

# Dr.-Ing. David Lindlbauer – CV

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Advanced Interactive Technologies Lab  
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## Research interests

My research lies in the general area of Human-Computer interaction, with influences from Computer Graphics and Computer Vision. I strive to **understand** how humans perceive and interact with digital information, and to **build technology** that goes beyond the flat displays of PCs and smartphones to advances our capabilities when interacting with the digital world.

My research follows three connected main lines of work: 1) **create and study enabling technologies** that bridge the virtual world and the physical world and allow for a seamless integration of the digital world in our everyday lives, 2) **explore methods to simulate a completely controllable physical world** to learn how much augmentation users actually want, and 3) **create computational approaches** that control when, where and how virtual content is displayed to increase the usability of AR and VR interfaces.

## Academic positions

### **Assistant Professor, Human-Computer Interaction Institute, Carnegie Mellon University**

Tenure Track Assistant Professor, from 01/2021  
Human-Computer Interaction Institute  
School of Computer Science  
Carnegie Mellon University  
Pittsburgh, PA, USA

### **Postdoctoral researcher at ETH Zurich, Department of Computer Science**

Advanced Interactive Technologies (AIT) Lab  
Zurich, Switzerland, 09/2018 – 12/2020  
AIT Lab is headed by Prof. Otmar Hilliges  
Funded through personal ETH Zurich Postdoctoral Fellowship (\$229,000 for 2 years)

## Education

### **Doktor der Ingenieurwissenschaften (Dr.-Ing.) at Technische Universität Berlin**

Computer Graphics Group, Berlin, Germany, 11/2014 – 09/2018  
Advisor: Prof. Marc Alexa  
PhD thesis: *Bridging the Virtual World and the Physical World with Optically Dynamic Interfaces*  
Thesis committee: Prof. Marc Alexa, Prof. Ravin Balakrishnan, Prof. Jörg Müller, Prof. Olaf Hellwich  
Graduated with distinction (summa cum laude)  
(\* Doctoral degree is comparable to PhD in Anglo-American educational system)

PhD candidate | Teaching and Research Assistant at Technische Universität Berlin  
Mobile and Physical Interaction Group, Berlin, Germany, 01/2014 – 11/2014  
Advisor: Prof. Jörg Müller (now Bayreuth University, Germany)

PhD candidate | Teaching and Research Assistant at University of Applied Sciences Upper Austria  
Media Interaction Lab, Hagenberg, Austria, 11/2012 – 12/2013  
Advisor: Prof. Michael Haller

### **Master of Science at University of Applied Sciences Upper Austria, Campus Hagenberg**

Program: Interactive Media, Hagenberg, Austria, 10/2010 – 08/2012,  
Master's thesis: *Perceptual Grouping of Digital Sketches*. Advised by Prof. Michael Haller  
Graduated with high distinction.

Term abroad at University of Waterloo  
Waterloo, Ontario, Canada, 05/2012 – 10/2012, Advisors: Prof. Mark Hancock, Prof. Stacey Scott

### **Bachelor of Science at University of Applied Sciences Upper Austria, Campus Hagenberg**

Program: Media Technology and Design, Hagenberg, Austria, 10/2006 – 08/2009,  
Bachelor's thesis: *The OpenSocial API*. Advised by FH-Prof. DI Rimbart Rudisch-Sommer  
Graduated with distinction

# Research stays

## Microsoft Research

Perception and Interaction Group. Internship with Andy Wilson.  
Redmond, WA, USA, 06/2017 – 09/2017

# Publications

## Conference full papers (fully refereed)

Top-tier venues in Human-Computer Interaction are ACM CHI and ACM UIST (acceptance rate 20-25%). Conference papers are considered premier outlets for publication in HCI, similar to journal articles in other scientific fields.

