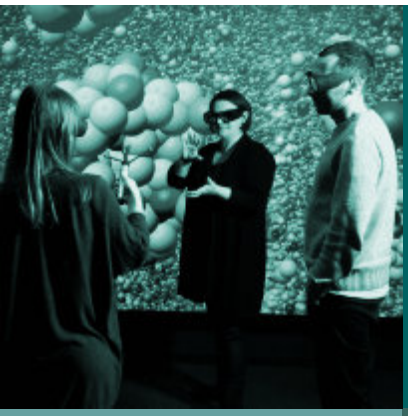
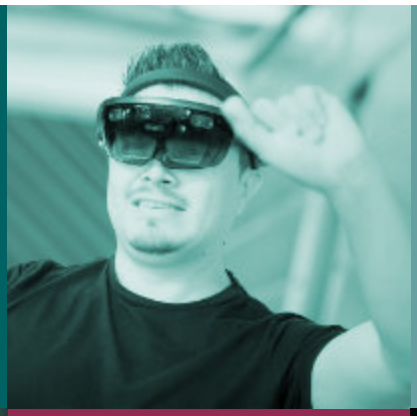
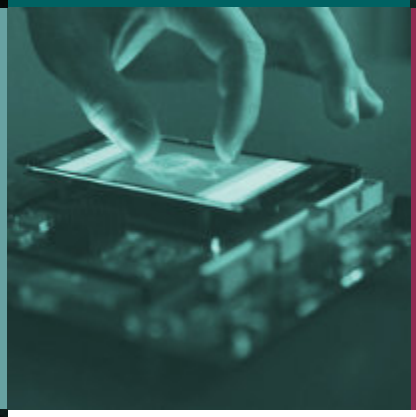
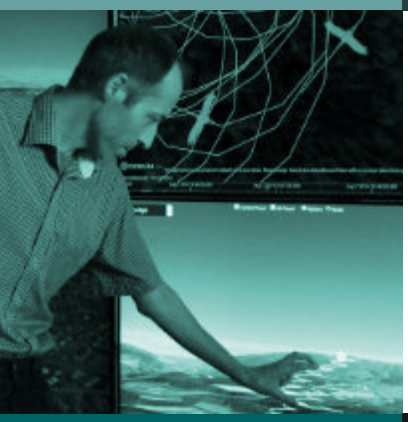
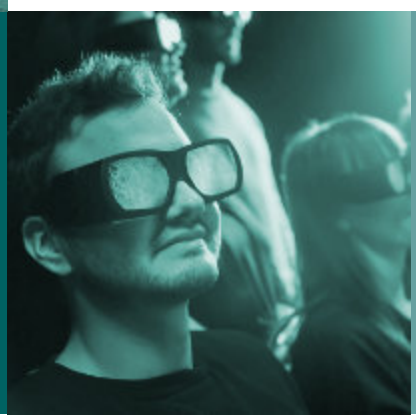
SFB-TRR 161

Quantitative Methods for Visual Computing

Transregional Collaborative Research Center


Annual Report 2022

FUNDED BY DFG

CONTENT

ABOUT THE SFB-TRR 161

The **SFB-TRR 161 "Quantitative Methods for Visual Computing"** is a Transregional Collaborative Research Center. Partner institutions are the University of Stuttgart, University of Constance, Ulm University, and LMU Munich.

In this interdisciplinary research center, around 50 scientists in the fields of visualization, computer vision, computer graphics, human-computer interaction, multimedia linguistics, and applied psychology are working together to establish quantification as a key ingredient of visual computing research.

We see quantification as a cornerstone to further advance visual computing as an established and maturing research field.

Dr. Heike Lehmann
SFB-TRR 161 Manager

Prof. Dr. Daniel Weiskopf
SFB-TRR 161 Spokesperson

Dear readers, dear members and friends of the SFB-TRR 161!

Since 2016, we have been informing you about the activities of the SFB-TRR 161 in the run-up to the annual status seminars. We continue this tradition with this sixth edition of the Annual Report.

Again, we have faced a difficult pandemic year since the last status seminar and again, we have had to react very flexibly to the challenges posed by the restrictions. Nevertheless, thanks to the enthusiasm and great engagement of all involved in the SFB-TRR 161 and thanks to our continuously evolving research infrastructure, we were able to decisively advance our projects.

In the first quarter of this year we launched two new research projects that complement our research portfolio and enrich our overall collaborations. Linked to this, we welcome two new project leaders in our SFB-TRR 161: Jun.-Prof. Dr. Benedikt Ehinger (Stuttgart) and Jun.-Prof. Dr. Tiare Feuchtner (Konstanz). Read more about the new projects on page 4.

