Rene E Mai

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Professional Profile

Technical patent litigation attorney turned mechanical engineering PhD student focusing in navigation and controls for autonomous and symbiotic autonomous systems. Prior experience as an attorney includes project management, persuasive writing, and extensive technical analysis from standards compliance to source code interpretation. Always a part of the “A team."

Education

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

PhD Candidate in Mechanical Engineering GPA 4.0

- Expected graduation: May 2026
- Focus: controls and guidance for symbiotic autonomy and autonomous systems; human-machine interaction; controls and guidance for complex systems
- Relevant coursework: Advanced Spaceflight Mechanics; Introduction to Spacecraft Navigation; Systems Analysis Techniques; Nonlinear Control; Optimal Control; Multivariable Control; Machine Learning for Autonomy; Safe Autonomy.

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.

Publications:

- 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* (submitted).
- 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.
- 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.
- 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. Available: https://ieeexplore.ieee.org/document/10156374/

Presentations:

- Analysis of human steering behavior differences in human-in-control and autonomy-in-control driving - forthcoming at 2024 Cyber-Physical Human Systems Conference
- Generalized Two-Point Visual Control Model of Human Steering for Accurate State Estimation - forthcoming at 2024 Modeling, Estimation, and Controls Conference
- Symbiotic autonomous team modeling and evaluation - forthcoming at 2024 Modeling, Estimation, and Controls Conference
- Dynamic system modeling, evaluation, and new teaming methods for symbiotic human-autonomy teaming - forthcoming
- Human-as-advisor in the loop for autonomous lane keeping - 2023 American Controls Conference
- Building a pipeline for large language model fine-tuning, with a semantic search application - August 2023 Presentation to Ames Research Center, Moffett Field, CA
- Patents, IP Litigation, and Entrepreneurship - March 2023 Presentation to University of Kentucky Paducah
- Human-as-Advisor for Human-in-the-Loop Control - August 2022 Presentation to Army Research Laboratory Humans in Complex Systems Group, Aberdeen, Maryland

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

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

Pathways Intern - Digital Information Platform and Human-Autonomy Teaming Lab *Troy, NY*

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

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

- 2024 CPHS Fellow[1]
- 2024 MECC 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]
- 2024-2025 Link Foundation Modeling, Simulation & Training Fellowship[1]
- 2024 Boeing Summer Fellowship
- 2023-2024 Founder's Award of Excellence, Rensselaer Polytechnic Institute
- 2021-2022 NDSEG Honorable Mention, United States Department of Defense[1]
- 2021-2022 SMART 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

[1] National awards

Leadership and Mentoring

Rensselaer Polytechnic Institute

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 inform input and feedback to department.

Middle States Accreditation Self-Study Committee Member *March 2023-present*

- 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.

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 and allies.

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

- Participant in the national-level 2022-23 and 2023-24 *Academic Leadership for Women in Engineering* cohorts.
- Attendee at the 2022 Annual Conference, representing university section.
- Dramatic increase in 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.

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 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