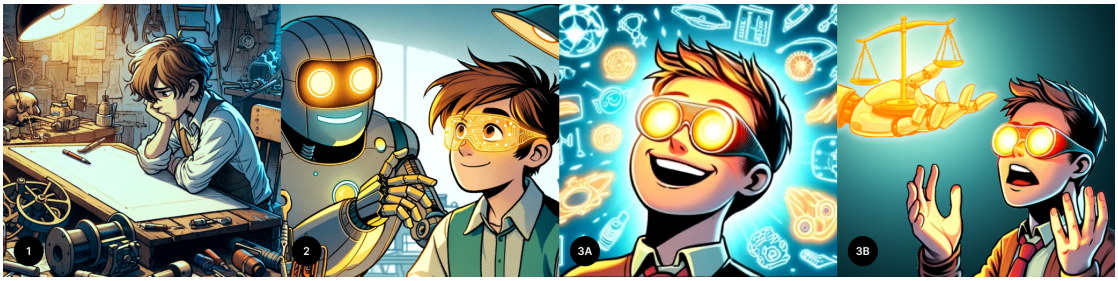

Figure 1: A depiction of how generative AI can help researchers in envisioning possible developments (3A) and evaluating potential implications of their work (3B). This image was created with DALL-E 3, Adobe Firefly, Photoshop, and Figma.

Expanded Envisoning: AI-Enabled Design Futuring for Early Career HCI Researchers in the Global South

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Abstract

Early Career Researchers (ECRs) in the Global South seek to conduct impactful and innovative research, but are lacking in support. Moreover, those who specialize in Human-Computer Interaction (HCI) experience a temporal and ethical disconnect that cannot be sufficiently addressed by conventional design methods like human-centered design (HCD). Radical design methods like design futuring offer potential but demand significant time and resources, often unavailable to ECRs in the Global South. This position paper proposes leveraging generative AI to aid these ECRs in (a) envisioning possible research ideas and (b) evaluating their ethical implications. We identify an opportunity to create an AI-enabled creativity support tool for design futuring. However, we recommend first conducting an anticipatory ethnography study to understand the speculation process and AI's influence on it, which would guide the tool's design and development. Overall, through generative AI's augmentation, we hope that design futuring can become central to HCI research.

Keywords

design futuring, generative AI, anticipatory ethnography, creativity support tool, Early Career Researchers

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1. Introduction

The future of technological innovation in the Global South hinges significantly on Early Career Researchers (ECRs)[1]: they are driven by the prospect of contributing to scientific advancement and broader societal welfare, as well as the aspiration for novelty and innovation [1]. Unfortunately, many encounter challenges in pursuing impactful research due to inadequate funding, support, visibility, and recognition [1]. Additionally, ECRs in the field of human-computer interaction (HCI) also have to deal with limitations within established methodologies like human-centered design (HCD). HCD, an approach emphasizing usability and user needs [2], has been widely adopted across various computing, design, and management projects; however, its individualistic focus gives it a narrow temporal and contextual lens.

One limitation of HCD lies in its temporal focus, as designers tend to innovate within *existing* frameworks rather than envisioning *entirely new* paradigms [3]. HCD's iterative nature favors incremental progress over radical innovation [4], while also overlooking ethical, societal, and political considerations [3]; this is exhibited by standards like ISO 9241-210, which was criticized for not only neglecting user security and privacy [5], but also disregarding local cultural contexts [6]. Consequently, HCI researchers often fail to critically evaluate the potential consequences of their work [7]. Building upon these concerns about HCD's oversight, we must realize how big of an impact these consequences make in our increasingly digital world. Wakkary and Oogjes [8] argue that the pervasiveness of technology design has become so resolute that it now shapes our everyday realities, influences human behaviors, and molds social structures. They contend that design is not only enmeshed within these broader concerns, but also complicit in them. This complicity becomes evident as emerging technologies like cryptocurrency and AI proliferate society, subjecting the general public to a range of amplified wicked problems, such as worsening climate change [9, 10], emerging political radicalization [11, 12], and inequitable wealth distribution [13, 14].

