# Rene E Mai

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## Education

**Rensselaer Polytechnic Institute**, *Troy, NY* **August 2021 – Current**

*PhD Candidate in Mechanical Engineering* GPA 4.0

- Expected graduation: May 2026
- Focus: navigation, controls, and guidance for symbiotic autonomy and autonomous systems; human-machine interaction; controls and guidance for complex systems
- Relevant coursework: Systems Analysis Techniques; Nonlinear Control; Optimal Control; Multivariable Control; Machine Learning for Autonomy; Safe Autonomy.
- Software: MATLAB, Simulink, Python

**University of Texas at Austin School of Law**, *Austin, TX* **2010-2013**

*Juris Doctor* GPA 3.14

**Texas A&M University**, *College Station, TX* **2006-2010**

*B.A. in Physics with Mathematics and Women's Studies minors* GPA 3.56

## Research Experience

**Rensselaer Polytechnic Institute** **August 2021 – Present**

*Graduate Research Assistant* *Troy, NY*

- Research focuses on dynamical system modeling for symbiotic autonomy systems.
- Supervise and mentor master's and undergraduate researchers; unofficial mentor to less senior PhD students.

*Journal Publications:*

- R. Mai, K. Sears, G. Roessling, A. Julius, and S. Mishra. "Generalized two-point visual control model of human steering for accurate state estimation." *ASME Letters in Dynamic Systems and Control* (joint submission to the *2024 Modeling, Estimation and Controls Conference*)(finalist for the **Best Student Paper Award**). https://doi.org/10.1115/1.4066630.

*Peer-Reviewed Conference Publications:*

- R. Mai, K. Sears, A. Julius, and S. Mishra. "Modeling driver behavior across varying levels of shared autonomy with an autonomous controller" *2026 IFAC World Congress*, August 2026 (under review).
- R. Mai, K. Sears, A. Julius, and S. Mishra. "Performance measures and sim-to-real gap assessment of human-autonomy teaming in obstacle avoidance" *2025 SigSim PADS Doctoral Colloquium*, June 2025, https://doi.org/10.1145/3726301.3731540.
- R. Mai, K. Daveron, A. Julius, and S. Mishra. "Modeling human-autonomy team steering behavior in shared-autonomy driving scenarios" *12th IFAC Symposium on Intelligent Autonomous Vehicles*, May 2025, https://doi.org/10.1016/j.ifacol.2025.07.003.
- R. Mai, A. Julius, and S. Mishra. "Analysis of human steering behavior differences in human-in-control and autonomy-in-control driving." *5th IFAC Workshop on Cyber-Physical Human Systems (CPHS)*, December 2024. https://doi.org/10.1016/j.ifacol.2025.01.187
- R. Mai, S. Mishra, and A. Julius. "Human-as-advisor in the loop for autonomous lane-keeping." in *2023 American Control Conference (ACC)*. IEEE, May 2023. https://ieeexplore.ieee.org/document/10156374/

*Other Conference Publications:*

- J. Ren, R. Mai, A. Allison, S. Mishra. "Using Acoustic Signals For Torch-to-bead Distance Estimation and Closed-loop Control in Wire Arc Additive Manufacturing" *2025 Solid Freeform Fabrication Symposium*, August 2025.

*In Preparation:*

- R. Mai, K. Sears, A. Julius, and S. Mishra. "Driver regulation of team behavior in shared autonomous scenarios" *ASME Journal of Autonomous Vehicles* (in preparation).
- R. Mai, T. Steinbach, K. Sears, A. Julius, and S. Mishra. "Dynamical trust modeling during obstacle avoidance of a shared autonomous vehicle" *IEEE/ASME TMECH* (in preparation).

