Erik Bauer

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linkedin.com/in/erbauer | scholar.google.com/citations?user=_GE0_goAAAAJ

Education

ETH Zurich, MSc Robotics, Systems & Control, GPA: 5.38/6.00   Sept 2022 – Dec 2024
- **Coursework:** Machine Learning, Computer Vision, Planning & Optimal Control, Visual SLAM, Dynamic Programming, Soft Robotics, Human Body Models

ETH Zurich, BSc Electrical Engineering, GPA: 5.18/6.00   Sept 2019 – Sept 2022
- **Coursework:** Calculus, Linear Algrebra, Complex Analysis, Electromagnetic Fields, Electric Circuits, Semiconductor Electronics, Control Theory, Algorithms & Datastructures, Machine Learning

Gymnasium Ohmoor, High School Graduation, GPA: 1.00   Aug 2011 – June 2019
- Graduated as valedictorian, received awards by the German Society of Physics and Mathematical Society in Hamburg for exceptional performance

Professional Experience

Intern, BMW – Munich, Germany   July 2023 - Feb 2024
- Lead research project to analyze the behavior of multi-object-tracking pipelines under latency
- Created latency evaluation framework to evaluate combinations of different LIDAR object detection and tracking algorithms under latency using the KITTI dataset and designed a novel probabilistic evaluation metric
- Created web app with Dash in Python to automate internal processes for ticket creation and manipulation in Jira

Small Business Owner, Bauer Custom Keyboards – Zurich, Switzerland   July 2022 – Mar 2023
- Built a small business around designing, manufacturing and selling custom mechanical computer keyboards
- Designed and manufactured acrylic cases with lasercutters, managed supply chain for PCBs and custom-built metal parts, handled e-commerce, payment processing and shipping 50+ keyboards to USA, EU, Asia and UAE

Software Consultant, PB Industries – Zurich, Switzerland   Feb 2022 – Aug 2023
- Co-founded a software consulting company with friends to build the MVP for a Zurich-based aerospace startup
- Built software for a content management and playback system for 150+ clients in airplane seats with a custom communication protocol, centralized client state management, media upload/synchronization and custom operating system images using Python, SQLite and OS-level scripts and customizations

Projects

RAPTOR: Soft Robotic Aerial Manipulation Platform   srl.ethz.ch/platforms/fsr/raptor.html

Founding member of a three-year research project to build a robot platform for autonomous aerial manipulation.
- Played a crucial role as systems engineer with focus on computer vision and onboard electronics
- Lead the development of pose estimation through a motion capture system and different visual SLAM systems and developed a vision-based system to estimate the pose of target objects and plan grasps with the drone
- Lead the systems integration of onboard electronics for communication and power, including the onboard computer, the PX4 flight controller, the soft gripper subsystem and power distribution circuitry
- Responsible for real-world tests of the drone system in indoor and outdoor environments

Imitation Learning with a Humanoid Robotic Hand   srl.ethz.ch/platforms/srh/

Working on end-to-end learning for learning human-like dexterous robotic manipulation with a five-fingered hand.
- Developed full imitation learning pipeline from optimization-based teleoperation and data collection to training transformer-based robot policies that map from pixels to actions with ACT and Octo frameworks
- Currently exploring large-scale pretraining using cross-embodiment robot and human manipulation data, learning multimodal latent action spaces to facilitate transfer learning across different embodiments

Publications

An Open-Source Soft Robotic Platform for Autonomous Aerial Manipulation   CoRL 2024

E. Bauer, M. Blöchlinger, P. Strauch, A. Raayatsanati, C. Cavelti, R.K. Katzschmann

10.48550/arXiv.2409.07662

BEAM: Bilevel Evaluation and Analysis of Multi-Object-Tracking under Latency   IEEE ITSC 2024

E. Bauer, Y. Yin, M. Ayeb, C.K. Krause, L. Brabetz

To appear in ITSC conference proceedings in late 2024.

Autonomous Marker-Less Rapid Aerial Grasping   IEEE IROS 2023

E. Bauer, B.G. Cangan, R.K. Katzschmann

10.1109/IROS55552.2023.10342033

RAPTOR: Rapid Aerial Pickup and Transport of Objects by Robots   IEEE IROS 2022

A.X. Appius, *E. Bauer*, M. Blöchlinger, A.Kalra, R. Oberson, A. Raayatsanati, P. Strauch, S. Saresh, M.V. Salis, R.K. Katzschmann

10.1109/IROS47612.2022.9981668

Awards

Award from the German Physical Society (DPG) for exceptional performance during high school studies   June 2019

Award from the Mathematical Society in Hamburg for exceptional performance during high school studies   June 2019

Awarded a spot in the ITSC 2024 conference travel support program, aiming to enable conference attendance for exceptional young researchers   Sept 2024

Other Experience

Teaching Assistant, High Voltage Lab, ETH Zurich – Zurich, Switzerland   Jan 2020 - Jan 2023

- Developed small electronics kits for students to assemble
- Created online assignments for first year electrical engineering students on Moodle
- Held exercise sessions for groups of around 20 students for an introduction to electrical networks and circuits
- Held short practical classes introducing students to high temperature superconductors
- Assisted teaching of a hands-on class about renewable energy in Switzerland, guiding experimental classes

Teaching Assistant, Power Electronic Systems Lab, ETH Zurich – Zurich, Switzerland   Oct 2020 - June 2022

- Held excercise sessions for about 20 students for an advanced lecture on electrical networks and circuits
- Converted exercise catalogue to online exercises on Moodle

Technologies

Languages: Python, C++, Java, HTML, CSS, SQL

Technologies: Linux Systems, Docker, Git, PyTorch, Jax, OpenCV, ROS 1/2, FastDDS, ZeroMQ