It is necessary for design to address these wicked problems because of how much its successes (i.e. the conception of progress) have contributed to them. Given the complex and uncertain nature of these problems, standard methods like HCD would not be enough to solve them. If ECRs in the Global South want to conceive of research that is both groundbreaking and principled, then they would need an expanded imagination — which can only be enabled by radical design methods. Enter design futuring: a type of approach to design that prioritizes the exploration of future possibilities and their societal implications through discourse over immediate problem-solving [15]. As exhibited by practices like speculative design and design fiction, design futuring has been gaining popularity due to offering ways of both resisting design solutionism and exploring avenues for engaging wicked problems in relation to designing and living with novel technologies [16]. Design methods like this also empower marginalized groups (like people in the Global South) in imagining futures by gifting them the ability to envision themselves in the design process [17]. However, producing design fictions necessitates proficiency in creative software and time, particularly when it comes to medium-fidelity to high-fidelity design fiction prototyping methods (e.g. graphic design, video editing, 2D and 3D animation) [18]. These aforementioned resources are often scarce for ECRs in the Global South

[1]For this paper, ECRs will be defined as researchers with 0-3 years of experience.

due to insufficient funding and demanding workloads [1, 19], given that such software is often paid and has steep learning curves. Therefore, there is a pressing need for the development of creative tools to facilitate rapid prototyping for design futuring. With the rapid advancement of generative AI, there is significant potential to develop these kinds of tools. Augmenting design futuring with generative AI would make the process much more accessible for ECRs in the Global South.

In this position paper, we will lay out the theoretical and practical foundations for AI-enabled design futuring. First, we will dicuss two approaches that could be done with this process: (a) the **futurism** approach, wherein the process is used to get more inspiration for potential research ideas, and (b) the **critique** approach, wherein the process is used to foresee the potential harms of such research ideas. Next, we will defend how generative AI can be used to support both approaches. Finally, we will sketch out the formative study that may provide a more precise direction in the future design and development of specialized generative AI tools in this space.

2. Futurism v.s. Critique Approach

2.1. Futurism Approach

The nature of HCI research forces practitioners to reckon with a temporal disconnect. A significant time gap, often spanning several decades, exists between the conception of ideas and their real-world implementation or impact [20, 21]. Because of this, practitioners are required

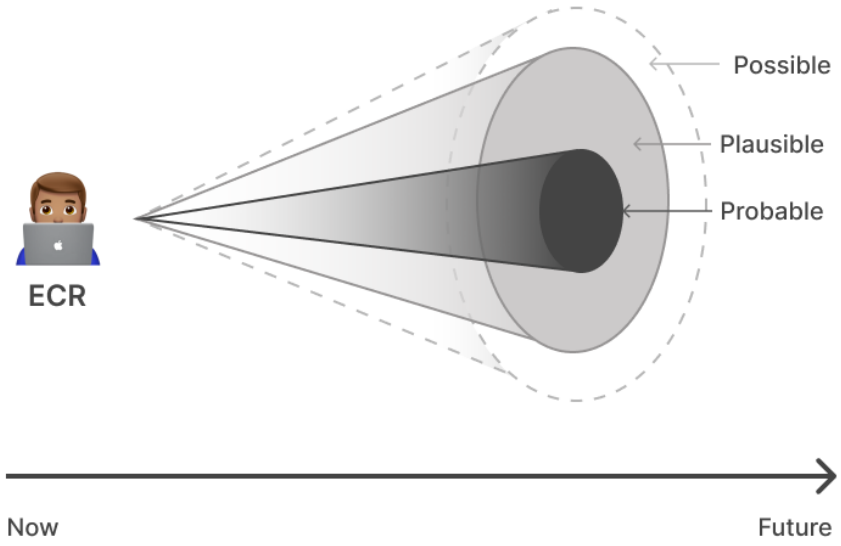

Figure 2: The Futures Cone model. Our assumption is that most ECRs can only perceive futures that are probable (temporal disconnect), limiting the kinds of work they produce.

