
German
HCI
CHI23
Hamburg | Germany
Hamburg 2023

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This year's edition of the German HCI party has the distinct honor of being hosted in Germany!

We have **6 journal articles**, **65 full papers**, **29 LBWs**, **11 interactivities**, **1 alt.chi** paper, **1 DC paper.** Additionally, we lead **3 workshops** and give **2 courses**. **4 papers** were awarded a **best paper award**, and **6 papers** received an **honourable mention**.

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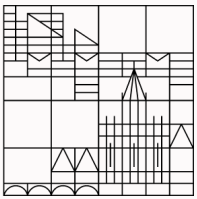

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“What if everyone is able to program?” – Exploring the Role of Software Development in Science Fiction

Kevin Krings (Cyber-Physical Systems, University of Siegen, Siegen, Germany), Nino S. Bohn (Cyber-Physical-Systems, University of Siegen, Siegen, Germany), Nora Anna Luise Hille (Cyber-Physical Systems, University of Siegen, Siegen, Germany), Prof. Dr. Thomas Ludwig (Cyber-Physical Systems, University of Siegen, Siegen, Germany)

For decades, research around emerging technologies has been inspired by science fiction and vice versa. While so far almost only the technologies themselves have been considered, we explore the underlying software development and programming approaches. We therefore conduct a detailed media content analysis of twenty-seven movies that examines the role of software development in science fiction by identifying and investigating new approaches to programming and how software development is conceptualized portrayed within science fiction scenes. With the additional analysis of eighteen design fiction stories exploring the scenario “What if everyone is able to program?”, we envision potential impacts of the democratization of software development on business and society. Our study opens new discussions and perspectives, by investigating the current vision of the future of programming and uncovers new approaches to software development which can serve as a starting point for further research in the HCI community.

"We Need a Big Revolution in Email Advertising":Users' Perception of Persuasion in Permission-based Advertising Emails

Anastasia Sergeeva (University of Luxembourg), Björn Rohles (University of Luxembourg), Verena Distler (University of Luxembourg / Bundeswehr University Munich), Vincent Koenig (University of Luxembourg)

Persuasive tactics intend to encourage users to open advertising emails. However, these tactics can overwhelm users, which makes them frustrated and leads to lower open rates. This paper intends to understand which persuasive tactics are used and how they are perceived by users. We first developed a categorization of inbox-level persuasive tactics in permission-based advertising emails. We then asked participants to interact with an email inbox prototype, combined with interviews (N=32), to investigate their opinions towards advertising emails and underlying persuasive tactics. Our qualitative findings reveal poor user experience with advertising emails, which was related to feeling surveilled by companies, forced subscription, high prior knowledge about persuasive tactics, and a desire for more agency. We also found that using certain persuasive tactics on the inbox level is perceived as ethically inappropriate. Based on these insights, we provide design recommendations to improve advertising communication and make such emails more valuable to users.

About Engaging and Governing Strategies: A Thematic Analysis of Dark Patterns in Social Networking Services

HONORABLE MENTION

Thomas Mildner (University of Bremen), Gian-Luca Savino (University of St.Gallen), Philip R. Doyle (University College Dublin), Benjamin R. Cowen (University College Dublin), Rainer Malaka (University of Bremen)

Research in HCI has shown a growing interest in unethical design practices across numerous domains, often described as "dark patterns". There is, however, a literature gap regarding social networking services (SNSs). Meanwhile, related studies emphasise a need for more control over personal data and agency on SNSs. To understand how dark patterns manifest in SNSs, we recorded over 16 hours of usage from four mobile SNS applications: Facebook, Instagram, TikTok, and Twitter. To mitigate possible difficulties of non-experts studied before, we turned towards six HCI experts as reviewers. Two researchers then conducted a thematic analysis based on existing taxonomies. Our results deliver two key findings: We observed which instances occur in SNSs and identified two strategies - engaging and governing - with five dark patterns undescribed before. This work expands prior research by demonstrating how existing taxonomies can be applied in alternative contexts, enabling the discovery of undefined ones.

Accidentally Evil: On Questionable Values in Smart Home Co-Design

Arne Berger (Computer Science, Languages, Anhalt University of Applied Sciences, Koethen, Germany), Albrecht Kurze (Computer Science, Chemnitz University of Technology, Chemnitz, Germany), Andreas Bischof (Chemnitz University of Technology, Chemnitz, Germany), Jesse Josua Benjamin (Lancaster University, Imagination Lancaster, Lancaster, United Kingdom), Richmond Y. Wong (Digital Media, Georgia Institute of Technology, Atlanta, Georgia, United States), Nick Merrill (Daylight Lab, Center for Long-Term Cybersecurity, University of California, Berkeley, Berkeley, California, United States)

An ongoing mystery of HCI is how do well-intentioned designers consistently enable products with unintentionally evil consequences. Using “questionable values” as a lens, we retell and analyze four design scenarios for smart homes that were created by participants with an IoT toolkit we designed. The selected design scenarios reveal practices that violate principles of responsible smart home design. Through our analysis we show (1) how participants explore sensor-driven objectification of the home then leverage data for surveillance, nudging, and control over others; (2) how the dominant technosolutionist narratives of efficiency and productivity ground such questionable values; (3) and how the materiality of mass-produced sensors pre-mediates questionable design scenarios. We discuss how to attend to and utilize questionable values in design: Making space for questionable values will empower design researchers to better “look around corners”, anticipating tomorrow’s concerns and forestalling the worst of their harms.

An Examination of Motivation in Physical Therapy Through the Lens of Self-Determination Theory: Implications for Game Design

HONORABLE MENTION

Maria Aufheimer (KIT), Kathrin Gerling (KIT), Nicholas Graham (Queen's University), Mari Naaris (KU Leuven), Marco Konings (KU Leuven), Elegast Monbaliu (KU Leuven), Hans Hallez (KU Leuven), Els Ortibus (UZ Leuven)

While it is widely assumed that games can engage patients in therapy through their inherent 'motivational pull', relatively little attention has been paid to what HCI games research can learn from strategies employed by therapists. We address this gap by leveraging Self-Determination Theory (SDT) and its mini-theories Basic Psychological Needs Theory and Organismic Integration Theory as a theoretical lens on physical therapy for children and adolescents. Results from in-depth interviews with twelve therapists show that they carefully adjust sessions to allow patients to experience competence, making more comprehensive adjustments than currently offered by games. Additionally, we highlight how therapists leverage their relationship with patients to support motivation, but struggle to reconcile meaningful experiences of autonomy with therapeutic goals. On this basis, we reflect on implications for researchers and designers who create games for physical therapy, and the potential of SDT to provide a foundation for game design and therapeutic practice.

ARound the Smartphone: Investigating the Effects of Virtually-Extended Display Size on Spatial Memory

Sebastian Hubenschmid (University of Konstanz), Johannes Zagermann (University of Konstanz), Daniel Leicht (University of Konstanz), Harald Reiterer (University of Konstanz), Tiare Feuchtner (University of Konstanz)

Smartphones conveniently place large information spaces in the palms of our hands. While research has shown that larger screens positively affect spatial memory, workload, and user experience, smartphones remain fairly compact for the sake of device ergonomics and portability. Thus, we investigate the use of hybrid user interfaces to virtually increase the available display size by complementing the smartphone with an augmented reality head-mounted display. We thereby combine the benefits of familiar touch interaction with the near-infinite visual display space afforded by augmented reality. To better understand the potential of virtually-extended displays and the possible issues of splitting the user's visual attention between two screens (real and virtual), we conducted a within-subjects experiment with 24 participants completing navigation tasks using different virtually-augmented display sizes. Our findings reveal that a desktop monitor size represents a "sweet spot" for extending smartphones with augmented reality, informing the design of hybrid user interfaces.

AutoVis: Enabling Mixed-Immersive Analysis of Automotive User Interface Interaction Studies

Pascal Jansen (Ulm University), Julian Britten (Ulm University), Alexander Häusele (Ulm University), Thilo Segschneider (Ulm University), Mark Colley (Ulm University), Enrico Rukzio (Ulm University)

Automotive user interface (AUI) evaluation becomes increasingly complex due to novel interaction modalities, driving automation, heterogeneous data, and dynamic environmental contexts. Immersive analytics may enable efficient explorations of the resulting multilayered interplay between humans, vehicles, and the environment. However, no such tool exists for the automotive domain. With AutoVis, we address this gap by combining a non-immersive desktop with a virtual reality view enabling mixed-immersive analysis of AUIs. We identify design requirements based on an analysis of AUI research and domain expert interviews (N=5). AutoVis supports analyzing passenger behavior, physiology, spatial interaction, and events in a replicated study environment using avatars, trajectories, and heatmaps. We apply context portals and driving-path events as automotive-specific visualizations. To validate AutoVis against real-world analysis tasks, we implemented a prototype, conducted heuristic walkthroughs using authentic data from a case study and public datasets, and leveraged a real vehicle in the analysis process.

BrailleBuddy: A Tangible User Interface to Support Children with Visual Impairment in Learning Braille

Florian Lang (LMU Munich), Verena Pues (LMU Munich), Albrecht Schmidt (LMU Munich), Tonja-Katrin Machulla (TU Chemnitz)

Learning to read Braille is crucial to academic success for people with blindness or severe visual impairment. In our work, we investigate how we can support early learning of Braille with tangible computing. In a human-centered inclusive design process with interviews, six design iterations with prototypes, and feedback from experts, students, and teachers, we created BrailleBuddy. BrailleBuddy is a tangible user interface supporting children with visual impairments in learning Braille. We evaluated BrailleBuddy in a user study with children with blindness. Our results show that BrailleBuddy provides intrinsic motivation for learning Braille and can be used by children without supervision. BrailleBuddy complements the educational program as it allows children to play with and explore Braille characters at their own pace, thus lowering the challenge of learning to read Braille. In addition, an open-source toolkit is provided to enable educators and researchers to support individual requirements.

Challenges and Opportunities for Interactive Technology to Support Parents of HIV-Positive Children in Ethiopia in the Disclosure Process

Alemitu Bezabih (KU Leuven), Kathrin Gerling (KIT), Workeabeba Taye (Addis Ababa University), Vero Vanden Abeele (KU Leuven)

Fearing stigma, parents often hide their children's HIV diagnosis from them, and postpone disclosure, in turn negatively impacting children's well-being. Our work explores whether interactive technology can support disclosure. In the first study, we examine disclosure experiences and the role of interactive technology from the perspective of HIV-positive children and parents. Through Thematic Analysis, we highlight how disclosure is linked with parents' own experience of HIV, and that disclosure needs to be viewed as a process. On this basis, we contribute an experience prototype that guides parents through an incremental disclosure process using interactive storytelling. In a second study, we evaluate the prototype through interviews with six parents. Leveraging Interpretative Phenomenological Analysis, we show that the prototype has potential to transform how parents understand and approach disclosure. Based on our results, we present further design directions, and discuss the (limitations of the) role that technology can play in this context.

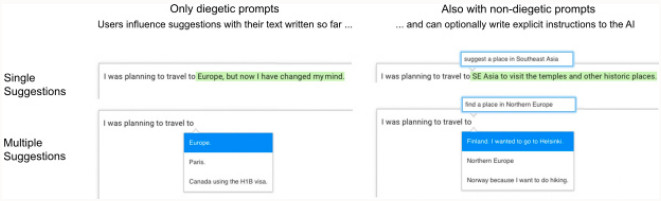
Tailor Twist: Assessing Rotational Mid-Air Interactions for Augmented Reality

Dominik Schön (Technical University of Darmstadt), Thomas Kosch (HU Berlin), Florian Müller (LMU Munich), Martin Schmitz (Saarland Informatics Campus), Sebastian Günther (Technical University of Darmstadt), Lukas Bommhardt (Technical University of Darmstadt), Max Mühlhäuser (Technical University of Darmstadt)

Mid-air gestures, widely used in today's Augmented Reality applications, are prone to the "gorilla arm" effect, leading to discomfort with prolonged interactions. While prior work has proposed metrics to quantify this effect and means to improve comfort and ergonomics, these works usually only consider simplistic, one-dimensional AR interactions, like reaching for a point or pushing a button. However, interacting with AR environments also involves far more complex tasks, such as rotational knobs, potentially impacting ergonomics. This paper advances the understanding of the ergonomics of rotational mid-air interactions in AR. For this, we contribute the results of a controlled experiment exposing the participants to a rotational task in the interaction space defined by their arms' reach. Based on the results, we discuss how novel future mid-air gesture modalities benefit from our findings concerning ergonomic-aware rotational interaction.

