Digital Communication Moving Beyond human-centric replication

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Abstract

This agenda-setting workshop will bring together HCI researchers and designers with colleagues from sociology, media, and communications to generate an interdisciplinary research agenda for digital communication beyond human-centric replication. It argues that the dominance of a human-centric replication paradigm in digital communication is problematic, constraining, limits digital innovation, and continues to unquestionably place humans at the center of digital futures with negative social implications for modes of digital communication and how we relate to one another. This workshop will explore and foster alternative visions of digital communication, drawing inspiration from animal and plant sensory worlds (through inspirational talks, hands-on-activities, discussion) to generate ideas towards a new way of thinking and working in sensorial immersion beyond the human-centric. We will address key research opportunities and challenges and build the foundations for a road-map for this novel area of research.

CCS Concepts

• **Human-centered computing → Interaction paradigms**; *HCI theory, concepts and models*; Interaction design theory, concepts and paradigms.

CHI EA '25, Yokohama, Japan

ACM ISBN 979-8-4007-1395-8/25/04
https://doi.org/10.1145/3706599.3707415

Keywords

human-centric mimicry, digital communication, senses, more-than-human

ACM Reference Format:
Carey Jewitt, Sara Price, Lucia Seminara, Nihar Sabnis, Jürgen Steimle, Nadia Berthouze, Kouta Minamizawa, Desiree Foerster, and Grant Jun Otsuki. 2025. Digital Communication Moving Beyond human-centric replication. In *Extended Abstracts of the CHI Conference on Human Factors in Computing Systems (CHI EA '25), April 26–May 01, 2025, Yokohama, Japan.* ACM, New York, NY, USA, 5 pages. https://doi.org/10.1145/3706599.3707415

1 Motivation and Background

The rapid expansion of techniques of simulation and sensory manipulation through augmented (AR), virtual (VR) and immersive reality (XR) is central to the future trajectory of digital communication (i.e., the use of wide range of digital devices and environments to mediate the ways that we design, send and interpret multimodal and multisensory meaning). There is growing interest in immersive techniques of simulation and sensory manipulation beyond the visual [4], industry visions of sensory virtual interaction and communication include being able to smell [7] and be touched by another (remote) person in the virtual world, and 'pass-through' headsets that bring VR content into a user's 'real-world' surroundings (e.g., Apple Vision Pro) are forecast to become the norm for mixed reality experiences over the coming years [1]. This sensory turn is primarily predicated on high fidelity human-centric replication of complex human psycho-physiological sensory processing. This approach dominates the efforts of many HCI designers, engineers, computer scientists and is epitomized by the concept 'digital twin'; a network of data sources treated

as a real-time digital copy of a physical entity [10]. Wholesale human-centric replication, buoyed by the rapid escalation of industry investment, ambition, and marketing underpins the future trajectory of digital communication environments; exemplified by industry dreams for the metaverse, e.g., 'Nature-verse' virtual travel experiences of nature in real time, a near-future (2030's) trend (https://www.ericsson.com/en/press-releases/2023/1/10-hot-consumer-trends-life-in-a-climate-impacted-future).

The dominance of this human-centric replication paradigm is, however, problematic, as it threatens to lock us in restrictive modes of relating to one another. First, it is grounded in a technical and limited view of the senses which severely constrains the range of digital sensory experiences available to people, which can lead to misaligned sensorial designs. Second, the possibilities for digital communication futures are anchored by the physical human world, rather than future digital possibilities: the dominant ambition to digitally replicate what we already have and make it available in more convenient ways, serves to lock in our current ways of perceiving and knowing that hold back innovation. Third, human-centric replication fails to engage with the possibilities of the more-than-human, the social implications of which matter in the contemporary era of the Anthropocene, which marks the overwhelming detrimental planetary impact of human activity [5].

