Ege Yuceel

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Research Statement

My research interests broadly lie in robotics, particularly fast and efficient motion planning algorithms, planning and localization under limited information, and their applications to aerial robotics.

Education

University of Illinois Urbana-Champaign — Illinois, United States
Ph.D. in Electrical and Computer Engineering; Advisor:Prof. Sayan Mitra — *August 2024 – Present*
M.S. in Electrical and Computer Engineering; GPA 4.00 — *August 2024 – June 2026*

Bilkent University — Ankara, Turkey
B.Sc. in Electrical and Electronics Engineering; GPA 3.88 (High Honors) — *Sep 2020 – June 2024*

Related Coursework: Feedback and Control Systems, Optimal Control, Robust Feedback Control, Nonlinear Control, Learning for Robotics, Computer Vision, Statistical Learning Theory, Diffusion and Flow Matching, Random Processes, Computational Inference

Publications

Ege Yuceel, Daniel Liberzon, Sayan Mitra, *Active Localization of Unstable Systems with Coarse Information*. **29th ACM International Conference on Hybrid Systems: Computation and Control (HSCC)**, 2026. **(Best Paper Award)**

Yan Miao, **Ege Yuceel**, Georgios Fainekos, Bardh Hoxha, Hideki Okamoto, Sayan Mitra, *Performance-Guided Refinement for Visual Aerial Navigation using Editable Gaussian Splatting in FalconGym 2.0*. **IEEE International Conference on Robotics and Automation (ICRA)**, 2026.

Yuksel Arslantas, Ahmet Said Donmez, **Ege Yuceel**, Muhammed O. Sayin, *Omniscient Attacker in Stochastic Security Games with Interdependent Nodes*. **IFAC World Congress**, 2026.

Yuksel Arslantas, **Ege Yuceel**, Yigit Yalin, Muhammed O. Sayin, *Convergence of Heterogeneous Learning Dynamics in Zero-sum Stochastic Games*. **IEEE Transactions on Automatic Control**, 2025.

Yuksel Arslantas, **Ege Yuceel**, Muhammed O. Sayin, *Strategizing against Q-learners: A Control-theoretical Approach*. **IEEE Control Systems Letters**, 2024.

Preprints

Sayan Mitra, **Ege Yuceel**, Noah Giles, Abhishek Pai, *Factored Diffusion Policies: Compositionally Generalized Robot Control with a Single Score Network*. **arXiv preprint**, 2026.

Ege Yuceel, Teodor Tchalakov, Sayan Mitra, *Minimal Information Control Invariance via Vector Quantization*. **arXiv preprint**, 2026.

Experience

Toyota Research Institute North America — Michigan, United States
Research Intern, Advisors: Georgios Fainekos, Bardh Hoxha, Hideki Okamoto — *May 2026 – Present*

- Research on safe and trustworthy autonomy.

Reliable Autonomy Group — Illinois, United States
Graduate Research Assistant, Advisor: Prof. Sayan Mitra — *Aug 2024 – Present*

- Research on safe-autonomy, vision-based control, localization with limited information, diffusion policies.

Swarmlab — Magdeburg, Germany
Intern, Advisor: Prof. Sanaz Mostaghim — *July 2023 – Sep 2023, Full-time*

- Assisted a Ph.D. student in developing the Decentralized Collective Conflict Resolution algorithm for safe swarm motion planning with debugging code, contributing to the coding of the local planner and performing experiments. Experience with ROS and Gazebo.

Aselsan Research Center Ankara, Turkey

Intern *June 2023 – July 2023, Full-time*

- Development of a motion planner for Vision60 quadruped robot, latent space extrapolation using LSTM and variational auto-encoders for future observation forecasting. Experience with ROS, OpenCV, PyTorch, Docker.

Bilkent University Ankara, Turkey

Undergraduate Researcher, Advisor: Asst. Prof. Muhammed O. Sayin *Jan 2022 – June 2024*

- Research on theoretical convergence analysis of RL algorithms.
- Research on the strategizing against Q-learning algorithms.

Undergraduate Researcher, Advisor: Asst. Prof. Ozgur S. Oguz *Sep 2023 - June 2024*

- Development of a combined task and motion planner for autonomous structure building using Graph Attention Networks and k-order Markov Path Optimization.

Geodo Technology Ankara, Turkey

R&D Engineer *Jan 2021 – Sep 2023*

- Developed AI and software systems including GNSS-RTK data processing, embedded programming for GSM communication, IMU tilt-compensation algorithms, and computer vision pipelines using YOLO for GPR data classification; designed GAN-based synthetic data augmentation models to improve training robustness.

Service

- **Reviewer:** HSCC 2026, FMCAD 2026, IFAC World Congress 2026, NeuS 2025, IEEE Transactions on Automatic Control (TAC)

Awards & Achievements

- Best Paper Award, Foundations Track, HSCC/CPS-IoT Week 2026 (with Daniel Liberzon and Sayan Mitra)
- Promise of Excellence Fellowship, University of Illinois Urbana-Champaign
- Research Excellence Award, Bilkent University
- Full Merit-Based Scholarship, Bilkent University
- Ranked 594th among 2.5 million candidates in the Turkish National University Placement Exam

Programming and Hardware Skills

- **Robotics Frameworks:** ROS1 & ROS2, MAVSDK, MAVLink, Gazebo, MujoCo, Isaac Sim
- **Hardware:** Drone platforms (PX4, Betaflight), Quadruped robot, TurtleBots, Motion capture, Nvidia Jetson
- **Programming:** Python, C++, MATLAB
- **Technical Areas:** Control theory, reinforcement learning, computer vision, optimization

Selected Projects

Joint Vision-Based Controller and Lyapunov Function Training
Developed an end-to-end vision-based control framework for drone navigation through rings, jointly training a neural controller and a neural Lyapunov function to ensure safety and stability. Implemented differentiable rendering, imitation learning (DAgger), and Lyapunov-based verification.

Safe Navigation with Gaussian Splatting
Designed an uncertainty-aware navigation pipeline for aerial robots using editable Gaussian splatting for 3D mapping, RRT-based planning, and PID control. Achieved stable vision based control under sensor noise via real-time replanning and pose estimation.