Yunus Emre Danabaş

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EDUCATION

Sabancı University, *B.Sc. in Electronics Engineering (Double Major)* 2023 – 2026
Second major in progress with focus on embedded systems and electronics for robotics applications

Sabanci University, *B.Sc. in Mechatronics Engineering* 2020 – 2025
Graduated 1st in class | CGPA: 3.77 / 4.00 — Dean's High Honor İstanbul, Turkey
Honors: Full-Tuition Scholarship | 2023 & 2024 Extracurricular Student Activities Leadership Award
Selected Courses: Kinematics and Dynamics of Machines, Introduction to Robotics, Autonomous Mobile Robotics, Deep Learning for Robot Control

RESEARCH & ENGINEERING EXPERIENCE

PRISMA Lab, University of Naples Federico II, Jun 2025 – present
Research Intern, Supervised by Prof. Vincenzo Lippiello
- Contributing to the mechanical and mechatronic design of a lunar micro-rover prototype Napoli, Italy
- Working with Fusion 360 for CAD modeling and early-stage prototyping

Sabancı University, *Teaching Assistant for Prof. Volkan Patoğlu* Sep 2024 – present
- Assisted in "ME312 Analysis and Synthesis of Mechanisms" and "ME403 Introduction to Robotics" instructing 20+ students per semester, holding weekly office hours, and supervising course projects.

Munich Institute of Robotics and Machine Intelligence, Technical University of Munich (TUM - MIRMI), *Research Intern, Supervised by M.Sc. Mehmet Can Yıldırım* Jun 2024 – Aug 2024
- Investigated crossed-flexure hinge architectures to decouple force and moment measurements in robotic 6-DoF force-torque sensors, enabling higher moment capacity without sacrificing force resolution. Munich, Germany
- Developed a parametric MATLAB simulation pipeline based on Wittrick's crossed-strip flexure theory to rapidly explore hinge geometries, loading scenarios, and deformation characteristics.
- Fabricated physical prototypes using SolidWorks for CAD design and implemented precise instrumentation with strain gauges; created a detailed installation and testing manual.
- Validated deformation models experimentally using a custom computer-vision pipeline (edge detection, RANSAC curve fitting), ensuring consistency between analytical predictions and real-world data.
- Implemented Gazebo-based digital twins to simulate and analyze the dynamic response of the flexure-stage integration onto a robotic system, facilitating pre-hardware controller tuning and stability assessment.

TUBITAK BILGEM, *Robotics Engineering Intern* Sep 2023 – Oct 2023
- Completed formal ROS training with focus on SLAM, navigation, and multi-robot systems Gebze, Turkey
- Developed and evaluated single- vs. multi-robot exploration strategies in Gazebo using TurtleBot3
- Implemented frontier-based exploration and real-time map merging with RViz visualization

Pubinno Inc., *Mechanical Engineering Intern* Jun 2023 – Sep 2023
- Designed 3D-printed prototypes using Onshape, expediting the production process. Istanbul, Turkey
- Led the development of an automated maintenance prototype for field staff to perform initial maintenance.
- Coordinated quality control activities, collaborating with manufacturers and documenting QA/QC procedures.

TUBITAK BILGEM, *Intern – Embedded Systems and Digital Design* Jan 2023 – Feb 2023
- Hands-on experience with Adalm-Pluto SDR for basic wireless communication and signal processing applications using Python.

