

DR. MARKUS STEINBERGER

PERSONAL INFORMATION

Research Area	High Performance Parallel Computing, Computer Graphics, Visualization
Current Position	Associate Professor Graz University of Technology, Austria
Born	09 March 1986 Leoben, Austria
Nationality	Austria
Marital status	married
Current project page	www.markussteinberger.net



ACHIEVEMENTS

- 03/2023 **Riemann Award (Team) by the Huawei MRC President**
With the Riemann Award Huawei honors the outstanding achievements of teams in Europe. My team received the award for the technical contributions to cloud rendering.
- 02/2023 **Technical Cooperation Annual Excellence Partner Award *CloudReuse***
With the technical cooperation excellence partner award, Huawei honors the most promising University collaboration projects. My team at TU Graz received the award for their work on caching rendering computations.
- 12/2022 **Team Gold Medal Award 2022**
Huawei honors the best teams among its twenty thousand employees with a gold medal team award. Together with nine colleagues from across the world, the distributed rendering team received this honor.
- 12/2022 **Individual Gold Medal Award 2022**
Huawei honors less than 1% of its twenty thousand employees with a gold medal for excellent contributions. I received the award for my contributions to cloud-native rendering.
- 05/2021 **Eurographics 2021 Best Full Paper Talk Award**
Eurographics is the premier conference for computer graphics in Europe and among the top three conference worldwide. Our talk for *SnakeBinning: Efficient Temporally Coherent Triangle Packing for Shading Streaming* was voted to be the best talk of 2021 and received the best talk award 2021.
- 05/2021 **Eurographics 2021 Best Fast Forward Award**
Eurographics is the premier conference for computer graphics in Europe and among the top three conference worldwide. The fast forward for our paper *SnakeBinning: Efficient Temporally Coherent Triangle Packing for Shading Streaming* was voted to be the best fast forward of 2021 and we received the best fast forward award 2021 and some Sachertorte.
- 06/2020 **Eurographics 2020 Best Paper Award**
Eurographics is the premier conference for computer graphics in Europe and among the top three conference worldwide. Our paper *Subdivision-Specialized Linear Algebra Kernels for Static and Dynamic Mesh Connectivity on the GPU* was selected as the best paper of 2020 and received the best paper award 2020.

- 05/2019 **I3D 2019 Best Poster Award**
I3D is the leading conference for real time 3D computer graphics and human interaction, and 2019 marks the 33rd year since the first conference. Our poster *From Ground to Space: Real-time Rendering of Procedural Planets at Arbitrary Altitudes* was select to the best poster of I3D'19.
- 09/2017 **Best Student Paper Award High Performance Extreme Computing**
IEEE High Performance Extreme Computing is the premier conference in the world on the convergence of High Performance and Embedded Computing. The paper *Autonomous, Independent Management of Dynamic Graphs on GPUs* was select to be the best student paper of HPEC'17.
- 10/2016 **OCG Heinz Zemanek Preis**
With this award the Austrian Computer Society honors the best Austrian dissertation in the field of Computer Science. My dissertation *Dynamic Resource Scheduling on Graphics Processors* was selected to be the best among all dissertation completed in Austria between 2012 and 2016.
- 09/2016 **Best Paper Finalist Award High Performance Extreme Computing**
IEEE High Performance Extreme Computing is the premier conference in the world on the convergence of High Performance and Embedded Computing. The paper *How Naïve is Naïve SpMV on the GPU* was select to be among the best five papers of HPEC'16.
- 11/2014 **Honorary Award from the Austrian federal ministry for Science, Research and Economy**
With this award, the Austrian federal ministry for Science, Research and Economy honors outstanding achievements during their studies.
- 10/2014 **GI Prize for the best dissertation (PhD thesis) of 2013**
The GI Prize for the best dissertation tries to award the best dissertation within the field of Computer Science completed at any university within Germany, Austria and Swiss. I am the first Austrian to ever win this Award for my dissertation *Dynamic Resource Scheduling on Graphics Processors*.
- 08/2014 **Best paper Award High Performance Graphics**
High Performance Graphics is the premiere conference for high performance computations on graphics processors. The paper *Fast ANN for High-Quality Collaborative Filtering*, which I wrote together with my colleagues at NVIDIA was selected to be the best paper of 2014.
- 07/2014 **Award of Excellence from the Austrian federal ministry for Science, Research and Economy**
The Austrian federal ministry for Science, Research and Economy supports outstanding young Researchers in their international travel activities for two years after completing their PhD.
- 07/2014 **Promotion sub auspiciis Praesidentis rei publicae**
In Austria, the highest possible honor for achievement is the *promotio sub auspiciis prasidentis rei publicae*. In this ceremony, the head of Austria honors the country's best students by attending their promotion and presenting them with a custom made gold ring.
- 04/2014 **Honorable Mention Award Human Factors in Computing Systems**
The ACM Human Factors in Computing Systems (CHI) is the premier conference for human computer interaction. Our paper *Show Me the Invisible: Visualizing Hidden Content* was selected to be one of the outstanding papers of 2014 and received an honorable mention paper award.

