

Philippe Rudolph

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EDUCATION *(German Grading System, 1.0 = best, 5.0 = fail)*

Technical University of Munich

Munich, Germany

Master of Science in *Robotics, Cognition and Intelligence* — GPA: 1.2

Expected 2027

Master of Science in *Aerospace* — GPA: 1.2

Expected 2027

Bachelor of Science in *Aerospace* — GPA: 1.8 (Top 5% of the cohort)

August 2025

- **Awards:** Deutschlandstipendium, TUM (10/2025 – *present*), merit-based scholarship.
- **Community Engagement:** Student Council of Aerospace and Geodesy (10/2022 – *present*); co-host and audio engineer on the podcast “On Air – Actually Rocket Science”; Committee for Selection of New Professors (Spacecraft Control, Astrodynamics, Spacecraft Electronics).
- **Competitions:** 1st place, Robotics Hackathon 2022, *robo.innovate Munich* — 2nd place, TUM Science Hackathon 2022.

Luisen-Gymnasium *(High School)*

Duesseldorf, Germany

Abitur — GPA: 1.2 (Graduated top of class) + Baccalaureate — GPA: 1.3 (French A-Levels)

June 2021

WORK & RESEARCH

Systems Control and Optimization Laboratory (syscop), University of Freiburg

Freiburg, Germany

Visiting Researcher

May 2026 – Present

- One-month research visit; ongoing collaboration with recurring on-site presentations of results.
- Implemented an NMPC in *acados* for an electric thrust-vector-controlled hopper.

German Aerospace Center (DLR)

Munich, Germany

Research Assistant – Vision-Based State Estimation for Extraplanetary Exploration

December 2025 – Present

- Surveyed state-of-the-art Visual-Inertial Odometry (VIO) methods.
- Extended and maintained a VIO-based state-estimation pipeline for UAV navigation in C++ and ROS2.

WARR Rocketry

Munich, Germany

Project, controls, and software lead

June 2024 – Present

Project Stage: Built an electric subscale TVC hopper; currently developing and building a bi-liquid TVC hopper.

- **Leading a 60-person team (undergraduate and graduate) to build and fly Germany’s first student-built bi-liquid TVC hopper.**
- Developed the full flight software stack from scratch in C++ with a ROS2 wrapper, geometric controller, INDI controller, online RTI-NMPC and trajectory generator via differential flatness.
- Built a high-fidelity Simulink models of both vehicles and a thrust-curve estimation tool for chamber sizing

AVILUS

Munich, Germany

Testing Engineer

May 2024 – May 2025

Startup building certified dual-use UAVs (drones, helicopters, planes) and an autonomous core architecture.

- Co-developed a MATLAB OOP MiL testing toolbox with templated scenarios and automated report generation.
- Designed and automated ~1,500 MiL test cases in MATLAB/Simulink across ground control station, flight computers, engine and actuator interface units, and full-system levels.
- Modeled ultrasonic and radar sensors in Simulink for a ground-detection algorithm.
- Analyzed flight data in Python (pandas, NumPy) for anomaly detection and envelope characterization.

Institute of Flight System Dynamics, TUM

Munich, Germany

Research Assistant – UAV Trajectory Generation

October 2023 – October 2024

- Co-developed an online 3D trajectory generation tool for UAVs in MATLAB/Simulink; results published in [1] and [2].

PUBLICATIONS

- [1] Mbikayi, Z., Steinert, A., Heimsch, D., Speckmaier, M., **Rudolph, P.**, Liu, H., Holzapfel, F. “Online Deterministic 3D Trajectory Generation for Electric Vertical Take-Off and Landing Aircraft.” *Aerospace* 11(2):157, 2024. doi:10.3390/aerospace11020157
- [2] Mbikayi, Z., Steinert, A., **Rudolph, P.**, et al. “Relative kinematics for a jerk-level trajectory generation system.” *CEAS Aeronautical Journal*, 2025. doi:10.1007/s13272-025-00861-y

TEACHING EXPERIENCE

Chair of Space Mobility and Propulsion, TUM

Munich, Germany

Teaching Assistant for “Control and Simulation of Rocket-Hopper Demonstrator”

December 2025 – February 2026

- Taught controller design for a hopper propelled by cold-gas thrusters.

Institute of Flight System Dynamics, TUM

Munich, Germany

Teaching Assistant for “Automatic Control Engineering”

April 2024 – September 2024

- Delivered lecture-style exercises (usually reserved for PhD students) as an undergraduate student.

School of Computation, Information and Technology, TUM

Munich, Germany

Teaching Assistant for “Basic Mathematics (Linear Algebra)” & “Differential and Integral Calculus”

April 2022 – March 2023

- Developed new lecture material and held lecture-style exercise sessions.

SKILLS

- **Programming:** C++, Python, MATLAB/Simulink, Julia
- **Frameworks & Libraries:** ROS2, Gazebo, Eigen, OpenCV, PyTorch, NumPy, Pandas, CasADi, acados, CORA
- **Hardware & Embedded Systems:** Raspberry Pi 4/5, ESP32, STM32, Arduino Uno
- **Other:** Linux, Git, LaTeX, Onshape (CAD)

OTHER

- **Languages:** English, French, and German (Fluent); Spanish (B1); Russian (A2); Japanese (A1)
- **Interests:** Climbing; music production and piano; reading (Hitchhiker's Guide, repeatedly)