This workshop proposes a new way of thinking and working in this emerging area, arguing that there is an urgent need (and immense potential benefits) to explore and foster alternative visions of digital communication. To do this, the workshop proposes to engage with the more than human (animal and plant sensory worlds) and draw inspiration from animal and plant worlds to generate ideas towards a new way of thinking and working in sensorial immersion beyond the human centric. The intention is not to exploit, mimic or seek to 'become' animal or plant, but rather to seek ways to creatively translate more-than-human sensorial worlds, reinterpret and reconfigure them to digitally unlock new playful, multimodal, and sensorially extended forms of digital communication beyond human-centric replication toward more optimistic and a renewal of digital possibilities.

2 Issues to be Addressed

The workshop will engage creatively with digital sensorial communication through three themes in ways that move beyond human-centric mimicry and replication, towards new ways of knowing and being fit for the contemporary era, guided by the concept of Ikigai. Further, this workshop will contribute to the 'futuring' of digital communication through a variety of activities to generate speculative forms of the immersive sensing body beyond human replication through a turn to the more-than-human to create sensorially extended ways that inject some 'play and wonder' [9] into how we experience and manage ourselves, our connections, and lives through digital communication.

To focus discussion, stimulate new thinking, dialogue, and new directions, the workshop activities will be framed around 3 key themes, each of which offers different entry points and ideas for sensations and collectively provide a rich matrix of possibilities for speculative inquiry as an informed imaginative leap to break out of our sensory limitations.

Theme 1: Challenging human-centric mimicry/replication. We will interrogate what constitutes mimicry within immersive digital spaces, and map application contexts where mimicry is considered essential and, more importantly for this workshop, where it is not. With a focus on HCI design and development beyond human-centric sensory mimicry and replication through alternative sensorimotor 'worlds', we will explore possible inspirations, opportunities, and challenges, as well as techniques and methods for incorporating novel experiences into technology design. Opportunities may include expanding bodily experiences through the digital, new scales and temporalities of experience and connection through the more-than-human, a de-centering of the self towards sensorial empathy design, or perhaps attuning to newly felt relationships between a person's body and the environment [6]. The challenges we will interrogate may include how to navigate new relationships to the 'real-world', how to map new sensorial possibilities to the human body, mutual bodily adaptivity, or the challenge of new perspective-taking.

Theme 2: Animal sensory worlds. While engagement and communication is challenged by the affordances and constraints of our sensing bodies, the subtle ways that animals communicate (through sounds, vibrations, smells, tastes, and electric and magnetic fields), often traverses physical distances that are inconceivable through a human lens. Take touch: sea urchins feel with their whole bodies, starfish see with the tips of their arms, the star nosed mole feels with its nose, and the manatee uses its lips, or the communicative sensorial world of the octopus, notably its proprioceptive control of its limbs.

Theme 3: Plant sensory worlds. A recent 'plant turn' in plant sciences proposes new sensorial attention to their place and behavior in the broader sensorial environment [3], in response to studies of how plants make sense of and actively intervene in their (our) worlds through their 'memory', 'internal timers' (sensitive to environmental and seasonal light and temperature changes), and the capacity to learn (e.g., changing behavior in relation to environmental challenges) and anticipate [8].

Through themes 2 and 3, we will ask how can we use digital technologies to mediate new sensorial experiences that draw inspiration from the more-than-human to newly connect us with ourselves, one another, and nature [2].

3 Workshop Objectives

The workshop embraces the theme of CHI2025, Ikigai, to contribute to the challenges related to human, more than human, and planetary well-being through starting to seek ways to disrupt and re-balance the connections between the digital, the physical, and nature, responding to the broader international and interdisciplinary *'turn to nature'*. This underpins four workshop objectives as follows:

(1) Facilitate creative engagement and exploration of concepts and resources from the more-than-human sensorial worlds.
(2) Speculate on alternative digital immersive communication futures beyond human-centric mimicry and replication.
(3) Develop a novel agenda for interdisciplinary research and design to speculate on expanded forms of digital sensory communication that situate human beings as part of a wider ecology.

(4) Build a new interdisciplinary community to explore digital communication in novel and less anthropocentric terms.

