

Exploring Stakeholder Challenges in Recruitment for Human-Centric Computing Research

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Abstract—Recruiting participants for human-centric computing (HCC) research studies is crucial for understanding user needs and behavior, evaluating usability, and providing real-world insights to design effective technology solutions. However, this process presents various challenges, from reaching target demographics to managing recruitment communication techniques. This paper investigates HCC research recruitment strategies, challenges, and solutions through 12 focus groups comprising of two different stakeholders in HCC research: researchers and research study participants, with a total of 26 participants. By examining the experiences and challenges faced by these groups, we aim to identify effective strategies to improve participant recruitment. The findings highlight common obstacles and offer recommendations for enhancing recruitment practices in HCC research, ultimately contributing to more robust experiments that promote user-centered technology development and solutions.

Index Terms—participant recruitment, focus groups

I. INTRODUCTION

Participant recruitment is a critical component of human-centric computing (HCC) research, directly influencing the validity and generalizability of study findings. Despite its importance, researchers often encounter significant challenges in recruiting engaged and representative participant pools. For example, Kokinda et al. found researchers report facing hostility, no-shows, and data poisoning when recruiting participants for software engineering-related empirical research studies [17]. In addition, prior work shows recruiting human participants for studies can be expensive [9] and time-consuming [26].

These challenges have led researchers to explore alternative solutions, such as leveraging students in research studies out of convenience—however, this can introduce threats such as a inadequate knowledge, irrelevant samples, and lack of understanding of concepts [7]. Recent work investigating the capabilities of artificial intelligence (AI) to replace human subjects in HCC research [10], [12], [30]. However, studies suggest AI-generated responses can be problematic due to lack of knowledge of tasks [30] and biased responses [1].

Challenges in participant recruitment can impede the progress and impact of HCC research, necessitating a deeper understanding of effective recruitment strategies to overcome obstacles researchers face. To this end, our paper seeks to address these issues by drawing on qualitative insights from 12 focus groups conducted with two distinct types of participants: researchers ($n = 13$ across six groups) and research study

participants ($n = 13$ across six groups). Each stakeholder group offers a unique perspective on the recruitment process, from the practical difficulties of reaching and engaging participants to the personal experiences of those being recruited.

The focus group discussions revealed a range of challenges for researchers (i.e., lack of valid, diverse, and representative samples) and participants (i.e., time commitments and lack of compensation), providing a comprehensive view of participant recruitment in HCC research. Based on our findings, we offer practical recommendations for enhancing study designs and participant engagement to improve recruitment processes. Through this exploration, we contribute to the ongoing efforts to refine and enhance participant recruitment strategies in the field of human-centric computing—hoping to enhance the quality and impact of HCC research.

II. BACKGROUND

Human-centric computing (HCC) research is essential for designing and developing technology solutions that meet user needs and enhance usability. HCC research aims to understand user behavior, preferences, and interactions with technology to create more intuitive and effective systems [14], [28]. By involving participants in the research process, HCC studies can obtain real-world insights that inform design decisions and improve overall user experience [15], [16].

Recruiting participants for HCC research is critical but often challenging. Successful recruitment ensures that studies are representative and that the findings are valid and generalizable. Participants provide valuable feedback that helps researchers identify usability issues, validate design choices, and understand user needs [21]. However, previous research has identified several common challenges in participant recruitment. These include low response rates [29], difficulties in recruiting specific user groups [27], and ethical considerations related to participant consent and privacy [20]. Studies have shown that leveraging social media, university email lists, and flyers can be effective recruitment channels, but their success varies depending on the target population and study design [25].

Various recruitment strategies have been explored in the literature. For example, snowball sampling [19], where existing participants refer new participants, has been used to increase recruitment efficiency. Incentives, such as monetary compensation or gift cards, are also commonly employed to

enhance participation rates [3]. Prior work also introduced an online platform to provide digital badges to encourage participation in software engineering-related research studies [5]. Numerous works have also offered guidelines for sampling strategies in research contexts [2], [11], [24]. Despite these efforts, researchers often struggle with maintaining participant engagement and ensuring a diverse sample.

This study aims to fill gaps in the current literature by investigating recruitment experiences and challenges faced by researchers and research study participants in HCC research. Through 13 focus groups, we identify challenges in participant recruitment and provide recommendations for improving recruitment practices in HCC research.