- 04/2014 **3rd Best Paper Award Eurographics**
Eurographics is the premier conference for computer graphics in Europe and among the top three conference worldwide. Our paper *Parallel Generation of Architecture on the GPU* was selected to be the third best paper presented at the conference in 2014.
- 10/2013 **IEEE SciVis Honorable Mention Poster Award**
IEEE SciVis is the premiere conference for scientific visualization. Our poster *Volume Rendering with advanced GPU scheduling strategies* was selected to be one of the best posters of 2013 and received an honorable mention poster award.
- 10/2011 **IEEE InfoVis Best Paper Award**
IEEE InfoVis is the premiere conference for information visualization. Our paper *Context-Preserving Visual Links* was voted to be the best paper of 2011 and received the best paper award 2011.
- 08/2011 **Non-Photorealistic Animation and Rendering Best Paper Award**
The symposium on Non-Photorealistic Animation and Rendering (NPAR) has a more than 10 year history of being the premiere symposium for the specialized field of non-photorealistic animation and rendering. Our paper *Stylization-based ray prioritization for guaranteed framerates* was selected to be the best paper in the category Rendering in 2011.
- 05/2011 **Honorable Mention Award Human Factors in Computing Systems**
The ACM Human Factors in Computing Systems (CHI) is the premier conference for human computer interaction. Our paper *Importance-Driven Compositing Window Management* was selected to be one of the outstanding papers of 2011 and received an honorable mention paper award.
- 05/2009 **3rd Best CESC Paper Award**
My first paper *Multiresolution Isosurface Rendering* was selected to be the 3rd best paper of the Central European Seminar on Computer Graphics.
- 2006 – 2009 **Achievement scholarship from the Faculty of Informatics**
Due to my outstanding study progress I received achievement scholarships from Graz University of Technology in 2006, 2007, 2008 and 2009.

EDUCATION

- 11/2010 – 10/2013 **PhD studies at Graz University of Technology**
Finished the PhD program in Computer Science with best possible grades within shortest possible time. Advisor: Prof. Dieter Schmalstieg. External Referee: Prof. Jens Krüger (University of Duisburg). Dissertation Title: *Dynamic Resource Scheduling on Graphics Processors*
- 10/2008 – 06/2010 **Master studies at Graz University of Technology**
Finished the master program in Telematics with best possible grades within minimum study durations. Advisor: Dr. Markus Grabner. Thesis Title: *Highly accurate Multiresolution Isosurface Rendering using compactly supported Spline Wavelets*
- 10/2005– 10/2008 **Bachelor studies at Graz University of Technology**
Finished the bachelor program in Telematics with best possible grades within minimum study durations. Advisor: Dr. Markus Grabner. Thesis Title: *Isosurface Representation and Rendering, an approach for polynomial isosurface functions*

PROFESSIONAL

- 09/2021 – now **Director Cloud Rendering**, Huawei Technologies, Austria
Leading the Cloud Rendering Laboratory
- 05/2021 – now **Associate Professor**, Graz University of Technology, Austria
Leading the GPU Computing and Visualization Group
- 04/2017 – 04/2021 **Assistant Professor**, Graz University of Technology, Austria
Leading the GPU Computing and Visualization Group
- 11/2015 – 03/2017 **Junior Group Leader**, Max Planck Institute Saarbrücken, Germany
Leading the GPU Scheduling and Parallel Computing Group
- 11/2013 – 10/2015 **Junior Group Leader / Post Doc**, Graz University of Technology, Austria
Leading the Parallel Computing Group at the Institute for Computer Graphics and Vision, Teaching courses in Computer Graphics and GPU computing
- 10/2013 – 02/2014 **Internship NVIDIA Corporation**, Santa Clara, California, USA
Researcher in the Mobile Computer Vision Group of Kari Pulli
- 06/2010 – 10/2013 **University Assistant**, Graz University of Technology, Austria
Research and Teaching at the Institute for Computer Graphics and Vision
- 10/2007 – 06/2010 **Teaching Assistant**, Graz University of Technology, Austria
Assistant with the Institute for computer Graphics and Vision, Institute for Signal Processing and Speech Communication, Institute for Applied Information Processing and Communications, Institute for Theoretical Computer Science, Institute for Software Technology.

TEACHING

COURSES

- 2023 Graz University of Technology,
Real-Time Graphics, Lecturer, 110 students
Teaching Real-time Graphics using modern Graphics APIs
- 2021 – now Graz University of Technology,
GPU Programming, Lecturer, 50-70 students
Master's level course on GPU Computing
- 2020 – now Graz University of Technology,
Object Oriented Programming 1, Exercise Lecturer, 100-200 students
Second semester basic programming course
- 2018 – now Graz University of Technology,
Scientific Methods, Shared Lecturer, 40-60 students
Introductory course for PhD students
- 2018 – 2021 Graz University of Technology,
Mathematical Principles in Vision and Graphics, Shared Lecturer, 30-40 students
Teaching mathematical views on mesh processing and geometry
- 2017 – 2022 Graz University of Technology,
Real-Time Graphics 2, Lecturer, 20-30 students
Teaching GPU Computing and GPGPU for Computer Graphics problems
- 2017 – 2021 Graz University of Technology,
Introduction to Scientific Working, Group Coordinator, 20 (of 300-400)

