



Participatory Design of AI Systems: Opportunities and Challenges Across Diverse Users, Relationships, and Application Domains

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ABSTRACT

Participatory design (PD) for Artificially Intelligent (AI) systems has gained in popularity in recent years across multiple application domains, both within the private and public sectors. PD methods broadly enable stakeholders of diverse backgrounds to inform new use cases for AI and the design of AI-based technologies that directly impact people's lives. Such participation can be vital for mitigating adverse implications of AI on society that are becoming increasingly apparent and pursuing more positive impact, especially to vulnerable populations. This panel brings together researchers who have, or are, conducting participatory design of AI systems across diverse subject areas. The goal of the panel is to elucidate similarities and differences, as well as successes and challenges, in how PD methods can be applied to Artificially Intelligent systems in practical and meaningful ways. The panel serves as an opportunity for the HCI research community to collectively reflect on opportunities for PD of AI to facilitate collaboration amongst stakeholders, as well as persistent challenges to participatory AI design.

CCS CONCEPTS

• **Human-centered computing** → Participatory design.

KEYWORDS

Participatory design, PD, artificial intelligence, AI, diversity

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1 INTRODUCTION

Participatory Design (PD) has been a crucial method within HCI research for multiple decades [12]. At its core, participatory design involves incorporation of stakeholders, such as anticipated end-users, into the design process to work alongside professional designers and researchers and share in decision-making. PD has been valued in the CHI community for its capacity to incorporate a wide range of stakeholders, particularly those from marginalized and underrepresented communities [7, 8, 11], in setting design agendas for the future and informing the design of technologies that will immediately and directly impact people's lives.

In more recent years researchers have considered the application of participatory design to AI-based technologies [2]. The importance—if not need—for participatory design of emerging technologies such as artificial intelligence (AI) has become increasingly apparent due to the widespread recognition of the adverse impacts that AI can have on society, such as through algorithmic bias, opacity in decision-making, and perpetuation of misinformation. The adaptation of participatory design methods to AI-based technologies is relatively new and has been met with questions and concerns about its feasibility [3, 9]. Nonetheless, the HCI literature has produced early evidence of its value to various application domains, such as empowering youth as agents of their own online safety [1, 15], foregrounding safety of women and LGBTQ people when using social matching apps for rapid face-to-face encounters [4, 6], embedding caseworkers' values in algorithms for the Child-Welfare System [13], and matching food donations to recipient non-profit organizations [10].

Researchers must consider several questions when adapting participatory design to AI in their respective application domains. The goal of this panel is to bring together researchers who have, or are, conducting participatory design of AI across diverse subject areas to elucidate similarities and differences, and successes in their challenges, in how the method is applied. We will scaffold panel discourse around the following questions:

Who conducts participatory AI design research? The disciplinary backgrounds of HCI researchers can be quite varied, and those backgrounds can shape approaches to participatory AI design in different ways. Researchers may wonder if a technical background in AI is necessary, or how researchers with technical expertise in AI are incorporated into a research team comprised of other backgrounds and disciplines. Within the panel we aim to articulate

who has been, and could be, involved in research teams conducting participatory AI design, and how their presence shapes adaptation of the method.

How do researchers determine what aspects of AI can or should be co-designed? The purview of what can be designed regarding AI-based technologies is wide-ranging, including user interfaces, explanations of AI decision-making within those interfaces, machine learning models, data that models are trained on, stakeholder values that should underpin AI development, and so on. At the same time, there are often practical constraints around which aspects of AI-based technologies can be subjected to participatory design. For example, in some instances the data used to train the model may be fixed, the model itself may be fixed, or the general use case for the AI (what decisions it is intended to make) may be predetermined. The panel aims to spark discussion around how researchers make decisions about *what* is subjected to participatory AI design, and what practical constraints researchers have had to accommodate when applying the method.

How does the act of participation in AI design happen? Participation of stakeholders in the design of AI-based technologies can happen in myriad ways. As evidenced by prior uses of participatory design for AI and other technologies, researchers can consider design activities that stakeholders partake in individually or as a group, as well as different tools to scaffold the design process, such as arts-and-crafts boxes for brainstorming or software to support ideation. Yet, in many cases, AI researchers invoke participatory design erroneously to mean almost any light engagement with end-users, such as one-time design workshops or focus groups to solicit feedback on researcher designed artifacts. This lightweight engagement dilutes the intention of PD as an approach that leads to active and sustained engagement that empowers end-users and directly influences the final system design through a highly interactive and iterative process. The panel aims to elucidate the different ways in which participatory AI design happens from the co-designer's perspective, and how those decisions are informed by the application domain.

