Annual Report

2024

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 Konstanz, 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, 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.
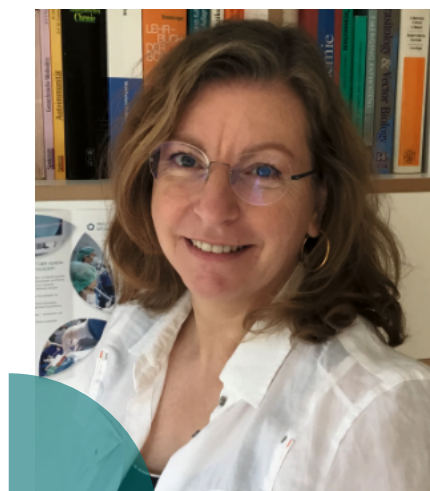
Dr. Heike Lehmann
SFB-TRR 161 Manager

Prof. Dr. Daniel Weiskopf
SFB-TRR 161 Spokesperson

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

this is the first annual report of the third funding period of the SFB-TRR 161, which started in July 2023. We are very pleased that our group, with the combined research forces of our four sites in Stuttgart, Konstanz, Ulm, and Munich, will be able to work on advancing visual computing for another four years until mid-2027. Now, we can continue our proven research strategies in the highly dynamic research field of quantitative methods for visual computing. Based on our previous experience and results, we have realigned our research and are now placing a stronger focus on applications with real-world impact.

We also want to significantly strengthen our scientific outreach and are implementing new ways of doing this. One example is the very positively received hackathon, which took place for the first time at the beginning of 2024 and led to new scientific publications just a few weeks after (see page 9)!

We have compiled further highlights of our events on pages 10 and 11, as well as an overview of our public outreach activities and research stays by our doctoral students. Particular focus lies on the report on the 2nd International Conference on Quantification in Visual Computing (QiVC), to which we had invited in the run-up to EuroVis 2023 in Leipzig. With the SFB-TRR 161 conference, we once again demonstrated our great collaborative research spirit, and there were countless stimulating discussions about results and projects. Of course, we also used the meeting to form new internal and external research networks with a view to the new funding period.

Over the last year, our researchers published an extraordinary amount of papers – for a summary please refer to pages 20 and 21.

Now we are looking forward to meeting you at the next status seminar and we wish you inspiration and reading pleasure with the Annual Report 2024!

Heike Lehmann &
Daniel Weiskopf

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2ND INTERNATIONAL CONFERENCE ON

QUANTIFICATION IN VISUAL COMPUTING

As the cornerstone of our event and outreach activities at the end of the second funding period, the 2nd International Conference on Quantification in Visual Computing (QiVC) took place in June 2023. With Gudrun Klinker, Melanie Tory, and Zhi Li, we were able to win three international visual computing experts as keynote speakers. The program was rounded off by a panel discussion and talks by SFB-TRR 161 project leaders in which they gave an overview of some of the research results of the collaborative research center. More than 60 researchers made their way to Leipzig, Germany, to attend the conference.

On June 11, 2023, the SFB-TRR 161 had the great pleasure of hosting the 2nd International Conference on Quantification in Visual Computing (QiVC). The conference took place in Leipzig and was co-located with EuroVis 2023. The event attracted over 60 participants.

Several renowned visual computing experts made their way to Leipzig to discuss trends and developments in the field. Gudrun Klinker from TU

Munich discussed issues regarding spatial vs. functional properties of information, user overload and safety, as well as user motivation in her keynote on "Gamified Immersive Information Visualization". In the second keynote of the day, Melanie Tory, Professor of the Practice and Director of Data Visualization at the Khoury College of Computer Science, Northeastern University, talked about the chasm between the needs of data workers and the analytic tools available to them. Her talk was titled "Visualization in the Wild: Meeting the People Where They Are". Zhi Li, video codecs and quality manager at Netflix, gave the third and final keynote of the conference: "A Lot of Bang for the Bit – Delivering Joy to Netflix Members on a Global Scale".

Two talks by SFB-TRR 161 members gave insight into some of our research topics and augmented the conference program. Marc Ernst (C05) described some recent results obtained also within the SFB-TRR 161 regarding human-machine interaction and gave an outlook towards adaptable

multisensory systems. Oliver Deussen (A01) discussed methods for rendering uncertainty in computing.

The conference finished with a panel discussion between keynote speakers Gudrun Klinker and Zhi Li as well as project leader Oliver Deussen. At the evening reception following the conference, attendees had the opportunity to get together in a less formal setting.

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Top: Over 60 researchers attended the conference in Leipzig. Bottom: SFB-TRR 161 spokesperson Daniel Weiskopf during the opening of the conference.

Top: Gudrun Klinker gave a keynote on "Gamified Immersive Information Visualization." Middle: In a panel discussion, the experts discussed current developments in visual computing. Bottom: Zhi Li (Netflix) during his keynote.

Images: Claudia Widmann

ALBRECHT SCHMIDT NAMED ACM FELLOW

On January 24, 2024, the Association for Computing Machinery (ACM) announced the 68 ACM members who were named as 2023 ACM Fellows. SFB-TRR 161 project leader **Albrecht Schmidt** (C06) is among this latest class of ACM Fellows that were recognized for their groundbreaking contributions to computing science and technology. With almost 110,000 ACM members world-wide, he now belongs to the 1% among them that have been inducted as ACM Fellows. Albrecht Schmidt, professor of computer science at Ludwig-Maximilians-Universität (LMU) in Munich, where he holds a chair for Human-Centered Ubiquitous Media, was selected as a fellow for his contributions to human-computer interaction, ubiquitous computing and implicit interaction, as well as his leadership in ACM SIGCHI.