- students
Seminar group on scientific writing and presentations
- 2018 – 2021 Graz University of Technology,
Biomedical Visualization / Selected Topics in Computer Graphics, Shared
Lecturer, 20 students
Master's level course on different visualization techniques
- 2017 – 2018 FH Salzburg,
Physics Based Simulation, Lecturer, 5-12 Students
Teaching basic and advanced physics engine design
- 2016 – 2018 FH Salzburg,
Advanced Rendering, Lecturer, 5-12 Students
Teaching advanced GPU Compute and Simulations
- 2017 Graz University of Technology,
Real-Time Graphics, Lecturer, 70 students
Teaching Real-time Graphics using OpenGL
- 2013 – 2015 Graz University of Technology,
Real-Time Graphics 2, Lecturer, 20 students
Teaching GPU Computing and GPGPU for Computer Graphics problems
- 2013 – 2015 Graz University of Technology,
Computer Graphics 2, Shared Lecturer, Exercise Coordinator, 150 students
Teaching basic Computer Graphics topics
- 2013 – 2015 Graz University of Technology,
Computer Graphics 1, Shared Lecturer, Exercise Coordinator, 250 students
Teaching basic Computer Graphics topics
- 2012 Graz University of Technology,
Virtual Reality, Exercise Coordinator, 20 students
- 2011 Graz University of Technology,
Software Development in Distributed Environments, Exercise Coordinator,
200 students
- 2009 – 2010 Graz University of Technology,
Computer Graphics 2, tutor, 150 students
- 2009 – 2010 Graz University of Technology,
Computer Graphics 1, tutor, 250 students
- 2009 Graz University of Technology,
Real-Time Graphics 1, tutor, 50 students
- 2009 Graz University of Technology,
Virtual Reality, tutor, 20 students
- 2009 Graz University of Technology,
Computational Intelligence, tutor, 180 students
- 2008 Graz University of Technology,
Operating Systems, tutor, 250 students
- 2007 – 2008 Graz University of Technology,
Data structures and Algorithms, tutor, 250 students
- 2006 Graz University of Technology,
Foundations of Computer Science, tutor, 400 students

TEACHING COMMITTEES AND OTHER TEACHING ACTIVITIES

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| 2015 – 2017 | Admission Committee Master Studies Visual Computing Saarland University, Germany |
| 2014 | Establishing the submission and assignment evaluation system for the Institute for Computer Graphics and Vision at Graz University of Technology, Austria, including Website, Database, Testing Sever, and connection to the TUGOnline account system. |

STUDENT SUPERVISION

- | | |
|-------------|--|
| 2021 – now | Andreas Kurz, PhD student, Compressed Neural Representations |
| 2020 – now | Wolfgang Tatzgern, PhD student, Caching Global Illumination |
| 2020 – now | Pascal Stadlbauer, PhD student, Caching Direct Illumination |
| 2020 – now | Alexander Weinrauch, PhD student, On-surface Shading Computations |
| 2019 – 2023 | Thomas Neff, PhD student, Streaming Neural Rendering |
| 2019 – 2023 | Mathias Parger, PhD student, Sparse Learning |
| 2018 – 2023 | Daniel Mlakar, PhD student, <i>Mesh Processing using Linear Algebra Primitives</i> |
| 2018 – 2021 | Martin Winter, PhD student, <i>GPU Streaming Graph Processing</i> |
| 2017 – 2021 | Jörg Müller, PhD student, <i>Dynamics in Object Space Shading</i> |
| 2016 – 2022 | Jozef Hladky, PhD student, <i>Delayed Rasterization and Shading</i> |
| 2014 – 2019 | Mark Dokter, PhD student, <i>Applications of Massively Parallel Geometry Processing</i> |
| 2014 – 2018 | Bernhard Kerbl, PhD student, <i>Load Balancing for Hardware and Software Rendering on the Graphics Processing Unit</i> |
| 2013 – now | Michael Kenzel, PhD student, <i>Software Rendering Pipelines</i> |
| 2011 – now | supervised 50+ Bachelor and Master's Theses |

FUNDING

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|-------------|--|
| 2022 – 2023 | Project NeSAGeR, industrial funding
2 PhD Students for 2 years |
| 2021 – 2024 | Project CloudRendering, industrial funding
3 PhD Students for 3 years |
| 2020 – 2022 | Project SparseLearning, Industrial funding,
1 PhD Student for 2 year |
| 2020 | Project RayScheduling, Industrial funding,
2 PhD Students for 1 year |
| 2019 | Project NNVRİK, Industrial funding,
1 PhD Student for 1 year |
| 2017 – 2018 | Project with Bongfish via VRVIS
1 PhD Student 2 years |

- 2017 – 2020 Principal Investigator: Fully Programmable GPU Pipelines funded by the Deutsche Forschungsgemeinschaft DFG as D-A-CH project
2 PhD Students for 3 years
- 2015 – 2020 GPU Scheduling and Parallel Computing Funding granted as part of the Junior Group Leader Position by the Max Planck Society
2 PhD Students for 3-5 years
- 2011 Co-Author: Automatic Volume Data Processing on Graphics Processors funded by the Austrian Science Fond FWF, P23329.

