Curriculum vitae

Name (first,last):	Andreas René Geist
Birthdate:	11.03.1992
ORCID:	0000-0003-2551-2419
Website:	www.andregeist.github.io

Address   Autonomous Learning Group
Tübingen AI Center
Maria-von-Linden-Str. 6
72076 Tübingen

Professional experience

Since 4/24 **Postdoctoral Researcher**
Autonomous Learning Group, University of Tübingen

5/23 – 03/24 **Postdoctoral Researcher**
Max Planck Institute for Intelligent Systems, Tübingen
   🎓 Georg Martius

6/22 – 4/23 **Postdoctoral Researcher**
*Institute for Data Science in Mechanical Engineering,
RWTH Aachen*

5/18 – 4/22 **Doctoral Researcher**
*Intelligent Control System Group,
Max Planck Institute for Intelligent Systems, Stuttgart*
   🎓 Sebastian Trimpe
   🎓 Jonathan Fiene

4/13 – 10/17 **Research assistant**
*Tutoring courses on Statistic, Elastomechanics, Dynamics,
and Vibration theory, Control design of underwater robots
Institute for Mechanics and Ocean Engineering,
Hamburg University of Technology*
   🎓 Eugen Solowjow
   🎓 Robert Seifried

Education

2018 – 2022 **PhD: *"Physics-informed regression of implicitly-constrained robot dynamics"***
Thesis examiners: *Frank Allgöwer, David Remy, Sebastian Trimpe*
*Faculty of Design, Production Engineering and Automotive Engineering &
International Max Planck Research School for Intelligent Systems*

2016 - 2018 **M.Sc. Theoretical Mechanical Engineering**
Hamburg University of Technology

2016 Exchange student (3 months)
Vehicle Dynamics and Control Laboratory, University of California Berkeley

2011 – 2015 **B.Sc. Mechanical Engineering**
Hamburg University of Technology

Extracurricular activities

2014 – 2015 E-gnition Hamburg e.V.
Designed and build a steering system for a formula student race car.

Open Source Projects

🎧 ★ 9+   a-paulus/softjax: a library for soft differentiable relaxations of common JAX functions.

🎧 ★ 250+   martius-lab/hitchhiking-rotations: an analysis of recent trends on gradient-based deep learning with 3D rotations.

🎧 ★ 130+   AndReGeist/wheelbot: repository containing all files required to build a Wheelbot robot.

Awards & Scholarships

2022   IROS award finalist: The Wheelbot project got nominated as an award finalist at the International Conference on Intelligent Robots and Systems.

2018   DSCC Travel Award

2016   TUHH Auslandsfond & PROMOS Stipendium

Submitted research proposals (currently under review)

2025   Forschungsprogramm Mit Innovationen den Ökologischen Landbau gemeinsam stärken vom Ministerium für Wissenschaft, Forschung und Kunst Baden- Württemberg, Authors: Prof. Dr. Georg Martius, Paul Hofmann, Dr. Wieland Brendel, Dr. A. René Geist, Dr. Philipp Weckenbrock, Prof. Dr. Christian Lippert, Prof. Dr. Michaela Dippold. Project title: AgRoDiverS - Robotics & Sensing to Diversify Agroecosystems), Funding amount: 499.950 Euro

2025   Klaus Tschira Boost Fund 2025/2026, Author: A. René Geist. Project proposal: Neural simulation. Funding amount: 90.600 Euro

Publications

• Equal contribution.   ♦ Equal advising.

Preprints

Onur Beker, **A. René Geist**, Anselm Paulus, Nico Gürtler, Ji Shi, Sylvain Calinon, & Georg Martius. *Smoothly Differentiable and Efficiently Vectorizable Contact Manifold Generation*. 2026. arXiv: `2602.20304 [cs.RO]`.

Mikel Zhobro, **A. René Geist**♦, & Georg Martius♦. *Learning 3D-Gaussian Simulators from RGB Videos*. 2025. arXiv: `2503.24009 [cs.GR]`.

Anselm Paulus •, **A. René Geist**•, Vít Musil, Sebastian Hoffmann, & Georg Martius. *SoftJAX and SoftTorch: Empowering Automatic Differentiation Libraries with Informative Gradients*.

Peer-reviewed articles

Onur Beker, Nico Gürtler, Ji Shi, **A. René Geist**, et al. *A Smooth Analytical Formulation of Collision Detection and Rigid Body Dynamics With Contact*. In: *arXiv:2503.11736 (to be published in IROS 2025)* (2025).

