Luisa Mao

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Robotics Researcher interested in robot learning with experience in preference-alignment and long-term autonomy.
Advised by Prof. Joydeep Biswas and Prof. Peter Stone.

Education

- **University of Texas at Austin** — Austin, TX
  BS in Computer Science (Turing Scholar), BS in Math (Dean's Scholar), Robotics Minor; GPA: 3.95 — *Expected Grad 05/26*

Awards

- **2026**: Computing Research Association (CRA) Outstanding Undergraduate Researcher Award
- **2025**: Astronaut Scholarship Winner
- **2025**: CRA Outstanding Undergraduate Researcher Honorable Mention
- **2024**: Goldwater Scholarship Winner
- **2024**: Astronaut Scholarship Winner
- **2023**: Jane Street Scholarship
- **2022**: Turing Scholars Honors Endowed Scholarship
- **2022**: Martin Luther King Youth Legacy Award in Math and Science

Publications

- **Terrain Costmap Generation via Scaled Preference Conditioning**: First Author; Submitted RA-L 2025
  Luisa Mao, Garrett Warnell, Peter Stone, Joydeep Biswas
  The University of Texas at Austin, Army Research Laboratory
- **PACER: Preference-conditioned All-terrain Costmap Generation**: Accepted RA-L 2025
  Luisa Mao, Garrett Warnell, Peter Stone, Joydeep Biswas
  The University of Texas at Austin, Army Research Laboratory
- **Semantic Masking and Visual Feature Matching for Robust Localization**: Accepted ISpaRo 2024
  Luisa Mao, Ryan Soussan, Brian Coltin, Trey Smith, Joydeep Biswas
  NASA Ames Research Center
- **Targeted Learning: A Hybrid Approach to Social Robot Navigation**: Accepted ICRA 2024
  Amir Hossain Raj, Zichao Hu, Haresh Karnan, Rohan Chandra, Amirreza Payandeh, **Luisa Mao**, Peter Stone, Joydeep Biswas, Xuesu Xiao
  The University of Texas at Austin, George Mason University

Research Experience

- **Tesla Optimus AI Team** — Palo Alto, CA
  Robotics Intern — *May 2025 - Aug 2025*
  - **Humanoid Model Training**: Concocted foundation model and policy training recipes for the Optimus humanoid robot.
- **DEVCOM Army Research Laboratory – Robotics** — Austin, TX; Grace's Quaters, MD
  Researcher in the Scalable, Adaptive, and Resilient Autonomy Collaborative Research Alliance — *January 2024 - Current*
  - **Preference Expression for Terrain-Aware Navigation (submitted RA-L)**:
    - Building upon PACER to overcome limitations in the expression of operator preferences in existing works
    - Goal of achieving multi-modal and highly expressive syntax and semantics to express preferences for robot navigation
  - **PACER (accepted CORL SAFE-ROL Workshop and RA-L 2025)**:
    - Leading project on vision foundation models for robot navigation in off-road environments.
    - Addressing preference-aligned all-terrain navigation for robots using conditional generative model.
    - Data collection, autonomous deployment, and field testing on large-scale Clearpath Warthog robots at Army Research Labs site in Grace's Quarters, MD.
- **NASA Intelligent Robotics Group (Ames Research Center)** — Mountain View, CA
  Astrobee Space Robotics Intern — *June 2023 - Sept 2023*
  - **Novel Visual Localization Research (accepted ISpaRo 2024)**:
    - First author for new visual localization algorithm to greatly improve NASA Astrobee robot operations on the International Space Station.
    - Developed new pipeline combining machine-learned semantics with visual features for localization.

- **Texas Robotics (UT Austin)** Austin, TX
  Undergraduate Researcher (AMRL). Advised by Prof. Joydeep Biswas and Prof. Peter Stone *June 2022 - Current*
  - **RoboCup Soccer 2026**:
    * Built infrastructure for training and testing of reinforcement learning policies
    * Training novel visuomotor policies for whole-body control
    * Participating with UT Austin team in humanoid league of international robot soccer competition
  - **IROS Earth Rover Challenge 2024**:
    * Competed with UT Austin team and placed in top 3 at autonomous open-world robot navigation challenge hosted at the International Conference on Intelligent Robotics and Systems. Competition sponsored by Frodobots, YGG, and Google DeepMind.
    * Remotely deployed autonomous navigation models to robots in multiple cities around the world and evaluated on realistic navigation scenarios.
    * Deployed PACER in the terrain perception module of the autonomy stack.
  - **ICRA BARN Challenge 2023**:
    * Competed with UT Austin team at autonomous navigation challenge held at the International Conference on Robotics and Automation (ICRA).
    * Redesigned global path planner on UT Austin's AMRL navigation stack to use Voronoi decomposition.
    * Demoed for Amazon Science Hub Launch and GoodSystems.

Academic Projects

- **Autonomous Vehicle Driving Stack (C++)**:
  - Created full autonomous stack for scaled 1/10 size F1 cars.
  - Implemented kinematic motion model, particle filter probabilistic reasoning, and graph-based path planner.
- **Operating System 2023 (C++)**:
  - Recreated subset of Linux kernel in C++ (no STD) and benchmarked system in multicore QEMU emulator.
  - Included support for user-level synchronization primitives, preemptive scheduling, virtual memory mapping, copy-on-write optimizations, and support for Physical Address Extension.
- **Processors 2023 (Verilog)**:
  - Implemented a 4-stage pipeline processor with a saturating 2-bit counter branch predictor (Individual).
  - Created a working Out of Order Processor implementing Tomasulo's Algorithm for LC3 instruction set (Group Project).
- **Compiler 2023 (C; Git)**:
  - Designed a spec for a Turing-Complete coding language.
  - Implemented full compiler converting language into X86 Assembly.
  - Performs tail-recursion elimination and constant folding optimizations.

Skills Summary

- **Programming**: Java, C++, Python, ROS, OpenCV, PyTorch, TensorFlow, Bash, HTML/CSS/Javascript, Verilog
- **Miscellaneous**: Machine Learning, Neural Networks, Deep Learning, Artificial Intelligence, Computer Vision, Docker, Git, Linux Systems, Concurrency/Multithreading, SQL, Google Apps Script, JUnit, GTKWave, LaTeX

Selected Coursework

- **Graduate**: Autonomous Robotics, Advancements in Deep Generative Models
- **Honors**: Programming Languages, Artificial Intelligence, Machine Learning, Algorithms and Complexity, Operating Systems, Computer Architecture, Data Structures and Algorithms, Differential Equations, Vector Calculus, Linear Algebra, Discrete Math
- **Undergraduate**: Real Analysis, Probability, Topology