We also report on the latest publications and awards of our members in this issue. And we inform about completed dissertations in the reporting period as well as about conference participations. Summaries of the Lecture Series in winter term 2021/2022 as well as a report on the Situated Analytics workshop in Konstanz can be found on pages 8 and 9. Finally, we are very pleased to be able to participate in the MS Wissenschaft with an interactive exhibit this year—read more about it on page 14.

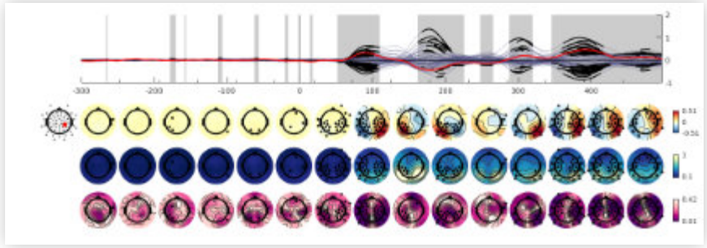
We are very much looking forward to meeting you at the status seminar 2022 and wish you inspiration and pleasure while reading the Annual Report 2022!

Heike Lehmann and Daniel Weiskopf

NEW SFB-TRR 161 PROJECTS

D05 VISUAL COMPUTING FOR ERP-BASED BRAIN ACTIVITY

After his successful proposal, **Benedikt Ehinger** from the Institute of Visualization and Interactive Systems at the University of Stuttgart joined the SFB-TRR 161 on January 1, 2022. In the project "Visual Computing for ERP-based Brain Activity" (D05), he and his team will investigate how brain potentials (EEG/ERPs) can be visualized in a modern, dynamic setting: "We want to understand how researchers explore and visualize their data, how we can support this process using open, interactive, and fast visualization tools, and finally benchmark different approaches against each other."



State of the art on regression based EEG visualization.

- Project Leader: Benedikt Ehinger
- Advisor: Daniel Keim
- Stuttgart

C07 REAL-TIME OPTIMIZATION OF XR USER INTERFACES

On February 1, 2022, **Tiare Feuchtner** from the University of Konstanz joined the SFB-TRR 161 with her project "Real-Time Optimization of XR User Interfaces" (C07). The project aims to dynamically adapt the user interface during interaction with Cross-Reality (XR) applications through head-mounted displays in order to improve usability and ensure the users' safety and comfort. Challenges which the project wants to address include, for example, how information and interactive elements need to be placed in 3D environments to meet the needs of a complex and dynamic interaction: "An AR application presenting a virtual button in mid-air in front of the user may occlude their view of their conversation partner, lead them to knock over the glass of water on the table when trying to reach it, and cause muscle fatigue if interacted with continuously."

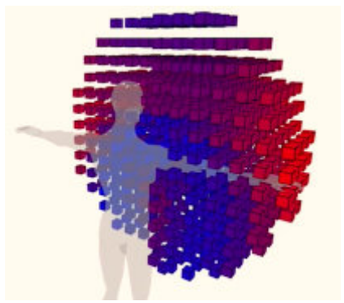


Fig. 1: Illustration of ergonomic cost in the user's interaction space.

Fig. 2: Common mid-air interaction with head-mounted Augmented Reality systems.

- Project Leader: Tiare Feuchtner
- Advisor: tbd
- Konstanz

TASK FORCES

TASK FORCE A: DATASETS, BENCHMARKS, AND REPLICATION

In the past year, despite the difficulties associated with the COVID-19 pandemic, Task Force A has been able to produce tangible results. Productive discussions led to the specification of requirements for data management. Project INF supported Task Force A in linking those requirements to the Data Management Plan as well as the DaRUS system.

As a result, the goal of establishing common guidelines for the replication of results and management of research data, as mandated by Task Force A, has been successfully met. Thanks to those common guidelines, researchers will be able to fully utilize available infrastructure to preserve and exchange research data in a structured and readable manner, so that repeatability of research can be guaranteed. Particular care has also been taken regarding FAIR, secure and GDPR-compliant practices.

Task Force A contributed further towards research data management: 1) by providing a practical workflow on how research data preservation can be achieved, and 2) by tackling various scenarios that may arise in the process. Organizationally, an administrator was identified for each sub-project, to be the link between research outcomes and research data management. In addition, within the consortium, a tangible result from Project C01 [1] has brought immersive environments and replication much closer; applied to user studies, the ReLive project opens the door for exciting new research in the domain.

dg, fs

[1]Sebastian Hubenschmid et al. "ReLive: Bridging In-Situ and Ex-Situ Visual Analytics for Analyzing Mixed Reality User Studies," *CHI Conference on Human Factors in Computing Systems (CHI'22)*, 2022.

