# Telelife: A Vision of Remote Living in 2035

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## CCS CONCEPTS

• **Human-centered computing → HCI theory, concepts and models**; **Mixed / augmented reality**.

## KEYWORDS

Telelife, Telepresence, Telework, Remote Living, Digital transformation, Biosensing

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## 1 TELELIFE: REMOTE LIVING AND THE WORK

The world has become super-connected via local transportation hubs and technological advances, pushing us to rethink the sustainable life and work culture. Transitioning from physical to virtual life may also reduce carbon footprints while remaining connected. Such transition may also reveal the potential for diversity. The transformation will enable including a wide variety of people around the globe to work together and support each other without physical restrictions for diversity. For example, a single parent who needs more time flexibility to handle their child-care responsibilities can parallelize duties for home and work synchronously via teleconferencing [2], people with disabilities who are limited to commute a long distance can participate in the labor market with a widened landscape for job choices [7], also, children living with limited access to higher education can receive a high quality lifelong learning virtually [6]. Coincidentally, the world has gone through the global challenge that sheltered everyone home for public safety due to the ongoing pandemic, expediting the switch. Changes have been swift enough for researchers to unveil key characteristics of the future of work, more time flexibility with less mobility, as well as resetting those in collaboration, education, commerce, healthcare, and even personal life. The idea of remote living promoted a suite of ideas to realize this emergent future. While exciting, many opportunities are mainly unexplored, giving us a ground to invite everyone and trigger research debates.

**Telelife** [5] encompasses novel concept areas and technology to actualize the provision of future remote living and work. Telelife includes but is not limited to digital twins, virtual/physical rapid prototyping, and attention and context-aware user interfaces with innovative hardware that can support ultrarealistic graphics and haptics and more. Now the questions are left unanswered for the world's leading experts and broader audiences from the CHI community, eliciting clues not solely for technical and scientific advances but ethical and philosophical discussion and debate around the theme for the future of computing, humanities, and the society.


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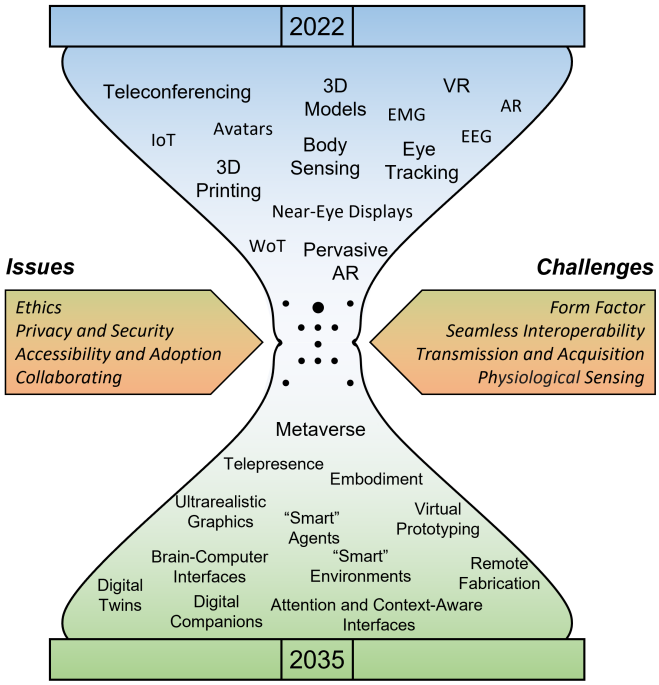


**Figure 1: Telelife, the future of remote living [5]. In 2022, we have access to advanced technologies and tools (e.g., the upper part of the hourglass). Yet, we are still locked in front of a stationary display and operating remotely in an unnatural and often exhausting way. Telelife provides a vision of the future that looks towards 2035, where a majority of our remotely performed interactions and daily routines will be supported with emerging technologies that are aligned with human nature. Telelife integrates learning, exploration, interaction, problem solving, and even gaming into a virtual ecosystem in which users will have experiences that are closely integrated into their lifestyles. To achieve this future, we must overcome technical challenges such as the form factor, interoperability, data collection, and transmission and address issues related to ethics, privacy and security, accessibility and adoption, and collaborating that we call out rigorous debates and discussion amongst world's leading experts through this panel.**

## 2 TELELIFE IN 2035 "AS WE MAY THINK"

Laying a high-level tangible roadmap can provide the opportunity to effectively solve problems by uniting researchers to move towards a common goal. Examples of such visionary goals have been proposed (e.g., [1, 8]) and discussed (e.g., [3, 4]) in our research community. We trust that the Human-Computer Interaction (HCI) and related research communities, including computer-supported cooperative work and social computing (CSCW) need a research roadmap. This roadmap can help us identify pathways that impact our societies and individual lives and overcome emerging problems, specifically in extraordinary situations similar to the current COVID-19 pandemic. Finding the way towards Telelife is a multidimensional problem that will require efforts from different ends of the HCI research. In this panel, we hope to contribute to unifying the visions and forces of researchers so that their work will better provoke the upcoming Telelife ecosystem. We will open up the discussion with the following essential questions:

- What are the domain areas and user context that the Telelife ecosystem can have an immediate impact?
- What are major trends and changes that we already see the clue of Telelife now (e.g., Metaverse)?
- In many contexts where Telelife will appear (i.e., Smart Homes, Learning, Work & Collaboration, Remote Assistance), which issues and challenges need researchers and practitioners' significant attention?
- How can the characteristics of Telelife (i.e., user state detection, ultrarealistic graphics, virtual prototyping, telework, and embodiment) foster investigations and promotions of a new technology?
- Is Telelife an opportunity or another harm for underprivileged groups of people?
- What are ethical issues and the related, to envision the fair and inclusive future with Telelife?
- How can we imagine inclusive design and technology investigation to support those who can potentially be disadvantaged by Telelife?

