

Collectively Reimagining Artificial Intelligence With Marginalized Communities

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Abstract

As artificial intelligence continues to advance, marginalized communities, particularly in Africa, remain limited in their ability to shape what AI should do, how it should be built, and how it might benefit them. This study adopted a speculative co-design approach with participants from Ocean View, a low-income community in South Africa. The aim was to elicit and facilitate collective visions to reimagine the future of AI and explore ways to make AI technologies more culturally relevant. Our findings reveal participants' perceptions about AI, which informed a collective vision of AI designs that embed the community's local language and culture as well as services aimed at improving the community's economic opportunities. Based on these insights, we identified directions for ethical AI design for marginalized communities that recognise and preserve cultural identity, needs for affordable AI designs, and the potential of AI for their socio-economic advancement as trajectories within AI research.

CCS Concepts

• **Human-centered computing** → **Human computer interaction (HCI)**; **Empirical studies in HCI**; • **Computing methodologies** → **Artificial intelligence**.

Keywords

Artificial Intelligence, Co-design, Speculative Design, Marginalized Communities

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1 Introduction

Artificial Intelligence (AI) continues to advance with more designs, capabilities, and applications emerging at a rapid pace, driven in part by large language models (LLMs) that now shape global communication, knowledge production, and decision-making. These models demonstrate the ability to produce visual, audio, and textual content in response to human prompts. However, the development of these models relies on massive datasets generated by experts and automated systems at a global scale. This results in limited representation of marginalized communities who live in resource-constrained environments with severe disparities in internet access, whose languages, cultural expressions, and lived experiences are rarely integrated into the training and design of AI systems [74, 87, 102]. Consequently, these communities remain excluded from shaping what AI should do, how it should be built, and how it might benefit their everyday lives [25, 60, 94, 96, 115].

Incorporating the wider public, AI research has taken a participatory turn, emphasising the involvement of broader public in the development and deployment of AI systems. Such participation is essential for understanding and adequately representing the needs, desires, and perspectives of marginalized communities. [58, 129]. This is expected to enforce values of inclusion, plurality, collective safety and ownership [15, 127]. Shifting from participatory is creating space to imagine, critique and provoke the status quo of technologies through imagination of possible futures [108], adapting to local values, structures and practices.



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Speculative design offers a critical and radical design approach that resonates with the ability to provoke and invoke imagination and future possibilities beyond the status quo of design practices and raises discussion about technological development [78]. Within Human-Computer Interaction (HCI) research, it navigates uncertain technological futures that embody community values [122]. These practices encourage envisioning potential futures, provoking dialogues around the impacts of emerging technologies, and fostering creative thinking beyond immediate utility and feasibility [10]. Generating and responding to speculative designs can be an effective way of engaging diverse audiences in conversations about AI [7, 43, 65, 73]. Moreover, studies have advocated for the infusion of speculative design and co-design as a pathway for innovative technology design and development with communities in Africa [9, 56, 80, 124], offering new ways to visualise these alternative futures.

While recent works have explored collaborative and participatory speculative design as an approach to make the act of imagining technological futures more democratic [38, 48, 51, 125], there is a call for situated engagements with members of marginalized and low-income communities to elicit and facilitate collective visions of their own technological futures, captured in a range of design fictions and other related conceptual design artefacts [9, 48, 51, 125]. As much as these diversely representative design fictions are crucial, we also need more specific material and functional forms of such future technologies imagined from and with the so-called margins. This becomes particularly important with complex, data-driven technologies that make up the current forms of AI. As a result, this study addresses the following research questions:

- (1) What material and functional forms could AI take when they are co-designed for, in and with low-income settings?
- (2) What would be the implications for ethical design and production of specific AI tools from such imaginations, including but not limited to ethical data governance and sharing frameworks?

In this paper, we report findings from a series of workshops conducted with a Non-Governmental Organization (NGO) based in peri-urban suburb in Cape Town, a low-income community in South Africa. We examine the role of AI in their activities and their perceptions of AI. As a collaborative articulation of our collective vision [2, 82], we present the speculative artefacts generated by diverse participants and design futures they imagine for the community. Our findings highlight the community's prioritization of culture and local dialects, and their desire for AI systems that are both context-aware and adaptable to local technological constraints. Through this work, we contribute to the emerging discourses of participatory speculative design with marginalized communities [48, 51, 80, 125], and speculative AI futures, demonstrating the possibility of bringing together HCI and AI research in long-term, situated and sustained practices. We argue for a more community-centred trajectory in AI research that foregrounds cultural values, local resources, and collective ownership of technology.

2 Background

2.1 Artificial Intelligence and Marginalized Communities

Artificial Intelligence has advanced rapidly over the past decade, becoming a pervasive force in global innovation and economic growth. Breakthroughs in machine learning algorithms, the growth of big data, and increased computational power have driven AI into mainstream use across multiple sectors. These developments have produced promising applications capable of transforming areas critical to economic development, social equity, and environmental sustainability [41, 111]. Increasingly regarded as a general-purpose technology, AI carries far-reaching socio-economic implications and offers new possibilities for societal transformation. This global momentum has influenced discourse on AI adoption within Africa, where the technology is positioned as a catalyst for economic growth, enhanced public services, and inclusive development [6, 45, 77]. Studies highlight AI's potential to address long-standing challenges affecting the continent, including persistent healthcare shortages, agricultural inefficiencies, fragile infrastructure, and educational inequalities [64].

As global AI ecosystems expand, similar developments are beginning to emerge within marginalized communities across Africa [29]. The successful deployment of AI systems depends on the availability of relevant datasets that reflect the needs and realities of end-users; however, this implementation also introduces significant risks. Key concerns include the widening of existing socio-technical gaps and the reinforcement of Global North dominance in AI design, where value systems embedded in Northern contexts may misalign with those of the Global South [113]. Within marginalized communities, these risks manifest in limited representation within training datasets, unfair automated decision-making, labour displacement, and the threat of algorithmically driven cultural erasure [74, 89, 102]. These lack of inclusivity, equity, and the uneven distribution of AI benefits remain persistent challenges [40, 90]. Biases often stem from non-representative training datasets [70, 83], disproportionately affecting communities rarely included as equal partners in HCI and technology design [27, 33]. Consequently, researchers call for culturally grounded, locally relevant AI systems supported by diverse global datasets and shaped by indigenous knowledge systems. Work on culturally sensitive design demonstrates how cultural norms, identities, and worldviews can meaningfully inform technology development [72, 76, 105, 110, 121]. This further extends how cultural factors shape the design and use of AI [4, 23, 117]. Yet, in Africa, AI development has often neglected the cultural values, identities, languages, and worldviews of marginalized communities [87, 104], resulting in culturally inaccurate or insensitive content generation [75] and raising concerns about misrepresentation and cultural erosion, especially among underserved communities [8, 99]. Since it is argued that Africa is not homogeneous, it is often questioned which African values and culture should be embedded in algorithms that are applied throughout Africa [39, 46]. Similarly, researchers also note ongoing uncertainty about how best to leverage machine learning techniques to improve representation in AI models and whether incorporating community feedback will directly translate into "improved" systems [24]. These underscore the need for inclusive, culturally representative datasets,

particularly in culturally diverse contexts where excluding cultural considerations may lead to resistance, underutilisation, or distrust of AI systems.

