

René Weller

Curriculum Vitae

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Education

- Autumn 2012 **University of Bremen**, *Ph.D. in Computer Science (Grade: Summa cum laude)*.
Dissertation: New Geometric Data Structures for Collision Detection
Advisor: Prof. Dr. Gabriel Zachmann
Co-advisor: Prof. Dr. Andreas Weber
- Winter 1999 - **University of Bonn**, *Diploma in Computer Science (Final Grade: Excellent)*.
Autumn 2005

Research Positions

- Since Autumn 2012 **Postdoctoral research assistant**, *University of Bremen*, Prof. Dr. Gabriel Zachmann, Computer Graphics and Virtual Reality.
- Summer 2005 **Research assistant**, *Clausthal University*, Prof. Dr. Gabriel Zachmann, Computer Graphics Group.
– Autumn 2012
- Autumn 2003 **Student research assistant**, *University of Bonn*, Prof. Dr. Reinhard Klein, Computer Graphics.
– Winter 2004
- Winter 2000 – **Student research assistant**, *University of Bonn*, Prof. Dr. Dr. h.c. Bernhard Korte, Research Institute for Discrete Mathematics.
Autumn 2003

Awards

- 2015 Best Paper Award, *Proving a Linear Worst-Case Bound for Collision Detection Between Triangle Soups*, *GI AR/VR Workshop 2015*, Bonn, Germany, September 2015
- 2013 Best Paper Award, *Parallel Collision Detection in Constant Time*, *Vriphys 2013*, Lille, France, November 2013
- 2013 EuroHaptics Ph.D Award, *New Geometric Data Structures for Collision Detection*, February 2013
- 2012 Best Paper Award, *Sphere-Spring Systems and Their Application to Hand Animation*, *GI AR/VR Workshop 2012*, Düsseldorf, Germany, September 2012
- 2012 Best Teaser Award, *User Performance in Complex Bi-manual Haptic Manipulation with 3 DOFs vs. 6 DOFs*, *Haptics Symposium 2012*, Vancouver, Canada, March 2012

- 2010 RTT Emerging Technology Award, *Haptasha: A Collaborative Multi-User Haptic Workspace*, Munich, Germany, May 2010
- 2009 ASME Virtual Environments and Systems - Best Paper Award, *Stable 6-DOF Haptic Rendering with Inner Sphere Trees*, IDETC/CIE, San Diego, CA, USA, August 2009

Scientific Community

Organizational Service

- 2017 Organizing a Workshop at IEEE World Haptics Conference
- 2015 Guest editor of Journal of Virtual Reality and Broadcasting (JVRB)
- 2014 Program Co-Chair at GI VR/AR 2014
- 2009 - 2015 Session Chair at several conferences such as ICAT/EGVE, EuroVR, GI VR/AR

Reviewer for Journals and Conferences

- 2006 - 2015 ACM Transactions on Graphics, Computers & Graphics, ACM Siggraph, Eurographics, IEEE VR, IEEE/RSJ IROS, ACM VRST, ASME WINVR, CGI, JVRB, ICAT/EGVE, EuroVR, WSCG, CAD, ASME TMCE, GI VR/AR

Membership in Associations

- 2009 - 2015 ACM Siggraph, Eurographics, IEEE, EuroVR

Invited Talks

- 2013 IEEE World Haptics 2013, *Daejeon, South Korea, January 2013*
- 2013 Symposium on Virtuality and Interaction 2013, *Heidelberg, Germany, June 2013*

Institutional Service

- Member of Doctoral Degrees Board
- Member of several appointment committees

Research Funding Applications

- 2016 - 2018 HIPS (HüftImplantat PfannenfräsSimulator), *Funding Body*: Federal Ministry for Economic Affairs and Energy, *Project Members*: University of Bremen, University of Chemnitz, FAKT Software GmbH and CAT Production GmbH
- 2014 - 2018 Creative Unit: Intra-Operative Information - What Surgeons Need, When They Need It, *Funding Body*: Federal Ministry of Education and Research, *Project Members*: University of Bremen (WG CGVR, WG Cognitive Systems, MRI Group, WG Digital Media), Fraunhofer MEVIS
- 2013 - 2014 Project I8-[DextrousSpace] supported by SFB/TR 8 Spatial Cognition, *Funding Body*: German Research Foundation, *Project Members*: University of Bremen, University of Freiburg
- 2013 - 2017 Project KaNaRiA, *Funding Body*: German Aerospace Center, *Project Members*: University of Bremen (WG CGVR, WG Cognitive Neuroinformatics, WG Optimization and Optimal Control), UniBW Munich (Institute of Space Technology, Institute of Space Applications)