to act as prophets, "designing for circumstances yet unknown" [21] Moreover, they must predict the most opportune moment to pursue and present their ideas, given their limited window of opportunity for achieving intellectual impact. If introduced too early, an innovation may be dismissed as impractical or challenging; if too late, it risks being constrained by immediate business outcomes [20]. Standard user-centered design methods, however, are incapable of addressing the future-oriented nature of HCI research; they are only useful for identifying present requirements for a limited number of participants, not the needs of future users in a rapidly changing world [21]. Therefore, to conduct impactful and innovative research, HCI practitioners — particularly ECRs — require methods that can help them bridge the gap between current research and future implementation.

Design futuring would be the ideal approach for bridging this temporal gap. By enabling practitioners to envision and explore potential future scenarios, it equips them to anticipate future needs, thereby overcoming the limitations of most user-centered design methods. This ability to identify emerging opportunities, which may not be apparent when focusing solely on current trends, would also help researchers find and capitalize on their window of opportunity. Aside from supporting ideation, design futuring can also help validate "impractical" ideas by conveying them through tangible artifacts like prototypes and fictions. In these concrete forms, such ideas are better understood by stakeholders who may struggle with envisioning abstract future concepts. This, in turn, aids researchers in securing support and resources for long-term research. Furthermore, design futuring's key benefit lies not in predicting timing or persuading stakeholders, but in empowering researchers' agency — by expanding their perception of what is possible. Sociologist and futurist Francis Hutchinson [22] once said that "[o]ur images of the future…play a crucial part in what we think is real or realizable, what we feel is worth doing or not worth doing". This asserts the idea that our actions are fundamentally shaped by our mental models of the future. In line with this, design futuring can be seen as a cognitive tool that expands these mental models (a.k.a. the scope of what is considered possible) by exposing researchers to a broader range of future scenarios. This expanded perception directly influences their assessment of what actions are "worth doing", thereby increasing their perceived and actual capacity to effect change through their research.

2.2. Critique Approach

Besides the temporal disconnect, there is also a significant gap between the real-world impacts of HCI research and the community's optimistic perspectives of their own work. This gap is akin to the medical community only discussing a treatment's benefits while ignoring its side effects [23]. HCI pracititoners' lack of consideration affects not only the general public, but also fellow researchers, ranging from the inadequate referencing of other disciplines [24] to experimental surveillance without consent [25]. Despite this shortsightedness, ethical considerations have been a longstanding concern for the HCI community. For instance, academic institutions have established formal guidelines and protocols through ethical approval processes [26]. Recognizing the need for broader reflection, some conferences, like the Conference on Neural Information Processing Systems (NeurIPS), now require authors to submit impact statements as part of the peer-review process [27]. Meanwhile, the industry has a diverse array of interventions like toolkits, checklists, principles, and educational programs [28].

However, despite these longstanding efforts, typical ethical frameworks often fall short in addressing the nuanced challenges of contemporary HCI practice. In academia, the formal guidelines established through ethical approval processes frequently clash with the realities of fieldwork, particularly when studies involve marginalized populations or challenging environments [26]. Even recent initiatives like mandating broader impact statements have had limited success, as seen in the prevalence of brief and superficial submissions [29]. This stems from a lack of expertise: publication committees struggle to frame "reflection on potential negative consequences" as a requirement, while authors lack training in this type of critical thinking about their work [30]. Similarly, in industry, the ethical scrutiny provided by interventions is limited to the narrow scope of systems design, with ethical concerns framed as "bugs". While these tools can still help legitimize such issues, they are frequently dismissed in favor of other priorities like customer-centricity or resource conservation. Thus, interventions end up insufficient because workers lack the power to act on them effectively [28]. This powerlessness is rooted in organizational norms and boundaries, which limit workers' sense of responsibility and agency over the downstream impact of their work [31]. So while HCI researchers can use design futuring for generating and communicating new ideas (as explored in the Futurism approach), it can also help them reflect on the future sociotechnical implications of the systems that they build [32, 15], particularly potential misuses [33].