TASK FORCE B: USER TESTING

The discussion led by Task Force B on the methodological issues in user-based studies due to COVID-19 is ongoing and has already produced several concrete results. The last plenary meeting of the SFB-TRR 161 offered an opportunity to discuss the topic, with many members sharing experiences and ideas on how to continue running user studies in the context of the pandemic. The discussion later continued during the first in-person meetings since the beginning of the pandemic at the Universities of Ulm and Konstanz. The insights gained during these exchanges led to the development and refinement of a customized software framework for running remote and online studies. We are in the process of making this framework publicly available to the research community, along with a tutorial that will be published in a special issue of Frontiers in Psychology.

Beyond this focus on the methodological shifts associated with COVID-19, we have also continued our activity of disseminating and sharing information regarding the general aspects of collecting and evaluating data in user-based studies. We organized a one-day workshop on experimental and statistical methods for psychophysics with Priscilla Balestrucci (C05) and guest speaker Alessandro Moscatelli. The workshop was held online and open to all SFB-TRR 161 members. We are currently organizing another workshop on quantitative methods for user studies to be held during the upcoming meeting of the IMRF (International Multisensory Research Forum), which will take place in Ulm in July 2022. The workshop will have a hybrid format and members of the SFB-TRR 161 will be invited to join.

pb

At the 51st Annual Conference of the German Informatics Society (GI), four scientists were honored for their outstanding achievements in computer science and appointed as GI-Fellows. Among the four scientists to receive this prestigious fellowship was SFB-TRR 161 project leader **Oliver Deussen** (A01, A04).

Oliver Deussen is one of the world's leading researchers in the field of visualization. The German Informatics Society particularly emphasizes his success at communicating the results of his research to the public. For example, his efforts have helped to increase the general public's awareness of the technical possibilities for image manipulation—a topic which is of particular social and political relevance in times of "fake news".

SFB-TRR 161 project leader **Michael Sedlmair** (A08) has recently joined the editorial board of IEEE Transactions on Visualization and Computer Graphics (TVCG) as an associate editor.

As the top-tier journal in the field of visualization, TVCG publishes papers on subjects related to computer graphics, information and scientific visualization, visual analytics, virtual and augmented reality, focusing on theory, algorithms, methodologies, human-computer interaction techniques, systems, software, hardware, and applications in these areas. Its Editorial Board strives to publish papers that present important research results and state-of-the-art seminal papers in computer graphics, visualization, and virtual reality.

Mohsen Jenadeleh, postdoctoral researcher in project A05 at the University of Konstanz, has received a three year grant from the German Research Foundation (DFG) for his project "JND-based perceptual video quality analysis and modelling".

Previously, Mohsen had received an Independent Research Grant (IRG) of the Zukunftskolleg at the University of Konstanz to support his project "Visually lossless compression for JND-based video quality assessment using crowdsourcing". With the help of the funding he received via the Zukunftskolleg, he was able to the conduct the pilot studies which supported his subsequent application for the DFG grant.

SFB-TRR 161 RESEARCHERS AMONG MOST CITED SCHOLARS IN THEIR FIELDS

The most recent edition of the Stanford/Elsevier citation database was published in October 2021 by Stanford University. The comprehensive dataset[1] spans 22 disciplines with 176 subfields and shows which scientists are at the very top of their respective field, taking into account variations in citation density between individual disciplines.

Five SFB-TRR 161 members made it onto the list and are thus among the top 2% of researchers cited in their fields in 2020. For the subfield "Human Factors", **Andreas Bulling** (A07) ranks 47 out of a total of 14.266 most cited scientists worldwide, while **Albrecht Schmidt** (C06) reaches 62nd place. In the field "Software Engineering", **Daniel Keim** (A03) ranks 7 out of 21.676, while **Daniel Weiskopf** (A01, B01) occupies rank 212 and **Michael Sedlmair** (A08) rank 248.

[1] J. Baas, K. Boyack, and J. P. A. Ioannidis, *August 2021 data-update for "Updated science-wide author databases of standardized citation indicators"*, Mendeley Data, 2021. doi: 10.17632/btchxktzyw.3

The European Laboratory for Learning and Intelligent Systems (ELLIS) promotes leading European research sites in the field of machine learning with the aim of retaining researchers in Europe and training young European researchers. The initiative focuses on advancing modern AI that positively impacts the economy and society.