The use of AI in Africa is further constrained by several technical and non-technical challenges [63, 85, 95, 116]. There are contextual challenges specific to African countries, including unreliable power supply, insufficient internet connectivity, weak digital infrastructure, limited human capital, and regulatory systems that are often underdeveloped or slow to adapt [46, 81, 86]. Collectively, these limitations exacerbate existing digital inequalities and hinder the ability of governments and communities to fully harness the benefits of AI for sustainable development. [67]. Marginalized and low-resource communities experience these barriers most acutely, as socio-economic constraints limit access to the devices, data, and digital skills necessary to adopt AI technologies [17]. As a result, these groups remain at the margins of AI innovation, deepening the digital divide and constraining opportunities for educational participation, economic engagement, and upward mobility [15, 16, 64, 79]. Furthermore, the era of AI has created a discourse among HCI researchers that has intensified critiques of technology solutionism, the tendency to treat technology as a universal solution to complex social problems [12, 44]. Researchers argue that such framing risks overlooking the socio-cultural and political realities of marginalized contexts and may inadvertently reproduce or amplify inequalities [114]. This highlights the legitimate expression of AI agency among the communities towards the limits and boundaries of AI solutions in practice [93]. Consequently, there is a pursuit of ethical AI designs for marginalized communities that prioritizes situated needs, lived experiences, community values, and goal of affected communities. While AI holds the potential to expand access to information, enable personalised learning, foster digital inclusion, and support socio-economic development, its deployment must be grounded in ethical, equitable, and inclusive frameworks to ensure that underserved communities are not left further behind.

These current developments highlight both the promise and the limitations of AI within marginalized African contexts, underscoring the need for a deliberate and participatory reimagining of AI futures. As AI continues to shape global socio-technical landscapes, it becomes essential to engage marginalized communities through deliberate and participatory reimagining of AI future and decision-makers in the development of AI systems [59]. Emphasizing on approaches that centre cultural relevance, linguistic diversity, lived experiences, local aspirations, transitions to ensure socio-economic inclusion and ethical consideration during AI deployment [47]. This ensures harnessing AI's potential to support community empowerment, rather than a technology that deepens existing inequities, ultimately contributing to more just, inclusive, and contextually grounded technological futures across the African continent.

2.2 Artificial Intelligence Speculations with Co-design

Within HCI communities, there have been advocates for the inclusion of marginalized and low-income communities in AI technologies [15]. Failure to include this discourse of marginalized populations in training data perpetuates hegemonic viewpoints and misrepresents social movements [13]. Thus, HCI researchers

have found success in engaging marginalized groups in co-design to identify innovation among existing and non-existing technologies [3, 50, 126] and have also called for a more critical reflection of co-design methods used with these populations [30, 49, 105, 120]. A conscious practice going beyond participation is the infusion of reimagination of AI technologies with the community to advance indigenous innovation and inclusion. This enables communities not only to appropriate existing technologies but to interrogate and reimagine them according to local cultural, social and economic context. Scholars have advocated for HCI's engagement with speculative design as a way to inform design decisions that foster more inclusive and impactful design futures for marginalized populations [48, 80, 123]. Researchers have also recently turned to speculative design as a useful method for anticipating AI futures [7, 43, 65, 73], critiquing the AI status quo, and engaging communities in AI policy and design. Furthermore, to make futuring more democratic, studies have explored collaborative and participatory speculative design, an approach to reimagining technological futures as a collective process involving communities and stakeholders [48, 103, 119, 128]. This approach has also been applied towards co-design and speculative design in reimagining the futures of AI [53, 68]. However, there is a gap in eliciting the future of AI with members of marginalized and low-income communities, considering the resource and data constraints and the available technological infrastructure in the community. Thus, to explore and elicit their values and visions of AI futures, we engaged with communities living in the under-resourced, peri-urban township in the city of Cape Town, South Africa, through a series of speculative and co-design workshops.

2.3 Ocean View Community

Our research is situated in Ocean View, an under-resourced, peri-urban township located within the city of Cape Town, South Africa. Ocean View was established in 1968 under the apartheid regime, which forcibly removed people from their homes in surrounding areas and resettled them in a controlled zone. The community is historically classified as "Coloured," comprising South Africans of Indian, Malay, Chinese, and Khoi descent. This classification system separated them not only from White South Africans but also from Black Africans¹, further entrenching social and spatial exclusion. According to the 2011 census, Ocean View had a population of 13,639, although more recent estimates suggest that the population is closer to 40,000. Over the decades, the community has endured both technological and economic exclusion. This long-standing marginalization has contributed to heightened poverty levels, elevated crime rates, inadequate educational opportunities, limited access to quality healthcare, and exclusion from essential initiatives such as housing, skills development, and employment programs.

Art Vibrations Inc. II (AV2) is a local youth development organization, established in 1988 to advocate for the youth of Ocean View through the performing arts. For the last two years, they have been collaborating with the University of Cape Town to develop a digital radio station, building on prior projects in Ocean View [55, 71].

¹In South Africa, the use of the leading capital letters in "Black", "White" and "Coloured" denotes official race classifications of South African citizens, and may be distinguished from racial descriptors, which may be used differently in other countries.

This radio station will be hosted on the internet and made available locally through a community wireless network [9, 56]. This research sits alongside the digital radio project, exploring how artificial intelligence might support the development of the radio station and the needs of the community more broadly. The fourth author, Alvin Castro is the founder of AV2, and the third author, Jasmine Mazwi heads up their journalism division.

3 Methods

This study employed a speculative design and community-based co-design approach to reimagine AI futures with marginalized community [14]. We aimed to elicit and facilitate collective visions of AI situated within the context of the community's lived context. Speculative design was used to prompt questions [125] and help participants, as co-designers, move beyond current social and structural limitations [9]. To strengthen agency within the partner community, the co-authors jointly developed the workshop protocols and co-facilitated the engagements. Before the workshops, the partner organization leaders completed research ethics training² and certification to ensure that ethical considerations were understood and prioritized by both researchers and community partners. All participants gave informed consent at the start of the study and were reminded of the voluntary nature of participation in each workshop. Each participant received ZAR200 (~USD12) in airtime to facilitate exploration of AI tools, and ZAR300 (~USD18) for participation in all the workshops.

3.1 Participants

Participants were recruited through our partner NGO, Art Vibrations Inc. II and Black Equations, building on existing relationships [9, 37, 71, 88]. In recruiting participants, the third and fourth authors, who are the community leaders within the partner organization, worked with the second and last authors to define the participation criteria. While participation was voluntary, recruitment was based on long-term familiarity between the research partner organization and community members, involvement in prior projects, and participants' stated availability for the period of the study. The community leaders shared the research plan within their organization and invited individuals who had expressed both interest and availability for all three workshop dates were confirmed as participants for the study.

This recruitment yielded 24 participants, including community partners, community participants, and resident artists and performers such as musicians, dancers, and painters. Of these participants, 15 were between 18–34 years old, 8 were between 35–60 years old, and 1 participant was under 18 (see Table 1). We opted not to exclude under-18s from the study since our partner organization specifically works with youth, and participation could be of benefit to under-age participants; we also sought parental consent for their participation. The gender breakdown included 11 females and 13 males. However, as the study progressed, the number of participants gradually decreased across the workshops (see Table 2). We did not recruit new participants to replace those who became absent, as maintaining continuity among the original group was important

for supporting consistent engagement, shared understanding, and progression across the workshop series.