- [C.20] *Optimal Control for Electromagnetic Haptic Guidance Systems*.  
T. Langerack, J. Zarate, V. Vechev, **D. Lindlbauer**, D. Panozzo, O. Hilliges  
*ACM UIST 2020*
- [C.19] *Omni: Volumetric Sensing and Actuation of Passive Magnetic Tools for Dynamic Haptic Feedback*. T. Langerack, J. Zarate, **D. Lindlbauer**, C. Holz, O. Hilliges  
*ACM UIST 2020*
- [C.18] *A Rapid Tapping Task on Commodity Smartphones as a New Metric to Assess Motor Fatigability*.  
L. Barrios, P. Oldrati, **D. Lindlbauer**, M. Hilty, H. Hayward-Koennecke, C. Holz, A. Lutteroti  
*ACM CHI 2020*, Honolulu, HI, USA. <https://doi.org/10.1145/3313831.3376588>
- [C.17] *Context-Aware Online Adaptation of Mixed Reality Interfaces*.  
**D. Lindlbauer**, A. Feit, O. Hilliges  
*ACM UIST 2019*, New Orleans, LA, USA. <https://doi.org/10.1145/3332165.3347945>
- [C.16] *Understanding Metamaterial Mechanisms*.  
A. Ion, **D. Lindlbauer**, P. Herholz, M. Alexa, P. Baudisch  
*ACM CHI 2019*, Glasgow, Scotland. <https://doi.org/10.1145/3290605.3300877>
- [C.15] *The Mental Image Revealed by Gaze Tracking*.  
X. Wang, A. Ley, S. Koch, **D. Lindlbauer**, J. Hays, K. Holmqvist, M. Alexa  
*ACM CHI 2019*, Glasgow, Scotland. <https://doi.org/10.1145/3290605.3300839>
- [C.14] *TacTiles: Dual-mode Low-power Electromagnetic Actuators for Rendering Continuous Contact and Spatial Haptic Patterns in VR*.  
V. Vechev, J. Zarate, **D. Lindlbauer**, R. Hinchet, H. Shea, O. Hilliges  
*IEEE VR 2019*, Osaka, Japan. <https://doi.org/10.1109/VR.2019.8797921>
- [C.13] *Remixed Reality: Manipulating Space and Time in Augmented Reality*.  
**D. Lindlbauer**, A. Wilson  
*ACM CHI 2018*, Montreal, QC, Canada. <https://doi.org/10.1145/3173574.3173703>
- [C.12] *HeatSpace: Automatic Placement of Displays by Empirical Analysis of User Behavior*.  
A. Fender, **D. Lindlbauer**, P. Herholz, M. Alexa, J. Müller  
*ACM UIST 2017*, Quebec, QC, Canada. <https://doi.org/10.1145/3126594.3126621>
- [C.11] *Changing the Appearance of Real-World Objects by Modifying Their Surroundings*.  
**D. Lindlbauer**, J. Müller, M. Alexa  
*ACM CHI 2017*, Denver, CO, USA. <https://doi.org/10.1145/3025453.3025795>
- [C.10] *Changing the Appearance of Physical Interfaces Through Controlled Transparency*.  
**D. Lindlbauer**, J. Müller, M. Alexa  
*ACM UIST 2016*, Tokyo, Japan. <https://doi.org/10.1145/2984511.2984556>
- [C.9] *Combining Shape-Changing Interfaces and Spatial Augmented Reality Enables Extended Object Appearance*.  
**D. Lindlbauer**, J.E. Grønbæk, M. Birk, K. Halskov, M. Alexa, J. Müller  
*ACM CHI 2016*, San Jose, CA, USA. <https://doi.org/10.1145/2858036.2858457>
- [C.8] *Influence of Display Transparency on Background Awareness and Task Performance*.  
**D. Lindlbauer**, K. Lilija, R. Walter, J. Müller  
*ACM CHI 2016*, San Jose, CA, USA. <https://doi.org/10.1145/2858036.2858453>  
**Best Paper Honorable Mention Award**