Choice Over Control: How Users Write with Large Language Models using Diegetic and Non-Diegetic Prompting

Hai Dang (University of Bayreuth), Sven Goller (University of Bayreuth), Florian Lehmann (University of Bayreuth), Daniel Buschek (University of Bayreuth) (Ed.)



We propose a conceptual perspective on prompts for Large Language Models (LLMs) that distinguishes between (1) diegetic prompts (part of the narrative, e.g. "Once upon a time, I saw a fox..."), and (2) non-diegetic prompts (external, e.g. "Write about the adventures of the fox."). With this lens, we study how 129 crowd workers on Prolific write short texts with different user interfaces (1 vs 3 suggestions, with/out non-diegetic prompts; implemented with GPT-3): When the interface offered multiple suggestions and provided an option for non-diegetic prompting, participants preferred choosing from multiple suggestions over controlling them via non-diegetic prompts. When participants provided non-diegetic prompts it was to ask for inspiration, topics or facts. Single suggestions in particular were guided both with diegetic and non-diegetic information. This work informs human-AI interaction with generative models by revealing that (1) writing non-diegetic prompts requires effort, (2) people combine diegetic and non-diegetic prompting, and (3) they use their draft (i.e. diegetic information) and suggestion timing to strategically guide LLMs.

Co-Writing with Opinionated Language Models Affects Users' Views

HONORABLE MENTION

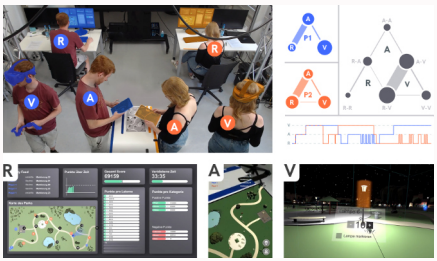
Maurice Jakesch (Cornell University), Advait Bhat (Microsoft Research), Daniel Buschek (University of Bayreuth), Lior Zalmanson (Tel Aviv University), Mor Naaman (Cornell Tech)

If large language models like GPT-3 preferably produce a particular point of view, they may influence people's opinions on an unknown scale. This study investigates whether a language-model-powered writing assistant that generates some opinions more often than others impacts what users write -- and what they think. In an online experiment, we asked participants (N=1,506) to write a post discussing whether social media is good for society. Treatment group participants used a language-model-powered writing assistant configured to argue that social media is good or bad for society. Participants then completed a social media attitude survey, and independent judges (N=500) evaluated the opinions expressed in their writing. Using the opinionated language model affected the opinions expressed in participants' writing and shifted their opinions in the subsequent attitude survey. We discuss the wider implications of our results and argue that the opinions built into AI language technologies need to be monitored and engineered more carefully.

Collaborating Across Realities: Analytical Lenses for Understanding Dyadic Collaboration in Transitional Interfaces

BEST PAPER 🏆

Jan-Henrik Schröder (University of Lübeck), Daniel Schacht (University of Lübeck), Niklas Peper (University of Lübeck), Anita Marie Hamurculu (University of Lübeck), Hans-Christian Jetter (University of Lübeck)



Transitional Interfaces are a yet underexplored, emerging class of cross-reality user interfaces that enable users to freely move along the reality-virtuality continuum during collaboration. To analyze and understand how such collaboration unfolds, we propose four analytical lenses derived from an exploratory study of transitional collaboration with 15 dyads. While solving a complex spatial optimization task, participants could freely switch between three contexts, each with different displays (desktop screens, tablet-based augmented reality, head-mounted virtual reality), input techniques (mouse, touch, handheld controllers), and visual representations (monoscopic and allocentric 2D/3D maps, stereoscopic egocentric views). Using the rich qualitative and quantitative data from our study, we evaluated participants' perceptions of transitional collaboration and identified commonalities and differences between dyads. We then derived four lenses including metrics and visualizations to analyze key aspects of transitional collaboration: (1) place and distance, (2) temporal patterns, (3) group use of contexts, (4) individual use of contexts.

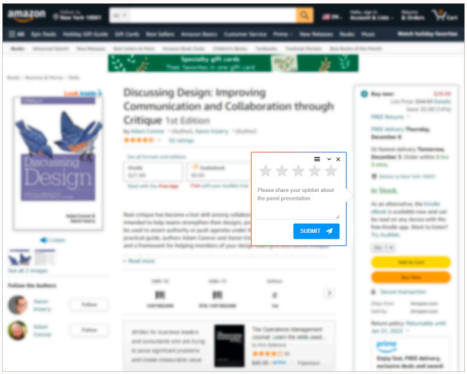
Comparing Dwell time, Pursuits and Gaze Gestures for Gaze Interaction on Handheld Mobile Devices

Omar Namnakani (University of Glasgow, Glasgow), Yasmeen Abdrabou (University of the Bundeswehr Munich, University of Glasgow), Jonathan Grizou (University of Glasgow), Augusto Esteves (University of Lisbon), Mohamed Khamis (University of Glasgow)

Gaze is promising for hands-free interaction on mobile devices. However, it is not clear how gaze interaction methods compare to each other in mobile settings. This paper presents the first experiment in a mobile setting that compares three of the most commonly used gaze interaction methods: Dwell time, Pursuits, and Gaze gestures. In our study, 24 participants selected one of 2, 4, 9, 12 and 32 targets via gaze while sitting and while walking.Results show that input using Pursuits is faster than Dwell time and Gaze gestures especially when there are many targets. Users prefer Pursuits when stationary, but prefer Dwell time when walking. While selection using Gaze gestures is more demanding and slower when there are many targets, it is suitable for contexts where accuracy is more important than speed. We conclude with guidelines for the design of gaze interaction on handheld mobile devices.

CrowdSurfer: Seamlessly Integrating Crowd-Feedback Tasks into Everyday Internet Surfing

Saskia Haug (KIT, h-lab), Ivo Benke (KIT, h-lab), Daniel Fischer (KIT, h-lab), Alexander Maedche (KIT, h-lab)



Crowd feedback overcomes scalability issues of feedback collection on interactive website designs. However, collecting feedback on crowdsourcing platforms decouples the feedback provider from the context of use. This creates more effort for crowdworkers to immerse into such context in crowdsourcing tasks. In this paper, we present CrowdSurfer, a browser extension that seamlessly integrates design feedback collection in crowdworkers' everyday internet surfing. This enables the scalable collection of in situ feedback and, in parallel, allows crowdworkers to flexibly integrate their work into their daily activities. In a field study, we compare the CrowdSurfer against traditional feedback collection. Our qualitative and quantitative results reveal that, while in situ feedback with the CrowdSurfer is not necessarily better, crowdworkers appreciate the effortless, enjoyable, and innovative method to conduct feedback tasks. We contribute with our findings on in situ feedback collection and provide recommendations for the integration of crowdworking tasks in everyday internet surfing.

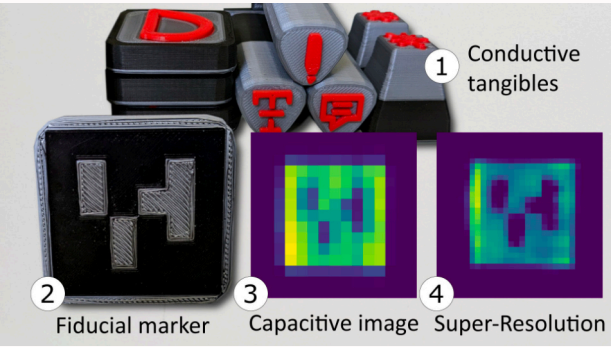
Don't Panic! - Influence of Virtual Stressor Representations from the ICU Context on Perceived Stress Levels

Sebastian Weiß (OFFIS), Wilko Heuten (OFFIS)

Intensive care nurses are prone to suffering from chronic stress due to constant exposure to two main profession-related stressors: interruption and time pressure. These stressors have detrimental effects on the well-being of the nursing staff and, by proxy, the patients. To alleviate stress, increase safety, and support the training of stressful scenarios, we investigate the impact these stressors have on subjective and objective stress levels in a virtual environment. We designed an intensive care unit in which participants (n=26, 18 healthcare professionals) perform common tasks, e.g. refilling an infusion pump, whilst being exposed to interruptions and time pressure. Results from our between-subjects study provide data indicating stress increase in both stressor conditions, suggesting that artificially evoking work-related stressors for stress inoculation training (SIT) is a possible extension to simulation training during nursing education. This knowledge is helpful for designing training scenarios of safety critical situations early in the professional apprenticeship.

Deep Learning Super-Resolution Network Facilitating Fiducial Tangibles on Capacitive Touchscreens

Marius Rusu (LMU Munich), Sven Mayer (LMU Munich)



Over the last years, we have seen many approaches using tangibles to address the limited expressiveness of touchscreens. Mainstream tangible detection uses fiducial markers embedded in the tangibles. However, the coarse sensor size of capacitive touchscreens makes tangibles bulky, limiting their usefulness. We propose a novel deep-learning super-resolution network to facilitate fiducial tangibles on capacitive touchscreens better. In detail, our network super-resolves the markers enabling off-the-shelf detection algorithms to track tangibles reliably. Our network generalizes to unseen marker sets, such as AprilTag, ArUco, and ARToolKit. Therefore, we are not limited to a fixed number of distinguishable objects and do not require data collection and network training for new fiducial markers. With extensive evaluation including real-world users and five showcases, we demonstrate the applicability of our open-source approach on commodity mobile devices and further highlight the potential of tangibles on capacitive touchscreens.

FingerMapper: Mapping Finger Motions onto Virtual Arms to Enable Safe Virtual Reality Interaction in Confined Spaces

Wen-Jie Tseng (Telecom Paris, IP Paris, TU Darmstadt), Samuel Huron (Telecom Paris, IP Paris), Eric Lecolinet (Telecom Paris, IP Paris), Jan Gugenheimer (Telecom Paris, IP Paris, TU Darmstadt)

Whole-body movements enhance the presence and enjoyment of Virtual Reality (VR) experiences. However, using large gestures is often uncomfortable and impossible in confined spaces (e.g., public transport). We introduce FingerMapper, mapping small-scale finger motions onto virtual arms and hands to enable whole-body virtual movements in VR. In a first target selection study (n=13) comparing FingerMapper to hand tracking and ray-casting, we found that FingerMapper can significantly reduce physical motions and fatigue while having a similar degree of precision. In a consecutive study (n=13), we compared FingerMapper to hand tracking inside a confined space (the front passenger seat of a car). The results showed participants had significantly higher perceived safety and fewer collisions with FingerMapper while preserving a similar degree of presence and enjoyment as hand tracking. Finally, we present three example applications demonstrating how FingerMapper could be applied for locomotion and interaction for VR in confined spaces.

