

Johannes Gebert

DEPUTY DIRECTOR AND GROUP LEAD AT THE INSTITUTE FOR HIGH-PERFORMANCE COMPUTING

RESEARCH SCIENTIST AT THE HIGH-PERFORMANCE COMPUTING CENTER STUTTGART (HLRS)

UNIVERSITY OF STUTTGART

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Johannes Gebert leads a research group in future computing at the High-Performance Computing Center Stuttgart (HLRS). His 10 years of experience as a design, structural, and software engineer bridges the gap between domain specialists and high-performance computing (HPC). He finished his PhD on a new biomechanical method on HPC systems with summa cum laude. A research visit at the Innovative Computing Laboratory (ICL) of the University of Tennessee, Knoxville (UTK), also strengthened his background in HPC. Several lectures and a Future Computing Lab foster young talents in undergraduate and graduate studies. Johannes is an Early Career Editorial Board Member for Advances in Engineering Software.

Professional Background

High-Performance Computing Center Stuttgart (HLRS)

PHD STUDENT, RESEARCH SCIENTIST

Stuttgart, Germany

Oct. 2018 - today

- Direct mechanics for human trabecular bone on HPC systems.
- Future computing to enable

Mercedes-Benz AG

SOFTWARE ENGINEER

Stuttgart, Germany

May. 2023 - Jan. 2025

- Measurement data management for prototype vehicles.
- Software engineering for development data of electric powertrains.

in2p GmbH

WORKING STUDENT, MASTER THESIS, STRUCTURAL ENGINEER

Fellbach, Germany

Sep. 2015 - Sep. 2018

- Design engineer for convertible roofs and other kinematic body systems.
- Structural engineer for convertible roofs and other kinematic body systems.

Audi AG

BACHELOR THESIS

Neckarsulm, Germany

Mar. 2015 - Aug. 2015

- Material characterization for carbon fiber reinforced plastics (CFRPs).

ADESS AG

INTERNSHIP

Munich, Germany

Aug. 2013 - Feb. 2014

- Design of a Le Mans Prototype 2 Monocoque.

Formula Student, Rennstall Esslingen

PART-PROJECT LEADER CARBON COMPOSITES

Esslingen, Germany

Sep. 2012 - Aug. 2013

- Design of a Le Mans Prototype 2 Monocoque.

EACC GmbH

WORKING STUDENT

Munich, Germany

Feb. 2012 - Dec. 2012

- Quality assurance of carbon fiber-reinforced plastic parts.

Gebert Medientechnik GmbH

TEMPORARY WORKER ...WORKING STUDENT ...PROJECT MANAGER FULL TIME

Munich, Germany

Jul. 2007 - Jan. 2020

- Parental business.

Academic Background

University of Stuttgart

PHD STUDENT

Stuttgart, Germany

Feb. 2020 - May 2025

- On the Anisotropy of Trabeculae in Vivo - Computationally and Morphometry Aware
Grade: Summa cum laude
 - Report submitted on June 13, 2024.
 - Defended on May 19, 2025.
 - Report can be published without remarks or corrections as submitted in June 2024.

University of Stuttgart

M.Sc., AUTOMOTIVE AND ENGINE ENGINEERING

- Masterthesis:
Die Modellierung und Simulation elektrohydraulischer Cabriovertdecke
Grade: 1.3

Stuttgart, Germany

Oct. 2015 - Dec. 2017

University of Applied Sciences (UAS) Esslingen

B.ENG., AUTOMOTIVE ENGINEERING

- Bachelorthesis:
Der Einfluss von Stabilisierungsfäden auf die mechanischen Eigenschaften eines Faser-Kunststoff-Verbundes
Grade: 1.0

Esslingen, Germany

Sep. 2011 - Aug. 2015

Research Focus

- Evaluating physical and technical characteristics and limits of innovative computing machinery (ICM).
- Developing software backends for libraries targeting ICMs and accelerating devices.
- Identifying and extracting mathematical kernels for computation on ICMs and accelerating devices.
- Collaborating with vendors to evaluate their hardware in the HPC ecosystem.
- Supporting domain-specific researchers in using HPC systems.

