

CHRISTIAN RICHARDT

Address Department of Computer Science, University of Bath, Claverton Down, Bath, BA2 7AY, UK

Email christian@richardt.name

Web <https://richardt.name>

Skype christianrichardt

RESEARCH & WORK EXPERIENCE

- Aug. 2016 **Lecturer (Assistant Professor)** – Department of Computer Science, University of Bath, England
– now I am working on video processing for 360-degree video, light fields, and for user-centric applications.
- Mar. 2014 **Postdoctoral Fellow** – Intel Visual Computing Institute and MPI Informatik, Saarbrücken, Germany
– Jul. 2016 I worked on user-centric video processing and motion capture in mobile scenarios, with a focus on reconstructing dynamic scenes from a few handheld cameras. With Christian Theobalt
- Oct. 2012 **Postdoctoral Fellow (16 months)** – Inria Sophia Antipolis – Méditerranée, Sophia Antipolis, France
– Feb. 2014 I worked on perceptually-based techniques for image-based rendering and vector graphics. With George Drettakis & Adrien Bousseau
- Summer 2012 **Research Intern (5 months)** – Disney Research, Zurich, Switzerland
I worked on creating high-resolution, high-quality stereoscopic panoramas based on omnidirectional stereo (patented). Published as oral presentation at CVPR 2013. Host: Alexander Sorkine-Hornung
- 2010 – 2011 **Visiting Scholar (7 months)** – MPI Informatik, Saarbrücken, Germany
In this project, I built a prototype Kinect-like RGBZ video camera and devised algorithms to upsample, denoise and smooth the depth data to create high-resolution coherent RGBZ videos. These enable video processing effects that go beyond what is possible using just a colour video. Host: Christian Theobalt
- Summer 2008 **Research Intern (3 months)** – Disney Research, Zurich, Switzerland
and Walt Disney Animation Studios, Burbank, California, United States of America
I researched approaches for compensating ‘ghosting’ artefacts caused by crosstalk in stereoscopic 3D projection setups. The resulting perceptually-based compensation technique can greatly improve the viewing experience of stereoscopic 3D imagery. Hosts: Markus Gross & Rasmus Tamstorf
- Summer 2007 **Software Engineering Intern (4 weeks)** – Mindquarry, Potsdam, Germany
I assisted in the design and development of a simple one-click Subversion client for novice users, which involved user interface design in SWT/JFace, and analysis and fixing of bug reports.
- Summer 2006 **Summer Intern (3 months)** – The MathWorks, Cambridge, England
My work investigated techniques for integrating highly optimised signal processing routines into a code-generation software environment based on model-based design (Simulink); I presented my findings to about 20 engineers in the UK and US.

EDUCATION

- 2012 **PhD in Computer Science** – University of Cambridge, England
Dissertation: Colour videos with depth – acquisition, processing and evaluation
My research investigated the full life cycle of videos with depth (RGBZ videos): from their acquisition, via filtering and processing, to the evaluation of stereoscopic display. Supervisor: Neil A. Dodgson
- 2011 **Master of Arts** – University of Cambridge, England
- 2007 **Bachelor of Arts (Honours) in Computer Science** – University of Cambridge, England
First class honours (highest honours), ranked 3rd out of 72 in final year (Part II)
Final-year dissertation: Flash-exposure high dynamic range imaging
My project extended HDR imaging techniques and showed useful computational photography applications like virtual photography and an intelligent flash. Supervisor: Rahul Vohra
- 2004 **Allgemeine Hochschulreife (Abitur)** – Albert-Schweitzer-Gymnasium, Erfurt, Germany
Average mark: 1.0 (highest honours); majored in mathematics and computer science

PUBLICATIONS

→ See also my profiles on *Google Scholar* and *DBLP*.

2018 **Deep Video Portraits**

H. Kim, P. Garrido, A. Tewari, W. Xu, J. Thies, M. Nießner, P. Pérez, **C. Richardt**, M. Zollhöfer, C. Theobalt
ACM Transactions on Graphics (Proceedings of SIGGRAPH), 37(4), 2018 [website] [pdf] [arXiv]

LIME: Live Intrinsic Material Estimation

A. Meka, M. Maximov, M. Zollhöfer, A. Chatterjee, H.-P. Seidel, **Christian Richardt** and C. Theobalt
Proceedings of CVPR, 2018 (**spotlight presentation, 6.6% acceptance rate**) [website] [pdf] [arXiv]

