Daniel Gedon

Postdoctoral Fellow in Machine Learning · Tübingen AI Center, University of Tübingen

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Research Interests

Probabilistic machine learning, generative models, AI for scientific discovery, simulation-based inference, foundation models and LLMs, model discovery, uncertainty quantification.

Technical Skills

Languages & frameworks: Python (PyTorch, scikit-learn, numpy, pandas), Git
Infrastructure: SLURM, Hydra, Ray, Linux HPC clusters
Methods: Bayesian inference, simulation-based inference, generative models, transformers and LLMs (including pre-training from scratch), uncertainty quantification, hyperparameter optimization

Professional Experience

Postdoctoral Fellow, Tübingen University, Tübingen AI Center, Germany — Sep 2024 – Present
Advisor: Jakob H. Macke

- Research on probabilistic ML and LLMs for AI-driven scientific discovery: LLM-based automated model discovery, and generative models and neural density estimation for simulation-based inference.
- Maintainer of `sbi` (800+ GitHub stars), a Python package for simulation-based inference.
- Student supervision, mentoring, and co-organization of SBI hackathons.

Satellite Attitude Control System Analyst, Airbus Defence & Space, Germany — Oct 2015 – Sep 2016

- High-precision satellite pointing error analysis using ESA PEET simulation software.
- AOCS/GNC system concept design for early-phase satellite missions.
- Sensor modeling and functional simulation of attitude determination.

Education

Ph.D. in Machine Learning, Uppsala University, Sweden — Aug 2019 – Aug 2024
Advisor: Thomas B. Schön · Thesis: *On Deep Learning for Low-Dimensional Representations* [Thesis]
Topics: deep learning for clinical ECG analysis, deep state-space models for system identification, self-supervised and kernel methods for representation learning
Visiting researcher, Belkin lab, UC San Diego, Spring 2023

M.Sc. in System and Control, TU Delft, Netherlands — Sep 2017 – Jul 2019
Thesis: *Tensor Network Kalman Filter for Large-Scale MIMO Systems* [Thesis]

B.Eng. in Aerospace Engineering, DHBW, Germany — Sep 2012 – Sep 2015

Open-Source Software

sbi — 2024 – present
Python package for simulation-based inference. 800+ GitHub stars. Maintainer. [github]

Grants & Awards

AI for Science Program, Anthropic — Spring 2026
$20,000 in Claude API credits for life science application

WASP Postdoctoral Fellowship, Knut and Alice Wallenberg Foundation — Spring 2024
Two-year scholarship at the Institute of Science and Technology Austria (ISTA). Awarded; declined.

WASP Research Grant, Knut and Alice Wallenberg Foundation — Spring 2023
Funding for three-month research visit to Mikhail Belkin's lab, UC San Diego.

Academic Service

Peer Review
ML venues: NeurIPS (2023–2026), ICLR (2024–2025), ICML (2025), AISTATS (2023–2024), UAI (2025)
Other conferences: IFAC WC (2023), CDC (2023), ECC (2023), MIR (2024), IEEE CCTA (2023)
Journals: Automatica (2023), IEEE CSS (2025), IEEE TC-SMC (2023), IEEE TIM (2023), IEEE Access (2023), BMJ (2022)

Organization
SBI Hackathon (5 days), Tübingen, Germany — Mar 2025
SBI Hackathon/Tutorial (3 days), Grenoble, France — Jan 2026

Supervision and Mentoring

Johannes Schmidt, GSoC contributor (`sbi`), University of Bonn — 2026 – present
Anupam Sourav Patra, student assistant, Tübingen University — 2026 – present
Ahmet Alperen Güngör, student assistant, Tübingen University — 2026 – present
Stefan Wahl, PhD student, Tübingen University — 2025 – present
Philipp von Bachmann, MSc project, Uppsala University — Spring 2022
Theogene Habineza, MSc thesis, Uppsala University — Spring 2022

Teaching

Teacher, Tübingen University, Germany — Sep 2024 – present
Seminar: Simulation-based inference (MSc) — Spring 2025
Teamproject: Benchmarking for Misspecified SBI (BSc) — Spring 2025
Seminar: Diffusion models (MSc) — Fall 2025

Lecturer, Uppsala University, Sweden — Sep 2023 – Aug 2024
Advanced Probabilistic Machine Learning, 1RT705 (MSc), Fall 2023

Teaching Assistant, Uppsala University & TU Delft — Oct 2018 – Aug 2024
Statistical ML, Advanced Probabilistic ML, System Identification, AI & ML for WASP PhD school — MSc/PhD level

Talks

Simulation-based inference and probabilistic model discovery with foundation models — Jun 2026
KTH, Stockholm

Simulation-based inference and probabilistic model discovery with foundation models — Jun 2026
Chalmers, Gothenburg

Simulation-based inference and probabilistic model discovery with foundation models — Dec 2025
Ai2, Seattle

Deep Networks for System Identification: A Survey — Sep 2023
ERNSI Workshop, Stockholm

No Double Descent in PCA: Training and Pre-Training in High Dimensions — Mar 2023
Belkin Lab Group Meeting, UC San Diego

Panel: *Training in Data Driven Life Science* — Nov 2022
SciLifeLab DDLS Annual Conference, Stockholm

Deep Learning-based ECG Reading in the Emergency Department — Nov 2022
Joint DSBS / FMS Meeting, Malmö

Other Experience

Solo Travel Oct 2016 – Apr 2017
Long-distance hike, Greater Patagonian Trail, Patagonia. Language school: Spanish (Sucre, Bolivia).

Voluntary Work Apr 2017 – Aug 2017
Work with primary school children, elderly, and refugees. Ansbach, Germany.

