# ESEN YEL

yele@rpi.edu | Website

## PROFESSIONAL EXPERIENCE

**Rensselaer Polytechnic Institute** Troy, NY
Position: Assistant Professor *2024 – Present*
Department of Electrical, Computer and Systems Engineering

**Stanford University** Stanford, CA
Position: Postdoctoral Scholar *2021 – 2023*
Affiliations: Stanford Intelligent Systems Lab (SISL), Stanford Center for AI Safety
Advisor: Mykel Kochenderfer

**University of Virginia** Charlottesville, VA
Position: Graduate Research Assistant *2016 – 2021*
Affiliations: Autonomous Mobile Robots Lab, Link Lab
Advisor: Nicola Bezzo

**Bogazici University** Istanbul, Turkey
Position: Graduate Research Assistant *2014 – 2016*
Affiliations: Intelligent Systems Lab (ISL)
Advisor: H. Işıl Bozma

## EDUCATION

**University of Virginia** Charlottesville, VA
Ph.D., Systems Engineering *2021*
Dissertation: *Online predictive monitoring and proactive planning for safe autonomous robot operations*

**Bogazici University** Istanbul, Turkey
M.S., Electrical and Electronics Engineering *2016*
Thesis: *Appearance based self localization and navigation using place memory*

B.S., Electrical and Electronics Engineering *2014*
Graduated with High Honors Certificate

## RESEARCH INTERESTS

The main objective of my research is to achieve safe, generalizable, and trustworthy autonomy for systems under uncertainty. My research uses concepts from reachability analysis, machine learning, verification, motion planning, and transfer learning to develop safe planning and runtime monitoring techniques.

## AWARDS & HONORS

**Rising Stars in Electrical Engineering and Computer Science** *2022*

**Link Lab Outstanding Graduate Research Award** *2021*
Link Lab, University of Virginia
*"This award was established as a way for faculty to recognize Link Lab students who have demonstrated excellence in research during the academic year."*

**Robotics: Science and Systems (RSS) Pioneers Workshop Participant** *2021*
*"RSS Pioneers brings together a cohort of the world's top early-career researchers."*

**Link Lab Student Seminar Award** *2020*
Link Lab, University of Virginia

*"The Link Lab Graduate Seminar provides a prestigious honor and award for a PhD student to showcase the highest quality research happening at Link Lab conveying impact and relevance in the CPS field"*

**Ruthie Oxford Memorial Award** *2018*
University of Virginia, Department of Systems and Information Engineering

## PUBLICATIONS

### Preprint

- H. Delecki, M. Vazquez-Chanlatte, **E. Yel**, K. Wray, T. Arnon, S. Witwicki, M. J. Kochenderfer, "*Entropy-regularized Point-based Value Iteration*", arXiv preprint arXiv:2402.09388, 2024.

### Journal and Magazine Articles

- N. Rober, S. M. Katz, C. Sidrane, **E. Yel**, M. Everett, M. J. Kochenderfer, and J. P. How. "*Backward reachability analysis of neural feedback loops: Techniques for linear and nonlinear systems*", IEEE Open Journal of Control Systems, vol. 2, pp. 108-124, 2023.
- **E. Yel***, S. Gao*, N. Bezzo, "*Meta-learning-based proactive online planning for UAVs under degraded conditions*", (*equal contribution), Robotics and Automation Letters (RA-L), 2022, vol. 7, no. 4, pp. 10320–10327.
- **E. Yel**, T. X. Lin, N. Bezzo, "*Computation-aware adaptive planning and scheduling for safe unmanned airborne operations*", Journal of Intelligent and Robotic Systems, 2020, vol. 100, no. 2, pp. 575–596.
- **E. Yel**, T. Carpenter, C. di Franco, R. Ivanov, Y. Kantaros, I. Lee, J. Weimer, N. Bezzo, "*Assured runtime monitoring and planning: Towards verification of neural networks for safe autonomous operations*", Robotics and Automation Magazine, June 2020, vol. 27, no. 2, pp. 102–116.