2008 - 2012 Verbundprojekt Avilus: Angewandte Virtuelle Technologien im Produkt- und Produktionsmittel-Lebenszyklus, *Funding Body*: Federal Ministry of Education and Research, *Projekt Members*: Volkswagen, Airbus, TU Munich, RWTH Aachen, Fraunhofer IFF, et al.

Publications

Peer-Reviewed Publications

- [1] **Max Kaluschke and René Weller and Gabriel Zachmann** *A Volumetric Penetration Measure for 6-DOF Haptic Rendering of Streaming Point Clouds*. Accepted for *IEEE World Haptics 2017*, Munich, Germany, June 2017.
- [2] **Patrick Lange, René Weller and Gabriel Zachmann** *GDS: Gradient Based Density Spline Surfaces for Multiobjective Optimization in Arbitrary Simulations*. Accepted for *ACM SIGSIM Conference on Principles of Advanced Discrete Simulation*, Singapore, May 2017.
- [3] **René Weller and Nicole Debowski and Gabriel Zachmann** *kDet: Parallel Constant Time Collision Detection for Polygonal Objects*. Accepted for *Computer Graphics Forum (Proc. Eurographics)*, Lyon, France, April 2017.
- [4] **Jörn Teuber, René Weller, Ron Kikinis, Karl-Jürgen Oldhafer, Michael J. Lipp and Gabriel Zachmann** *Optimized Positioning of Autonomous Surgical Lamps*. In *Spie - Medical Imaging*, Orlando, FL, USA, February 2017.
- [5] **Patrick Lange, René Weller and Gabriel Zachmann** *Knowledge Discovery for Pareto based Multiobjective Optimization in Simulation*. In *ACM SIGSIM Conference on Principles of Advanced Discrete Simulation*, Banff, Canada, May 2016.
- [6] **Patrick Lange, René Weller and Gabriel Zachmann** *GraphPool: A High Performance Data Management for 3D Simulations*. In *ACM SIGSIM Conference on Principles of Advanced Discrete Simulation*, Banff, Canada, May 2016.
- [7] **Andreas Grabski, Toni Toni, Tom Zigrand, René Weller and Gabriel Zachmann** *Kinaptic - Techniques and Insights for Creating Competitive Accessible 3D Games for Sighted and Visually Impaired Users*. In *Haptics Symposium 2016*, Philadelphia, PE, USA, March 2016.
- [8] **Patrick Lange, René Weller and Gabriel Zachmann** *Wait-Free Hash Maps in the Entity-Component-System Pattern for Realtime Interactive Systems*. In *9th Workshop on Software Engineering and Architectures for Realtime Interactive Systems SEARIS 2016*, Greenville, NC, USA, March 2016.
- [9] **Nicole Debowski, René Weller and Gabriel Zachmann** *A Geometric Predicate for Linear Time Collision Detection of Polygonal Objects*. In *25th Fall Workshop on Computational Geometry (FWCG)*, Buffalo, NY, USA, October 2015.
- [10] **Jörn Teuber, René Weller and Gabriel Zachmann** *Framework for Transparent Execution of CUDA and OpenCL*. In *EuroVR Conference 2015*, Lecco, Italy, October 2015.