TWO FELLOWSHIPS FOR CHRISTIN BECK

From March to June 2023, **Christin Beck** (D02) joined the DFG Center for Advanced Studies *Words, Bones, Genes, Tools* at the University of Tübingen for a four-month fellowship. During the fellowship, she collaborated with Marisa Köllner, working on developing a new methodology for investigating lexical semantic change across language stages that combines the usage of contextualized language models and phylogenetic methodologies for cognate identification.

Since April 2024, Christin Beck has been a Konstanzia Fellow. The Konstanzia program was initiated by the University of Konstanz to support female postdoctoral researchers on their last steps towards gaining a professorship. For the next two years, Christin will benefit from the mentoring, coaching, and co-funding support of the program.

SHAOLIN SU WINS MARIE CURIE FELLOWSHIP

Former SFB-TRR 161 scholarship holder **Shaolin Su** was successful in his application for a prestigious Marie Curie Postdoctoral Fellowship. As part of Horizon Europe, the Marie Skłodowska-Curie Actions are the European Union's flagship funding programme for doctoral education and postdoctoral training of researchers. For the next two years, Shaolin Su's research will be funded with a sum of 165,000 Euros. Most recently, Shaolin Su was funded by the SFB-TRR 161 via a stipend for international researchers. In the Department of Computer and Information Science at the University of Konstanz, he worked with the group of former SFB-TRR 161 project leader Dietmar Saupe (A05). The research conducted in the course of this fellowship served as the basis for the grant application to the Marie Curie Fellowship.

MOHSEN JENA-DELEH ACCEPTED AS JPEG EXPERT

Postdoctoral researcher **Mohsen Jenadeleh** (A05) was accepted as a member of the Joint Photographic Experts Group (JPEG) committee in December 2023. Within the committee, he serves as a JPEG AIC (Advanced Image Coding) expert. The work of JPEG AIC already produced a technical report, *Guidelines for image coding system evaluation* in ISO/IEC TR 29170-1:2017 and a standard, the *Evaluation procedure for nearly lossless coding*, in ISO/IEC 29170-2:2015. Currently, the project is working on developing a new standard, known as AIC-3: *Visual quality assessment in the range from high to nearly visually lossless qualities*.

Dietmar Saupe (A05), who served as a co-chair of JPEG AIC since 2022, was recently appointed as chair of JPEG AIC after Michela Testolina, who formerly held that position, stepped down.

COOPERATION WITH EXTERNAL PARTNERS

Our researchers work together with both national and international colleagues on a regular basis. In 2023 and 2024 those collaborations included:

- Joao Ascenso & Shima Mohammadi, University of Lisbon, Portugal (A05)
- Michael Behrisch, Utrecht University, Netherlands (D04)
- Raimund Dachselt, Technische Universität Dresden, Interactive Media Lab Dresden, Germany (C01 & C07)
- Matthias Hirth & Edwin Gamboa, Technische Universität Ilmenau, Germany (A05)
- Lucjan Janowsky, Bogdan Cmiel, & Krzysztof Rusek, AGH University of Science and Technology, Poland (A05)
- Andreas Kerren, Linköping University, Sweden (D04)
- Stephen Kouborov, University of Arizona, USA (D04)

- Michael Krone & Nicolas Brich, University of Tübingen, Germany (D04)
- Hieu Nim, Murdoch Children's Research Institute, Melbourne, Australia (INF)
- Marius Pedersen & Simon Hvid Del Pin, Norwegian University of Science and Technology, Norway (A05)
- Bruno Pinaud, University of Bordeaux, France (D04)
- Jon Sneyers, Cloudinary (A05)
- Michela Testolina, Ecole Polytechnique Fédérale de Lausanne, Switzerland (A05)
- Hannah Williams, Max Planck Institute of Animal Behavior, Konstanz, Germany (A09)

VISITING SCHOLARS

In 2023 and 2024, several international scientists visited our research sites:

- Roland Aigner (Konstanz, C01 & C07)
- Andreas Fender (Konstanz, C01 & C07)
- Hans Gellersen (Konstanz, C01)
- Raouf Hamzaoui (Konstanz, A05)
- Hanhe Lin (Konstanz, A05)
- David Lindlbauer & Alexandra Ion (Konstanz, C01)
- Hantao Liu (Konstanz, A05)
- Silvia Miksch (Konstanz, C01 & C07)
- Hugo Nascimento (Konstanz, D04)
- Iris Nowenstein (Konstanz, D02)
- Bruno Pinaud (Konstanz, D04)
- Hendrik Strobelt (Stuttgart)
- Tamas Sziranyi (Konstanz, A05)
- Uta Wagner (Konstanz, C01 & C07)
- Gunther Weber (Stuttgart)

2023 STANFORD/ELSEVIER RANKING

In the sixth iteration of the Stanford/Elsevier author database, SFB-TRR 161 researchers were once again highly successful. In total, seven of our project leaders managed to secure a spot on the prestigious list, which ranks the top 2% of researchers worldwide based on career-long data of their citations.

