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 *Sept 2019 - June 2023*
- **B.S.** Computer Science & Engineering (Double Major) - GPA: 3.58/4.00 *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 *June 2020, Feb 2021, June 2021*
- **Dean's Honor List,** Sabancı University *Feb 2020, Feb 2022*
- **National University Exam Achievement Scholarship,** Sabancı University *June 2018*
  - **Scholarship amount:** $81000

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

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++, ROS2, C#, MATLAB, Unity, GitLab, MATLAB Simulink, MATLAB App Designer, Rust, Raspberry Pi, Arduino, Solidworks, Simscale, 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.