Thus, we propose design futuring as an alternative tactical intervention to typical ethical frameworks in HCI spaces. This approach is supported by Richard Wong's case study [34], which explores the politics of using speculative design (a design futuring practice) in service of "values work": practices used to surface, advocate for, and attend to values. Design futuring approaches like speculative design benefit HCI practitioners by broadening their scope of ethical consideration. This is done through "infrastructural inversion", wherein relationships (among people, practices, artifacts, and structures) that normally exist in the background of a situation are highlighted. Consequently, the focus of speculative design now shifts from moments of immediate invention and design to entire lifeworlds: the complex and long-lived relationships of technologies within broader systems. We believe that this kind of infrastructural speculation remains crucial nowadays, where HCI practitioners are increasingly interrogating questions of broad, societal concern. Contrary to popular belief, unethical technologies generally do not come from the malicious intent of designers; instead, the "evilness" of these technologies arise from the systems of power in which they are embedded or adopted [35]. For example, in AI development, tech ethics can be seen as a supply chain problem, where responsibility is distributed across different stages, mirroring the modular approach of software engineering. This creates a fragmented accountability structure where workers recognize potential harms but consider them outside their capability or responsibility, treating ethical issues as separate from core development [31]. Most ethical interventions fail to acknowledge such realities, focusing on making studies/technologies "more ethical" rather than questioning systems of power (i.e. capitalism, financial models). Design futuring approaches can counter this by bringing attention to both the wide-ranging impacts of infrastructures and the ongoing labor needed to maintain them. This would help both academic researchers and industry workers reflect on implications without being limited by formal guidelines or toolkits.

Design futuring can also help HCI practitioners advocate for more values-oriented changes within their organizations. By translating abstract concepts (like infrastructures) into tangible

artifacts, it serves as a form of problematization, making the impacts of ethical issues more comprehensible to stakeholders (e.g. committees and managers). Furthermore, framing these issues through the lens of innovation, speculation, and long-term futures helps to 'legitimize' them in organizational contexts [34]. For instance, the supply chain problem of tech ethics can be spotlighted through organizational fictions (i.e. design fictions that depict a set of speculative organizational practices); these can act as a communitive set of artifacts, portraying workers' experiences without directly exposing them. Consequently, design futuring approaches such as speculative design function as a form of soft resistance [36]. They utilize dominant logics in technology research and practice—like usability and efficiency—by taking familiar forms (e.g., products, systems, or user studies); simultaneously, these approaches also critique these logics by repurposing design techniques to question assumptions, explore alternative social values, and propose new sociotechnical configurations.

Overall, design futuring's enhancement of perception and communication would be empowering for HCI practitioners. Academic researchers would be more prepared to address ethical implications (whether in conducting fieldwork or writing reflections), while industry workers would be more confident to advocate for values in their organizations. For both of these groups, design futuring allows for a more proactive engagement with the societal impacts of their work, moving beyond the limitations of standard ethical interventions. These HCI practitioners would have an increased sense of agency, taking responsibility for ethics work instead of disavowing it. It must be noted that design futuring should not be considered the ultimate ethical intervention. In fact, no single method should be expected to solve all values and ethics problems, given that addresing such issues will always be partial; due to the complex nature of these issues and the limitations of working in existing systems, enacting meaningful change will always be a challenging process. Nevertheless, design futuring's capacity to illuminate diverse pathways for values work empowers HCI practitioners to engage more effectively with ethical challenges, making it a valuable addition to existing ethical frameworks in HCI.