For the subfield *Human Factors*, **Albrecht Schmidt** (C06) ranks 31 out of a total of 14,370 most cited researchers worldwide. **Andreas Bulling** (A07) reaches 107th place in the same subfield. Out of 22.073 researchers in the subfield *Software Engineering*, **Daniel Keim** (A03) reaches 6th place, while **Daniel Weiskopf** (A01, B01, INF, Ö, MGK) occupies rank 150 and **Oliver Deussen** (A01) rank 347. **Falk Schreiber** (A09, D04, INF, Ö, MGK) reaches rank 385 out of 21.123 in *Bioinformatics* and **Marc Ernst** (C05) occupies rank 505 out of 33.023 in *Experimental Psychology*.

[1]Ioannidis, John P.A. (2023), "October 2023 data-update for "Updated science-wide author databases of standardized citation indicators", Elsevier Data Repository, V6, doi: 10.17632/btchxktzyw.6

NEW BENCHMARK FOR SCENE FLOW, OPTICAL FLOW, AND STEREO

Project B04 published a new high-detail and high-resolution benchmark for evaluating algorithms to estimate stereo displacements (disparity), 2D motion information (optical flow), and 3D motion information (scene flow). The benchmark is based on the Blender short movie "Spring" and was first presented at CVPR 2023 by project member Lukas Mehl. Since its publication in June 2023, more than 300 researchers have downloaded the benchmark data and it is used by many authors in their upcoming papers. The contained sequences allow the training for neural networks for stereo and motion estimation as well as the evaluation of trained neural networks to quantify their performance regarding several aspects including overall performance, detailed regions, non-rigid regions, occluded regions, and sky regions.
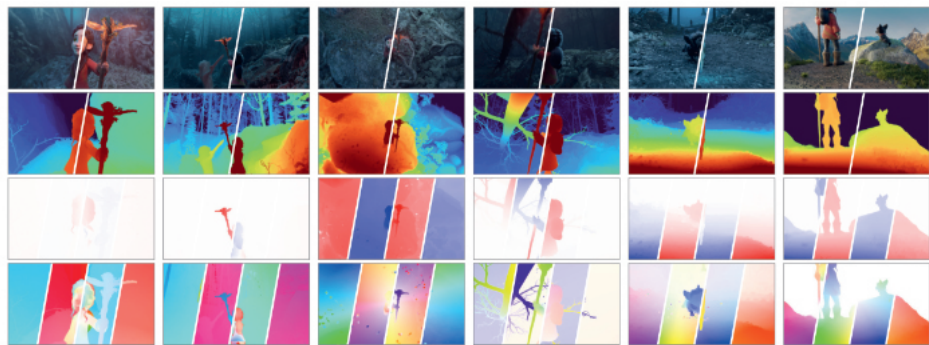
Example sequences from the Spring dataset. First row: left and right images; second row: corresponding left and right disparity; third row: change in disparity for forward left, backward left, forward right and backward right; fourth row: optical flow visualization for forward left, backward left, forward right and backward right. Please note that we visualize disparity change, while the dataset contains target frame disparity. The Spring movie assets by Blender Foundation are licensed under CC BY 4.0.

The dataset and benchmark can be accessed under
https://spring-benchmark.org/   *ab*

SPIN-OFF PROJECT ON ROBUST OPTICAL FLOW FUNDED BY DFG

Jenny Schmalfuss' research on the robustness of optical flow methods, which was performed as part of Project B04's research in the second funding period, triggered a stand-alone DFG project that deals with the analysis and robustification of optical flow methods. Instead of using small pixel perturbations to attack and test the robustness of motion estimation algorithms, the researchers in B04 use a more realistic approach with adversarially optimized particles that mimic weather effects like snowflakes, rainstreaks, or fogclouds.

The new DFG project "Robust Optical Flow" was approved for funding in December 2023 and will take up its work in the upcoming months.

Corresponding SFB-TRR 161 publication:
J. Schmalfuss, L. Mehl and A. Bruhn, "Distracting Downpour: Adversarial Weather Attacks for Motion Estimation," in *2023 IEEE/CVF International Conference on Computer Vision (ICCV)*, Paris, France, 2023, pp. 10072-10082. doi: 10.1109/ICCV51070.2023.00927

Adversarial attacks with simulated raindrops and snowflakes.

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FIRST SFB-TRR 161 HACKATHON

After the many online meetings during the COVID-19 pandemic, we wanted to return to more in-person events and also explore some new for-

mats. One such format was the DR4ET (Dimensionality Reduction for Eye-Tracking) Hackathon, which took place in Stuttgart from January 30 to February 1, 2024. By bringing domain experts and visualization designers from different institutes and disciplines together, the hackathon served as an ideal opportunity to foster collaborative projects within the SFB-TRR 161.

The original idea for the hackathon came from our special interest group Dimensionality Reduction (DR SIG) and Dietmar Saupe, project leader of completed Project A05. Once the general direction of developing visualization tools for eye-tracking data analysis had been set, the DR SIG cooperated with the Uncertainty Visualization SIG and the Eye-tracking SIG to prepare the program. Via a proposal template, domain experts were asked to provide domain problems, motivation, data, and preliminary solution means such as data parser code.

We collected six proposals covering topics from Image Quality Assessment and Eye-Tracking Analysis to exporting the Uncertainty-aware Multidi-

mensional Scaling code to other programming languages. Iteratively working with the SIGs, the domain experts provided us with excellent topics and data with strong motivations. Due to the many topics, we sent the proposals to the registered participants to vote and select the topics they would join in the hack. In the end, four topics were kept.

