

Participatory Noticing through Photovoice: Engaging Arts- and Community-Based Approaches in Design Research

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ABSTRACT

Noticing differently commits to stepping out of familiar reference frameworks while attending to oft-neglected actors, relations, and ways of knowing for design. Photovoice is an arts- and community-based participatory approach allowing individuals to communicate their lives and stories about pressing community concerns through photography. This paper bridges photovoice and the commitment to noticing in HCI and design through a photovoice project with Detroit residents on safety and surveillance. The photovoice process—alongside the production, reflection, and dissemination of photographs—makes residents' everyday situations legible and sensible, allowing both community members and researchers to orient to and engage with multiple viewpoints, sensibilities, and temporal trajectories. This process confronts the invisibility of both the sociotechnical infrastructures (in our case, surveillance infrastructures) and minoritized communities' relational ontologies. By advocating *participatory noticing* in design research, we show the opportunities for adopting arts- and community-based participatory approaches in decentering dominant ways of knowing and seeing, while at the same time fostering community capacity and relations for future potentialities.

CCS CONCEPTS

• **Human-centered computing** → **Field studies; Collaborative and social computing theory, concepts and paradigms.**

KEYWORDS

noticing, decentering, photovoice, community-based participatory research, surveillance infrastructure

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1 INTRODUCTION

With the uptake of Feminist Human-Computer Interaction (HCI) [7] and Entanglement HCI [34], design researchers have increasingly been exploring new potentials for design to support multiple and alternative ways of knowing and becoming. They are doing so by paying attention to relations, bodies, spaces, and materialities (e.g., [8, 29, 66, 85, 92]). As Stewart articulated, this exploration shifts design researchers from creating rationalist solutions to “the pursuit of attentive and open-ended inquiry into the possibilities latent within lived material contexts” [98, p.275]. More recently within the Designing Interactive System (DIS) community, Key et al. [58] call for engaging with feminist and more-than-human thinking that reorients design to the agenda of “decentering”—decentering expert knowledge, white supremacist and patriarchal arrangements, human-centered ecology, and more. By decentering, these authors



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urge researchers and designers to develop and take up new ways and methods of imagining [58]. These methods of imagining are messy and situated by nature, in order to disrupt existing HCI design methodological commitments and practices that are often oriented towards function, solution, and progress [28, 64]. To this end, *noticing* is a design commitment that advocates decentering. Originally conceived of by anthropologist Anna Tsing, to notice is to attend to the often overlooked actors, relations, and processes by stepping out of a familiar framework of reference [101].

Despite ongoing efforts, the commitments to activism and interventions still lack generative tools and materials in connecting decentering knowledge production with facilitating collective action, and in turn, making visible community members' experiences and knowledge in the response and reimagining of existing sociotechnical infrastructures [22]. In other words, how can we share the analytical lenses and tools developed for scholarship work and design with community members who are bearing the discursive and material harms precisely brought about by the constructs that we are seeking to decenter [22, 57]? The goal of this article is thus to continue the decentering effort taken up by Feminist HCI and Entanglement HCI scholarship, while developing analytical and methodological repertoires to further democratize such effort.

With these sensibilities and questions in mind, we present a photovoice study that we conducted with eleven Black middle-aged and senior Eastside Detroit residents in collaboration with a local community organization. Photovoice is an arts- and community-based participatory research method that allows community members to document and communicate their lived experiences and practices through photography. In our case, community members were invited to take photographs of how they interact with the ever-expanding public and private surveillance infrastructures in the city and how they navigate safety in their everyday life. In this light, we position photovoice as an “attentive and open-ended inquiry” [98] that looks into the relationality, practices, and potentialities within the community's socio-material configurations.

As compared to other visual methods used in HCI and design, we show that photovoice is especially valuable in that it allows both community members and design researchers to collectively notice hidden sociotechnical infrastructures (in our case, public and private surveillance infrastructures), the mundane everyday design created by community members, the situated needs within the community, and the temporal diversity and possibilities for the community. These multi-layered opportunities of noticing through photovoice make it possible for community members and design researchers to contest the invisibility constructed by knowledge-power relations—the relational invisibility of the racialized and patriarchal gazes embedded in pervasive sociotechnical infrastructures and the invisibilization of the community's ontological complexities. In this light, we show that photography as an art form works in tandem with photovoice's participatory nature to *democratize* noticing as a generative approach for minoritized communities. Besides noticing's known benefits of decentering [101], we highlight the opportunity for photovoice to bridge noticing as a *commitment/sensibility* for design researchers and noticing as a *generative approach* for community capacity building and learning, while constituting new social forms and relations for future potentialities.

2 RELATED WORK

To situate this work, we first review the power embedded in photography as an art form and how photography has been adopted to shape social changes. Then we turn to Tsing's notion of noticing and show how HCI has taken up the commitment to noticing as a method for design. Finally, we review the photovoice approach and position it as an arts- and community-based participatory approach.

2.1 Photography as an Art and a Medium for Change

Photography is perhaps one of the most important devices through which people engage with the world and one another. Since its conception in our modern society, photography has played a pivotal role in mediating and shaping modernity, lived experiences, social relations, histories and memories, knowledge production, and human agency [59]. Sontag reminds us that photographs should not be perceived as an “objective” depiction of “reality” [93]. Subjective contingencies on who is making the photography, whose viewpoints and relations are embodied, and whose life is captured and represented in the photograph (and correspondingly, whose is left out) all shape the materiality and symbolic meanings of photographs, in one way or another [89, 91]. In fact, a photograph is an “object in a context” [93, p.106]—in thinking with HCI scholars, photographs can be considered boundary objects with fluid meanings in different social worlds and contexts where photographs are interpreted, deliberated, and employed to shape social action [15]. As such, any phenomena captured in any photograph in fact embody complex relations stemming from ongoing negotiation and interactions, and the photograph makes such complex phenomena noticeable [9]. And importantly, photography, as with other forms of art, makes space for individuals to empathize (or not [94]) with others' experiences, needs, and situations [9]. Put otherwise, the evocative nature of photography and other arts-based inquiry makes opportunities for participation and often initiates opportunities for further inquiry and forming new relations [31].

As Lacan famously puts it, “any picture is a trap for the gaze” [60, p.89]. The gaze is a matter of power [33]. How one is made visible, seen, and known under the gaze is entrenched with unequal power arrangements that are often gendered and racialized [17, 59]. In Carney's words, photography “performs in a field where the material realities of cultural practices in the field of power and desire are at stake” [18, p.31]. Indeed, the gazes embedded in photography make it “a technology of power” with the dual potential of exerting social control and challenging the dominant cultural representation [87]. Gaze and visibility embedded in photography, in this sense, is an epistemological and methodological work to legitimize certain ways of knowing and seeing, which in turn bring discursive and material consequences [80]. And on the flip side, photography through reverse gaze can privilege marginalized positionalities and partial viewpoints and thereby disrupt the dominant gaze [44]. In this way, photography has been adopted as an epistemic and practical tool for resisting objectifying and reductive gazes from surveillance infrastructures and apparatuses [17, 81]. For example, anti-policing protesters have relied on cameras on their smartphones to take photos and videos “from below” with the intention of sharing stories from protesters' viewpoints and

balancing the police gaze [1]. Black feminist scholar bell hooks also argues that the “oppositional gaze” practiced at visual encounters could trouble institutionalized representational practices [50]. She contends that this oppositional gaze in fact signals a power to gaze and observe, through which Black women were able to capture and construct their own narratives and voices.

More broadly, photography has always been a powerful agent and catalyst in shaping social change, particularly for minoritized communities [13]. As early as the 19th Century, Black communities in the U.S. were using photography as a resistance tool for Black equality [49]. Up until today, Black photographers and artists have relied on photography to challenge the reductive vision and harmful representations of Blackness that persisted in popular and academic discourses [82]. Through photography, these photographers have documented the material and political struggles, mundane experiences, and joy of Black people and their everyday life. Among them, Dawoud Bey and Roy DeCarava are prominent figures known for their work in challenging the underrepresentation of Blackness through their street photography projects in Harlem, New York, and other parts of the U.S. in the mid to late 20th Century [2, 38, 90]. In this light, our photovoice project with residents from Eastside Detroit neighborhoods similarly aims to attend to residents’ experiences and voices, but through their situated viewpoints.

In HCI, scholars have adopted photography-based approaches to understanding how individuals and communities [11, 67] interact with varied sociotechnical systems in different contexts, especially in the context of working with minoritized and vulnerable groups (e.g., [25, 36, 39, 40, 61]). Mundane sociotechnical practices uncovered through such visual means have contributed unique insights into designing technologies that serve the situated needs and values. Building on this research, our work seeks to further theorize how oppositional gazes embedded in photography and participatory approaches can help us to challenge dominant ways of knowing and seeing in design research.

2.2 Noticing as a Methodological Commitment for Design

Feminist scholars in HCI and technoscience studies have called for alternative ways of knowing and living to our current modernity which is founded on patriarchal capitalist production and market globalization. The call involves staying away from the modernist pursuit of techno-solutions while moving towards living with interdependence and uncertainties, situated knowledge, and coexistence of/with other human and nonhuman actors [7, 43, 44, 64, 65, 70, 100, 101]. In this light, anthropologist Anna Tsing proposes the notion of “noticing differently” to invite researchers to attend to the otherwise overlooked actors, processes, and relations that have survived the devastation of capitalist and rationalist modernity [101]. Tsing conceives of noticing as a methodological commitment and an analytical sensibility in ethnographic fieldwork and observation. This commitment requires researchers to attune to marginalized actors’ knowledge, histories, and viewpoints, and how they are related to one another across the spatial and temporal dimensions.