3.2 Workshop Approach

The study was conducted between November 2024 and February 2025 and consisted of three full-day workshops held on weekends. The workshops were originally designed to occur once per month, allowing participants enough time to reflect on the activities and integrate emerging insights into subsequent sessions. Accordingly, the first two workshops were held approximately one month apart. However, the final workshop, initially planned for the end of 2024, was rescheduled to February 2025 (see Table 2). This adjustment was made to ensure sufficient time to analyse the data generated from the first two workshops and to refine the final session based on preliminary findings. The rescheduling also considered the availability and operational schedule of our partner organization, ensuring alignment with their commitments and supporting continued participation.

Each workshop lasted six to seven hours. Workshop 1 focused on AI and co-design readiness, uncovering participants' existing perceptions and narratives about AI and established the dominant ideas held about AI. In workshop 2, we encouraged participants to reimagine alternative AI futures for their domains of interest, fostering curiosity, inclusiveness, and preparation for deeper engagement. For Workshop 3, participants envisioned and co-created AI-related ideas tailored to their community contexts and needs.

To support participants with limited computational expertise in exploring abstract technologies such as AI, we adopted an embodiment approach inspired by Nina and Alvaro's work [18]. Before the first workshop and the commencement of the study, the second author (academic researcher) and the third and fourth authors (community leaders) met and shared the workshop plans with resident artists, who had indicated interest and were recruited as participants for the study. They were not given any details or information about AI or how it works; rather, they were informed to create artistic impressions of AI based on their current understanding of AI, using their professional skills, with the prompt given to them, "What does AI mean to you?" We used the artists' impressions of AI to spark conversation and engagement with participants and to demystify AI in ways that were meaningful to them. We also drew on these impressions to better understand the resident artists' existing perceptions and understanding of AI.

Unlike Nina and Alvaro's work [18], our approach involved creating different AI embodiments for each of the three workshops. Hence, as the workshop proceeded, the resident artists created more impressions of AI, which were presented at the start of each workshop to spark conversation and make AI more accessible, relatable, and engaging. For Workshop 1, the AI impressions reflected the artists' personal prior experiences with AI, serving as compelling entry points for dialogue. By Workshops 2 and 3, the impressions evolved to incorporate participants' growing knowledge of AI, speculative design, and AI futures. This iterative embodiment approach allowed participants to expand their imaginations and creative abilities, supporting active engagement and ownership of outcomes. To further build trust, establish mutual understanding with participants and ensure participants felt safe sharing perspectives, we

²Training and Resources in Research Ethics Evaluation Module 1 Introduction to Research Ethics and Module 3 Informed Consent. <https://elearning.trree.org/>

included facilitation sessions as part of the workshop session. The facilitation session was led by one of their respected community leaders, the third author.

The workshops also included breakout groups to ensure a more intimate and engaging atmosphere. For the first workshop, the participants were grouped into four groups based on their domains of interest. Group 1 was called the Collective Empowered, which consisted of mature participants, including working-class members, entrepreneurs, mothers and breadwinners of households. Group 2 was the Agriculture Group, which consisted of participants with agricultural and/or home farming interests. Group 3 was the Education group, consisting of teachers and educators, and Group 4 was the Dance and Entertainment Group, which included the resident artists. Participants, who were under 18 years of age and younger participants who had not yet identified a domain of interest, were invited to select their preferred breakout group, ensuring that their agency and comfort were prioritized. To minimize power imbalance and ensure adequate facilitation in each breakout group, we assigned at least one staff member from Art Vibrations Inc. II, who was familiar with the participants' contexts, to each of the breakout groups. The Collective Empowered Group was facilitated by the second author, an academic researcher and the third author, the community leader from our partner organization. Two people facilitated the Agriculture Group: the first author, an academic researcher and a staff member of the partner organization. The Education Group was facilitated by two members of the partner organization. Lastly, the fifth author, an academic researcher, facilitated the Dance and Entertainment Group with another staff member of the partner organization. This facilitation strategy was adopted to foster inclusive facilitation practices, sensitivity to participant diversity, and techniques for encouraging equitable participation. In workshop 2, we used the same groups but merged two groups due to the absence of some group members. In workshop 3, we divided into two groups not necessarily aligned with the breakouts defined in earlier workshops (see Table 2).

3.2.1 Workshop 1: AI and Co-design Readiness. The first workshop aimed to introduce participants to fundamental concepts of AI, primarily through chatbots and AI-automated voices (speech-to-text), and to empower them with the knowledge and confidence to articulate what AI meant to them. A total of 24 participants attended. Fostering readiness among participants ensured capacity building, confidence and familiarity with the study's context, while also fostering cultural understanding and readiness for the researcher [106].

As we began this workshop activity, we uncovered the participants' current narratives and perceptions about AI using the same prompt that was given to the resident artist prior to the workshop, "What does AI mean to you personally?" This was to ensure that, as much as the resident artists expressed what AI means to them through their crafts and professions, other participants discussed and shared their opinions and perceptions about AI.

To lay the groundwork for subsequent activities, we introduced participants to two subsets of AI, chatbots and voice automation, while they further discussed other AI tools they had encountered. Following this introduction, the three resident artists (a dancer, a singer, and a painter) who had been briefed beforehand expressed



Figure 1: An AI Solo Dance Performance that blends Choreography with Emotions and Expressive Depth of Human Grace and Movement.

their interpretations of AI through performances. These performances included a solo robotic-inspired dance movement called AI Dance with Human Grace, Fig. 1, an AI-generated rap audio called Algorithmic Song, Fig. 2, and an abstract visual representation painting called AI is infinite, Fig. 3. These artistic impressions reflected the artists' own understandings of AI and encouraged the broader group to begin reflecting on what AI meant to them.

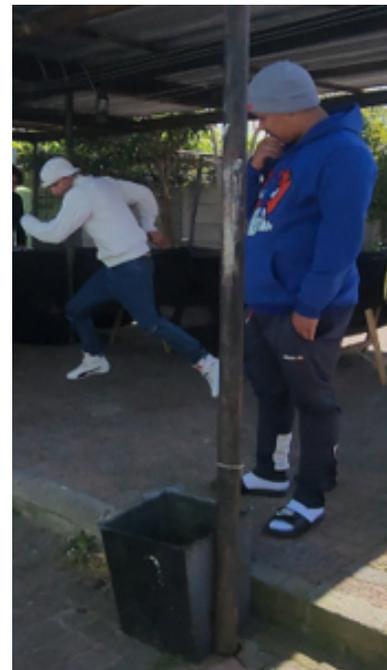


Figure 2: An AI-generated algorithmic rap Song paired with an AI Solo Dance infused with Human Grace and Movement.

To further immerse participants, a facilitated session was led by a community leader, the third author, who shared perspectives on the impact of AI on skills development, employment, and potential benefits for their community. This grounded discussion encouraged participants to begin considering how AI could be shaped to serve their community.

