

Dr. David C. Schedl, MSc

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SHORT BIO

David C. Schedl is a professor of Visual Computing at the University of Applied Sciences Hagenberg. He was a post-doctoral researcher at the Institute of Computer Graphics at the Johannes Kepler University Linz until 2021. In 2018, he finished his Ph.D. degree at the Johannes Kepler University Linz. He joined the Rendering group at the Vienna University of Technology, in 2012. In 2011, he graduated from the master's program Interactive Media at the University of Applied Sciences in Hagenberg.

His research interests include computer vision, computational photography, machine learning, and drones. He is particularly interested in optimal sampling strategies and novel algorithms for multi-view data such as light fields.

EXPERIENCE



University of Applied Sciences Hagenberg, Austria <i>Professor of Visual Computing</i>	since 2021
Johannes Kepler University Linz, Austria <i>Postdoctoral researcher, Institute of Computer Graphics</i>	2018–2021
University of Applied Sciences Hagenberg, Austria <i>Lecturer</i>	2016–2018 & 2020
Johannes Kepler University Linz, Austria <i>Predoctoral fellow, Institute of Computer Graphics</i>	2012–2018
Vienna University of Technology, Austria <i>Research associate, Institute of Computer Graphics</i>	2012



EDUCATION



Doctoral Degree (Dr.techn.): Faculty of Engineering & Natural Sciences, Johannes Kepler University Linz, Austria Supervisor: Prof. Oliver Bimber.	2012–2018
Master of Science: Interactive Media, University of Applied Sciences, Hagenberg, Austria	2009–2011



Exchange Semester: Media Technology & Games, IT University of Copenhagen, Denmark	2010–2011
Bachelor of Science in Engineering: Media Technology & Design, University of Applied Sciences, Hagenberg, Austria	2006–2009
University-Entrance Diploma: Electronic Data Processing & Organization, HTL Pinkafeld, Austria	2001–2005

PUBLICATION HIGHLIGHTS

Search and Rescue with Airborne Optical Sectioning 2020 & 2021
 Airborne Optical Sectioning applies camera drones for synthetic aperture imaging, to computationally remove occluding vegetation for revealing hidden objects. We have presented its principles in our previous work in the journals *Journal of Imaging*, *IEEE Sensors Journal*, *Remote Sensing*, and *IEEE Geoscience and Remote Sensing Letters*. In our recent publications, we show that automated person detection under occlusion conditions significantly improves with Airborne Optical Sectioning. Finding lost or injured people in dense forests becomes practical with thermal recordings and our technique. Our findings lay the foundation for effective future search and rescue technologies that can be applied in combination with autonomous or manned aircraft. Our articles are published in the journals *Nature Machine Intelligence* and *Science Robotics*.  

Airborne Optical Sectioning for Nesting Observation 2020
 Here, we applied Airborne Optical Sectioning to monitor birds' nesting behavior at Austria's largest heron colony. Thermal sensors record the radiated heat signals of animals. Occluded birds can be made visible by integrating multiple recordings from slightly different perspectives. Ornithologists can use our technique to count and monitor birds. This work has been published in *Nature's Scientific Reports*.  

Optimized Sampling for View Interpolation in Light Fields with Overlapping Patches 2018
 This work focuses on angular superresolution approaches for light fields captured with sparse camera arrays. One of the project's result is an optimal sampling mask, which is used to directionally upsample a recorded light-field, by using local dictionaries, extracted directly from the scene. These principles also apply to reflectance data, and the method applies to arbitrary scenes because the need for depth reconstruction is avoided, which often fails for complex scene effects such as transparency and reflections. This article was presented at Eurographics 2018 and is based on our two previous publications, presented at the International Conference on Computational Photography (ICCP) 2015 and in the journal *Computer Vision and Image Understanding* in 2017.  