4 Organizers

The organizing committee itself comprises of an interdisciplinary group of scholars from HCI, Media and Communication, Interaction design and Computer Science. They are scholars at different career stages, from doctoral researchers and associate: professors to full professors. It is an international group from Germany, India, Italy, Netherlands, Japan, Spain, and UK.

Prof. Carey Jewitt. (social researcher, digital touch) UCL Knowledge Lab, Department of Culture, Communication and Media, University College London, UK. She is an interdisciplinary social scientist engaged with the social critique and re-imagining of digital communication futures. https://profiles.ucl.ac.uk/48752-carey-jewitt

Prof. Sara Price. (HCI, embodied/enactive cognition) UCL Knowledge Lab, Department of Culture, Communication and Media, University College London, UK. She has expertise in interdisciplinary research at the intersection of social science, computer science and engineering, with a focus on embodied, multisensory, multimodal forms of interaction. https://profiles.ucl.ac.uk/48680-sara-price

Prof. Lucia Seminara. (human-in-the-loop haptic interfaces, sensorimotor approach to haptics), Electronic Engineering, University of Genoa, Italy. With experience in the artificial reconstruction of the sense of touch for prosthetics, she coordinates a transdisciplinary effort between arts and sciences to transform haptic interfaces into creative tools for interaction and world exploration. https://www.researchgate.net/profile/Lucia-Seminara

Nihar Sabnis. (HCI, Haptic Interfaces, Augmented-Wearables) is a PhD student at the Max Planck Institute for Informatics associated with University of Saarland. His research focuses on developing novel ways (devices, algorithms, interaction paradigms) of human-human and human-computer interaction through the sense of touch. https://people.mpi-inf.mpg.de/~nsabnis/

Nadia Bianchi-Berthouze. (Affective Computing Researcher) UCLIC, University College London, UK She is an interdisciplinary researcher working at the intersection of human-computer interaction and affective sensing technologies, with a particular focus on how touch and body movement gestures. https://profiles.ucl.ac.uk/3849-nadia-berthouze.

Jürgen Steimle. (HCI, embodied interaction, sensing) HCI Lab, Computer Science Department, Saarland University. His research investigates embedded and embodied user interfaces that seamlessly merge with the physical world and the human body. His current focus areas include flexible sensors and displays, on-body interaction and wearable computing, touch and haptic interfaces, digital fabrication and new materials for interaction.

Kouta Minamizawa. (Haptics, Virtual Reality, Human Augmentation, Embodied Informatics) Keio Media Design, Keio University. He directs KMD Embodied Media Project, where he conducts research and social deployment of embodied media that transfer, enhance, and create human experiences with digital technologies.

Desiree Forster. (media theory, phenomenology) University of Chicago, Department of Cinema and Media Studies, US. She is an interdisciplinary scholar engaged with processes of cognition and perception and how they are taken up and contested in the arts and design.https://cms.uchicago.edu/people/desiree-foerster-0.

Grant Jun Otsuki. (social-cultural anthropology, Science and Technology Studies) University of Tokyo. He works with scientists & engineers in Japan developing new human-machine interfaces and robots, and explores how people think about themselves as human as they learn to live their lives with new technologies. Questions that are key to the workshop topic. https://www.gjotsuki.net/

The organizers. of this workshop are actively involved in sensory, tactile, and embodied research, and several have successfully organized related CHI workshops, e.g, Reshaping Touch Communication (Price, Jewitt, Berthouze, 2018). Jewitt, Price and Steimle collaborated on a 2020 Eurohaptics workshop: Designing Digital Touch: social & Sensory challenges. Jewitt, Price and Seminara collaborated on a 2024 Eurohaptics workshop on tactile non-human possibilities. This proposed CHI workshop brings a new team together to build on and significantly extend this work in new directions by moving beyond a focus on touch to the sensing body, honing in on immersive technologies, and focusing in on alternatives for digital communication.

5 Workshop Structure and Activities

5.1 Pre-Workshop Activities

The pre-workshop plan includes participants making a short video-introducing themselves and virtually meeting others helps participants to feel more comfortable and enables the group to 'hit the ground running' on the topic. The activities are enlisted in Table 1.