Table 1: Participants' Demographics

Participant Label	Gender	Age	Prior Experience with AI devices/Tools	Group
P1-P3	Female	40-52	Beginner	Collective Empowered
P4,P6	Male	35-50	Intermediate	Collective Empowered
P5	Male	31	Intermediate	Education
P7	Female	45	Very experienced	Collective Empowered
P8	Female	60	Not experienced	Collective Empowered
P9	Female	45	Intermediate	Collective Empowered
P10,P13	Male	26-32	Very experienced	Dance and Entertainment
P11	Male	26	Intermediate	Dance and Entertainment
P12	Male	25	Intermediate	Agriculture
P14	Female	28	Intermediate	Dance and Entertainment
P15	Male	21	Intermediate	Education
P16	Male	20	Beginner	Agriculture
P17	Female	25	Beginner	Education
P18	Female	23	Beginner	Education
P19	Male	29	Beginner	Dance and Entertainment
P20	Male	17	Beginner	Agriculture
P21	Male	19	Beginner	Dance and Entertainment
P22	Female	30	Beginner	Education
P23	Female	28	Very experienced	Education
P24	Male	28	Very experienced	Education

Table 2: Summary of Workshop Sessions

	Workshop 1	Workshop 2	Workshop 3
Date	19th October 2024	30th November 2024	22nd February 2025
Participants	24	18	12
Groups	4	3	2

To enhance participants' engagement with AI, we introduced several AI applications as technology probes. In co-design, technology probes are simple technologies that both expose participants to real-world applications and capture user input [54]. We used Microsoft Co-pilot,³ Jaguza Farmchat,⁴ Invideo AI,⁵ and Google Gemini⁶ to help participants explore how AI is embedded in applications and to spark conversations about possible AI futures for their community. We selected tools based on our familiarity with these AI tools, and we felt might be relevant to the participants. Participants engaged with these applications through guided prompts designed to elicit discussion. In addition, participants were introduced to an AI-managed hydroponic system previously deployed at the research site. This soil-less farming setup uses sensors to monitor and automate environmental factors such as temperature, humidity, pH level, and nutrient concentration. The system applies predictive models to optimise water use, nutrient delivery, and plant health, with a connected mobile app providing real-time monitoring [61, 62, 107]. In this workshop, the hydroponic system served as both a technology probe and a speculative artefact, grounding

abstract ideas of AI in a tangible, locally relevant context. For participants familiar with farming, it provided a concrete entry point into discussions of how AI might intersect with agriculture and community life. Then, the facilitators grouped the participants into four groups. They responded to two prompts: "What does AI mean to you?" and "What can AI do for me?" Responses were captured through affinity mapping exercises to surface individual and collective perspectives on AI. The workshop concluded with a reflection session, during which participants shared additional thoughts and insights, consolidating their initial understandings and aspirations for AI.

3.2.2 Workshop 2: Speculative Design Practices. The second workshop introduced participants to speculative design as a forward-thinking approach for envisioning alternative AI futures. Following the first workshop, which ensured participants had a foundational understanding of AI and co-design, it was necessary to further support their understanding of speculative design and how AI can be meaningfully speculated upon. Accordingly, the goal of this workshop was to equip participants with the skills and confidence to apply speculative design principles in practice. This workshop served as preparation for Workshop 3, which focuses on speculative design for the community, with particular emphasis on prioritising community values and needs. In this workshop, we built on

³<https://copilot.microsoft.com/>⁴<https://jaguzafarmchat.com/>⁵<https://invideo.io/>⁶<https://gemini.google.com/>



Figure 3: An AI infinity painting that stretches into the infinite, where imagination has no boundaries.

participants' shared perceptions of AI and the foundational understanding developed in Workshop 1, and introduced training on the meaning and practice of speculation. To further strengthen their understanding of speculative design, the activities centred on participants reimagining AI within their domains of interest. A total of 18 participants attended.

The workshop began with a recap of the previous session, followed by an introduction to speculative design. As in Workshop 1, the session included artistic impressions of AI, which were deliberately incorporated into each workshop to create an interpretive space where participants, especially those less familiar with technical skills, could express their understandings and speculations about AI. By this stage, the artists' interpretations had matured, aligning more closely with design futures. They displayed two AI impressions, including TON-AI, Fig. 4 and NA-AIm, Fig. 5. These evolving interpretations highlighted how the artists' understandings of AI shifted over time and how collective imagination unfolded in the co-design space. The creative systems not only stimulated participants' curiosity but also deepened their engagement in the research process.

A facilitator-led discussion then explored the importance of reimagining AI in ways tailored to Ocean View context, setting the stage for breakout sessions. Due to lower attendance from the Dance and Entertainment Group, three breakout groups were formed, which include the Collective Empowered and Dance/Entertainment combined Group, the Education Group, and the Agriculture Group.

To scaffold speculative thinking among participants and in each breakout group, we adopted the *what-if* question to open spaces for debates and discussions [31]. Each group was tasked with *What-if* questions for their domains of interest to facilitate reimaginative and radical thinking, along with worksheets to document their ideas. Participants were encouraged to move beyond their current use of technology and to envision futures in which AI is designed to benefit them and is situated within their evolving social conditions.

- Collective Empowered and Dance/Entertainment combined Group: *What-if we reimagine new AI technologies for community changes that drastically improve work-life balance in Oceanview?*
- Education Group: *What-if we redesign a global education network that connects students and teachers from around the world with Oceanview?*
- Agriculture Group: *What-if we envision a farm that uses AI and IoT devices to optimize crop yields and reduce waste?*

Several ideas were generated from the breakout groups, and each group collaboratively co-designed prototypes of their most compelling idea. The AI futures developed by each group in this workshop were tailored to how participants envisioned the future of AI within their respective domains of interest and how AI designs could personally support their interests. Following the breakout sessions, all participants reconvened to share their work. The groups presented the ideas generated from their prompts, walked through their prototypes, and engaged in a collective reflection session. During this exchange, participants contributed to and built upon the ideas presented by others, further enriching the group's designs.

3.2.3 Workshop 3: Co-designing Community-Centred AI Futures.

The third workshop centered on co-designing and prototyping AI concepts tailored to Ocean View community. Building on the AI and co-design readiness established in Workshop 1 and the speculative design practices developed in Workshop 2, participants were prepared to actively engage in collectively envisioning, co-creating, and co-prototyping AI futures that directly addressed the community's needs and concerns. Throughout the design and prototyping activities, participants centred community visions and values. In this workshop session, the *what-if* scenario question was narrowed down to the community's needs, focusing on envisioning AI design for their community. Twelve participants took part in this workshop.

Before the breakout group and co-design activities began, the resident artists presented new artistic impressions of AI to spark creativity and support engagement, Jongetjie Chatbot, Fig. 6 and Fit Bot, Fig. 7. These artistic prompts also served as a medium for interaction and interpretation. By this stage, the artists' understanding and embodiment of AI had deepened further.

Since the focus of this workshop was to redesign AI solutions for the community collectively and due to low attendance, two breakout groups were created, and the same *what-if* question was posed to the breakout groups: *Think of challenges people face in Ocean View, what-if we design an AI system to help solve them?* Through a series of discussions, the first group envisioned a Bot that would serve as a resource hub and guide, while the second group envisioned an AI voice automator that would include their local dialect and provide the services they desired.

Before each group began prototyping their respective ideas, they listed the possible challenges faced in the community which will served as the service their AI design would provide. Each group collectively designed the potential functionality and its features and prototyped their solutions. They critically reflected on what might or might not work in their context and identified which elements to include, adapt, or discard to make the AI solutions more meaningful for their community.

3.3 Data Collection and Analysis

Data were collected through field notes and audio recordings, which were transcribed while we composed photos and videos into workshop reports. To analyse our data, we utilized the reflexive thematic analysis as described by Braun and Clarke [19] across the workshops. An inductive approach was used to openly identify key patterns and differences across participants' experiences [20]. For the first workshop data, the second and third authors transcribed and immersed themselves in the data to create initial codes. The first and the second author consulted together to generate the themes. After which, the first author revisited and refined the themes, merged overlapping ones and removed those that lacked analytic relevance across transcripts. The first and second authors further conducted a final review of the themes and shared the themes with all the authors, engaging in discussions to reflect on the evolving themes. The research team (that is, all the authors), through team discussion, decided on the final themes. Our approach further adopted a process of meaning-making where multiple perspectives are valued by using collaborative reflection to explore differences in interpretation and deepen analytic insights [21].