Dying, Death and the Afterlife in Human-Computer Interaction. A Scoping Review

Ruben Albers (University of Siegen), Shadan Sadeghian (University of Siegen), Matthias Laschke (University of Siegen), Marc Hassenzahl (University of Siegen)

Dying is a universal experience that entails uncertainty, loss, and termination. Often, people face death unprepared and miss out on opportunities to shape their final stage of life as well as their afterlife. To better understand how thanato-technology can support the dying and the bereaved, we performed a scoping review on the current state-of-art in Human Computer Interaction. Following the PRISMA-ScR procedure, we gathered and analyzed 107 relevant papers. We categorized theoretical and conceptual contributions into three overarching themes: digital remains, remembrance, and coping. We further highlight 18 practices, such as curation, honor-ing and letting go. We show that technology can help to capture the identity of the deceased, to validate the life lived, and to come to terms with death. However, available approaches focus more on the bereaved than on the dying. In addition, potentially important aspects of dying (e.g., balancing involvement and autonomy, spiritual meaning-making) remain largely unexplored.

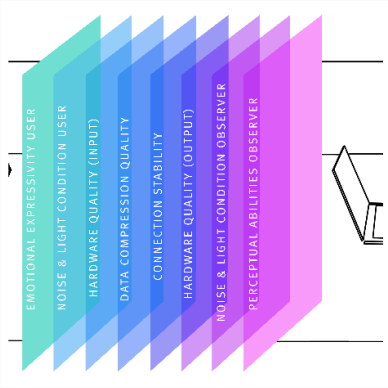
Designing for Uncontrollability: Drawing Inspiration from the Blessing Companion

Sara Wolf (Institute Human-Computer Media, Julius-Maximilians-Universität, Würzburg, Germany), Simon Luthe (Institute of Protestant Theology, Religious Education, Julius-Maximilians-Universität, Würzburg, Germany), Lennart Baumeister (Institute Human-Computer Media, Julius-Maximilians-Universität, Würzburg, Germany), Frauke Mörike (Department of Psychology, Ergonomics, Technische Universität Berlin, Germany), Vyjayanthi Janakiraman (Design department, York University, Toronto, Ontario, Canada), Jörn Hurtienne (Chair of Psychological Ergonomics, Julius-Maximilians-Universität Würzburg, Würzburg, Germany)

This paper presents an inspirational concept for companion technology design, uncontrollability, and a corresponding artefact, the Blessing Companion. Both originated from a research through design project exploring companion technologies for blessing rituals. We established an exchange with Protestant theologians, explored believers' experiences of blessings, co-speculated on potential technologies, and refined the resulting ideas through ideation, prototyping, and testing. Inspired by believers' descriptions of blessing experiences as not plannable, predictable, controllable, or enforceable, we adopted the concept of uncontrollability, explored how it might be implemented in companion technologies, and designed the Blessing Companion. The Blessing Companion embodies uncontrollability through its ambiguous appearance and (partly) uncontrollable behaviour. It thus stands in contrast to the prevailing on-demand and user-driven interaction paradigms. We discuss how uncontrollability can be reflected in content, form, and interaction, highlight respective possibilities for companion technologies, and reflect on the Blessing Companion as an example of designing for religious rituals.

Empathic Accuracy and Mental Effort during Remote Assessments of Emotions

Stephan Huber (Julius-Maximilians-Universität Würzburg, Chair for Psychological Ergonomics, Würzburg), Natalie Rathß (Julius-Maximilians-Universität Würzburg, Chair for Psychological Ergonomics, Würzburg)



Observing users in remote settings is unfavorable because it adds filters altering the information that underlie judgement. Still, the COVID pandemic led to an unprecedented popularity of remote user experience tests. In this work, we revisited the question, which information is most important for evaluators to assess users' emotions successfully and efficiently. In an online study, we asked N=55 participants to assess users' emotions from short videos of 30 interaction situations. As independent variable, we manipulated the combination of the information channels video of users, video of the interactive technology, and audio within subjects. Our findings indicate that empathic accuracy is highest and mental effort is lowest when all stimuli are present. Surprisingly, empathic accuracy was lowest and mental effort highest, when only video of users was available. We discuss these findings in the light of emotion literature focusing on persons' facial expressions and derive practical implications for remote observations.

Exploring Pseudo-Stiffness to Enrich the Haptic Experience in Virtual Reality

Yannick Weiss (LMU Munich), Steeven Villa (LMU Munich), Albrecht Schmidt (LMU Munich), Sven Mayer (LMU Munich), Florian Müller (LMU Munich)

Providing users with a haptic sensation of the hardness and softness of objects in virtual reality is an open challenge. While physical props and haptic devices help, their haptic properties do not allow for dynamic adjustments. To overcome this limitation, we present a novel technique for changing the perceived stiffness of objects based on a visuo-haptic illusion. We achieved this by manipulating the hands' Control-to-Display (C/D) ratio in virtual reality while pressing down on an object with fixed stiffness. In the first study (N=12), we determine the detection thresholds of the illusion. Our results show that we can exploit a C/D ratio from 0.7 to 3.5 without user detection. In the second study (N=12), we analyze the illusion's impact on the perceived stiffness. Our results show that participants perceive the objects to be up to 28.1% softer and 8.9% stiffer, allowing for various haptic applications in virtual reality.

When XR and AI Meet - A Scoping Review on Extended Reality and Artificial Intelligence

Teresa Hirzle (University of Copenhagen), Florian Müller (LMU Munich), Fiona Draxler (LMU Munich), Martin Schmitz (Saarland University), Pascal Knierim (Universität Innsbruck, Bundeswehr University Munich), Kasper Hornbæk (University of Copenhagen)

Research on Extended Reality (XR) and Artificial Intelligence (AI) is booming, which has led to an emerging body of literature in their intersection. However, the main topics in this intersection are unclear, as are the benefits of combining XR and AI. This paper presents a scoping review that highlights how XR is applied in AI research and vice versa. We screened 2619 publications from 203 international venues published between 2017 and 2021, followed by an in-depth review of 311 papers. Based on our review, we identify five main topics at the intersection of XR and AI, showing how research at the intersection can benefit each other. Furthermore, we present a list of commonly used datasets, software, libraries, and models to help researchers interested in this intersection. Finally, we present 13 research opportunities and recommendations for future work in XR and AI research.

Going, Going, Gone: Exploring Intention Communication for Multi-User Locomotion in Virtual Reality

BEST PAPER 🏆

Julian Rasch (LMU Munich), Vladislav Dmitrievic Rusakov (LMU Munich), Martin Schmitz (Saarland University, Saarland Informatics Campus), Florian Müller (LMU Munich)

Exploring virtual worlds together with others adds a social component to the Virtual Reality (VR) experience that increases connectedness. In the physical world, joint locomotion comes naturally through implicit intention communication and subsequent adjustments of the movement patterns. In VR, however, discrete locomotion techniques such as point&teleport come without prior intention communication, hampering the collective experience. Related work proposes fixed groups, with a single person controlling the group movement, resulting in the loss of individual movement capabilities. To close the gap and mediate between these two extremes, we introduce three intention communication methods and explore them with two baseline methods. We contribute the results of a controlled experiment (n=20) investigating these methods from the perspective of a leader and a follower in a dyadic locomotion task. Our results suggest shared visualizations support the understanding of movement intentions, increasing the group feeling while maintaining individual freedom of movement.

Handheld Tools Unleashed: Mixed-Initiative Physical Sketching with a Robotic Printer

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Personal fabrication has mostly focused on handheld tools as embodied extensions of the user, and machines like laser cutters and 3D printers automating parts of the process without intervention. Although interactive digital fabrication has been explored as a middle ground, existing systems have a fixed allocation of user intervention vs. machine autonomy, limiting flexibility, creativity, and improvisation. We explore a new class of devices that combine the desirable properties of a handheld tool and an autonomous fabrication robot, offering a continuum from manual and assisted to autonomous fabrication, with seamless mode transitions. We exemplify the concept of mixed-initiative physical sketching with a working robotic printer that can be handheld for free-hand sketching, can provide interactive assistance during sketching, or move about for computer-generated sketches. We present interaction techniques to seamlessly transition between modes, and sketching techniques benefitting from these transitions to, e.g., extend (upscale, repeat) or revisit (refine, color) sketches. Our evaluation with seven sketchers illustrates that RoboSketch successfully leverages each mode's strengths, and that mixed-initiative physical sketching makes computer-supported sketching more flexible.

Hexad-12: Developing and Validating a Short Version of the Gamification User Types Hexad Scale

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The Hexad scale is a crucial tool for personalized gamification in user experience (UX) design. However, completing a 24-item questionnaire can increase dropout rates and screen fatigue within online surveys. When included in larger surveys, scale brevity makes a difference. To reduce the time required for the assessment process, we developed and validated a 12-item version of the Hexad scale. To create it, we carried out an exploratory factor analysis on an existing data set to identify appropriate items (n=882). To validate the 12-item version, we conducted a confirmatory factor analysis on a new data set (n=1,101). Our results show that Hexad-12 outperforms the original Hexad scale regarding model fit, reliability, convergent, and discriminant validity. Therefore, Hexad-12 resolves issues found in studies using the original Hexad scale and provides a suitable and swift instrument for concisely assessing Hexad user types in tailored gamification design.

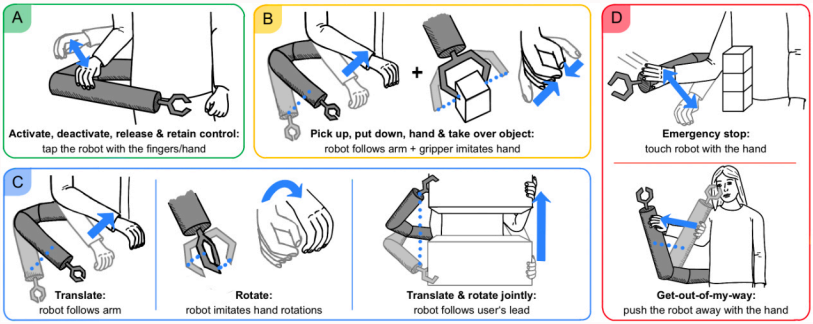
How to Communicate Robot Motion Intent: A Scoping Review

Max Pascher (Westphalian University of Applied Sciences & University of Duisburg-Essen), Uwe Gruenefeld (University of Duisburg-Essen), Stefan Schneegass (University of Duisburg-Essen), Jens Gerken (Westphalian University of Applied Sciences)

Robots are becoming increasingly omnipresent in our daily lives, supporting us and carrying out autonomous tasks. In Human-Robot Interaction, human actors benefit from understanding the robot's motion intent to avoid task failures and foster collaboration. Finding effective ways to communicate this intent to users has recently received increased research interest. However, no common language has been established to systematize robot motion intent. This work presents a scoping review aimed at unifying existing knowledge. Based on our analysis, we present an intent communication model that depicts the relationship between robot and human through different intent dimensions (intent type, intent information, intent location). We discuss these different intent dimensions and their interrelationships with different kinds of robots and human roles. Throughout our analysis, we classify the existing research literature along our intent communication model, allowing us to identify key patterns and possible directions for future research.

I Need a Third Arm! Eliciting Body-based Interactions with a Wearable Robotic Arm

Marie Muehlhaus (Saarland University, Saarland Informatics Campus, Saarbrücken, Germany), Marion Koelle (OFFIS - Institute for Information Technology, Oldenburg, Germany), Artin Saberpour (Saarland University, Saarland Informatics Campus, Saarbrücken, Germany), Jürgen Steimle (Saarland University, Saarland Informatics Campus, Saarbrücken, Germany)



Wearable robotic arms (WRA) open up a unique interaction space that closely integrates the user's body with an embodied robotic collaborator. This space affords diverse interaction styles, including body movement, hand gestures, or gaze. Yet, it is so-far unexplored which commands are desirable from a user perspective. Contributing findings from an elicitation study (N=14), we provide a comprehensive set of interactions for basic robot control, navigation, object manipulation, and emergency situations, performed when hands are free or occupied. Our study provides insights into preferred body parts, input modalities, and the users' underlying sources of inspiration. Comparing interaction styles between WRAs and off-body robots, we highlight how WRAs enable a range of interactions specific for on-body robots and how users use WRAs both as tools and as collaborators. We conclude by providing guidance on the design of ad-hoc interaction with WRAs informed by user behavior.

