIUC Research Forum (Engineering+), Jan. 2022
- **Inference, Prediction, and Representations for Safe Navigation**
  - Invited Talk: ICSR Workshop on Safe Human-Robot Interaction: Sensing, Modeling, and Learning, 2021
- **Uncovering Structure in Human-Robot Systems**
  - Invited Talk: CSL Future of Computing Symposium, 2021
- **Hey, I'm Walkin' Here! Inferring human behaviors from observations**
  - Invited Talk: CIRCLES Workshop on Traffic and Autonomy, 2021
- **Building Trustworthy Autonomy in Critical Scenarios**
  - Keynote: CHI Workshop on Towards Explainable and Trustworthy Autonomous Physical Systems, May 2021
- **Predictive Methods for Safe Vehicle-Pedestrian Interaction**
  - Invited Talk: UC Berkeley Semiautonomous Seminar, Jan. 2021
  - Invited Talk: IEEE Intelligent Vehicle Symposium Workshop - From Benchmarking Behavior Prediction to Socially Compatible Behavior Generation in Autonomous Driving, Nov. 2020
- **Inference and Prediction Insights for Safe Vehicle-Pedestrian Interaction**
  - Invited Talk: IPAM Workshop on Safe Operation of Connected and Autonomous Vehicle Fleets, Oct. 2020
- **Fantastic Failures and Where to Find Them**
  - Plenary Talk at c3.ai Safe Autonomy Workshop, December 2020
  - Keynote on Autonomy: Runtime Verification, October 2020
  - Invited Talk: Robotics: Science and Systems Workshop - Robust autonomy: Safe robot learning and control in uncertain real-world environments, July 2020
- **Tutorial on Designing Trustworthy Driver Assistance Systems**
  - Invited Lecture: Autonomous Vehicles and Transportation Long Program, Sept. 2020
- **Tutorial on Model Considerations for Behavior Estimation and Prediction**
  - Invited Lecture: Autonomous Vehicles and Transportation Long Program, Sept. 2020
- **Trustworthy Autonomy: Robust Decision-Making and Adaptive Validation**
  - Invited Talk: Sci-Tech Innovative Frontiers Forum | STIFF Lecture Series, April 2020



- **Trustworthy Autonomy: Behavior Prediction and Validation**
  - Invited Talk: Autonomous Systems Design at Design, Automation, and Test in Europe (DATE), March 2020
  - Guest Lecture: BioDesign Institute at Arizona State University, Feb. 2020
  - Invited Talk: IPAM workshop on Autonomous Vehicles, March 2019
- **Perspectives and Open Problems in Human-Robot Interaction**
  - Invited Panelist: CRA CCC Assured Autonomy Workshop: Panel for Human Interactions, Feb. 2020
  - Invited Talk and Participant: US Robotics Roadmap, Sept. 2019
- **Towards Robust Autonomy: Adversarial Learning and Adaptive Validation**
  - Invited Talk: UC Berkeley ITS Seminar, Nov. 2019
  - Invited Talk: IEEE ITSC Workshop on Decision-making for Self-driving Cars in Dynamic and Complex Environments, Oct. 2019
  - Invited Talk: Samsung Innovation Center, Aug. 2019
- **Panel on *Humans in network transportation systems***
  - Invited Panelist: NSF Workshop on Control for Networked Transportation Systems (CNTS) at ACC, July 2019
- **Robust, Informative Behavior Predictions for Trustworthy Autonomy**
  - Invited Talk: IEEE Intelligent Vehicle Symposium: Workshop on Prediction and Decision-Making for Socially Interactive Autonomous Driving, June 2019
- **Open Problems for Robotics and Cyber-Human Systems**
  - Invited Participant: Dagstuhl Seminar 19071 on Specification Formalisms for Modern CPS, Feb. 2019
- **State of the Art in Driver Modeling**
  - Invited Talk: Samsung Strategy and Innovation Center, Nov. 2018
- **Deep Learning and Validation for Automated Driving Systems**
  - Invited Talk: Waymo, July 2018
  - Invited Talk: SAE Innovations in Mobility, May 2018
- **Lecture on Combinatorial Optimization**
  - Guest Lecture: AA222: Algorithms for Optimization, May 2017
- **Trustworthy Autonomy: Algorithms for Human-Robot Systems**
  - Invited Talk: Department of Electrical Engineering Systems, USC, April 2018
  - Invited Talk: Department of Electrical and Computer Engineering, UIUC, March 2018
  - Invited Talk: Department of Electrical and Computer Engineering, UCSB, Feb. 2018
- **Human-Centered Autonomy: Uncovering Structure in Multi-Agent Systems**
  - Invited Talk: Department of Mechanical Engineering, McGill, March 2018
  - Invited Talk: Department of Mechanical Engineering, University of Michigan, March 2018
- **What are the Main Practical Safety Issues with AI Products?**
  - Invited Panelist: Re\*Work Deep Learning Summit Panel, Jan. 2018
- **Towards Trustworthy Autonomy**
  - Invited Talk: SAE Autonomous Vehicle Meetup, Oct. 2017
  - Invited Talk: Re\*Work Autonomous Vehicles Summit, March 2017
- **Understanding Driver Behaviors for Safe Interaction**
  - Invited Talk: GRASP Special Seminar, Feb. 2017

