

Daniel Bösch

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Graduate student at KIT working on Vision-Language-Action models for robotic surgery.

EXPERIENCE

03/2025 -- 12/2025	Software Engineer – Gyde, Stuttgart Built data and retrieval pipelines for retrieval-augmented LLM workflows on a FastAPI backend, with structured outputs (Pydantic) and agentic frameworks (LangChain, Langfuse).
10/2023 -- 08/2024	ML Engineer – ArtiMinds Robotics, Karlsruhe Built a natural-language assistant for industrial robot control with PhD researchers (LLM → Python pseudo-code → ArtiMinds' proprietary robot language); evaluated prompt-engineering vs. fine-tuning for code generation and demoed on a real robot.
04/2023 -- 09/2023	Research Assistant – Information Management in Engineering (IMI), KIT Engineered an Augmented Reality digital twin of a robotic assembly line in Unreal Engine.
10/2021 -- 04/2023	Research Assistant – Health Robotics & Automation (HERA), KIT Real-world demo work for B.Sc. surgical-robotics thesis: Python control on a physical robot setup over existing C++/TwinCAT ADS controllers; designed and built a Unity-based operator UI.
08/2020 -- 08/2022	Backend Engineer – Knuddels, Karlsruhe Backend development for a social platform: Spring Boot, GraphQL, RabbitMQ, Postgres.
06/2019 -- 08/2020	Software Engineer – P3 Group, Stuttgart Real-Driving-Emissions route-calculation software over OpenStreetMap data; extended with Google Routing API for real-world coverage.

EDUCATION

10/2022 -- 09/2026	Karlsruhe Institute of Technology (KIT) – M.Sc. Computer Science (expected) Thesis (in progress): Vision-Language-Action models for Robotic Surgery (Da Vinci Research Kit). Focus: deep learning, robotics, computer vision, medical image processing.
09/2024 -- 02/2025	Instituto Superior Técnico (IST) – Erasmus Exchange, Lisbon Coursework in robotics and machine learning.
10/2016 -- 10/2022	Karlsruhe Institute of Technology (KIT) – B.Sc. Computer Science Thesis: Automating Endoscope Movement for Minimally Invasive Abdominal Surgery using Deep Reinforcement Learning.

PROJECTS & ACTIVITIES

04/2026 until now	Karlsruhe Intelligent Robot Association (KAIRA) – Founding and building up a new robotics student association at KIT.
06/2026	Europe Embodied Hackathon – Implemented a PID controller balancing a ball on a flat end-effector with a Franka Panda arm.
05/2026	RoboHack 2026 , EPFL AI Team, Lausanne (1st place) – End-to-end imitation-learning policy on a LeRobot SO-101 arm for peg-in-keyhole insertion in 36h. [write-up]
2026	LLM-to-Robot Trajectory Planning – Architecture comparison of tool-calling, code generation, and constrained decoding for Franka-arm trajectories. [write-up]
2025	DDNet RL – RL design and experiments at scale (1,500 parallel agents) on top of an existing C++ game server with Python inference over shared memory; Go-Explore-style curriculum. [write-up]
08/2025	Elite Summer School for Robotics & Entrepreneurship , Odense, DK (3 weeks, 5 ECTS) – Anomaly Detection with AnomalyDINO.
2025	Data Visualization (6 ECTS) – Interactive viz of historic US elections: encrux.github.io/infoviz
2024	Natural Language Lab (6 ECTS) – LLM assistant with Google Calendar tool integration.
2019	RDE Route Planner – KIT Software Engineering Lab: heuristic-guided BFS over OpenStreetMap data for balanced city/rural/highway route generation. Published in ACM Ubiquity.
07/2019	Volunteer – Hacker School , Karlsruhe – Tutored young students in Python & Raspberry Pi.

SKILLS

Languages	Python, Java, C#, TypeScript, SQL, C/C++ (basic)
Frameworks / Tools	PyTorch, Isaac Sim, MuJoCo, ROS2, MATLAB/Simulink, FastAPI, Spring Boot, Unity, Unreal Engine
Robotics	Teleoperation, Real-time Control (TwinCAT ADS), Kinematics, Path Planning, Digital Twins
AI / ML	Reinforcement Learning, Computer Vision, Vision-Language-Action models, Large Language Models, statistics & experimental analysis
Systems / DevOps	SLURM, W&B, TensorBoard, Docker, Git, CI/CD, Linux
Spoken	German (native), English (fluent)