For the second workshop, the second and third authors transcribed the audio recordings from each breakout group and prepared detailed workshop reports based on the session agendas. To analyse the data and filter out ideas unrelated to the emerging artefact, the first author reviewed the generated design artefacts and identified the ideas and quotes that directly informed the development of the chosen artefact. These were then shared with the entire research team. For the third workshop, the third author transcribed the audio recording and provided the workshop report detailing the AI design artefact from the two breakout groups. In reporting this workshop, we present only the list of services identified by the community and the artefacts designed to address those needs and services.

Ethics approval was obtained by the Institutional Ethics Committees, ensuring compliance with ethical standards of confidentiality and informed consent. Participants were fully briefed on the study's objectives, and their participation was entirely voluntary. All data collection methods adhered to ethical guidelines, and participants' privacy was safeguarded throughout the research process.

3.4 Authors Positionality

Our research team is interdisciplinary, with members who have extensive experience conducting co-design research with marginalized communities. The first author is a Black African woman who grew up in a low-income area in Nigeria and now resides in South Africa. The second and fifth authors are Coloured South African men who live outside Ocean View community. The third and fourth authors are Coloured South African women who reside within Ocean View community and serve as community leaders in our partner organization. The sixth and seventh authors are our Indian collaborators based at a university in India, who have been involved in working with marginalized communities in India and South Africa. The first, second, fifth, and last authors are affiliated with a South African university. The research lab led by the last author, from which this study emerges, has engaged in ongoing

work with Ocean View community for the past eight years, building collaborative relationships. Our collective commitment gives voice to marginalized African communities in the trajectories of technology innovation, particularly in interventions intended to benefit them. This commitment extends to AI, given its increasing deployment and anticipated influence on communities such as Ocean View. Throughout the study, we remained attentive to the power dynamics inherent in collaborations between university researchers and community members. We approached the workshops with a commitment to co-design, centering participants' and community leaders' voices, lived experiences, and visions in shaping AI designs. Interpretations of our study findings were discussed iteratively within the team to mitigate individual bias.

4 Resident Artists' Speculative AI Artefacts

This section describes the speculative artefacts designed and demonstrated by the resident artists. These artefacts were solely designed by each of the artists, which reflects how they envisioned AI for the community and in their professions.

4.1 TON-AI

TON-AI, Fig. 4, is a professional AI dance stylist designed for individuals unable to attend dance practice in person. The user interacts with the system by pressing an interface icon, which activates a robot that demonstrates dance routines. A sensor positioned on the robot's face detects user input and notifies the user to specify the type of dance to be practised. Upon clicking the type of dance, the robot is triggered, which demonstrates the corresponding dance movements.

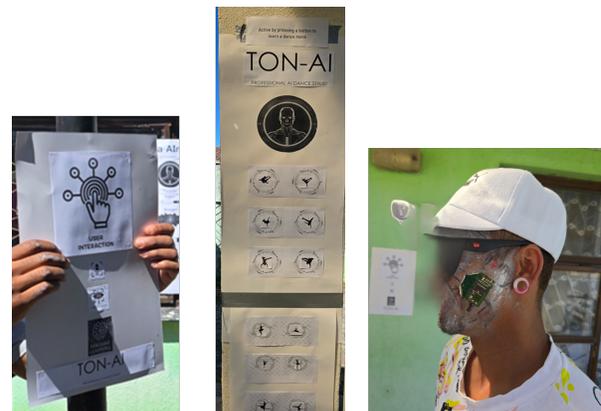


Figure 4: TON-AI, an AI-powered professional dance robot demonstrating customised routines based on the user's selected dance style. As users interact with the 'buttons' on the pillar (center), the 'bot' (right) would demonstrate the move.

4.2 NA-AIm

The "Speak to NA-AIm" Chatbot, Fig. 5, is a local voice AI automation system that speaks in the local language of the community, Afrikaans. This display allowed users to communicate or ask questions in English, Afrikaans or Afrikaans and receive responses in the

language of their choice, including English or Afrikaans. Afrikaans is a language, dialect or slang commonly spoken within the Ocean View community.

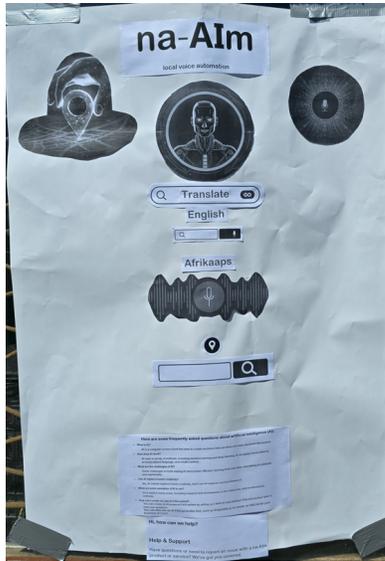


Figure 5: The “Speak to NA-AIm” chatbot, a local voice-based AI system that communicates with users in English, Afrikaans, and Afrikaans.

4.3 Jongetjie Chatbot

The “Jongetjie Chatbot”, Fig. 6, is a Frequently Asked Questions (FAQs) system designed to respond in the local language, Afrikaans. Users can interact with the chatbot either by dictating their questions through speech-to-text (voice typing) or by typing them directly into the interface. The chatbot generates responses in the same language in written form. Additionally, users have the option to listen to the responses by clicking the play or pause button as needed. The chatbot interface also includes navigation features, which are the home section, the settings menu, and volume control. Some of the prompts that were used to test the chatbot were: Directions from the community’s Police Station to the community’s Clinic?, What date is the next pension payout? What are the crime statistics for February 2025? Can I sell AI Art as my own if I am the co-creator of my own piece? Is AI capable of teaching basic movement without a human interface?. While interacting with the Jongetjie Chatbot, some participants expressed the need to include additional South African languages, such as Afrikaans, Zulu, isiXhosa, and English, in future developments. *Jongetjie* is the Afrikaans word for “young man”.

4.4 Fit Bot

The “Fit Bot”, Fig. 7, was designed for individuals who are unable to attend or access a gym. The application presents a virtual robot that guides users through stretching exercises as part of a workout routine. Its interface includes a set of clickable buttons representing various workout and stretch options, alongside a phone screen that



Figure 6: The Jongetjie Chatbot, a local Afrikaans FAQ system that allows users to type or voice their questions and receive written or spoken responses in the same language

displays the corresponding exercises. When a user selects a button, the screen presents the associated workout/stretch routine for the user to follow.



Figure 7: The Fit Bot, a virtual exercise assistant that displays guided stretching and workout routines for users who cannot access a gym. The resident artist would stand behind the frame on the left and act as the AI ‘bot’ in response to people interacting with the buttons depicted on the screen on the right.

5 Findings

In this section, we present the findings, results, and speculative prototypes generated across the three workshops to answer research question 1, drawing from the insights that emerged from participants’ discussions, activities, and collaborative design work. This includes the themes that surfaced in their interpretations of AI,

AI futures ideas they imagined for their community, and the speculative prototypes they created to represent these ideas. We note that while the ideas presented reflected varying levels of technical feasibility, these findings illustrate participants' understandings of AI and the futures they envision that incorporate AI.