What do researchers do with co-designed AI artifacts? Because of the variety in choices regarding “where” and “what” co-designers may produce during participatory AI design, there are different approaches to how researchers choose to utilize co-produced artifacts or synthesize them into a singular design. Further, this raises ethical questions on who owns the intellectual property of the design artifacts created by non-researcher stakeholders (i.e., end-users). While not a new concern to participatory design in general, AI may introduce new facets to how researchers choose to utilize or incorporate co-produced artifacts. The panel seeks to extrapolate on how researchers utilize co-produced AI artifacts.

How do we facilitate collaboration between co-designers and researchers with expertise across different applications domains? Co-designers and researchers involved in participatory AI design may have experience in many different domains inside and outside of AI and computing. While these diverse perspectives can strengthen the participatory design process, they can also pose barriers to collaboration between co-designers and between co-designer and researcher. Examples including a stakeholder with a computing background using technical terminology that some

co-designers do not understand, or a stakeholder with relative unfamiliarity with AI opting to withhold ideas so as not to be judged by other co-designers. Such barriers may become particularly apparent when designing for a potentially esoteric technology such as AI: they may pose challenges to stakeholder comprehension of particular design activities, and they may disempower stakeholders from fully participating in design and decision-making if their positions are not fully understood by other co-designers and researchers. The panel aims to extract approaches to facilitating collaboration amongst co-designers and between co-designers and researchers with disparate expertise and experience.

What are persistent challenges to participatory AI design? Extant publications on the use of participatory AI design may not always reveal limitations of the method – challenges that the researchers may have encountered, and persistent difficulties with adapting the method to particular subject areas. The panel seeks to provide a platform for the community to voice and collectively reflect on challenges or concerns with participatory AI design as a method.

2 PANEL FORMAT AND AUDIENCE ENGAGEMENT

This will be a fully virtual 60-minute panel so as to mitigate disparities in who can attend the panel and how the audience can interact with the panelists and each other. The first 30 minutes of the panel will be used for panelists to highlight their prior or ongoing work regarding participatory AI design across diverse application areas, organized as answers to the aforementioned questions. The final 30 minutes will be used for the audience to point out issues that the panel has not touched on regarding participatory AI design, raise questions to which the panelists and/or audience can engage with, or broach their own application areas and collectively reflect with the panelists and audience on challenges and opportunities for participatory AI design in the broached context. The panel ultimately intends to 1) motivate the audience to consider participatory AI design across diverse application areas and 2) provide actionable considerations for applying participatory AI design to those diverse areas.

Part 1: Participatory AI design introduction. The moderator will begin with a short introduction to participatory AI design and the goals of the panel. Panelists will then individually introduce themselves and summarize prior or ongoing work most applicable to participatory AI design, along with visual aids as needed. Panelist introductions will be organized around the questions listed in the previous section. The questions may also be used to solicit input from the audience. Value of these panelist summaries for audience members include: identification of diverse application areas for participatory AI design, methodological choices that can inform the audience of different ways to apply participatory AI design, successes with the method that could motivate the audience to consider potential in their own work, and challenges with the method that could spark audience input.

Part 2: Collective reflection on participatory AI design as a method of HCI research/practice. Discussion in the second half of the panel will be driven by audience input and interaction. They may point out issues or raise questions regarding panelists'

research summaries or suggest application areas germane to their own interests as prompts for the panelists and rest of the audience to reflect on how participatory AI design could be applied. The moderator will encourage audience questions be submitted as text online (see below) to ensure equal opportunity for audience participation, as well as to facilitate audience interaction while panelist introductions are still ongoing. The audience members will also be encouraged to “upvote” submitted questions to assist the moderator in identifying questions of most interest to the audience.

