

Multi-sensory Dark Patterns

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Abstract

Deceptive patterns in visual interfaces - subtle nudges that persuade or manipulate users to take a certain action - have been researched extensively. Yet, little is known about how these patterns can be translated to the other human senses and what other forms of deception could be implemented for them. This meet-up aims to bring together researchers and practitioners with an interest in studying multi-sensory manipulative interface design, exploring how deceptive patterns for touch, sound, taste, and smell, but also lesser-known senses such as balance, pain, or interoception, can be created, embedded, and mitigated in and with current and future technologies. By facilitating the discussion of potential opportunities and risks across senses, we want to foster new collaborations to advance the field of responsible multisensory deceptive pattern research. In the long term, we hope to raise awareness of potential threats before they arise so we can better safeguard end users.

CCS Concepts

• **Human-centered computing** → **Human computer interaction (HCI)**; *Interaction design theory, concepts and paradigms*; Haptic devices.

Keywords

Dark Patterns, Deceptive design, Design research, Manipulative design, Multisensory design, UX

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1 Motivation and Meet-up Goal

Deceptive (or Dark) patterns (DPs) are subtle nudges that are imposed to the detriment of users and benefit of service providers, constantly trying to hijack our senses [8]. Most research on DPs focuses on visual dark patterns [8], leaving a significant lack of understanding of how manipulation can be orchestrated through multi-sensory approaches.

Within the Human-Computer Interaction (HCI) community, there is a growing interest in investigating the mechanisms that allow for dark or deceptive design through multimodal channels such as immersion [1, 5, 10, 17], haptics [13, 15, 17], and audio [3, 9].

To avoid the segmentation and provenance complexity that the large corpus of academic literature on dark pattern research has shown [2], we consider it necessary to take a proactive approach in creating a community to tackle these concepts early on. To that end, this meet-up will be organized with the following goals in mind. First, we seek to raise awareness about the potential of multi-sensory manipulation to the wider scientific community, expanding our reach and helping bring in trans-disciplinary voices and perspectives into the discussion. Secondly, this meet-up will provide a platform for linking resources between different organizations within industry and academia to create open-source tools for the detection and mitigation of multi-sensory dark patterns.



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2 Meet-Up Structure & Activities

We propose structuring our meetup along four main phases, focusing most of the time on interactive discussions and network building.

(1) Introduction - 15 minutes. First, the organizers will briefly introduce themselves (name, role, and relevant expertise) along with a short statement on the meet-up's overall theme. To manage the different perspectives (novice-expert, academia-industry), we will follow up with a short presentation (8 minutes) on core terms related to dark patterns and multi-sensory interactions with real life examples such as deceptive architecture and audio design, along with an overview of established classification systems and frameworks in dark pattern research. This section will conclude with an outline of the planned interactive activities, including the objectives of each activity and the rules of engagement

(2) Interactive Polls - 15 minutes. Our first activity will be a series of real-time interactive polls conducted using Mentimeter¹, including questions regarding the attendees' backgrounds, interests, and expertise. This allows us to sample the experience in the room, given that meetups are open to anyone attending CHI, discover shared interests, and identify potential focus areas for the later activities.

(3) Discussion/Networking Activity - 45 minutes. During our main activity, people will be divided into five groups, where each group focuses its discussion on one of the five senses or a subset of the senses. Attendees will be asked to reflect on their own research or practical work and think about the manipulation potential of multi-sensory feedback in those contexts. We will limit the maximum number of people per group to six to optimize discussions. In case the number of attendees for this meetup exceeds our expectations, we will assign the remaining groups to discuss overarching research methodologies and approaches for multi-sensory dark pattern research, such as user study designs, experiment protocols, manipulation types, detection, and mitigation strategies [2].

(4) Wrap-up and Conclusion - 15 minutes. We invite the groups to share the core points of the discussion briefly with the rest of the attendees. We aim to record and share the meet-up outcomes with all attendees, which may take the form of sensory manipulation maps, key emergent research directions, and best practices to safeguard against multi-sensory DPs. We will provide resources for attendees to stay connected with each other (e.g. slack channel) and discuss community engagement strategies to foster newly established connections for future events and editions of CHI.