Together with a team of seven scientists from the University of Stuttgart and the Max Planck Institute for Intelligent Systems Stuttgart, **Andreas Bulling** (A07) successfully applied to join ELLIS as one of its 34 units. "Being accepted into the ELLIS network is a great success for our location in these important AI future areas, which will significantly increase our visibility within Cyber Valley, nationally and internationally," said Andreas Bulling. "The chances of success for future research proposals as well as for attracting young researchers at all levels of the scientific career ladder increase."

Tiare Feuchtner (C07) has accepted the role of Equal Opportunity and Diversity Representative for the SFB-TRR 161. As such, she will act as advocate for all SFB-TRR 161 members on matters of equal opportunity and address measures to ensure diversity in a scientific context. Our long-term goal is to introduce standards of diversity into several levels of research: in addition to data collections from a representative sample of the (world) population and an awareness of potential bias within the data, we want to pay special attention to diversity in the target user population when designing new interactive systems, applications, and approaches and thereby define accessibility as a design and research goal.

COOPERATION WITH EXTERNAL PARTNERS

Our researchers work together with both national and international colleagues on a regular basis. In 2021 and 2022 those collaborations included:

- Matthias Hirth, TU Ilmenau, (A05)
- Stephen Kobourov, University of Arizona (D04)
- Lars Linsen, WWU Münster (A08/A01)
- Sven Mayer, LMU (A08)
- Babak Naderi, TU Berlin (A05)
- Beate Ochsner, University of Konstanz (A05)
- Marius Pedersen, Norwegian University of Science and Technology (NTNU) (A05)
- Gillian Ramchaud, University of Tromsø, Norway (D02)
- Shaolin Su, Northwestern Polytechnical University (NPU) (A05)

PERSONNEL CHANGES

Since July 2021

New Arrivals:

- René Cutura (Stuttgart, A08)
- Frederik Dennig (Konstanz, A03)
- Benedikt Ehinger (Stuttgart, D05)
- Tiare Feuchtner (Konstanz, C07)
- Tim Krake (Stuttgart, B01)
- Peter Schäfer (Konstanz, B06)

Alumni:

- Jochen Görtler (Konstanz, A01)
- Hanhe Lin (Konstanz, A05)
- Hui Men (Konstanz, A05)
- Leonel Merino (Stuttgart, MGK)

SFB-TRR 161 ONLINE LECTURE SERIES

Once again, our lecture series during the winter term 2021/2022 took place online. With eight renowned speakers from both national and international institutions, we covered a broad area of topics and heard some highly interesting talks which offered lots of new insights.

NOV 09 2021 — **"The Cyber Valley Cluster & Entrepreneurship Support at the University of Stuttgart"** by Dr. Ferran Giones, Tobias Dürr, Marcel Werle and Philipp Häßler, University of Stuttgart

DEC 06 2021 — **"Human Motion Analysis for Sport Education and Training"** by Peter Kán, Institute of Visual Computing and Human-Centered Technology, TU Wien

JAN 17 2022 — **"Mixed Reality User Manuals"** by Denis Kalkofen, TU Graz

JAN 31 2022 — **"Cross-Device and Transitional Interfaces for Human-Data Interaction"** by Hans-Christian Jetter, University of Lübeck

NOV 29 2021 — **"Visualization in Data Conversations"** by Melanie Tory, Roux Institute of Northeastern University, Portland, Maine

JAN 10 2022 — **"High-Dimensional Processing: From Visual Analytics to Machine Learning"** by Nicola Pezzotti, Eindhoven University of Technology

JAN 24 2022 — **"Map the Knowledge for Human-Data Communication"** by Hsiang-Yun Wu , St. Pölten University of Applied Sciences and TU Wien

FEB 07 2022 — **"Epistemology of Data Visualization"** by Ali Zolfangharian, Advanced Data and Information Literacy Track, University of Konstanz

FURTHER SFB-TRR 161 TALKS AND WORKSHOPS

- July 12th, 2021: **"Visual Analytics Tool VISPLORE"** by Harald Piringer, Visplore GmbH, Vienna, Austria
- July 26, 2021: **"Quantification of Visual Attention in Mobile HCI"** by Mihai Bâce, University of Stuttgart, VIS
- Nov 12, 2021: **"Introduction to R and Models for Psychophysics"** by Dr. Alessandro Moscatelli, University of Rome and Priscilla Balestrucci, University of Ulm
- Nov 22nd, 2021: **"Situated Analytics"** by Dieter Schmalstieg, Graz University of Technology, Austria
- Jan 25, 2022: **"Analyzing the Language of Food on Social Media"** by Stephen Kobourov, University of Arizona, USA

cwr

SITUATED ANALYTICS WORKSHOP

On November 22 and 23, 2021 a workshop on Situated Analytics took place at the University of Konstanz. The workshop organizers Tiare Feuchtner, Harald Reiterer, and Falk Schreiber invited Dieter Schmalstieg and Philipp Fleck from TU Graz as keynote speakers to talk in detail about Situated Analytics and present their own toolkit. The workshop was well attended by 22 researchers from Aarhus University, TU Graz, University of Konstanz, and University of Stuttgart.