PUBLICATIONS

JOURNAL ARTICLES

- J.41 Alexander Weinrauch, Wolfgang Tatzgern, Pascal Stadlbauer, Alexis Crickx, Jozef Hladky, Arno Coomans, Martin Winter, Joerg H. Mueller, **Markus Steinberger**:
Effect-based Multi-viewer Caching for Cloud-native Rendering
ACM Transactions on Graphics (SIGGRAPH '23), 2023
- J.40 Philip Voglreiter, Bernhard Kerbl, Alexander Weinrauch, Joerg H. Mueller, Thomas Neff, **Markus Steinberger**, Dieter Schmalstieg:
Trim Regions for Online Computation of From-Region Potentially Visible Sets
ACM Transactions on Graphics (SIGGRAPH '23), 2023
- J.39 Alexander Weinrauch, Daniel Mlakar, Hans-Peter Seidel, **Markus Steinberger**, Rhaleb Zayer:
A Variational Loop Shrinking Analogy for Handle and Tunnel Detection and Reeb Graph Construction on Surface
Computer Graphics Forum (EG'23), 2023
- J.38 Jozef Hladky, Michael Stengel, Nicholas Vining, Bernhard Kerbl, Hans-Peter Seidel, **Markus Steinberger**:
QuadStream: A Quad-Based Scene Streaming Architecture for Novel Viewpoint Reconstruction
ACM Transactions on Graphics (TOG) 41 (6), 1-13
- J.37 Thomas Neff, Joerg H. Mueller, **Markus Steinberger**, Dieter Schmalstieg
Meshlets and How to Shade Them: A Study on Texture-Space Shading
Computer Graphics Forum / Eurographics (EG'22), 2022
- J.36 Mathias Parger, Chengcheng Tang, Yuanlu Xu, Christopher D. Twigg, Lingling Tao, Yijing Li, Robert Wang and **Markus Steinberger**:
UNOC: Understanding Occlusion for Embodied Presence in Virtual Reality
IEEE Transactions on Visualization and Computer Graphics, 2021
- J.35 Thomas Neff, Pascal Stadlbauer, Mathias Parger, Andreas Kurz, Joerg H Mueller, Chakravarty R. A. Chaitanya, Anton Kaplanyan and **Markus Steinberger**:
DONeRF: Towards Real-Time Rendering of Compact Neural Radiance Fields using Depth Oracle Networks
Computer Graphics Forum (EGSR'21), 2021
- J.34 Jozef Hladky, Hans-Peter Seidel, **Markus Steinberger**:
SnakeBinning: Efficient Temporally Coherent Triangle Packing for Shading Streaming
EG Best Fast Forward and EG Best Full Paper Talk Award
Computer Graphics Forum (Eurographics'21), 2021

- J.33 Joerg H. Mueller, Thomas Neff, Philip Voglreiter, **Markus Steinberger**, Dieter Schmalstieg:
Temporally Adaptive Shading Reuse for Real-Time Rendering and Virtual Reality
 ACM Transaction on Graphics (TOG)
 Presented at SIGGRAPH, 2021
- J.32 Pascal Stadlbauer, Daniel Mlakar, Hans-Peter Seidel, **Markus Steinberger**, Rhaleb Zayer:
Interactive Modeling of Cellular Structures on Surfaces with Application to Additive Manufacturing
 Computer Graphics Forum / Eurographics (EG'20), 2020
- J.31 Daniel Mlakar, Martin Winter, Pascal Stadlbauer, Hans-Peter Seidel, **Markus Steinberger**, Rhaleb Zayer:
Subdivision-Specialized Linear Algebra Kernels for Static and Dynamic Mesh Connectivity on the GPU
Eurographics '20 Best Paper Award
 Computer Graphics Forum / Eurographics (EG'20), 2020
- J.30 Jozef Hladky, Hans-Peter Seidel, **Markus Steinberger**:
The Camera Offset Space: Real-time Potentially Visible Set Computations for Streaming Rendering
 ACM Transactions on Graphics (SIGGRAPH Asia'19), 2019
- J.29 Jozef Hladky, Hans-Peter Seidel, **Markus Steinberger**:
Tessellated Shading Streaming
 Computer Graphics Forum / Eurographics Symposium on Rendering (EGSR'19), 2019
- J.28 Mark Dokter, Jozef Hladky, Mathias Parger, Dieter Schmalstieg, Hans-Peter Seidel, **Markus Steinberger**:
Hierarchical Rasterization of Curved Primitives for Vector Graphics Rendering on the GPU
 Computer Graphics Forum / Eurographics (EG'19), 2019
- J.27 Rhaleb Zayer, Daniel Mlakar, **Markus Steinberger**, Hans-Peter Seidel:
Layered Fields for Natural Tessellations on Surfaces
 ACM Transactions on Graphics (SIGGRAPH Asia '18), 2018
- J.26 Joerg H. Mueller, Philip Voglreiter, Mark Dokter, Thomas Neff, Mina Makar, **Markus Steinberger**, Dieter Schmalstieg:
Shading Atlas Streaming
 ACM Transactions on Graphics (SIGGRAPH Asia '18), 2018
- J.25 Michael Kenzel, Bernhard Kerbl, Dieter Schmalstieg, **Markus Steinberger**:
A High-Performance Software Graphics Pipeline Architecture for the GPU
 ACM Transactions on Graphics (SIGGRAPH '18), 2018
- J.24 Bernhard Kerbl, Michael Kenzel, Elena Ivanchenko, Dieter Schmalstieg, **Markus Steinberger**:
Revisiting The Vertex Cache: Understanding and Optimizing Vertex Processing on the modern GPU
 Proceedings of the ACM on Computer Graphics Interaction Techniques, 2018
- J.23 Michael Kenzel, Bernhard Kerbl, Wolfgang Tatzgern, Elena Ivanchenko, Dieter Schmalstieg, **Markus Steinberger**:
On-the-fly Vertex Reuse for Massively-Parallel Software Geometry