III. METHODOLOGY

A. Focus Groups

We used focus groups to explore challenges with participant recruitment for HCC research. Focus groups are a data collection method involving a small group of individuals discussing topics guided by a moderating researcher [23]. This method was selected due to its ability to facilitate increased engagement and extract additional information from participants. For example, interactions between focus group participants, such as one comment triggering a chain of responses, has been shown to create a “synergistic effect”—generating increased amounts of data than what would be provided in other research methods [6]. The study protocol was approved by our institutional review board (IRB) for human subjects research. We divided focus groups based on participant populations to gain perspectives from two HCC research stakeholder groups: researchers and participants.

B. Participant Recruitment and Selection

We used convenience sampling to recruit participants based on availability to participate in the focus group sessions. Participants were recruited through university and departmental email lists, direct emails to personal contacts, and student research forums to ensure a broad representation of experiences and perspectives. To be eligible to participate, participants were required to be one the following: 1) *researchers* with experience conducting HCC research studies and recruiting participants for experiments; or 2) *participants* with experience being recruited and/or participating in HCC-related research studies. An initial email invitation outlining the study’s purpose and requirements was sent to potential participants, followed by a reminder email to increase participation rates.

C. Study Design

1) *Background Survey*: Before the focus group sessions, participants were asked to complete a background pre-survey designed to gather demographic information and relevant details about their previous experiences with participant recruitment as a researchers or participants. The survey included questions about their role (researcher or participant), and asking if they have conducted studies involving humans.

TABLE I: Focus Group Participants

Focus Group	Participant Type	Count	Research Areas
Group 1	Researchers	3	SE, HCI, CSEd
Group 2	Researchers	2	HCI
Group 3	Researchers	2	SE
Group 4	Researchers	2	SE, AI
Group 5	Researchers	2	ML, HCI
Group 6	Researchers	2	SE, AI
Group 7	Participants	2	SE, HCI
Group 8	Participants	2	AI, ML
Group 9	Participants	2	ML, HCI
Group 10	Participants	2	SE
Group 11	Participants	2	AI, SE
Group 12	Participants	3	SE, HCI, CSEd

SE = Software Engineering; HCI = Human-Computer Interaction; CSEd = CS Education; ML = Machine Learning; P = Privacy

2) *Focus Group Composition*: A total of 12 focus groups were conducted, with six focus groups for each type of participant: researchers and research study participants. The study involved a total of 26 participants, with two to three members per group. Each focus group provided valuable insights into the challenges, strategies, and experiences related to participant recruitment in human-centric computing (HCC) research. The researcher focus groups consisted of individuals who were actively involved in conducting research that requires participant recruitment, such as surveys, interviews, controlled user studies, etc. All of these participants were graduate students in the Computer Science department at the authors’ institution. An overview of our researcher focus group participants is presented in Table ???. The participant focus groups consisted of individuals who have previously participated in research studies. These participants represent students from across campus from various fields.

3) *Focus Group Structure*: Each focus group session lasted approximately 25 minutes and was conducted either on Zoom or in-person, depending on participants’ preferences and availability. All focus group settings leveraged Zoom capabilities to record and transcribe the discussion. Each session was semi-structured and focused on a set of ten guiding questions tailored to the specific group (see Appendix A for the full list of questions). The questions focused on the challenges faced in recruiting participants, effective strategies employed, and suggestions for improvement. The guided questions ensured consistency across all focus groups while allowing for open-ended discussion and additional insights from participants.

a) *Researchers*: Six focus groups were conducted with HCC researchers. Five were held in person while one was conducted via Zoom. Researcher participants reported using a wide variety of strategies to recruit participants, including email lists, social media, online discussion forums, professional networks, posters and flyers, the GitHub API, recruitment websites, snowball sampling, class management systems, friends and personal contacts. Participants discussed their experiences with participant recruitment in their respective research projects, highlighting specific challenges and strategies to overcome recruitment challenges.

b) *Participants*: For the research study participants, five focus groups were conducted in-person and one remotely via Zoom. These participants agreed to join HCC research studies through a variety of recruitment methods, including emails, physical posters, and personal invitations. These sessions provided insights into participants' perspectives on the recruitment process, their motivations for joining studies, and the challenges they encountered while participating or being recruited for research activities.