- [11] **Jörn Teuber, René Weller and Gabriel Zachmann** *Autonomous Surgical Lamps*. In *CURAC 2015*, Bremen, Germany, September 2015.
- [12] **Patrick Lange, René Weller and Gabriel Zachmann** *Multi Agent System Optimization in Virtual Vehicle Testbeds*. In *Eighth EAI International Conference on Simulation Tools and Techniques*, Athens, Greece, August 2015.
- [13] **Nicole Debowski, René Weller and Gabriel Zachmann** *Proving a Linear Worst-Case Bound for Collision Detection Between Triangle Soups*. In *GI AR/VR Workshop 2015*, Bonn, Germany, September 2015, *Best Paper Award*.
- [14] **Dominic Elm, Andreas Grabski, Maximilian Kaluschke, Philipp Krieter, Andrea Sander, Arne Schlamann, Björn Stradtman, Toni Toni, Tom Lian Zigrand, Daniela Zimmermann, René Weller and Gabriel Zachmann** *Development and Evaluation of a 3D Game for Sighted and Visually Impaired Users*. In *GI AR/VR Workshop 2015*, Bonn, Germany, September 2015.
- [15] **Patrick Lange, René Weller and Gabriel Zachmann** *Scalable Concurrency Control for Massively Collaborative Virtual Environments*. In *ACM Multimedia Systems, Massively Multiuser Virtual Environments (MMVE) 2015*, Portland, USA, March 2015.
- [16] **Max Kaluschke, Uwe Zimmermann, Marinus Danzer, Gabriel Zachmann and René Weller** *Massively-Parallel Proximity Queries for Point Clouds*. In *Vriphys 2014*, Bremen, Germany, September 2014.
- [17] **René Weller, David Mainzer, Abhishek Srinivas, Matthias Teschner and Gabriel Zachmann** *Massively Parallel Batch Neural Gas for Bounding Volume Hierarchy Construction*. In *Vriphys 2014*, Bremen, Germany, September 2014.
- [18] **Patrick Lange, René Weller and Gabriel Zachmann** *A Framework for Wait-Free Data Exchange in Massively Threaded VR Systems*. In *International Conference in Central Europe on Computer Graphics, Visualization and Computer Vision (WSCG)*, Plzen, June 2014.
- [19] **René Weller, Gabriel Zachmann and Udo Frese** *Parallel Collision Detection in Constant Time*. In *Vriphys 2013*, Lille, France, November 2013, *Best Paper Award*.
- [20] **Jörn Teuber, René Weller, Gabriel Zachmann and Stefan Guthe** *Fast Sphere Packings with Adaptive Grids on the GPU*. In *GI AR/VR Workshop 2013*, Würzburg, Germany, September 2012, *Second Place for Best Paper Award*.
- [21] **Stephan Mock, Weiyu Yi, René Weller and Gabriel Zachmann** *Sphere-Spring Systems and Their Application to Hand Animation*. In *GI AR/VR Workshop 2012*, Düsseldorf, Germany, September 2012, *Best Paper Award*.
- [22] **René Weller and Gabriel Zachmann** *User Performance in Complex Bi-manual Haptic Manipulation with 3 DOFs vs. 6 DOFs*. In *Haptics Symposium 2012*, Vancouver, Canada, March 2012.

- [23] **René Weller and Gabriel Zachmann** *3-DOF vs. 6-DOF - Playful Evaluation of Complex Haptic Interactions*. In *IEEE International Conference on Consumer Electronics (ICCE), 2011 Digest of Technical Papers*, Las Vegas, NV, USA, January 2011.
- [24] **René Weller and Gabriel Zachmann** *Protosphere: A GPU-assisted prototype-guided sphere packing algorithm for arbitrary objects*. In *ACM SIGGRAPH ASIA 2010 Sketches*, Seoul, Republic of Korea, December 2010.
- [25] **René Weller, David Mainzer, Mikel Sagardia, Thomas Hulin, Gabriel Zachmann and Carsten Preusche** *A benchmarking suite for 6-DOF real time collision response algorithms*, In *Proceedings of the 17th ACM Symposium on Virtual Reality Software and Technology (VRST)*, pages 63–70, Hong Kong, China, November 2010.
- [26] **René Weller and Gabriel Zachmann** *Stable 6-DOF Haptic Rendering with Inner Sphere Trees*. In *International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, (IDETC/CIE)*, San Diego, CA, USA, August 2009, *CIE/VES Best Paper Award*.
- [27] **René Weller and Gabriel Zachmann** *A Unified Approach for Physically-Based Simulations and Haptic Rendering*. In *Sandbox 2009: ACM SIGGRAPH Video Game Proceedings*, New Orleans, LA, USA, August 2009.
- [28] **René Weller and Gabriel Zachmann** *Inner sphere trees for proximity and penetration queries*. In *Robotics: Science and Systems Conference (RSS)*, Seattle, WA, USA, June/July 2009.
- [29] **Sven Trenkel, René Weller and Gabriel Zachmann** *A Benchmarking Suite for Static Collision Detection Algorithms*, In *International Conference in Central Europe on Computer Graphics, Visualization and Computer Vision (WSCG)*, Plzen, Czech Republic, January/February 2007.
- [30] **René Weller and Gabriel Zachmann** *Kinetic Separation Lists for Continuous Collision Detection of Deformable Objects*. In *Third Workshop in Virtual Reality Interactions and Physical Simulation (Vriphys)*, Madrid, Spain, November 2006.
- [31] **Gabriel Zachmann and René Weller** *Kinetic bounding volume hierarchies for deformable objects*. In *ACM Int'l Conf. on Virtual Reality Continuum and Its Applications (VRCIA)*, Hong Kong, China, June 2006.
- [32] **René Weller, Jan Klein and Gabriel Zachmann** *A Model for the Expected Running Time of Collision Detection using AABB Trees*. In *Eurographics Symposium on Virtual Environments (EGVE)*, Lisbon, Portugal, May 2006.