After the selection round, four teams were formed to work on the selected topics: (1) "Multidimensional Embedding of Triplet Comparisons for Image Quality Assessment" (Mohsen Jenadeleh and Dietmar Saupe), (2) "Mobile Eye-Tracking in an Artwork Gallery" (Maurice Koch and Kuno Kurzhals), (3) "Understanding Key Parameters in Interactive Visualization Design Process" (Yao Wang), and (4) "Improving UAMDS Performance and Toolbox for Uncertainty-Aware Dimensionality Reduction" (David Hägele).

The four teams started hacking their problems at 12:00 PM on the 30th of January, and the Hackathon ended at 4:00 PM on the 1st of February. With the ARENA 2036 on the University Campus Stuttgart Vaihingen, we were lucky to find a venue that already had some experience with hackathons and was able to meet all our requirements.

After many hours of "hacking hard," the teams delivered four presentations before the jury committee consisting of Dieter Schmalstieg, Andreas

Bulling (A07), and Benedikt Ehinger (D05). In the end, four certificates were granted to the teams, including "The Longest Code Award" to team (2), "The Out-of-the-box Award" to team (3), "The Most Complete Solution Award" to team (4), and "The Aesthetic Design Award" to team (1).

Our first hackathon was not only a fun, but also a productive event. It brought together colleagues from different institutes and disciplines and allowed them to collaborate on four topics. So far, two papers from the Hackathon were published: "NMF-Based Analysis of Mobile Eye-Tracking Data," published in ETRA (2024) as a workshop paper by team (2),

and "An Image Quality Dataset with Triplet Comparisons for Multi-dimensional Scaling" published in QoMEX (2024) as a short paper by team (1). An eye-tracking dataset related to the Hackathon was also published in DARUS, the data repository of the University of Stuttgart: "Dataset for NMF-based Analysis of Mobile Eye-Tracking Data" by team (2). All teams continue working on their topics to publish their work or to strengthen their results and publications.

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SFB-TRR 161 LECTURE SERIES

From December 2023 to February 2024, the most recent edition of the SFB-TRR 161 lecture series took place with a number of renowned experts as guest speakers. In five lectures, they shared their insights and research findings from a variety of fields related to visual computing.

Dec 11, 2023
University of Stuttgart

Nina Gaißert (Festo SE & Co. KG)

INNOVATION IS THE KEY TOWARDS SUSTAINABLE INDUSTRIES

Dec 18, 2023
University of Stuttgart

Anna Vilanova (TU Eindhoven)

VISUAL ANALYTICS: MACHINE LEARNING AND THE HUMAN IN THE LOOP

Jan 22, 2024
University of Konstanz

Silvia Miksch (TU Wien)

VISUAL ANALYTICS: A MIXED-INITIATIVE PROCESS FOR ENHANCED PROBLEM-SOLVING AND UNDERSTANDING

Jan 29, 2024
University of Stuttgart

Manuela Waldner (TU Wien)

ATTRACTIVE GUIDANCE IN DYNAMIC VISUALIZATIONS

Feb 5, 2024
University of Stuttgart

Arzu Çöltekin (Fachhochschule Nordwestschweiz)

UNDERSTANDING HUMAN INFORMATION PROCESSING TO ADVANCE HUMAN-COMPUTER INTERACTION

OPPORTUNITIES AND OBSTACLES IN A TECH CAREER

Supported by the SFB-TRR 161 and Humane AI Net, the European network of Human-Centered artificial intelligence, the Women* in Computing Workshop took place on June 22, 2023. Around 25 young researchers from the field of computing gathered at the University of Konstanz to discuss opportunities and obstacles in a tech career. After the overwhelmingly positive feedback on the 2022 Workshop on Women* in Computing, this was the second iteration of the event.

After an opening by workshop co-organizer Tiare Feuchtner (C07), the event kicked off with a talk by Andrea Volkamer from Saarland University. In her talk, she covered the topics of

Image: Claudia Widmann

WOMEN* IN COMPUTING

advancing drug design and embracing open science and gave tips for building an academic career.

As the second speaker, the workshop participants welcomed Miriam Butt, professor for Linguistics at the University of Konstanz and project leader of SFB-TRR 161 Project D02. She shared her perspectives from computing in South Asia.

Some practical career advice was given by Sarah Theres Völkel, who is a user experience researcher at Google. She dis-

cussed how to get your CV ready for a transition from academia to industry. A more subject-based approach was taken by Enxhi Gjini from Takeda Pharmaceutical. In her talk, she gave the workshop participants some insight into implementing digital solutions in Pharma Manufacturing.

Andrea Šipka from the Data Science and its Applications research group at the German Research Center for Artificial Intelligence posed the question "What on earth is a scientific manager?" In her talk, she discussed perspectives of doing research the industrial way.

The afternoon was rounded off with a talk on careers beyond the PhD by Passant Elagroudy from the German Research Center for Artificial Intelligence. She shared some ideas on exploring postdoc pathways, giving back, and exploring the world in computing.

Once again, the workshop provided an excellent opportunity for networking as well as a safe space for multifaceted discussions of career and family struggles. In a relaxed and collegial atmosphere, the participants

were able to connect to each other and to reflect on their own (future) career paths.

A third iteration of the Women* in Computing Workshop is planned for July 4, 2024, with Munich as a prospective location.