HCI design researchers have adopted noticing as a commitment and methodology for design [69]. In a DIS ’19 workshop, Liu et al. position noticing as “a complementary technique [...] to shift

user-centered design processes in directions that can consider the complexities in sociotechnical assemblages, and envision ethical and responsible ways of working with new technologies” [69, p.379]. Building on this, noticing is taken up in HCI design research in three major ways. First, scholars have designed tools to expand and support noticing processes and relations, especially across species and other dualist categories. Indeed, noticing is a powerful tool for research and design work to escape from the modernist pursuit of progress and development, while slowing down and embracing the multiple possibilities that open up by blurring the dualist binaries between human/nonhuman, culture/nature, human/machine, etc. [7, 10, 66, 68, 70, 85]. For example, Liu et al. contributed design prototypes for individuals to attune to and engage with their multifaceted relations with fungi, which reimagines the relationships between humans and fungi for collective survival [68]. Dew and Rosner’s work takes up noticing by attending to the intricate relations between woodworkers and trees in timber farming. Their work advocated for noticing the material’s existence “beyond the design moment” when they encounter humans and when they are quantified as profit value to humans [24, p.586]. By bridging noticing with an intersectional approach, Lu et al. coined the term “everyday noticing” to describe mundane practices through which Detroit neighborhood residents navigate and achieve multiple forms of safety in everyday life [76]. Through everyday noticing, residents attune themselves to human and nonhuman actors’ rhythms and trajectories to look out for themselves and their communities. Everyday noticing, in this sense, is imbricated in lived materialities as both a survival skill and a more-than-human care act. Second, noticing has also been used as an analytic framework and sensitivity to identify new entry points for design interventions. For example, Lindtner et al.’s work urges us to embrace seemingly complicit positionalities within the power structures to ideate interventions to erode the material and sociopolitical domination from within [65]. Researchers also show that noticing ambivalent data practices can inform ways to better support everyday resistance carried out by those under seemingly inescapable surveillance [72, 73]. And finally, the commitment to noticing is well-aligned with the growing interest in decentering expert knowledge in modern design practices that orient towards decontextualized progress, efficiency, and rationality [64, 78], while re-situating design in place and space, embodiment, practices, and relational ways of being-in-the-world [8, 29]. With this shift from the functional and solutionist focus of design to the attention to situated experiences and meanings, alternative approaches and sensitivities for design and engagement are needed.

Our work takes up this call for alternative and generative approaches toward noticing in HCI design research. We position photovoice, as we will introduce next, as an arts-based and community-based participatory approach that supports multi-layered ways of noticing differently. Particularly, we will show how photovoice activities make opportunities for both design researchers and community members to notice infrastructural violence and relational ontologies on the ground. In this light, our work contributes to this line of research by offering insights into what *the participatory turn* of noticing would look like.

2.3 Photovoice as an Arts-based and Community-based Participatory Approach

We adopted a photovoice approach that reflects the concept that people are the experts of their own lives [104]. This approach is both an arts-based qualitative and community-based participatory research (CBPR) approach in nature. Photovoice is an anti-colonial methodology that allows both community members and researchers to share and collaborate in the process of knowledge production. Photovoice is also an art-based research method. As Barone and Eisner state, the aim of arts-based research is to “enlarge human understanding” and “create an expressive form that will enable an individual to secure an empathic participation in the lives of others and in the situations studies” [9, p.8-9]. In this sense, relying on photographs as an artistic medium, photovoice aims to make visible a diversity of viewpoints in which one can respond to and feel about other community members’ lives and situations [42].

Through photovoice, participants are able to document the concerns and assets of communities, discuss the photographs and consider how they were produced, and communicate individual and community insights to stakeholders and other key stakeholders such as policy-makers [47]. The photographs and stories that are produced in the photovoice project make visible everyday practices and situated experiences from the viewpoint of the community members themselves, rather than the researchers [104, 105]. Importantly, these photographs and stories are relational—they are situated in local relations and encounters between researchers and community members [86]. As such, photovoice as a CBPR approach helps disrupt the power dynamics between researchers and communities, brings in important and overlooked perspectives, challenges biased representations, and enables collective reflection [42].

Photovoice is still relatively new to HCI and design research, perhaps because technologies are not a primary concern in the fields of public health and social work in which photovoice was originally used. O’Leary et al. first introduced photovoice to HCI to investigate technology design at the intersection of religion and racial identity [84]. Our work builds on this study and extends the photovoice approach to the study of surveillance infrastructures for the first time. By showing how photovoice activities facilitate both community members and researchers to notice differently, we will further theorize how photovoice is well-aligned with HCI’s commitment to decentering through noticing, while further pushing noticing to the participatory turn.

3 METHOD

In our photovoice study, we sought to center the voices of residents of Eastside Detroit and to understand their lived experiences in relation to safety and surveillance in their communities. To this end, our project involved eleven community members who were asked to take photographs related to their thoughts and experiences around safety and surveillance in their communities.

Issues of safety and surveillance are of particular concern in Detroit—the city with the largest Black-majority in the U.S.—where expansive surveillance infrastructures are being rolled out by the city government and the Detroit Police Department (DPD) and are being rationalized by the rhetoric of improving community safety [6, 76]. Large-scale surveillance infrastructures can have

profoundly negative discursive-material consequences on Black individuals and communities [17, 23], including through heightened monitoring and police presence in poor Black neighborhoods [30] and the misidentification and arrests of innocent Black men based on incorrect inferences by facial recognition software [48]. Thus, engaging local communities who are impacted by such technologies in the process of making sense of, troubling, and rethinking surveillance infrastructures in the city is central to this work [22]. It is a critical step toward holding such infrastructures accountable while collectively imagining alternative futures that are socially just and desired.

3.1 Community-University Partnership and Positionality

The CBPR approach informed each aspect of our project. The study was conducted as a partnership between the university and a community-based organization (referred to as ‘CO’ in what follows). The CO provides varied programs to serve the engagement and development of Detroit’s eastside neighborhoods and communities. The community and university partners have been collaborating on CBPR efforts for nearly a decade on supporting Eastside residents’ sociotechnical needs in a diversity of areas, including economic mobility (via employment and entrepreneurship [26]), community-based mentorship [27], and digital skills development.

The study team (comprising both university and CO members) met regularly throughout 2022 to plan the project and reflect on the partnership. Researchers on the university team were not Detroit residents and varied by race, nationality, gender, and academic status. The CO team members were Eastside Detroit residents or had worked extensively with Eastside residents. To mitigate power imbalances and avoid the potentially extractive nature of community-based research, we emphasized reciprocity and relationship building during project conceptualization to center the sustainability of the partnership and ensure that the project aligned with the CO’s goals. Both teams took time to share each other’s priorities and goals in this partnership. With the expansion of surveillance infrastructure in Eastside neighborhoods, the CO was interested in understanding how residents react to these technologies and how to better support neighborhood safety through their existing community well-being and resilience programs. The university team’s goal was to create a space for residents to share their perceptions of surveillance technologies and to engage residents in the process of rethinking sociotechnical infrastructures that support community safety.

We made sure that both the CO team and the university team are equal partners in this work, and all members of the university and CO teams are the co-authors of this paper. We worked closely through all phases of the research process. Specifically, we collaboratively identified research questions and conceptualized the study, discussed recruitment strategies, considered the ethical implications of the study, and prepared the IRB application. Then, we worked collaboratively to design the study materials, negotiate photo-taking probes, manage logistics, recruit and liaise with participants, co-organize the workshops and exhibition, and unpack the insights generated by the study. Throughout the process, we actively evaluated and reflected on our partnership by recognizing the progress and identifying areas for improvement.

As a team, our positionalities shape and are shaped by our engagement with community members. In the first workshop, we started our project with an open invitation for engagement (e.g., respecting and including all voices in the discussion, all voices are important and there are no right or wrong answers, encouraging participants to have fun with the project). We explicitly explained our motivations for the project and foregrounded the role of race and nationality in the discussion. Throughout the planning and dissemination of the project, we engaged resident participants in the decision-making process and created spaces for them to share feedback with us. Certainly, our relations with the community shifted as we encountered each other, got to know each other, listened to and learned about each others' stories, and understood what we shared in common and how we could move towards our shared goals [86]. In our work, we carefully attend to and embrace these shifting relations as opportunities to facilitate co-learning, participate in community making, and enact understandings of the phenomenon, of each other, and of ourselves.

3.2 Participant Recruitment and Demographics

The CO team recruited participants in May 2022 by advertising the study to adult community members through emails, phone calls, online posts, and during community meetings. Through these efforts, eleven community members participated in the study, and received \$175 each as compensation for their time and insights. All the participants in the study were Black and residents of Eastside Detroit. In terms of gender, ten participants were women and one was a man. They ranged from 49 to 79 years in age, with an average of 65 years. The majority were retired or unable to work (n=8), while two worked full-time and one worked part-time. Most participants (n=7) reported an annual household income lower than \$30K. Participants reported a range of educational attainment, ranging from some high school (n=1), a GED (n=1), some college (n=4), a Bachelor's degree (n=2), and a Master's degree (n=2).

3.3 Study Design and Process

The main study activities involved three phases: (1) Onboarding, (2) Photo taking, and (3) Photo sharing and reflection (see Figure 1). The three research phases took place between May and June 2022 in a hybrid form. All group sessions and workshops took place online via Zoom. The other research activities took place in person, including photo taking, individual check-ins and interviews with participants, fieldwork visiting their homes and neighborhoods, and the community-based public-facing photo exhibition.

In Phase 1, we hosted onboarding and education workshops where participants were introduced to the project and taught techniques for photo taking. In Phase 2, participants took photographs in their communities based on several probes (see Table 1) and reflected on these during several interviews. And in Phase 3, we hosted a group reflection workshop and a public-facing exhibition where participants were able to reflect on each other's photographs and discuss their thoughts about safety and surveillance with each other and their broader community.¹ During the group reflection workshop, participants commented on the photographs following

¹For detailed information and practical insights on the organization of this community-based public-facing photo exhibition, readers may refer to our case study [75].

the structure of Wang's "SHOWED" questions [105] that help viewers investigate various aspects of photographs.² As such, each phase uniquely compelled participants to consider and reflect on the situated meaning of safety, the design of surveillance technologies, and their everyday interactions with such technologies. An extensive description of each study phase is included in the Appendix A.

As noted earlier, we position photovoice as an "attentive and open-ended inquiry" [98, p.275]. That means participants' photographs—alongside their titles, captions, and stories—are not stable artifacts or stand-alone objects independent of context. Rather, they are made and remade, stabilized and destabilized, through a process of knowledge coproduction [45, 55]. That is, these photographs and stories are inherently *relational*, partial, and socially situated in a particular time and space [86]. And they are stemmed from encounters and relations among all participants and community members [86]. Recognizing this, we encouraged flexibility and open-endedness in all three phases of this project, especially for photo-taking and sharing. We encouraged creativity and flexibility in participants' interpretation of probes and their artistic expression in photo taking. Undoubtedly, each participant had their own thoughts and ideas. We made ourselves available to participants as viable resources for capturing and presenting their ideas which might be technically challenging [27].³

To this end, the shifting relations among the study team members and participants were a vital part of the photovoice coproduction process. For example, through multiple check-ins and one-on-one interviews with participants in Phase 2, the encounters between the first author and participants staged a responsive space for the researcher to reflect on their questions and positionality, and for participants to talk through their ideas and process their emotions. And similarly, through the group discussion in Phase 3, the meaning of the photographs and their stories are being negotiated among the group.⁴ Given the relational nature of photovoice and storytelling, we particularly attend to the coproduction of participants' photographs and stories, and how their meanings and materialities were adjusted as encounters and relationships unfold.