5.1 Workshop 1: Perception of AI

We present the themes generated from the participants' perceptions and current narratives of AI as uncovered during workshop 1. This section outlines how participants currently understand, describe, and make sense of AI technologies, including their expectations, assumptions, concerns, and their everyday experiences with AI-enabled technologies. While some participants had previously interacted with AI-enabled tools, many held a partial understanding of AI. Their descriptions often blended actual past use of digital tools with their interpretations of what AI does or could do. We report their accounts as expressions of their current perceptions of AI, which reflect both lived experience and perceived potential.

5.1.1 Support. Participants from the marginalized community perceived AI as a set of tools that support their daily responsibilities and community engagement. Their accounts revealed how AI has already been integrated into aspects of their lived realities, offering a nuanced understanding of its potential to bridge gaps in resource-constrained environments. Participants described how AI has provided support in healthcare and wellbeing, administrative tasks, and education. Several community health workers, many of whom operate without formal training, reported relying on AI-driven instructions to deliver basic care. These systems were viewed as augmenting their limited access to professional medical expertise, enabling them to offer essential care within their communities. For example, participant P3 explained how AI guides her practice in delivering essential care to her client, *"For a massage business, the client has a certain type of condition (example, growth under the shoulder), but to me, AI could guide me on how to massage this client, customise a massage according to their conditions."* [P3].

In addition, participants emphasized AI's role in education, particularly in supporting learners with neurodevelopmental challenges such as Attention Deficit Hyperactivity Disorder (ADHD) and dyslexia. By leveraging on iPads, voice automation, and similar tools, teachers reported that AI made learning more accessible and engaging for their students and helped them overcome some of the challenges they faced while teaching. As Participant P18 noted, *"AI is a tool for learning."* [P18]. Similarly, Participant P5 reflected on how AI assists in teaching children with learning differences, *"I work at a school. Kids are dyslexic, ADHD, and things like that. It's easier to speak to the iPad than write, as kids with dyslexia struggle with writing and spelling. For some, it's beyond their comprehension, so we just allow them to listen to it."* [P5].

5.1.2 Generational Contrast. A contrast exists between the older and younger participants in how they perceived and accepted AI technologies. Older participants often described AI as overwhelming, intimidating, and difficult to comprehend. They expressed concern that technologies had advanced too far for them to easily understand or use. An older participant, P6, expressed that *"Old*

people don't want. Keep it simple." [P6]. This unease reflects a desire among older people to avoid tools that appear complicated or detached from the realities of their everyday lives.

For some older participants, AI also posed a perceived threat to their identity and the wisdom they hold within the community. They worried that if AI became too powerful, their traditional roles as guides, teachers, and cultural custodians might be undermined. Older participants emphasized that younger community members often look to them for directions and life lessons, but the rapid advance of technology risks rendering them valueless in the community. One participant, P7 questioned during the workshop, *"If it becomes smarter, we will become valueless. What about the old people who have wisdom? What role will we now play in society? Young people normally learn from our mistakes as we guide them."* [P7]. Participant P8 wondered, *"Will it replace us, as old people have the wisdom? Does it become more intelligent than us?"* [P8].

In contrast, younger participants demonstrated greater openness, curiosity and adaptability in their interaction with AI. Their willingness to experiment and interact with new technologies was particularly evident in their creative spaces. For example, participant P11 remarked that *"Younger dancers are more likely to embrace AI and social media, while older generations may find it challenging."* [P11]. For these younger participants, AI was not seen as a threat or challenging, but rather as an extension of the tools they already use in their daily lives.

Despite the initial hesitation, older participants stressed that their voices should not be excluded from conversations about AI, even if they are less comfortable with the technology. One older participant, P4, insisted that *"We must have an input. The community doesn't consist only of youngsters."* [P4]. This perspective underlines the importance of ensuring that AI is not shaped solely around categories of people but reflects the experiences, values and contributions of both younger and older generations, ensuring that technology does not privilege one group while marginalizing another.

5.1.3 Uncreative. Some participants stated that AI lacks creativity and innovative ideas, particularly in relation to their professions and artistic practices. They emphasized that their creativity is deeply rooted in the quality they possess through passion, lived experience and personal expression, which AI could not replicate. A participant explained, *"As an artist, AI can be uncreative as it removes the passion."* [P19]. They demonstrated that creativity is beyond producing new ideas, but includes the intentionality and the drives behind the new and innovative ideas, which AI could not achieve for them.

Another participant also described the process of creating new dance moves as something that emerges from human interaction, inspiration, and reinterpretation: *"When listening to music, you always come up with something new, like new moves. What is the process? I watch TikToks, take different parts, and bring them together. For dance moves, we will copy the choreography and do it in a different way."* [P10]. This description illustrates how creativity is seen as a dynamic process of remixing, experimenting, and infusing personal style, rather than simply generating outputs.

While the participants have expressed the support they received while using AI, and as a tool that may be able to mimic or reproduce existing patterns, they stressed its struggles to embody the

passion, intuition, and spontaneity that they associated with genuine creativity. For them, creativity was inseparable from human experience, shaped by culture, emotion, and community, which AI was perceived as unable to capture.

5.1.4 Tool to Gain Exposure, Visibility and Reach Wider Audiences. AI serves as a tool to expand their visibility and connect them to wider audiences beyond their immediate community. Rather than replacing their creativity, AI was often understood as a supportive mechanism that helps showcase existing talents to new spaces and people. For some participants, social media platforms powered by AI, such as TikTok, provided opportunities to share their performances more broadly, gain recognition, and build a sense of belonging within a global creative community. Participant, P13 shared that, “AI through platforms like Tiktok, seemed to help Ocean View performance artists (especially dancers) gain exposure and reach a broader audience, while this in turn fostered healthy competition for dancers to showcase talent to the rest of the world.” [P13].

AI offered a form of visibility that could translate into recognition, amplify their voices and talents, confidence, and new opportunities. This visibility fosters healthy competition and motivates them to refine their crafts, while also positioning them within broader cultural conversations that extend beyond their local community.

5.1.5 Not Affordable. While participants acknowledged the visibility and opportunities gained through AI technologies on various platforms, they also emphasized their limited access due to affordability constraints. As P5 described: “Affordability to afford this technology. We in OV don’t have a PC, a working kettle, or an electricity box. We can’t even afford bread every day.” [P5].

These challenges are rooted in the broader economic hardships faced within the community. Many residents survive on minimal wages from precarious jobs, which are insufficient to cover basic living costs. Participants explained that survival needs to take precedence over technology investments. As P6 asked: “R50 towards the robot or R50 towards bread?” [P6].

Participants also pointed out the high cost of accessing these technologies, since most require a stable internet connection, which many cannot afford. As a result, they rely on simpler, more affordable technologies. Several participants noted that current AI technologies primarily benefit wealthier individuals, leaving communities like Ocean View excluded. P1 reflected, “Make the app that’s free. We were all sticking with Motorola at some point.” [P1], while P12 added “The rich will benefit the most because OV community is the poorest of the poor.” [P12].