Other Publications

- [1] **Gabriel Zachmann, René Weller and André Hinkenmann (Guest Editors)** *Journal of Virtual Reality and Broadcasting (JVRB) Volume 13*, 2015.

- [2] **Gabriel Zachmann, René Weller and André Hinkenmann (Editors)** *Virtuelle und Erweiterte Realität - Proceedings of 11. Workshop der GI-Fachgruppe VR/AR*, isbn 978-3-8440-3054-9, Shaker 2014.
- [3] **René Weller** *New Geometric Data Structures for Collision Detection and Haptics*. In *Springer Series on Touch and Haptic Systems*, isbn 978-3-319-010199-0, Springer 2013.
- [4] **René Weller** *New Geometric Data Structures for Collision Detection*. Dissertation, ULB Bremen 2012.
- [5] **David Mainzer, René Weller and Gabriel Zachmann** *Kollisionserkennung und natürliche Interaktion in virtuellen Umgebungen*. In *Virtuelle Techniken im industriellen Umfeld*, chapter 3.2 and 3.4, pages 33–38 and 114–116, isbn 978-3-642-20635-1, Springer 2011.
- [6] **René Weller and Gabriel Zachmann** *Inner Sphere Trees and Their Application to Collision Detection*. In *Virtual Realities*, chapter 10, pages 181–202, isbn 978-3-211-99177-0, Springer 2011.
- [7] **René Weller and Gabriel Zachmann** *Inner Sphere Trees and Their Application to Collision Detection*. Technical Report, IfI-08-09, Clausthal University 2008.
- [8] **René Weller and Gabriel Zachmann** *Kinetic Bounding Volume Hierarchies for Collision Detection of Deformable Objects*. Technical Report, IfI-06-16, Clausthal University 2006.

Demos

- 2017 World Haptics 2017, *Munich, Germany, April 2017*.
- 2015 Spatial Cognition 2015, *Bremen, Germany, September 2015*.
- 2014 Vriphys 2014, *Bremen, Germany, September 2014*.
- 2012 Haptics Symposium 2012, *Vancouver, Canada, March 2012 (Nominated for Best Demo Award)*.
- 2011 AVILUS Statustagung 2011, *Braunschweig, Germany, January 2011*.
- 2010 JVRC 2010, *Stuttgart, Germany, September 2010*.
- 2010 Eurohaptics 2010, *Amsterdam, Netherlands, July 2010*.
- 2010 RTT Excite 2010, *Munich, Germany, May 2010*.

Teaching Experience

Supervised Theses

- 2017 Sascha Hestermann, *A Friction Modell for Volumetric Sphere Intersections*, Master Thesis (work in progress)
- 2017 Toni Toni, *Optimized Bounding Volume Hierarchies for large Branching Factors*, Master Thesis (work in progress)
- 2017 Andreas Grabski, *Usability-Evaluation der Video-on-Demand Webseiten Netflix und Amazon Video*, Bachelor Thesis