MORE TALKS IN 2023 & 2024

June 21, 2023, Stuttgart: Gunther H. Weber (Lawrence Berkeley National Laboratory): "Rethinking High Performance Data Analsis for the Exascale and Beyond"

July 24, 2023, Stuttgart: Hendrik Strobelt (IBM Research): "Human Interaction and Collaboration with Machine Learning Models"

April 18, 2024, Konstanz: Raimund Dachselt (TU Dresden): "Leaving the Confines of the Desktop: Towards Ubiquitous Data Visualization"

CONFERENCES

In 2023 and 2024, members of the SFB-TRR 161 presented their research at a large number of national and international conferences and workshops. For their outstanding work, they won several conference awards (cf. Awards, pp. 14-15). As a special highlight, the SFB-TRR 161 hosted its own scientific conference in June 2023: the 2nd International Conference on Visual Computing (QiVC) (cf. pp. 4-5)

SELECTED CONFERENCE HIGHLIGHTS IN 2023 AND 2024

June 2023: 2nd SFB-TRR 161 conference "Quantification in Visual Computing" (QiVC) took place in Leipzig, Germany with over 60 attendees (cf. pp 4-5) +++ Keynote "Rethinking High Performance Data Analysis for the Exascale and Beyond" by Gunther H. Weber at EGPGV 2023 supported by SFB-TRR 161 +++ EuroVIS PhD Award for Christoph Schulz (MGK) (cf. p. 14) +++ Lukas Mehl (B04) presents Spring Benchmark at CVPR 2023, an A* conference with low acceptance rates (cf. p. 8) +++ Best Student Paper Award at QoMEX 2023 for "JPEG AIC-3 dataset: Towards defining the high quality to nearly visually lossless quality range"(cf. p. 15) +++ 2nd Workshop on Women* in Computing co-organized by SFB-TRR 161 researchers Tiare Feuchtner (C07), Fiona Draxler (C06), Sita Vriend (A01) & Sabrina Jaeger-Honz (D04) **July 2023**: Best Presentation Award (3rd place) for Jenny Schmalfuss (B04) at ICVSS (cf. p. 14) **September 2023**: Best Paper award at GD '23 for "CelticGraph: Drawing Graphs as Celtic Knots and Links" (cf. p. 14) +++ Workshop on "The Futue of Cognitive Personal Informatics" at MobileHCI 23 co-organized by Francesco Chiossi (C06) **October 2023:** Workshop on "Hybrid User Interfaces" at ISMAR 2023 co-organized by SFB-TRR 161 members Sebastian Hubenschmid (C01), Johannes Zagermann (C01), Tiare Feuchtner (C07) & Harald Reiterer (C01)

CONFERENCES

2023

APR

CHI 2023
ACM CHI Conference on Human Factors in Computing Systems, Hamburg, Germany

MAY

WCPH 2023
World Congress on Public Health, Rome, Italy

ETVIS 2023
7th Workshop on Eye Tracking and Visualization, colocated with ETRA 2023, Tübingen, Germany

JUN

QiVC 2023
2nd International Conference on Quantification in Visual Computing, Leipzig, Germany

EuroVis 2023
Eurographics Conference on Visualization, Leipzig, Germany

EGPV 2023
Eurographics Symposium on Parallel Graphics and Visualization, Leipzig, Germany

CVPR 2023
Conference on Computer Vision and Pattern Recognition, Vancouver, Canada

QoMEX 2023
15th International Conference on Quality of Multimedia Experience, Ghent, Belgium

WiC 2023
2nd Workshop on Women in Computing,* Konstanz, Germany

VQEG Meeting
Video Quality Experts Group, San Mateo, CA, USA

Spaces and Interfaces
A Summer School on HCI for Well-being, Bremen, Germany

JUL

SVCP 2023
8th VDE ITG Graduate Summer School on Video Compression and Processing, Fürstenfeldbruck, Germany

100th JPEG Meeting
Covilha, Portugal

ICVSS
International Computer Vision Summer School, Sicily, Italy

WADS 2023
18th Algorithms and Data Structures Symposium, Montreal, Quebec, Canada

AUG

CCCG 2023
35th Canadian Conference on Computational Geometry, Montreal, Quebec, Canada

SEP

Shonan 173 TAT
Toughening the Foundation of Abstraction in Visualization Techniques, Shonan, Japan

GD '23
31st International Symposium on Graph Drawing and Network Visualization, Palermo, Italy

MobileHCI 23
ACM Conference on Mobile Human-Computer Interaction, Athens, Greece

OCT

ICCV 2023
International Conference on Computer Vision, Paris, France

Fall IDC 2023
International Doctoral Consortium, Venice, Italy

Chi Play 2023
Annual Symposium on Computer-Human Interaction in Play, Stratford, Canada

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ISMAR 2023
International Symposium on Mixed and Augmented Reality, Sydney, Australia

1st Joint Workshop on Cross Reality
Held in conjunction with ISMAR 2023, Sydney, Australia

Workshop on Hybrid User Interfaces
Complementary Interfaces for Mixed reality Interaction, hybrid workshop at ISMAR 2023, Sydney, Asutralia

VIS 2023
IEEE Visualization Conference, Melbourne, Australia

NOV

ISS 2023
ACM Interactive Surfaces and Spaces Conference, Pittsburgh, PA, USA

Dagstuhl 23451
Visualization of Biomedical Data–Shaping the Future and Building Bridges, Schloss Dagstuhl, Germany