- **Driver Modeling for Safe Interaction: A data-driven hybrid systems approach**
  - Invited Talk: Autonomous Systems Lab (ASL), Feb. 2017
  - Invited Talk: Stanford Intelligent Systems Lab (SISL): Automotive Seminar, Jan. 2017
  - Invited Talk: Robotics Seminar, University of Michigan, Jan. 2017
  - Invited Talk: UCLA Vision Lab, Dec. 2016
- **Modeling Driver Behaviors in Semi- and Fully Autonomous Vehicles for Safe Interaction**
  - Invited Talk: Automatic Control Department Seminar at KTH, June 2016
- **Driver Modeling for Smart Vehicles**
  - Invited Talk: PreScan User Group Meeting at the SAE World Congress, April 2015
- **Human Inspired Modeling for Autonomy: Utilizing Sensors, Machine Learning, and Control**
  - Invited Talk: UIUC Coordinated Science Lab Student Conference, Jan. 2015
- **Lab-on-a-Cell Phone for Personal Exposure Assessment**
  - Plenary Speaker: From Exposure to Health Effects: Novel Approaches to Find the Linkage, University of Birmingham, UK, May 2011

## Research Experience

### Tenure-Track Assistant Professor, Univ. of Illinois at Urbana-Champaign – January 2019 to present

*Department of Electrical and Computer Engineering + Coordinated Science Laboratory*

- Leading research group that investigates fundamental research into modeling, learning, and decision making for interactive robotic and autonomous systems
- Considering how to design safe and interactive systems with applications in agriculture, manufacturing, autonomous vehicles, and assistive robotics
- Affiliated with the Department of Computer Science and associated with the Illinois Discovery Partners Institute (DPI); Institute for Inclusion, Diversity, Equity, and Access (IDEA); and Center for Digital Agriculture

### Research Consultant – Dec. 2018 to June 2019

*Samsung Strategy and Innovation Center*

- Providing research support and insight to the autonomous driving R&D team, in the fields of human behavioral modeling and learning for autonomous systems

### Postdoctoral Research Scholar, Stanford Intelligent Systems Lab – June 2017 to Dec. 2018

*Aeronautics and Astronautics Department, Stanford University*

*Advisor: Prof. Mykel J. Kochenderfer*

- Leading an industry sponsored research project to develop autonomous systems that can effectively perceive and interact in complex urban environments

### Graduate Student Researcher, UC Berkeley – Aug. 2012 to May 2017

*Department of Electrical Engineering and Computer Sciences*

- Funded research on modeling, decision making, and control frameworks for human-in-the-loop systems to provide safety guarantees on interaction in smart vehicles

### Research Intern, MIT Lincoln Laboratory – June 2015 to Aug. 2015

*Supervisor: Timothy J. Dasey, Ph.D.*

- Research conducted on human-in-the-loop systems with the Informatics and Decision Support Group, applying Active Perception techniques to surveillance applications

### Research and Development Intern, TASER International – June 2011 to Aug. 2011

*Supervisor: Michael Gish*

- Research conducted for the development of new safety control mechanisms to provide higher safety margins while maintaining the ability to induce Neural Muscular Incapacitation

