Michael Zollhöfer

Post Doctoral Researcher

MPI Informatics
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Michael Zollhöfer works as a post doctoral researcher at the intersection of computer vision and computer graphics.

Profile

Name	Michael Zollhöfer
Gender	male
Date of birth	28/07/1985
Place of birth	Neustadt a.d. Aisch, Germany
Citizenship	German
Languages	German (native), English (fluent), Spanish (basic)

Research Statement

The primary focus of my research is **understanding our physical world at frame rate** based on **visual input**. To this end, I develop novel mathematical models and algorithms that enable computers to first reconstruct and subsequently understand our world based on commodity sensors. My main focus is on fast and robust algorithms to tackle the underlying reconstruction and machine learning problems for **static as well as dynamic scenes** at real-time based on commodity graphics hardware (GPUs). To tackle these challenges, I develop key technology to invert the image formation models used in computer graphics based on **data-parallel real-time optimization techniques** and extract **deeper knowledge** using state-of-the-art machine learning techniques.

Education

12/2014	**Completed PhD (summa cum laude)**. Thesis: "Real-Time Reconstruction of Static and Dynamic Scenes"
2011 – 2014	**PhD in Computer Science**. Advisor: Prof. Dr. Günther Greiner, Computer Graphics Group, Erlangen, Germany
09/2010	**Diploma with honors (Dipl.-Inf.)**. Comparable to M.Sc., Final Grade: 1.0 (best) University Erlangen-Nuremberg, Germany
08/2010	**Diploma Thesis**. Topic: "Point Based Hierarchical Light Transport" Comparable to Master Thesis, Grade 1.0 (best)
10/2007	**Intermediate Diploma in Computer Science**, *German "Vordiplom"*. University Erlangen-Nuremberg, Germany
07/2007	**Student Research Project**. Titel: "Shape Manipulation and Non-Rigid Registration using Embedded Deformations" Comparable to Bachelor Thesis, Grade 1.0 (best)
2005 - 2010	**Studies of Computer Science**, *University Erlangen-Nuremberg, Germany*. ○ Major Subjects: Computer Graphics, Operating Systems, Compilers ○ Minor Subject: Numerical Mathematics
05/2005	**University-Entrance Qualification**, *German "Abitur"*.

1997 – 2005	**German High School**.
	Gymnasium Herzogenaurach, Germany
1993 – 1996	**Elementary School**.
	Grundschule Herzogenaurach, Germany

Positions

02/2015 – present	**Max Planck Institute for Informatics**.
	Post Doctoral Researcher
	Supervisor: Christian Theobalt, Graphics, Vision & Video Group, Saarbrücken, Germany
08/2014	**Stanford University**.
	Visiting Researcher (3 month)
	Host: Dr. Matthias Nießner, Computer Graphics Group, Stanford, CA, USA
08/2013	**Microsoft Research Cambridge**.
	Research Intern (3 month)
	Host: Shahram Izadi, Interactive 3D Technologies (I3D), Cambridge, UK
2011 – 2014	**University Erlangen-Nuremberg**.
	Research Assistant
	Advisor: Prof. Dr. Günther Greiner, Computer Graphics Group, Erlangen, Germany
2010	**University Erlangen-Nuremberg**.
	Student Research Assistant
03/2009	**Eurographics Student Volunteer**.
	Eurographics, Munich, Germany

Awards

02/2011	**ASQF-Sponsorship Award**.
	Association for Software Quality and Further Education
10/2014	**EG GCH 2014 Best Papers Award**.
	Graphics and Cultural Heritage 2014
07/2016	**Best of Show Award at Emerging Technologies**.
	Siggraph 2016

Teaching

Teaching Assistant	**Max Planck Institute for Informatics**.
	Seminars:
	○ Computer Vision for Computer Graphics (Summer 2015, Summer 2016)
Teaching Assistant	**University Erlangen-Nuremberg**.
	Courses:
	○ Algorithms of Continuous Systems (Summer 2011)
	○ Fundamentals of Computer Science (Winter 2011/12)
	○ Geometry Processing (Summer 2012, Summer 2013)
Student Teaching Assistant	**University Erlangen-Nuremberg**.
	Courses:
	○ Algorithms and Data Structures (Winter 2007/08)
	○ Algorithms of Continuous Systems (Winter 2009/10, Summer 2010)
	○ Computer Graphics (Winter 2009/10, Summer 2010, Winter 2010/11)

Programming Skills

GPU	**CUDA, DirectX, HLSL, OpenGL, GLSL**.
CPU	**C++, C, Phyton, Java, Scheme, Prolog**.
CNN	**Caffe, cuDNN, Theano**.