Harald Reiterer kicked off the workshop by introducing the general theme, the overall agenda, and the invited speakers to the audience. This was followed by an inspiring keynote on Situated Analytics by Dieter Schmalstieg, which was also live-streamed for interested remote SFB researchers.

Dieter Schmalstieg giving his keynote. Photo: cwi

As part of the keynote, Dieter Schmalstieg distinguished Immersive Analytics and Situated Analytics: Unlike immersive visualizations, which can make use of the infinite space afforded by Virtual Reality environments, Situated Visualizations are grounded in the physical environment and, therefore, implemented in Augmented Reality (AR). With a mobile AR display (e.g., head-mounted or handheld), users are freed from having to bring the data to a workplace and, instead, may go where the data actually belongs (represented as so-called referents). This leads to Situated Analytics, which is analytic work supported by Situated Visualizations. Situated Analytics near physical referents is particularly relevant if referents themselves actively provide data (e.g., Internet of Things).

Despite its promise to grant access to just the right data, anywhere and anytime, only few works explore Situated Analytics for extensive and complex tasks, such as visualization authoring or data exploration. To solve this problem, Philipp Fleck presented their self-developed toolkit for Situated Analytics, which facilitates the creation and exploration of situated analytics.

Philipp Fleck presented a toolkit for Situated Analytics. Photo: cwi

In the afternoon, the workshop participants split up into three groups to attend a total of seven different demos from local labs and visiting workshop participants related to Situated Analytics (e.g., augmented and virtual reality experiences). The first day was concluded by a discussion on interesting topics and ideas that came up during the informative and interactive workshop parts, which was the foundation for the activities for day 2.

For the second day, participants split up again and worked in break-out groups on various topics and activities, including a hands-on tutorial with the presented Situated Analytics toolkit and brainstorming sessions covering individual and collaborative Situated Analytics scenarios. The outcome and results of these break-out groups were presented and discussed in the concluding session of the workshop in the afternoon.

All in all, a very productive workshop with interesting results during a time where all workshop participants were glad to meet in person. The many contributions and opportunities for networking and socializing have sparked new ideas or even started new collaborations, of which we will hopefully hear more during future SFB-TRR 161 events.

sh, jz

- Organizers: Tiare Feuchtner, Harald Reiterer, Falk Schreiber
- Konstanz

CONFERENCES

CONFERENCES & WORKSHOPS

In 2021 and 2022, many academic conferences and workshops once again took place virtually while some returned to in-person events or were held as hybrid formats.

Our members represented the SFB-TRR 161 at a large number of national and international conferences and workshops, their contributions ranging from presentations to keynote speeches and capstone talks. Several workshops were also organized by SFB-TRR 161 members (cf. highlights).

SOME CONFERENCE HIGHLIGHTS FROM 2021 AND 2022

June 2021: Albrecht Schmidt (C06) and colleagues won a best paper award at EICS 2021 +++ July 2021: Keynote by Albrecht Schmidt (C06) on "The End of Serendipity: Will Artificial Intelligence remove Chance and Choice in Everyday Life?" at CHItaly 2021 +++ July 2021: Dietmar Saupe (A05) acted as one of four scientific chairs at ITG SVCP (Summer School on Video Coding and Processing) +++ September 2021: Captstone "Eye-Tracking in (Software) Visualization" by Daniel Weiskopf (A01, B01) at VISSOFT 2021 +++ October 2021: Karsten Klein (D04, INF) was co-organizer of the Dagstuhl-Seminar 22401 „Visualization of Biological Data - From Analysis to Communication" +++ October 2021: Rebekka Kehlbeck, Jochen Görtler (A01), Yunhai Wang and Oliver Deussen (A01) received an Honorable Mention Best Paper Award at IEEE VIS 2021 for "SpEuler: Semantics-preserving Euler Diagrams" (cf. p. 12) +++ November 2021: The workshop "Situated Analytics" took place in Konstanz. Organizers were SFB-TRR members Harald Reiterer (C01), Tiare Feuchtner (C07), and Falk Schreiber (D04, INF) (cf. p. 9) +++ January 2022: Karsten Klein (D04, INF) was co-organizer of the Dagstuhl-Seminar 22031 „Bringing Graph Databases and Network Visualization Together"