CIC31
Color & Imaging Conference, Paris, France

DEC

ICAT-EGVE 2023
International Conference on Artificial Reality and Telexistence and Eurographics Symposium on Virtual Environments, Dublin, Ireland

2024

JAN

WACV 2024
IEEE/CVF Winter Conference on Applications of Computer Vision, Waikoloa, Hawaii, USA

Lchange'23
4th International Workshop on Computational Approaches to Historical Language Change, Singapore

MAR

Dagstuhl-Seminar 23051
Perception in Network Visualization, Schloss Dagstuhl, Germany

Image: Alessia Cocconi, Unsplash

ICVSS 2023 BEST PRESENTATION PRIZE

For her poster on the paper "Distracting Downpour: Adversarial Weather Attacks for Motion Estimation", Jenny Schmalfuss (B04) received a best presentation prize (third place) at the International Computer Vision Summer School 2023 (ICVSS).

The paper, which was co-authored with Lukas Mehl (B04) and Andrés Bruhn (project leader, B04), presents a novel attack on motion estimation that exploits adversarially optimized particles to mimic realistic weather effects like snowflakes, rain streaks or fog clouds. ICVSS 2023 took place in Sicily, Italy, from July 9 to July 15, 2023.

▶ Project B04
▶ Stuttgart

EUROVIS 2023 DISSERTATION AWARD

At the EuroVis 2023 conference, former SFB-TRR 161 researcher and MGK manager Christoph Schulz received the EuroVis PhD Award for his dissertation "Uncertainty-aware Visualization Techniques", which significantly expands the solutions for uncertainty visualization from the scientific and medical domain to information visualization. The EuroVis PhD Award is granted for outstanding dissertations on visualization-related topics to recognize excellent young researchers in their early career and to highlight visualization research. The award ceremony took place during the conference in Leipzig in June 2023.

▶ Projects A01, MGK
▶ Stuttgart

GD'23 BEST PAPER AWARD

At the 31st International Symposium on Graph Drawing and Network Visualization (GD '23), Peter Eades, Niklas Gröne (A09), Karsten Klein (A09), Patrick Eades, Leo Schreiber, Ulf Hailer, and Falk Schreiber (A09, D04, INF, Ö, MGK) won a best paper award for their publication "CelticGraph: Drawing Graphs as Celtic Knots and Links". The drawing process presented in their paper raises interesting combinatorial concepts in the theory of circuits in planar graphs. Further, CelticGraph uses a novel algorithm to represent edges as Bézier curves, aiming to show each link as a smooth curve with limited curvature.

▶ Project A09
▶ Konstanz

TRANSFER AWARD OF THE UNIVERSITY OF KONSTANZ SOCIETY

For their pivotal role in implementing the interactive exhibition " YOUTOPIA - Stadtvisionen erleben", SFB-TRR 161 project leaders Falk Schreiber (D04, A09, Ö, INF, MGK) and Harald Reiterer (C01) received the Transfer Award of the University of Konstanz Society alongside their colleagues from the teaching team of the module "Media Exhibition Design" and the students that designed and built the exhibition. "YOUTOPIA" was the most recent exhibition that resulted from the teaching module, which has been taught in Konstanz since 2013.

Image: Claudia Widmann

With the Transfer Award, the University of Konstanz Society honors outstanding transfer achievements and a strong commitment to the dialog between science and society.

▶ Projects C01, D04, A09, INF
▶ Konstanz

QoMEX 2023 BEST STUDENT PAPER AWARD

At the 15th International Conference on Quality of Multimedia Experience (QoMEX 2023), the paper "JPEG AIC-3 dataset: Towards defining the high quality to nearly visually lossless quality range" (authors Michela Testolina, Vlad Hosu (A05), Mohsen Jenadeleh (A05), Davi Lazzarotto, Dietmar Saupe (A05), and Touradj Ebrahimi) won the Best Student Paper Award. QoMEX 2023 was held from June 20 to 22 in Ghent, Belgium.

▶ Project A05
▶ Konstanz

ACM ISS 10-YEAR IMPACT AWARD

For their paper "HuddleLamp: Spatially-aware Mobile Displays for Ad-hoc Around-the-Table Collaboration" (ACM ITS '14), Roman Rädle, Hans-Christian Jetter, Nicolai Marquardt, Harald Reiterer (C01), and Yvonne Rogers received the 10-Year Impact Award at the 2023 ACM Interactive Surfaces and Spaces Conference (ACM ISS 2023). The award recognizes papers that had a significant impact on the ISS community, the HCI community in general, or the industry.

The conference took place in Pittsburg, PA, USA, from November 6 to 8, 2023.

▶ Project C01
▶ Konstanz

SFB-TRR 161 DOCTORAL STUDENTS ON LAB VISITS

In 2023, several of our doctoral students spent time in international labs as their research stay abroad. Supported by the Integrated Research Training Program of the SFB-TRR 161, they were able to form valuable contacts and to advance their own projects.

Ying Zhang (A09) visited Monash University in Melbourne, Australia, for a research stay in spring 2023. She mainly worked with the Data Visualization and Immersive Analytics Lab (DVIA), which is led by Helen Purchase. During her stay, Ying explored the potential use of the interface media "tangible globe", which was developed by the DVIA lab, as an add-on for the TEAMwISE tool— an open source tool for collective behavior research developed by the Life Science Informatics Group of Falk Schreiber. She also had the chance to visit other labs with different research foci, e.g. the SensiLab led by Jon McCormack or the Transcriptomics and Bioinformatics Laboratory at the Murdoch Children's Research Institute. "The research stay was a great experience, as I got to visit a top ranked university and several research groups with quite different research directions, compositions, and working styles. To see different groups taking different approaches to investigate and represent their data was very helpful for me," says Ying about her time at Monash.