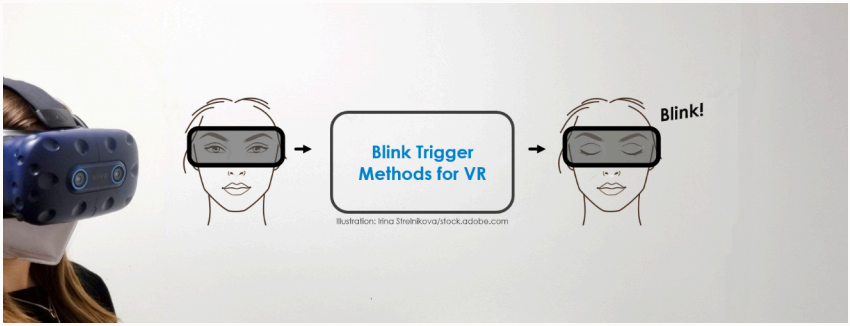
In Sync: Exploring Synchronization to Increase Trust Between Humans and Non-humanoid Robots

Wieslaw Bartkowski (University of Warsaw), Andrzej Nowak (University of Warsaw), Filip Ignacy Czajkowski (University of Warsaw), Albrecht Schmidt (LMU Munich), Florian Müller (LMU Munich)

When we go for a walk with friends, we can observe an interesting effect: From step lengths to arm movements - our movements unconsciously align; they synchronize. Prior research found that this synchronization is a crucial aspect of human relations that strengthens social cohesion and trust. Generalizing from these findings in synchronization theory, we propose a dynamical approach that can be applied in the design of non-humanoid robots to increase trust. We contribute the results of a controlled experiment with 51 participants exploring our concept in a between-subjects design. For this, we built a prototype of a simple non-humanoid robot that can bend to follow human movements and vary the movement synchronization patterns. We found that synchronized movements lead to significantly higher ratings in an established questionnaire on trust between people and automation but did not influence the willingness to spend money in a trust game.

Induce a Blink of the Eye: Evaluating Techniques for Triggering Eye Blinks in Virtual Reality

André Zenner (Saarland University & DFKI), Kristin Ullmann (Saarland University), Oscar Ariza (Universität Hamburg), Frank Steinicke (Universität Hamburg), Antonio Krüger (Saarland University & DFKI)



As more and more virtual reality (VR) headsets support eye tracking, recent techniques started to use eye blinks to induce unnoticeable manipulations to the virtual environment, e.g., to redirect users' actions. However, to exploit their full potential, more control over users' blinking behavior in VR is required. To this end, we propose a set of reflex-based blink triggers that are suited specifically for VR. In accordance with blink-based techniques for redirection, we formulate (i) effectiveness, (ii) efficiency, (iii) reliability, and (iv) unobtrusiveness as central requirements for successful triggers. We implement the soft- and hardware-based methods and compare the four most promising approaches in a user study. Our results highlight the pros and cons of the tested triggers, and show those based on the menace, corneal, and dazzle reflexes to perform best. From these results, we derive recommendations that help choosing suitable blink triggers for VR applications.

Inhabiting Interconnected Spaces: How Users Shape and Appropriate their Smart Home Ecosystems

Mikołaj P. Woźniak (University of Oldenburg), Sarah Vöge (University of Oldenburg), Ronja Krüger (University of Oldenburg), Heiko Müller (University of Oldenburg), Marion Koelle (OFFIS - Institute for Information Technology), Susanne Boll (University of Oldenburg)

Over the last decade, smart home technology (SHT) has become an integral part of modern households. As a result, smart home ecosystems blend with daily social life, appropriated and integrated into personalised domestic environments. The lived experience of inhabiting smart home ecosystems, however, is not yet understood, resulting in a mismatch between ecosystem design and inhabitants' needs.Drawing on contextual inquiry methods, we conducted an explorative interview study (N=20) with SHT users in their homes. Our thematic analysis reveals how users shape their smart home ecosystems (SHEs), considering social relationships at home, perceived ownership of SHTs, and expected key benefits. Notably, our analysis shows that household members consciously choose `their' level of SHT interconnectedness, reflecting social, spatial and functional affinities between systems. Following our findings, we formulate five implications for designing future SHTs. Our work contributes insights on the dynamics and appropriation of smart home ecosystems by their inhabitants.

Interaction Effects of Pedestrian Behavior, Smartphone Distraction and External Communication of Automated Vehicles on Crossing and Gaze Behavior

Mirjam Lanzer (Human Factors, Ulm University), Ina Koniakowsky (Human Factors, Ulm University), Mark Colley (Media Informatics, Ulm University), Martin Baumann (Human Factors, Ulm University)

External communication of automated vehicles is proposed to replace driver-pedestrian communication in ambiguous crossing situations. So far, research has focused on simpler scenarios with one attentive pedestrian and one automated vehicle. This virtual reality study (N=115) investigates a more complex scenario with other crossing pedestrians, a distracting task on the smartphone, and external communication by the automated vehicle. Interaction effects were found for crossing duration, gaze behavior, and subjective measures. For attentive pedestrians, the external communication resulted in shorter crossing durations, higher perceived safety, as well as lower perceived criticality, cognitive workload, and effort. These positive effects were not found when pedestrians were distracted. Instead, distracted pedestrians benefited from other crossing pedestrians because they looked less at the stopping vehicle, felt safer, perceived the situation as less critical, and reported lower cognitive workload and effort. Pedestrians initiated crossings earlier with a group or external communication and later with a smartphone.

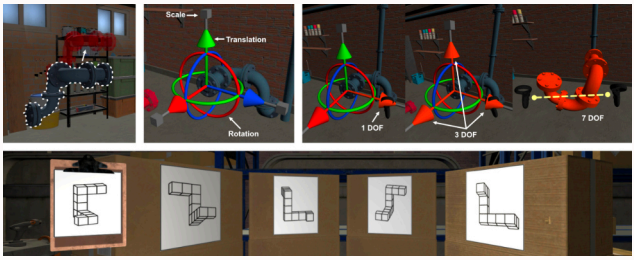
Investigating Tangible Privacy-Preserving Mechanisms for Future Smart Homes

Maximiliane Windl (LMU Munich, Munich Center for Machine Learning (MCML)), Albrecht Schmidt (LMU Munich), Sebastian S. Feger (LMU Munich)

Most smart home devices have multiple sensors, such as cameras and microphones; however, most cannot be controlled individually. Tangible privacy mechanisms provide control over individual sensors and instill high certainty of privacy. Yet, it remains unclear how they can be used in future smart homes. We conducted three studies to understand how tangible privacy mechanisms scale across multiple devices and respond to user needs. First, we conducted a focus group (N=8) on speculative tangible control artifacts to understand the user perspective. Second, we ran a workshop at a human-computer interaction conference (N=8) on tangible privacy. Third, we conducted a six-week in-the-wild study with a tangible, static privacy dashboard across six households. Our findings help to contrast the need for tangible privacy mechanisms on the sensor level with user needs on a smart home level. Finally, we discuss our design implications for future smart homes through the lens of inclusive privacy.

Investigating the Effects of Individual Spatial Abilities on Virtual Reality Object Manipulation

Tobias Drey (Institute of Media Informatics, Ulm University, Ulm, Germany), Michael Montag (Department of General Psychology, Magdeburg-Stendal University of Applied Science, Magdeburg, Germany), Andrea Vogt (Institute of Psychology, Education, Ulm University, Ulm, Germany), Nico Rixen (Institute of Media Informatics, Ulm University, Ulm, Germany), Tina Seufert (Institute of Psychology, Education, Ulm University, Ulm, Germany), Steffi Zander (Department of General Psychology, Magdeburg-Stendal University of Applied Science, Magdeburg, Germany), Michael Rietzler (Institute of Media Informatics, Ulm University, Ulm, Germany), Enrico Rukzio (Institute of Media Informatics, Ulm University, Ulm, Germany)



Object manipulation in 3D space, meaning translating, rotating, and scaling, is ubiquitous in virtual reality (VR), and several interaction techniques have been developed in the past to optimize the task performance and usability. However, preliminary research indicates that individual spatial abilities also have an impact. Yet, it was never investigated if users' spatial abilities influence VR object manipulation. We assessed this in a user study (N=66) using 21 manipulation tasks defined in a Fitts' law-related approach. As interaction techniques, we chose gizmos for simultaneously manipulating 1 and 3 degrees of freedom (DOF) and a handle bar metaphor for 7 DOF. Higher spatial abilities resulted in significantly shorter task completion time and more targeted manipulations, while task accuracy was unaffected. However, an optimized interaction technique could compensate individual disadvantages. We propose seven guidelines on spatial abilities in interaction technique design and research to personalize and improve VR applications.

Keep it Real: Investigating Driver-Cyclist Interaction in Real-World Traffic

HONORABLE MENTION

Ammar Al-Taie (University of Glasgow), Yasmeen Abdrabou (University of the BundeswehrMunich, University of Glasgow), Shaun Macdonald (University of Glasgow), Frank Pollick (University of Glasgow), Stephen Brewster (University of Glasgow)

Cyclists encounter drivers in many traffic scenarios; good communication is key to avoiding collisions. Little is known about everyday driver-cyclist interaction and communication. This is important in designing Automated Vehicles (AVs) that must drive safely around cyclists. We explored driver-cyclist interaction across diverse scenarios through in-the-wild observations (N=414) and a naturalistic study involving cyclists wearing eye-trackers (N=12). Results showed cyclists attended to road markings and traffic signs in controlled traffic scenarios but to vehicle sides and windows in uncontrolled encounters. Interactions were unlikely at controlled intersections, but various techniques were used to negotiate right-of-way in uncontrolled scenarios, e.g. cyclists used arm gestures and shoulder checks to communicate their intent and awareness when lane merging. Drivers communicated these through on-vehicle signals and head movements at roundabouts. We discuss the implications of driver-cyclist interaction behaviour on AV interaction design and offer insights into system requirements to support cyclists riding in traffic.

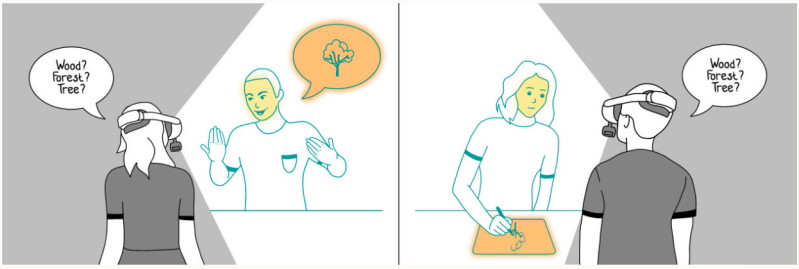
Kerfmeter: Automatic Kerf Calibration for Laser Cutting

Shohei Katakura, Martin Taraz, Muhammad Abdullah, Paul Methfessel, Lukas Rambold, Robert Kovacs, Patrick Baudisch

We present Kerfmeter, a hardware + software device that automatically determines how much material the laser cutter burns off, also known as kerf. Its knowledge about kerf allows Kerfmeter to make the joints of laser cut 3D models fit together with just the right tension, i.e., loose enough to allow for comfortable assembly, yet tight enough to hold parts together without glue—all this without user interaction. Kerfmeter attaches to the head of a laser cutter and works as follows: when users send a model to the laser cutter, Kerfmeter intercepts the job, injects a brief calibration routine that determines kerf, dilates the cutting plan according to this kerf, and then proceeds to fabricate the cutting plan. During the calibration routine, Kerfmeter cuts a 2cm Archimedean spiral and uses a motor to rotate it in place until it jams against the surrounding material; the angle at which the spiral jams allows Kerfmeter to infer kerf. The calibration process takes about 20s, which is >10x faster than traditional, manual kerf calibration, while also eliminating the need for expertise. In our technical evaluation, Kerfmeter produced functioning press fit joints reliably at a precision comparable to traditional manual kerf strips. Kerfmeter makes it easy to sample repeatedly; we demonstrate how this allows boosting precision past any traditional kerf strip.