June 2021
EICS2021
13th ACM SIGCHI Symposium on Engineering Interactive Computing Systems, virtual

June 2021
EuroVis 2021
24th EG Conference on Visualization, virtual

July 2021
CHItaly 2021
14th Edition of the Biannual Conference of the Italian SIGCHI Chapter, Bozen-Bolzano, Italy & virtual

July 2021
ITG SVCP 2021
6th ITG/VDE Graduate Summer School on Video Compression and Processing, Berlin, Germany

Sep. 2021
AOWI 2021
12th Biannual Congress of the DGPs departments Work, Organizational, and Economic Psychology and Human Factors, Chemnitz, Germany & virtual

Sep. 2021
MuC 2021
Mensch und Computer 2021, virtual

Sep. 2021
VINCI 2021
14th International Syposium on Visual Information Communication and Interaction, virtual

Sep. 2021
Graph Drawing 2021
29th International Symposium on Graph Drawing and Network Visualization, Tübingen, Germany & virtual

Sep. 2021
[BC]² 2021
Basel Computational Biology Conference, Basel, Switzerland

Sep. 2021
Informatik 2021
51st Annual Conference of the German Informatics Society, virtual

Sep. 2021
VISSOFT 2021
9th IEEE Working Conference on Software Visualization, virtual

Sep. 2021
VMV 2021
26th International Symposium on Vision, Modeling, and Visualization, virtual

Oct. 2021
Dagstuhl-Seminar 21401
Visualization of Biological Data - From Analysis to Communication, Schloss Dagstuhl, Germany

Oct. 2021
ISMAR 2021
IEEE International Symposium on Mixed and Augmented Reality, virtual

Oct. 2021
COMBINE 2021
12th International meeting of the "Computational Modeling in Biology" Network, virtual

Oct. 2021
IEEE VIS 2021
IEEE Visualization Conference, virtual

Oct. 2021
ICIP 2021
28th IEEE International Conference on Image Processing, virtual

Oct. 2021
VISAP 2021
The IEEE VIS 2021 Arts Program, virtual

Nov. 2021
BMVC 2021
32nd British Machine Vision Conference, virtual

Nov. 2021
VQEG Meeting
Video Quality Experts Group, virtual

Jan. 2022
Dagstuhl-Seminar 22031
Bringing Graph Databases and Network Visualization Together, Schloss Dagstuhl, Germany

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VGTC AWARD

Daniel Weiskopf received the VGTC Visualization Technical Achievement Award. With the award, the IEEE Visualization and Graphics Technical Committee honors Daniel Weiskopf for his outstanding research on quantifiable approaches.

- Projects A01, B01
- Stuttgart

EICS BEST PAPER AWARD

Albrecht Schmidt and colleagues received a best paper award at EICS2021 for "EMBody: A Data-Centric Toolkit for EMG-Based Interface Prototyping and Experimentation." Research partially funded by SFB-TRR 161.

- Project C02
- Munich

LANDESLEHRPREIS

Harald Reiterer (C01) and **Falk Schreiber** (D04, INF) are part of a team of researchers who won the Landeslehrpreis of the Ministry for Science, Research, and the Arts Baden-Württemberg for their innovative teaching concept Media Exhibition design. In different modules, students learn how to design and implement interactive exhibition concepts. Together with Prof. Stefan Hauser from the history department at the University of Konstanz and Prof. Eberhard Schlag from the architecture and design faculty at the HTWG Konstanz, SFB-TRR 161 project leader Harald Reiterer designed the teaching concept for Media Exhibition Design in 2013 and has since implemented it with various teaching teams. His expertise on multimodal interaction concepts for mobile computing as well as mixed reality are an integral part of the teaching concept. In 2017, the teaching team was joined by Falk Schreiber, who contributes his expertise on immersive environments, virtual reality and interactive visualizations.

- Projects C01, D04, INF
- Konstanz

AMINER AI 2000 MOST INFLUENTIAL SCHOLAR AWARD

Three SFB-TRR 161 project leaders were named among the one hundred most influential scholars in the subfield of visualization on the 2022 AMiner AI 2000 Most Influential Scholars list. **Michael Sedlmair** (A08) occupies first place, making him the top-cited and therefore most influential scholar in the field of visualization between 2012 and 2021. **Daniel Keim** (A03) and **Daniel Weiskopf** (A01, B01) reach ranks 74 and 91 respectively, for which they receive an AI 2000 Most Influential Scholars Honorable Mention.