- [C.7] *GelTouch: Localized Tactile Feedback Through Thin, Programmable Gel*  
V. Miruchna, R. Walter, **D. Lindlbauer**, M. Lehmann, R. von Klitzing, J. Müller  
ACM UIST 2015, Charlotte, NC, USA. <https://doi.org/10.1145/2807442.2807487>  
**Best Paper Honorable Mention Award**
- [C.6] *Creature Teacher: A Performance-Based Animation System for Creating Cyclic Movements*  
A. Fender, J. Müller, **D. Lindlbauer**  
ACM SUI 2015, Los Angeles, CA, USA. <https://doi.org/10.1145/2788940.2788944>
- [C.5] *Analyzing Visual Attention During Whole Body Interaction with Public Displays*  
R. Walter, A. Bulling, **D. Lindlbauer**, M. Schuessler, J. Müller  
ACM UBICOMP 2015, Osaka, Japan. Short paper. <https://doi.org/10.1145/2750858.2804255>
- [C.4] *Tracs: Transparency Control for See-through Displays*  
**D. Lindlbauer**, T. Aoki, R. Walter, A. Höchtl, Y. UEMA, M. Haller, M. Inami, J. Müller.  
ACM UIST 2014, Honolulu, HI, USA. <https://doi.org/10.1145/2642918.2647350>
- [C.3] *A Chair as Ubiquitous Input Device: Exploring Semaphoric Chair Gestures for Focused and Peripheral Interaction*  
K. Probst, **D. Lindlbauer**, M. Haller, B. Schwartz, A. Schrempf.  
ACM CHI 2014, Toronto, Canada. <https://doi.org/10.1145/2556288.2557051>
- [C.2] *Perceptual Grouping: Selection Assistance for Digital Sketching*  
**D. Lindlbauer**, M. Haller, M. Hancock, S. D. Scott, W. Stuerzlinger.  
ACM ITS 2013, St. Andrews, Scotland. <https://doi.org/10.1145/2512349.2512801>
- [C.1] *Exploring the Use of Distributed Multiple Monitors Within an Activity-Promoting Sit-and-Stand Office Workspace*  
K. Probst, **D. Lindlbauer**, F. Perteneder, M. Haller, B. Schwartz, A. Schrempf.  
IFIP Interact 2013, Cape Town, South Africa. [https://doi.org/10.1007/978-3-642-40477-1\\_30](https://doi.org/10.1007/978-3-642-40477-1_30)

## Journal articles

- [J.1] *Measuring Visual Saliency of 3D Printed Objects.*  
X. Wang, **D. Lindlbauer**, C. Lessig, M. Maertens, M. Alexa  
IEEE Computer Graphics and Applications 36/4. Special Issue on Quality Assessment and Perception in Computer Graphics, 2016. <https://doi.org/10.1109/MCG.2016.47>

## Book chapters

- [B.2] *Accuracy of Monocular Gaze Tracking on 3D Geometry.*  
X. Wang, **D. Lindlbauer**, C. Lessig, M. Alexa  
In *Eye Tracking and Visualization. Foundations, Techniques, and Applications*. ETVIS 2015  
Springer International Publishing 2017. M. Burch, L. Chuang, B. Fisher, A. Schmidt and D. Weiskopf (Eds.), ISBN 978-3-319-47023-8
- [B.1] *Beyond Prototyping.*  
J. Ängeslevä, I. Nicenboim, J. Wunderling, **D. Lindlbauer**  
In *Rethink! Prototyping*. Springer International Publishing 2016.  
C. Gengnagel, E. Nagy, R. Stark (Eds.), ISBN 978-3-319-24439-6

## Other publications

- [EA.3] *Optically Dynamic Interfaces.*  
**D. Lindlbauer**  
UIST 2017 Adjunct (Doctoral Symposium). Quebec City, QC, Canada.
- [EA.2] *A Collaborative See-through Display Supporting On-demand Privacy.*  
**D. Lindlbauer**, T. Aoki, A. Höchtl, Y. UEMA, M. Haller, M. Inami, J. Müller  
ACM Siggraph 2014 Emerging Technologies, Vancouver, BC, Canada.
- [EA.1] *Rotating, Tilting, Bouncing: Using an Interactive Chair to Promote Activity in Office Environments.*  
K. Probst, **D. Lindlbauer**, P. Greindl, M. Trapp, M. Haller, B. Schwartz, A. Schrempf  
ACM CHI 2013 Extended Abstracts, Paris, France.
- [W.2] *Accuracy of Monocular Gaze Tracking on 3D Geometry.*  
X. Wang, **D. Lindlbauer**, C. Lessig, M. Alexa  
Workshop on Eye Tracking and Visualization (ETVIS) co-located with IEEE VIS 2015.

