Zhiting (May) Mei

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My research approaches robotics from a fundamental science perspective, aiming to bridge the gap between specialist and generalist robots by establishing upper limits and safety assurances for robotics.

Upper Limits: I explore fundamental limitations inherent in robotic systems that hold regardless of advancements in algorithms or learned policies.

Safety Assurances: I develop safety and performance assurances when robots are generalized to unseen environments and tasks, via rigorous uncertainty quantification.

Keywords: conformal prediction, uncertainty quantification, information theory, robotics.

EDUCATION

Princeton University	**Princeton, NJ**
Ph.D., Mechanical and Aerospace Engineering	Expected May 2027
Francis Robins Upton Fellowship	

Duke University	**Durham, NC**
B.S.E, Mechanical Engineering	
B.S., Physics	
Certificate, Innovation and Entrepreneurship	May 2022
Magna Cum Laude and Graduation with Distinction	

RESEARCH EXPERIENCE

Princeton Intelligent Robot Motion (IRoM) Lab   **Princeton, NJ**
Advisor: Anirudha Majumdar
Research Assistant   Jun. 2022 — Present

- Derived an information theoretic fundamental upper bound on robot performance, given the robot's task and sensing capabilities. Generalized and tightened this bound with f-divergence. Showed that the fundamental bound holds for robot systems of increasing complexity and intelligence.
- Proved an upper limit for language-instructed autonomy. Showed that the ambiguity in language itself would lead to imperfect behavior, regardless of scaling of the large language models leveraged. Estimate the upper limit on realistic home robot scenarios.
- Established end-to-end safety assurances for robot navigation via rigorous uncertainty quantification on learned perception modules.
- Hardware demonstration with the Unitree Go1 quadruped robot.
- Using uncertainty quantification, guide active perception and exploration while maintaining safety.

Duke Pratt Fellows   **Durham, NC**
Advisor: Stefan M. Goetz
Undergraduate Research Assistant   Dec. 2020 — May. 2022

- Develop theories and simulations on control and optimization of lattice modular multilevel converters with serial and parallel connectivity.
- Obtain most efficient control algorithms for lattice converters under requirements including converter size, input/output terminals, and output voltage/current.

Duke Neutrino & Cosmology Group   **Durham, NC**
Advisor: Kate Scholberg
Undergraduate Research Assistant   Nov. 2019 — Feb. 2021
- Work on SNEWS (Supernova Early Warning System), produce sky maps with predicted supernova location and uncertainty intervals.
- Analyze neutrino events detected at the Super-Kamiokande Detector.

PUBLICATIONS

[7] **VERDI: VLM-Embedded Reasoning for Autonomous Driving.**

Zhiting Mei*, Bowen Feng*, Baiang Li, Julian Ost, Roger Girgis, Anirudha Majumdar, and Felix Heide. *Under review.*

[6] **WoMAP: World Models for Embodied Open-Vocabulary Object Localization.**

Tenny Yin*, **Zhiting Mei**, Tao Sun, Lihan Zha, Jeremy Bao†, Miyu Yamane†, Emily Zhou†, Ola Shorinwa*, and Anirudha Majumdar. *Under review.*

[5] **Perceive With Confidence: Statistical Safety Assurances for Navigation with Learning-Based Perception.**
Zhiting Mei, Anushri Dixit, Meghan Booker, Emily Zhou, Mariko Storey-Matsutani, Allen Z. Ren, Ola Shorinwa, and Anirudha Majumdar. *Under review.*

[4] **A Survey on Uncertainty Quantification of Large Language Models: Taxonomy, Open Research Challenges, and Future Directions.**

Ola Shorinwa, **Zhiting Mei**, Justin Lidard, Allen Z. Ren, and Anirudha Majumdar. *Under review.*

[3] **Perceive With Confidence: Statistical Safety Assurances for Navigation with Learning-Based Perception.**
Anushri Dixit, **Zhiting Mei**, Meghan Booker, Mariko Storey-Matsutani, Allen Z. Ren, and Anirudha Majumdar. *In 8th Annual Conference on Robot Learning. 2024.*

[2] **Fundamental Limits for Sensor-Based Robot Control.**
Anirudha Majumdar, **Zhiting Mei**, and Vincent Pacelli, *The International Journal of Robotics Research* (2023), 42, no. 12: 1051-1069.

[1] **Control and Optimization of Lattice Converters.**
Zhiting Mei, Jingyang Fang, Stefan M. Goetz, *Electronics* 2022, *11*, 594.

TALKS, POSTERS, AND WORKSHOPS

Princeton Symposium on Safe Deployment of Foundation Models in Robotics   Princeton, NJ

[W3] **How Much Help Does My Robot Need?**
Zhiting Mei and Anirudha Majumdar. (Best poster award)

Robotics: Science and Systems, 2024 Workshops   Delft, Netherlands

[W2] **Perceive With Confidence: Statistical Safety Assurances for Navigation with Learning-Based Perception.**
Anushri Dixit, Zhiting Mei, Meghan Booker, Mariko Storey-Matsutani, Allen Z. Ren, and Anirudha Majumdar. Towards Safe Autonomy: Emerging Requirements, Definitions, and Methods.

[W1] **How Much Help Does My Robot Need?**
Zhiting Mei and Anirudha Majumdar. Robots that help and ask for help.

AWARDS AND HONORS

Graduate
- Harari Post-generals Fellowship (2024)   Departmental
- Phillips Second Year Fellowship (2023)   Departmental
- Francis Robins Upton Fellowship (2022)   University

Undergraduate
- Graduation with Distinction (2022)
- Dean's List with Distinction (2018, 2019, 2021)
- Engineering Honor Societies: Tau Beta Pi, Pi Tau Sigma

TEACHING EXPERIENCE

- Introduction to Robotics (MAE 345/549), Princeton MAE   Fall 2024
- Control Systems (ME 344), Duke ME   Fall 2021, Fall 2022
- Solid Mechanics (EGR 201), Duke CEE   Fall 2020, Fall 2021, Spring 2022
- Introductory Physics (Physics 141), Duke Physics   Spring 2020
- Linear Algebra (Math 221), Duke Math   Spring 2021
- Multivariable Calculus (Math 212), Duke Math   Spring 2019, Fall 2020, Spring 2021

SERVICE

- **Undergraduate research mentoring:** Emily Zhou (MAE), Princeton
- **Reviewer (Journal):** IEEE Robotics and Automation Letters.
- **Reviewer (Conference):** IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2024); IEEE International Conference on Robotics and Automation (ICRA 2025); Conference on Robot Learning (CoRL 2025).
- **Reviewer (Workshops):** Towards Safe Autonomy (RSS 2024), Out-of-Distribution Generalization in Robotics (CoRL 2023)