Processing

Proceedings of the ACM on Computer Graphics Interaction Techniques, 2018

- J.22 **Markus Steinberger:**
On Dynamic Scheduling for the GPU and its Applications in Computer Graphics and Beyond
IEEE Computer Graphics and Applications, 2018
- J.21 Bernhard Kerbl, Michael Kenzel, Joerg H. Mueller, Dieter Schmalstieg,
Markus Steinberger:
A scalable queue for work distribution on GPUs
ACM SIGPLAN Notices (PPoPP'18), 2018
- J.20 Karl Haubenwallner, Hans-Peter Seidel, **Markus Steinberger:**
ShapeGenetics: Using Genetic Algorithms for Procedural Modeling
Computer Graphics Forum / Eurographics (EG'17), 2017
- J.19 Rhaleb Zayer, **Markus Steinberger**, Hans-Peter Seidel:
A GPU-adapted Structure for Unstructured Grids
Computer Graphics Forum / Eurographics (EG'17), 2017
- J.18 Bernhard Kerbl, Michael Kenzel, Dieter Schmalstieg, Hans-Peter Seidel,
Markus Steinberger:
Hierarchical Bucket Queuing for Fine-Grained Priority Scheduling on the GPU
Computer Graphics Forum, 2016
- J.17 Pedro Boechat, Mark Doktor, Michael Kenzel, Hans-Peter Seidel, Dieter Schmalstieg, **Markus Steinberger:**
Representing and Scheduling Procedural Generation using Operator Graphs
ACM Transactions on Graphics (SIGGRAPH Asia '16), 2016
- J.16 Yun-Ta Tsai, **Markus Steinberger**, Dawid Pająk, Kari Pulli:
Fast ANN for High-Quality Collaborative Filtering
Computer Graphics Forum (35), 2016
- J.15 Bernhard Kainz, **Markus Steinberger**, Wolfgang Wein, Maria Murgasova, Christina Malamateniou, Kevin Keraudren, Paul Aljabar, Mary Rutherford, Joseph Hajnal, Daniel Rueckert:
Fast Volume Reconstruction from Motion Corrupted Stacks of 2D Slices
IEEE Transactions on Medical Imaging, 2015
- J.14 Bernhard Kerbl, Denis Kalkofen, **Markus Steinberger**, Dieter Schmalstieg:
Interactive Disassembly Planning for Complex Objects
Computer Graphics Forum (EG'15), 2015
- J.13 **Markus Steinberger:**
An Overview of Dynamic Resource Scheduling on Graphics Processors
it-Information Technology, 2015
- J.12 **Markus Steinberger**, Michael Kenzel, Pedro Boechat, Bernhard Kerbl, Mark Doktor, Dieter Schmalstieg:
Whippetree: Task-based Scheduling of Dynamic Workloads on the GPU
ACM Transactions on Graphics (SIGGRAPH Asia '14), 2014
- J.11 Felix Heide, **Markus Steinberger**, Yun-Ta Tsai, Nasa Rouf, Dawid Pająk, Dikpal Reddy, Orazio Gallo, Jing Liu, Wolfgang Heidrich, Karen Egiazarian, Jan Kautz, Kari Pulli:
FlexISP: A flexible camera image processing framework
ACM Transactions on Graphics (SIGGRAPH Asia '14), 2014

