Johanna Beyer

Curriculum Vitae

I am a researcher in the field of visual computing, with a focus on scalable techniques for high-throughput data visualization and visual methods for large-scale data analysis. I am also interested in the combination of abstract information visualization with scientific visualization for novel domain-specific applications.

Education

2004–2009 **Ph.D. in Computer Science**, *Vienna University of Technology*, Austria.
Dissertation: *GPU-based Multi-Volume Rendering of Complex Data in Neuroscience and Neurosurgery.*
Ph.D. committee: Prof. Dr. Eduard Gröller, Prof. Dr. Hanspeter Pfister.

2000–2004 **Dipl. Ing. (FH) in Medical Software Engineering**, *Upper Austrian University of Applied Science*, Austria.

Research Experience

2016-now **Research Associate**, *Visual Computing Group, Harvard University*, USA.

2013–2016 **Postdoctoral Fellow**, *Visual Computing Group, Harvard University*, USA.

2013 **Visiting Research Fellow**, *Institute of Computer Graphics and Algorithms, Vienna University of Technology*, Austria.

2010–2013 **Postdoctoral Fellow**, *Geometric Modeling and Scientific Visualization Research Center, King Abdullah University of Science and Technology (KAUST)*, Saudi Arabia.

2009 **Visiting Research Fellow**, *Initiative on Innovative Computing, Harvard University*, USA.

2008–2010 **Researcher**, *Visualization Group, VRVis Research Center*, Austria.

2004–2008 **Junior Researcher**, *Medical Visualization Group, VRVis Research Center*, Austria.

Teaching Experience

Classroom Teaching

2017 **Lecturer**, *Visualization*, 70 undergraduate and graduate students. Harvard University..

2015-2016 **Head Teaching Fellow**, *Visualization*, 240 undergraduate and online students. Harvard University.

2013–2014 **Senior Teaching Fellow**, *Visualization*, Harvard University.

2014 **Senior Teaching Fellow**, *Systems Development for Computational Science*, 70 graduate and online students. Harvard University.

2013 **Senior Teaching Fellow**, *Data Science*, 400 undergraduate, graduate and online students. Harvard University.

2010–2012 **Teaching Fellow**, *Scientific Visualization*, KAUST.

2010–2012 **Teaching Fellow**, *GPU and GPGPU Programming*, KAUST.

Student Co-Supervision and Mentoring

2015–now Leader of the visualization subgroup of Prof. Pfister's lab, including student mentoring, Harvard University.

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2013–now Supervision of PhD students and Master's theses, Harvard University.

2010–2012 Supervision of Master's theses and directed research, King Abdullah University of Science and Technology.

2009–2010 Supervision of Master's theses and directed research, VRVis Research Center.

Academic Activities

Committees Program Committee IEEE SciVis 2014-2015, 2017.

Program Committee EuroVis 2014, 2016.

Posters Chair IEEE LDAV 2015.

Program Committee IEEE LDAV 2014, 2015, 2017.

Program Committee EuroVis Short Papers 2012-2014, 2017.

Conference Reviewing IEEE Visualization Conference; ACM Siggraph; ACM Siggraph Asia; SC International Conference for High Performance Computing, Networking, Storage and Analysis; ACM Chi; Eurographics Conference on Visualization; IEEE Pacific Visualization Symposium; IEEE/EG International Symposium on Volume and Point-Based Graphics; Eurographics Symposium on Parallel Graphics and Visualization; IEEE Symposium on Large-Scale Data Analysis and Visualization; International Conference in Central Europe on Computer Graphics, Visualization and Computer Vision; Eurographics Workshop on Visual Computing for Biology and Medicine; Central European Seminar on Computer Graphics.

Journal Reviewing IEEE Transactions on Visualization and Computer Graphics; IEEE Computer Graphics and Applications; Computer Graphics Forum; The Visual Computer; Computer Assisted Radiology and Surgery; Information Visualization; Computers in Biology and Medicine; Neuroinformatics.

Grants and Grant Writing Experience

2016-2017 *Administrating:*, CCF collaborative research project Harvard University, KAUST Visual Computing Center, with Hanspeter Pfister and Markus Hadwiger.

2013-2015 *Administrating:* NSF OIA-1125087, with Hanspeter Pfister.

2013-2015 *Administrating:* Harvard Cuda Center of Excellence, with Hanspeter Pfister.

2015 *Assisting:* KAUST CCF Grant Proposal, with Markus Hadwiger.

2011 Sabic Postdoctoral Fellowship, post-doctoral funding.

2008 Marshall Plan Scholarship, partial doctoral funding.

2008 *Assisting:* WWTF ICT08-040, with Markus Hadwiger.

Publications – Journal and Reviewed Conference Publications

2017 H. Mohammed, A. K. Al-Awami, J. Beyer, C. Corrado Cali, P. Magistretti, H. Pfister, and M. Hadwiger. Abstractocyte: A Visual Tool for Exploring Nanoscale Astroglial Cells. *IEEE Trans. on Visualization and Computer Graphics, (Proc. of IEEE SciVis 2017), to appear*.