Compressive Volumetric Light-Field Excitation 2017
 This publication shows how to concentrate light simultaneously at multiple selected volumetric positions and presents our follow-up work. Both articles have been published in the *Nature* journal *Scientific Reports* in 2016 and 2017. We use a light-field microscope to record a volume and subsequently illuminate individual probe particles utilizing a four-dimensional illumination light field. One of our contributions is a temporal coding strategy, which significantly improves scanning time for scattering and non-scattering probes.  

PUBLICATIONS

- David C. Schedl, Indrajit Kurmi, and Oliver Bimber. **An autonomous drone for search and rescue in forests using airborne optical sectioning.** *Science Robotics*, 6(55):eabg1188, June 2021
- David C. Schedl, Indrajit Kurmi, and Oliver Bimber. **Search and rescue with airborne optical sectioning.** *Nature Machine Intelligence*, 2(12):783–790, December 2020
- David C. Schedl, Indrajit Kurmi, and Oliver Bimber. **Airborne Optical Sectioning for Nesting Observation.** *Scientific Reports*, 10(1):7254, April 2020
- Indrajit Kurmi, David C. Schedl, and Oliver Bimber. **Fast Automatic Visibility Optimization for Thermal Synthetic Aperture Visualization.** *IEEE Geoscience and Remote Sensing Letters*, 2020
- Indrajit Kurmi, David C. Schedl, and Oliver Bimber. **Thermal Airborne Optical Sectioning.** *Remote Sensing*, 11(14), 2019
- Indrajit Kurmi, David C. Schedl, and Oliver Bimber. **A Statistical View on Synthetic Aperture Imaging for Occlusion Removal.** *IEEE Sensors Journal*, pages 1–1, 2019
- David C. Schedl, Indrajit Kurmi, and Oliver Bimber. **Voxelizing Light-Field Recordings.** In *Eurographics – Posters*, 2019
- Oliver Bimber and David C. Schedl. **Light-Field Microscopy: A Review.** *Journal of Neurology & Neuromedicine*, 4(1):1–6, 01 2019
- Oliver Bimber, Indrajit Kurmi, David C. Schedl, and Mike Potel. **Synthetic Aperture Imaging With Drones.** *IEEE Computer Graphics and Applications*, 39(3):8–15, 2019
- Indrajit Kurmi, David C. Schedl, and Oliver Bimber. **Micro-lens aperture array for enhanced thin-film imaging using luminescent concentrators.** *Opt. Express*, 26(22):29253–29261, 2018
- Indrajit Kurmi, David C. Schedl, and Oliver Bimber. **Airborne Optical Sectioning.** *J. Imaging*, 4(8), 2018
- David C. Schedl and Oliver Bimber. **Optimized Sampling for View Interpolation in Light Fields with Overlapping Patches.** In *Eurographics – Short Papers*, 2018
- David C. Schedl, Clemens Birklbauer, and Oliver Bimber. **Optimized sampling for view interpolation in light fields using local dictionaries.** *Computer Vision and Image Understanding*, 168:93 – 103, 2018 (online 2017)
- David C. Schedl, Clemens Birklbauer, and Oliver Bimber. **Optimized sampling for view interpolation in light fields using local Dictionaries.** In *ACM SIGGRAPH Posters*, 2017
- David C. Schedl and Oliver Bimber. **Compressive Volumetric Light-Field Excitation.** *Scientific Reports*, 7, 2017
- David C. Schedl and Oliver Bimber. **Volumetric Light-Field Excitation.** *Scientific Reports*, 6, 2016
- Clemens Birklbauer, David C. Schedl, and Oliver Bimber. **Nonuniform spatial deformation of light fields by locally linear transformations.** *ACM Transactions on Graphics*, 35(5), 2016

David C. Schedl, Clemens Birklbauer, Johann Gschnaller, and Oliver Bimber. **Generalized Depth-of-Field Light-Field Rendering**. In *Computer Vision and Graphics*, pages 95–105, 2016

David C. Schedl, Clemens Birklbauer, and Oliver Bimber. **Directional Super-Resolution by Means of Coded Sampling and Guided Upsampling**. In *IEEE International Conference on Computational Photography*, 2015