### **Undergraduate Researcher, Arizona State University – Nov. 2009 to May 2012**

*Department of Electrical, Computer, and Energy Engineering + BioDesign Institute*

*Advisor: Prof. NJ Tao*

- Research partially funded by the FURI program and NIH, focusing on wearable bio- and chemical sensor development for epidemiology studies

### **Technical Employee, COVID Inc. – May 2009 to Aug. 2009**

*Supervisor: Norm Carson*

- Provided technical support, assisted in manufacturing and production, and testing support for various signal processors and audio/visual receivers and transmitters

## **Teaching Experience**

### **ECE 598: Human-Robot Interaction, U of I at Urbana-Champaign – 2020,2022,2023**

New special topics class introducing methods for designing robots that understand people, are easily understood by people, and interact effectively with people

### **ECE 470: Introduction to Robotics, U of I at Urbana-Champaign – 2019-2023**

(Course director) Re-vamped course to include modern robotics perspectives, covering state estimation, kinematics, decision-making, and motion planning with labs on UR3

- Co-Taught at the Zhejiang University-University of Illinois Urbana-Champaign Institute (ZJUI)

### **ECE 484: Principles of Safe Autonomy, U of I at Urbana-Champaign – 2019,2021**

(Co-taught with Prof. Sayan Mitra) New course that covers the development of a full autonomous system stack that can be deployed on a real-world test vehicle (provided by AutonomouStuff), with an emphasis on safety analysis

### **EECS 106b: Robotic Manipulation and Interaction, UC Berkeley – 2016**

Head TA, with Profs. Ruzena Bajcsy, Shankar Sastry, and Ken Goldberg

### **EECS 70: Discrete Math and Probability Theory, UC Berkeley– 2015**

Head TA, with Prof. Anant Sahai

## **Leadership, Community Outreach, Diversity Efforts**

### **Illinois IDEAS Institute**

| Active member – 2020 to present

### **Women in Computer Science and Electrical Engineering (WICSE)**

| Co-President – Summer 2014 to Summer 2015

| Outreach Coordinator – Summer 2013 to Summer 2014

### **Electrical Engineering Graduate Student Association (EEGSA)**

| Faculty Interview Coordinator – Fall 2015 to Summer 2016

| Co-President – Fall 2013 to Summer 2014

| Visit Day Coordinator – Spring 2013 and 2014

| GA Delegate – Fall 2012 to Spring 2013

### **Girls in Engineering at Berkeley**

| Developed an origami robotics module for NSF sponsored summer camp that aims to expose girls to science and engineering at a young age

## **Sponsored Research Projects**

### **• Perception Beyond Sensors**

- Sub-award: \$20,000 / 2 years, 2019-2020
- Supported by Ford Foundation / Stanford University
- PI: Mykel Kochenderfer, Co-I: Katie Driggs-Campbell

- **Human-Robot Collaboration: Interactive Manipulation for Industrial Robotics**
  - \$3,471,472 / 3 years, 2020-2023
  - Supported by Foxconn Interconnect Technology Ltd and C-NICE
  - PI: Katie Driggs-Campbell, Co-I: Tim Bretl and Nancy Amato
- **UIUC/ZJU Joint Research Center on Flexible Manufacturing: Adaptive, Resilient Cyber Manufacturing Networks (CyMaN)**
  - \$1,500,000 / 5 years, 2020-2025
  - Supported by Zhejiang University - University of Illinois at Urbana-Champaign Institute
  - Lead: Katie Driggs-Campbell, Co-Lead: Placid Ferreira, Members: Klara Nahrstedt, Bill King, Xin Chen, Srinivasa Salapaka, Chenhui Shao
- **Member of AI Institute: Artificial Intelligence for Future Agricultural Resilience, Management, and Sustainability (AIFARMS)**
  - \$59,000 / member / 5 years, 2020-2025
  - Supported by NIFA / USDA
  - Lead: Vikram Adve
- **NRI 2.0: Increasing the Level of Autonomy for Agricultural Robots Through Effective Interaction and Programming Paradigms**
  - \$1,047,874 / 4 years, 2020-2024
  - Supported by NIFA / USDA
  - PI: Katie Driggs-Campbell, Co-I: Roy Dong, Girish Chowdhary, Sayan Mitra, Sasa Misailaovic
- **Exploring Communication between Drivers and Intelligent Vehicles**
  - \$108,000 / 1.5 years, 2020-2022
  - Supported by State Farm
  - PI: Katie Driggs-Campbell
- **NSF CAREER: Uncovering Structure in Human-Robot Systems for Trajectory Prediction and Crowd Navigation**
  - \$500,236.00 / 5 years, 2022-2026
  - \$100,000 supplement, 2022-2023 for *Safe Human-Aware Robot Navigation in Warehouses* through the NSF-TIH Collaborative Research program
  - Supported by NSF
  - PI: Katie Driggs-Campbell