We think that the concepts discussed in this panel will inspire and guide future research on domains relevant to remote living. Lastly, we aim to raise the opportunity to interactively discuss future questions about how we can and should live our remote social, intellectual, professional, and personal lives. We believe this introduction can help improve the visibility of our vision, but it can also trigger much needed further discussion among experts on how the future could look like and how researchers can align their goals and efforts with the ongoing transformation.

## 3 STRUCTURE

This panel starts by five minutes presentation of each panelist reflecting upon the questions listed above and describing their views in grounding the foundation of Telelife. During these presentations we will collect and sort questions from the local and remote audience using online collaboration tools (e.g., Slido[1], Mentimeter[2]) and maintain a live and interactive feedback loop across the globe. In the second half of the panel, we will moderate the discussion based on the collected questions and invite attendees to the debate by asking questions directly to the presenters. Panel discussion and live commentaries from audiences will be interconnected with the Zoom[3] panel as a primary source of paneling, regardless of the CHI '22 mode (completely virtual vs. hybrid) as we discuss Telelife and supporting tools and technology.

## 4 PARTICIPANTS

### 4.1 Panelists

Following expert researchers will contribute their unique perspectives to this panel:

[1] https://www.sli.do/
[2] https://www.mentimeter.com/
[3] https://zoom.us/

**Kaan Akşit** is an Associate Professor in the computer science department at University College London, where he leads the computational light laboratory (https://complightlab.com). Kaan researches the intersection of light and computation, including computational approaches in imaging, graphics, fabrication and displays. Kaan's research works are most known among the optics and graphics community for his contributions to display technologies dedicated to virtual reality, augmented reality, and three-dimensional displays with glasses and without glasses.

**Kiyoshi Kiyokawa** is a Professor at Nara Institute of Science and Technology, Japan, where he leads the Cybernetics and Reality Engineering Laboratory (https://carelab.info). His research interests include virtual reality, augmented reality, human augmentation, 3D user interfaces, CSCW, and context awareness.

**Anthony Steed** is Professor of Virtual Environments and Computer Graphics in the Department of Computer Science at University College London. He has broad interests in real-time graphics systems, with a particular focus on telepresence and telecollaboration systems.

**Tobias Höllerer** is Professor of Computer Science in the Department of Computer Science at the University of California, Santa Barbara, where he directs the Four Eyes Laboratory for research in the four I's of Imaging, Interaction, and Innovative interfaces (https://ilab.cs.ucsb.edu). His research interests lie in HCI and experimental systems; AR, VR, and adaptive user interfaces; machine learning for computer vision and HCI; interactive visualization and real-time computer graphics; wearable, situated, ubiquitous, and social computing; and multi-modal and multimedia computing.

**Nataliya Kos'myna** is a Research Scientist at MIT Media Lab, Fluid Interfaces group, Cambridge, US. Her research projects strongly emphasise Brain-Computer Interfaces in the context of consumer grade applications. Nataliya worked for the past 13 years on designing solutions to control drones, robots, home appliances using brain activity. Nataliya's work also expands on closed-loop systems using real-time biofeedback to enhance and augment human performance, particularly attention and focus (https://www.braini.io).

## 4.2 Moderators

This panel will be moderated by the following researchers:

**Jeeeun Kim** is an Assistant Professor at Computer Science & Engineering, Texas Texas A&M University, where she leads the HCIed lab (https://hcied.info). Her research interest intersects the domain of digital fabrication and personal robotic devices. She wants to use HCI as a magnifying lens to empower everyone to appreciate everyday design challenges, creates new workflows toward the future everyone can imagine and build smart and accessible surroundings via augmented everyday objects.

**Huaishu Peng** is an Assistant Professor in the Computer Science department at the University of Maryland, College Park, where he leads the Small Artifacts Lab (SMART Lab). His multi-disciplinary research focus on interaction challenges that related to (1) design and fabrication, (2) virtual and augmented reality, (3) assistive and enabling technology.

**Kenan Bektaş** is a Postdoctoral Researcher at the Interaction- and Communication-based Systems Lab of the University of St. Gallen (https://interactions.ics.unisg.ch/) and affiliated with the ETH AI Center in Zurich. His research comprises Gaze-contingent Augmented Reality Systems, HCI, and Ubiquitous Computing. He is the deputy manager of the project "Mixed-Reality Support for Context-Aware and Autonomous Industrial Processes" (i.e., funded by the Innosuisse Award Number: 48342.1 IP-ICT).

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