Table 1: Pre-Workshop Activities

Duration	Activity
15 mins	Participants submit a short two-minute video briefly stating their discipline, research focus, and interest in the workshop. **Participant online activity**: record and post a 2 min bio-video.
15 mins	Identify one inspirational image, video, or artifact related to the workshop theme that they are happy to bring and share.
60 mins	Position papers will be circulated (via the workshop website) in advance of the workshop. **Participant online activity**: read 2 or more participant position papers.

5.2 Schedule

The workshop will be a one-day workshop with the schedule as shown in Table 2. This is justified by the newness and complexity of the topic which necessitates time to foster a shared grounding, offer novel inspirational sparks, ensure time for vignette development,

Table 2: Schedule of the Workshop

Time	Activity
9:00 – 9:30	Pre-workshop coffee welcome
9:30 – 10:00	Introductions: quick fire participant intros (1 minute, 1 slide)
10:00 – 10:45	**Framing the workshop scope and goals**: This session will provide participants with a shared foundation focus. **Theme 1: Beyond human-centric mimicry replication** - Keynote (15 min): Why move beyond mimicry replication - Three participant short papers/video-demo (5 min each) - QA/ discussion
10:45– 11:15	**Mapping of the challenge space**: Group Activity: Sharing, brainstorming to map key challenges, opportunities, dimensions of moving beyond mimicry replication
11:15 – 11:30	Coffee/comfort break
11:30 – 13:00	**Inspirations for expansion** This two-part session will offer pathways beyond human-centric replication to facilitate speculative vignette development. 1) A presentation as an inspirational 'spark' 2) A curated collection of resources on the sensory worlds of plants/animals 3) Participant exploration
11:30 – 12:15	**Theme 2: Animal sensory worlds** - Spark: Kuai Shen, Ant tactile tactics Collaborator on ERC – Consolidator Animal Abidings, Germany(15-min pre-recorded video) - HCI framing comment (5 mins) - Participants will explore animal practices, ways of knowing, and their sensory potentials for communication. Focusing Question: What communicative behaviors and sensory dimensions of animals might expand and enrich our sensorial capabilities?
12:15 – 13:00	**Theme 3: Plant sensory worlds** - Spark: Paco Cavlo Prof. Director Minimal Intelligence Lab, University of Murcia, Spain on Plant movement (15-min pre-recorded video) - HCI framing comment (5 mins) - Participants will explore plant practices, ways of knowing, and their sensory potentials for communication. Focusing Question: What digital immersive ecologies might be inspired by plants related to symbiosis, temporality, notions of collective behavior, responses to the environment?
13:00 – 13:45	Lunch
13:45 – 15:45	**Thematic synthesis: Hands-on group activity (speculative vignettes)** Introduction: Jürgen Steimle (5 mins) This session will generate vignettes of digital communication beyond human-centered mimicry and replication. 1) Small group ideation and vignette drafting (60 mins) 2) Vignette presentation/sharing (30 mins: 4 × 5 mins) 3) Vignette refinement (30 mins)
15:45 – 16:00	Coffee/comfort break
16:00 – 17:00	**Plenary discussion**: Building on the speculative vignettes, the organizers will facilitate a group discussion to identify research directions centered on alternative directions to expand digital communication research.newline - What might radical new communicative digital ecologies for the sensing body that draw on the sensory capacities of the more-than-human feel, look, smell like? - How/why might we bring new sensitivity to the more-than-human to bear on how we communicate digitally? The session will conclude with a discussion of next steps, including the possibility of a journal special issue and collaborative plans.

group reflection and new collective synthesis. The program is designed to encourage exchange and communal knowledge creation, including informal breaks. Groups will be organized to ensure a mix of disciplines and/or perspectives to foster lively and stimulating interactions. The workshop will follow a logical sequence of focused and interactive activities which build on one another from 'information to inspiration' including agenda setting keynotes, short presentations, discussion, mapping, to hands-on activity (rapid prototyping) to generate speculative vignettes. A closing plenary session focuses on practical proposals for future directions and next steps. The day workshop will be preceded by online preparation tasks, a time-efficient strategy the organizers used successfully in a 2020 Eurohaptics workshop; and be followed an optional follow-up

meeting focused on future publication and plans. These three elements (pre-workshop, workshop, and post-workshop) are outlined below.