Professional Activities

- Organizer - Future Computing Workshop, March 2026
- Early Career Editorial Board Member for Advances in Engineering Software
- Co-Organizer - Workshop on Sustained Simulation Performance (**WSSP** 33-40), 2022-2025
- Organizer - Franco-German Science Talks (**DFWG**) 2025
- Conference Special Session co-chair - PINNs in in Engineering Applications, **AI CIVIL-COMP 2025**
- Conference Special Session co-chair - Ethics of AI - How Engineers Earn Trust , **AI CIVIL-COMP 2025**

Research Visits

- RIKEN Center for Computational Science (R-CCS), Kobe, Japan, planned for 07/2025 - 09/2025
- Bristol Center for Supercomputing (BriCS), UK, 03/2025
- Innovative Computing Laboratory (ICL), University of Tennessee, Knoxville (UTK), USA, 03/2022-09/2022

Third Party Funding

2021	Lead applicant and project manager of IKILeUS - Integrierte KI in der Lehre der Universität Stuttgart, Total volume €1.9M.
2022	Sondermittel zur Abmilderung der pandemiebedingten Lernrückstände, Total volume €12k.

Teaching Experience

2023-2025	Parallelrechner - Architektur und Anwendung
2022-2025	Nachhaltigkeit für angehende Ingenieure, co-organizer
2022-2024	Ki-Ringvorlesung für Ingenieure
2018-2020	Modellierung Simulation und Optimierungsverfahren I+II

Supervised Bachelor and Master Students

- Benjamin Schnabel
- Niklas Neher
- Hossein Zidehi
- Hanwen Mao
- Matti Sack
- Nico Zito
- Johannes Däges
- Luke Wankmüller
- Marc-Philipp Schmid

Supervised Student Research Assistants

- Daniel Renschler
- Fabian Pelzer
- Franziska Stegmaier
- Hossein Nikseresht Zidehi
- Jakob Hermann
- Johanna Sellhorn-Timm
- Johannes Däges
- Jonathan Schäfer
- Lukas Baur
- Marc-Philipp Schmid
- Michael Baier
- Niklas Neher
- Simon Heudorfer

Awards and Distinctions

2022 Supercomputing 22 Travel Grant Award

PhD Report

- [1] J Gebert. "On the Anisotropy of Trabeculae in Vivo - Computationally and Morphometry Aware". PhD thesis. University of Stuttgart, 2025.

Conference Papers

- [2] J Gebert, MP Schmid, B Schnabel, R Schneider, and M Resch. The Effectice Stiffness of 3-Dimensional Heterogenous Structures Derived by 1-Dimensional Finite Element Meshes. In: 15th World Congress on Computational Mechanics 2022. July 2022.
- [3] J Gebert, JM Däges, B Schnabel, R Schneider, and M Resch. Topology Optimization by the Anisotropy of Cancellous Bone. In: 11th European Solid Mechanics Conference 2022. July 2022.
- [4] L Poslon and J Gebert. Beyond Biomedical Simulations in Supercomputing: Ethical Challenges and Regulatory Obstacles with Boundary Conditions in Healthcare. In: Ethical, Social and Policy issues in HPC - Supercomputing 24. Nov. 2024.
- [5] J Gebert and B Schnabel. HPC in Biomechanics - Challenges, Current Research and Future Opportunities. In: Virtual Physiological Human Conference 2024. Sept. 2024.
- [6] B Schnabel, AL Tracht Johnson, J Gebert, and R Schneider. A Continuum Mechanical Model for Trabecular Bone Incorporating Viscoelastic and Plastic Behavior. In: 58th Annual Conference of the German Society for Biomedical Engineering - BMT2024. Sept. 2024.

Submitted Conference Papers

- [7] J Gebert, MP Schmid, B Schnabel, R Schneider, and M Resch. The Effectice Stiffness of 3-Dimensional Heterogenous Structures Derived by 1-Dimensional Finite Element Meshes. In: 15th World Congress on Computational Mechanics 2022. 2022.
- [8] J Gebert, D Glück, C Tradonsky, and J Schäfer. Exploring QUBO on LPUs for Engineering. In: HPC on Heterogeneous Hardware (H3) - ISC 2025. June 2025.
- [9] B Schnabel and J Gebert. A Proof of Concept on Cleaning Medical Devices in Silico. In: 2nd European Fluid Dynamics Conference. Aug. 2025.

- [10] J Gebert and F Pelzer. On the Way to AI-Based Effective Stiffness Parameters. In: The Seventh International Conference on Artificial Intelligence, Soft Computing, Machine Learning and Optimization in Engineering 2025. Aug. 2025.

Conference Posters

- [11] J Gebert, DP Barry, and J Dongarra. PowerMan: Online Power Capping by Computationally Informed Machine Learning. In: Supercomputing 22. Nov. 2022.
- [12] J Gebert, R Schneider, and M Resch. High-Performance Computing by and for Patient Specific Mechanical Properties. In: Platform for Advanced Scientific Computing 23 (PASC23). June 2023.