- J.10 Rostislav Khlebnikov, Philip Voglreiter, **Markus Steinberger**, Bernhard Kainz, Dieter Schmalstieg:
Parallel Irradiance Caching for Interactive Monte-Carlo Direct Volume Rendering
Computer Graphics Forum (EuroVis'14), 2014
- J.09 **Markus Steinberger**, Michael Kenzel, Bernhard Kainz, Peter Wonka, Dieter Schmalstieg:
On-the-fly Generation and Rendering of Infinite Cities on the GPU
in Computer Graphics Forum (EG'14), 2014
- J.08 **Markus Steinberger**, Michael Kenzel, Bernhard Kainz, Jörg Müller, Peter Wonka, Dieter Schmalstieg:
Parallel Generation of Architecture on the GPU
EG'14 3rd Best Paper Award
Computer Graphics Forum (EG'14), 2014
- J.07 Rostislav Khlebnikov, Bernhard Kainz, **Markus Steinberger**, Dieter Schmalstieg:
Noise-based volume rendering for the visualization of multivariate volumetric data
IEEE Transactions on Visualization and Computer Graphics (VIS'13), 2013
- J.06 **Markus Steinberger**, Bernhard Kainz, Bernhard Kerbl, Stefan Hauswiesner, Michael Kenzel, Dieter Schmalstieg:
Softshell: Dynamic Scheduling on GPUs
ACM Transactions on Graphics (SIGGRAPH Asia '12), 2012
- J.05 Rostislav Khlebnikov, Bernhard Kainz, **Markus Steinberger**, Marc Streit, Dieter Schmalstieg:
Procedural Texture Synthesis for Zoom-Independent Visualization of Multivariate Data
Computer Graphics Forum (EuroVis'12), 2012
- J.04 **Markus Steinberger**, Manuela Waldner, Dieter Schmalstieg:
Interactive Self-Organizing Windows
Computer Graphics Forum (EG'12), 2012
- J.03 **Markus Steinberger**, Bernhard Kainz, Stefan Hauswiesner, Rostislav Khlebnikov, Denis Kalkofen, Dieter Schmalstieg:
Ray Prioritization Using Stylization and Visual Saliency
Computers and Graphics, 2012
- J.02 **Markus Steinberger**, Manuela Waldner, Marc Streit, Alexander Lex, Dieter Schmalstieg:
Context-Preserving Visual Links
InfoVis '11 Best Paper Award
IEEE Transactions on Visualization and Computer Graphics (InfoVis '11), 17(12), 2011.
- J.01 Manuela Waldner, **Markus Steinberger**, Raphael Grasset, Dieter Schmalstieg:
Importance-Driven Compositing Window Management
CHI '11 Honorable Mention Award
in Proceedings of Human Factors in Computing Systems (CHI '11), pp. 959-968, 2011.

CONFERENCE PAPERS

- C.38 Mathias Parger, Chengcheng Tang, Thomas Neff, Christopher D Twigg, Cem Keskin, Robert Wang, **Markus Steinberger**:
MotionDeltaCNN: Sparse CNN Inference of Frame Differences in Moving Camera Videos with Spherical Buffers and Padded Convolutions
International Conference on Computer Vision, 2023
- C.37 Pascal Stadlbauer, Alexander Weinrauch, Wolfgang Tatzgern, **Markus Steinberger**:
Surface Light Cones: Sharing Direct Illumination for Efficient Multi-viewer Rendering
High Performance Graphics 2023
- C.36 Robert Stojanovic, Alexander Weinrauch, Wolfgang Tatzgern, Andreas Kurz, **Markus Steinberger**:
Efficient Rendering of Participating Media for Multiple Viewpoints
High Performance Graphics 2023
- C.35 Thomas Neff, Brian Budge, Zhao Dong, Dieter Schmalstieg, **Markus Steinberger**:
PSAO: Point-Based Split Rendering for Ambient Occlusion
High Performance Graphics 2023
- C.34 Alexander Weinrauch, Stephan Lorbek, Wolfgang Tatzgern, Pascal Stadlbauer, **Markus Steinberger**:
Clouds in the Cloud: Efficient Cloud-Based Rendering of Real-Time Volumetric Clouds
High Performance Graphics 2023
- C.33 Michael Kenzel, Stefan Lemme, Richard Membarth, Matthias Kurtenacker, Hugo Devillers, **Markus Steinberger**, Philipp Slusallek:
AnyQ: An Evaluation Framework for Massively-Parallel Queue Algorithms
IEEE International Parallel and Distributed Processing Symposium (IPDPS'23), 2023
- C.32 Andreas Kurz, Thomas Neff, Zhaoyang Lv, Michael Zollhöfer, **Markus Steinberger**:
AdaNeRF: Adaptive Sampling for Real-Time Rendering of Neural Radiance Fields
European Conference on Computer Vision, 2022
- C.31 Mathias Parger, Chengcheng Tang, Christopher D. Twigg, Cem Keskin, Robert Wang and **Markus Steinberger**
DeltaCNN: End-to-End CNN Inference of Sparse Frame Differences in Videos
Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition, 2022
- C.30 Benedikt Mayr, Alexander Weinrauch, Mathias Parger, **Markus Steinberger**:
Are van Emde Boas trees viable on the GPU?
IEEE High Performance Extreme Computing, 2021
- C.29 Daniel Mlakar, Martin Winter, Mathias Parger, **Markus Steinberger**:
Speculative Parallel Reverse Cuthill-McKee Reordering on Multi- and Many-core Architectures
IEEE International Parallel and Distributed Processing Symposium (IPDPS'21), 2021
- C.28 Martin Winter, Mathias Parger, Daniel Mlakar, **Markus Steinberger**:
Are dynamic memory managers on GPUs slow?: a survey and benchmarks

- ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP'21), 2021
- C.27 Martin Winter, Daniel Mlakar, Mathias Parger, **Markus Steinberger**:
Ouroboros: virtualized queues for dynamic memory management on GPUs
International Conference on Supercomputing (ICS'20), 2020
- C.26 Johannes Unterguggenberger, Bernhard Kerbl, **Markus Steinberger**, Dieter Schmalstieg, Michael Wimmer:
Fast Multi-View Rendering for Real-Time Applications
Eurographics Symposium on Parallel Graphics and Visualization (EGPGV '20), 2020
- C.25 Wolfgang Tatzgern, Benedikt Mayr, Bernhard Kerbl, **Markus Steinberger**:
Stochastic Substitute Trees for Real-Time Global Illumination
Proceedings of Symposium on Interactive 3D Graphics and Games (I3D '20), 2020
- C.24 Mathias Parger, Martin Winter, Daniel Mlakar, **Markus Steinberger**:
spECK: Accelerating GPU Sparse Matrix-Matrix Multiplication Through Lightweight Analysis
Proceedings of the 25th Symposium on Principles and Practice of Parallel Programming, 2020
- C.23 Dominic Tödling, Martin Winter, **Markus Steinberger**:
Breadth-First Search on Dynamic Graphs using Dynamic Parallelism on the GPU
High Performance Extreme Computing, 2019
- C.22 Martin Winter, Daniel Mlakar, Rhaleb Zayer, Hans-Peter Seidel, **Markus Steinberger**:
Adaptive sparse matrix-matrix multiplication on the GPU
Proceedings of the 24th Symposium on Principles and Practice of Parallel Programming, 2019
- C.21 Mathias Parger, Joerg H. Mueller, Dieter Schmalstieg, **Markus Steinberger**:
Human Upper-Body Inverse Kinematics for Increased Embodiment in Consumer-Grade Virtual Reality
Symposium on Virtual Reality Software and Technology (VRST '18), 2018
- C.20 Martin Winter, Daniel Mlakar, Rhaleb Zayer, Hans-Peter Seidel, **Markus Steinberger**:
faimGraph: High Performance Management of Fully-Dynamic Graphs under tight Memory Constraints on the GPU
High Performance Computing, Networking, Storage and Analysis (SC'18), 2018
- C.19 Bernhard Kerbl, Joerg Mueller, Michael Kenzel, Dieter Schmalstieg, **Markus Steinberger**:
The Broker Queue: A Fast, Linearizable FIFO Queue for Fine-Granular Work Distribution on the GPU
International Conference on Supercomputing (ICS'18), 2018
- C.18 Rhaleb Zayer, **Markus Steinberger**, Hans-Peter Seidel:
Sparse Matrix Assembly on the GPU Through Multiplication Patterns
IEEE High Performance Extreme Computing, 2017
- C.17 Martin Winter, Rhaleb Zayer, **Markus Steinberger**:
Autonomous, Independent Management of Dynamic Graphs on GPUs

HPEC '17 Best Student Paper

IEEE High Performance Extreme Computing, 2017

- C.16 Bernhard Kerbl, Michael Kenzel, Dieter Schmalstieg, **Markus Steinberger**:
Effective Static Bin Patterns for Sort-Middle Rendering
High Performance Graphics (HPG'17), 2017
- C.15 **Markus Steinberger**, Rhaleb Zayer, Hans-Peter Seidel:
Globally homogeneous, locally adaptive sparse matrix-vector multiplication on the GPU
International Conference on Supercomputing (ICS'17), 2017
- C.14 Andreas Derler, Rhaleb Zayer, Hans-Peter Seidel, **Markus Steinberger**:
Dynamic scheduling for efficient hierarchical sparse matrix operations on the GPU
International Conference on Supercomputing (ICS'17), 2017
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- C.10 Thomas Geymayer, **Markus Steinberger**, Alexander Lex, Marc Streit, Dieter Schmalstieg:
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- P.02 Philip Voglreiter, **Markus Steinberger**, Rostislav Khlebnikov, Bernhard Kainz, Dieter Schmalstieg:
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THESIS

- T.03 **Markus Steinberger**:
Dissertation: *Dynamic Resource Scheduling on Graphics Processors*
Supervisor: Dieter Schmalstieg, October, 2013
- T.02 **Markus Steinberger**:
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- O.08 Berhard Kerbl, Michael Kenzel, Martin Winter, **Markus Steinberger**
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- O.06 Joerg H. Mueller, Thomas Neff, Philip Voglreiter, Mina Makar, **Markus Steinberger**, Dieter Schmalstieg:
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- O.05 Michael Kenzel, Bernhard Kainz, Dieter Schmalstieg, **Markus Steinberger:**
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- O.04 Michael Kenzel, Bernhard Kerbl, Martin Kenzel, **Markus Steinberger:**
Advanced Rendering Effects
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- O.03 Michael Kenzel, Bernhard Kerbl, Martin Kenzel, Dieter Schmalstieg, Hans-Peter Seidel, **Markus Steinberger:**
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- O.02 **Markus Steinberger:**
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- O.01 **Markus Steinberger:**
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COMMUNITIES AND REVIEWING

EDITORIAL

- E.02 Associate Editor Computer Graphics Forum 2020-2023
- E.01 Guest Editor Computer Graphics Forum Volume 38 Number 8

