

Markus Worchel

✉ m.worchel@tu-berlin.de
📄 mwoorchel.github.io
🌐 [mwoorchel](#)
in [Markus Worchel](#)
👤 [Markus Worchel](#)

Research Interests

differentiable rendering, real-time rendering, physically-based rendering, neural shading, 3D reconstruction, GPU-accelerated computing, appearance capture, machine learning, differentiable programming, geometry processing

Education

- 2022 – 2026 **Ph.D. in Computer Science**, *Technische Universität Berlin*.
Computer Graphics group, supervised by Prof. Marc Alexa.
Thesis: “Efficient Differentiable Rendering: Approximate and Physics-based”.
Graduated with distinction (summa cum laude).
- 2016 – 2018 **M.Sc. in Computer Science**, *Technische Universität Berlin*.
Computer graphics, computer vision, machine learning, physics.
GPA: 1.1 (German scale: 1.0 = best, 4.0 = lowest passing grade).
Thesis: “Learning-based interest point operators for PolSAR images”.
- 2012 – 2016 **B.Sc. in Computer Science**, *Technische Universität Berlin*.
Computer graphics, software engineering, scientific computing.
GPA: 1.2 (German scale: 1.0 = best, 4.0 = lowest passing grade).
Best among Computer Science graduates.

Experience

- 2026 – present **Postdoctoral Researcher**, *Technische Universität Berlin*.
Researching rendering, differentiable rendering, and inverse rendering, with a focus on efficiency.
- 2022 – 2026 **Researcher**, *Technische Universität Berlin*.
Researched efficient differentiable rendering using real-time graphics techniques, physically-based differentiable rendering, and inverse rendering applications in graphics, vision, and other domains.
- 2019 – 2022 **Researcher**, *Fraunhofer Heinrich Hertz Institute*.
Researched multi-view geometry and appearance reconstruction using differentiable and neural rendering. Maintained and extended a GPU-accelerated 3D reconstruction pipeline used in multiple commercial volumetric video productions. Mentored student researchers and co-authored successful grant proposals.
- 2017 – 2019 **Student Research Assistant**, *Fraunhofer Heinrich Hertz Institute*.
Implemented GPU-accelerated computer vision algorithms, including stereo depth estimation, (temporal) depth filtering, and semantic segmentation. Supported research on multi-view 3D reconstruction.
- 2015 – 2017 **Student Software Developer**, *Assystem Germany GmbH*.
Designed and implemented a real-time 3D renderer for visualizing complex automotive codebases.

Publications

- 2025 **Moment Bounds are Differentiable: Efficiently Approximating Measures in Inverse Rendering**.
[M. Worchel](#), M. Alexa.
ACM Transactions on Graphics (Proceedings of SIGGRAPH 2025).
🏆 **Best Paper Honorable Mention**
- Differentiable Geometric Acoustic Path Tracing using Time-Resolved Path Replay Backpropagation**.
U. Finnendahl[†], [M. Worchel](#)[†], T. Jüterbock, D. Wujecki, F. Brinkmann, S. Weinzierl, M. Alexa.
ACM Transactions on Graphics (Proceedings of SIGGRAPH 2025).

- Radiative Backpropagation with Non-Static Geometry.**
M. Worchel[†], U. Finnendahl[†], M. Alexa.
 Proceedings of the Eurographics Symposium on Rendering (EGSR 2025).
- Interpolating Splines over Triangulated Surfaces by Blending Vertex-Centric Local Geometries.**
 T. Djuren, U. Finnendahl, M. Kohlbrenner, **M. Worchel**, M. Alexa.
 Computers & Graphics.
- 2023 **Differentiable Rendering of Parametric Geometry.**
M. Worchel, M. Alexa.
 ACM Transactions on Graphics (Proceedings of SIGGRAPH Asia 2023).
- Differentiable Shadow Mapping for Efficient Inverse Graphics.**
M. Worchel, M. Alexa.
 Proc. of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR 2023).
- 2022 **Multi-View Mesh Reconstruction with Neural Deferred Shading.**
M. Worchel[†], R. Diaz[†], W. Hu, O. Schreer, I. Feldmann, P. Eisert.
 Proc. of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR 2022).
- 2021 **Hardware Design and Accurate Simulation of Structured-Light Scanning for Benchmarking of 3D Reconstruction Algorithms.**
 S. Koch[†], Y. Piadyk[†], **M. Worchel**, M. Alexa, C. Silva, D. Zorin, D. Panozzo.
 Conf. on Neural Information Processing Systems (NeurIPS 2021), Datasets and Benchmarks.
- 2020 **Ernst Grube:**
A Contemporary Witness and His Memories Preserved with Volumetric Video.
M. Worchel, M. Zepp, W. Hu, O. Schreer, I. Feldmann, and P. Eisert.
 Eurographics Workshop on Graphics and Cultural Heritage (EG GCH 2020).
- 2019 **Capture and 3D Video Processing of Volumetric Video**
 O. Schreer, I. Feldmann, S. Renault, M. Zepp, **M. Worchel**, P. Eisert, and P. Kauff.
 IEEE International Conference on Image Processing (ICIP 2019).

[†]Equal contribution (joint first authors)

Academic Service and Other Experience

Reviewer

SIGGRAPH (2024, 2025), SIGGRAPH Asia (2024, 2026), CVPR (2023, 2024, 2025*, 2026), ICCV (2023, 2025), ECCV (2024*, 2026*), HPG (2026), Pacific Graphics (2023), ICIP (2025)

*Recognized as outstanding reviewer

Invited Talks

Efficient Differentiable Rendering in Graphics and Beyond (Carnegie Mellon University Graphics Seminar 2025)

2022 – **Teaching Assistant**, *Technische Universität Berlin*.

present Computer Graphics “Fundamentals”, Computer Graphics II “Geometric Modeling”, Computer Graphics Seminar and Project, Scientific Computing, supervising Bachelor and Master theses.

Expertise

Programming C++, CUDA, Python, PyTorch, pybind11/nanobind, HLSL, Direct3D 11, GLSL, OpenGL, Eigen, OpenCV

Software and Tools git, CMake, L^AT_EX, Blender, Windows, Linux

Languages German (native), English (fluent)