

# Sadik Bera Yuksel

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## PROFESSIONAL SUMMARY

Results-driven robotics researcher with expertise in reinforcement learning, motion planning, and learning-based control for autonomous systems. Specializing in developing algorithms that incorporate task and safety constraints into learning and planning, with proficiency in Python, deep learning, and end-to-end system deployment. Developed and deployed a constraint-aware autonomy stack on a physical drone and contributed to peer-reviewed research across top robotics and control venues. Seeks to apply this expertise to advance reliable, deployable autonomous systems in applied research settings.

## EDUCATION

**Northeastern University**, Boston, MA Expected May 2028  
Ph.D. in Computer Engineering | GPA: 4.0/4.0

**Northeastern University**, Boston, MA May 2025  
M.S. in Computer Engineering | GPA: 4.0/4.0  
**Concentration:** Computer Vision, Machine Learning, and Algorithms

**Bilkent University**, Ankara, Turkey June 2023  
B.S. in Electrical and Electronics Engineering | GPA: 3.65/4.0

**Korea University**, Seoul, South Korea February - June 2022  
Exchange Student, Electrical and Electronics Engineering

## PROFESSIONAL EXPERIENCE

**Northeastern University** Boston, MA  
*Doctoral Researcher (Advisor: Prof. Derya Aksaray)* September 2023 - Present

- Conducted research on trustworthy autonomy by integrating temporal logic specifications into vision-language-action (VLA) policies and robotic foundation models, providing formal verification guarantees for constrained decision-making under mild assumptions.
- Trained deep reinforcement learning policies in PyTorch that satisfy Signal Temporal Logic constraints during training via Control Barrier Functions, an optimization-based safety filter, reaching up to 99.56% constraint satisfaction with theoretically bounded worst-case violations.
- Contributed to developing an online policy-switching algorithm that adaptively balances reward maximization with temporal logic constraint satisfaction across varying probability thresholds, achieving higher cumulative reward than a state-of-the-art baseline while requiring significantly fewer training episodes to converge.
- Developed a temporal-logic-guided motion planning and navigation algorithm with contingency constraints, providing probabilistic task satisfaction guarantees for autonomous navigation under uncertainty.
- Demonstrated sim-to-real transfer by deploying the planning algorithm from simulation onto a custom Pixhawk-based drone using ROS2 in a GPS-denied environment, successfully completing the task with its guaranteed probabilistic satisfaction level in physical flight tests, using OptiTrack motion capture for pose estimation and onboard vision-based object detection to track a moving target, with integrated control and runtime monitoring.

**Northeastern University** Boston, MA  
*Teaching Assistant* January - May 2026

- Supported instruction for EECE5644: Introduction to Machine Learning and Pattern Recognition, covering core ML theory such as Bayesian estimation, classification, and deep learning, and mentored students on applying these methods through office hours.

## ASELSAN

*Transmitter and Receiver Design Intern* Ankara, Turkey  
July - September 2022

- Owned the full design-to-validation lifecycle for an RF diplexer, from circuit simulation in Keysight Genesys through PCB layout and manufacturing to hardware bring-up, an end-to-end engineering process.

- Validated final hardware against design specifications through systematic S-parameter analysis using a vector network analyzer, confirming performance before integration.

## HAVELSAN

*Robotics and Autonomous Systems Intern*

Ankara, Turkey

*June - August 2021*

- Implemented autonomous navigation for a differential drive robot in a simulation environment using ROS and Python.
- Developed a vision-based face recognition system on Qualcomm Robotics RB5 platform using OpenCV.

## Bilkent University

*Teaching Assistant*

Ankara, Turkey

*October 2019 - January 2020*

- Mentored students through hands-on lab sessions for CS115: Introduction to Programming in Python, reinforcing core programming fundamentals and fostering stronger conceptual understanding and engagement.

