

SIMON BACHHUBER

✉ bachhuber@imes.uni-hannover.de · [🌐 https://simon-bachhuber.github.io](https://simon-bachhuber.github.io) · [🐙 https://github.com/simon-bachhuber](https://github.com/simon-bachhuber)

Education

- Dr.-Ing. in AI in Biomedical Engineering at **FAU Erlangen-Nürnberg**, Erlangen, Germany Sep, 2021 – Present
Advisor: Prof. Thomas Seel [🌐](#) Thesis: *Dynamic motion state estimation and control via RNNs and sim-to-real transfer*
- M.S. in Physics at **The University of Regensburg**, Regensburg, Germany Oct, 2018 – Nov, 2020
Grade: 1.2 (GPA: 3.8/4) [🌐](#) Thesis: *Increasing label efficiency in supervised classification for industrial application*
- B.S. in Physics at **The University of Regensburg**, Regensburg, Germany Mar, 2015 – Jul, 2018
Grade: 1.6 (GPA: 3.4/4) [🌐](#) Thesis: *Lieb-Liniger model for relativistic particles*

Work Experience

- Institute of Mechatronic Systems**, Hanover, Germany Sep, 2024 – Present
Learning Control and Inertial Motion Tracking Technology, Postdoctoral Researcher
• Proposal writing work and supervision of Ph.D. students
- Department Artificial Intelligence in Biomedical Engineering**, Erlangen, Germany Sep, 2021 – Aug, 2024
Learning Control and Inertial Motion Tracking Technology, Doctoral Researcher
• Developing **RNN-, Neural-ODE-, and Transformer-based** solutions for human motion capture with wearable, inertial sensors and for autonomous learning control
• In three years, published **seven papers in first-authorship** and six papers in co-authorship published in top-outlets (IROS, TMLR, ...)
• Presented our research and re-presented our department at several international conferences in Sweden, Singapore, and Abu Dhabi
• Won [🌐 Jean-Pierre Le Cadre Award \(best-paper award\)](#) as first author (2nd runner-up) and as co-author
• Supervised several student projects, three Bachelor thesis and four Master thesis students
• Designed and delivered a highly-rated course on Explainable ML with over **300 participants**, teaching advanced concepts with clarity
- German Aerospace Center**, Ulm, Germany Apr, 2021 – Jul, 2021
Battery Degradation Simulation, Scientific Staff
• Prototyped a modular, json-based experiment configuration system, improving experiment reproducibility and iteration speed
- BMW AG**, Regensburg, Germany Sep, 2020 – Mar, 2021
Anomaly Detection for Predictive Maintenance, Internship
• Developed and deployed (via Azure) an anomaly detection system within months that proved so effective that it was rolled out to other production sites; received an outstanding [🌐 employment reference letter](#)

Related Projects

- Plug-and-Play Inertial Motion Tracking**, state-of-the-art methods with **< 5 lines of code** [🐙 simon-bachhuber/imt](#)
• Contains methods of more than five papers, both constraint-based as well as ML-based methods; made portable via ONNX
- Recurrent Inertial Graph-based Estimator**, a novel, message-passing RNN architecture [🐙 simon-bachhuber/ring](#)
• contains a complete physics engine, a motion generation engine, extensive quaternion algebra, and a feature-complete deep learning stack with WandB logging, all written in JAX that automatically scales from a single CPU to multiple GPUs (SIMD)
- Neural ODE Control**, automatic design of feedback controllers, uses JAX and MuJoCo [🐙 simon-bachhuber/chain_control](#)
• Automatic design of Neural-ODE-based output feedback policies via truncated backpropagation through time or Deep RL

Skills

- Programming Languages: Deep understanding of the Python language (including the interpreter itself); comfortable with Matlab, Julia, C, Bash, Cython, Zsh, Scala (random order)
- **Python: Over six years experience**, skilled in publishing and maintaining packages on [🌐 PyPI](#), automated CI via Github Actions and flake8, pytest, mkdocs, black, mypy, pytype
- Deep Learning Frameworks: Over **five years experience in PyTorch, Tensorflow, JAX**; in general proficient in autograd and array frameworks such as Numba, MLX, PyTensor, CuPy; Personal LLM project involving finetuning Llama3 using torchtune
- High-performance Computing: Comfortable with SLURM, ray, optuna, multiprocessing, asyncio, TorchScript, Azure Cloud, Databricks
- Tools: Bitbucket, Github, Gitlab, MuJoCo, Stable Baselines 3, OpenAI Gym, Ray RLLib, \LaTeX , Typst, Jira, Slack, Teams, WandB, Neptune

Selected Publications [📖 Google Scholar](#)

- [1] S. Bachhuber, A. Pawluchin, A. Pal, I. Boblan, and T. Seel, "A Soft Robotic System Automatically Learns Precise Agile Motions Without Model Information," in *2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Oct. 2024. doi: [10.48550/arXiv.2408.03754](https://doi.org/10.48550/arXiv.2408.03754).
- [2] S. Bachhuber, I. Weygers, D. Lehmann, M. Dombrowski, and T. Seel, "Recurrent Inertial Graph-Based Estimator (RING): A Single Pluripotent Inertial Motion Tracking Solution," *Transactions on Machine Learning Research*, Jul. 2024, [Online]. Available: <https://openreview.net/forum?id=h2C3rkn0zR>
- [3] S. Bachhuber, D. Lehmann, E. Dorschky, A. D. Koelewijn, T. Seel, and I. Weygers, "Plug-and-Play Sparse Inertial Motion Tracking With Sim-to-Real Transfer," *IEEE Sensors Letters*, vol. 7, no. 10, pp. 1–4, Oct. 2023, doi: [10.1109/LSENS.2023.3307122](https://doi.org/10.1109/LSENS.2023.3307122).

Last Updated on December 31, 2024