5.3 Workshop Details:

Workshop mode: while the mode will be Hybrid, in-person attendance and participation will be encouraged.

Accessibility: All materials will be made accessible in accordance with CHI guidelines, including auto-generated live transcription of presentations and position papers in a screen-reader compatible format.

Asynchronous materials: Participants will be able to attend remotely via zoom, and undertake group work using the collaborative tool Miro, 1-2 of the organizers will facilitate the virtual participation and integrate their contributions in the in-person discussion and feedback. All talks and resources will be available online. The organizers have extensive experience of running hybrid workshops (e.g., our Eurohaptics 2020 workshop).

Expected Size of Attendance We aim to recruit 15–25 participants (at least 15 in person) working in the area from academia and industry through an open call for papers through the CHI website, the organizers' and relevant HCI and social science mailing lists, and social media platforms.

5.4 Post-Workshop Plans

There will be 4 key outputs from the workshop:

(1) Generate an interdisciplinary research agenda for digital sensory communication that integrates the more-than-human for publication in *ACM Interactions*.
(2) A set of vignettes/design provocations to inform and support future design beyond human-centric mimicry and replication.
(3) A Special issue Journal publication in a leading HCI journal.
(4) Proposal for a 2-day workshop or 5-day Dagstuhl retreat to consolidate and expand the emergent cross-disciplinary community and explore future collaborations.

Outputs 3 and 4 will be supported by the optional online follow-up meeting to build on and extend the workshop learning and outcomes with interested participants.

Plans to publish workshop proceedings The workshop short position papers will be published as workshop proceedings via https://ceur-ws.org or ArXiv using report numbers. In addition, the workshop organizers will secure a special issue of a leading journal (e.g., ToCHI or Frontiers in Computer Science) on the workshop topic to publish full papers by workshop participants as well as new papers via a CFP. The organizers have extensive editorial experience, including special issues in ToCHI, and other high-ranking relevant journals.

6 Website

Information about the workshop will be available online before, during, and after the workshop at https://digitalcommunicationecologies.wordpress.com/. This information includes an introduction to the workshop topics, organizers, detailed schedule, and a call for participation. The website will link to an online form, where interested people can apply to participate by uploading a position paper. Reports on results from the workshop will also be made available through the website. Later, this website would also serve as a medium for researchers and practitioners to join the community.

7 Call for Participation

Submissions are invited to a one-day in-person CHI workshop, Digital communication beyond human-centric mimicry and replication. This workshop brings together an interdisciplinary group of researchers and designers to critique human-centric mimicry and replication, engage with the potentials of the more-than-human for digital communication, participate in speculative rethinking, build a future research agenda and a cross-disciplinary community to foster future collaboration. It will focus on three themes: mimicry and replication; animal sensory worlds; plant sensory worlds, to generate a wide range of ideas, sensorial possibilities, metaphors, and structures to expand our understanding of how our sensing bodies might actively and newly engage in a digital dialogue with the world, and how HCI design might extend human sensorial experiences.

Prospective participants are invited to submit a 2-4 page position paper by Feb. 13, 2025; notification 10th March using the ACM SIGCHI Extended Abstract format. This can be a paper, vignette/scenario, or video that responds to the theme of the workshop. The organizers will select participants based on the quality and relevance of their position paper to the scope and goals of the workshop, innovativeness, ethical or methodological reflexivity, and where possible to reflect a range of disciplines, technologies, or user contexts. To upload your paper and for more information, please visit: https://digitalcommunicationecologies.wordpress.com/. At least one author must register for the workshop and one day of CHI 2025 conference. Position papers will be available to participants in advance of the workshop.

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