Online platform for audience feedback and interaction. Audience members will be invited to use an online platform at the start of the panel for posting questions and maintaining continuous audience/panelist interaction that does not interrupt verbal dialogue. This will also serve as an artifact for audience members to refer to later. The moderator will maintain “panel minutes” consisting of notes and ideas from discussion, which will likely be valuable to audience members who broach discussion topics but are unable to take notes while simultaneously engaging in verbal dialogue. The platform may also be used to maintain audience/panelist interaction after the panel is over.

3 MODERATORS AND PANELISTS

Moderator: Douglas Zytko is an Assistant Professor in the Department of Computer Science and Engineering at Oakland University. He is also Director of the Oakland HCI Lab, a hub for interdisciplinary research into online-to-offline harm. The lab integrates researchers in AI, human-computer interaction, psychology, and nursing to leverage emerging technologies for the prevention of harms that emerge through the combination of computer-mediated and face-to-face interaction. Most relevant to this panel, Doug is using participatory AI design methods for the prevention of sexual violence facilitated through mobile social matching apps. The work puts stakeholders at risk of sexual violence victimization in position to articulate new use cases for AI pursuant to safety and produce models for prediction of online-to-offline harm. The research also coalesces experts in AI and sexual violence in clinical and research contexts to produce theory-informed and AI-based technologies for altering behavior of potential perpetrators of sexual violence.

Panelist: Pamela Wisniewski is an Associate Professor in the Department of Computer Science at the University of Central Florida. She is the Director of the Socio-Technical Interaction Research (STIR) Lab, and more recently, of Teenovate, a Participatory Action Research and Design (PAR/PD) program for adolescents (13-17) to co-design online safety solutions that empower youth. She is also the founder of MOSafely [5], a human-centered artificial intelligence (HCAI) open-source community and research consortium for AI risk detection systems designed to proactively protect youth online. Thus, Pam, her colleagues, and her students, are working together and with teens at the intersection of PD and AI to build teen-centered online safety solutions that move away from the traditional paradigm of parental control. She has also worked with Shion Guha on critiquing AI decision-making systems used within child welfare. As a HCI researcher whose focus is on predominantly on humans and user-centered design, rather than AI, she often plays the devil’s advocate when it comes to research that overly evangelizes the use of AI to automate important social

interactions and/or high-stakes decision making that profoundly affects people’s lives.

Panelist: Shion Guha is an Assistant Professor in the Faculty of Information at University of Toronto. His research primarily focuses on understanding how algorithms are designed, deployed and implemented in public services such as child welfare or criminal justice systems. His methodological research focuses on developing methods that bridge computational and human-based analyses. He has used Participatory Design methods to inform the design, deployment, and decision-making processes of AI in Child Welfare Systems. In addition, through his methodological research he’s shown how PD can be combined with traditional AI/ML methods in useful and interesting ways. This has led to the development of a novel, intersectional research area called Human Centered Data Science which seeks to combine computational, technical AI/ML methods with critical, interpretive inquiry. A textbook titled Human Centered Data Science: An Introduction is being published through MIT Press in March 2022. It has substantial content on how to integrate PD and co-design methods with AI/ML techniques.

Panelist: Eric P.S. Baumer is Associate Professor Computer Science and Engineering at Lehigh University. His research examines human interactions with AI and machine learning algorithms in the context of social computing systems. Prior and current projects have included participatory efforts with computational journalists, researchers from social sciences and humanities, and eating disorder patients. Across these and other projects, his research examines how HCI accounts for and represents varied human relationships with computing, especially those beyond the traditional purview of “the user.”

Panelist: Min Kyung Lee is an Assistant Professor in the School of Information at the University of Texas at Austin and directs a Human-AI Interaction lab at UT Austin. Her lab aims to build more just and empowering workplaces and cities by creating technology that strengthens individual and collective human decision-making. Dr. Lee has conducted some of the first studies that empirically examine the social implications of algorithms’ emerging roles in management and governance in society. She has extensive expertise in developing theories, methods and tools for human-centered AI and deploying them in practice through collaboration with real-world stakeholders and organizations.

Her current research focuses on participatory and fair AI-based systems. In her work, she developed a participatory framework that empowers community members to design matching algorithms that govern their own communities [10]. She has also worked with gig workers to co-design different ways to leverage data and AI to improve their well-being [14]. Workers’ design ideas included personalized recommendations that balance financial, physical, and psychological well-being, incentive designs co-created by workers and companies, and collective sense-making and auditing platforms.

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