In summer 2023, **Katrin Angerbauer** (A08) stayed at the Global Disability Innovation Hub (GDI Hub) at the University College London, where she was integrated into the group of Catherine Halloway. At the GDI Hub, an academic research centre and a community interest company work together to research disability innovations and assistive technology to empower people with disabilities. During her stay, Katrin started working on her Access Stories project where she wants to explore the design space for visualizations of access information as an aid for planning and awareness creation. She was also involved in other projects of Prof. Holloway's group, e.g. a literature review to be published at ACM CHI 2024, and used her stay for a lot of networking. "Beyond my research experience, I was very impressed by London's disability aware culture," Katrin says. "I never felt the need to apologize for my access needs, which was a liberating experience."
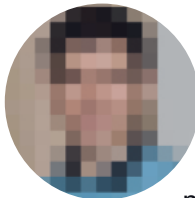
From February to April 2023, **Dimitar Garkov** (INF) joined the Algorithmics group at the University of Perugia led by Giuseppe Liotta and worked on situating, planning, and designing a user experiment on collaboration for complex problem solving in immersive environments. After some preliminary work with Tommaso Piselli, Dimitar implemented a prototype in Unity in order to run an experiment using a Meta Quest Pro headset and handtracking. The prototype was then iterated over in expert meetings and used to collect preliminary evidence to finalize the design. Results of the experiment will be submitted for publication once all data has been analyzed. "Not only was the stay an excellent opportunity to live abroad in a different culture, but also very interesting to see the different approaches our groups take to tackling research problems. I benefitted greatly from the insights my colleagues shared in and well beyond the topics of network science and graph drawing, as well as experiment design," Dimitar says about his research stay.

Frederik Dennig (A03) spent three months with the Visualization and Graphics group at Utrecht University, which is led by Alexandru C. Talea. As a member of Project A03 "Quantification of Visual Explainability", Frederik's research aims at explaining the outcomes of dimensionality reduction methods using quantitative methods. During his research stay, he had the opportunity to present his previous work and to discuss it with members of the research group: "The ideas proposed by Prof. Talea were invaluable and remain the basis for current and future collaborations. I also had many discussions and brainstormed about topics with other members of the group, where we found relevant and significant overlap." During his stay, Frederik was able to finish the paper *FS/DS: A Theroetical Framework for the Dual Analysis of Feature Space and Data Space*, which is now published in IEEE TCVG. The paper describes one coherent framework for the joint analysis of data items and data dimensions combining previously disjoint approaches.

For the full reports, visit our blog: www. visual-computing.org

DOCTORAL SPEAKERS

Sita Vriend (A01) and **Patrick Paetzold** (A01) are the current doctoral speakers. As such, they represent the interests of the doctoral students and organize events such as doctoral retreats and workshops.

Left: Sita Vriend,
Right: Patrick Paetzold.

DISSERTATIONS

Since May 2023, two candidates completed and successfully defended their dissertations:

- Nils Rodrigues (B01), Adaptation of Point- and Line-based Visualization
- Sabrina Jaeger-Honz (D04), Combining Bio- and Cheminformatics for Small Data Sets: Microcystins as a Use Case

Congratulations!

DOCTORAL RETREAT

This year's doctoral retreat was held from April 10th to 12th at Burg Rothenfels—a castle in the quiet village of Rothenfels between Frankfurt and Würzburg.

After getting to know each other over dinner and board games on the first evening at the venue, the second day started of with a social event. Jan Sachers, an expert archer, taught the group of doctoral students about the history of archery. Of course, everyone also got the chance to practice shooting arrows at a target. With guidance from Jan, all participants were able to improve their accuracy throughout the event.

The afternoon started with a round of presentations: each doctoral researcher presented their work so far as well as their plans for the rest of the third funding period. During Q&A slots after each presentation, the participants discussed potential collaborations. After the presentations, the doctoral researchers talked bout more general issues they encountered during their PhD, how they approached them and how they go about planning their work.

The last morning was spent sharing final thoughts and wrapping up discussions from the day before. During a short hike, the participants discussed collaborations and projects in a less formal setting.

sv

Image: Sita Vriend

NEW DOCTORAL RESEARCHERS

Yannik Bosch, D04, Konstanz
Lucas Joos, A03, Konstanz
Wilhelm Kerle-Malcharek, D04, Konstanz

Naomi Amber Reichmann, D02, Konstanz
Carina Truschel, B06, Konstanz
Yumeng Xue, A01, Konstanz

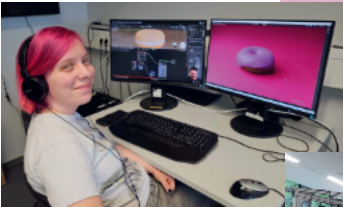A warm welcome to all new doctoral researchers!

DFG PHOTO CALENDAR

For the 2024 edition of the DFG Photo Calendar, the SFB-TRR 161 contributed an image for the month of July. The images in the calendar were selected from over 60 submissions to the call issued by the DFG. On its twelve calendar sheets, the calendar illustrates in what varied and creative ways DFG projects approach the topic of storing knowledge.