CHAIRING

- CH.03 General Co-Chair High Performance Graphics, 2020
- CH.02 Paper Co-Chair High Performance Graphics, 2019
- CH.01 Paper Chair CESCG 2019-2022

PROGRAM COMMITTEE MEMBER

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- PC.10 EGSR 2021
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- PC.05 Pacific Graphics 2019-2021
- PC.04 Eurographics, 2019, 2021-2024
- PC.03 IEEE VR Journal Papers, 2019-2020
- PC.02 High Performance Graphics, 2015-2019, 2021-2023
- PC.01 Central European Seminar on Computer Graphics (CESCG), 2012-2015, 2018-2022

JOURNAL REVIEWING (SELECTION)

- JR.13 ACM Transaction on Architecture and Code Optimization
- JR.12 IEEE Transactions on Parallel and Distributed Systems
- JR.11 Elsevier Journal of Systems and Software
- JR.10 Elsevier Journal of Computational Physics
- JR.09 Elsevier Journal of Parallel and Distributed Computing
- JR.08 ACM Transactions on Spatial Algorithms and Systems
- JR.07 Springer Journal of Real-Time Image Processing
- JR.06 Springer Realtime Image Processing
- JR.05 IEEE Electrical Engineering
- JR.04 Computer & Graphics
- JR.03 Computer Graphics Forum
- JR.02 ACM Transaction on Graphics
- JR.01 IEEE Transactions on Visualization and Computer Graphics

CONFERENCE REVIEWING (SELECTION)

- CR.8 IEEE ISMAR
- CR.7 ACM SIGGRAPH
- CR.6 ACM SIGGRAPH Asia
- CR.5 EG Eurographics
- CR.4 High Performance Graphics
- CR.3 IEEE Virtual Reality
- CR.2 IEEE Scientific Visualization
- CR.1 IEEE Information Visualization

PUBLIC FUNDING REVIEWER

- RP.2 European Research Council (ERC)
RP.1 Austrian Agency for International Mobility

MEMBERSHIPS

Association for Computing Machinery (ACM)
Eurographics Association (EG)
Austrian Computer Society (OCG)

TALKS AND PRESENTATIONS

- 11/2020 Invited Talk Huawei, Finland
2D Vector Graphics Rendering on the GPU
- 01/2020 Invited Talk Qualcomm, San Diego, USA
The Camera Offset Space: Real-time Potentially Visible Set Computations for Streaming Rendering
- 04/2019 Invited Talk CESC 2019, Smolenice, Slovakia
On the dynamics of GPU execution: Software Rasterization, Geometry Processing, and Dynamic Graphs
- 06/2018 Invited Lecture Saarland University, Germany
An Introduction to GPU Computing
- 01/2018 ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP 2018), Vienna, Austria
A scalable queue for work distribution on GPUs
- 07/2017 Invited Lecture Saarland University, Germany
An Introduction to GPU Computing
- 05/2017 Invited Talk Johannes Kepler University Linz, Austria
Adaptive GPU Scheduling for Efficient Numerical Computing and Computer Graphics
- 05/2017 International Conference on Supercomputing 2017, Chicago, USA
Globally Homogeneous, Locally Adaptive Sparse Matrix-Vector Multiplication on the GPU
- 05/2017 International Conference on Supercomputing 2017, Chicago, USA
Dynamic Scheduling for Efficient Hierarchical Sparse Matrix Operations on the GPU
- 09/2016 High Performance Extreme Computing 2016, Boston, USA
How naive is naive SpMV on the GPU?
- 08/2015 Invited Talk NVIDIA, California, USA:
Whippletree: Task-based Scheduling of Dynamic Workloads on the GPU
- 07/2015 Invited Talk University of Erlangen, Germany,
GPU Resource Management - one step towards a GPU OS
- 05/2015 Invited Talk MPI Informatics, Saarbrücken, Germany,
Dynamic Resource Scheduling on Graphics Processors
- 03/2015 Invited Talk GI Meeting Chemnitz, Germany,
GPU Resource Management - one step towards a GPU OS
- 12/2014 Invited Talk University of Dortmund, Germany,
Dynamic Resource Scheduling on Graphics Processors

- 05/2014 GI Kolloquium 2014, Dagstuhl, Germany
Dynamic Resource Scheduling on Graphics Processors
- 04/2014 Eurographics 2014, Strasbourg, France:
On-the-Fly Generation and Rendering of Infinite Cities on the GPU
- 04/2014 Eurographics 2014, Strasbourg, France:
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- 02/2014 NVIDIA, California, USA:
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- 11/2012 SIGGRAPH Asia 2012, Singapore EXPO, Singapore
Softshell: Dynamic Scheduling on GPUs
- 05/2012 Eurographics 2012, Cagliari, Italy:
Interactive Self-Organizing Windows
- 10/2011 Vis Week, InfoVis 2011:
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- 05/2011 ACM Human Factors in Computing Systems (CHI 2011), Vancouver, Canada:
Importance-Driven Compositing Window Management
- 05/2010 IEEE/EG International Symposium on Volume Graphics, Norrköping, Sweden:
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September 2023