InverseFaceNet: Deep Monocular Inverse Face Rendering

Hyeongwoo Kim, Michael Zollhöfer, Ayush Tewari, Justus Thies, **Christian Richardt**, Christian Theobalt
Proceedings of CVPR, 2018 [website] [pdf] [arXiv]

Cutting-Edge VR/AR Display Technologies

George-Alex Koulieris, Kaan Akşit, Rafał Mantiuk, **Christian Richardt** and Katerina Mania
Tutorial at *IEEE Conference on Virtual Reality and 3D User Interfaces (VR)*, 2018 [website]

Parallax360: Stereoscopic 360° Scene Representation for Head-Motion Parallax

Bicheng Luo, Feng Xu, **Christian Richardt** and Jun-Hai Yong
IEEE Transactions on Visualization and Computer Graphics, 24(4), 2018 [website] [pdf] [doi]

2017 **Undoing Instagram Filters**

Padraig Boulton and **Christian Richardt**
Short Paper at *European Conference on Visual Media Production (CVMP)*, 2017 [pdf]

Dynamic Mixed-Reality Compositing with Unity

Joanna Tarko, **Christian Richardt** and Peter Hall
Short Paper at *European Conference on Visual Media Production (CVMP)*, 2017 [pdf]

Predictor Combination at Test Time

Kwang In Kim, James Tompkin and **Christian Richardt**
International Conference on Computer Vision (ICCV), 2017 [pdf] [doi]

Live User-Guided Intrinsic Video For Static Scenes

Abhimitra Meka*, Gereon Fox*, Michael Zollhöfer, **Christian Richardt** and Christian Theobalt
IEEE Transactions on Visualization and Computer Graphics, 23(11), 2017 [website] [pdf] [doi]

Video for Virtual Reality

Christian Richardt, James Tompkin, Jordan Halsey, Aaron Hertzmann, Jonathan Starck, Oliver Wang
SIGGRAPH Course, 2017 [website] [doi]

2016 **EgoCap: Egocentric Marker-less Motion Capture with Two Fisheye Cameras**

H. Rhodin, **Christian Richardt**, D. Casas, E. Insafutdinov, M. Shafiei, H.-P. Seidel, B. Schiele, C. Theobalt
ACM Transactions on Graphics (Proceedings of SIGGRAPH Asia), 35(8), 2016 [website] [pdf] [doi] [arXiv]

Dense Wide-Baseline Scene Flow From Two Handheld Video Cameras

Christian Richardt, Hyeongwoo Kim, Levi Valgaerts and Christian Theobalt
International Conference on 3D Vision (3DV), 2016 (**oral presentation**) [website] [pdf] [doi] [arXiv]

Video Depth-From-Defocus

Hyeongwoo Kim, **Christian Richardt** and Christian Theobalt
International Conference on 3D Vision (3DV), 2016 [website] [pdf] [doi] [arXiv]

Real-time Halfway Domain Reconstruction of Motion and Geometry

Lucas Thies, Michael Zollhöfer, **Christian Richardt**, Christian Theobalt and Günther Greiner
International Conference on 3D Vision (3DV), 2016 [website] [pdf] [doi] [arXiv]

General Automatic Human Shape and Motion Capture Using Volumetric Contour Cues

Helge Rhodin, Nadia Robertini, Dan Casas, **Christian Richardt**, Hans-Peter Seidel, Christian Theobalt
European Conference on Computer Vision (ECCV), 2016 (**spotlight presentation**) [website] [pdf] [doi] [arXiv]

Live Intrinsic Video

Abhimitra Meka, Michael Zollhöfer, **Christian Richardt** and Christian Theobalt
ACM Transactions on Graphics (Proceedings of SIGGRAPH), 35(4), 2016 [website] [pdf] [doi]

2015 **A Versatile Scene Model with Differentiable Visibility Applied to Generative Pose Estimation**

Helge Rhodin, Nadia Robertini, **Christian Richardt**, Hans-Peter Seidel and Christian Theobalt
International Conference on Computer Vision (ICCV), 2015 [website] [pdf] [doi] [arXiv]

User-Centric Computational Videography

Christian Richardt, James Tompkin, Jiamin Bai and Christian Theobalt
SIGGRAPH Course, 2015 [website] [doi]

4D Model Flow: Precomputed Appearance Alignment for Real-time 4D Video Interpolation

Dan Casas, **Christian Richardt**, John Collomosse, Christian Theobalt and Adrian Hilton
Computer Graphics Forum (Proceeding of Pacific Graphics), 2015 [website] [pdf] [doi]