The SFB-TRR 161 contribution demonstrates that storing knowledge in datasets can not only be useful, but also very aesthetic. By applying different dimensionality reduction techniques to existing large datasets, members of Project **A08** compiled a collage of stunning, artistic images. Their approach to creating artwork with dimensionality reduction was previously also published in the IEEE VIS Arts Program.

▶ R. Cutura, K. Angerbauer, F. Heyen, N. Hube and M. Sedlmair, "DaRt: Generative Art using Dimensionality Reduction Algorithms," 2021 IEEE VIS Arts Program (VISAP), New Orleans, LA, USA, 2021, pp. 59-72, doi: 10.1109/VISAP52981.2021.00013.

PROGRAMMING SKILLS, VISUALIZATION TECHNIQUES, AND VIRTUAL DONUTS

Between spring 2023 and spring 2024, the SFB-TRR 161 made it possible for a total of thirteen school students to discover the world of visual computing during a BOGY internship.

In October 2023 and February 2024, two groups of students from 10th and 9th grade spent a week at the Visualization Research Center in Stuttgart where they learned the basics of hardware programming and 3D modeling. During lecture visits and demos with doctoral students, they got an impression of what studying and working at a university looks like.

In Konstanz, two students spent a week in the Visual Computing group where they worked on programming their own virtual reality game. Another student visited the Life Science Informatics group. The highlight of her week was modeling, texturing, and animating a donut in Blender which she then also got to print on a 3D printer.

Thank you to all staff who tutored the students and made their internships such an enriching experience!

*Two of our BOGY interns at the University of Konstanz.*

BOGY group at the University of Stuttgart in February 2024.

GIRLS' DAY 2024

On April 25th 2024 it was once again time for the Girls' Day, the national vocational orientation day for girls from grade 5 upwards. After our programming workshops in previous years, we wanted to offer a slightly different format to foster an interest in computer science. Tutored by doctoral students Rebecca Kehlbeck and Patrick Paetzold (A01), one student had the opportunity to spend an entire day at the computer science department at the University of Konstanz and to gain an insight into different research areas and technologies.

The day started off with a little programming project. Using Processing, the student developed a simple game and was able to gather some initial experience in software development.
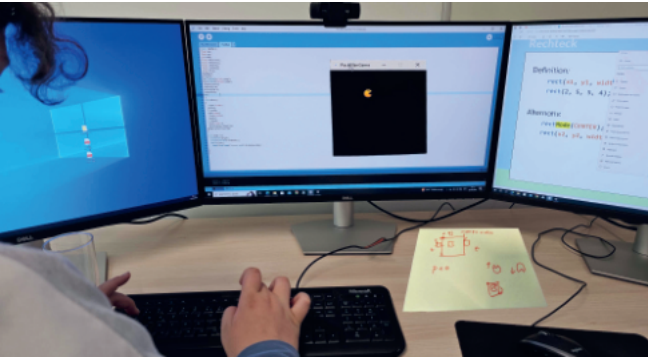

First programming exercise in Processing. Image: cwi

One highlight of the day was a tour of the powerwall. On the impressive, high-resolution display, our student viewed some fascinating visualizations. Up next was a visit to the control room of the imaging hangar. Although a biological experiment was running and access to the hangar was not possible, we were still able to gain an insight into the state-of-the-art research environment and learn more about the interface between biology and computer science.

Another highlight was the encounter with the painting robot e-David. It creates works of art on canvases with paints and brushes, just like a real artist. We were fascinated by the robot's extensive painting techniques and were able to see how technology and art combine in an innovative way.
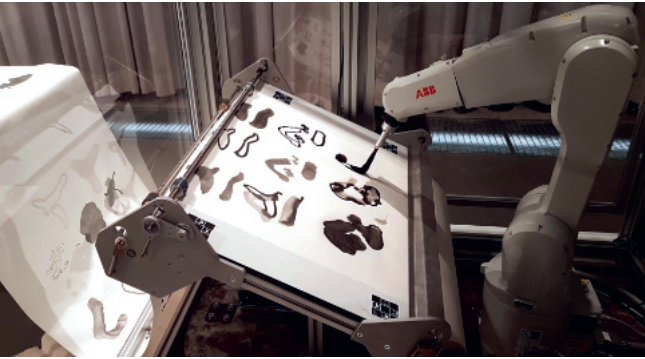
Painting robot e-David. Image: cwi

Overall, the Girls' Day at the University of Konstanz was an inspiring experience for our participant, giving her insights into different areas of science and technology and encouraging her to pursue her interests in these fields.
pp, cwi

Since February 2024, the SFB-TRR 161 has also been active on the social media platform Instagram:

https://www.instagram.com/sfbtrr161/

Via photos, videos, and graphics we share news about our research and our members. The new Instagram channel is part of our long-term goal to bring visual computing closer to the general public.

SFB-TRR 161 ON SOCIAL MEDIA
Some Facts & Numbers
04/2023 – 04/2024

#girlsday #sfbtrr161 #quantification #QiVC2023 #EuroVis2023 #VisualComputing #keynote #vr #hci #WiC2023 #bogy #womenintech #openscience #unikonstanz #conference #DFG #visualization #genderequality #diversity #machinelearning #programming #unistuttgart #codingisfun

70 Social Media Posts

9 Blog Entries

320 Followers on Social Media

427 Likes

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