Moritz Heep

Curriculum Vitæ

My research addresses the computational challenges of high-resolution 3D reconstruction by incorporating structural information to guide the optimisation process, e.g. detecting objects in a scene to reduce the complexity of the correspondence search in multiview reconstruction.

Research Interests: Photometric Stereo, 3D Reconstruction, Geometry Processing, Image Segmentation, Graph Algorithms, Physically Based Rendering.

Education

Since 2020   **PhD Student in Computer Science**, *PhenoRob/University of Bonn*, Germany
During my research under Eduard Zell:
- applied decimation and remeshing techniques from triangle mesh processing to photometric stereo to accelerate normal integration
- combined photometric stereo and image segmentation to simplify correspondence search in depth-from-stereo

2017 – 2020   **B.Sc. in Mathematics**, *University of Göttingen*, Germany
Graduation in 2020 with an overall grade of "good" (1.9)
- Focus on analysis and optimisation
- Thesis on "The Charge operator in Wightman theory" under Dorothea Bahns

2016 – 2020   **M.Sc. in Physics**, *University of Göttingen*, Germany
Graduation in 2020 with an overall grade of "very good" (1.4)
- Focus on (theoretical) particle physics and mathematical aspects of physics
- Thesis on "Local generators of global symmetries in quantum field theory" under Karl-Henning Rehren

2016   **Semester Abroad**, *McMaster University*, Hamilton, Canada

2013 – 2016   **B.Sc. in Physics**, *University of Göttingen*, Germany
Graduation in 2016 with an overall grade of "good" (1.9)
- Project Course on "Neural networks for single-station weather forecasting"
- Thesis on "Aspects of new physics in top-quark pair production at hadron colliders" under Steffen Schumann

Professional Experience

Since 2020   **Research Assistant**, *University of Bonn*

2017 – 2020   **Teaching Assistant**, *University of Göttingen*
Tutor for exercise groups on 'Quantum Field Theory', 'Quantum Mechanics' and 'Calculation Methods of Physics'

09/2018   **Teaching Assistant**, *University of Göttingen*
Instructor of refresher courses on 'Analytical Mechanics' and on 'Quantum Mechanics'. I was in charge of devising lectures and exercises to recap the semester material and prepare students for upcoming exams.

Publications

M. Heep, S. Behnke and E. Zell, *Feature-Preserving Mesh Decimation for Normal Integration*, Conference on Computer Vision and Pattern Recognition (2025)

M. Heep and E. Zell, *An Adaptive Screen-Space Meshing Approach for Normal Integration*, European Conference on Computer Vision (2024)

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M. Heep and E. Zell, *Image Segmentation from Shadow-Hints using Minimum Spanning Trees*, SIGGRAPH Posters (2024)

M. Heep and E. Zell, *ShadowPatch: Shadow Based Segmentation for Reliable Depth Discontinuities in Photometric Stereo*, Pacific Graphics (2022)

Reviewer

2025	IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR)
2025	IEEE / CVF International Conference on Computer Vision (ICCV)

Scholarships and Awards

2014 – 2020	**Student Scholarship**, *Konrad Adenauer Foundation*
2019	**Travel Grants for the DPG Spring Meeting**, *Wilhelm and Else Heraeus Foundation*
2024	**Third Place in the SIGGRAPH Student Research Competition**, *SIGGRAPH 2024, Denver, Colorado*, for 'Image Segmentation from Shadow-Hints using Minimum Spanning Trees'

Skills

Languages	German (Native speaker), English (Fluent), French (Basics)
Programming & Libraries	C++, Python, PyTorch, LibTorch, Eigen, OpenCV, PolygonMeshProcessing Library, LEMON

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