- 2017 Max Kaluschke, *Volumetric 6-DOF Haptic Rendering for Streaming Point Cloud Data*, Master Thesis
- 2016 Marcel Kaup, *Attraktiv.Informativ.Effektiv.*, Bachelor Thesis
- 2016 Joscha Cepok, *Refactoring einer existierenden Code-Basis zur Simulation von Fisch-Schwärmen und Weiterentwicklung deren Verhaltens*, Bachelor Thesis
- 2015 Mohammad Razavi, *Automatic Breast Cancer Classification using Sphere-Packings*, Master Thesis
- 2015 Stefan Heitmann, *Sphere-Graph-Based Real-Time Sound Propagation in VR*, Bachelor Thesis
- 2015 Nicole Debowski, *Constant Time Collision Detection for Deformable Polygonal Objects*, Master Thesis
- 2015 Jan Friedrich Schütze, *Ein objektorientierter Ansatz zur SAT-basierten Verifikation von Graphtransformationseinheiten*, Diploma Thesis
- 2014 Rafael Trautmann, *Parallele Klonerkennung in Graphen mit Hilfe von CUDA*, Diploma Thesis
- 2014 Max Kaluschke, *Massively-Parallel Proximity Queries for Point Clouds*, Bachelor Thesis
- 2013 Jörn Teuber, *Fast Sphere Packings with Adaptive Grids*, Bachelor Thesis
- 2012 Yingbing Hua, *Collision Avoidance between Point Clouds and Inner Sphere Trees*, Master Thesis
- 2011 Weiyu Yi, *The parallel simulation and collision detection of deformable geometry using sphere-springs system*, Diploma Thesis
- 2011 Stephan Thiele, *Parallel-hierarchisches Clustering auf der GPU am Beispiel von Batch Neural Gas*, Bachelor Thesis
- 2009 Stephan Mock, *Approximativ volumenerhaltende Deformation eines 3D-Handmodells mittels innerer Kugeln*, Diploma Thesis
- 2006 Sven Trenkel, *Entwicklung einer Benchmark-Suite zur Optimierung von ADB-Trees*, Diploma Thesis

Lectures

- Autumn 2016 Media Engineering, *University of Bremen*, Compulsory Lecture for the Bachelor Degree Course *Digital Media*
- Winter 2016 Introduction to Game Engines, *Poznan University of Economics*, Erasmus Teaching Mobility Program
- Autumn 2015 Media Engineering, *University of Bremen*, Compulsory Lecture for the Bachelor Degree Course *Digital Media*
- Autumn 2014 Introduction to Collision Detection, *Univerity Paris-Sud*, Erasmus Teaching Mobility Program
- Fall 2011 Introduction to Computer Graphics, *Nordhausen University of Applied Sciences*
- Fall 2010 Introduction to Computer Graphics, *Nordhausen University of Applied Sciences*

Practical Courses

Winter 2015 Kinaptik - Asymmetric Interaction Metaphors for Collaborative 3D Environments
Summer 2011 Computer Graphics
Summer 2010 Computer Graphics
Winter 2007 Programming a Powerwall
Summer 2007 Programming a Powerwall
Winter 2006 Animated 3D Worlds
Summer 2006 Animated 3D Worlds

Seminars

Winter 2014 Haptics for Visually Impaired People
Summer 2012 Physics and Simulation
Winter 2009 Game Physics
Summer 2009 Physics and Simulation
Winter 2008 Game Physics
Winter 2007 Recent Research in Computer Graphics
Winter 2006 Recent Research in Computer Graphics

Teaching Assistant

Summer 2015 Lecture: Geometric Data Structures for Computer Graphics
Summer 2014 Lecture: Advanced Computer Graphics
Winter 2014 Lecture: Virtual Reality and Physically-Based Simulation
Winter 2013 Lecture: Advanced Computer Graphics
Summer 2012 Lecture: Introduction to Computer Graphics
Winter 2012 Lecture: Virtual Reality
Winter 2011 Lecture: Geometric Data Structures for Computer Graphics
Winter 2010 Lecture: Introduction to Computer Graphics
Summer 2009 Lecture: Geometric Data Structures for Computer Graphics
Summer 2008 Lecture: Advanced Computer Graphics Advanced
Summer 2007 Lecture: Advanced Computer Graphics
Winter 2006 Lecture: Introduction Computer Graphics
Winter 2005 Lecture: Introduction to Computer Science

Supervised International Internship Students

2014 Nasiba Sharifova (*Tadzhikistan*)
2013 Ilya Tazitdinov (*Russia*)
2013 Skandan Chockalingam (*India*)