TECHNICAL SKILLS / LANGUAGES

- **CAD & Fabrication:** OnShape · SolidWorks (CSWA) · Fusion 360 · FDM 3-D printing
- **Robotics, Simulation & Electronics:** ROS 1/2, URDF/Xacro, Gazebo, MuJoCo, Brax, RealSense SDK Arduino, ESP32, LTSpice
- **Programming & ML:** Python (JAX, Optax, Diffrax, TensorFlow, OpenCV) · C++ · MATLAB/Simulink · Autolev · OpenAI Gym/PPO · Verilog · Docker · Git
- **Languages:** English (Advanced), Turkish (Native)

PROJECTS

Passive Walker RL Pipeline, *Graduation Project | Supervisors: Prof. Volkan Patoğlu, Dr. Aykut Cihan Satıcı* Oct 2024 – May 2025

- Built an end-to-end bipedal locomotion pipeline using FSM, behavior cloning (BC), and PPO reinforcement learning.
- Developed expert controllers and trained JAX-based neural policies using Equinox and Optax.
- Integrated Brax for high-throughput simulation; converted MuJoCo models for GPU-parallel PPO training.
- Ran large-scale hyperparameter sweeps to optimize learning rate, reward scaling, and network size.
- Delivered a reproducible, open-source project leveraging JAX, Brax, MuJoCo, and modern RL tools.

SURover (Sabancı University Rover Team), *Board Member* Jun 2022 – Jan 2025

- Developed ROS + Gazebo digital-twin of the rover, authoring URDF/xacro models and MoveIt motion-planning pipelines for arm and drivetrain control.
- Implemented multi-sensor fusion and ArUco-based fiducial SLAM with ZED2 stereo, Intel RealSense D435i, and RPLIDAR-A3.
- Built a Wi-Fi-based joystick and GUI control system with safety features like watchdog and emergency stop; tested in long-running simulations and real-world setups.
- Led SolidWorks design, hands-on fabrication, cabling, and Arduino based motor control to deliver a fully integrated, field ready rover platform.
- Project supported by major aerospace and defense sponsors including TUSAŞ, Baykar, and TEI.

Hand-Steer Sim – Gesture Teleoperation for Mobile Robots Mar 2025 – May 2025

- Replaced physical joysticks with a webcam-only interface; MediaPipe landmarks feed a 1 k-param MLP (static commands) and 6 k-param LSTM (steering).
- Achieved 99% macro-F1 and 13 ms end-to-end latency at 30 FPS at GPU; runs at 25 ms on CPU.
- Published fused /cmd_vel velocities via a ROS Noetic pipeline; one launch or Docker starts camera, inference, and Gazebo simulation.
- Released full dataset, training notebooks, and CPU/GPU Docker images for turn-key reproducibility.

Cart-Pole Swing-Up Control with JAX and MuJoCo Oct 2024 – Jan 2025

- Developed classical (Linear, LQR) and neural network (MLP) controllers trained via differentiable simulations.
- Utilized JAX, Equinox, and Diffrax for efficient automatic differentiation, NN modeling, and ODE integration.
- Implemented real-time simulations and interactive visualizations using MuJoCo and mujoco_viewer.
- Evaluated controller robustness through disturbances and compared performance across control methods.
- Achieved reliable swing-up from varied initial conditions and demonstrated robustness against external disturbances.

How can a robot place an item on a cluttered desk?, Jan 2023 – Jan 2025
Supervised by Professors Volkan Patoğlu and Esra Erdem

- Designed and implemented an intelligent approach for robotic item placement on cluttered surfaces using Gazebo simulations and the Baxter robot.
- Optimized ROS Noetic compatibility for the Baxter robot, resolving MoveIt integration challenges for simulated and real-world applications.

ACTIVITIES

Sabancı IEEE Student Chapter, *Board Member* Sep 2022 – Sep 2024

- Responsible board member overseeing SURover team operations, leadership structure, and project continuity within the chapter.

Sabanci University SIAM (Society for Industrial and Applied Mathematics) Student Chapter, Sep 2022 – Jun 2024
Financial Affairs Coordinator

- Managed financial matters, budgets, and communications with global SIAM authorities.
- Coordinated seminars, reading groups, and mathematics competitions.

Civic Involvement Projects, *Volunteer* Apr 2021 – Jun 2021

- Narrated audiobooks for visually impaired individuals, contributing to accessibility and community support.