5.1.6 A Threat or Not. There were mixed feelings about whether AI poses a threat to their professions, reflecting both optimism and concern. While some viewed AI as a supportive tool that enhances their skills and visibility, others worried about the risks it brings to the sustainability of their careers. For dance artists, AI was not seen as a major threat. The nature of dance, with its constant innovation, movement, and physical expression, was perceived as something that AI could not easily replace. “For Dance, AI is not much of a threat. As of now, there are new dance moves coming out every day. AI sings and generates lyrics.” [P14]. Dance, being deeply embodied and socially rooted, was regarded as resistant to full automation,

with AI playing a supplementary role rather than a competitive one.

In contrast, participants from the music field expressed more concern. They pointed to the increasing ability of AI to mimic voices, generate lyrics, and replicate styles, raising questions about originality, ownership, and future livelihoods. A participant, [P21] in the music profession, expressed concern that, “Music industry is panicking about this technology as AI is mimicking artists. I can use it, and someone can use my voice-over.” [P21]. These contrasting perspectives illustrate how perceptions of AI as either a threat or not a threat are shaped by the nature of the art form and its relationship to human creativity. For dancers, AI was seen as limited in its ability to replicate embodied movement and cultural expression. For musicians, however, AI’s capacity to mimic and reproduce raised fears about displacement and the erosion of artistic identity.

5.2 Workshop 2: Speculative AI Practices

During Workshop 2, participants engaged in brainstorming diverse ideas for AI futures, based on *what-if* prompts that aligned with their groups and domains of interest. Each group collectively brainstormed ideas and selected one idea from their collective suggestions to develop into a prototype. These prototypes represent the participants’ speculative visions of AI futures situated within their respective domains. In this subsection, we present the ideas and quotes relevant to the artefact that was co-designed and prototyped by the groups for their domains of interest.

5.2.1 Collective Empowered Group - Fundamental Human Need Application. The participants in the collective empowered group envisioned a range of ideas grounded in their lived experiences, particularly the persistent concerns surrounding household security. Many of their contributions reflected a desire for intelligent safety mechanisms. For instance, Participant P7 envisioned that “Households should have panic buttons. I would make it voice-activated. You just say ‘emergency,’ and the ambulance comes immediately.” [P7]. Participant P4 added “And a voice automation to say who’s there?” [P4], indicating a preference for hands-free, automated verification systems.

Similarly, Participant P2 described a scenario that illustrated both fear and uncertainty: “There is someone at my door at 2 am. Is it an emergency? Is somebody hurt? What do I do? And then, is it safe to open? More than anything, I would like for the AI app to work with a sensory function to notify anybody that something has happened to me now.” [P2]. Then Participant P14 added to the focus on emergency responsiveness, imagining an accessible trigger mechanism: “Talking about the emergency button in the household. Where can it be?. It can be against your head. You clap three times and it is activated.” [P1].

Together, the collective empowered group reimagined a smart home with integrated security features, directly responding to the ongoing safety concerns in their community. Acknowledging that crime and insecurity are pressing challenges in Ocean View, the group designed a home system with a biometric fingerprint scanner at the entrance. The speculative artefact, Fig. 8, visualises the fingerprint icon embedded at the doorway, serving both as a lock and

an alert mechanism. In their vision, the system would notify household members when someone attempts entry, thereby enhancing the sense of safety for families.

This artefact illustrates how the participants positioned AI as a practical response to lived vulnerabilities. Security is not simply a matter of convenience but a fundamental concern that directly impacts well-being, livelihood, and community cohesion. By embedding biometric verification and automated alerts into everyday housing, participants sought to imagine a future where AI could mediate trust and protection in environments where such needs are most urgent, while ensuring socio-economic and security conditions of the community.



Figure 8: A speculative AI-enhanced home security artefact integrating biometric verification to support safety in the community.

5.2.2 Education Group - StreetWise Application. Participants in the education group articulated strong concerns about barriers to education and employment in their community. Their contributions reflected everyday struggles with job-searching platforms and limited schooling opportunities. Participant P18 explained: *“I use Indeed and sometimes LinkedIn when uploading a CV, but mostly I don’t get a job. These applications should know that I want jobs that are in proximity to my area. We should talk to the app and the Curriculum Vitae is created.”* [P18]. Another participant, P24 emphasized the need for accessible learning pathways: *“Online schools with online teachers that can allow you to complete school or studying at your own pace.”* [P24].

Participants also highlighted the localised challenges that shape educational attainment in Ocean View. As participant P15 noted, *“We have one high school in Oceanview. We need an online school because the greatest challenge is the number of people who drop out of school to earn money to support and sustain their families at home. They need to work for their family.”* [P15]. Furthermore, language and cultural identity emerged as critical design considerations. Participant P17 stressed, *“It should adapt to adapting to cultures you know because that’s going to be pointless if we don’t include our dialect, Afrikaaps.”* [P17].

These narratives informed the group’s speculative AI artefact, an educational application Fig. 9 designed to provide comprehensive learning, ranging from foundational school subjects to general knowledge and practical life skills essential for becoming ‘street smart’. The application was imagined as voice-activated, featuring

visual icons such as lips, speech bubbles, and a printout pathway, which can be accessed without access to an internet connection or WiFi. These icons served symbolic purposes: the lips indicate that the app responds in Afrikaaps, the speech bubbles represent the natural and culturally rooted flow of dialogue, which moves synchronously with the lips, and the printout signifies the tangible outcomes of user requests.

The envisioned interaction begins with a user making a request, such as seeking guidance on enrolling in an online school or preparing a job application. The app responds by asking follow-up questions in Afrikaaps to clarify details and ensure accuracy. Once the request is processed, the system generates a printout containing a structured plan, whether a curriculum for education or a step-by-step guide for the specific task. By integrating spoken dialogue in the community’s language with a tangible printed resource, the app bridges oral, digital, and physical modes of knowledge sharing. This reflects visions of AI to democratize access to education, enhance employability, and provide culturally grounded learning pathways oriented towards practical outcomes such as academic advancement and job readiness.



Figure 9: A speculative AI educational app that uses Afrikaaps voice interaction and printable guidance to support culturally grounded learning and practical life skills.

5.2.3 Agriculture Group - Recycled Water for Farming. Following the prompt given to the Agriculture Group, the participants expressed interest in sustainable resource use, particularly regarding water. Their ideas reflected practical, everyday observations about household water usage and a desire to reduce waste. A participant P16 proposed a gutter farming, *“What about Gutter farming. The rainwater can help the plants grow from the gutter on the roof.”* [P16]. While P12 emphasized the need for controlled irrigation, noting

that, “We want to ensure that crops get water and stop being watered before the optimal point. This will help with climate change; irrespective of how much water it gets, the plant will stop accepting water.” [P12]. The group further discussed practical scenarios that illustrated avoidable household waste, imagining how everyday activities could be linked to a closed-loop system. Participant, P20 added “The wastewater from the washing machine or during dishes can be recycled and passes through to the plant. If a guy is doing the dishes, as soon as he is done, then the water drains into a system to remove dirt, then the clean water goes into a container and then goes to the hydroponic tent or to the farm.” [P20].

Drawing from these insights, the group conceptualised an idea called Recycled Water for Farming. Their vision is a farming system that optimises water usage, recognising its essential role in plant growth. As illustrated in Fig. 10, wastewater from kitchen activities, such as dishwashing, is collected, filtered, and purified through an AI-powered water filtration system. This system separates clean water from waste by directing the purified water through designated pipes while diverting toxic residues into a waste tank for safe disposal. The clean water is then channelled to irrigate the plants.