Let's Face It: Influence of Facial Expressions on Social Presence in Collaborative Virtual Reality

Simon Kimmel (OFFIS - Institute for Information Technology), Frederike Jung (OFFIS - Institute for Information Technology), Andrii Matviienko (KTH Royal Institute of Technology), Wilko Heuten (OFFIS - Institute for Information Technology), Susanne Boll (University of Oldenburg)



As the world becomes more interconnected, physical separation between people increases. Existing collaborative Virtual Reality (VR) applications, designed to bridge this distance, are not yet sufficient in providing a sense of social connection comparable to face-to-face interactions. Possible reasons are the limited multimodality of VR systems and the lack of non-verbal cues in VR avatars. We systematically investigated how facial expressions influence Social Presence in two collaborative VR tasks. We explored four types of facial expressions: eyes and mouth movements, their combination, and no expressions, for two types of explanations: verbal and graphical. To examine how these expressions influence Social Presence, we conducted a controlled VR experiment (N = 48), in which participants had to explain a specific term to their counterpart. Our results demonstrate that eye and mouth movements positively influence Social Presence in VR. Particularly, combining verbal explanations and eye movements induces the highest feeling of co-presence.

Literature Reviews in HCI: A Review of Reviews

Evropi Stefanidi (University of Bremen), Marit Bentvelzen (Utrecht University), Paweł W. Woźniak (Chalmers University of Technology), Thomas Kosch (HU Berlin), Mikołaj P. Woźniak (University of Oldenburg), Thomas Mildner (University of Bremen), Stefan Schneegass (HCI Group, University of Duisburg-Essen), Heiko Müller (University of Oldenburg, OFFIS - Institute for Information Technology), Jasmin Niess (University of St. Gallen, University of Oslo)

This paper analyses Human-Computer Interaction (HCI) literature reviews to provide a clear conceptual basis for authors, reviewers, and readers. HCI is multidisciplinary and various types of literature reviews exist, from systematic to critical reviews in the style of essays. Yet, there is insufficient consensus of what to expect of literature reviews in HCI. Thus, a shared understanding of literature reviews and clear terminology is needed to plan, evaluate, and use literature reviews, and to further improve review methodology. We analysed 189 literature reviews published at all SIGCHI conferences and ACM Transactions on Computer-Human Interaction (TOCHI) up until August 2022. We report on the main dimensions of variation: (i) contribution types and topics; and (ii) structure and methodologies applied. We identify gaps and trends to inform future meta work in HCI and provide a starting point on how to move towards a more comprehensive terminology system of literature reviews in HCI.

Memory Manipulations in Extended Reality

HONORABLE MENTION

Elise Bonnail (Telecom Paris, IP Paris), Wen-Jie Tseng (Telecom Paris, IP Paris), Mark McGill (University of Glasgow, Glasgow), Eric Lecolinet (Telecom Paris, IP Paris), Samuel Huron (Telecom Paris, IP Paris), Jan Gugenheimer (TU Darmstadt)

Human memory has notable limitations (e.g., forgetting) which have necessitated a variety of memory aids (e.g., calendars). As we grow closer to mass adoption of everyday Extended Reality (XR), which is frequently leveraging perceptual limitations (e.g., redirected walking), it becomes pertinent to consider how XR could leverage memory limitations (forgetting, distorting, persistence) to induce memory manipulations. As memories highly impact our self-perception, social interactions, and behaviors, there is a pressing need to understand XR Memory Manipulations (XRMMs). We ran three speculative design workshops (n=12), with XR and memory researchers creating 48 XRMM scenarios. Through thematic analysis, we define XRMMs, present a framework of their core components and reveal three classes (at encoding, pre-retrieval, at retrieval). Each class differs in terms of technology (AR/VR) and impact on memory (influencing quality of memories, inducing forgetting, distorting memories). We raise ethical concerns and discuss opportunities of perceptual and memory manipulations in XR.

Never Skip Leg Day Again: Training the Lower Body with Vertical Jumps in a Virtual Reality Exergame

HONORABLE MENTION

Sebastian Cmentowski (High-Performance Computing, University of Duisburg-Essen, Germany), Sukran Karaosmanoglu (Human-Computer Interaction, Universität Hamburg, Germany), Lennart E. Nacke (HCI Games Group, University of Waterloo, Canada), Frank Steinicke (Human-Computer Interaction, Universität Hamburg, Germany), Jens Krüger (High-Performance Computing, University of Duisburg-Essen, Germany)

Virtual Reality (VR) exergames can increase engagement in and motivation for physical activities. Most VR exergames focus on the upper body because many VR setups only track the users' heads and hands. To become a serious alternative to existing exercise programs, VR exergames must provide a balanced workout and train the lower limbs, too. To address this issue, we built a VR exergame focused on vertical jump training to explore full-body exercise applications. To create a safe and effective training, nine domain experts participated in our prototype design. Our mixed-methods study confirms that the jump-centered exercises provided a worthy challenge and positive player experience, indicating long-term retention. Based on our findings, we present five design implications to guide future work: avoid an unintended forward drift, consider technical constraints, address safety concerns in full-body VR exergames, incorporate rhythmic elements with fluent movement patterns, adapt difficulty to players' fitness progression status.

ONYX: Assisting Users in Teaching Natural Language Interfaces Through Multi-Modal Interactive Task Learning

Marcel Ruoff (KIT, h-lab), Brad Myers (CMU, HCII), Alexander Maedche (KIT, h-lab)

Users are increasingly empowered to personalize natural language interfaces (NLIs) by teaching how to handle new natural language (NL) inputs. However, our formative study found that when teaching new NL inputs, users require assistance in clarifying ambiguities that arise and want insight into which parts of the input the NLI understands. In this paper we introduce ONYX, an intelligent agent that interactively learns new NL inputs by combining NL programming and programming-by-demonstration, also known as multi-modal interactive task learning. To address the aforementioned challenges, ONYX provides suggestions on how ONYX could handle new NL inputs based on previously learned concepts or user-defined procedures, and poses follow-up questions to clarify ambiguities in user demonstrations, using visual and textual aids to clarify the connections. Our evaluation shows that users provided with ONYX's new features achieved significantly higher accuracy in teaching new NL inputs (median: 93.3%) in contrast to those without (median: 73.3%).

Playful Reflection: Impact of Gamification on a Virtual Reality Simulation of Breastfeeding

Kymeng Tang (KU Leuven), Kathrin Gerling (KIT), Vero Vanden Abeele (KU Leuven), Luc Geurts (KU Leuven), Maria Aufheimer (KIT)

Gamification is a popular technique to improve task engagement, and has broadly been deployed in health and education to a point where many users now expect gameful experiences in these settings. However, gamification has been criticised for being a potential obstacle to the experience of reflection. Motivated by this tension, our work examines how the addition of gamification to a Virtual Reality simulation of breastfeeding impacts player experience and reflection. Using a within-subjects design, we invited 34 participants to take part in a mixed-methods evaluation of a gamified and non-gamified variant of the simulation that included questionnaires and semi-structured interviews. Results show that gamification improved player experience and encouraged players to reflect on goal achievement and performance. However, it also diverted players' attention from nuances within the act of nursing. Drawing on our findings, we contribute considerations for the application of gamification in personal and sensitive settings such as breastfeeding.

Point of no Undo: Irreversible Interactions as a Design Strategy

Beat Rossmy (LMU Munich), Nađa Terzimehić (LMU Munich), Tanja Döring (University of Bremen), Daniel Buschek (University of Bayreuth), Alexander Wiethoff (LMU Munich)

Despite irreversibility being omnipresent in the lifeworld, research on irreversibility in computing systems has been surprisingly sparse. In fact, user freedom – provided by the undo functionality – is considered to be a pillar of "usable" computer systems, overcoming irreversibility. Within this paper, we set up a thought experiment, challenging the "undo feature" and instead take advantage of irreversibility in the interaction with physical computing systems (tangibles, robots, etc). First, we present three exploratory design speculations, each inherently utilizing irreversibility. Second, we elaborate on the concept of irreversible interactions by contextualizing our work with critical HCI discourses and deducing three design strategies. Finally, we discuss irreversibility as a design element for self-reflection, meaningful acting, and a sustainable relationship with technology. While previously single aspects of irreversibility have been explored, we contribute the first comprehensive discussion of irreversible interactions in HCI presenting artifacts, a conceptualization, design strategies, and application purposes.

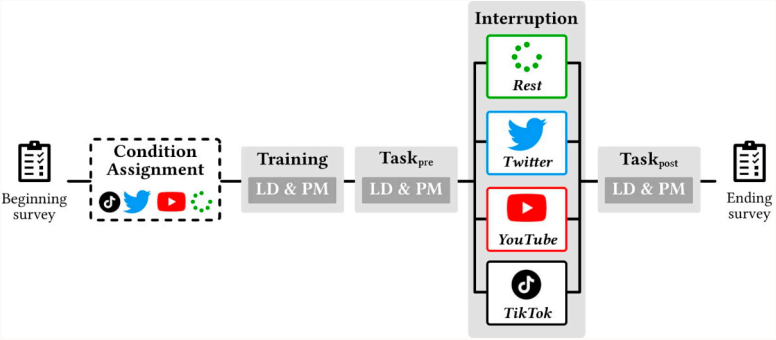
SelVReflect: A Guided VR Experience Fostering Reflection on Personal Challenges

Nadine Wagener (University of Bremen), Leon Reicherts (University College London), Nima Zargham (University of Bremen), Natalia Bartłomiejczyk (Lodz University of Technology), Ava Elizabeth Scott (University College London), Katherine Wang (University College London), Marit Bentvelzen (Utrecht University), Evropi Stefanidi (University of Bremen), Thomas Mildner (University of Bremen), Yvonne Rogers (University College London), Jasmin Niess (University of St. Gallen, University of Oslo)

Reflecting on personal challenges can be difficult. Without encouragement, the reflection process often remains superficial, thus inhibiting deeper understanding and learning from past experiences. To allow people to immerse themselves in and deeply reflect on past challenges, we developed SelVReflect, a VR experience which offers active voice-based guidance and a space to freely express oneself. SelVReflect was developed in an iterative design process (N=5) and evaluated in a user study with N=20 participants. We found that SelVReflect enabled participants to approach their challenge and its (emotional) components from different perspectives and discover new relationships between these components. By making use of the spatial possibilities in VR, they got a better understanding of the situation and of themselves. We contribute empirical evidence of how a guided VR experience can support reflection. We discuss opportunities and design requirements for guided VR experiences that aim to foster deeper reflection.

Short-Form Videos Degrade Our Capacity to Retain Intentions: Effect of Context Switching On Prospective Memory

Francesco Chiossi (LMU Munich), Luke Haliburton (LMU Munich), Changkun Ou (LMU Munich), Andreas Butz (LMU Munich), Albrecht Schmidt (LMU Munich)



Social media platforms use short, highly engaging videos to catch users' attention. While the short-form video feeds popularized by TikTok are rapidly spreading to other platforms, we do not yet understand their impact on cognitive functions. We conducted a between-subjects experiment (N=60) investigating the impact of engaging with TikTok, Twitter, and YouTube while performing a Prospective Memory task (i.e., executing a previously planned action). The study required participants to remember intentions over interruptions. We found that the TikTok condition significantly degraded the users' performance in this task. As none of the other conditions (Twitter, YouTube, no activity) had a similar effect, our results indicate that the combination of short videos and rapid context-switching impairs intention recall and execution. We contribute a quantified understanding of the effect of media feed formats on Prospective Memory and outline consequences for media technology designers to not harm the users' memory and wellbeing.