- [W.1] *Exploring the Potential of Peripheral Interaction through Smart Furniture.*  
K. Probst, **D. Lindlbauer**, M. Haller, B. Schwartz, A. Schrempf  
Workshop on Peripheral Interaction at CHI 2014, Toronto, Canada.
- [TR.1] *Understanding Mid-Air Hand Gestures: A Study of Human Preferences in Usage of Gesture Types for HCI.* R. Aigner, D. Wigdor, H. Benko, M. Haller, **D. Lindlbauer**, A. Ion, S. Zhao, and J.T.K.V. Koh  
Microsoft Tech Report MSR-TR-2012-11, Redmond, WA, USA.

## Demonstrations & exhibits

- [D.7] *ad infinitum: a parasite that lives off human energy.* Ars Electronica 2017.
- [D.6] *Changing the Appearance of Real-World Objects by Modifying Their Surroundings,* CHI 2017.
- [D.5] *Changing the Appearance of Physical Interfaces Through Controlled Transparency,* CeBit 2017.
- [D.4] *ad infinitum: a parasite that lives off human energy.* Science Gallery Dublin 2017.
- [D.3] *Changing the Appearance of Physical Interfaces Through Controlled Transparency,* UIST 2016.
- [D.2] *Tracs: Transparency Control for See-through Displays,* UIST 2014.
- [D.1] *A Collaborative See-through Display Supporting On-demand Privacy,* SIGGRAPH 2014.

## Theses

*Bridging the Virtual World and the Physical World with Optically Dynamic Interfaces*  
2018, PhD thesis, Technische Universität Berlin

*Perceptual Grouping of Digital Sketches.*  
2012, Master's thesis, University of Applied Sciences Upper Austria, Hagenberg.

*The OpenSocial API.*  
2009, Bachelor's thesis, University of Applied Sciences Upper Austria, Hagenberg

## Awards & recognitions

Best Paper Honorable Mention Award ACM CHI 2016  
*Influence of Display Transparency on Background Awareness and Task Performance.*

Best Paper Honorable Mention Award ACM UIST 2015  
*GelTouch: Localized Tactile Feedback Through Thin, Programmable Gel.*

Special recognitions for reviewing:  
UIST 2014, 2 x CHI 2016, UIST 2016, CHI 2017, UIST 2017, CHI 2018, 3 x CHI 2019, 2 x CHI 2020

## Grants

NSF Grant - Student Innovation Challenge at UIST (2019, Co-writer) \$15,900  
*Increasing diversity & inclusiveness at UIST. Grant provides funding for 5 teams from underrepresented minorities to participate in the student innovation contest and attend the conference.*

SIGCHI Grant - Student Innovation Challenge at UIST (2019, Co-writer) \$18,330  
*Increasing diversity & inclusiveness at UIST. Grant provides funding for 2 non-US teams from underrepresented minorities to participate in the student innovation contest and attend the conference.*

ETH Zurich Postdoctoral Fellowships (2018, Principal investigator) CHF 229,600 / \$229,068  
*A Computational Framework for Increasing the Usability of Augmented Reality and Virtual Reality.*

Shapeways Educational Grant (2015, Co-writer) \$1,000  
*Exploring Visual Saliency of 3D Objects*

Performance scholarship (2011, Awardee) €725 / \$850  
*One of twelve awardees for performance scholarship by FH Hagenberg (Leistungsstipendium)*

## Teaching

### Co-supervised Bachelor's and Master's theses

Joel Neuner-Jehle, 2020. Reinforcement Learning on Atari games with improved saliency prediction.

Véronique Kaufmann, 2020. Detection and visualization of safety critical objects in panoramic images.

Ramus Lüscher, 2020. Simulating Nystagmus in Virtual Reality.  
Alice Myalus, 2020. A wearable acupressure device to alleviate headaches and migraine.  
Robin Wiethüchter, 2020. Plane detection for Mixed Reality.  
Jonathan Lehner, 2019. *Real-Time Hand Tracking from Wrist-Worn RGB Cameras*.  
Stefan Weber, 2019. *Feasibility of the Index of Pupillary Activity*.  
Tobias Bernard, 2017, *Design and Evaluation of Spatial Interfaces in Virtual Reality*.  
Leonardo Hahn, 2017, *Hiding Objects by Creating Camouflage Surroundings*.  
Patrick Engelhard, 2016. *3D Modeling using Sparse Sensor Data*.  
Klemen Lilija, 2015. *Interaction with Transparent Displays*.  
Viktor Miruchna, 2015. *Exploring the Potential Usage of Hydrogels for Tactile Feedback Systems*.  
Andreas Fender, 2014. *Design and Implementation of a Performance Based Animation System for Prototyping Non-Humanoid Character Movements*.  
Eva-Maria Grossauer, 2013. *Supporting Seamless Integration of Handwritten Casual Notes in Digital Tools Through Semantic Classification*.