Alexander Koppelhuber, Sean Fanello, Clemens Birklbauer, David C. Schedl, Shahram Izadi, and Oliver Bimber. **Enhanced learning-based imaging with thin-film luminescent concentrators**. *Optics Express*, 22(24), 2014

David C. Schedl, Clemens Birklbauer, and Oliver Bimber. **Coded Exposure HDR Light-field Video Recording**. *Computer Graphics Forum*, 33(2):33–42, 2014

David C. Schedl, Clemens Birklbauer, and Oliver Bimber. **Coded Exposure HDR Light-field Video Recording**. In *ACM SIGGRAPH Posters*, 2013

David C. Schedl and Michael Wimmer. **Simulating partial occlusion in post-processing depth-of-field methods**. In Wolfgang Engel, editor, *GPU Pro 4: Advanced Rendering Techniques*. A K Peters, 2013

David C. Schedl and Michael Wimmer. **A layered depth-of-field method for solving partial occlusion**. *Journal of WSCG*, 20(3):239–246, 2012

Julian Togelius, Emil Kastbjerg, David C. Schedl, and Georgios N. Yannakakis. **What is Procedural Content Generation?: Mario on the Borderline**. In *Proceedings of the 2nd International Workshop on Procedural Content Generation in Games*, pages 3:1–3:6, 2011

THESES

David C. Schedl. **Coded Light-Field Sampling**. *PhD Thesis*. Supervision and Primary Reviewer: Prof. Dr. Oliver Bimber; Secondary Reviewer: Prof. Ren Ng (University of California, Berkeley). 2018

David C. Schedl. **A layered depth-of-field method for solving partial occlusion in computer renderings**. *Master's Thesis*. Supervision: Prof. (FH) Dr. Wilhelm Burger. 2011

David C. Schedl. **jCuda** (GPGPU computing with Nvidia's CUDA for ImageJ). *Bachelor's Thesis*. Supervision: Prof. (FH) Dr. Wilhelm Burger. 2009

TALKS & EXHIBITIONS

David C. Schedl and Indrajit Kurmi. **Synthetic Aperture Imaging with Drones (exhibition)** *50-Years of Informatics Anniversary at the Johannes Kepler University Linz, Austria*, 8th Nov. 2019

David C. Schedl. **Coded Light-Field Sampling (PhD defence talk)**. *Johannes Kepler University Linz, Austria*, 13th Nov. 2018

David C. Schedl. **Optimized Sampling for View Interpolation in Light Fields with Overlapping Patches**. *Eurographics 2018, Delft, Netherlands*, 17th Apr. 2018

David C. Schedl. **Optimized Sampling for View Interpolation in Light Fields Using Local Dictionaries (invited talk)**. *Graz University of Technology (TU Graz)*, Austria, 13th Dec. 2016

David C. Schedl. **Generalized Depth-of-Field Light-Field Rendering**. *ICCVG 2016*, Warsaw, Poland, 20th Sep. 2016

David C. Schedl and Clemens Birklbauer. **Wide-field-of-view light-field processing and coded sampling (invited talk)**, *Max Planck Institute for Informatics*, Saarbrücken, Germany, 9th Jun. 2015

David C. Schedl. **Directional Super-Resolution by means of Coded Sampling and Guided Upsampling**. *IEEE International Conference on Computational Photography (ICCP)*, Houston, USA, 24th Apr. 2015

David C. Schedl. **Coded Exposure HDR Light-Field Video Recording**. *Eurographics 2014*, Strasbourg, France, 4th Aug. 2014

David C. Schedl and Clemens Birklbauer. **Light Fields (exhibition)** *Ars Electronica Festival*, Linz, Austria, 5th Sep. 2013 to 9th Sep. 2013

David C. Schedl. **Coded Exposure HDR Light-Field Video Recording**. *Siggraph 2013*, Los Angeles, USA, 22nd Jul. 2013

