Ege Yuceel

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RESEARCH STATEMENT

My research interests broadly lie in robotics, particularly in exploring the safe and robust limits of vision-based control. I am also interested in world models and neural scene representations to enable autonomous planning in complex, dynamic environments.

EDUCATION

University of Illinois Urbana-Champaign — Illinois, United States
Ph.D. in Electrical and Computer Engineering; Advisor:Prof. Sayan Mitra; — Aug 2024 – Present
M.S. in Electrical and Computer Engineering; GPA 4.0 — Aug 2024 – Jun 2026 (Expected)
Promise of Excellence Fellowship

Bilkent University — Ankara, Turkey
B.Sc. in Electrical and Electronics Engineering; GPA 3.88 (High Honors) — *Sep 2020 – Jun 2024*
Research Excellence Award, Full Scholarship

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

PUBLICATIONS/PREPRINTS

[**Submitted**] 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**. *arXiv*

[**Working Draft**] **Active Localization of Unstable Systems with Coarse Information**.

[**Published in IEEE Control Systems Letters**] Yuksel Arslantas, **Ege Yuceel**, Muhammed O. Sayin, **Strategizing against Q-learners: A Control-theoretical Approach**. *IEEE Xplore.*

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

EXPERIENCE

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

- Research on safe-autonomy, reach-avoid planning, vision-based control, quadcopter motion planning.

Bilkent University — Ankara, Turkey
Undergraduate Researcher, Advisor: Asst. Prof. Muhammed O. Sayin — *Jan 2022 – Jun 2024*

- Research on theoretical convergence analysis of RL algorithms. [**IEEE TAC**]
- Research on the strategizing against Q-learning algorithms. [**L-CSS**]

Undergraduate Researcher, Advisor: Asst. Prof. Ozgur S. Oguz — *September 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.

Swarmlab — Magdeburg, Germany
Research Intern, Advisor: Prof. Sanaz Mostaghim — *July 2023 – September 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+VAE for future observation forecasting. Experience with ROS, OpenCV, PyTorch, Docker.

Service

- Reviewer, *International Conference on Neuro-symbolic Systems (NeuS)*, 2025

Programming and Hardware Skills

- **Robotics Frameworks:** ROS1 & ROS2, MAVSDK, MAVLink, Gazebo, MujoCo

- **Hardware Experience:** Drone platforms (PX4, Betaflight), Quadruped robot, TurtleBots, Motion capture systems

- **Programming:** Python, C++, MATLAB

- **Technical Areas:** Reinforcement learning, computer vision, control theory, 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.