3.4 Data Analysis

We drew on Clarke's situational analysis [21] to iteratively analyze a variety of data, including transcripts of individual interviews and group workshops, the first author's field notes, the photographs taken by participants and their descriptions, and participants' feedback. The first author began by open-coding the transcripts on ATLAS.ti, and met regularly with the second author to discuss and revise the generated codes and themes. Then, the first author coded participants' photos and field notes to triangulate the interview data. Throughout the analysis, four authors also met as a group to discuss the data and findings. All authors on the university and CO teams also met regularly to check in about the findings and

²Wang's (1999) "SHOWED" set of questions have been frequently used and adapted in Photovoice research: 1) What do you See here? 2) What is really Happening here? 3) How does this relate to Our lives? 4) Why does this condition Exist? 5) What can we Do about it?

³As shown in section 4.1, Mr. Lendderick asked us to put his photographs in a collage to convey a particular message.

⁴As shown in section 4.4, Ms. Loretta switched her selected photo after her follow-up interview with the first author, and updated the title of that photo upon getting feedback from other participants.

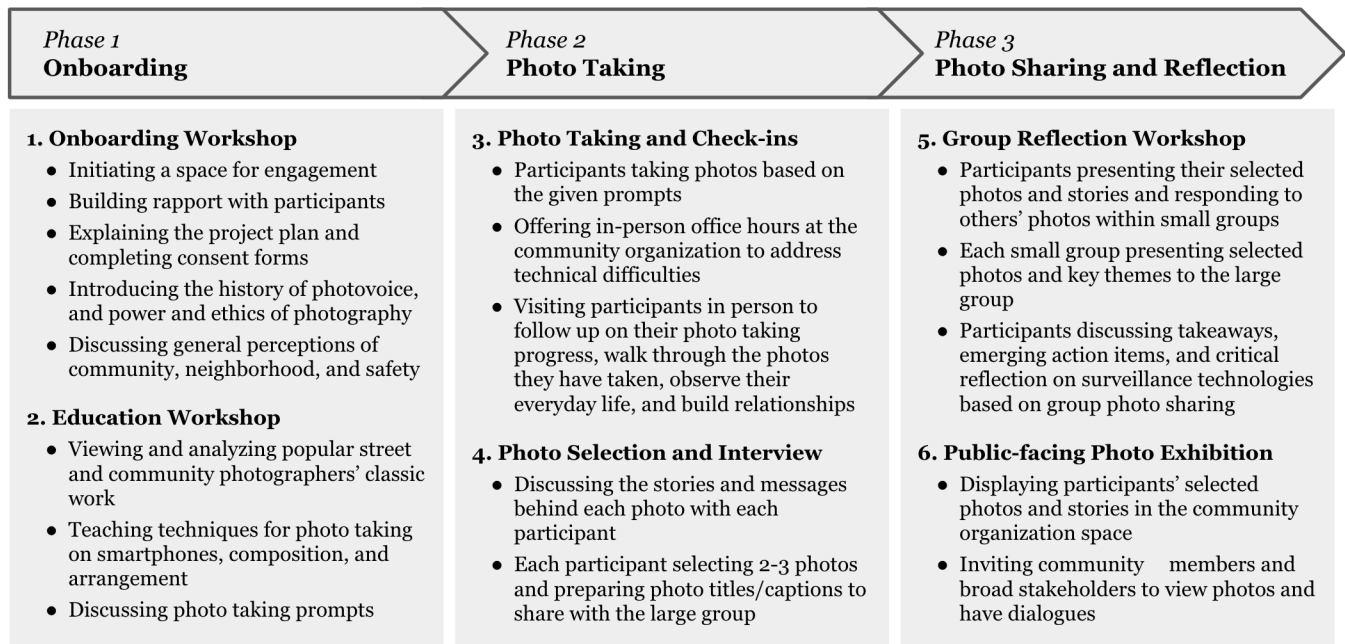


Figure 1: Our photovoice study consisted of three phases: 1) onboarding, 2) photo taking, and 3) photo sharing and reflection.

Categories	Probes
Neighborhood and safety	<ul style="list-style-type: none"> What does safety mean to you? What makes you feel safe or unsafe? Who do you reach out to and what do you do when you don't feel safe? What promotes safety in your neighborhood and community?
Surveillance	<ul style="list-style-type: none"> What does surveillance mean to you? What are the ways in which you feel surveilled and monitored? What are the ways in which you are surveilling and monitoring? What are your roles in surveillance?
Surveillance Technologies	<ul style="list-style-type: none"> What surveillance technologies have you encountered and used in your daily life, and why? How do you interact with these surveillance technologies? How do these surveillance technologies affect your sense of safety?

Table 1: Photo taking probes

analysis. The university research team also engaged in member checking with participants as well as the CO team to ensure that community members' experiences were faithfully captured.

4 MULTI-LAYERED NOTICING

As an arts- and community-based participatory approach, photovoice created an intentional space for community members to capture and communicate their lived experiences and everyday encounters through photography. When asked about what stood out from participating in photovoice after the group reflection session, a participant, Ms. Toya shared how photovoice activities challenged her to re-examine the comfortable lens through which she saw and related to the community:

The whole process of [the project] definitely made me pay more attention to detail... Personally, I've gotten comfortable with the mundane. I've been living over here forever. So, you take your routes, and you just know what it is. *But in capturing photos... it made me really look at the little intricate thing that I might not have paid attention to...*⁵ We got this issue with [the waste management] and their garbage trucks are leaking fluid, and I never even paid attention to that. The photovoice made me look at others' pictures in more detail, and even take pictures with more detail...

⁵Hereinafter, the italic text in participants' quotes denotes the emphasis added by the authors.



Figure 2: Hello! You are on Candid Camera by Lenderrick. “These are the surveillance cameras that I observed on a typical day. The cameras watch me throughout the day.”

I consider myself a pretty detailed person, but clearly I must not be. And then it always makes me reflect on before and after, or what was, what will be to come, or things that may need to be addressed.

As Toya suggested here, the process of producing, viewing, and collectively reflecting on photographs enabled both residents and researchers to step out of their own familiar perspectives, while “paying attention to” intricate details, different viewpoints, and shifting relations that were otherwise neglected. Sections 4.1 through 4.4 unpack Toya’s quote in detail by describing four different vignettes and layers of noticing as observed throughout the photovoice activities: 1) noticing the invisibilized sociotechnical infrastructure, 2) noticing mundane and trivial everyday design, 3) noticing and sensitizing situated struggles, and 4) noticing multiple temporal trajectories. In the context of safety and surveillance, these multi-layered ways of noticing tease out the complexity of the sociotechnical assemblages within which community members navigate everyday life. Additionally, these possibilities also illustrate how the art form of photography and the participatory nature of photovoice work in tandem to create unique opportunities to trouble and decenter dominant and routinized ways of seeing and knowing.

4.1 Noticing Invisibilized Sociotechnical Infrastructures

The first layer of noticing concerns centering the often invisibilized technical apparatuses and sociotechnical infrastructures in the process of photo-taking and deliberation. To illustrate this, we zoom into how photovoice activities nudged one participant, Lenderrick, to step out of his routine activities. Intentionally stepping out of his routinized everyday trajectories reoriented Lenderrick to see familiar surroundings from a different perspective, interrogate taken-for-granted arrangements, reflect on the information and

power imbalances embedded in surveillance infrastructures, and share his situated viewpoints with others through his photography.

Mr. Lenderrick is a 65-year-old man and was the only man among our eleven participants. He is a lifelong Detroit resident and has spent his whole life on the Eastside. After retiring from the airline industry, he has been living alone in a senior apartment within a public housing complex. Lenderrick sees himself as quite digitally proficient and always curious to learn about technologies. This has led him to volunteer at the CO and teach other senior community members basic digital skills. Almost every time we saw him, he would present devices such as his smartphones, earbuds, tablets, and sometimes, his laptop and ask us questions about these devices’ different features. Yet, taking photos on these digital devices was something new to him. “I never took good photos on my phone; it’s a new skill that I had to learn,” he admitted.

During a photo-taking check-in, he was excited to show us nearly 20 photos of different surveillance cameras—this series featured all the surveillance cameras he encountered on a typical day, from the senior apartment building, the clinic waiting room, the hospital entrance and hallway, the grocery store, the community center, and more (see Figure 2). “[I was wondering] just how many surveillance cameras would I notice? It [turned out to be] about 15 to 20 cameras on me every day... I didn’t realize there were that many cameras throughout the neighborhood,” Lenderrick explained when articulating how he interpreted the photo-taking probes on surveillance technologies and his intention behind the photograph series.

Viewing these images as both a thematic collection and as individual photographs, and learning about the locations of and stories behind each photograph, gave us an entry into their production. Indeed, we⁶ could follow Lenderrick’s viewpoint, trace his movement paths, and recontextualize his feelings in different situations. For instance, he was enthusiastic about sharing with us how he caught sight of the cameras’ arrangement when inspecting his familiar grocery store with fresh eyes and how that experience made him question surveillance devices’ pervasiveness and technical capability. As he observed in a local grocery store:

What happened is that you’re noticing the cameras because you normally don’t notice them. And inside of [the store], they have many, I’ll say, at least 50 cameras. Because when you walk into the store, there’s cameras right there when you walk in... Then you walk a little bit further, maybe 20 feet, you look up, there’s a line of cameras because all the checkout, each one of the checkout stations has cameras. All the other spots like the customer service and returns and all, there’s cameras there... Then if you look further back, the whole back wall has cameras... They hang down, they’re on poles. I was like, “Wow, they really can see everyone in the store from beginning to end.”