3. Augmentation with Generative AI

If design futuring is so beneficial for HCI practitioners, why is it not more widely practiced? Besides a lack of awareness, we believe the main limitation is its resource intensiveness, often demanding a lot of time, money, and skill. This is because producing design fictions usually requires proficiency in creative software, particularly when it comes to medium-fidelity to high-fidelity prototyping methods (e.g. graphic design, video editing, 2D and 3D animation) [18]. Ivanov et al.'s study [18] on using cinematic "pre-visualization" techniques for rapid design futuring in HCI research illustrates this issue; here, the limited availability and customization options for preexisting 3D assets constrained the participants' ideation, resulting in less accurate depictions of their envisioned futures. The researchers suggested improving medium-fidelity design futuring in HCI research by testing alternative mediums and fidelities and creating rapid scene-building tools, especially since their design sprint approach has not been extensively tested yet [18].

We propose that generative AI can address these opportunities, amplifying researchers' idea generation without significantly compromising their original plans. Functioning as an "engine

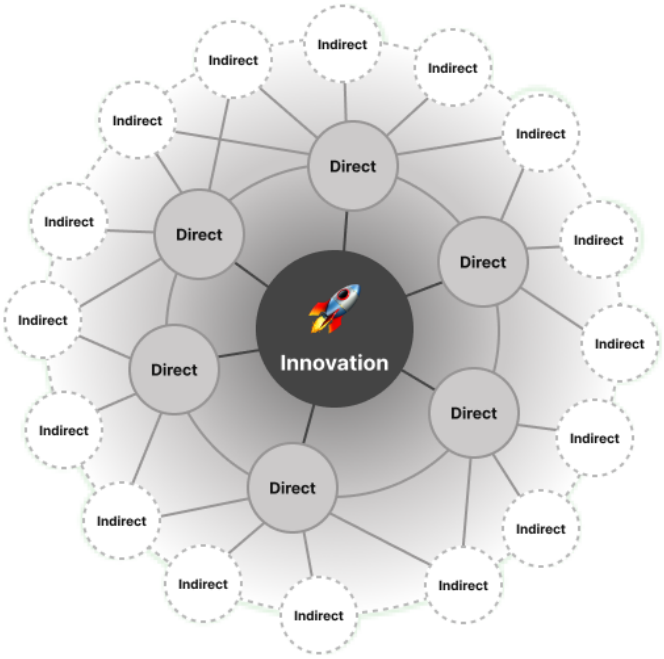

Figure 3: The Futures Wheel model. Our assumption is that most ECRs may struggle to foresee the consequences of their work (ethical disconnect), especially those that would be harmful for the general public.

for the imagination" [37], generative AI is a great support for ideation and creation processes [38]. Tools like ChatGPT and Dall-E have democratized creative exploration by embodying accessibility: offering a low entry barrier (low floor) yet enabling users to achieve high-quality outputs (high ceiling) applicable across various domains (wide walls) [39]. Interestingly, hallucinations, which would usually be considered a flaw, can actually enhance users' creativity by encouraging them to consider and learn from new perspectives [40]. This potential is already being realized in the field of industrial design [41], from the exploration of product ideas to the creation of hyper-real prototypes; additionally, both small studios [42] and large corporations [43] have been developing their own proprietary models to help with design conceptualization.

Building on this potential, we believe that generative AI's applications extend beyond physical product design to the realm of contemplating possible futures. Text-to-image models, in particular, excel at bringing scenarios to life, as seen in both practical forecasting and creative storytelling. For the former, they aid experts in decision-making by visualizing complex scenarios [44]; for the latter, they enhance interactive worldbuilding experiences [45]. This visualization capability not only supports the generation of new ideas (i.e. the futurism approach) but also facilitates the evaluation and critique of these ideas (i.e. the critique approach). For instance, by enabling the vivid envisioning of potential futures, several studies [46, 47, 48] have demonstrated how these models can foster meaningful discourse on pressing societal issues such as climate change.