2017 M. Hadwiger, A. K. Al-Awami, J. Beyer, M. Agos, and H. Pfister. SparseLeap: Efficient Empty Space Skipping for Large-Scale Volume Rendering. *IEEE Trans. on Visualization and Computer Graphics, (Proc. of IEEE SciVis 2017), to appear*.

2015 A. K. Al-Awami, J. Beyer, D. Haehn, N. Kasthuri, J. W. Lichtman, H. Pfister, and M. Hadwiger. NeuroBlocks - Visual Tracking of Segmentation and Proofreading for Large Connectomics Projects. *IEEE Trans. on Visualization and Computer Graphics, (Proc. of IEEE SciVis 2015)*.

2015 J. Beyer, M. Hadwiger, and H. Pfister. State-of-the-Art in GPU-Based Large-Scale Volume Visualization. *Computer Graphics Forum*.

2014 A. K. Al-Awami, J. Beyer, H. Strobelt, N. Kasthuri, J. W. Lichtman, H. Pfister, and M. Hadwiger. NeuroLines: A Subway Map Metaphor for Visualizing Nanoscale Neuronal Connectivity. *IEEE Trans. on Visualization and Computer Graphics, (Proc. of IEEE InfoVis 2014).*

2014 D. Haehn, S. Knowles-Barley, M. Roberts, J. Beyer, N. Kasthuri, J. W. Lichtman, and H. Pfister. Design and Evaluation of Interactive Proofreading Tools for Connectomics. *IEEE Trans. on Visualization and Computer Graphics, (Proc. of IEEE SciVis 2014).*

2013 J. Beyer, A. K. Al-Awami, N. Kasthuri, J. W. Lichtman, H. Pfister, and M. Hadwiger. onnectomeExplorer: Query-Guided Visual Analysis of Large Volumetric Neuroscience Data. *IEEE Trans. on Visualization and Computer Graphics, (Proc. of IEEE SciVis 2013).*

2013 J. Beyer, M. Hadwiger, A. Al-Awami, W.-K. Jeong, N. Kasthuri, J. W. Lichtman, and H. Pfister. Exploring the Connectome - Petascale Volume Visualization of Microscopy Data Streams. *IEEE Computer Graphics and Applications.*

2012 M. Hadwiger, R. Sicat, J. Beyer, J. Krüger, and T. Möller. Sparse PDF Maps for Non-Linear Multi-Resolution Image Operations. *ACM Transactions on Graphics (Proc. of SIGGRAPH Asia 2012).*

2012 M. Hadwiger, J. Beyer, W.-K. Jeong, and H. Pfister. nteractive Volume Exploration of Petascale Microscopy Data Streams Using a Visualization-Driven Virtual Memory Approach. *IEEE Trans. on Visualization and Computer Graphics (Proc. of IEEE SciVis 2012).*

2011 T. Hoellt, J. Beyer, F. Gschwantner, P. Muigg, H. Doleisch, G. Heinemann, and M. Hadwiger. Interactive Seismic Interpretation with Piecewise Global Energy Minimization. *Proc. of IEEE Pacific Visualization.*

2010 W.-K. Jeong, J. Beyer, M. Hadwiger, R. Blue, C. Law, A. Vasquez, C. Reid, J. Lichtman, and H. Pfister. SSECRETT and NeuroTrace: Interactive Visualization and Analysis Tools for Large-Scale Neuroscience Datasets. *IEEE Computer Graphics and Applications.*

2009 W.-K. Jeong, J. Beyer, M. Hadwiger, A. Vasquez, H. Pfister, and R. Whitaker. Scalable and Interactive Segmentation and Visualization of Neural Processes in EM Datasets. *IEEE Trans. on Visualization and Computer Graphics (Proc. of IEEE Visualization 2009).*

2008 J. Beyer, M. Hadwiger, T. Möller, and L. Fritz. Smooth Mixed-Resolution GPU Volume Rendering. *Proc. of IEEE International Symposium on Volume and Point-Based Graphics 2008.*

2007 J. Beyer, M. Hadwiger, S. Wolfsberger, and K. Bühler. High-Quality Multimodal Volume Rendering for Preoperative Planning of Neurosurgical Interventions. *IEEE Trans. on Visualization and Computer Graphics (Proc. of IEEE Visualization 2007).*

2007 J. Beyer, M. Hadwiger, S. Wolfsberger, C. Rezk-Salama, and K. Bühler. Segmentierungsfreie Visualisierung des Gehirns für Direktes Volume Rendering. *Proc. of Bildverarbeitung für die Medizin 2007.*

2007 J. Beyer, C. Langer, L. Fritz, M. Hadwiger, S. Wolfsberger, and K. Bühler. Interactive Diffusion Based Smoothing and Segmentation of Volumetric Datasets on Graphics Hardware. *Methods of Information in Medicine.*

Publications – Book Chapters

2011 W.-K. Jeong, H. Pfister, J. Beyer, and M. Hadwiger. GPU-accelerated Brain Connectivity Reconstruction and Visualization in Large-Scale Electron Micrographs. *GPU Computing Gems, Vol 1.*

Publications – Technical Sketches, Talks and Posters

2017 H. Mohammed, A. K. Al-Awami, J. Beyer, C. Corrado Cali, P. Magistretti, H. Pfister, and M. Hadwiger. Abstractocyte: A Visual Tool for Exploring Nanoscale Astroglial Cell Morphology. *Poster at IEEE Pacific Visualization (PacificVis)*.