Lenderrick responded to our probe asking if he had noticed any of the cameras before taking photos,

⁶Here, “we” specifically refers to the research team and the community participants during the project. But “we” or “us” could also mean anyone who is viewing the photograph and the caption including design researchers, practitioners, community members, and readers of this article.

You never, because *you're not in there to look at the cameras. You were there to shop and look at the food specials and whatever other items.* So I never really paid any attention that there are cameras everywhere. [...] *See, now with the pictures, you'll notice it more,* but in real life, you wouldn't because it basically blends into that white beam [...], unless you were looking for it, I guess. [...] Because anyway, it's not at eye level, it's way up on the ceiling.

Here, “You're not in there to look at cameras” is especially telling. To Lenderrick, the grocery store space was too familiar, and over time, his way of seeing and interacting with other actors in this space converged into a rather routinized temporal and spatial trajectory—“shopping and looking at the food specials and whatever other items.” Yet, even though the cameras and the surveillance infrastructures are key nonhuman actors in this grocery store space, their embeddedness in the background environment keeps them “hidden,” or intentionally, opaque from everyday customers. In effect, one's intricate relations with these cameras and their underlying infrastructures are not necessarily central to community members' everyday attention—they go unnoticed. Photovoice activities alongside the photo-taking probes, in this sense, nudged community members to intentionally step out of their familiar and comfortable viewpoint, thereby noticing the infrastructures that are ubiquitous yet embedded and made hidden. And as Lenderrick stated, “now with the pictures, you'll notice it more.” The photographs that community members created, in this way, become artistic artifacts that materialize such moments of noticing and make legible opaque actors and relations for their viewers. In other words, what was otherwise invisibilized becomes hypervisible.

Lenderrick asked us to help him put his photos of different surveillance cameras into one collage (see Figure 2) and named it “Hello! You are on Candid Camera”.⁷ The collage and its title are ingenious and powerful in their referential punning that simultaneously emphasizes the contested visibility of the surveillance infrastructures and brings one's ontological relations with the ubiquitous surveillance infrastructure to the fore. Besides the aforementioned hiddenness afforded by the design of the environment, this contested visibility also speaks to the logics of control that are often rendered invisible to community members. Therefore for Lenderrick, noticing the invisibilized sociotechnical surveillance also means peeking into “behind the scenes” power structures: [97]:

That makes me feel watched. That really makes me feel kind of like I'm being watched for almost everything I'm doing here. Whether I'm picking my nose, or whatever it is, there's a camera watching me... It kind of creeps me out sort of, too, because *it's like I'm being watched for what reason? You know? I don't know.* I know theft, shoplifting, and all that, I know that goes on. But it's just like, “Wow, do you really need this many cameras?”... *You really don't know who's watching you, or why, or how they're going to interpret your actions.*

⁷ *Candid Camera* is the name of a classic and long-running hidden camera reality TV series in the U.S. The catchphrase of the show was “Smile! You're on Candid Camera.”

Furthermore, when he was taking photos, Lenderrick even took the initiative to approach the agents of power in different spaces by himself, such as staff members of the public housing community, security guards at the clinic and hospital, managers of the grocery store, and even the police officers at the local police stations. Confronting these agents of power allowed Lenderrick to ask questions like whether he was allowed to take photos of the surveillance cameras in the space, whether the cameras are normally turned on, whether someone is monitoring the video footage in real-time, how far each camera can cover, and in effect, what/who is of the camera's interests. On some occasions, Lenderrick went on and took a further step to observe and analyze the directions in which the cameras are pointing. For instance, he was trying to make sense of why the cameras inside the grocery store were often pointing inward monitoring customers, while the cameras at his clinic were pointing toward the entrance monitoring everyone coming in and out of the clinic, given the two spaces' respective functions and goals of surveillance.

Not surprisingly, the questions Lenderrick asked were occasionally received as suspicious, and the answers from the authorities were often ambiguous in addressing Lenderrick's questions due to the systematic information and power asymmetry embedded in large-scale sociotechnical infrastructures. Yet, this process nonetheless made participants like Lenderrick increasingly curious about whose safety is being considered and centered and the ultimate purpose of surveillance. As Lenderrick asked, “Are they watching [for] my safety or are they watching to see whether I'm dangerous or potentially dangerous, or if I had done something?” This reflection was especially salient when he was describing a photo taken at a community center entrance (i.e., the second photo on the top row of Figure 2). Pointing at the cameras in that photo, Lenderrick recalled:

Lenderrick: At the time the picture was taken or even at this time, the cameras are not on, they are only activated once the alarm system is activated... when there's no one here and when the building is closed. Alex: How do you know [that they were not on]?

Lenderrick: Because I asked the person that runs the building... Which kind of gave me a [feeling that], well, what if I was being robbed out in the parking lot on the way into the building, no one would ever [know] unless I screamed, hollered, or yelled. And knowing that kind of put me in the mind of, well, *I'm not important, the building is more [important] than I am.* You know what I mean?... So [the camera] is really not looking out for my sake, it's looking out for the safety of the building.

As illustrated in this snippet, Lenderrick's self-initiated reflection motivated him to articulate his situated perceptions of surveillance cameras in their varied spaces, each enacting a distinct sense of purpose and safety. Through this process, surveillance cameras were no longer seen as self-contained to Lenderrick, but site-specific and always in relation. Indeed, the moments of noticing differently that take place during photo-taking often involve encountering other human/nonhuman actors and making sense of the situated relations among these actors.



Figure 3: Multiple layers of protection by Ryn. “I can see what’s in front of me and behind me at the same time.”

Lenderrick’s collage was provocative. During the group reflection workshop and public-facing photo exhibition, other participants and community members were amazed and surprised by what Lenderrick had seen. In fact, no one had seen the large number of cameras installed in the grocery store and other everyday spaces. What other participants noticed in the collage became the source of further dialogue and deliberation. One participant noted that “When I go in the store... I’m going to go look at those cameras.” Another participant similarly echoed, “You would not have noticed this if it had not been photovoice... Sometimes we have to focus in on something, but I [normally] wouldn’t do that, [I would] just pass by.” With surveillance apparatuses and infrastructures becoming “seen” through Lenderrick’s collage, participants also started engaging in dialogues and debates around their varied perceptions of surveillance cameras in different spaces, situating these otherwise “stand-alone” cameras within the power structures of criminalization and incarceration, and opening up deliberation on the potential sociotechnical harms to personal privacy and community autonomy brought about by the ever-expanding surveillance infrastructures.

4.2 Noticing Mundane Everyday Design

In dealing with mundane everyday situations, people adapt and appropriate existing tools and resources, be they old or new, to reinvent and realize new informal working solutions [20, 78]. The second layer of noticing concerns making visible community members’ seemingly trivial everyday designs. Compared to the last section which mainly focused on how community members could notice differently through photo-taking, this section shifts the focus onto how community members, organizers, and design researchers could

notice differently through participants’ photographs and group deliberation. We particularly trace Ryn’s photograph of a working safety system that she designed to maintain multiple forms of safety. By making visible this everyday design to viewers, Ryn’s photograph allows us to notice not only the nuanced social relations and situated knowledge within the community but also her ongoing community-making efforts.

Ms. Kathryn is known as “Lady Ryn” in her neighborhood—that’s what every kid on her block calls her. Ryn is wise and sharp. When we first met, she proudly told us that “I am the *legacy* eastside resident.” Since Ryn was born 69 years ago, she hasn’t moved out of her family house. Throughout the years, more and more families have moved out of her neighborhood. “We look out for each other... There’s not a lot of us, but we are very attentive to each other,” Ryn acknowledged that connection among neighbors is vital for the collective safety of the neighborhood. Now serving as the president of her block club,⁸ she has been striving to bring a sense of legacy, pride, and connection that was salient in the past back to her community. As we will see, this goal undergirded both her everyday design itself and her decision to make the design visible through photography.

In response to the probes “What does safety mean to you?” and “What makes you feel safe or unsafe?” Ryn took a picture of a safety system she designed and assembled near her front door (see “Multiple Layers of Protection” in Figure 4a). To Ryn, there was no simple answer to these photo-taking probes—hence the photograph’s titular multiple layers. By producing and sharing this photograph as a “snapshot” of her safety system, Ryn wanted to showcase how multiple meanings of safety and trajectories for navigating safety co-exist in a single time and space. She explained this photograph during the group workshop:

What we have are multiple images of what safety is in one snapshot. We have a chair where a person can sit and watch ... what’s going on. We have the Ring doorbell, which connects to us and to third parties that watch [the footage]. We have the traditional porch light that is there. And that third light is on and it gives reflections of light at night for safety and travel. We have the door with a lock and a reflection... And so this is a snapshot of a neighborhood from the front, from the side view, and from the back. And that’s why we are calling it layers of protection... *So to me being able to have like a global perspective, a global view, of what’s going on around me is important.*

Here, Ryn’s photograph and explanation described a delicate working system that emerged from her mundane negotiations with the sociomaterial surroundings. It was through this system that Ryn looked out for herself and her community on a regular day. Besides adopting surveillance technologies to monitor the front door remotely, Ryn also creatively appropriated other “low-tech” tools and artifacts, such as the reflective door, the chair, and the light, to navigate safety in varied daily situations and get ready for

⁸A block club consists of residents who live within one (or sometimes more) blocks in urban neighborhoods. Block clubs are self-organized and managed by residents. They committed to facilitating the socialization and connection among neighbors, discussing and addressing shared concerns, and promoting mutual support and communication among neighbors.

unexpected encounters. As the quote above clarifies, this everyday design is not a stand-alone system; rather, it is a sociotechnical assemblage entrenched in the existing communal relations.

Yet, informal working systems that emerged from everyday design are often only temporarily stable and thereby undergo constant reconfigurations [103]. For example, during our group discussion when addressing one of the SHOWED questions, “What is really happening here?” one participant speculated about the potential technical breakdown of the system depicted in Ryn’s photograph:

Participant: Catheryn, with this picture here, I think even what I’m pulling out is, let’s say your Ring Doorbell technology fails, you still have a chair on the porch right? Which says, *‘Yep my technology may fail me, but I’m still out here, and I’m watching too.’*

Ryn: Absolutely, absolutely!

Though short, this snippet requires detailed consideration for its multiple insights into the importance of attending to everyday design. The potential breakdowns of design-in-use could result in disruptions in participants’ routines and relations mediated by the system, which makes legible the uncertainties with which community members have to live and navigate. Also as signified in this quote, this discussion made space for participants to take a step back and rethink the limitations of “high-tech” surveillance technologies through these vernacular designs.