## SKILLS

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|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>Programming Languages</b>      | Python, C++, MATLAB, Assembly                                                                                                       |
| <b>Robotics &amp; Control</b>     | ROS, Motion Planning, State Estimation, Control Systems, SLAM, Sensor Fusion, Runtime Monitoring, Formal Methods, MuJoCo, Gymnasium |
| <b>Machine Learning &amp; AI</b>  | Deep Reinforcement Learning, Imitation Learning, Vision-Language Models, CNNs, LSTMs, Transformers                                  |
| <b>Data &amp; Pipelines</b>       | Pandas, NumPy, Data Preprocessing, Simulation-Based Data Generation                                                                 |
| <b>Libraries &amp; Frameworks</b> | PyTorch, JAX, TensorFlow, Scikit-learn, OpenCV                                                                                      |
| <b>Tools &amp; Software</b>       | Linux, Git, Docker, CUDA                                                                                                            |

## PUBLICATIONS

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- S.B. Yüksel** and D. Aksaray, “Specification-Aware Distribution Shaping for Robotics Foundation Models”, under review at *International Conference on Intelligent Robots and Systems (IROS)*, 2026. arXiv:2603.17969
  - S.B. Yüksel**, A.T. Buyukkocak and D. Aksaray, “Shielded Reinforcement Learning Under Dynamic Temporal Logic Constraints”, to appear in *American Control Conference (ACC)*, 2026.
  - X. Lin, **S.B. Yüksel**, Y. Yazıcıoğlu, and D. Aksaray, “Probabilistic Satisfaction of Temporal Logic Constraints in Reinforcement Learning via Adaptive Policy-Switching”, *Proc. of the Learning for Dynamics & Control (L4DC)*, 2025.
  - S.B. Yüksel**, A. Taheri, Y. Yazıcıoğlu, and D. Aksaray, “Robust Temporal Logic Planning Under Contingency Constraints”, *International Conference on Automation Science and Engineering (CASE)*, 2025.

## SELECTED PROJECTS

### Autonomous Parking via Reinforcement and Imitation Learning

Spring 2026

*Northeastern University*

- Trained an autonomous parking car in a Unity environment using PPO and Generative Adversarial Imitation Learning (GAIL), which combines reward-driven exploration with expert demonstrations to enable sample-efficient policy learning.
- Demonstrated that GAIL-augmented policies reached convergence approximately 40% faster than PPO-only baselines, and conducted systematic reward function analysis to evaluate behavioral fidelity and generalization across varied parking configurations.

### End-to-End Voice Assistant with LLM and Voice Cloning

Spring 2026

*Northeastern University*

- Built and deployed a voice assistant that listens, understands, and replies in a natural-sounding cloned voice, combining speech recognition, an LLM for generating responses, and a text-to-speech system for voice output.
- Fine-tuned the text-to-speech model to clone a specific speaker’s voice, benchmarked multiple speech and language models for speed and accuracy, and redesigned the pipeline to stream responses in parallel, which cut the response latency by 37% (9.48s to 6.01s).

## **Sketch-to-Image Translation for Human Identification**

Spring 2025

*Northeastern University*

- Designed and trained a Generative Adversarial Network (GAN) model in PyTorch for image generation from sketches, yielding a 28.2% increase in cosine similarity and a 3.5% improvement in SSIM over the baseline, which indicates enhanced feature-level and structural similarity to ground truth images.

## **Real-Time Localization and Mapping for Autonomous Vehicles**

Fall 2023

*Northeastern University*

- Developed and deployed a real-time visual-inertial SLAM pipeline using ORB-SLAM3 in ROS, fusing camera and IMU measurements for robust localization and mapping in driving environments using real vehicle data.

## **Indoors Drone Localization Using UWB Sensors**

Spring 2023

*Bilkent University*

- Developed an indoor drone localization system in Python that fuses Ultra-Wideband (UWB) distance data with IMU measurements using trilateration and filtering algorithms to determine accurate real-time position estimates, achieving an average localization error of 0.26 meters in real time.
- Deployed the algorithm on the drone's onboard computer and created a real-time monitoring interface for ground-based visualization with an update rate of 20 Hz.

## **HONORS AND AWARDS**

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- Placed in the top 0.02% in the Turkish National University Entrance Exam (2018)
- Global KU Scholarship, Korea University (2022)
- Fellowship, Department of Electrical and Computer Engineering, Northeastern University (2023)