### **Head teaching assistant**

Includes organization of courses, teaching and presentation of exercises, and correction of homework and exams.

Winter term 2020, Human-computer interaction, ETH Zurich  
Summer term 2020, Seminar on Computation Interaction, ETH Zurich  
Winter term 2019. Certificate of Advanced Studies – HCI, ETH Zurich  
Winter term 2019, Human-computer interaction, ETH Zurich  
Summer term 2019, Seminar on Computation Interaction, ETH Zurich  
Winter term 2018, Human-computer interaction, ETH Zurich  
Summer term 2018, Computer Graphics 2, TU Berlin  
Winter term 2016 / 2017, Computer Graphics 1, TU Berlin  
Winter term 2013, Computer Graphics 2, University of Applied Sciences Hagenberg

### **Lectures**

Introduction to HCI and User-centered design (90 min), HCI-CAS at ETH Zurich, 2019  
Analytical Investigation: Usability and Heuristic Evaluation (90 min), HCI at ETH Zurich, 2019  
Experimental design and statistical analysis (90 min), HCI at ETH Zurich, 2019  
Introduction to Windows Presentation Foundation (60 min), CG1 at FH Hagenberg, 2013

### **Student teaching assistant**

Correction of homework and exams.  
Winter term 2011, Digital Imaging, University of Applied Sciences Hagenberg  
Summer term 2011, Hypermedia programming, University of Applied Sciences Hagenberg  
Summer term 2010, Computer Graphics (OpenGL), University of Applied Sciences Hagenberg

### **Project supervision, TU Berlin & ETH**

approximately 1 day / week for 3 months

Slaven Cvijetic (Balance VR, 2019)  
Rebecca Fribourg (Airbrush, 2016)  
Friedrich Meckel, Jeremias Eichelbaum (Camouflage, 2016)  
Mirko Greese (AR illusions, 2017)  
Maurice Quennet (Control theory + robotic arm, 2018)  
Tim Grutzeck (Smartphone-based 3D input device, 2018)  
Mike Funk (VR voxel editor, 2018)  
Fabian Puch (Mobile AR illusions, 2018)

# Professional activity

## Program committee / Editorial boards

Editorial Board member for ACM ISS 2020  
Program committee member for UIST 2020  
Program committee member for CHI 2020  
Program committee member for CHI 2019  
Program committee member for UIST 2018  
Program committee member for ISS 2017

## Organizing committee

SIGCHI Operations committee (since 02/2016)  
Student innovation contest co-chair for UIST 2019  
Student innovation contest co-chair for UIST 2018  
Student volunteers co-chair for UIST 2016  
Video capture chair for CHI 2016, 2017, 2018, 2019, 2020  
Poster chair for PerDis 2016  
Video capture chair for UIST 2015

## Outreach

Leading the creation and maintenance of the SIGCHI YouTube channel (since 2016)  
*The SIGCHI YouTube channel is the largest freely available resource of HCI research videos. The channel has more than 3000 recordings of keynotes and technical paper presentations from conferences such as CHI, UIST and IUI. It has more than 6500 subscribers and attracted over 2.5 million views in the last 3 years.*

Co-chairing of the UIST Student Innovation Contest 2018 and 2019  
*The UIST Student Innovation Contest is one of the main driving sources to increase participation of students and junior researchers to UIST and HCI. In 2018, more than 35 students participated in the contest. For 2019, I was involved in winning 2 grants to provide full funding to a total of 20 students from underrepresented minorities in STEM to increase the diversity and inclusiveness of the contest and UIST.*