Ryn’s photograph also prompted other participants to similarly share their own everyday designs for navigating safety during the group discussion. Some of them are larger in scale such as creating a community resilience house, while some of them are more trivial and, in effect, go unnoticed in everyday life. For example, one participant shared how she redesigned the front gate of her house after seeing Ryn’s photograph:

[The gate in front of my closed porch] has to be open and closed in order for anyone to get through. So that’s the way it’s... You know I had grandchildren and dogs, so that meant that somebody had to stay in place. And that really gives another sense of you can enter, it’s not locked. But it does have a latch on it, so it doesn’t just swing open. You have to stop and do something here before you can get on the other side.

For this participant, adding a latch to the gate, instead of a lock, was an intentional decision that aimed to construct permeable boundaries between communal and personal spaces. It was a compromise she had to make in order to create a welcoming environment for some and a barrier for others.

In fact, Ryn had her own takeaways and intended messages for the community by showing a photograph of her own safety system. “I think that this was good for me to stop and take a look at these things and not just assume. I had to do some thinking about it. I really did,” Ryn said as she reflected on the process of photo-taking and selection. She explained her process for selecting this photograph, “What would I want to share, especially when you started talking about the photos that we [would have] on exhibit? What would I want the photo to say? What would I want it to express?” For Ryn, the answer to her self-posed questions above was found in her desire to show that her safety system could bring a multifaceted sense of safety, rooted in love and peace

instead of fear and isolation, to the community. By showing and encouraging neighbors to sit in the chair on the porch and to look out for the children’s safety as they are hanging out on the block and neighbor’s safety as they are coming back home from work, Ryn was hoping to bring back the legacy of community connection and mutual care that she had long valued in her neighborhood. Ryn articulated that this safety system on her porch was indeed situated in a broad safety network that consists of immediate neighbors and children and other human and nonhuman actors that one might normally ignore:

It’s all connected. It’s spiritual. You don’t have to have religion to be spiritual. “Spiritual” has to do with the elements of Earth and air and all of that. Those components are spiritual factors—growth and beauty. Those things have to have a network, but the person has to understand the network. *If the person doesn’t have any sense for how it’s connected, it doesn’t really mean anything to them.*

As Ryn aptly articulated here, community members’ everyday designs are deeply connected, and in relation to the surrounding actors, both human and nonhuman, and the meaning of these everyday designs is produced only when they are recognized and acted upon by others in the community. In this light, to notice overlooked everyday design is to notice existing intricate relations, situated wisdom, material conditions, and the mundane routines of community members represented in photographs on the one hand, and to notice the community-making, or local world-making projects, carried out by community members through these everyday designs, on the other.

4.3 Noticing and Sensitizing Situated Needs

The third layer of noticing differently touches on noticing and sensitizing often-neglected needs that community members capture through photography. As we will see, photographs are a creative medium for participant photographers to *express* and for viewers and photographers alike to *notice* the situated needs stemming from moments of fragility and precarity that are otherwise hard to describe. Noticing the situated needs here is beyond “seeing” the needs through the visual *per se*. Instead, viewing and discussing photographs is a multisensorial and embodied experience that makes it possible for us to sensitize the embeddedness of community members’ needs in particular situations.

In this account, we turn to Ms. Juannette. Juannette is 59 years old and has been living in an eastside neighborhood with her husband and son for decades. Juannette is a little shy. It appeared to us that she often retreats in her thoughts, and is a bit quiet compared to other participants. During our group workshops, Juannette was always the one sitting behind and listening to everyone. Yet she is sensitive and observing, carefully paying attention to small details in what other participants had to say and what their photos had to show. This was reflected in most of the photographs Juannette took—they are mostly taken from a distance, be it from across the street or behind the car window. The only photo of Juannette’s that was not taken from a distance was “Mace” (see Figure 4b):

Well, that’s kind of blurry, but that’s me standing there with a bottle. The red bottle is mace [the pepper

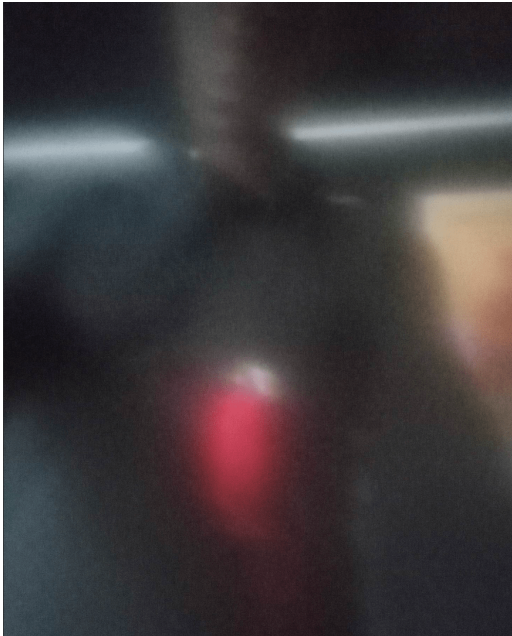


Figure 4: Mace by Juannette. “I always take my mace with me when I go outside. I’ve never had to use it and I’ve never been robbed so far.” (Photo is purposefully blurred by the participant)

spray]. And I always take my mace with me when I go outside. I’ve never had to use it. And I’ve never been robbed so far. When I’m working in the garden in case a dog or human tries to attack me, I have mace available... Mace is just a security [measure]. And you just spray it, for the person, it burns your eyes and it detects the person, it leaves a coat on their body so that you know, that they did it.

Juannette’s daily routine is mainly focused on two sites in the neighborhood: her home and the community garden. For Juannette, avoiding unexpected bodily harm was her single most safety need when she was outside in public alone, for example, when she was working alone in the community garden, walking between her home and the garden, or going to other unfamiliar public environments on her own. In fact, according to Juannette, she decided to take this photograph when she was taking a break from cutting grass in her community garden. The feeling of being alone in the garden with no one to look out for her—the sensation of having to rely solely on oneself to navigate safety—was important to capture. In fact, Juannette had been carrying mace for more than six years as a means to protect herself in situations of being alone outside. Even though she never needed to pull it out so far, having the artifact readily available to block potential unanticipated encounters gave her a sense that “I’m protecting myself the best I can.”

By taking and selecting this photograph of the mace as an object of self-protection, Juannette aimed at representing a particular safety need salient to women in the community, as well as heightening community members’ awareness of the mundane artifacts

available in their surroundings to navigate unanticipated situations. In fact, this intended message was certainly sensed by other participants during the group discussion, but in unexpected ways. When we posed the SHOWED questions, “What do you see here?” and “What is really happening here?”, one participant said,

When we look at the mace [in the photograph], you can’t really see it. *But I love how she tied in the fact that if you get mace, that’s what it’s going to do [with] your vision. It’s going to be blurry.* You’re not going to really be able to see. And so I think that was ingenious. When she talks about mace, like, don’t start it, I’m warning you.

What was “seen” by this participant was clearly beyond the photograph and the mace itself. In fact, the “unseeable” mace in the photograph and the overall blurry photograph made it possible for her to see and sense something else—the tensions exist in the moment of encountering embodied danger and spraying mace. Another participant similarly echoed, “Like now I’m even kind of like, ‘Oh, my eyes.’ Like I feel like I’m *feeling* it.” Here, we see a transition from the focus on the mace as an object featured in the photograph, to the mace as a sensation of embodied experiences and a way of feeling the embedded phenomena that Juannette might experience. As Juannette responded to these comments, “I think the mace [is] right here because you can see it, but you can’t see it. And that’s how mace is. You can’t see it, but when you get it sprayed in your eyes, it’s blurry.” Photography as a kind of art, in this way, allowed Juannette to rely on the very ambivalence of vision and visuality in photographic images to express her voice that would be ineffable otherwise. Such aesthetic considerations taken by Juannette in photography made space for new potentialities of expressing her situated needs and feelings, while making it possible for viewers to sensitize how she felt when she was alone in the community garden.

Admittedly, vision, or the visual, is often the predominant or default sense within photography, it nonetheless offers valuable “pathways to the other senses and to social experience more generally” which can evoke “psychological and kinaesthetic responses with interpretive ones” among viewers [77, p.289]. As illustrated by the above snippets of group deliberation, participants’ engagement was *multisensorial*, beyond seeing what’s simply “seeable” in the photographs. As Lenderrick clarified,

So I’d like to say [that] the pictures encompass more than just visual. I mean some of the pictures you get a feel of what the atmosphere was like. You got the smell of what its like. The one picture that we discussed... was the sound of the gunshot. So you got to, you heard the picture. I mean, you can feel the pictures, you can smell the pictures, and you can also hear the picture.

Taken together, the making, viewing, and deliberating photographs are all sensory encounters with other social actors and their rich experiences. Indeed, the social is inherently sensorial, and visa versa [51]. It is the multisensorial experiences evoked by photography that allow us to notice the embedded needs and experiences of others, especially those that remain overlooked. Put otherwise, the otherwise “external”—external needs of the external other—become entangled with our own selves and our own bodies. Such ways of



Figure 5: *Abandoned, Gone but not Forgotten* by Loretta. “I went to Hutchinson Elementary School, I remembered when my fifth-grade teacher asked us what we wanted to be when we grew up and I said a teacher. They made it a Historical School in 2001. It can never be torn down but it is still abandoned. I was very sad to hear that my elementary school I graduated from was closing its doors in 2012. Our community wasn’t looking so beautiful anymore. I was disappointed to see the change that happened to our beautiful community. I started working for Detroit Public School Community District on September 16, 2011 as a Pre-k Paraeducator teacher. My dream had become a reality. I received my associate degree in Early Childhood Education in May 2013. I am a Phi Theta Kappa International Honor Society member. I am proud to say that I love how our neighborhood is looking so much better now since my Butterfly Rain Garden, Little Detroit Community Garden and Gazebo Garden. I hope they will make a decision to do something positive with the school very soon for our community. It can be a recreational center, senior homes or something to bring neighbors back.”

embodied affective and multisensorial noticing help us to better understand the embeddedness of the photographed phenomena, which would offer an entry point for communities’ and design researchers’ further inquiry into the entangled needs and design with the social.