Languages

German (native) · English (fluent) · Swedish (intermediate) · Spanish (beginner)

Publications

* denotes equal contribution / joint supervision.

Preprints

1. **Mixed neural posterior estimation for simulators with discrete and continuous parameters**
   Jan Boelts, Cornelius Schröder, Jonas Beck, Jakob H. Macke*, Michael Deistler*, **Daniel Gedon***
   arXiv, 2026 [arXiv]

Peer-Reviewed Publications

1. **A Probabilistic Framework for LLM-Based Model Discovery**
   Stefan Wahl, Raphaela Schenk, Ali Farnoud, Jakob H. Macke, **Daniel Gedon**
   accepted at *ICML*, 2026 [arXiv] [code]

2. **A Deep Learning ECG Model for Localization of Occlusion Myocardial Infarction**
   Stefan Gustafsson, Antônio H. Ribeiro, **Daniel Gedon**, Petrus E.O.G.B. Abreu, Nicolas Pielawski, Gabriela M.M. Paixão, Antonio Luiz P. Ribeiro, Daniel Lindholm, Thomas B. Schön, Johan Sundström
   accepted at *Nature Communications*, 2026 [medRxiv]

3. **Effortless, Simulation-Efficient Bayesian Inference using Tabular Foundation Models**
   Julius Vetter, Manuel Gloeckler, **Daniel Gedon***, Jakob H. Macke*
   NeurIPS, 2025 [arXiv] [OpenReview] [code]

4. **Deep Networks for System Identification: A Survey**
   Gianluigi Pillonetto, Aleksandr Aravkin, **Daniel Gedon**, Lennart Ljung, Antônio H. Ribeiro, Thomas B. Schön
   Automatica, 2025 [DOI] [arXiv]

5. **No Double Descent in Principal Component Regression: A High-Dimensional Analysis**
   Daniel Gedon, Antônio H. Ribeiro, Thomas B. Schön
   ICML, 2024 [OpenReview] [ICML] [code]

6. **Uncertainty Estimation with Recursive Feature Machines**
   Daniel Gedon, Amirhesam Abedsoltan, Thomas B. Schön, Mikhail Belkin
   UAI, 2024 [OpenReview] [code]

7. **Evaluating Regression and Probabilistic Methods for ECG-based Electrolyte Prediction**
   Philipp Von Bachmann, **Daniel Gedon**, Fredrik K. Gustafsson, Antônio H. Ribeiro, Erik Lampa, Stefan Gustafsson, Johan Sundström, Thomas B. Schön
   Scientific Reports 14, 15273, 2024 [DOI] [arXiv] [code]

8. **End-to-end Risk Prediction of Atrial Fibrillation from the 12-Lead ECG by Deep Neural Networks**
   Theogene Habineza, Antônio H. Ribeiro, **Daniel Gedon**, Joachim A. Behar, Antonio Luiz P. Ribeiro, Thomas B. Schön
   Journal of Electrocardiology, 2023 [DOI] [arXiv] [code]

9. **Screening for Chagas Disease from the Electrocardiogram using a Deep Neural Network**
   Carl Jidling, **Daniel Gedon**, Thomas B. Schön, Claudia Di Lorenzo Oliveira, Clareci Silva Cardoso, Ariela Mota

Ferreira, Luana Giatti, Sandhi Maria Barreto, Ester C. Sabino, Antonio L. P. Ribeiro, Antônio H. Ribeiro
PLOS Neglected Tropical Diseases, 2023 [DOI] [medRxiv] [code]

10. **Invertible Kernel PCA with Random Fourier Features**
Daniel Gedon, Antônio H. Ribeiro, Niklas Wahlström, Thomas B. Schön
IEEE Signal Processing Letters, 2023 [DOI] [arXiv] [code]

11. **Development and Validation of Deep Learning ECG-based Prediction of Myocardial Infarction in Emergency Department Patients**
Daniel Gedon*, Stefan Gustafsson*, Erik Lampa, Antônio H. Ribeiro, Martin J. Holzmann, Thomas B. Schön, Johan Sundström
Scientific Reports 12, 19615, 2022 [DOI]

12. **First Steps Towards Self-Supervised Pretraining of the 12-Lead ECG**
Daniel Gedon, Antônio H. Ribeiro, Niklas Wahlström, Thomas B. Schön
Computing in Cardiology (CinC), 2021 [DOI] [slides] [video]

13. **Deep State Space Models for Nonlinear System Identification**
Daniel Gedon, Niklas Wahlström, Thomas B. Schön, Lennart Ljung
Proceedings of the 19th IFAC Symposium on System Identification (SYSID), 2021 [DOI] [arXiv] [code]

14. **Automatic 12-Lead ECG Classification using a Convolutional Network Ensemble**
Antônio H. Ribeiro, **Daniel Gedon**, Daniel Martins Teixeira, Manoel H. Ribeiro, Antonio L. Pinho Ribeiro, Thomas B. Schön, Wagner Meira Jr.
Computing in Cardiology (CinC), 2020 [DOI] [code]

15. **Tensor Network Kalman Filter for LTI Systems**
Daniel Gedon, Pieter Piscaer, Kim Batselier, Carlas Smith, Michel Verhaegen
27th European Signal Processing Conference (EUSIPCO), A Coruña, Spain, 2019 [DOI] [code]

16. **PointingSat – High Precision Pointing Error Analysis with ESA PEET v1.0**
Thomas Ott, Marc Hirth, Massimo Casasco, Simon Görries, **Daniel Gedon**, Alison Ponche
10th International ESA Conference on Guidance, Navigation & Control Systems, Salzburg, Austria, 2017 [Paper]