Supervising Multiple Operating Rooms Using a Head-Worn display: A Longitudinal Evaluation of the Experience of Supervising Anesthesiologists and Their Co-Workers

Tobias Grundgeiger (University of Würzburg, Germany) Alea Münz (University Hospital Würzburg, Germany) Paul Schlosser (The University of Queensland, Australia) Oliver Happel (University Hospital Würzburg, Germany)

Research has explored head-worn displays (HWD) in various professional contexts. However, evaluations have been limited by short-term use, a focus on the person using the HWD, and on performance variables. In a field study, we evaluated a monocular, opaque HWD for multi-patient monitoring, which supervising anesthesiologists wore for 8-10 days each. We investigated the effect of prolonged HWD use on the experience of the supervising anesthesiologists and their co-workers using interviews and repeated observations. A reflexive thematic analysis showed (1) interaction and mindset changes over time, (2) information on the HWD is more than numbers, (3) the HWD affects co-workers' collaboration with supervisors, and (4) distraction depends on the point of view. Using activity theory, we discuss the fact that HWD use develops and changes over time and that even a single-user HWD influences the collaboration with co-workers. We conclude with implications for HWD design, implementation, and evaluation.

Sustainability by Design. How to Encourage Users to Choose Energy-Saving Programs and Settings when Washing Laundry

Laura Grönewald (Interaction Design for Sustainability, Transformation, University of Siegen, Siegen, Germany), Julian Weiblen (Interaction Design for Sustainability, Transformation, University of Siegen, Siegen, Germany), Matthias Laschke (Interaction Design for Sustainability, Transformation, University of Siegen, Siegen, Germany, Lara Christoforakos (Department Psychology, Ludwig-Maximilians-University, Munich, Bavaria, Germany), Marc Hassenzahl (Ubiquitous Design / Experience & Interaction, University of Siegen, Siegen, Germany)

One way to counteract anthropogenic climate change, is to reduce individual energy consumption. An especially energy-intensive everyday practice is doing the laundry. In Germany, laundry accounts for about 5% of domestic electricity consumption. In part, this is because users do not make use of the energy-saving programs offered by modern washing machines. Based on different principles of behavior change, we created four concepts for washing machine interfaces to encourage users to choose energy-saving programs and settings. These concepts were implemented as functional prototypes. An online experiment (N=400) showed that all concepts increased the choice of energy-saving programs compared to a standard machine. Especially effective was to interrupt impulsive actions and suggest alternative choices (concept B) and to restructure the entry of settings (concept E). This demonstrates how small changes in a standard interfaces can significantly increase the probability of energy conservation in a private setting.

The Entoptic Field Camera as Metaphor-Driven Research-through-Design with AI Technologies

Jesse Josua Benjamin (Department of Philosophy, University of Twente), Heidi Biggs (College of Information Sciences, Technology, The Pennsylvania State University), Arne Berger (Computer Science, Languages, Anhalt University of Applied Sciences), Julija Rukanskaitė (Julija.Works, Malmö), Michael B. Heidt (Computer Science, Languages, Anhalt University of Applied Sciences), Nick Merrill (Daylight Lab, Center for Long-Term Cybersecurity, University of California, Berkeley), James Pierce (School of Art + Art History + Design, University of Washington Seattle), Joseph Lindley (Lancaster University)

Artificial intelligence (AI) technologies are widely deployed in smartphone photography; and prompt-based image synthesis models have rapidly become commonplace. In this paper, we describe a Research-through-Design (RtD) project which explores this shift in the means and modes of image production via the creation and use of the Entoptic Field Camera. Entoptic phenomena usually refer to perceptions of floaters or bright blue dots stemming from the physiological interplay of the eye and brain. We use the term entoptic as a metaphor to investigate how the material interplay of data and models in AI technologies shapes human experiences of reality. Through our case study using first-person design and a field study, we offer implications for critical, reflective, more-than-human and ludic design to engage AI technologies; the conceptualisation of an RtD research space which contributes to AI literacy discourses; and outline a research trajectory concerning materiality and design affordances of AI technologies.

The Influence of Context on Response to Spear-Phishing Attacks: an In-Situ Deception Study

Verena Distler (University of Luxembourg, University of the Bundeswehr Munich, Germany)

In today's digitized societies, phishing attacks are a security threat with damaging consequences. Organizations remain vulnerable to phishing attacks, and it is not clear how the work context influences people's perceptions and behaviors related to phishing attempts. I investigate (1) how contextual factors influence reactions to a spear-phishing attempt, (2) why people report or do not report phishing attempts, (3) which opportunities for security-enhancing interventions people identify. I use an in-situ deception methodology to observe participants (N=14) in their realistic work environment. I triangulate observational and self-reported data to obtain rich qualitative insights into participants' emotions, thoughts, and actions when receiving a targeted phishing email. I find that task, IT, internal and social context play an important role. The email's request being aligned with expectations and perceived time pressure when responding to emails were associated with insecure behavior. The social context positively influenced phishing detection, but ``phished'' participants did not tell anyone.

The Intricacies of Social Robots: Secondary Analysis of Fictional Documentaries to Explore the Benefits and Challenges of Robots in Complex Social Settings

Judith Dörrenbächer (Ubiquitous Design / Experience & Interaction, University of Siegen, Germany), Ronda Ringfort-Felner (Ubiquitous Design / Experience & Interaction, University of Siegen, Germany), Marc Hassenzahl (Ubiquitous Design / Experience & Interaction, University of Siegen, Germany)

In the design of social robots, the focus is often on the robot itself rather than on the intricacies of possible application scenarios. In this paper, we examine eight fictional documentaries about social robots, such as SEYNO, a robot that promotes respect between passengers in trains, or PATO, a robot to watch movies with. Overall, robots were conceptualized either (1) to substitute humans in relationships or (2) to mediate relationships (human-human-robot-interaction). While the former is basis of many current approaches to social robotics, the latter is less common, but particularly interesting. For instance, the mediation perspective fundamentally impacts the role a robot takes (e.g., role model, black sheep, ally, opponent, moralizer) and thus its potential function and form. From the substitution perspective, robots are expected to mimic human emotions; from the mediation perspective, robots can be positive precisely because they remain objective and are neither emotional nor empathic.

The Walking Talking Stick: Understanding Automated Note-Taking in Walking Meetings

BEST PAPER 🏆

Luke Haliburton (LMU Munich), Natalia Bartłomiejczyk (Lodz University of Technology), Albrecht Schmidt (LMU Munich), Paweł W. Woźniak (Chalmers University), Jasmin Niess (Oslo University)

While walking meetings offer a healthy alternative to sit-down meetings, they also pose practical challenges. Taking notes is difficult while walking, which limits the potential of walking meetings. To address this, we designed the prototype{}---a tangible device with integrated voice recording, transcription, and a physical highlighting button to facilitate note-taking during walking meetings. We investigated our system in a three-condition between-subjects user study with thirty pairs of participants (N=60) who conducted 15-minute outdoor walking meetings. Participants either used lapel microphones, the prototype without the button, or the prototype with the highlighting button. We found that the tangible device increased task focus, and the physical highlighting button facilitated turn-taking and resulted in more useful notes. Our work demonstrates how interactive artifacts can incentivize users to hold meetings in motion and enhance conversation dynamics. We contribute insights for future systems which support conducting work tasks in mobile environments.

TicTacToes: Assessing Toe Movements as an Input Modality

Florian Müller (LMU Munich), Daniel Schmitt (TU Darmstadt), Andrii Matviienko (KTH Royal Institute of Technology), Dominik Schön(TU Darmstadt), Sebastian Günther (TU Darmstadt) Thomas Kosch (HU Berlin), Martin Schmitz (Saarland Informatics Campus, Saarland University)

From carrying grocery bags to holding onto handles on the bus, there are a variety of situations where one or both hands are busy, hindering the vision of ubiquitous interaction with technology. Voice commands, as a popular hands-free alternative, struggle with ambient noise and privacy issues. As an alternative approach, research explored movements of various body parts (e.g., head, arms) as input modalities, with foot-based techniques proving particularly suitable for hands-free interaction. Whereas previous research only considered the movement of the foot as a whole, in this work, we argue that our toes offer further degrees of freedom that can be leveraged for interaction. To explore the viability of toe-based interaction, we contribute the results of a controlled experiment with 18 participants assessing the impact of five factors on the accuracy, efficiency and user experience of such interfaces. Based on the findings, we provide design recommendations for future toe-based interfaces.

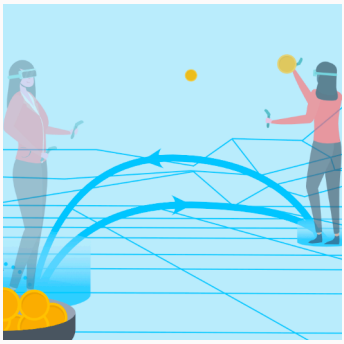
Towards a Consensus Gesture Set: A Survey of Mid-Air Gestures in HCI for Maximized Agreement Across Domains

Masoumehsadat Hosseini (University of Oldenburg, Oldenburg, Germany), Tjado Ihmels (University Oldenburg, Oldenburg, Germany), Ziqian Chen (Universität des Saarlandes, Saarbrücken), Marion Koelle (OFFIS - Institute for Information Technology, Oldenburg, Germany), Heiko Müller (OFFIS - Institute for Information Technology, Oldenburg, Germany), Susanne Boll (Media Informatics, Multimedia Systems, University of Oldenburg, Oldenburg, Germany)

Mid-air gesture-based systems are becoming ubiquitous. Many mid-air gestures control different kinds of interactive devices, applications, and systems. They are, however, still targeted at specific devices in specific domains and are not necessarily consistent across domain boundaries. A comprehensive evaluation of the transferability of gesture vocabulary between domains is also lacking. Consequently, interaction designers cannot decide which gestures to use for which domain. In this systematic literature review, we contribute to the future research agenda in this area, based on an analysis of 172 papers. As part of our analysis, we clustered gestures according to the dimensions of an existing taxonomy to identify their common characteristics in different domains, and we investigated the extent to which existing mid-air gesture sets are consistent across different domains. We derived a consensus gesture set containing 22 gestures based on agreement rates calculation and considered their transferability across different domains.

UndoPort: Exploring the Influence of Undo-Actions for Locomotion in Virtual Reality on the Efficiency, Spatial Understanding and User Experience

Florian Müller (LMU Munich), Arantxa (LMU Munich), Dominik Schön (TU Darmstadt), Julian Rasch (LMU Munich)



When we get lost in Virtual Reality (VR) or want to return to a previous location, we use the same methods of locomotion for the way back as for the way forward. This is time-consuming and requires additional physical orientation changes, increasing the risk of getting tangled in the headsets' cables. In this paper, we propose the use of undo actions to revert locomotion steps in VR. We explore eight different variations of undo actions as extensions of point&teleport, based on the possibility to undo position and orientation changes together with two different visualizations of the undo step (discrete and continuous). We contribute the results of a controlled experiment with 24 participants investigating the efficiency and orientation of the undo techniques in a radial maze task. We found that the combination of position and orientation undo together with a discrete visualization resulted in the highest efficiency without increasing orientation errors.

Understanding Perception of Human Augmentation: A Mixed-Method Study

Steeven Villa (LMU Munich), Jasmin Niess (University of Oslo), Takuro Nakao (Keio University), Jonathan Lazar (Maryland University), Albrecht Schmidt (LMU Munich), Tonja Machulla (TU Chemnitz)

Technologies that help users overcome their limitations and integrate with the human body are often termed “human augmentations'”. Such technologies are now available on the consumer market, potentially supporting people in their everyday activities. To date, there is no systematic understanding of the perception of human augmentations yet. To address this gap and build an understanding of how to design positive experiences with human augmentations, we conducted a mixed-method study of the perception of augmented humans (AHs). We conducted two scenario-based studies: interviews (n=16) and an online study (n=506) with participants from four countries. The scenarios include one out of three augmentation categories (sensory, motor, and cognitive) and specify if the augmented person has a disability or not. Overall, results show that the type of augmentation and disability impacted user attitudes towards AHs. We derive design dimensions for creating technological augmentations for a diverse and global audience.