4.4 Noticing Multiple Temporal Trajectories

The final layer of noticing concerns time and temporality. Noticing multiple temporal trajectories is to re-entangle the present situations captured in photographs with personal and collective histories and memories while envisioning potential futures. We describe this by showing how varied temporal trajectories were brought to attention through the production and group deliberation of Loretta’s photo featuring her already-closed elementary school. Importantly as we will see, this process of engaging with the photograph was *affective* for both Loretta as the participant photographer and other

community members as viewers, be it vulnerable, nostalgic, or hopeful. These engendered affects in turn inform new relations among community members that might create new possibilities for preferable collective futures.

Ms. Loretta is 61 years old. She is now working part-time in a kindergarten as a paraeducator. Loretta moved to Detroit from the South with her family when she was only four years old, and since then, she has been living on the same block in Eastside Detroit. To her, the ups and downs of the neighborhood and the city have all been deeply inscribed into her memories. Among the participants, Loretta was the first to invite us to visit her neighborhood, which housed her butterfly-shaped community garden she named “Little Detroit.” The Little Detroit community garden was designed and created by Loretta and her friend during the early months of the pandemic. Together, they transformed a vacant lot of weeds and unkempt bushes into a flourishing community space featuring 141 distinct Michigan native plants and flowers. Since the transformation, taking pictures of the plants and flowers and uploading them to Facebook has become part of her routine. “I always try taking pictures of different things, ever since we started doing the garden,” she continued, “I love taking pictures because then you can see how it grows or how it started off, and how it grows, how it changed, how the Michigan native flowers had got bigger.” For Loretta, taking pictures captures instants of time and her subjects—frequently the nonhuman life in her garden—within them; while no one photograph captures the passage of time in itself, when displayed in sequence, they collectively showcase the flow of time.

Naturally, most of the photographs Loretta took and selected during our one-on-one interview were continuations of her ongoing garden project. In fact, she took and sent over 90 photographs depicting different corners and minute details of the Little Detroit community garden during the photo-taking phase. Yet at 5 a.m. on the morning of the group reflection workshop, she texted us, “Good morning Alex, I apologize: I want my third picture [to] be the school. I have [a] history with the school, I used to attend and I want to talk about it” (see Loretta’s photo and story “Abandoned, Gone but not Forgotten” in Figure 5). Going through the stories behind all 90 photos during the interview, according to Loretta, made her ponder for the whole night what stories she would like to share and what messages about her community her photographs would convey in the future. She later shared that this process prompted her to rethink the meaning of photography and attend to her shifting relations with the photographed subjects over time:

Even though you see the buildings and you take pictures, you never think about the story behind the pictures. I just take pictures all the time—just take pictures *all the time*. But then when you think about what did this building mean to you, what did this flower mean to you, what does the picture mean to you, it just makes you think about what you done been through or what it means to you.

For Loretta, these meanings carry heavy personal and emotional weight. Her new photograph “Abandoned, Gone but not Forgotten” depicts what her elementary school looks like in the present—its windows removed and boarded up, bricks on the roof missing, and the front door blocked by wild weeds and bushes but fronted by a

green lawn of recently-trimmed grass. Loretta originally named this photograph “Abandoned” and paired the image with an extremely lengthy caption that nonetheless tells a powerful story about herself, the closed school, and her community. A caption can “speak” for a photograph—a caption is often a photograph’s “missing voice” [93]. Indeed, Loretta’s caption broke the temporal boundary of the present while making visible the multiple trajectories of her relation to the community across temporal distances. Through the picture and the caption, we were able to follow teenage Loretta’s connection with her teachers in the past, today’s paraeducator Loretta’s relations with young teenage Loretta, the shifting symbolic meanings of the school building to the community, and more importantly, the changing community relations in light of the school closure. In tracing these changes, the unexpressed emotions, unspoken memories, and unattended relations that have disappeared and been buried with time emerged to be noticed. And for Loretta, creating this photograph was a unique medium to express and preserve the complex affects stemming from these relations across temporal distances. During the group workshop, she confessed that,

When I took a picture of that [...] abandoned school, I was hurt. I was hurt when it closed. I was hurt when that school closed. And I was disappointed how the neighborhood had turned, changed because of the people that had moved out of the neighborhood. So I was able to express that. And I don’t even know if I ever told anybody how hurt I was when I heard it was still closed. Because I was hoping that school would stay open. That was my elementary school. That was the school [where] the teacher asked me what I want to be when I grow up. [...] *I never thought about telling [this story], [but] this brought out how I felt about the school, and how it affected my neighborhood. So, it’s good to take pictures and talk about it.*

As shown in this quote, this sharing of her photograph and feelings created a particularly evocative and vulnerable moment during the workshop. Engaging with this photograph was similarly affective for other participants. In the group discussion, each participant tried to make sense of the same photograph and notice the temporality differently through their own viewpoint and lived experiences. For example, the photograph “brings a different feeling” to Lenderrick because it reminded him of his grandma who used to live nearby, a place he had not visited again since his grandma passed and the house was torn down. For Ryn, she particularly attended to the symbolic meaning of the building, and the connection stemmed from the school, which brought her a sense of joy and peace. She told Loretta, “I think the theme of that picture should be ‘Gone, but not Forgotten’ because of all of the *children* who learned and had great memories there, who grew, who connected.” In fact, Loretta incorporated Ryn’s suggestion and added “Gone, but not Forgotten” to its original name “Abandoned.” In comparison, another participant noticed things that were *not* featured in Loretta’s photograph yet meaningful to the community:

It’s so funny that Loretta, you chose this picture because I was actually riding up French Road, probably I think yesterday actually, [...] and they have not cut the grass in front of the school at all. And there’s still

a basketball court that remains, but I wanted to take the picture because the grass is probably a little bit above my waist, but all you can see is the basketball court. *But through that, you see the little kids still over there playing basketball. And that the contrast between that, you know what I mean? And the resiliency of the neighborhood [...]* It just really spoke volumes.

Even though the children and the basketball courts were not featured and the tall grass was already cut in Loretta’s photograph, alternative perspectives of seeing and sense-making the space became available through participatory deliberation and interaction with the photograph. For this participant, the historical marks inscribed in the community’s present material conditions made the seemingly mundane and taken-for-granted activities practiced by children especially precious and inspiring. Multiple temporal trajectories relating to a single moment captured in Loretta’s photograph emerged and converged, extending from the past to the future. Ryn concluded the discussion of this photograph by re-articulating the traumatic past of Black communities against all odds and envisioning an alternative future of resilience and flourish:

I think about the darkness of 20 years ago, 30 years ago, and to see the photographs now that show hope, possibilities, and life are very... for my mental health, [they] have been just everything. *It just has opened up the opportunity to not feel doom and gloom and that we’re all going to go down in the fire, but that there is life, and that we have all had an opportunity to speak that life in each of these photos.* So for me, it has been a very rewarding [experience], and photos should continue to be a part of what we do at [CO]. It tells a story.

In this sense, the photographs that participants produced and shared are no longer simply passive artifacts that are being viewed and discussed; instead, they become objects, or nonhuman actors, in relation. They are entangled in the relational ontologies among participants and within the community going forward. As new actors that bear personal and communal historicity, living memories, and affects, these photographs also constitute new relations and potentialities for the community to envision a different future and collectively take action to move toward it.

5 DISCUSSION

In the following sections, we first discuss how photovoice makes spaces for community members and design researchers to decenter the knowledge-power arrangements that construct the relational in/visibility of both the sociotechnical infrastructures and the ontological complexities of Black communities. Doing so allows us to further theorize photovoice, and arts- and community-based participatory approaches in general, in the context of studying and designing the sociotechnical through the lens of noticing. Thereafter, we discuss how photography as an art form works in tandem with photovoice’s participatory nature to democratize noticing as a generative approach. We develop arguments that arts- and community-based approaches can take noticing to a *participatory* turn, while further democratizing HCI’s ongoing efforts in decentering hegemonic ways of knowing and seeing.

5.1 Contesting the Relational In/visibility

As Suchman suggests, what is rendered visible (or not) is inherently political [99]. Invisibility is relational and situated—it is not simply a matter of what is out there to be seen or not [35], but a dynamic power negotiation of what can be seen (and correspondingly, noticed), by whom, under what conditions, and in what ways [20, 53]. As we have shown, our photovoice activities offered opportunities for community members to notice and question the often hidden power arrangements embedded in the making of ubiquitous surveillance infrastructures, while creating a space where a multitude of local lived experiences, situated knowledge, and intricate relations are unfolded, encountered, and entangled to trouble the dominant modes of knowledge production. As such, central to noticing through photovoice is its commitment to decentering the dominant knowledge-power relations and two salient dimensions of invisibility constructed by these relations: 1) the relational invisibility of the racialized and patriarchal gazes embedded in pervasive sociotechnical infrastructures and 2) the invisibilization of relational ontologies within minoritized communities in rationalist and modernist knowledge production and design.

5.1.1 Contesting the Invisibility of Sociotechnical Infrastructures. Sociotechnical infrastructures play a central role in constituting modernity, and they are often made invisible in the background by authorities “in hegemonic social positions” [79]. Such infrastructural invisibility further grants political institutions and private capital the power in obfuscating and (re)producing uneven political, socioeconomic, and material conditions for historically minoritized people and groups [3, 16, 79, 102]. The ever-expanding public and private surveillance infrastructures in Detroit that target the dispossessed poor and working-class Black neighborhoods, as in other parts of the U.S. and the world, emerged in such conditions.

Star famously asserts that the invisibilized sociotechnical infrastructures and their embedded power relations primarily become visible when they break down [95, 96]. In other words, they only “emerge” to the foreground when they become objects of attention during times of breakdown [62]. Our findings, in contrast, tell a rather different story of when and how surveillance infrastructures could be noticed and sometimes became hypervisible to community members. For example, recall that Lenderrick could “see” the ubiquitous surveillance cameras in a familiar grocery store when prompted to document his encounters with surveillance apparatuses through photography. And beyond technology apparatuses, photovoice activities also nudged Lenderrick and others to come to realize the information and power imbalances embedded in surveillance infrastructures through confronting the agents of power and self-initiated reflections. Similarly, for Ryn, her subconscious distrust of her Ring Doorbell was noticed by other participants and, in turn, collectively reflected upon through the photograph of her delicate safety system.