2014 **Vectorising Bitmaps into Semi-Transparent Gradient Layers**

Christian Richardt, Jorge Lopez-Moreno, Adrien Bousseau, Maneesh Agrawala and George Drettakis
Computer Graphics Forum (Proceeding of EGSR), 33(4), 2014 [website] [pdf] [doi]

Temporally Coherent Video De-Anaglyph

Joan Sol Roo and **Christian Richardt**
Talk and Poster at *SIGGRAPH*, 2014 [website] [pdf] [doi]

2013 **Megastereo: Constructing High-Resolution Stereo Panoramas**

Christian Richardt, Yael Pritch, Henning Zimmer and Alexander Sorkine-Hornung
Proceedings of CVPR, 2013 (oral presentation, 3.3% acceptance rate) [website] [pdf] [doi]

Perception of Perspective Distortions in Image-Based Rendering

Peter Vangorp, **Christian Richardt**, Emily Cooper, Gaurav Chaurasia, Martin Banks, George Drettakis
ACM Transactions on Graphics (Proceedings of SIGGRAPH), 32(4), 2013 [website] [pdf] [doi]

2012 **Coherent Spatiotemporal Filtering, Upsampling and Rendering of RGBZ Videos**

Christian Richardt, Carsten Stoll, Neil A. Dodgson, Hans-Peter Seidel and Christian Theobalt
Computer Graphics Forum (Proceedings of Eurographics), 31(2), 2012 [website] [pdf] [doi]

Random Discrete Colour Sampling

Henrik Lieng, **Christian Richardt** and Neil A. Dodgson
Computational Aesthetics, 2012 [website] [pdf] [doi]

2011 **Layered Photo Pop-Up – Winner of the ACM SIGGRAPH Student Research Competition**

Lech Świrski, **Christian Richardt** and Neil Dodgson
Poster at *SIGGRAPH*, 2011 [website] [pdf] [doi]

Predicting Stereoscopic Viewing Comfort Using a Coherence-Based Computational Model

Christian Richardt, Lech Świrski, Ian P. Davies and Neil A. Dodgson
Computational Aesthetics, 2011 [website] [pdf] [doi]

2010 **Real-Time Spatiotemporal Stereo Matching Using the Dual-Cross-Bilateral Grid**

Christian Richardt, Douglas Orr, Ian Davies, Antonio Criminisi and Neil A. Dodgson
European Conference on Computer Vision (ECCV), 2010 [website] [pdf] [doi]

Stereo Coherence in Watercolour Rendering

Christian Richardt, Jan Eric Kyrianiadis and Neil A. Dodgson
Poster at the symposia on *NPAR* and *Computational Aesthetics*, 2010 [pdf]

2009 **Proteus – Semi-Automatic Interactive Structure-from-Motion**

Malte Schwarzkopf and **Christian Richardt**
Poster at the *Vision, Modelling, and Visualization (VMV)* workshop, 2009 [website] [pdf]

Voronoi Video Stylisation

Christian Richardt and Neil A. Dodgson
Computer Graphics International (short papers), 2009 [website] [pdf] [doi]

ACADEMIC EXPERIENCE

Service Website Chair for CVMP 2018.

Publicity Chair for the Expressive/CAe-SBIM-NPAR joint symposia in 2011, 2013, 2014, and 2015 and 2016, and member of the programme committee 2013–5 and 2017–8.

Public speaking **Stereoscopic and 6-Degree-of-Freedom Photography**

Royal Photographic Society (Bath), May 2018

3D photography: from the Victorians to Virtual Reality

Pint of Science (Bath), May 2017

Invited talks **Towards reconstructing the visual world**

École polytechnique fédérale de Lausanne (EPFL), July 2018

Microsoft Research Cambridge, April 2018

Rainbow Group at University of Cambridge, April 2018

Reconstructing Visual Information from Images and Videos

Oslo and Akershus University College of Applied Sciences, November 2015

Graphics, Vision & Interaction Group at Harvard University, August 2014

Computer Graphics Group at MIT, August 2014

Techniques for Creating High-Quality Visuals

Computer Graphics Lab at TU Berlin, September 2013

Visual Computing Lab at University of California, Berkeley, May 2013

Graphics Laboratory at Stanford University, May 2013

Constructing High-Resolution Stereo Panoramas

Nvidia Research, Santa Clara, July 2013

Coherent Depth in Stereo Vision

Adobe Advanced Technology Labs Seattle, August 2011

Microsoft Research Redmond, August 2011 [\[website\]](#)