### Conference Papers

- M. Toyungyernsub, **E. Yel**, J. Li, M. Kochenderfer, "*Predicting future spatiotemporal occupancy grids with semantics for autonomous driving*", Intelligent Vehicles, 2024.
- S. M. Katz, A. L. Corso, **E. Yel**, and M. J. Kochenderfer, "*Efficient Determination of Safety Requirements for Perception Systems*", IEEE/AIAA Digital Avionics Systems Conference (DASC), 2023, pp. 1-10
- A. Yildiz, **E. Yel**, A. Corso, K. Wray, S. Witwicki and M. J. Kochenderfer, "*Experience filter: Transferring past experiences to unseen tasks or environments*", IEEE Intelligent Vehicles Symposium (IV), 2023.
- M. Toyungyernsub, **E. Yel**, J.Li, M. J. Kochenderfer, "*Dynamics-aware spatiotemporal occupancy prediction in urban environments*", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2022, pp. 10836-10841.
- M. Cleaveland, **E. Yel**, Y. Kantaros, I. Lee, N. Bezzo, "*Learning enabled fast planning and control in dynamic environments with intermittent information*", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2022, pp. 10290-10296.
- L. Kruse, **E. Yel**, R. Senanayake, M. J. Kochenderfer, "*Uncertainty-aware online merge planning with learned driver behavior*", IEEE International Conference on Intelligent Transportation Systems (ITSC), 2022, pp. 1202-1207.
- **E. Yel**, N. Bezzo, "*A meta-learning-based trajectory tracking framework for UAVs under degraded conditions*", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2021, pp. 6884–6890.
- **E. Yel**, N. Bezzo, "*GP-based runtime planning, learning, and recovery for safe UAV operations under unforeseen disturbances*", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020, pp. 2173–2180.

- **E. Yel** and N. Bezzo, "*Fast run-time monitoring, replanning, and recovery for safe autonomous system operations*", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019, pp. 1661–1667.
- **E. Yel**, T. X. Lin and N. Bezzo, "*Self-triggered adaptive planning and scheduling of UAV operations*", IEEE International Conference on Robotics and Automation (ICRA), 2018, pp. 7518–7524.
- T. X. Lin, **E. Yel** and N. Bezzo, "*Energy-aware persistent control of heterogeneous robotic systems*", Annual American Control Conference (ACC), 2018, pp. 2782–2787.
- **E. Yel**, T. X. Lin and N. Bezzo, "*Reachability-based self-triggered scheduling and replanning of UAV operations*", NASA/ESA Conference on Adaptive Hardware and Systems (AHS), 2017, pp. 221–228.

## TEACHING EXPERIENCE/TRAINING

**Instructor** Rensselaer Polytechnic Institute
Robotics II (ECSE 4490/6490, CSCI 4969/6969, MANE 4963/6963) Spring 2024, 2025
Decision Making under Uncertainty (ECSE 4964/6964, CSCI 6968, ISYE 6964) Fall 2024

**Guest Lectures** Stanford University
Engineering Design Optimization *Spring 2023*
- Gave a guest lecture on linear constrained optimization.

Decision Making under Uncertainty *Winter 2023*
- Gave two guest lectures on representation and inference.

Advanced Topics in Sequential Decision Making *Winter 2022*
- Gave a guest lecture on applications areas of partially observable Markov decision processes.

**Pedagogical Training**
CIRTL@Stanford Teaching Certificate Program (Associate Level) *2023*
Stanford Scientific Teaching Summer Institute *2022*
- Attended a 3-day workshop to explore the core principles of Scientific Teaching (inclusion and equity, active learning, assessment, and effective lesson planning).

**Graduate Teaching Assistantship** Bogazici University
System Dynamics and Control *Spring 2015, Spring 2016*
Control Technology and Design *Fall 2015*
Introduction to Electrical Engineering *Fall 2015*
- Teaching responsibilities included grading and leading lab and discussion sessions.