We, therefore, argue that these moments of noticing the surveillance infrastructures during photovoice are precisely what Bowker calls “infrastructural inversion” [14], a figure-ground gestalt shift in the analytic attention. The originally invisibilized and thus “black-boxed” surveillance infrastructures and their power arrangements of control are brought to community members’ attention and called

into question. Granted, the shifted visibility of surveillance infrastructures and their fragile promises that became visible to Lenderrick and Ryn, among other participants, do not necessarily signal the functional breakdown of these infrastructures. In contrast to Star’s position and aligning with past literature that contests the neat visibility-breakdown relation [3], we further argue that infrastructural breakdown does not need to be, and should not be, the primary precondition for infrastructural visibility. Instead, infrastructural inversion that is made possible by noticing differently could become a productive tool for what surveillance scholars have called counter-surveillance or *sousveillance*—“intentional, tactical uses, or disruptions of surveillance technologies to challenge institutional power asymmetries” [81, p.516]. Community members’ critical awareness developed through projects like ours could serve as an introduction for asking critical questions about the unethical deployment of data-extractive technologies within their communities and holding authorities accountable [16].

Jackson has urged us to rethink breakdown as a starting point to forge new infrastructures and relations [54]. Indeed, moments of breakdown serve as opportunities for repair—repair of broken social relations and already-caused material harm [46]. By definition, repairing as a *post hoc* act could be too late as harm has already been caused. A way to move beyond remedial accountability [63], then, is by creating intentional moments of infrastructural inversion and taking collective actions prior to breakdowns. Indeed, design methods and processes need to be anticipatory of the relations and consequences that new technologies would unfold [37]. This requires design researchers and practitioners to develop tools alongside community members to democratize the capacity of noticing and build noticing into the everyday. We believe arts- and community-based participatory approaches like photovoice, through multi-layered noticing, can open up new spaces for research designers, and HCI at large, to contest infrastructural invisibility (e.g., [6, 19, 32]) and to move toward a series of anticipatory accountability and community-involved governance [28] in new technology design and deployment that no longer centers on breakdowns and the seeming inevitability of outsourcing repair labor to the most vulnerable and impacted [3, 46, 54, 74].

5.1.2 Resisting the Invisibilization of Community Ontological Complexities. Contesting invisibility also speaks to resisting the ongoing social production of the nonexistence and the invisibilization of minoritized communities’ ontological complexities in dominant popular and academic discourses. As Escobar puts it, “What doesn’t exist is actively produced as nonexistent, or as a noncredible alternative to what exists” [29, p.68]. As feminist, postcolonial, and critical race scholars have repeatedly warned, dispossessed and racialized communities’ experiences, knowledge, and histories have been subjugated, reduced, or sometimes effaced altogether in light of the dominance of modernist and rationalist knowledge and economic production [4, 17, 23, 44, 52]. A consequence of such ongoing invisibilization and displacement of Black communities’ situated ways of knowing and living is precisely what Escobar calls “ontological occupation”—a replacement of local relational ontologies with a particular ontology—that of “expert knowledge, markets, and the economy” [29, p.69]. Despite the knowledge of such ongoing occupation, as HCI scholars have called out, today’s techno-solutionist

design still largely emerges and operates within such dominant modernist and rationalist social and cultural backgrounds [23, 65].

To us, decentering is not only to complicate and trouble the reductive ways in which minoritized communities are represented in dominant knowledge production but also to overwrite and reconfigure an ontology of separation and fragmentation. Therefore, we position an engagement in photovoice, including the production, deliberation, and dissemination of photographs and stories, as an ontological commitment that privileges the local sensibilities over the prevailing “god trick of seeing everything from nowhere” [44, p.581]. Here is where we see photovoice and similar arts- and community-based participatory approaches as playing a key role in resisting ontological occupation in three fruitful ways. First, these approaches create a space to capture and make visible the very complexity of ontological relations within the community through visual means, beyond descriptive textual materials. In fact, this was what the photovoice approach was originally set off to achieve by scholars in public health and social work—capturing and elevating community expertise, situated needs, and lived experiences [47, 104]. In our case, recall that through Ryn’s photograph, we are able to peek into the existing social dynamics within the community. We could also notice the community’s practice of resilience and joy in Loretta’s photograph, albeit alongside the material conditions shaped by ongoing infrastructural violence. These photographs and the stories behind them both make visible the community members’ interdependent ways of being and living, which become productive evidence to recover communities’ situated knowledge [7, 44]. They, in turn, help researchers and practitioners to notice “better” in design. In other words, community-generated photographs and stories could serve as new entry points for us to reflect and step out of our own prejudices, while attuning to a diversity of local relations and processes to which design should be reoriented [65].

Second, perhaps more importantly, is the opportunities for photovoice activities to constitute new social relations and forms of life within communities. As we have seen in Ryn’s case, her photograph became a source of learning and call-to-action. Her intention of inviting more neighbors to sit on the porch to look out for one another had its beginnings in photovoice practice. Her photograph made the need for increased community participation visible to other community members and, in turn, (re)created new possibilities for community members to relate with one another (that were perhaps damaged by ongoing ontological occupation).

And finally, as we have shown in noticing multiple temporal trajectories, photovoice re-entangles the “stand-alone” present with pasts and futures. To be sure, we are not talking about a single prescribed history and future, but a multitude of personal and communal temporal trajectories. For example, by taking a picture and sharing memories of an abandoned elementary school, Loretta offered a convincing account of how present-day struggles with safety and surveillance technologies cannot be divorced from historical and systematic accounts [56]. And these present and historical struggles are certainly shared but sensitized and embodied differently by different community members. In this sense, Loretta’s photograph traces multiple histories of how the social fiber and interdependencies among Black communities have been divided

and partitioned by political and material domination, and questions how the invisibilization of these histories and struggles obscures technologies that reinforce the hegemonic ways of knowing and being [17, 23]. Unlike merely describing the present for the sake of creating another intervention to “solve” the present, these intertwined histories and their respective affective attachments uncovered through photovoice could open up new opportunities to interrogate the present situation and reimagine preferable futures outside the ontological occupation [22]. Noticing through arts- and community-based approaches like photovoice thus offer new grounds for design as “weaving”—tinkering with the mesh of life and maintaining the legacies and practices of cultural, economic, and ecological differences [29]. In this way, it pushes design as a practice of un-fixating futures from the ontological occupation and returning the right to reimagine and speculate alternative futures back into community members’ hands.

5.2 Decentering through Participatory Noticing

Positioning photovoice as a critical process of noticing and space for decentering is a methodological, ontological, and, importantly, epistemological reorientation. Rooted in producing, deliberating, and acting upon photography as a form of art, photovoice takes the commitment to noticing in HCI design research to a participatory turn. We see that photovoice, among other arts- and community-based participatory approaches, furthers the agenda to decenter dominant narratives by bridging noticing as a commitment/sensibility for researchers/designers and noticing as a generative approach for community capacity building and learning. Our reflection on the photovoice approach and the existing push for noticing in HCI design research suggested a pair of interrelated questions that speak to the benefits of bridging the two: *how to notice?* and *who is noticing?*

The question *How to notice* directs our attention to the medium through which we notice—in our case, photography as an art form. Blevins et al. argue that photographs are salient contributions themselves to design research as they offer different dimensions of interpretive and analytic power that sound and text could not offer [12]. In HCI, photographs and visual means are often used to illustrate situated complexities, catalyst conversations with research subjects, and ideate new design opportunities within cracks between dualistic binaries of nature/culture and human/nonhuman [11, 36, 39, 67]. Indeed, as an arts-based approach, the photographic and arts component of photovoice offered design researchers and community members to comprehend, express, and make sense of complex phenomena in different ways. As we have shown, the coproduction and meaning-making process of photovoice is relational, multisensorial, and affective. It is the plurality of viewpoints and the multi-layered noticing afforded by arts-based research and its commitment to provide an image of the complex interactions that make it a more heuristic than “monotheistic” approach to research [9].

In our work, the engagement with photography as an art form was especially generative for noticing differently in its relationality as well as its ambivalence in linear time. Indeed, photographs are always in relation—in relation with the photographer, the (un)photographed subjects, the viewer, and more. The photograph triangulates and mediates the social relations among these actors and situations despite their temporal and spatial distances [59, 83, 93].

Such intricate relations embodied in photographs allow design researchers and other viewers to attend to the embeddedness of individuals' situated needs and lived experiences accumulated over time (recall Juannette's and Ryn's cases), things that are often hard to notice without a long immersion in the field. In addition, such intricate relationality embodied in photographs is further complicated when it is entangled with temporal dimensions. Indeed, photography is itself ambivalent towards time and temporality. As anthropologist Morris sharply states, photography "opens between an orientation to the past as that which is cut off from its own future, and an orientation to the future as the ideal form of the past" [83, p.9]. This temporal ambivalence of photography makes it possible for design researchers to see the captured phenomena through trajectories of what happened in the past and what could come in the future, despite these temporal trajectories not being "there" explicitly in the photographs (recall Loretta's case). Therefore, in thinking with anthropologist Gordon [41], we argue that photographs and other art-based visual materials make it possible for design researchers to notice and look for what's absent, besides what's present. And in our case, what's absent particularly speaks to the aforementioned two dimensions of invisibility.

When asking *who is noticing*, we propose asking the questions of *who has the right to notice?* and *who has the tools to notice?* Tsing originally proposed noticing as a complementary approach to the commitment to ethnographic fieldwork and observations [101]. Past scholarship has demonstrated how noticing differently as an analytic lens, and a methodological sensibility is especially beneficial for ethnographers and design researchers to pay attention to the multilayered world-making projects on the ground [66, 68, 88] as well as to reflect on the taken-for-granted reference frames and design assumptions [65]. We then ask, if noticing helps researchers and designers to better sensitize and know the world, why can't we share this tool with community members as an approach to community learning and capacity development? Or, how can we democratize noticing? Anthropologist Appadurai asserts that instead of positioning research as "a high-end, technical activity, available by training and class background to specialists," research should be "a capacity with democratic potential" [5, p.167]. We similarly argue that noticing should be a critical capacity with democratic potential instead of a toolkit only operationalized for ethnographic gazes. Put otherwise, noticing should not only be about researchers noticing and attuning themselves to different actors and relations from their own positionality. Instead, through approaches like photovoice, we can start reconsidering noticing as a participatory and collective process to establish new relations that entangle different positionalities and viewpoints together. In our photovoice project, ordinary community members were prompted to collectively re-examine how they see and relate to their surrounding worlds and the underlying sociotechnical infrastructures in the group setting through the production and engagement of photographs. These photographic images are endowed with meanings, ones that are different from researcher-generated, photographer-generated, or, say, technology-generated screenshots of Google Maps.