Google Seattle, August 2011

Predicting Stereoscopic Viewing Comfort

GrUVi Lab at Simon Fraser University, Vancouver, August 2011

Flash-Exposure HDR Imaging

ETH Zurich Graphics Lunch, November 2007

Reviewing **Journals:**

ACM Transactions on Graphics 2013, 2016, 2017

IEEE Transactions on Pattern Analysis and Machine Intelligence 2011, 2014

IEEE Transactions on Image Processing 2014, 2015, 2018

IEEE Transactions on Circuits and Systems for Video Technology 2015, 2016

IEEE Transactions on Visualization and Computer Graphics 2011, 2013, 2014, 2015, 2016, 2017, 2018

IEEE Computer Graphics & Applications 2017

IEEE Signal Processing Letters 2014

Computer Graphics Forum 2013

Computer Vision and Image Understanding 2012

Journal of Visual Communication and Image Representation 2012

The Visual Computer 2016, 2017

Optical Engineering 2017

Computer Graphics & Applications 2015, 2016, 2017

Computers & Graphics 2013, 2014, 2015, 2016, 2017

EURASIP Journal on Image and Video Processing 2015

Journal of Electronic Imaging 2013

Conferences:

ACM SIGGRAPH	2013, 2016, 2017, 2018
ACM SIGGRAPH Asia	2016, 2017
Eurographics	2012, 2014, 2015, 2016, 2017
Computer Vision and Pattern Recognition (CVPR)	2011, 2014, 2015, 2016
International Conference on Computer Vision (ICCV)	2015, 2017
ACM Conference on Human Factors in Computing Systems (CHI)	2017
European Conference on Computer Vision (ECCV)	2014
Eurographics Symposium on Rendering (EGSR)	2015
Pacific Graphics	2016
Expressive Symposium on CAe, SBIM and NPAR	2014, 2015, 2017
Symposium on Non-Photorealistic Animation and Rendering (NPAR)	2012
German Conference on Pattern Recognition (GCPR)	2014
Computer Graphics International (CGI)	2012
IEEE Virtual Reality (VR)	2014, 2017
Graphics Interface (GI)	2014

SUPERVISING & MENTORING STUDENTS

Supervised & co-supervised PhD/EngD students

2017 – Joanna Tarko: *Mixed-reality rendering*

2016 – Tobias Bertel: *Light field editing*

Mentored PhD students

2015 – Abhimitra Meka: *Live intrinsic video, material estimation*

2014 – Hyeongwoo Kim: *Video refocusing, inverse rendering for faces*

2015 – 2016 Helge Rhodin: *Unconstrained motion capture*

2015 – 2016 Lucas Thies: *Real-time scene flow*

2014 Hamid Sarmadi: *Intrinsic video*

Supervised Masters students

2018 Kenneth Dasalla: *Multi-view HDR video*
Jacob Haynes: *360° lightprobe*

2017 Alex Baer: *Stabilising time lapses*
Padraig Boulton: *Inverting Instagram filters*
Andrew Shin: *Foreign exchange technical analysis*

Summer 2013 Joan Sol Roo: *Video de-anaglyph*

2009 – 2010 Lech Świrski: *Stereoscopic pop-up*

Supervised Interns

Summer 2009 Douglas Orr: *Real-time stereo vision*

Supervised Bachelor students

2017 – 2018 Liam Berrisford: *Underwater scene reconstruction*
Freddie Millman: *Undoing image enhancements*

2016 – 2017 Oliver Shannon-Lepper: *Hands in VR*

2011 – 2012 Joseph Seaton: *Shader compositor*

2010 – 2011 James Neve: *Converting anaglyph 3D to stereoscopic 3D*
Ludwig Schmidt: *Streaming videos of solar imaging data*

2009 – 2010 Mark Wheeler: *Lecture voting system*
Rubin Xu: *A GPU-enabled real-time video processing library*

2008 – 2009 Aloysius Han: *Panorama viewfinding*
Malte Schwarzkopf: *Interactively guided structure-from-motion*
Lech Świrski: *Automatic people removal from photographs*

TEACHING

Lecturing

2016 – 2018 **Fundamentals of Visual Computing** (CM20219, University of Bath)

This second-year undergraduate course is an introduction to the theoretical and mathematical foundations of image processing, computer graphics and computer vision. The course is attended by 110 computer science and electrical engineering students.

Visual Understanding 1 (CM50248, University of Bath)

This intensive, coursework-heavy Masters-level course (15 hours of lectures in 3 weeks) provides a solid coverage of the fundamentals of image processing, computer vision and multi-view geometry that are required for visual understanding tasks.