- Projects A08, A03, A01, B01
- Stuttgart & Konstanz

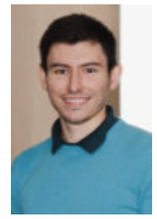
IEEE VIS BEST PAPER HONORABLE MENTION AWARD

Rebecca Kehlbeck, **Jochen Görtler**, Yunhai Wang and **Oliver Deussen** received a Best Paper Honorable Mention Award at IEEE VIS 2021. In their paper "spEuler: Semantics-preserving Euler Diagrams", they discuss how highly overlapping set-typed data can be visualized comprehensibly using Euler diagrams.

- Projects A01, A04
- Konstanz

DOCTORAL SPEAKERS

Dimitar Garkov (INF) and **Cedric Beschle** (B07) are the current doctoral speakers. As such, they represent the interests of the PhD students and organize events such as doctoral retreats and workshops.



Left: Dimitar Garkov, Right: Cedric Beschle.

DISSERTATIONS

Since July 2021, seven candidates completed and successfully defended their dissertations:

- **Valentin Bruder (A02), Performance Quantification of Visualization Systems**
- **Jochen Görtler (A01), Quantitative Methods for Uncertainty Visualization**
- **Ole Johannsen (B05), Variational 3D Reconstruction of Non-Lambertian Scenes Using Light Fields**
- **Matthias Kraus (A03), Assessing the Applicability of Virtual Reality for Data Visualization**
- **Hui Men (A05), Boosting for Visual Quality Assessment with Applications for Frame Interpolation Methods**
- **Christoph Schulz (A01), Uncertainty-aware Visualization Techniques**
- **Daniel Seebacher (A03), Visual Analytics of Spatial Events: Methods for the Interactive Analysis of Spatio-Temporal Data Abstractions**

Congratulations!

PHD RETREAT

After nearly two years without in-person meetings, the PhD candidates were able to organize a retreat at Evangelische Tagungstätte Löwenstein on November 16 and 17, 2021. For those who started their PhD during the pandemic, this was the first opportunity to see each other "live".

In presentations, the PhD candidates brought each other up to date on the current status of their projects and also gave an outlook on the third funding period. Invited communication trainer Marie-Theres Braun gave a workshop on how to deliver convincing talks by using the right kind of voice and conversation technique.

A full report on the retreat is available on our Visual Computing Blog.

NEW DOCTORAL CANDIDATES

René Cutura, A08
Frederik Dennig, A03

Image: © Felicia Buitenwerf/unsplash.com

OUTREACH TO SCHOOLS: ONLINE TEACHING UNITS ABOUT TOPICS FROM COMPUTER SCIENCE

To complement our activities for school students (e.g. BOGY, Girls' Day, Programming Courses) and to provide an alternative to on-site events, **Falk Schreiber** and **Michael Aichem** (D04) and members of Project Ö have launched a new cooperation with Barbara Pampel from the University of Konstanz. The aim of their project is to create a low-threshold offer with online teaching units for interested teachers and (prospective) partner schools.

The teaching units used for the projects were designed by Barbara Pampel's students in her informatics didactics course and were subsequently prepared for publication on our website. The first units are set to be added to the website in late spring 2022, followed by further materials and offers for school students.

EXHIBITION "INCOMPUTABLE IMAGERY: REIMAGINING THE BRUSHSTROKE"

Supported by the SFB-TRR 161, the exhibition "InComputable Imagery: Reimagining the Brushstroke" took place between November 5th and December 5th, 2021 at the Kulturzentrum am Münster in Konstanz. In the exhibition, a portable version of **Oliver Deussen**'s e-David painting robot created live paintings after Berlin-based cross-disciplinary painter and media artist Liat Grayver had positioned the initial brushstroke during the vernissage.

e-David (Electronic Drawing Apparatus for Vivid Image Display) is a pioneer project in the field of robotic painting and was one of the first to use a visual feedback system. This system constantly generates new data which influences the robot's activity. Upon the completion of each brushstroke, the evolution of the new stroke is analyzed by the visual feedback and the "target" is reset according to the state of the evolving image.

The e-David painting robot in action. Photos: cwi

SFB-TRR 161 ABOARD THE MS WISSENSCHAFT 2022

On May 3, 2022, the MS Wissenschaft—a swimming exhibition initiated by the BMBF and Wissenschaft im Dialog—will launch its tour across Germany in Berlin. Aboard the exhibition ship visitors can view our exhibit "Collaboration in Augmented Reality," a joint project of Harald Reiterer's team (C01) and Ö.