A. René Geist, Jonas Frey, Mikel Zhobro, Anna Levina, & Georg Martius. *Learning with 3D rotations, a hitchhikers guide to SO(3)*. In: *International Conference on Machine Learning (ICML)*. 2024.

Shamil Mamedov, **A. René Geist**, Ruan Viljoen, Sebastian Trimpe, & Jan Swevers. *Learning deformable linear object dynamics from a single trajectory*. In: *IEEE Robotics and Automation Letters* (2024).

Shamil Mamedov •, A. René Geist •, Jan Swevers, & Sebastian Trimpe. *Pseudo-rigid body networks: learning interpretable deformable object dynamics from partial observations*. In: *2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE. 2024, pp. 9542–9548.

Minh Trinh •, **A. René Geist** •, J. Monnet, S. Vilceanu, Sebastian Trimpe, & Christian Brecher. *Newtonian and Lagrangian Neural Networks: A Comparison Towards Efficient Inverse Dynamics Identification*. In: *IFAC Symposium on Robotics* (2024).

Ramón Uhl, Isabel Schuele, Laurin Ludmann♦, & **A. René Geist**♦. *Development and Evaluation of a Combined Driveline Oscillation and Traction Controller Using Model Predictive Control and Reinforcement Learning: A Comparative Case Study*. In: *FKFS Symposium 2025* (2024).

[**Spotlight**] **A. René Geist**, Jonathan Fiene, Naomi Tashiro, Zheng Jia, & Sebastian Trimpe. *The wheelbot: A jumping reaction wheel unicycle*. In: *IEEE Robotics and Automation Letters (IROS)* (2022).

Lucas Rath •, **A. René Geist** •, & Sebastian Trimpe. *Using Physics Knowledge for Learning Rigid-body Forward Dynamics with Gaussian Process Force Priors*. In: *5th Conference on Robot Learning (CoRL)*. 2022.

A. René Geist & Sebastian Trimpe. *Structured learning of rigid-body dynamics: A survey and unified view from a robotics perspective*. In: *GAMM-Mitteilungen* (2021).

A. René Geist & Sebastian Trimpe. *Learning Constrained Dynamics with Gauss' Principle adhering Gaussian Processes*. In: *2nd Annual Conference on Learning for Dynamics and Control (L4DC)*. PMLR. 2020, pp. 225–234.

Daniel Andre Duecker •, **A. René Geist** •, Edwin Kreuzer, & Eugen Solowjow. *Learning environmental field exploration with computationally constrained underwater robots: Gaussian processes meet stochastic optimal control*. In: *Sensors* (2019).

A. René Geist, Andreas Hansen, Eugen Solowjow, Shun Yang, & Edwin Kreuzer. *Data collection for robust end-to-end lateral vehicle control*. In: *Dynamic Systems and Control Conference*. American Society of Mechanical Engineers. 2017.

Daniel-André Duecker, **A. René Geist**, Michael Hengeler, Edwin Kreuzer, Marc-André Pick, Viktor Rausch, & Eugen Solowjow. *Embedded spherical localization for micro underwater vehicles based on attenuation of electro-magnetic carrier signals*. In: *Sensors* (2017).

A. René Geist, Axel Hackbarth, Edwin Kreuzer, Viktor Rausch, Michael Sankur, & Eugen Solowjow. *Towards a hyperbolic acoustic one-way localization system for underwater swarm robotics*. In: *IEEE International Conference on Robotics and Automation (ICRA)*. 2016.

Anselm Paulus •, **A. René Geist** •, Pierre Schumacher, Vít Musil, & Georg Martius. *Hard Contacts with Soft Gradients: Refining Differentiable Simulators for Learning and Control*. In: *arXiv:2506.14186 (To be published in ICLR 2026)* ().

Doctoral dissertation

A. René Geist. *Physics-informed regression of implicitly-constrained robot dynamics*. Universität Stuttgart, 2022.

Selected media coverage

Our work on the "Wheelbot" has been featured in Heise Online, TechXplore, ScienceX, and HacksterIO. The Wheelbot's official YouTube video received over 60,000 views.