Aside from brainstorming and prototyping, generative AI's utility in design futuring also extends to other methods. For example, there is horizon scanning: the systematic identification of potentially significant developments through emerging signals of change [49]. Recent advancements in machine learning have enhanced the efficiency and objectivity of trend monitoring and scanning [50]. While primarily used to identify innovation opportunities (i.e. the futurism approach), horizon scanning can also uncover potential threats or issues arising from emerging trends (i.e. the critique approach). Another relevant method is the Delphi-based scenario: the construction of present and future scenarios through consultation with subject matter experts [51]. Here, generative AI can simulate subject matter experts, offering a cost-effective and time-efficient alternative to consulting real experts. This approach not only aids in planning future technologies and policies (i.e. the futurism approach), but also in evaluating their potential impacts (i.e. the critique approach). In essence, generative AI streamlines design futuring across various methods, while enhancing both its exploratory and critical applications.

These theoretical benefits have already begun to materialize in practice, with several implementations emerging in recent years. ChatGPT has been utilized in various foresight activities like signal processing [52], scenario development [53], and consequence scanning [54]. Building upon this, custom GPTs have been created for specific futuring purposes, as seen in the Foresight Facilitator [55] and the AI-Augmented Futures Wheel [56], while image generators like DALL-E can be used to bring these visions to life. Developing this integration further, Lyu et al. [57] have explored embedding generative AI into the design of a futuring workbook, similar to the one developed by Ivanov et al. [18] for their design futuring sprint. However, these approaches have limitations: they are often locked behind paywalls (particularly when using custom GPTs and image generation), and the forecasting of generative AI models may not be completely reliable due to their tendency to hallucinate information. Given these constraints, there is an opportunity to create a specialized creativity support tool designed specifically for design futuring, addressing both accessibility and reliability concerns.

The closest existing example to this is Futures Platform's AI Futurist [58], a generative AI chatbot built specifically for foresight use cases. What differentiates it from AI text generators is that it is powered by a proprietary database consisting of analyses writen and peer-reviewed by professional futurists. Additionally, the chatbot can also utilize knowledge stored in the user's personal workspace to provide relevant and customized answers. However, while this tool is great for foresight, it is not fully suited for design futuring. The future scenarios it convceives may be limited in perspective due to being fully based on current trends, data, and patterns; it may not be able to explore future possibilities that stray too far from this dataset. Aside from this, users cannot visualize their own artifacts/prototypes/scenarios in the platform due to the lack of an image generation function. Overall, despite proven capabilities and existing examples, generative AI's use in speculative and critical design remains underexplored. We believe there is an opportunity to advance this emerging field by investigating generative AI's role as an interface for design futuring, exposing researchers to a multitude of future possibilities — hence the need to develop another specialized creativity support tool.

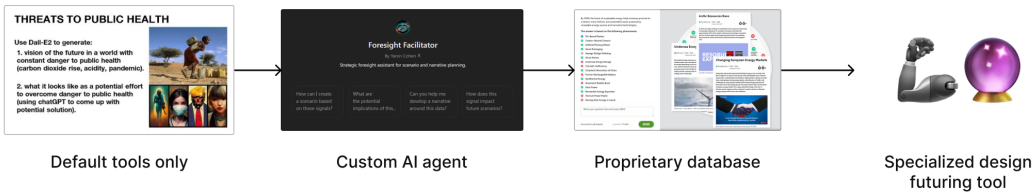

Figure 4: Applications of generative AI to design futuring have become increasingly specialized over time. However, we still believe that there is much room for innovation.

4. Formative Study

To develop an effective AI-enabled creativity support tool for design futuring, we believe that a deeper investigation into the process of speculation is necessary, particularly given the current lack of research in this area. Therefore, we propose conducting a formative study to establish design guidelines for this specialized tool. This study would focus on two key objectives: (a) **understanding how ECRs engage in speculation**, and (b) **examining the impact of generative AI on the process of speculation**.