D. Data Analysis

All focus group discussions were recorded and transcribed with the consent of the participants. The recordings were reviewed to ensure accuracy, and the transcriptions were subjected to thematic analysis. In addition, the first author, who moderated all of the focus group sessions, took detailed field notes during the discussion to contextualize discussions and denote topics of interest [22]. The researcher coded the transcripts to identify key themes and insights. Another researcher then reviewed the field notes and preliminary categorizations derived from the initial coding. The two authors collaborated to form higher-level themes and concepts based on comments from participants in focus group discussions.

IV. FINDINGS

A. Challenges Faced by Researchers

Researchers faced several major challenges in recruiting participants for their studies.

a) *Low Response Rates and Trust Issues*: One of the most common challenges identified was the issue of low response rates (x9) and trust concerns (x7), particularly when offering monetary incentives. P17 noted, "It's challenging to get responses, especially with monetary incentives. People are cautious; they want to be sure it's legitimate research." P2 noted that they had to send 700 emails to receive only 30 responses. Offering studies without compensation resulted in lower response rates (x10). P7 noted, "When compensation wasn't provided, response rates were extremely low. Participants were less motivated to participate in studies that didn't offer incentives".

b) *Obtaining a Diverse and Representative Sample*: Researchers often faced difficulties in ensuring a diverse sample (x3), resulting in a homogenous participant pool. Getting diversity is tough, especially in tech fields. P4 pointed out, "Most respondents are white males, and we need more representation from other demographics".(x2) Researchers also noted struggles reach participants with specific expertise or from particular research areas relevant to their studies (x5). For example, P8 noted, "Finding domain-specific participants was challenging. My research required familiarity in GUI testing, and it was difficult to locate professionals with the right qualifications".

c) *Managing Email Communication*: Effectively managing email communication to avoid being marked as spam and ensuring clear consent processes posed obstacles (x3). One researcher mentioned, "My email account was even blocked

due to the high volume of recruitment emails I had to send out". Further, communicating the purpose and objectives of the research to potential participants in a clear way proved challenging (x2). For example, P5 explained, "Explaining my research in simple terms that other participants could understand was tough. It was essential to make the study's goals clear without overwhelming them with technical details".

d) *Delay in Responses*: Researchers encountered delays in receiving responses from potential participants, impacting study timelines (x7). For example, P10 stated, "There were significant delays in responses to recruitment emails. This delayed the start of my study and affected data collection".

e) *Limited Funding for Compensation*: Budget constraints limited researchers' ability to offer adequate compensation, impacting participant recruitment efforts (x6). P3 mentioned, "We had limited funding for participant compensation, which restricted our ability to attract a diverse pool of participants".

f) *Validating Participants*: Verifying the credentials and qualifications of professionals recruited for studies presented challenges (x3). P5 stated, "Validating participants' professional backgrounds was crucial but time-consuming. Ensuring they were genuine professionals in relevant fields required thorough screening". Similarly, ensuring participants meet the technical requirements to complete the study is challenging. For instance, verifying potential participants have the necessary computer setup and configurations to effectively participate in user studies to evaluate research tools posed a challenge (x2). P9 mentioned, "Setting up the tool I built required specific computer configurations, which limited the pool of eligible participants. Some potential participants didn't meet these technical requirements".

g) *Challenges with Incentives and Fraudulent Responses*: Offering incentives, i.e., Amazon gift cards, attracted fraudulent responses from individuals outside the target demographic (x2). For example, P12 highlighted, "We faced issues with participants claiming incentives without meeting study criteria. Many responses were from individuals not residing or working in the US".

Key Challenges Faced by Researchers

- Difficulty in reaching domain-specific participants.
- Low response rates, especially for non-compensated studies.
- Validating participant qualifications.
- Filtering out ineligible participants completing surveys for compensation.

B. Challenges Faced By Participants

Research studies participants highlighted several challenges they encountered:

a) *Time Constraints and Study Duration*: The time-consuming nature of studies, particularly those involving multiple sessions or lengthy questionnaires, posed challenges (x8).