## Advising & University Service

### Committees

- Coordinated Science Lab Policy and Planning Committee, 2021-present
- Dept. of ECE Broadening Participation Committee, 2021-present
- Grainger College of Engineering Diversity Committee Member, 2020-present
- Dept. of ECE Curriculum Committee, 2019-2023
- Center for Autonomy Operations Committee, 2019-present
- Illinois Robotics Education Subcommittee Member, 2019-present

### Postdoctoral Associates

1. Junyi Geng, 2020-2021. Co-advised with T. Bretl and N. Amato.  
Placement: Penn State, Assistant Professor
2. Tan Chen, 2021-2022. Co-advised with T. Bretl and N. Amato.

Placement: Michigan Tech, Assistant Professor

3. D. Livingston McPherson, 2022-present  
Placement: UIUC, Assistant Teaching Professor

### PhD Theses

1. Peter Du (ECE, UIUC, 2023): Autonomous system safety: Towards targeted and scalable approaches for validation and behaviour analysis  
Placement: Nvidia

### Masters Theses

2. Xiang Li (ECE, UIUC, 2023): An end-to-end agent-map interaction framework for multi-agent trajectory prediction
3. Yiqing Xie (ECE, UIUC, 2023): Evaluation and Improvement of Online Human Correction in Physical Human-Robot Interaction.
4. Eric Liang (ECE, UIUC, 2022): Geometry-based Video Prediction with Visual Odometry Prediction and View Synthesis.  
Placement: Tesla.
5. Zhenyi Tang (CS, UIUC, 2020): Robust Imitation Learning from Observation  
Placement: Nvidia.
6. Ke Xu (CS, UIUC, 2020): Autonomous Vehicles that Understand Road Agents: Detection, Tracking, and Behavior Prediction  
Placement: USC CS PhD Program.
7. James Keiller (ECE, UIUC, 2019): Localization for Teams of Autonomous Ground Vehicles. Co-advised with William Norris.  
Placement: Komatsu Mining.

### Undergraduate Theses

1. Surya Murthy (ECE, UIUC, 2023): Exploring the Effects of Pedestrian Model on Crowd Navigation Training
2. Yilong Niu (ECE, UIUC, 2023): A Safe Human-Robot Collaboration System with Admittance Control and Collision Detection on a 6 DoF Industrial Robot with a F/T Sensor
3. Justin Lin (ECE, UIUC, 2023): Location Extraction for Voice Controlled Robot Guides
4. Zhaoxu Deng (ECE, UIUC, 2021): Vehicle-Pedestrian Interaction in Partially Observable Environments
5. Kazuki Shin (ECE, UIUC, 2021): Interpretable Multi-Pedestrian Trajectory Prediction using SocialGAN and SocialGCNN
6. Abhi Kamboj (ECE, UIUC, 2021): The Optimal Audio Interface for Teleoperation on an Autonomous Farm
7. Neeloy Chakraborty (ECE, UIUC, 2021): Hierarchical Self-Imitation Learning in Single-Agent Sparse Reward Environments
8. Rui Liu (CS, UIUC, 2020): Turtlebot Anomaly Detection
9. Shanduojiang Jiang (CS, UIUC, 2020): In-Vehicle Communication Strategies
10. Xinyi Guo (ECE, UIUC, 2020): How Humor Affects Trust in Human-Robot Interaction

### Doctoral Dissertation Committees

1. Kristina Miller (ECE, UIUC, expected 2024). Thesis Advisor: Sayan Mitra.
2. Anwesa Choudhuri (AE, UIUC, expected 2023). Thesis Advisor: Girish Chowdhary.
3. Jiarui Sun (ECE, UIUC, expected 2023). Thesis Advisor: Girish Chowdhary.