2016 J. Beyer, H. Strobelt, M. Oppermann, L. Deslauriers, and H. Pfister. Teaching Visualization for Large and Diverse Classes on Campus and Online. *Pedagogy of Data Visualization Workshop*.

2014 A. K. Al-Awami, J. Beyer, H. Strobelt, N. Kasthuri, J. W. Lichtman, H. Pfister, M. Hadwiger. NeuroLines - A Subway Map Metaphor for Visualizing Nanoscale Neuronal Connectivity. *Poster at 4th Symposium on Biological Data Visualization (BioVis)*.

2011 J. Beyer, M. Hadwiger, W. Jeong, H. Pfister, J. Lichtmann, and C. Reid. Demand-Driven Volume Rendering of Terascale EM Data. *SIGGRAPH 2011 Talks.*

2011 J. Beyer, M. Hadwiger, W. Jeong, H. Pfister. Distributed Terascale Volume Visualization Using a Shared Virtual Memory Space. *IEEE Symposium on Large-Scale Data Analysis and Visualization (LDAV)*.

2010 J. Beyer, M. Hadwiger, W. Jeong, H. Pfister, J. Lichtmann, and C. Reid. Distributed Multi-Level Out-of-Core Volume Rendering. *Poster at NVIDIA GPU Technology Conference (NVIDIA Research Summit)*.

Publications – Courses

2014 J. Beyer, M. Hadwiger, H. Pfister. A Survey of GPU-Based Large-Scale Volume Visualization. *Eurographics Conference on Visualization (EuroVis) - State of The Art Reports*.

2013 M. Hadwiger, J. Krüger, J. Beyer, S. Bruckner. GPU-Based Large-Scale Visualization. *SIGGRAPH Asia*.

Invited Talks and Guest Lectures

2017 *Guest lecture: Visualizing Spatial Data: Volumes and Flow*. COMPSCI 205: Computing Foundations for Computational Science. Harvard University.

2016 *Visualization for Connectomics*. Immersive Approaches to Biological Data Visualization. Cold Spring Harbor Laboratory.

2015 *Visualization for Connectomics*. Data Visualization Meeting. Broad Institute.

2015 *Data Visualization and Visual Computing for Life Sciences*. Visual Computing Center, King Abdullah University of Science and Technology.

2014 *NeuroLines: A Subway Map Metaphor for Visualizing Nanoscale Neuronal Connectivity*. CSAIL, Massachusetts Institute of Technology.

2012 *Interactive Volume Exploration of Petascale Microscopy Data*. Visual Computing Group, Harvard University.

2012 *Petascale Visualization for Neuroscience*. Workshop on Computational Biomedicine and Geophysics, Salt Lake City.

2011 *Petascale Visualization for Neuroscience*. Argonne National Labs.

2006 *High-Quality Real-Time Visualization of Medical Data*. European Workshop on basic techniques of microsurgery and cerebral revascularization.

Conference Presentations

2014 *A Survey of GPU-Based Large-Scale Visualization*. EuroVis.

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2013 *Course on GPU-Based Large-Scale Visualization*. ACM Siggraph Asia.

2013 *ConnectomeExplorer: Query-Guided Visual Analysis of Large Volumetric Neuroscience Data*. IEEE SciVis.

2013 *Interactive Non-Linear Image Operations on Gigapixel Images*. NVIDIA GPU Technology Conference.

2012 *Terascale Volume Visualization in Neuroscience*. NVIDIA GPU Technology Conference.

2011 *Demand-Driven Volume Rendering of Terascale EM Data*. ACM Siggraph.

2009 *Scalable and Interactive Segmentation and Visualization of Neural Processes*. IEEE SciVis.

2008 *Smooth Mixed-Resolution GPU Volume Rendering*. IEEE Volume and Point-based Graphics.

2007 *High-Quality Multimodal Volume Rendering for Preoperative Planning of Neurosurgical Interventions*. IEEE Visualization.

Awards

2014 Best Paper Honorable Mention, IEEE InfoVis Conference.

2014 Best Poster, BioVis.

2012 Best Paper Honorable Mention, IEEE SciVis Conference.

2008 Medvis Award (Karl-Heinz-Höhne-Preis), second place.

2007 Best Applications Paper Award, IEEE Visualization Conference.

2011 Best Student Project Award, Upper Austrian University of Applied Sciences.

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