Workshops

- [13] J Gebert. A Data Driven Biomechanical Workflow on NEC Vulcan. In: 32nd Workshop on Sustained Simulation Performance (WSSP). High-Performance Computing Center Stuttgart (HLRS), Cyberscience Center at Tohoku University, and NEC Corporation. Dec. 2021.
- [14] J Gebert. Strategies for Power Adjustments with Machine Learning. In: 34th Workshop on Sustained Simulation Performance (WSSP). Cyberscience Center at Tohoku University, High-Performance Computing Center Stuttgart (HLRS), and NEC Corporation. Oct. 2022.
- [15] J Gebert. Load Balancing by Histomorphology. In: 35th Workshop on Sustained Simulation Performance (WSSP). High-Performance Computing Center Stuttgart (HLRS), Cyberscience Center at Tohoku University, and NEC Corporation. Mar. 2023.
- [16] J Gebert. Morphometry Driven Profiling - On the Patient-Specific Use of HPC Resources. In: 36th Workshop on Sustained Simulation Performance (WSSP). Cyberscience Center at Tohoku University, High-Performance Computing Center Stuttgart (HLRS), and NEC Corporation. Dec. 2023.
- [17] J Gebert and J Schäfer. Power Capping in High Performance Computing - A Case Study on an AMD System. In: 37th Workshop on Sustained Simulation Performance (WSSP). High-Performance Computing Center Stuttgart (HLRS), Cyberscience Center at Tohoku University, and NEC Corporation. June 2024.
- [18] J Gebert and J Schäfer. Power Capping the DTC: Conclusions and Lessons Learned. In: 38th Workshop on Sustained Simulation Performance (WSSP). Cyberscience Center at Tohoku University, High-Performance Computing Center Stuttgart (HLRS), and NEC Corporation. Dec. 2024.
- [19] J Gebert. Future Computing at HLRS. In: 39th Workshop on Sustained Simulation Performance (WSSP). High-Performance Computing Center Stuttgart (HLRS), Cyberscience Center at Tohoku University, and NEC Corporation. May 2025.
- [20] P Luszczek, A Danalis, H Jagode, D Barry, and J Gebert. Online regulation of power draw for energy savings in HPC kernels. In: Scheduling Variable Capacity Resources for Sustainability, University of Chicago, Paris. Mar. 2023.
- [21] J Gebert. High-Performance Computing to Enable Patient-Specific Medical Solutions - Anisotropies of Cancellous Bone ex Vivo. In: Leogang High Performance Computing Workshop 2024. Mar. 2024.
- [22] J Gebert. Future Computing at HLRS. In: Leogang High Performance Computing Workshop 2025. Feb. 2025.

Invited Talks

- [23] J Gebert. *The Mechanical Challenges of Human Cancellous Bone, pre-conference virtual lightning talk*. Numerical Engine Room Talks, University of Augsburg. May 2025.
- [24] J Gebert. *Towards AI-based Anisotropies of Human Trabecular Bone*. Medical Information Sciences, University of Augsburg. May 2025.
- [25] J Gebert. Traditional HPC Software in Future Computing. In: National Supercomputer Center Guangzhou, PRC. Apr. 2025.

Other Talks

- [26] J Gebert. The Mechanical Challenges of Human Cancellous Bone, pre-conference virtual lightning talk. In: Supercomputing 21. Oct. 2021.
- [27] J Gebert. AI for Society. Wie aus Erstis Innovatoren werden. In: University Future Festival 2023. Apr. 2023.
- [28] J Gebert. Computing the Anisotropy of Human Bone with HPC. In: Tongji University, Shanghai, PRC. Apr. 2025.

Software

- [29] J Gebert. *A-FMF-File-to-Meta-Format-Converter*. 2022. DOI: 10.5281/ZENODO.6301402.
- [30] J Gebert. *M-ROT-Rotational-Tensor-Optimization*. 2022. DOI: 10.5281/ZENODO.6301413.
- [31] J Gebert and R Schneider. *M-DTC-Direct-Tensor-Computation*. 2022. DOI: 10.5281/ZENODO.6321325.

Datasets

- [32] M Ruf, H Steeb, J Gebert, R Schneider, and P Helwig. *Sample 1 of human femoral heads: micro-XRCT data sets*. 2021. DOI: 10.18419/DARUS-1177.
- [33] J Gebert, R Schneider, P Helwig, and JP Schenkengel. *A clinical Computed Tomography Scan of a Human Femoral Head*. Version V1. 2021. DOI: 10.18419/darus-1182. <https://doi.org/10.18419/darus-1182>.
- [34] J Gebert, R Schneider, B Schnabel, F Pelzer, P Helwig, and JP Schenkengel. *Scanning Spongiosa: A set of Clinical Computed Tomography Scans of Human Femoral Heads*. Version V1. 2023. DOI: 10.18419/darus-3065. <https://doi.org/10.18419/darus-3065>.