**Undergraduate Student Assistantship** Bogazici University
System Dynamics and Control (Assisted discussion sessions) *Spring 2014*
Orientation to Electrical Engineering (Assisted lab sessions) *Fall 2013*

## MENTORSHIP

**Rensselaer Polytechnic Institute**

- *Doctoral Students*
  Mehmet Taha Bekar — *Fall 2024 - Present*
  Jainik Mehta — *Fall 2024 - Present*
- *Masters Students*
  Shriansh Chabra, Stochastic reachability — *Fall 2024 - Present*
  Andy Ma, World model representations — *Spring 2024*
- *Undergradute Students*
  Sanghyun Kim, Mobile ground robot behavior — *Fall 2024*
  Curran Flaunders, Controller design for aerial vehicles — *Summer 2024*

**Stanford University**

- *Graduate Student Research*
  Anil Yildiz, Transfer learning and validation for autonomous driving tasks — *2021 – 2023*
  Liam Kruse, Safe planning for autonomous vehicles — *2021 – 2023*
  Dylan Asmar, Out-of-distribution detection — *2022 – 2023*
  Sydney Katz, Backward reachability for nonlinear systems — *2022 – 2023*
  Maneekwan Toyungyernsub, Occupancy grid prediction — *2021 – 2022*
  Alexandros Tzikas, Trajectory verification for autonomous driving — *2022*
  Chelsea Sidrane, Backward reachability for nonlinear systems — *2022*
- *Stanford Undergraduate Research Fellowship (SURF)* — *Summer 2022*
  Research mentor for an 8-week program to promote diversity within the engineering and science student body in the USA. I advised an undergraduate student on her research topic, monitored her research progress, and advised research alongside a graduate student. Student: Michelle Ho.
- *Undergradute Student Research*
  Ellie Talius, Trajectory verification for autonomous driving — *2022*

**University of Virginia**

- *Graduate Mentor for Capstone Project* — *Spring 2021*
  Co-mentoring four undergraduate students on a robot navigation project
- *Graduate Mentor for Society of Women Engineers* — *Spring 2017*
  Graduate student mentor for undergraduate engineering students associated with the Society of Women Engineers. This mentorship program involved helping a student navigate her early engineering education and career.

## PRESENTATIONS

Dagstuhl Seminar on AI and Formal Methods Join Forces for Reliable Autonomy, Talk — *2024*
Ford Otosan, Talk — *2024*
Stanford Center for AI Safety Workshop, Talk — *2023*
Bay Area Robotics Symposium, Poster — *2022*
Stanford SystemX 2021 Fall Conference, Poster — *2021*
UVA Link Lab Student Seminars, Talk — *2020*
UVA Link Lab Student Flash Talks, Talk — *2020*
UVA ESE Graduate Symposium, Poster — *2018, 2020*
ICRA PhD Forum, Poster — *2018*
UVA ECE Student Research Session, Poster — *2017*

## PROFESSIONAL ACTIVITIES

### Journal, Conference and Workshop Service

| | |
|---|---|
| Program committee member, International Conference on Cyber-Physical Systems (ICCPS) | *2025* |
| Associate Editor, IEEE Conference on Automation Science and Engineering (CASE) | *2024* |
| Editorial Board Associate Chair, Journal of Artificial Intelligence Research (JAIR) | *2023-Present* |
| Moderator, Stanford Center for AI Safety Workshop Industry Panel | *2023* |
| Co-organizer, Learning for Dynamics & Control Conference (L4DC) | *2022* |
| Program Committee Member, RSS Pioneers Workshop | *2022* |
| Session Co-chair, IEEE/RSJ International Conference on Intelligent Robots (IROS) | *2021* |
| Session Chair, IEEE Systems and Information Engineering Design Symposium | *2019* |

### Review Activities

*Journals*

IEEE Robotics and Automation Letters (RA-L)
Journal of Artificial Intelligence Research (JAIR)
Journal of Aerospace Information Systems
IEEE Computer Magazine

*Conferences*

IEEE/RSJ International Conference on Intelligent Robots (IROS)
Conference on Robot Learning (CoRL)
IEEE Conference on Decision and Control (CDC)
American Control Conference (ACC)
IEEE International Conference on Robotics and Automation (ICRA)
ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS)
IEEE International Conference on Intelligent Transportation Systems (ITSC)
AAAI Conference on Artificial Intelligence