We recommend utilizing the methodology of anticipatory ethnography: the application of the methods, theories, and ideologies of design ethnography to design fiction in order to produce actionable insights [59]. There are three approaches to anticipatory ethnography: (a) studying the process of creating a design fiction, (b) studying how an audience interacts with or perceives a design fiction, and (c) studying the content of a design fiction [60]. For this formative study, the primary focus would be on the process of the design fiction. ECRs would be observed going through a design futuring sprint (like Ivanov et al.) without and with generative AI to answer the two objectives. Studying the content of a design fiction could also be useful as a secondary approach; studying the final output can help show how the use of generative AI affected the design futuring process. To specifically carry this methodology out, we recommend employing two ethnographic methods: **autoethnography** and **contextual inquiry**. While both methods are adequate on their own, they can also be combined in order to triangulate findings and provide a more comprehensive understanding of speculation.

4.1. Autoethnography

Autoethnography is an ethnographic approach to research and writing wherein wherein the researcher describes and systematically analyzes (i.e. ”graphy”) their personal experiences with technology (i.e. ”auto”) in order to understand the broader cultural meanings behind them (i.e. ”ethno”) [61, 62]. We believe that this method would be helpful due to the rich quality of resulting data and insights (especially valuable for topics that are difficult to access) [62] and its methodological efficiency [63]. Additionally, autoethnographers are also more likely to be sensitive towards ethical issues related to the technology being studied (since they have a deep understanding of the technology’s real-world deployment) [63]; this is particularly relevant for generative AI, given its controversial nature. While autoethnography has already been utilized

in studies on academics' experience with generative AI [64, 65, 66] and workshops exploring experiential futures [67, 68], there is still a lack of knowledge regarding the intersection of these two elements: the use of generative AI on design futuring. This is the research gap that could be addressed by this formative study. In this study, the researcher/s would utilize autoethnography by going through Ivanov et. al's design sprint themselves twice; in the first time, they would do it alone, while in the second time, they would do it with generative AI tools (e.g. ChatGPT and DALL-E).

4.2. Contextual Inquiry

Contextual inquiry is a type of ethnographic field study wherein a sample of users undergoes in-depth observation (in their natural environment) and interviews in order to gain a robust understanding of their practices and behaviors [69]. We believe that this method would be helpful because the context it gives insight on is crucial for not just building human-centered HCI systems, but also designing new ways of work [70]; this is exactly what we are trying to do in this study — creating a new way of design futuring. Through contextual inquiry, HCI researchers have utilized understandings of current practices/behaviors for designing futures [71, 72, 73] and expanding imaginaries [74]. In line with this, design futuring is a process that often aims to question or critique imaginaries (i.e.. syntheses of cultural, societal, political, or institutional norms) [16]. In order to build a system that makes this process easier for researchers, this activity must be fully understood in their context. This is what the formative study can contribute empirically. So in this formative study, the researcher/s would utilize contextual inquiry by holding a remote workshop consisting of some activities from Ivanov et. al's design sprint. During the workshop, participants would be observed through recordings of their screens and cameras. After the workshop, participants will be interviewed about their experience.

5. Conclusion

In this position paper, we argue that ECRs in HCI, particularly those from the Global South, should adopt design futuring to conduct innovative and impactful research. We propose leveraging generative AI to make this resource-intensive process more accessible. We introduce two key applications of AI-enabled design futuring: futurism and critique, which address the temporal and ethical disconnect that ECRs in HCI often face. Through a survey of related work, including previous studies and existing AI applications, we identify an opportunity for innovation in developing a creativity support tool for design futuring. To establish design guidelines for this tool, we call for future studies on the process of speculation, suggesting anticipatory ethnography of design futuring sprints, which could be carried out by autoethnography and contextual inquiry methods.

While this paper has primarily focused on the application of generative AI, our broader aspiration is to advocate for a novel way of thinking rather than merely introducing a new tool. Given the pervasive and profound impacts of emerging technologies, we argue that critical reflection on future implications should be an integral part of HCI research. As Soden et al. [33] aptly note, "reflection on the social consequences of technology should be seen as part

of regular, ongoing practice rather than a question to be settled". By integrating this forward-thinking approach, ECRs in HCI, particularly those in the Global South, can leverage their unique perspectives to create technologies that are not only innovative but also more catered to diverse ethical challenges.

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