## Reviewing

2020 CHI, UIST, IEEE VR, GI, DIS, MobileHCI, ACM ISS  
2019 CHI, UIST, IEEE VR, TOCHI, SIGGRAPH, Computer Graphics Forum  
2018 CHI, UIST, ISS, TEI, IEEE VR, TOCHI  
2017 CHI, UIST, ICMI, IMWUT (UbiComp), MobileHCI, DIS, DESFORM  
2016 CHI, UIST, ISS, ICMI, SUI, AH, IJHCI  
2015 CHI, ICMI, ITS, SUI, PerDis, PERCOMP Journal  
2014 CHI, UIST, ICMI, NordiCHI, SUI

## Student volunteering

ITS 2014, UIST 2014, CHI 2015

## Invited Talks

2019/12/17 Aalto University. Hosted by Antti Oulasvirta.  
2019/10/28 University of Chicago. Hosted by Pedro Lopes.  
2019/08/09 Google Mountain View – Interaction Lab. Hosted by Alex Olwal.  
2019/08/08 UC Berkeley. Hosted by Björn Hartmann.  
2019/08/07 Stanford University. Hosted by Sean Follmer.  
2019/08/02 UCLA. Hosted by Xiang 'Anthony' Chen and Ankur Metha.  
2019/07/10 MIT Media Lab – Tangible Media Group. Hosted by Hiroshi Ishii.  
2019/07/10 MIT CSAIL. Hosted by Stefanie Mueller.

2019/07/08 Columbia University. Hosted by Steven Feiner.  
2019/06/15 Swiss Society of Virtual and Augmented Reality, Meetup #HOMIXR  
2018/05/22 University of Sussex – Interact Lab. Hosted by Diego Martinez.  
2018/03/02 IST Austria. Hosted by Bernd Bickel.  
2018/02/21 University of Toronto – DGP. Hosted by Seongkook Heo.  
2017/12/15 ETH Zurich. Hosted by Otmar Hilliges.  
2017/12/14 Disney Research Zurich. Hosted by Anselm Grundhöfer.  
2017/12/12 INRIA Bordeaux. Hosted by Martin Hachet.  
2017/10/05 Aarhus University. Hosted by Roman Rädle.

## Selected press

Shiropen (Japan). *ETH Zurich and EPFL announce lightweight and low-power haptic device "TacTiles" that reproduces a sense of touch by pressing a pin against 15 points of one hand.* 2019  
Shiropen (Japan). *The Mental Image Revealed by Gaze Tracking.* 2019  
MSPowerUser. *Microsoft aims to Remix Reality with new VR technology.* 2018  
Virtual Reality Summit. *Microsoft Research Demoing New Remixed Reality Technology.* 2018  
VRRoom. *Remixed Reality Manipulates Space & Time In AR.* 2018  
Shiropen (Japan). *Remixed Reality.* 2018  
Fast Co.Design. *It's Alarmingly Easy For Machines To Control Us.* 2017.  
Fast Co.Design. *An Invisibility Cloak for Distracting Gadgets.* 2016.  
Vice Motherboard. *Origami-Like' Objects Can Instantly Change Their Transparency.* 2016.  
Futurism. *Controlled Transparency Is The Chameleon of Technology.* 2016.  
MIT Technology Review. *Make Your Own Buttons with a Gel Touch Screen.* 2015.  
Wired Germany. *Berliner Forscher haben einen Weg gefunden, Touchscreens temporäre Tasten zu verpassen.* 2015.  
El País. *Teclas en relieve que aparecen y desaparecen de la pantalla del móvil.* 2015.  
Engadget. *Gel-filled touchscreen creates real buttons on demand.* 2015.  
Gizmodo. *7 Experimental Interfaces That Show the Future of UI Design.* 2014.

## Professional experience

Software developer iOS [part time]  
Interactive Pioneers (former Powerflasher)  
Aachen, Germany, 09/2010 – 02/2012

Software developer iOS [full time]  
Interactive Pioneers (formerly Powerflasher)  
Aachen, Germany, 10/2009 – 09/2010

Software developer [internship]  
Interactive Pioneers (formerly Powerflasher)  
Aachen, Germany, 03/2009 – 09/2009  
Developer for WPF and Silverlight. Involved in concept & technical planning.

Web developer [internship]  
Lomographic Society Vienna  
Vienna, Austria, 08/2008 – 09/2008

Screen designer [internship]  
Monte Video & Point advertising agency  
Linz, Austria, 08/2001 – 09/2001