Understanding and Mitigating Technology-Facilitated Privacy Violations in the Physical World

Maximiliane Windl (LMU Munich, Munich Center for Machine Learning (MCML)), Verena Winterhalter (LMU Munich), Albrecht Schmidt (LMU Munich), Sven Mayer (LMU Munich)

We are constantly surrounded by technology that collects and processes sensitive data, paving the way for privacy violations. Yet, current research investigating technology-facilitated privacy violations in the physical world is scattered and focused on specific scenarios or investigates such violations purely from an expert's perspective. Informed through a large-scale online survey, we first construct a scenario taxonomy based on user-experienced privacy violations in the physical world through technology. We then validate our taxonomy and establish mitigation strategies using interviews and co-design sessions with privacy and security experts. In summary, this work contributes (1) a refined scenario taxonomy for technology-facilitated privacy violations in the physical world, (2) an understanding of how privacy violations manifest in the physical world, (3) a decision tree on how to inform users, and (4) a design space to create notices whenever adequate. With this, we contribute a conceptual framework to enable a privacy-preserving technology-connected world.

VR Almost There: Simulating Co-located Multiplayer Experiences in Social Virtual Reality

Philipp Sykownik (University of Duisburg-Essen), Sukran Karaosmanoglu (Universität Hamburg), Katharina Emmerich (University of Duisburg-Essen), Frank Steinicke (Universität Hamburg), Maic Masuch (University of Duisburg-Essen)

Consumer social virtual reality (VR) applications have recently started to enable social interactions at a distance. Yet it is still relatively unknown if and to what extent such applications provide meaningful social experiences in cases where in-person leisure activities are not feasible. To explore this, we developed a custom social VR application and conducted an exploratory lab study with 25 dyads in which we compared an in-person and a virtual version of a co-located multiplayer scenario. Our mixed-methods analysis revealed that both scenarios created a socially rich atmosphere and strengthened the social closeness between players. However, the lack of facial animations, limited body language, and a low field of view led to VR's main social experiential limitations: a reduced mutual awareness and emotional understanding compared to the in-person scenario. We derive implications for social VR design and research as well as game user research.

What does it mean to cycle in Virtual Reality? Exploring Cycling Fidelity and Control of VR Bicycle Simulators

Andrii Matviienko (KTH Royal Institute of Technology, Sweden), Hajris Hoxha (Technical University of Darmstadt, Germany), Max Mühlhäuser (Technical University of Darmstadt, Germany)

Creating highly realistic Virtual Reality (VR) bicycle experiences can be time-consuming and expensive. Moreover, it is unclear what hardware parts are necessary to design a bicycle simulator and whether a bicycle is needed at all. In this paper, we investigated cycling fidelity and control of VR bicycle simulators. For this, we developed and evaluated three cycling simulators: (1) cycling without a bicycle (bikeless), (2) cycling on a fixed (stationary) and (3) moving bicycle (tandem) with four levels of control (no control, steering, pedaling, and steering + pedaling). To evaluate all combinations of fidelity and control, we conducted a controlled experiment (N = 24) in indoor and outdoor settings. We found that the bikeless setup provides the highest feeling of safety, while the tandem leads to the highest realism without increasing motion sickness. Moreover, we discovered that bicycles are not essential for cycling in VR.

What's That Shape? Investigating Eyes-Free Recognition of Textile Icons

René Schäfer (RWTH Aachen University), Oliver Nowak (RWTH Aachen University), Lovis Suchmann (RWTH Aachen University), Sören Schröder(RWTH Aachen University), Jan Borchers (RWTH Aachen University)

Textile surfaces, such as on sofas, cushions, and clothes, offer promising alternative locations to place controls for digital devices. Textiles are a natural, even abundant part of living spaces, and support unobtrusive input. While there is solid work on technical implementations of textile interfaces, there is little guidance regarding their design—especially their haptic cues, which are essential for eyes-free use. In particular, icons easily communicate information visually in a compact fashion, but it is unclear how to adapt them to the haptics-centric textile interface experience. Therefore, we investigated the recognizability of 84 haptic icons on fabrics. Each combines a shape, height profile (raised, recessed, or flat), and affected area (filled or outline). Our participants clearly preferred raised icons, and identified them with the highest accuracy and at competitive speeds. We also provide insights into icons that look very different, but are hard to distinguish via touch alone.

LATE BREAKING WORK | 24

A Database for Kitchen Objects: Investigating Danger Perception in the Context of Human-Robot Interaction

Jan Leusmann (LMU Munich), Carl Oechsner (LMU Munich), Johanna Prinz (LMU Munich), Robin Welsch (Aalto University), Sven Mayer (LMU Munich)

Balancing Power Relations in Participatory Design: The Importance of Initiative and External Factors

Torben Volkmann (Universität zu Lübeck), Markus Dresel (Universität zu Lübeck), Nicole Jochems (Universität zu Lübeck)

Blended Interaction: Communication and Collaboration Between Two Users Across the Reality-Virtuality Continuum

Lucie Kruse (Universität Hamburg), Joel Wittig (Universität Hamburg), Sebastian Finnern (Universität Hamburg), Melvin Gundlach (Universität Hamburg), Niclas Iserlohe (Universität Hamburg), Dr. Oscar Ariza (Universität Hamburg), Prof. Dr. Frank Steinicke (Universität Hamburg)

Exploring Gesture and Gaze Proxies to Communicate Instructor's Nonverbal Cues in Lecture Videos

Tobias Wagner (Institute of Media Informatics, Ulm University), Teresa Hirzle (Department of Computer Science, University of Copenhagen), Anke Huckauf (Institute of Psychology, Education, Ulm University), Enrico Rukzio (Institute of Media Informatics, Ulm University)

Exploring Mixed Reality in General Aviation to Support Pilot Workload

Christopher Katins (HU Berlin), Sebastian S. Feger (LMU Munich), Thomas Kosch (HU Berlin)

Exploring Mobility Behavior Around Ambient Displays Using Clusters of Multi-dimensional Walking Trajectories

Jan Schwarzer (Hamburg University of Applied Sciences), Julian Fietkau (University of the Bundeswehr Munich), Laurenz Fuchs (University of the Bundeswehr Munich), Susanne Draheim (Hamburg University of Applied Sciences), Kai von Luck (Hamburg University of Applied Sciences), Michael Koch (University of the Bundeswehr Munich)

Exploring Physiological Correlates of Visual Complexity Adaptation: Insights from EDA, ECG, and EEG Data for Adaptation Evaluation in VR Adaptive Systems

Francesco Chiossi (LMU Munich), Changkun Ou (LMU Munich), Sven Mayer (LMU Munich)

Exploring Shape Designs for Soft Robotics and Users' Associations with Them

Anke Brocker (RWTH Aachen University), Ekaterina Nedorubkova (RWTH Aachen University), Simon Voelker (RWTH Aachen University), Jan Borchers (RWTH Aachen University),

Exploring the Perception of Pain in Virtual Reality using Perceptual Manipulations

Gaëlle Clavelin (Telecom Paris, IP Paris), Mickael Bouhier (Telecom Paris, IP Paris), Wen-Jie Tseng (Telecom Paris, IP Paris), Jan Gugenheimer (TU Darmstadt)

Exploring the Use of Electromagnets to Influence Key Targeting on Physical Keyboards

Lukas Mecke (University of the Bundeswehr Munich, LMU Munich), Ismael Prieto Romero (University of the Bundeswehr Munich), Sarah Delgado Rodriguez (University of the Bundeswehr Munich), Florian Alt (University of the Bundeswehr Munich)

EyesOnMe: Investigating Haptic and Visual User Guidance for Near-Eye Positioning of Mobile Phones for Self-Eye-Examinations

Luca-Maxim Meinhardt (Ulm University), Kristof Van Laerhoven (University of Siegen), David Dobbelstein (Carl Zeiss AG)

HaptiX: Vibrotactile Haptic Feedback for Communication of 3D Directional Cues

Max Pascher (Westphalian University of Applied Sciences & University of Duisburg-Essen), Til Franzen(Westphalian University of Applied Sciences), Kirill Kronhardt (Westphalian University of Applied Sciences), Uwe Gruenefeld (University of Duisburg-Essen), Stefan Schneegass (University of Duisburg-Essen), Jens Gerken (Westphalian University of Applied Sciences)

Fabric Faces: Combining Textiles and 3D Printing for Maker-Friendly Folding-Based Assembly

Adrian Wagner (RWTH Aachen University), Paul Miles Preuschoff (RWTH Aachen University), Philipp Wacker (RWTH Aachen University), Simon Voelker (RWTH Aachen University), Jan Borchers (RWTH Aachen University),

I want to be able to change the speed and size of the avatar: Assessing User Requirements for Animated Sign Language Translation Interfaces

Amelie Nolte (University of Luebeck), Barbara Gleissl (Ergosign GmbH), Jule Heckmann (Ergosign GmbH), Dieter Wallach (Ergosign GmbH), Nicole Jochems (University of Luebeck)

Immersive Reading: Comparison of Performance and User Experience for Reading Long Texts in Virtual Reality

Jenny Gabel (Understanding Written Artefacts, Human Computer Interaction, Universität Hamburg), Melanie Ludwig (Human Computer Interaction, Universität Hamburg), Frank Steinicke (Human Computer Interaction, Understanding Written Artefacts, Universität Hamburg)

Interpretable Time-Dependent Convolutional Emotion Recognition with Contextual Data Streams

David Bethge (LMU Munich, Dr. Ing. h.c. F. Porsche AG), Constantin Patsch (Dr. Ing. h.c. F. Porsche AG), Philipp Hallgarten (Dr. Ing. h.c. F. Porsche AG, Universität Tübingen), Thomas Kosch (HU Berlin)

Point Cloud Alignment through Mid-Air Gestures on a Stereoscopic Display

Katja Krug (Interactive Media Lab Dresden, Technische Universität Dresden, Germany), Marc Satkowski (Interactive Media Lab Dresden, Technische Universität Dresden, Germany), Reuben Docea (Translational Surgical Oncology, National Center for Tumor Diseases Dresden, Germany), Tzu-Yu Ku (Interactive Media Lab Dresden, Technische Universität Dresden, Germany), Raimund Dachselt (Interactive Media Lab Dresden, Technische Universität Dresden, Germany)

Reach Prediction using Finger Motion Dynamics

Dimitar Valkov (Saarland University, Germany; DFKI, Saarland Informatics Campus, Germany), Pascal Kockwelp (Computer Science Department, University of Münster, Germany), Florian Daiber (DFKI, Saarland Informatics Campus, Germany), Antonio Krüger (DFKI, Saarland Informatics Campus, Germany)

Spatiality and Semantics - Towards Understanding Content Placement in Mixed Reality

Mats Ole Ellenberg (Interactive Media Lab Dresden,Technische Universität Dresden; Centre for Tactile Internet with Human-in-the-Loop (CeTI), Technische Univerität Dresden), Marc Satkowski (Interactive Media Lab Dresden,Technische Universität Dresden; Centre for Scalable Data Analytics, Artificial Intelligence (ScaDS.AI), Dresden/Leipzig), Weizhou Luo (Interactive Media Lab Dresden,Technische Universität Dresden), Raimund Dachselt (Interactive Media Lab Dresden,Technische Universität Dresden; Centre for Tactile Internet with Human-in-the-Loop (CeTI), Technische Univerität Dresden; Centre for Scalable Data Analytics, Artificial Intelligence (ScaDS.AI), Dresden/Leipzig; Cluster of Excellence Physics of Life, Technische Universität Dresden)

Statistically Controlling for Processing Fluency Reduces the Aesthetic-Usability Effect