In line with the motto for the Science Year 2022 ("Nachgefragt!"), the exhibition aboard the MS Wissenschaft aims to take a closer look at research itself and to offer a look behind the scenes of science. Our exhibit allows visitors to experience a collaborative interaction in Augmented Reality.

After jointly building a wind turbine to generate electricity for a fictional town, they learn more about how interaction concepts are developed, tested, and adapted to allow for a successful simulation.

The MS Wissenschaft will tour Germany between May and October 2022, anchoring in many bigger cities. A complete schedule can be found on their website:

www.ms-wissenschaft.de

A report on our experience aboard the MS Wissenschaft will follow on the Visual Computing Blog.

cwr, cwi

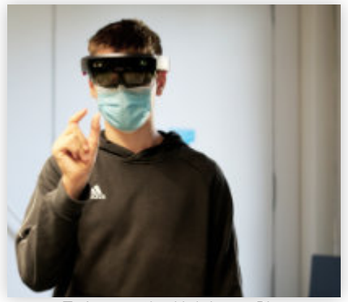
DIGITAL GIRLS' DAY 2022: BUILD YOUR OWN SCREENSAVER

Due to our positive experiences with an online coding workshop at the last Girls' Day, we decided to join the Girls' Day 2022 with another virtual offer. Together with the SFB 1313 "Interface-Driven Multi-Field Processes in Porous Media – Flow, Transport and Deformation" at the University of Stuttgart, we invited girls from all across Germany to participate in our workshop and learn how to code their own screensaver using C#. Our tutors from the University of Stuttgart and the University of Konstanz also provided the girls with information about computer science in general as well as possible careers in that field. Same as last year, the workshop was complemented by a quiz on Informatics in which the girls competed for an attractive prize: a B·O·B·3 programming robot.

BOGY INTERNSHIPS RESUMED

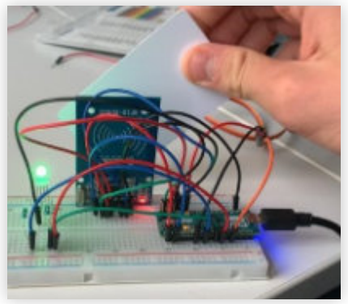
After an enforced break of one and a half years, we were finally able to once again offer BOGY internships to 9th and 10th grade students. In fall 2021, one student each had the opportunity to visit our sites in Stuttgart and Konstanz where they got a glimpse of what working in academia looks like and had the chance to discover some of the technologies our researchers work with. Both interns gave very positive feedback on their time at the SFB-TRR 161, stating that it increased their motivation to pursue a career in computer science.

For spring 2022 we have one more BOGY week with four students planned and are already receiving applications for the fall.

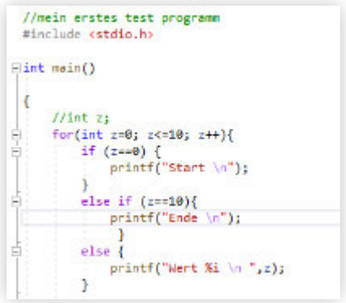


Trying out the HoloLens. Photo: cwr

»[Dank meines Praktikums] kann ich sagen, dass die Informatik auf jeden Fall etwas ist, das mir Spaß macht und ich auch in der Zukunft etwas in Richtung Informatik machen werde. Ich möchte mich hiermit bei allen Betreuern für die tolle Woche bedanken!«
(Nicholas Coledan, BOGY Intern in Stuttgart)



Building an RFID card reader with Arduino
Photo: Nicholas Coledan



```
//mein erstes test programm
#include <stdio.h>

int main()

{
    //int z;
    for(int z=0; z<=10; z++){
        if (z==0) {
            printf("Start \n");
        }
        else if (z==10){
            printf("Ende \n");
             }
        else {
            printf("Wert %i \n ",z);
        }
```

First programming exercises with C.
Photo: Nicholas Coledan

AN EVENING WITH ADA

As a special (pre-)Christmas treat for all members, the SFB-TRR 161 funded a screening of the 2019 short film „Ada", which documents the late life of Ada Lovelace, the first author of a computer programme – about a century before the modern computer was invented.

The screening of the film on December 14, 2021 was complemented by an introductory talk about Ada Lovelace by mathematician Sebastian Krapp and a panel discussion with Steven Kammerer, director of the film, and its leading actress Julie Bruhns. In the lively discussion via Zoom, Kammerer and Bruhns gave a deeper insight into the production of their film as well as their motivation to produce films about women in STEM. A recording of the talk and the discussion is available on the website of the University of Konstanz.

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