*Selected Presentations:*

- "Performance measures and sim-to-real gap assessment of human-autonomy teaming in obstacle avoidance" 2025 SigSim PADS Doctoral Colloquium, Santa Fe, NM, June 2025.
- "Modeling human-autonomy team steering behavior in shared-autonomy driving scenarios" 12th IFAC Symposium on Intelligent Autonomous Vehicles, Tempe, AZ, May 2025.
- "Dynamical System Modeling and Architectures for Improved Human-Autonomy Teaming in Vehicle Steering," NASA Ames Research Center, Moffett Field, CA and Johnson Space Center, Houston, TX, February 2025.
- "Analysis of human steering behavior differences in human-in-control and autonomy-in-control driving," 2024 Cyber-Physical Human Systems Conference, Antalya, Turkïye, December 2024.
- "Generalized Two-Point Visual Control Model of Human Steering for Accurate State Estimation," 2024 Modeling, Estimation, and Controls Conference, Chicago, IL, October 2024.
- "Symbiotic autonomous team modeling and evaluation," 2024 Modeling, Estimation, and Controls Conference, Chicago, IL, October 2024.

- “Dynamic system modeling, evaluation, and new teaming methods for symbiotic human-autonomy teaming," University of Texas at Austin, Austin, TX, October 2024.
- “Building a pipeline for large language model fine-tuning, with a semantic search application," NASA Ames Research Center, Moffett Field, CA, August 2023.
- “Human-as-advisor in the loop for autonomous lane keeping," 2023 American Controls Conference, San Diego, CA, July 2023.
- “Human-as-Advisor for Human-in-the-Loop Control," Army Research Laboratory Humans in Complex Systems Group, Aberdeen, Maryland, August 2022.

## Teaching Experience

### Rensselaer Polytechnic Institute

*Graduate Teaching Assistant, Mechatronics* *August 2023-May 2024*

- Overall rating: 4.81/5 (Spring 2024) and 4.50/5 (Fall 2023)
- Updated labs and other assignments for clarity, adding key takeaways from each lab to guide student progress.
- Revised the assignment structure for the second project, magnetic levitation, to follow the engineering design process and help guide students through solving the problem themselves, rather than with explicit direction.

*Graduate Teaching Assistant, Modeling & Control of Dynamic Systems* *August-December 2022*

- Overall rating: 4.26/5
- Provided lecture-style examples, individual guidance, and formed homework groups to build student community.

### New Visions STEM

*Guest Lecturer* *August 2021-present*

- Develop content for core lessons in the government and engineering domains.
- Provide lectures and guide class discussion on topics such as artificial intelligence, patent law, and the intersection of law and technology.
- Revised electric car project to include motor modeling and feedback and feedforward controls, including providing lectures explaining basic control theory at a high school level.

## Engineering Experience

### Draper Laboratories **June-August 2025**

*Space GNC Graduate Intern* *Houston, TX*

- Navigation analysis to support Dreamchaser space plane in initial flight to International Space Station.
- Develop and modularize fault detection, isolation, and recovery scripts for multiple sensors.
- Develop and modify software used to verify spacecraft parameters and overall spaceflight plan.

### NASA Ames Research Center **January 2023 – Present**

*Pathways Intern* *Moffett Field, CA; Troy, NY*

- Identify key areas for future NASA research on LLM development.
- Monitored human-autonomy teaming research for potential development and cross-collaboration, with an emphasis on disaster recovery and complex human-autonomy teaming scenarios.
- Built large language model training and evaluation pipeline for future aviation-specific LLM development, including aviation-specific semantic search application to showcase training pipeline.

## Legal Experience

### Weil, Gotshal & Manges LLP **May 2017 – December 2020**

*Patent Litigation Associate* *Houston, TX*

- Promoted a full year upon hire. The go-to attorney for technical analysis of electrical and mechanical technologies.
- Set and tracked deadlines for projects across multiple high-dollar value patent litigation cases.
- Developed technical litigation strategies for Fortune 500 and Fortune 50 clients.
- Wrote winning briefs on case scheduling, discovery conflicts, patent interpretation, and expert testimony.
- Created successful persuasive technical presentations in diverse technologies, from high-speed modems to solar cells.

### Pillsbury Winthrop Shaw Pittman LLP **July 2014 – May 2017**

*Patent Litigation Associate* *San Diego, CA and Houston, TX*

- Hired as a patent agent and quickly promoted to technical patent litigation attorney.
- Set and tracked deadlines across multiple cases for one of the firm’s highest-value clients.
- Created educational slides that won a case by educating a judge on the difference between digital logic performed on binary numbers and arithmetic with real values.
- As a key member of the International Trade Commission (ITC) team, won an exclusion order for a Fortune 500 client, resulting in a key competitor being barred from importing products for sale in the United States.
- One of the youngest attorneys to sit second chair for expert witness questioning at trial.