P2 stated, “Long study durations and extensive questionnaires made participation challenging, especially with academic commitments”. Another participant complained about the duration of studies, stating “If I sign up for 30 [minutes], it should be completed in 30 [minutes]” (P13).

b) **Unclear Study Design and Objectives:** Participants struggled when the study design and objectives were not clearly communicated (x3). P3 mentioned, “Understanding the study objectives and the expected outcomes was difficult at times. Clear communication about the study purpose would have helped”.

c) **Lack of Compensation:** Participants were hesitant to participate in studies that did not offer compensation (x2). P1 explained, “The lack of compensation was a one of the factors that made me hesitant to participate. It’s important to acknowledge participants’ time and effort”.

d) **Logistical Issues:** Logistics, such as scheduling conflicts between in-person and online sessions, also affected participation (x3).

Key Challenges Faced by Study Participants

- Extensive time commitment for participation.
- Lack of clarity in the study goals.
- Lack of adequate compensation.
- Considerable logistics involved with participating in studies.

C. How Challenges Were Addressed

In the focus groups, we particularly asked researchers how they overcame the aforementioned recruitment challenges. Researchers employed a variety of methods to address recruitment challenges, focusing on personalized communication, multiple recruitment channels, snowball sampling, and targeted recruitment approaches.

One effective method involved **tailoring recruitment messages** to make them more engaging and relevant to potential participants (x7). This strategy helped improve response rates, as the researchers noted that personalized messages increased participant engagement. P4 found that personalized emails with participants’ names greatly enhanced the survey participant engagement, 15 out of 20 emails got positive responses.

Utilizing multiple channels for recruitment was another crucial strategy. Researchers used GitHub profiles, LinkedIn, email lists, Discord groups, and professional networks to reach a broad audience. P2 highlighted the importance of posting recruitment messages on social media platforms like LinkedIn, Facebook, and Slack. P26 mentioned the effectiveness of directly contacting potential participants through email and messaging apps like WhatsApp.

Snowball sampling was also a widely used method (x9), where researchers asked participants to refer others in their network. This approach proved effective in expanding the participant pool, with five participants endorsing it. P8 shared that they encouraged initial participants to invite their friends and colleagues to join the study. P6 emphasized the use of

professional networks to identify potential participants and asking them for referrals.

Targeted recruitment approaches were tailored based on the specific research area, such as focusing on students for UI testing or professionals for software engineering (SE) testing. P21 mentioned using the GitHub API to collect contact information and send out email invitations to individuals with specific research backgrounds.

By employing these diverse strategies, researchers were able to address recruitment challenges more effectively and enhance the overall quality of their studies.

V. EFFECTIVE STRATEGIES FOR PARTICIPANT RECRUITMENT

We conducted focus groups with HCC researchers and participants to understand recruiting strategies, challenges, and solutions. During the focus group discussions, participants reported using a range of recruitment methods. These methods were tailored to appeal to different participant demographics, ensuring a diverse and representative sample for their human-centric computing research studies. The focus groups offered insights from researchers and participants on effective strategies for recruiting participants in HCC research studies. Based on our findings, we provide guidelines to enhance participant recruitment processes for HCC-related experiments through research study design and engagement with potential subjects.

A. Research

a) **Make Studies Less Time Consuming:** Participants are more likely to engage in studies that require less time and offer appropriate compensation (x11). Ensuring the study is not overly time-consuming can increase participation rates. P1 noted, “If the study is less time-consuming, I am more inclined to participate”. Alternatively, if studies do require longer time commitments from participants then recruitment materials should be transparent about the study duration up front, stick to the time limit mentioned, and compensate participants accordingly.

b) **Provide Adequate Compensation:** Offering adequate compensation or incentives is a significant motivator for participation (x9). Participants often value tangible rewards such as gift cards or academic credits. P26 emphasized, “Compensation is important. It shows that researchers value participants’ time and effort”. While participant compensation can be expensive for researchers [9], our findings indicate it plays a major role in encouraging participation for HCC-related research studies.

c) **Enhance Research Relevance:** Participants are more motivated to engage in studies that are relevant to their current work or interests (x7). P24 emphasized, “If the research topic is interesting and related to my work, I am more likely to participate”. Further, P25 mentioned “Having sufficient background knowledge on the topic makes me more willing to get involved”. However, prior work notes challenges with making research relevant in real-world settings (i.e., [4], [18]). Thus, researchers should incorporate techniques, such as engaging

with target samples to understand relevant problems [13], to enhance the relevance of research and encourage participation.

