

Okan Arif Güvenkaya

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EDUCATION

Technical University of Munich, Munich, Germany

- M.Sc. Mechatronics Robotics and Biomechanical Engineering

Oct 2024 - Present

Sabancı University, Istanbul, Turkey

- B.S. Mechatronics Engineering (Major) - GPA: 3.68/4.00
- B.S. Computer Science & Engineering (Double Major) - GPA: 3.58/4.00

Sept 2019 - June 2023

Sept 2020 - June 2024

Çınar Private Science High School, Istanbul, Turkey - GPA: 97.91/100

Sept 2014 - June 2018

PUBLICATIONS

Paper Title: [Local Path Planning with Dynamic Obstacle Avoidance in Unstructured Environments](#)

IEEE IECON 2024

- Authors: Okan Arif Güvenkaya, Selim Ahmet İz, Mustafa Ünel

RESEARCH INTERESTS

Autonomous Mobile Robotics, Swarm (Multi-Agent Systems), Unmanned Aerial Vehicles (UAVs), Reinforcement Learning, Motion Control, Path Planning, Computer Vision, Machine Learning, Deep Learning, Artificial Intelligence

WORK EXPERIENCE

Quantum Systems, Glitching, Germany | Software Engineer/Swarm Developer

March 2025 - Present

- Develop and test algorithms for multi-drone operations
- Optimize algorithms for overall mission performance
- Use simulations for development and then deploy to embedded Linux
- Find solutions in the areas of multi-vehicle-routing, scheduling and data fusion
- Integrate code into an existing ROS2 Nvidia architecture

ASELSAN, Ankara, Turkey | Intern

July – Sept 2022

- Conducted system identification, controller design, and controller application for a 3-degree-of freedom system named "SATCOM on the Move Antenna System".

RESEARCH EXPERIENCE

Technical University of Munich Autonomous Aerial Systems Lab, Munich, Germany | Semester Thesis

Oct 2025 – Present

- Developing optimization-based trajectory generation methods for UAVs under dynamic and kinematic constraints.
- Designing cost functions targeting trajectory smoothness, feasibility, and mission efficiency.
- Extending it for future UAV swarm trajectory optimization.

Sabancı University, Istanbul, Turkey | Research

July 2023 – Sept 2024

- Engaged in collaborative research focused on path planning for unmanned ground vehicles in conjunction with unmanned aerial vehicles.
- Operating in a dynamic environment, our path planning algorithm integrates both local and global strategies.
- Research resulted in conference [paper](#) in conference IEEE IECON 2024.

Sabancı University PURE, Istanbul, Turkey | Research Assistant

Oct 2022 – Jan 2023

- PURE (Program for Undergraduate Research): Performed segmentation and mask operations on bacteria images for the deep-learning algorithm UNET.
- Project: [Report](#)

Sabancı University Soft Robotics and Control Lab, Istanbul, Turkey | Research Intern

Sept – Oct 2022

- Designed and controlled a 3D printer for the Embedded 3D Printing project.
- Project: [Poster](#), [Report](#), [Video](#)

HONORS & AWARDS

- Dean's High Honor List, Sabancı University
- Dean's Honor List, Sabancı University
- National University Exam Achievement Scholarship, Sabancı University
 - Scholarship amount: \$81000

June 2020, Feb 2021, June 2021

Feb 2020, Feb 2022

June 2018

TEACHING EXPERIENCE

Sabancı University, Istanbul, Turkey | Learning Assistant PROJ 201

Sept 2021 - Jan 2022

- Mentored students in the Undergraduate Project Course, focusing on "Aerodynamic Optimization of a Racecar Using CFD."

- Conducted workshops on 3D CAD and CFD
- Sabancı University, Istanbul, Turkey | Learning Assistant ENS 209** *July - Aug 2021*
- Duties included conducting office hours and providing guidance to students on course materials, assignments, and laboratory work in the Introduction to Computer Aided Draft & Solid course during the summer term.