Academic Services

Reviewing.
- Conferences:
  - SIGGRAPH, SIGGRAPH Asia, CVPR, ECCV/ICCV, EG, GI, FG, ...
- Journals:
  - TOG, PAMI, TVCG, CGF, ...

Chairing.
- Session Chair:
  - CVPR 2016

Invited Talks

07/2014 **Real-time Reconstruction of Static and Dynamic Objects**.
MPI Informatics, Saarbrücken, Germany

12/2014 **Capturing Reality: Real-time Reconstruction of Static and Dynamic Objects**.
International Workshop on Computational Photography and Visual Computing, Shenzhen, China

07/2016 **Is it real? Capturing Human Body, Hand and Face Motion in the Wild**.
Tech Open Air (TOA), Berlin, Germany

Publications

[1] A. Dai, M. Nießner, **M. Zollhöfer**, S. Izadi, and C. Theobalt. BundleFusion: Real-time Globally Consistent 3D Reconstruction using On-the-fly Surface Re-integration. *arXiv preprint arXiv:1604.01093 (arXiv 2016)*, 2016.

[2] Z. DeVito, M. Mara, **M. Zollhöfer**, G. Bernstein, C. Theobalt, P. Hanrahan, M. Fisher, and M. Nießner. Opt: A domain specific language for non-linear least squares optimization in graphics and imaging. *arXiv preprint arXiv:1604.06525 (arXiv 2016)*, 2016.

[3] P. Garrido, **M. Zollhöfer**, D. Casas, L. Valgaerts, K. Varanasi, P. Perez, and C. Theobalt. Reconstruction of personalized 3d face rigs from monocular video. *ACM Transactions on Graphics (TOG) (SIGGRAPH 2016)*, 35 (3), 2016.

[4] P. Garrido, **M. Zollhöfer**, C. Wu, D. Bradley, P. Pérez, T. Beeler, and C. Theobalt. Corrective 3d reconstruction of lips from monocular video. *ACM Transactions on Graphics (TOG) (SIGGRAPH ASIA 2016)*, 35(6), 2016.

[5] M. Innmann, **M. Zollhöfer**, M. Nießner, C. Theobalt, and M. Stamminger. VolumeDeform: Real-time Volumetric Non-rigid Reconstruction. In *Proceedings of European Conference on Computer Vision (ECCV 2016)*, 2016.

[6] A. Meka, **M. Zollhöfer**, C. Richardt, and C. Theobalt. Live intrinsic video. *ACM Transactions on Graphics (Presented at SIGGRAPH 2016)*, 35(4), 2016.

[7] M. Nießner, **M. Zollhöfer**, S. Izadi, and M. Stamminger. Real-time 3d reconstruction at scale using voxel hashing. *ACM Transactions on Graphics (TOG) (SIGGRAPH ASIA 2013)*, 2013.

[8] C. Siegl, M. Colaianni, L. Thies, J. Thies, **M. Zollhöfer**, S. Izadi, M. Stamminger, and F. Bauer. Real-time pixel luminance optimization for dynamic multi-projection mapping. *ACM Transactions on Graphics (TOG) (SIGGRAPH ASIA 2015)*, 34(6), 2015.

[9] S. Sridhar, F. Mueller, **M. Zollhöfer**, D. Casas, A. Oulasvirta, and C. Theobalt. Real-time Joint Tracking of a Hand Manipulating an Object from RGB-D Input. In *Proceedings of European Conference on Computer Vision (ECCV 2016)*, 2016.

[10] J. Süßmuth, **M. Zollhöfer**, and G. Greiner. Animation transplantation. *Computer Animation and Virtual Worlds (CASA 2010)*, 21(3-4):173–182, 2010.

[11] **M. Zollhöfer**. *Real-Time Reconstruction of Static and Dynamic Scenes*. PhD thesis, Computer Graphics Group, Department of Computer Science, University of Erlangen-Nuremberg, Germany, 2014. Verlag Dr. Hut (Dissertation), Munich, Germany.