## Awards and Fellowships

- 2025-2026 Link Foundation Modeling, Simulation & Training Fellowship[1]
- 2024-2025 Link Foundation Modeling, Simulation & Training Fellowship[1]
- 2025 WiscProf: Future Faculty in Engineering Workshop awardee[1]
- 2024 National Science Foundation Cyber-Physical Human Systems Fellow[1]
- 2024 Modeling, Estimation, and Controls Conference Best Student Research Award Finalist[1]
- 2024 Carnegie Mellon University Rising Stars in Mechanical Engineering[1]
- 2024 Future of the Controls Field: Perspectives from Young Members of the MECC Community[1]
- 2024 Boeing Summer Fellowship
- 2023-2024 Founder's Award of Excellence, Rensselaer Polytechnic Institute
- 2021-2022 National Defense Science and Engineering Graduate Fellowship Honorable Mention[1]
- 2021-2022 Science, Mathematics, and Research for Transformation Scholarship Semi-Finalist[1]
- 2021-2022 Rensselaer Graduate Fellowship, Rensselaer Polytechnic Institute
- 2011-2013 School of Law Scholarship, University of Texas at Austin School of Law
- 2010-2011 Endowed Presidential Scholarship in Law, University of Texas at Austin School of Law
- 2010 University Honors Certificate, Texas A&M University
- 2010 Foundation Honors Certificate, Texas A&M University
- 2006-2010 University Scholar, Texas A&M University
- 2006-2010 President's Endowed Scholar, Texas A&M University

## Leadership and Mentoring

### Rensselaer Polytechnic Institute

*Society of Women Engineers Graduate Student Committee Secretary* *October 2021-present*

- Participant in national-level 2022-23, 2023-24, and 2025-26 *Academic Leadership for Women in Engineering* cohorts.
- Guest speaker at career direction events for undergraduate students.
- Volunteer at recurring STEM outreach events like Explore Engineering Day.
- Attended the 2022 Annual Conference as a representative of the university section.
- Dramatically increased graduate section engagement through recruiting events and outreach.
- Propose, organize, and plan events tailored to graduate student interests.
- Organize meeting agendas, take notes during meetings, and organize items for follow-up as needed.
- Update main Society of Women Engineers about graduate student events and coordinate between graduate committee and undergraduate activities.

*Graduate women's mentoring circle founder; MANE Department* *March 2022-present*

- Initiate and organize networking and professional development luncheons for women graduate students and faculty members in MANE department.
- Develop topics and foster discussion to provide mentoring to graduate students and junior faculty members.
- Coordinate future sessions, including potential guest speakers and joint events for other underserved groups, allies.

*Mechanical, Aerospace, and Nuclear Engineering (MANE) Student Advisory Committee Member* *October 2023-present*

- Represent MANE students to the department faculty and staff.
- Provide student input on faculty hires, curriculum changes, and other department functions.
- Elicit feedback from students to help shape future of department, including changes to courses and new courses.

*Society of Automobile Engineers - Member* *September 2025-present*

- Mentor founding member and provide connections to academic partners.
- Participate in discussion on advanced driver assistance systems.

*Middle States Accreditation Self-Study Committee Member* *March 2023-August 2024*

- Research and document the student experience at RPI for self-study accreditation report.
- Provide feedback and edits to self-study report.
- Interface with institute faculty and administration to facilitate self-study process.

### NASA Lucy Student Pathway Accelerator and Competency Enabler (L'SPACE)

*NASA Proposal Writing and Evaluation Experience Academy* *May-August 2022*

- Led a team of undergraduate students to propose a unique solution to prevent/reduce incidence of astronaut hand injuries during EVA.
- Implemented NASA proposal review standards and procedures during proposal assessment phase.

### Nidan, Shotokan Karate

*Second Degree Black Belt* *Achieved May 2021*

- Recognized by multiple worldwide organizations including SKIF, JKS, and JKA.
- Formal and informal mentoring and teaching of students from beginning to advanced levels in all age groups.

## Interests

Formula 1 Racing | Martial Arts | 3D Printing and Design | Horseback Riding | Baking | Writing | Crochet

[1] National awards