Teaching

2025	**Guest lecturer** - University of Tübingen Master course: *"Reinforcement learning"* Lecture topic: *Value estimation with Monte Carlo and temporal difference learning*
2025	**Teaching assistant** - University of Tübingen Master course: *"Reinforcement learning"*
2024	**Guest lecturer** - University of Tübingen Bachelor course: *Basics of Machine Learning* Lecture topics: *Ridge and Bayesian regression, Random Forest*
2024	**Teaching Assistant** - University of Tübingen Bachelor course: *Reinforcement Learning (Proseminar)*
2023	**Teaching Assistant** - RWTH Aachen Bachelor course: *"Computer Science in Mechanical Engineering"*
2023	**Guest lecturer** - RWTH Aachen Bachelor course: *"Fundamentals of Machine Learning"* Lecture topic: *Learning dynamics with probabilistic machine learning models*
2022	**Teaching Assistant** - RWTH Aachen Master course: *"Ethics of Artificial Intelligence and Robotics"*

Professional activities & Service

PC Member & treasurer	European Workshop on Reinforcement Learning 2025
	Evaluator for ELLIS PhD applications 2025
	Evaluator for IMPRS-IS PhD applications 2025
Assessor	Evaluator for IMPRS-IS PhD applications 2024
	Evaluator for ELLIS PhD applications 2024
	Evaluator for IMPRS-IS PhD applications 2023
Reviewing	International Conference on Computer Vision (ICCV) - 2025
	Conference on Neural Information Processing Systems (NeurIPS) - 2021, 2025
	International Conference on Machine Learning (ICML) - 2024
	Association for the Advancement of Artificial Intelligence (AAAI) - 2020
	Conference on Robot Learning (CORL) - 2023, 2024
	Robotics: Science and Systems - 2020
	International Conference on Intelligent Robots and Systems (IROS) - 2023, 2024
	IEEE International Conference on Robotics and Automation (ICRA) - 2021
	Transactions on Robotics (T-RO) - 2023
	European workshop on reinforcement learning (EWRL) - 2023, 2025
	Learning for Dynamics & Control Conference (L4DC) - 2020, 2021, 2022, 2024
	MDPI Sensors - 2019, 2023
	IFAAC - 2020
	Systems Theory in Data and Optimization (SysDo) - 2024
	IEEE Control Systems Letters (L-CSS) - 2023, 2024
	Transactions on Automatic Control (TACON) - 2024
	Conference on Dynamics and Control (CDC) - 2023, 2024

Mentoring & Supervision

Interns	Zheng Jia │ Max Planck Institute for Intelligent Systems
	"Simulator design and controllability analysis of a robot platform"
	Naomi Tashiro │ Max Planck Institute for Intelligent Systems
	"Design of a motherboard and 3D-printed frame for a unicycle robot" (co-advised)
	Cathrin Senst │ Max Planck Institute for Intelligent Systems
	"IMU calibration for a robot testbed"
	Milan Tepic │ Max Planck Institute for Intelligent Systems
	"Software design for sensor integration on a robot platform"
M.Sc. theses	Jan Knecht │ University of Tübingen
	"Active exploration using differentiable simulation for system identification"
	Rojan Abolhasani│ University of Tübingen
	"Universal control via large-scale imitation learning"
	Isabel Schüle │ Porsche AG
	"Model-based reinforcement learning for direct vehicle torque control" (co-advised)
	Josefine Monnet │ RWTH Aachen
	"Friction identification in robot arms via physics-informed neural networks" (co-advised)
	Tom Rothe │ RWTH Aachen
	"Robot control using structured neural networks" (co-advised)
	Lucas Rath │ Max Planck Institute for Intelligent Systems
	"Structured learning for robot control: Learning constraint dynamics with Gauss principle"
B.Sc. theses	Simon Rappenecker │ University of Tübingen
	"Parameter estimation of contact force models with neural network surrogate gradients"
	Paul Masan │ University of Tübingen
	"An analysis of stepsize adaptation for training physics-informed neural networks"
	Simon Braunreuther │ University of Tübingen
	"Comparison of gradient regularization methods for the neural equation learner"
	Max van Haren │ Max Planck Institute for Intelligent Systems
	"Design and control of an agile mobile robot: Development of a flywheel-driven testbed for non-Linear learning control"
	Koen Scheres │ Max Planck Institute for Intelligent Systems
	"Comparison of learning control algorithms for a robotic stand-up maneuver"

Languages

English   full professional proficiency

German   native speaker