[12] **M. Zollhöfer** and M. Stamminger. Meshless hierarchical radiosity on the gpu. In *Proceedings of Vision, Modeling, and Visualization (VMV 2011)*. Eurographics Association, 2011.

[13] **M. Zollhöfer**, M. Martinek, G. Greiner, M. Stamminger, and J. Süßmuth. Automatic reconstruction of personalized avatars from 3d face scans. *Computer Animation and Virtual Worlds (CASA 2011)*, 22(2-3): 195–202, 2011.

[14] **M. Zollhöfer**, E. Sert, G. Greiner, and J. Süßmuth. Gpu based arap deformation using volumetric lattices. In *Eurographics Short Papers Annex (EG 2012)*, 2012.

[15] **M. Zollhöfer**, M. Nießner, S. Izadi, C. Rehmann, C. Zach, M. Fisher, C. Wu, A. Fitzgibbon, C. Loop, C. Theobalt, and M. Stamminger. Real-time non-rigid reconstruction using an rgb-d camera. *ACM Transactions on Graphics (TOG) (SIGGRAPH 2014)*, 33(4), 2014.

[16] **M. Zollhöfer**, C. Siegl, B. Riffelmacher, M. Vetter, B. Dreyer, M. Stamminger, and F. Bauer. Low-cost real-time 3d reconstruction of large-scale excavation sites using an rgb-d camera. In *EUROGRAPHICS Workshop on Graphics and Cultural Heritage (GCH 2014)*, pages 1–10. Eurographics Association, 2014.

[17] **M. Zollhöfer**, J. Thies, M. Colaianni, M. Stamminger, and G. Greiner. Interactive model-based reconstruction of the human head using an rgb-d sensor. *Computer Animation and Virtual Worlds (CASA 2014)*, 25(3-4), 2014.

[18] **M. Zollhöfer**, A. Dai, M. Innmann, C. Wu, M. Stamminger, C. Theobalt, and M. Nießner. Shading-based refinement on volumetric signed distance functions. *ACM Transactions on Graphics (TOG) (SIGGRAPH ASIA 2015)*, 34(4), 2015.

[19] **M. Zollhöfer**, C. Siegl, M. Vetter, B. Dreyer, M. Stamminger, S. Aybek, and F. Bauer. Low-cost real-time 3d reconstruction of large-scale excavation sites. *ACM Journal on Computing and Cultural Heritage (JOCCH 2015)*, 9(1), 2015.

[20] J. Thies, **M. Zollhöfer**, M. Nießner, L. Valgaerts, M. Stamminger, and C. Theobalt. Real-time expression transfer for facial reenactment. *ACM Transactions on Graphics (TOG) (SIGGRAPH ASIA 2015)*, 34(6), 2015.

[21] J. Thies, **M. Zollhöfer**, M. Stamminger, C. Theobalt, and M. Nießner. FaceVR: Real-Time Facial Reenactment and Eye Gaze Control in Virtual Reality. *arXiv preprint arXiv:1610.03151 (arXiv 2016)*, 2016.

[22] J. Thies, **M. Zollhöfer**, M. Stamminger, C. Theobalt, and M. Nießner. Face2Face: Real-time Face Capture and Reenactment of RGB Videos. In *Proc. Computer Vision and Pattern Recognition (CVPR 2016), IEEE*, 2016.

[23] L. Thies, **M. Zollhöfer**, C. Richardt, C. Theobalt, and G. Greiner. Real-time halfway domain reconstruction of motion and geometry. In *Proc. of the International Conference on 3D Vision (3DV 2016)*, 2016.

[24] C. Wu, **M. Zollhöfer**, M. Nießner, M. Stamminger, S. Izadi, and C. Theobalt. Real-time shading-based refinement for consumer depth cameras. *ACM Transactions on Graphics (TOG) (SIGGRAPH ASIA 2014)*, 33 (6), 2014.

[25] C. Wu, D. Bradley, P. Garrido, **M. Zollhöfer**, C. Theobalt, M. Gross, and T. Beeler. Model-based teeth reconstruction. *ACM Transactions on Graphics (TOG) (SIGGRAPH ASIA 2016)*, 35(6), 2016.