3 Organizers

The organizers for this meet-up come from diverse academic contexts, studying multisensory interactions from different perspectives. Their experience in organizing workshops and contributions within their sub-domains brings in unique flavors to the discussion on multi-sensory dark patterns, making them highly suitable to run this meet-up.

¹Mentimeter - Interactive Polling Tool: <https://www.mentimeter.com/>, last accessed October 2nd, 2025

Karthikeya Puttur Venkatraj is a Design Researcher at TU Delft and Centrum Wiskunde & Informatica in the Netherlands. His work has contributed to HCI and design, focusing on novel interactions in immersive environments [14], expanding into dark design patterns in haptics [13] and Virtual Reality (VR) [15]. He has also conducted workshops and public demonstrations to raise awareness of dark patterns in the Netherlands.²

Donald Degraen is a Lecturer (Assistant Professor) at the HIT Lab NZ, a research centre at the University of Canterbury in Christchurch, New Zealand. His research explores the intersection of haptics, fabrication, and virtual reality to democratize the design process of touch experiences.

Abdallah El Ali (abdoelali.com) is a research scientist at Centrum Wiskunde & Informatica, and part-time Assistant Professor at Utrecht University. He leads the research areas on Affective Interactive Systems and Trustworthy Human-AI Interaction, focusing on AI transparency and meaningful human augmentation.

Jan Gugenheimer is an Assistant professor for Computer Science heading the HCI group at TU Darmstadt, Germany. His research focuses on context-aware computing, multi-sensory user experiences and interaction paradigms. His research spans the ethical, societal and technical implications within ubiquitous digital environments.

Gijs Huisman is Assistant Professor of Embodied Interaction at TU Delft's Faculty of Industrial Design Engineering. His focus is on the role the sense of touch plays in technology-mediated social interactions. His research involves studying the social and affective qualities of haptic technologies, multi-sensory interactions, and technology-mediated social communication.

Veronika Krauß is a professor at Ansbach University of applied sciences. Her research focuses on manipulative and deceptive design practices in emerging technologies like Extended Reality (XR) [6] and AI [4]. She further investigates ways to create responsible interactive systems and has extensive experience in conducting Design Thinking workshops with participants of various backgrounds.

Christina Schneegass is an assistant professor for Cognition & Design at TU Delft, Netherlands, who focuses in her research on the design of interfaces and interaction techniques with personal cognitive data - specifically, risks and potential for misuse. She has extensive experience organizing seminars and hosting workshops (e.g., [7, 11, 16])

Steeven Villa (Posthci.com) is a Postdoctoral Researcher at the Human-Centered Ubiquitous Media Lab at LMU Munich, Germany. His research investigates multisensory integration in tactile perception through encountered-type haptics, ultrasonic, wearable haptic systems, and haptic illusions, with applications in HCI and human augmentation.

4 Communities to which this meet-up is relevant

This meet-up's relevance includes but is not limited to the following communities:

²<https://www.tudelft.nl/en/ide/delft-design-stories/uncovering-manipulation-techniques-in-virtual-reality>, TU Delft University news article, accessed October 2, 2025.

- Researchers and other conference attendees who are interested in the future and risks of multi-modal design
- Industry professionals working on digital product design, interaction designers, system designers, game developers, user experience design, and regulatory compliance
- Graduate students and early career researchers interested in multi-modal design and DPs
- Conference attendees interested in emerging risks and challenges within the technology sector

In the past years, the CHI community has led a trans-disciplinary effort in creating an open and accessible forum to discuss nuanced ideas on the characterization, regulation, and mitigation of DPs, through case studies, workshops, and Special Interest Groups (SIGs) [12]. While these efforts have been significant in shaping the global engagement on this topic in legal, regulatory, and academic circles, the approach has been reactionary. As a result, DPs are studied once they have already been implemented in interfaces. The community would benefit from a proactive framework for anticipating emerging manipulative design strategies before they become widespread. The discussions in this meet-up will have implications on design practices now and in the future, ensuring vulnerable communities are safeguarded from manipulation across all modalities. Furthermore, this platform will open up the discussion to highlight key themes and challenges of DPs, such that individuals embedded within DP research can share their experience, which can help early career researchers to learn and further contribute meaningfully to the field.

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