David C. Schedl. **Light Fields (exhibition)** *Science Days at the Ars Electronica Center*, Linz, Austria, 11th May. 2013 to 12th May. 2013

FUNDED PROJECTS

<i>SARAOS: Search and Rescue by Airborne Optical Sectioning</i> (LIT-2019-8-SEE-114) Linz Institute of Technology (LIT) / Land Oberösterreich	2020–2022
<i>Wide Synthetic Aperture Sampling</i> (P 32185-NBL) Austrian Science Fund (FWF) / State of Upper Austria / Nationalstiftung für Forschung, Technologie und Entwicklung	2019–2021
<i>LumiConCam: Towards a Flexible, Scalable, and Transparent Thin-Film Camera</i> Linz Institute of Technology (LIT) / State of Upper Austria	2017–2019
<i>Directional Super-Resolution through Coded Sampling and Guided Upsampling</i> (P 28581-N33) Austrian Science Fund (FWF)	2016–2018

TEACHING

Advanced Computer Graphics, Master's level 2016–2018 & since 2020
University of Applied Sciences, Hagenberg
This course focuses on Advanced Computer-Graphics techniques such as ray tracing, global illumination, visualization, and physically correct shading. Students implement advanced techniques in projects using OpenGL.

- Computer Vision**, Master's level since 2021
University of Applied Sciences, Hagenberg
This course provides an introduction to computer vision including fundamentals of image formation, perception, feature detection and matching, multiview geometry, classification, and deep learning. The focus of the course is to understand the intuitions and mathematics of computer vision methods and how to apply them in practice.
- Computer Graphics**, Bachelor's level since 2021
University of Applied Sciences, Hagenberg
Students learn basic computer-graphics concepts as used in games and movies and apply them in OpenGL.
- Introduction to Programming**, Bachelor's level since 2021
University of Applied Sciences, Hagenberg
This course provides a general introduction into programming.
- Computer Graphics**, Johannes Kepler University Linz 2016–2020
Students learn the basic concepts of Computer Graphics such as transformations, the rendering pipeline, scenegraphs, and animations, and practically apply them in an OpenGL/WebGL framework.
- Computer Vision**, Johannes Kepler University Linz 2019–2020
The course gives insights into image analysis and image understanding for tasks such as object recognition, camera calibration, and structure from motion. In a project, students apply and implement computer vision methods independently.
- Visual Computing for Virtual Anatomy**, Johannes Kepler University Linz 2013
Students learn the basics of medical imaging techniques such X-ray, computer tomography, and ultrasound, and how to process recorded data.

TUTORING & MENTORING

- Young Computer Scientists Workshops** at the Johannes Kepler University Linz since 2017
The workshop takes students aged 15-18 on an immersive exploration through computer graphics.
- Tomorrow's Experts in Computing (TEC)** at the Johannes Kepler University since 2016
The workshop's aim is to interest students in computer science.
- Visual Computing Club** at the Johannes Kepler University Linz since 2015
I am acting as the contact person for the student club at the Institute of Computer Graphics.
- Supervision and Co-supervision** at the Johannes Kepler University Linz since 2012
Supervision of bachelor and master projects. Supporting PhD students at the Institute of Computer Graphics.
- Supervision Master's Theses** at the Vienna University of Technology 2012
Supervision of theses at the Institute of Computer Graphics.
- Computer Science Tutor** at the University of Applied Sciences, Hagenberg 2009–2011
Tutor for the courses Digital Media Technology, Computer Graphics, and Algorithms and Data Structures.

SKILLS

Programming

C++, Matlab, Python, OpenCV, OpenGL, GLSL, CUDA, JavaScript, Java, C#, PHP

Operating Systems

Microsoft Windows, Linux, Android

Software

Visual Studio, Adobe Creative Cloud, Inkscape, Blender, Unreal Engine, Unity

LANGUAGES

German: mother tongue

English: fluent