d) Design Studies for Convenience: The design of the study and the convenience of participation play crucial roles in recruitment. Participants appreciate well-designed studies that are easy to understand and participate in (x4). P3 mentioned “*study design is important. If it’s straightforward and the objectives are clear, I’m more likely to take part*”. Additionally, offering options for in-person or virtual participation (e.g., via Zoom) can make the study more accessible and encourage broader participation. (x4)

e) Obtain and Advertise IRB Approval: Clear and compelling advertisements, along with Institutional Review Board (IRB) approval, build trust and attract participants (x5). For instance, P13 mentioned, “*I look at the advertisement, IRB approval, and research abstract to decide if I want to participate*”. Transparent communication about the study’s purpose and ethical considerations is crucial.

B. Engagement

a) Leverage Personal Connections and Credibility: Engaging participants through personal connections and community networks can enhance recruitment efforts (x8). Participants are often more willing to participate if approached by someone they know or trust. “*Personal recommendations from colleagues or friends often sway my decision to participate*”, acknowledged a participant. Participants also highlighted that the credibility of the research institution or research team can attract participation for research studies (x3).

b) Build Community: Personal connections and a sense of community emerged as significant motivators for participation among participants (eight mentioned). Many cited their willingness to assist fellow researchers or support friends as reasons for their engagement. For instance, one participant stated, “*I often participate out of favor to friends or to help fellow researchers*” highlighting the interpersonal dynamics driving involvement. Participants offered practical guidelines and insights for improving recruitment practices in HCC research. Emphasizing the importance of personal relationships in recruitment efforts, participants stressed that messaging on platforms like LinkedIn often yielded better results when the relationship was already established. On the other hand, researchers noted randomly messaging people on LinkedIn has not been helpful without prior acquaintance.

c) Positive Interactions: The quality of interaction between participants and researchers also played a crucial role in influencing participation. Participant P4 emphasized, “*Positive interactions with researchers would encourage me more and make the study sound more interesting*”, underscoring the importance of researcher-participant rapport in recruitment and retention strategies. Research study participants also mentioned researchers being “welcoming”, “excited” and “full of energy” helped them stay engaged throughout the study. Alternatively, participants noted bad interactions, such as miscommunication about the study and its design, negatively impacted their experience participating in the study. Moreover, prior

work shows bad interactions can further damage researcher and target participant communities [8].

d) Provide Clear and Transparent Communication: Effective recruitment strategies also involve clear and engaging communication throughout the recruitment process. Engaging potential participants through informative and compelling recruitment materials can capture their interest (x2). Maintaining ongoing communication and providing feedback to participants throughout the study process can foster a positive participant experience (x5). For instance, one participant noted “*Feeling valued and informed throughout the study keeps me engaged and motivated to contribute*” (P17). Establishing trust through transparent communication about the study’s purpose, total time commitment, procedures, and ethical considerations is essential (x2). Participants value clear information about how their data will be used and protected.

VI. LIMITATIONS AND FUTURE WORK

All of the focus group participants were from one institution, limiting the generalizability of our findings. In addition, individuals in the participants focus groups were students. While they had experience being recruited and participating in HCC research studies, participants from different backgrounds may have other experiences and insights on HCC research recruitment processes. Similarly, the researcher participants were graduate students, yet faculty and more experienced researchers may have different perspectives. To overcome this, future work can leverage other data collection methods (i.e., qualitative interviews or online surveys) to reach a broader and more diverse sample. Finally, our analysis leverages qualitative insights based on the memory and perception of participants, which can be unreliable. Future studies can leverage additional metrics, such as participant response rate, to quantify the effectiveness of various study recruitment techniques.

There are also several avenues of future work to enhance participant recruitment for HCC research. P12 recommended providing educational resources, such as video tutorials and training tools, for researchers to improve sampling strategies and recruitment practices. In addition, future work can explore sociotechnical systems to help facilitate interactions and build community between researchers and potential participants based on common interests.