Jan Preßler (Julius-Maximilians-Universität), Lukas Schmid (Julius-Maximilians-Universität), Jörn Hurtienne (Julius-Maximilians-Universität)

Text Me if You Can: Investigating Text Input Methods for Cyclists

Andrii Matviienko (KTH Royal Institute of Technology, Sweden), Jean-Baptiste Durand-Pierre (Technical University of Darmstadt, Germany), Jona Cvancar (Technical University of Darmstadt, Germany), Max Mühlhäuser (Technical University of Darmstadt, Germany)

Up, Up and Away - Investigating Information Needs for Helicopter Pilots in future Urban Air Mobility

Luca-Maxim Meinhardt (Ulm University), Mark Colley (Ulm University), Alexander Fassbender (Ulm University), Michael Rietzler (Ulm University), Enrico Rukzio (Um University)

Virtual Tourism, Real Experience: A Motive-Oriented Approach to Virtual Tourism

Sara Wolf (Institute Human-Computer-Media, Julius-Maximilians-Universität, Würzburg, Germany), Michael Weber (Institute Human-Computer-Media, Julius-Maximilians-Universität, Würzburg, Germany), Jörn Hurtienne (Chair of Psychological Ergonomics, Julius-Maximilians-Universität, Würzburg, Germany)

VRisbee: How Hand Visibility Impacts Throwing Accuracy and Experience in Virtual Reality

Malte Borgwardt (University of Bremen), Jonas Boueke (University of Bremen), María Fernanda Sanabria (University of Bremen), Michael Bonfert (Digital Media Lab, University of Bremen), Robert Porzel (Digital Media Lab, University of Bremen)

INTERACTIVITY | 10

Demonstrating Trusscillator: A System for Fabricating Human-Scale Human-Powered Oscillating Devices

Robert Kovacs (Hasso Plattner Institute, Potsdam, Germany), Lukas Rambold (Hasso Plattner Institute, Potsdam, Germany), Lukas Fritzsche (Hasso Plattner Institute, Potsdam, Germany), Dominik Meier (Hasso Plattner Institute, Potsdam, Germany), Jotaro Shigeyama (Hasso Plattner Institute, Potsdam, Germany), Shohei Katakura (Hasso Plattner Institute, Potsdam, Germany), Ran Zhang HCI (Hasso Plattner Institute, Potsdam, Germany), Patrick Baudisch (Hasso Plattner Institute, Potsdam, Germany)

Design and Fabrication of Body-Based Interfaces (Demo of Saarland HCI Lab)

Jürgen Steimle (Saarland University), Marie Muehlhaus (Saarland University), Madalina Nicolae (Saarland University), Aditya Nittala (Saarland University), Narges Pourjafarian (Saarland University), Adwait Sharma (Saarland University), Marc Teyssier (Saarland University), Marion Koelle (Saarland University), Bruno Fruchard (Saarland University), Paul Strohmeier (Saarland University)

Interacting with Neural Radiance Fields in Immersive Virtual Reality

Ke Li (Universität Hamburg, Deutsches Elektronen-Synchrotron DESY), Tim Rolff (Universität Hamburg), Susanne Schmidt (Universität Hamburg), Reinhard Bacher (Deutsches Elektronen Synchrotron DESY), Wim Leemans (Deutsches Elektronen Synchrotron DESY), Frank Steinicke (Universität Hamburg)

SparseIMU: Computational Design of Sparse IMU Layouts for Sensing Fine-Grained Finger Microgestures

Adwait Sharma (Saarland University, Saarland Informatics Campus, Germany), Christina Salchow-Hömmen (Department of Neurology, Charité-Universitätsmedizin Berlin, Germany & Control Systems Group, Technische Universität Berlin, Germany), Vimal Suresh Mollyn (Saarland University, Saarland Informatics Campus, Germany), Aditya Shekhar Nittala (Saarland University, Saarland Informatics Campus, Germany), Michael A. Hedderich (Saarland University, Saarland Informatics Campus, Germany), Marion Koelle (Saarland University, Saarland Informatics Campus, Germany), Thomas Seel (Control Systems Group, Technische Universität Berlin, Germany & Department of AI in Biomedical Engineering, FAU Erlangen-Nürnberg, Germany), Jürgen Steimle (Saarland University, Saarland Informatics Campus, Germany)

The Aachen Lab Demo: From Fundamental Perception to Design Tools

Jan Borchers (RWTH Aachen University), Anke Brocker (RWTH Aachen University), Sebastian Hueber (RWTH Aachen University), Oliver Nowak (RWTH Aachen University); René Schäfer (RWTH Aachen University), Adrian Wagner (RWTH Aachen University), Paul Preuschoff (RWTH Aachen University), Lea Schirp (RWTH Aachen University)

Towards More Inclusive and Accessible Virtual Reality: Conducting Large-scale Studies in the Wild

Thereza Schmelter (Berlin University of Applied Sciences, Technologies), Lucie Kruse (Human-Computer Interaction, Universität Hamburg), Sukran Karaosmanoglu (Human-Computer Interaction, Universität Hamburg), Sebastian Rings(Human-Computer Interaction, Universität Hamburg), Frank Steinicke (Human-Computer Interaction, Universität Hamburg), Kristian Hildebrand (Berlin University of Applied Sciences, Technologies)

The Art of Privacy - A Theatrical Privacy Installation in Virtual Reality

Frederike Jung (OFFIS - Institute for Information Technology), Jonah-Noël Kaiser (University of Oldenburg), Kai von Holdt (OFFIS - Institute for Information Technology), Wilko Heuten (OFFIS - Institute for Information Technology), Jochen Meyer (OFFIS - Institute for Information Technology)

ThermalPen: Adding Thermal Haptic Feedback to 3D Sketching

Philipp Pascal Hoffmann (TU Darmstadt), Hesham Elsayed (TU Darmstadt), Max Mühlhäuser (TU Darmstadt), Rina Wehbe (Dalhousie University), Mayra D. Barrera Machuca (Dalhousie University)

Versatile Immersive Virtual and Augmented Tangible OR - Using VR, AR and Tangibles to Support Surgical Practice

Anke V. Reinschluessel (Digital Media Lab, University of Bremen), Thomas Muender (Digital Media Lab, University of Bremen), Roland Fischer (CGVR, University of Bremen), Valentin Kraft (Fraunhofer MEVIS, Bremen), Verena N. Uslar (University Hospital for Visceral Surgery, University of Oldenburg), Dirk Weyhe (University Hospital for Visceral Surgery, Pius-Hospital Oldenburg), Andrea Schenk (Fraunhofer Institute for Digital Medicine MEVIS), Gabriel Zachmann (Mathematics, Computer Science, University of Bremen), Tanja Döring (Digital Media Lab / HCI Group, University of Bremen), Rainer Malaka (Digital Media Lab, University of Bremen)

What's That Shape? Investigating Eyes-Free Recognition of Textile Icons

René Schäfer (RWTH Aachen University), Oliver Nowak (RWTH Aachen University), Lovis Suchmann (RWTH Aachen University), Sören Schröder(RWTH Aachen University), Jan Borchers (RWTH Aachen University)

JOURNAL | 4

“Nah, it’s just annoying!” A Deep Dive into User Perceptions of Two-Factor Authentication

Karola Marky (Ruhr-University Bochum, University of Glasgow), Kirill Ragozin (Keio University), George Chernyshov (Keio University), Andrii Matviienko (Technical University of Darmstadt), Martin Schmitz (Saarland University), Max Mühlhäuser (Technical University of Darmstadt), Chloe Eghtebas (TUM), Kai Kunze (Keio University)

Flowboard: How Seamless, Live, Flow-Based Programming Impacts Learning to Code for Embedded Electronics

Anke Brocker (RWTH Aachen University), René Schäfer (RWTH Aachen University), Christian Remy (Lancaster University), Simon Voelker (RWTH Aachen University), Jan Borchers (RWTH Aachen University)

SparselMU: Computational Design of Sparse IMU Layouts for Sensing Fine-Grained Finger Microgestures

Adwait Sharma (Saarland University, Saarland Informatics Campus, Germany), Christina Salchow-Hömmen (Department of Neurology, Charité-Universitätsmedizin Berlin, Germany & Control Systems Group, Technische Universität Berlin, Germany), Vimal Suresh Mollyn (Saarland University, Saarland Informatics Campus, Germany), Aditya Shekhar Nittala (Saarland University, Saarland Informatics Campus, Germany), Michael A. Hedderich (Saarland University, Saarland Informatics Campus, Germany), Marion Koelle (Saarland University, Saarland Informatics Campus, Germany), Thomas Seel (Control Systems Group, Technische Universität Berlin, Germany & Department of AI in Biomedical Engineering, FAU Erlangen-Nürnberg, Germany), Jürgen Steimle (Saarland University, Saarland Informatics Campus, Germany)

The Placebo Effect of Artificial Intelligence in Human-Computer Interaction

Thomas Kosch (HU Berlin), Robin Welsch (Aalto University), Lewis Chuang (Technische Universität Chemnitz), Albrecht Schmidt (LMU Munich)

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Structural Equation Modeling in HCI Research using SEMinR

André Calero Valdez (University of Lübeck), Lilian Kojan (University of Lübeck), Nicholas Danks (Trinity College Dublin), Soumya Ray (National Tsing Hua University)

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The Fits' Law Filter Bubble

Heiko Drewes (LMU Munich)

WORKSHOPS | 3

Behind the Scenes of Automation: Ghostly Care-Work, Maintenance, and Interferences

Yana Boeva (University of Stuttgart, Stuttgart, Germany), Arne Berger (Computer Science, Languages, Anhalt University of Applied Sciences, Koethen, Germany), Andreas Bischof (Chemnitz University of Technology, Chemnitz, Germany), Olivia Doggett (Faculty of Information, University of Toronto, Toronto, Ontario, Canada), Hendrik Heuer (Institute for Information Management Bremen, University of Bremen, Bremen, Bremen, Germany), Juliane Jarke (University of Graz, Graz, Austria), Pat Treusch (The Trinity Long Room Hub, Trinity College Dublin, Dublin, Ireland), Roger Soraa (NTNU Norwegian University of Science, Technology, Trondheim, Norway), Zhasmina Tacheva (School of Information Studies, Syracuse University, Syracuse, New York, United States), Maja-Lee Voigt (Leuphana University Lüneburg, Lüneburg, Germany)

Moral Agents for Sustainable Transitions: Ethics, Politics, Design

Matthias Laschke (Interaction Design for Sustainability, Transformation, University of Siegen, Siegen, Germany), Amy Bucher (Lirio, Knoxville, Tennessee, United States), Paul Coulton LICA, Lancaster University, Lancaster, United Kingdom), Marc Hassenzahl (Ubiquitous Design / Experience & Interaction, University of Siegen, Siegen, Germany), Lenneke Kuijer (Industrial Design, Eindhoven University of Technology, Eindhoven, Netherlands), Carine Lallemand (Department of Industrial Design, Eindhoven University of Technology, Eindhoven, Netherlands Human-Computer Interaction research group, University of Luxembourg, Esch-sur-Alzette, Luxembourg, Dan Lockton (Industrial Design, Eindhoven University of Technology, Eindhoven, Netherlands), Geke Ludden (Department of Design, Production, Management, University of Twente, Enschede, Netherlands) Sebastian Deterding (Dyson School of Design Engineering, Imperial College, London, United Kingdom)

Behavioural Design in Video Games: Ethical, Legal, and Health Impact on Players

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The 2023

German HCI

Party

-Hamburg-

When?

Wednesday 26th April, 2000hrs

Where?

@ Karoline

Karolinenstraße 45, Hamburg

ORGANISING TEAM

This event was also made possible by a team of volunteers from German Labs. Here we want to take the chance to thank all the involved persons!

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Johannes Zagermann (University of Konstanz) – Lead
Sukran Karaosmanoglu (University of Hamburg) – Venue
Julian Rasch (LMU Munich) – Venue

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