4. Yu Chen (ISE, UIUC, 2023). Enabling Mobile Robot Perception and Shared-Control with Vision-based Sensor Fusion Systems. Thesis Advisor: Bob Norris and Liz Hsiao-Wecksler.
5. Yifan Zhu (CS, UIUC, 2023). Data-Efficient Learning for Contact-Rich Robotics Tasks. Thesis Advisor: Kris Hauser.
6. James Motes (CS, UIUC, 2023). Multi-Robot Task and Motion Planning in Hybrid State Spaces. Thesis Advisor: Nancy Amato.
7. Xiaobai Ma (Aero/Astro, Stanford, 2021): Deep Reinforcement Learning Methods for Autonomous Driving Safety and Interactivity. Thesis Advisor: Mykel J. Kochenderfer.
8. David Hanley (ECE, UIUC, 2021): Empirical Investigation of Magnetic Indoor Positioning Systems and the Development of Evaluation Methods. Thesis advisor: Tim Bretl.
9. Jonathan Hoff (ECE, UIUC, 2020): Trajectory Optimization and Data-Driven Modeling for Robotic Bat Flapping Flight. Thesis advisor: Seth Hutchinson.

## Awards and Fellowships

IEEE Robotics and Automation Society Early Academic Career Award – 2023  
 George N. Saridis Best Transactions Paper Award for **J5** in Transactions on Intelligent Vehicles – 2023  
 Named Grainger College of Engineering Bruning Family Faculty Fellow in ECE – 2023  
 Best Paper Award for **W1** in NeurIPS Workshop on NeurIPS Workshop on Progress and Challenges in Building Trustworthy Embodied AI – 2022  
 NSF CAREER Award – 2022  
 Teacher's Rated as Excellent by Students – 2020, 2022  
 Rising Stars in EECS – 2017  
 Demetri Angelakos Memorial Achievement Award – 2016  
 EECS Department Chair's Special Award, UC Berkeley – 2014  
 EECS Department Chair's Special Award, UC Berkeley – 2013  
 EECS Department Fellowship, UC Berkeley – 2013  
 Gary and Diane Tooker Scholarship for Engineering – 2011 to 2012  
 Craig and Barbara Barrett Engineering Scholarship – 2010 to 2011  
 Nellie "Jean" Randle Scholarship – Fall 2010 to Spring 2011  
 Gary and Diane Tooker Scholarship for Engineering – 2009 to 2010  
 Society of American Military Engineers Scholarship – 2008 to 2012  
 Provost Scholarship, Arizona State University – 2008 to 2012

## Professional Activities

### Invited Reviewer

**Conferences:** IEEE International Conference on Robotics and Automation, IEEE/RSJ Conference on Robotics and Systems, Robotics: Science and Systems, Conference on Robot Learning, Workshop on Algorithmic Foundations of Robotics,  
 IEEE Intelligent Vehicle Symposium, IEEE Intelligent Transportation Systems Conference, IEEE American Control Conference, IEEE Conference on Decision and Control  
**Journals:** IEEE Transaction on Human-Robot Interaction, IEEE Transactions on Robotics, IEEE Transactions on Intelligent Vehicles, IEEE Transactions on Intelligent Transportation Systems, IEEE Robotics and Automation Letters, Springer Autonomous Robotics, IEEE Transactions on Human-Machine Systems, IEEE Transactions on Control Systems Technology

### Professional Services: Associate Editor and/or Advisory/Program Committee

IEEE International Conference on Robotics and Automation (ICRA) Senior Program Committee, Virtual Participant (2023)

Robotics: Science and Systems (RSS), Area Chair (2023)  
IEEE International Conference on Intelligent Robotics and Systems (IROS), Associate Editor (2019 - 2023)  
IEEE International Conference on Robotics and Automation (ICRA), Associate Editor (2019 - 2022)  
IEEE Intelligent Vehicle Symposium (IV), Associate Editor (2019, 2021)  
IEEE Intelligent Vehicle Symposium (IV), Program Co-Chair (2020)  
Runtime Verification (RV), Program Committee (2020)

#### **Technical Memberships**

SAE Member; ACM Member; IEEE Member: Robotics and Automation Society, Intelligent Transportation Systems Society