PROJECTS

- Vision-Based Opponent Detection and Autonomous Blocking in F1TENTH Racing:** *Oct – Feb 2026*
- Developed a modular ROS2-based autonomous racing system on the F1TENTH (1:10 scale) platform, enabling autonomous blocking against a dynamic opponent.
 - Implemented vision-based opponent detection using a YOLOv8 model trained on a custom dataset and LiDAR-based particle filter localization for accurate real-time state estimation.
 - Designed multi-raceline trajectory planning and a finite-state machine (FSM) for perception-driven decision making and strategic raceline switching.
 - Executed trajectories using a Pure Pursuit controller with dynamic lookahead tuning and validated the system in real-time experiments under competitive racing conditions.
 - Project: [Video](#), [Report](#)
- Mobile Robot Development for Intralogistics** *Sept – Oct 2025*
- Designed and implemented a full mobile robot stack covering kinematics, perception, control, localization, and navigation on a Raspberry Pi platform.
 - Applied PID control for low-level motion, Dijkstra algorithm for global path planning, and OpenCV-based visual object detection.
 - Performed multi-sensor fusion using camera, ultrasonic, and color sensors to enable reliable operation in structured indoor environments.
- Autonomous Driving in ROS-based Unity Simulation** *March – Aug 2025*
- Designed and implemented an autonomous driving stack in ROS, integrating perception, planning, decision-making, and control modules.
 - Developed path planning modules including global waypoint processing, short-term goal selection, and trajectory generation using the TEB local planner.
 - Project: [Simulation Video](#)
- Reinforcement Learning for Humanoid Motion Optimization** *March – Aug 2025*
- Modeled humanoid motion in MuJoCo using real gait data collected via motion capture system.
 - Processed static and dynamic trials in OpenSim, performing scaling, inverse kinematics, and gait cycle extraction.
 - Implemented a PPO-based reinforcement learning framework in DeepMind's dm_control to track human joint angles, maintain upright posture, and minimize control effort.
 - Project: [Project Presentation](#)
- Vision Based Motion Control of a Differential Drive Robot** *Feb – June 2023*
- Developed PID control for a differential drive robot, achieving target position against external disturbances.
 - Designed the robot in Solidworks and implemented coding and physical control via Raspberry Pi.
 - Used ArUco markers for position detection and created 2D animations.
 - Project: [Report](#), [Hardware Video](#), [Simulation Video](#)
- Implantation, Interaction Control, and Experimental Characterization of a Haptic Interface** *Sept 2022 – June 2023*
- Designed a spherical haptic system for educational purposes, utilizing various representation methods used in robotics such as unit quaternions, rotation matrices, Euler angles and Axis-angle.
 - Created a user-friendly GUI to provide a 3D rendering of the system and physical system.
 - Project: [Hardware Video](#), [GUI Video](#)
- Detecting Traffic Violations of Heavy Vehicles via Computer Vision** *Sept 2022 – Jan 2023*
- Detected traffic violations of heavy vehicles using computer vision methods.
 - Employed techniques such as Hough line detection, foreground detection, noise elimination, blob analysis, and optical flow.
 - Project: [Report](#)
- Sabancı Motorsports, Aerodynamics Department Leader** *Feb 2020 - Jan 2022*
- Acted as the Aerodynamics department leader (Sept 2021 - Jan 2022) and a department member (Feb 2020 - Sept 2021) in the Sabancı Motorsports team. [Workshop Video about CFD](#)
 - Designed and optimized aerodynamic packages, including rear wing and front wing of a race car.
 - Conducted cooling optimization of the battery box design via conjugate heat transfer.
- Sabancı Aerospace Team, Team Member** *July 2020 – Sept 2021*
- Collaborated as a team member in the Sabancı Aerospace team for the TEKNOFEST Rocket Competition.
 - Conducted structural, thermal, and CFD analyses of the rocket.

SKILLS

Programs and Programming Languages: Python, C++, Rust, ROS2, C#, MATLAB, Unity, GitLab, MATLAB Simulink, MATLAB App Designer, Rust, Raspberry Pi, Arduino, Solidworks, Simscape, ANSYS, G-Code, LTSpice, ImageJ,
Languages: Turkish (Native), English (Advanced)

VOLUNTEER WORK

Sabancı University Robotic Club (SURK), Istanbul, Turkey | Board Member

Sept 2019 - Sept 2024

- Organized workshops on Solidworks 3D CAD and robot programming for club members.
- Workshops: [Video](#)

MÜDEK (Association for Evaluation and Accreditation of Engineering Programs) | Student Evaluator

April 2024

- Served Evaluated engineering education programs and accreditation processes.
- Provided student perspective insights to enhance program effectiveness and ensure standards compliance, including participation in the evaluation of Gaziantep University.

Civil Involvement Project, Istanbul, Turkey | Volunteer

Feb - May 2019

- Coordinated weekly activities for children with neurodevelopmental disorders.