VII. CONCLUSION

Human-centric computing (HCC) research relies on experiments involving human participants to understand and improve user experiences in digital settings. However, the recruitment of participants in a difficult an arduous process. To explore challenges in participant recruitment, we conducted 12 focus groups consisting of HCC researchers and HCC study participants. Our findings outline challenges faced by both stakeholder groups—such as low response rates and lack of diversity in sampling for researchers and time constraints and unclear studies for participants. Based on our findings, we provide insights into effective strategies and guidelines to enhance participant recruitment for HCC research experiments.

REFERENCES

- [1] M. Atari, M. J. Xue, P. S. Park, D. E. Blasi, and J. Henrich. Which humans?, Sep 2023.
- [2] S. Baltes and P. Ralph. Sampling in software engineering research: A critical review and guidelines. *Empirical Software Engineering*, 27(4):94, 2022.
- [3] C. Brandt and A. Zaidman. Strategies and challenges in recruiting interview participants for a qualitative evaluation. In *International Workshop on Recruiting Participants for Empirical Software Engineering, co-located with the 44th International Conference on Software Engineering (RoPES-ICSE 2022)*, 2022.
- [4] B. Brown, S. Bødker, and K. Höök. Does hci scale? scale hacking and the relevance of hci. *Interactions*, 24(5):28–33, 2017.
- [5] C. Brown. “Nudging developers to participate in se research”. In *International Workshop on Recruiting Participants for Empirical Software Engineering.*, RoPES, 2022.
- [6] J. Cameron et al. Focusing on the focus group. *Qualitative research methods in human geography*, 2(8):116–132, 2005.
- [7] J. Carver, L. Jaccheri, S. Morasca, and F. Shull. Issues in using students in empirical studies in software engineering education. In *Proceedings. 5th international workshop on enterprise networking and computing in healthcare industry (IEEE Cat. No. 03EX717)*, pages 239–249. IEEE, 2004.
- [8] M. Chin. How a university got itself banned from the linux kernel. *Verge*, 2021. <https://www.theverge.com/2021/4/30/22410164/linux-kernel-university-of-minnesota-banned-open-source>.
- [9] M. Endres, W. Weimer, and A. Kamil. Making a gamble: Recruiting se participants on a budget. In *1st Workshop on Recruiting Participants for Empirical Software Engineering*, 2022.
- [10] M. Gerosa, B. Trinkenreich, I. Steinmacher, and A. Sarma. Can ai serve as a substitute for human subjects in software engineering research? *Automated Software Engineering*, 31(1):13, 2024.
- [11] G. Guest. Sampling and selecting participants in field research. *Handbook of methods in cultural anthropology*, 2(1):215–250, 2014.
- [12] P. Hämäläinen, M. Tavast, and A. Kunnari. Evaluating large language models in generating synthetic hci research data: a case study. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*, pages 1–19, 2023.
- [13] H. Hochheiser and J. Lazar. Hci and societal issues: A framework for engagement. *International Journal of Human [x02013] Computer Interaction*, 23(3):339–374, 2007.
- [14] A. Jaimes, D. Gatica-Perez, N. Sebe, and T. S. Huang. Guest editors’ introduction: Human-centered computing—toward a human revolution. *Computer*, 40(5):30–34, 2007.
- [15] S. Khalid and C. Brown. Software engineering approaches adopted by blockchain developers. In *2023 Tenth International Conference on Software Defined Systems (SDS)*, pages 1–6, 2023.
- [16] M. Ko, D. B. Bose, H. A. Chowdhury, M. Seyam, and C. Brown. Exploring the barriers and factors that influence debugger usage for students. In *2023 IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC)*, pages 168–172, 2023.
- [17] E. Kokinda, M. Moster, J. Dominic, and P. Rodeghero. Under the bridge: Trolling and the challenges of recruiting software developers for empirical research studies. In *2023 IEEE/ACM 45th International Conference on Software Engineering: New Ideas and Emerging Results (ICSE-NIER)*, pages 55–59. IEEE, 2023.
- [18] D. Lo, N. Nagappan, and T. Zimmermann. How practitioners perceive the relevance of software engineering research. In *Proceedings of the 2015 10th Joint Meeting on Foundations of Software Engineering*, pages 415–425, 2015.
- [19] M. Naderifar, H. Goli, and F. Ghaljaie. Snowball sampling: A purposeful method of sampling in qualitative research. *Strides in development of medical education*, 14(3), 2017.
- [20] C. Nebeker, J. Harlow, R. Espinoza Giacinto, R. Orozco-Linares, C. S. Bloss, and N. Weibel. Ethical and regulatory challenges of research using pervasive sensing and other emerging technologies: Irb perspectives. *AJOB empirical bioethics*, 8(4):266–276, 2017.
- [21] K. A. Negrin, S. E. Slaughter, S. Dahlke, and J. Olson. Successful recruitment to qualitative research: A critical reflection. *International Journal of Qualitative Methods*, 21, 2022.
- [22] J. Phillippi and J. Lauderdale. A guide to field notes for qualitative research: Context and conversation. *Qualitative health research*, 28(3):381–388, 2018.
- [23] R. A. Powell and H. M. Single. Focus groups. *International journal for quality in health care*, 8(5):499–504, 1996.
- [24] A. Rainer and C. Wohlin. Recruiting credible participants for field studies in software engineering research. *Information and Software Technology*, 151:107002, 2022.
- [25] M. Rocchetti, C. Prandi, S. Mirri, et al. Designing human-centric software artifacts with future users: a case study. *Human-centric Computing and Information Sciences*, 10(1):8, 2020.
- [26] J. Ross. Recruiting better research participants. *UX Matters*, 2010. <https://www.uxmatters.com/mt/archives/2010/07/recruiting-better-research-participants.php>.
- [27] A. Schlesinger, W. K. Edwards, and R. E. Grinter. Intersectional hci: Engaging identity through gender, race, and class. In *Proceedings of the 2017 CHI conference on human factors in computing systems*, pages 5412–5427, 2017.
- [28] N. Sebe. Human-centered computing. In *Handbook of ambient intelligence and smart environments*, pages 349–370. Springer, 2010.
- [29] K. B. Sheehan. E-mail survey response rates: A review. *Journal of computer-mediated communication*, 6(2):JCMC621, 2001.
- [30] T. Wu, H. Zhu, M. Albayrak, A. Axon, A. Bertsch, W. Deng, Z. Ding, B. Guo, S. Gururaja, T.-S. Kuo, et al. Llms as workers in human-computational algorithms? replicating crowdsourcing pipelines with llms. *arXiv preprint arXiv:2307.10168*, 2023.