Seminar

2014 – 2016 **Computer Vision for Computer Graphics** with Christian Theobalt (at Saarland University)

In this seminar with 8–11 students, each student gives a half-hour presentation about two state-of-the-art papers from computer vision and graphics, which is followed by an hour of group discussion. In 2016, the students ranked our seminar as the best computer science seminar offered in the semester.

Courses & Tutorials

2018 **Cutting-Edge VR/AR Display Technologies** at IEEE VR 2018

In this full-day tutorial on the latest VR and AR display technology (with George-Alex Koulieris, Kaan Akşit, Rafał Mantiuk and Katerina Mania), I presented on ‘motion-away displays’. My part covers different kinds of motion input for VR/AR displays, including head tracking, hand tracking and full-body motion capture.

2017 **Video for Virtual Reality** at SIGGRAPH 2017

I co-organised this half-day course on fusion of video and virtual reality technology with James Tompkin. The course provides an overview of three aspects of this promising fusion: technical foundations, current systems in practice, and the potential for future systems of VR video.

2015 **User-Centric Computational Videography** at SIGGRAPH 2015

I organised a half-day course on user-centric video techniques with James Tompkin, Jiamin Bai and Christian Theobalt. We covered state-of-the-art techniques that aim to improve the quality and flexibility of capturing, editing and exploring of consumer videos.

Tutoring (Cambridge ‘Supervisions’)

2007 – 2012 *I have taught groups of 2–3 undergraduates for around 350 hours, mostly on computer graphics, image processing and computer vision, but also on information theory, algorithms, probability, and type theory.*

QUALIFICATIONS, AWARDS & ACHIEVEMENTS

2017 Best Poster Award for “EgoCap” at Motion in Games (MIG) conference [\[website\]](#)

2016 Busy Beaver Award (best CS seminar at Saarland University in summer semester 2016)

2012–2014 Inria Post-doctoral Research Fellowship

2011 Winner of the ACM SIGGRAPH Student Research Competition (SRC)

Associate of the Higher Education Academy (AHEA)

2007–2011 EPSRC Doctoral Training Studentship

2007 Data Connection Dissertation Prize

Honorary Cambridge European Trust Scholar

2006 The MathWorks Bursary in Computer Science

2005–2007 Senior Scholar of Gonville & Caius College

2004–2007 Cambridge European Trust Bursary

2004 Forth prize in “Jugend forscht” (Germany-wide competition for school-aged ‘researchers’) for an optical 3D measurement system (using structured light)

2000–2004 Distinctions in German Mathematics competitions, top 16 in Germany

MEDIA COVERAGE

- 2018 “AI can transfer human facial movements from one video to another”, [Engadget](#), 5 June 2018
“Forget DeepFakes, Deep Video Portraits are way better (and worse)”, [TechCrunch](#), 5 June 2018
“Uh oh! Here’s yet more AI that creates creepy fake talking heads”, [The Register](#), 4 June 2018
- 2017 “Augmented Reality in real”, [Technology Review](#) (Germany), 23 March 2017
- 2013 “Disney Research Creates Megastereo – Panoramas With Depth”, [Slashdot](#), 23 June 2013
“Team creates techniques for high quality, high resolution stereo panoramas”, [Phys.org](#), 21 June 2013

PATENTS

- 2018 “Stereoscopic panoramas” – JP Patent 6,273,163
2016 “Stereoscopic panoramas” – US Patent 9,398,215

ADDITIONAL SKILLS

Languages German (native), English (fluent), [French](#) (basic conversational)

Programming

- Scientific** C/C++ (Visual Studio, Xcode), Python (Jupyter Notebook), C#, Matlab
- GPGPU** GLSL, [CUDA](#)
- Scripting** Python, [batch files](#), [shell scripts](#)
- Libraries** OpenCV, NumPy, SciPy, Matplotlib, OpenGL, Qt, TensorFlow
- Web sites** HTML, CSS, PHP, WordPress, [jQuery](#), [Apache](#), [MySQL](#)

Computing

- Office software** Microsoft Word, Excel, PowerPoint, Outlook & [Publisher](#); Apple Keynote, Pages & [Numbers](#); \LaTeX with [TikZ](#); [OpenOffice/LibreOffice](#)
- Digital media** Adobe Photoshop, Premiere, Acrobat, Lightroom & Illustrator; VirtualDub; [AviSynth](#); [PhotoLine](#); [Autodesk Maya](#); [Blender](#)