Indeed, as Tsing and many other researchers have shown, human and nonhuman actors are engaged in different forms of noticing— noticing different temporal rhythms and spatial arcs for their everyday navigation and survival, be it intentional or not [66, 76, 101].

Committing to participatory noticing thus amplifies the existing everyday noticing routines while offering tools to make noticing more intentional and critical, while orienting towards collectively resisting infrastructural violence. While our work focuses on surveillance and safety, this commitment to participatory noticing can be extended to deconstructing other sociotechnical infrastructures and their power arrangements alongside communities that are impacted. Going forward, we believe it would be meaningful to incorporate more intentional probes that prompt participant photographers' noticing, with the particular goals of contesting the invisibility of sociotechnical infrastructures and resisting the invisibilization of the community's ontological complexities. For example, it can be beneficial to integrate the *Methods for Noticing Workbook* developed by Livio et al. [71] with photo-taking probes and the SHOWED photo-deliberation questions. In addition, the different layers of noticing uncovered in our work— noticing the invisibilized sociotechnical infrastructures, trivial everyday design, embeddedness of situated needs, and multiple temporal trajectories— can also serve as a starting point for design researchers to conceptualize their probes and engagement with the goal of facilitating participatory noticing.

Taken together, democratizing noticing through photovoice approaches is, in a way, aligned with what Crooks calls "seeking liberation": "reintegrat[ing] the production of knowledge with the study of the implications of knowledge" [22, p.416]. Certainly, this work is only a starting point for arts- and community-based approaches and the commitment to participatory noticing to explore their mutual potential in decentering. Going forward, we hope this work can inspire future HCI research designers, practitioners, and community members to continue exploring meaningful ways to bridge the arts- and community-based participatory approaches and the commitment to participatory noticing.

6 CONCLUSION

Unlike many past photovoice studies that treat participants' photographs as stable data points when presenting research findings, this paper aims to bring readers to the "backstage" of the photovoice process, including the coproduction of photography as a visual form of art and the participatory dialogues stemming from the photographs. This process is mundane but relational and generative by nature. In doing so, our four vignettes have demonstrated the multi-layered and multivalent opportunities for *participatory noticing* throughout photovoice activities: 1) noticing invisibilized sociotechnical infrastructures, 2) noticing trivial everyday designs, 3) noticing and sensitizing situated needs, and 4) noticing multiple temporal trajectories. These moments and layers offered empirical insights into why photovoice—an arts- and community-based participatory approach— presents novel opportunities to facilitate participatory noticing as a methodological commitment to decentering and an analytic sensibility in HCI design research and practice.

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A PHOTOVOICE DESIGN AND PROCESS

Guided by the procedures outlined in Wang's seminal photovoice methodological work [105], we crafted a three-phase photovoice study. These phases consisted of 1) onboarding and education, 2) photo taking, and 3) photo sharing and reflection (see Figure 1).



Figure 6: 6a (left): During one of our in-person visits, a participant was trying to take a photograph of her community garden. She wanted to capture the whole garden in the photograph and create the perspective that the viewer was a bird looking from above. After a couple of unsuccessful trials due to the technical limitations of her phone, she decided to find a ladder and take the photograph standing on the ladder. 6b (right): A community member is viewing and taking photographs of the photo display during the photo exhibition. (Photo by the authors)

A.1 Phase 1: Onboarding and Education

A.1.1 Onboarding Workshop. To kick off the photovoice project, all eleven participants took part in a 2.5-hour online group onboarding workshop. The goal of this onboarding workshop was to familiarize the participants with the research team, community team, and other participants while introducing them to the photovoice and CBPR approaches. This workshop began with a collaborative effort to identify invitations for engagement, which would serve as a framework for discussions throughout the project. The first author then introduced the photovoice approach (including the method's benefits, procedures, and objectives), the history of photography in social change, and the ethics of photo taking. Following this introduction, the group engaged in an open discussion on the topics of neighborhood, community, and safety, with an emphasis on reflecting on the values and assets of their neighborhood, their connection to the city of Detroit, and their perceptions of personal and communal safety.

A.1.2 Educational Workshop. The onboarding workshop was followed by a 2.5-hour online educational workshop to acquaint participants with photo-taking basics and the photovoice study's probes. The two workshop leads (one from the university team and one from the community team) were both experienced in photography, and one had experience in professional photography. Participants were first shown photographs of Gordon Parks, Dawoud Bey, and Roy DeCarava, Black artists known for their social and racial commentary through urban photography [2, 38, 90], and were invited to share what they saw in the images, what messages they interpreted, and how they situated these works in historical and sociopolitical contexts. Group discussion led to conversations on the use of composition, reality, and symbolism and how these artistic choices can shape the emotion and interpretation of photographs. The workshop leads then taught participants how to implement these features into their own photographs through smartphone tools, such as zoom, crop, grids, and focus.

Following the educational workshop and subsequent group conversations, we reviewed the objectives of the photovoice approach and presented participants with the three categories of probes: 1) neighborhood and safety, 2) surveillance, and 3) surveillance technologies, each category containing corresponding questions (see Table 1).

A.2 Phase 2: Photo Taking

A.2.1 Photo Taking, In-Person Check-ins, and Ethnographic Fieldwork. Upon completing the onboarding phase, participants spent three weeks capturing photographs in accordance with the outlined photovoice study probes. We asked participants to take at least two photographs for each photovoice probe per week. As participants began taking photographs, we asked that they send them to the study team with a brief description through SMS. These images and descriptions were then collected and organized into individual slide decks. In addition, we offered disposable cameras as an option for participants. Only one participant expressed an interest in a disposable camera in tandem with digital photographs. We collected the additional disposable camera photographs and descriptions a week following the photo-taking time period to adjust for processing and film development.

Throughout the three-week photo-taking period, both the community and university teams maintained ongoing communication with each community participant through SMS messages and phone calls to clarify any questions, encourage participation, and offer technical support. We encouraged each participant to be creative and made sure the team was flexible to accommodate participants' individual needs and visions. Specifically, during the second week of the photo-taking process, the first and third authors held office hours at the CO community center. These office hours sessions were individualized to ensure all participants were equipped with everything they needed to be proud of their artwork and represent

their creative vision. This also allowed participants to further ask questions or receive technical help in person. Participants' technical questions included, for example, how to zoom in and out when they were taking photographs, how to crop photographs, how to focus on different objects when taking photographs, and how to share photographs through SMS.

The first author also visited participants' home spaces and neighborhoods upon request throughout participants' photo taking following the ethnographic approach. The first author also held unstructured discussions with participants regarding their stories, memories, everyday experiences of living in their neighborhood, and perceptions of surveillance. These in-person check-ins and ethnographic fieldwork allowed us to build rapport and relations with participants, peek into their creation of photographs (see Figure 6a), follow up on participants' progress, and observe participants' and community members' everyday lives. These emerging relations also created a space for participants to walk through the photographs they had taken, share their ideas and visions regarding photo taking, and talk through their emotions and feelings stemming from this process. Throughout this process, we emphasized to all participants that they could reach out to us whenever they want, and leverage us as an additional resource in case they wanted to capture or express something they were not able to do due to the technical constraints.

A.2.2 Photo Selection and Individual Interviews. After three weeks of photo taking, the first author conducted in-depth in-person interviews with each participant. The interviews were held at the CO community center and participants' home spaces, per participants' preferences. In these interviews, we walked through each participant's photographs and encouraged them to share the stories behind each photo and the messages they intended to capture and communicate. We also prompted participants to reflect on how each photo spoke to safety and surveillance technologies used in the community. Thereafter, participants reflected on their experience of photo taking about the benefits and challenges of communicating feelings through visual means. At the end of the interview, we asked each participant to identify two or three photos that they deemed most significant and meaningful to share with the larger group and worked with participants to develop titles and captions for each selected photograph if participants hadn't already done so.

A.3 Phase 3: Photo Sharing and Reflection

A.3.1 Photo Sharing and Reflection Workshop. After completing the photo collection process and one-on-one interviews, we invited the participants to come together in a three-hour online photo sharing and reflection workshop. The purpose of this workshop was

for participants to reflect upon, share, view, and discuss each other's photographs in the context of safety and surveillance technologies and their communities.

In the first hour of the workshop, we broke participants into three small groups. Within each small group, we invited participants to present their selected two or three photographs and other participants to comment on these photographs following the structure of Wang's "SHOWED" questions [105]. After all participants completed presenting and discussing their photographs and the stories behind them, each small group collectively commented on any interesting, relevant, or surprising themes they noticed in the photographs. Based on this discussion, each participant then chose one photograph to bring back to the large group. In the second hour of the workshop, each small group reported their selected photographs and themes that emerged to the larger group. We then invited all participants to discuss their impressions of the selected photographs, how these presented photographs and stories confirmed and/or challenged their understanding of safety and surveillance, and collective action items to better support safety within the community. In the final hour of the workshop, we asked participants to share their experiences participating in photovoice activities and their thoughts on how photography could be incorporated into CO's future programming. The community and university teams also appreciated participants' efforts in sharing their stories and experiences and invited them to contribute ideas to the dissemination of research results.

A.3.2 Community-Based Public-Facing Photo Exhibition. During the photo-sharing and reflection workshop, participants expressed a desire for a community-based event to share their photographs and stories and continue discussions on safety and surveillance technologies. As such, based on participant feedback and guidance, we framed participants' selected photographs and hosted these images at a community-based photo exhibition titled *Every Photo Has a Story: An Eastside Story on Safety and Surveillance from Behind the Lens* [75]. This title was collectively brainstormed and selected by all participants. The exhibition event was held at the CO community center in August 2022. This photovoice exhibition offered a space for participants to showcase their photographs and stories with those not involved in the study both within and outside their community (see Figure 6b). Through storytelling with families, friends, neighbors, and other stakeholders (including media outlets, community organizers, and academics), participants shared their everyday experiences and thoughts on safety and surveillance to advocate for community safety and accountable use of surveillance technologies. In addition, we used this exhibition as an opportunity to member check our findings and make notes of discrepancies.