APPENDIX

A. Focus Group Questions for Researchers Facing Recruitment Challenges

Introduction and Warm-Up:

- 1) Can you briefly introduce yourself and describe your current research area?
- 2) Have you been involved in recruiting participants for your research studies? If so, can you describe one of your recent experiences?

Approaches/Challenges

- 1) What methods or channels have you used to recruit participants (e.g., social media, university email lists, flyers)?
- 2) How do you tailor your recruitment strategies to appeal to different types of participants (e.g., industry professionals, students, end users)?
- 3) What are the main challenges you face when recruiting participants for your studies?
- 4) Have you encountered difficulties in reaching your target participant demographic? If so, can you elaborate?

Effective Strategies

- 1) Can you share any strategies that have been particularly effective in recruiting participants for your research?
- 2) How do you ensure participants remain engaged and committed throughout the study?

Closing Thoughts

- 1) What lessons have you learned from your experiences with participant recruitment?
- 2) What recommendations would you give?

B. Focus Group Questions for Participants Facing Recruitment Challenges

Introduction and Warm-Up

- 1) Can you briefly introduce yourself and mention how you were recruited to participate in research studies?
- 2) What motivated you to participate in these studies?

Approaches/Challenges

- 1) What recruitment methods did the researchers use to reach out to you (e.g., email, social media, in-person)?
- 2) Which recruitment approaches did you find most appealing and why?
- 3) What challenges or barriers did you encounter during the recruitment process?
- 4) Were there any factors that made you hesitant to participate in the studies?

Effective Strategies

- 1) What incentives or factors influenced your decision to participate in the studies?
- 2) How do you prefer researchers communicate with you throughout the study to keep you engaged?

Closing Thoughts

- 1) What would improve your experience as a participant in future research studies?
- 2) Do you have any suggestions for researchers to better recruit and retain student participants data?