This idea reflects the community’s exploration of how AI technologies can be integrated into agricultural practices to promote sustainable water management in farming. By introducing an AI-powered filtration system, the group not only highlighted the potential of technology to reduce water wastage but also demonstrated an innovative approach to addressing the challenge of water scarcity. The recycling of household wastewater into clean irrigation water illustrates a shift towards circular resource use, where waste is repurposed into a valuable input for food production. Furthermore, the inclusion of AI underscores a move towards precision and efficiency, as intelligent systems can monitor water quality, detect contaminants, and ensure that only safe water reaches the plants. Such an approach suggests that the community envisions farming practices that are environmentally conscious, resource-efficient, and technologically driven, positioning AI as a key enabler of sustainable agricultural futures.

5.3 Workshop 3: Community-Centred Reimagining AI Futures

In this section, we present the artefacts developed by each group alongside the services these AI systems were envisioned to provide. These artefacts are grounded in the challenges experienced by the Ocean View community and reflect participants’ interpretations of how AI could meaningfully support their needs. The services represent the functionalities the artefacts would need to deliver to respond to these challenges, reflecting their values, priorities, and contextual realities.

5.3.1 AlvinBot. Through the participants’ collective imagination of an AI-enabled future, the group co-designed AlvinBot, an AI house that encapsulates the community’s aspirations for technology. AlvinBot Fig. 11 was envisioned as a trusted digital companion designed to host and mediate essential services that respond directly to the community’s lived realities. In this vision, AlvinBot acts as both a resource hub and a guide, helping individuals navigate, access, and make sense of services that are often inaccessible due to socioeconomic barriers. The design process foregrounded

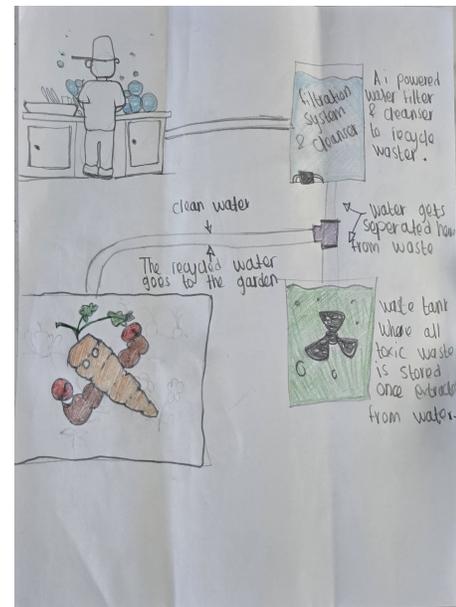


Figure 10: A speculative AI-powered water filtration system that recycles household wastewater into clean irrigation water for sustainable farming.

the community’s articulated needs and aspirations, resulting in a system that reflects their priorities for improving their life and fostering collective advancement.

Some of the envisioned services and features of AlvinBot, Fig. 12, included, Affordable offline access and free information, addressing the persistent challenge of high data costs and unreliable internet connectivity; A Curriculum Vitae Generator, supporting job-seeking and professional development within the community; An offline teaching and learning page, aimed at supplementing educational opportunities with accessible resources; An interactive website, designed to be simple, inclusive, and engaging, enabling both individual and community-level knowledge sharing.

5.3.2 Dinges. Dinges is a universal language translator with embedded cultural context Fig. 13. Beyond a translation tool, it was envisioned to enhance inclusivity within and beyond the community. The app incorporated both touch and voice interaction options, enabling users to engage either by typing or speaking. A notable feature was the navigation of voice output in English or Afrikaaps, allowing users to choose. This inclusivity extended to gendered voice options (female or male), ensuring that responses could align with user preferences and cultural norms. The word *dinges* in Afrikaaps is a generic and gender-neutral designation for people and things. Thus, this prototype extends the previous Jongetjie prototype by incorporating both male (Jongetjie) and female (Maisie) voices (see Fig. 13). Such considerations reflect the community’s emphasis on dignity, identity, and accessibility in digital interactions.

The community envisioned a wide range of services that Dinges could facilitate Fig. 14, including: Access to government services to help residents engage with administrative systems often perceived



Figure 11: AlvinBot, a speculative AI house designed as an offline, community-centred digital companion offering accessible services.

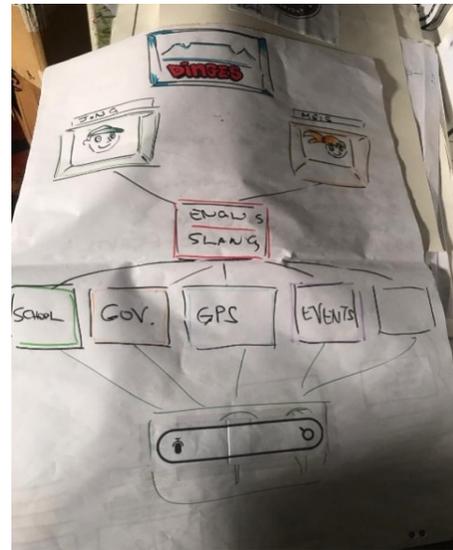


Figure 13: Dinges, a universal language translator with embedded cultural context, offering touch and voice interaction.

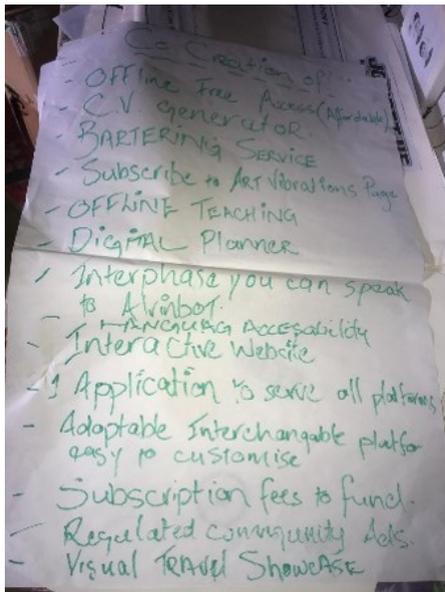


Figure 12: A visual overview of AlvinBot’s community-centred services, reflecting the needs and concerns identified by the community.

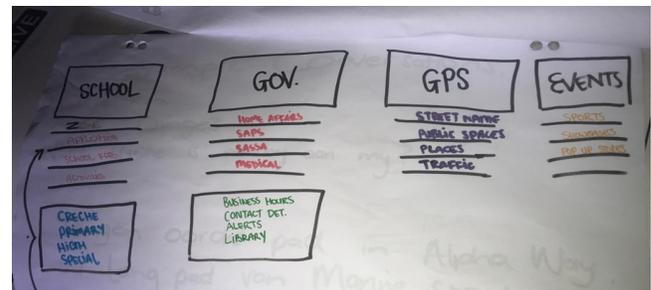


Figure 14: Services imagined by the community for the Dinges AI system, shaped by their expressed priorities and everyday needs.

as distant or inaccessible; A functional GPS designed for the community, while addressing gaps in existing navigation systems that fail to recognise informal settlements or under-documented areas; Access to education and schools to support learners and families in overcoming barriers to information and learning resources; And access to community events, enabling stronger social connections and participation in local initiatives.

6 Discussion

Our analysis and speculative artefacts illustrate how the community prioritizes collective values when envisioning AI futures for their

context. To answer research question 2, we draw on these insights to suggest new directions for developing ethical AI designs that centre the needs and concerns of marginalized communities, particularly in Africa, towards more community-centred AI solutions.

6.1 Cultural Preservation in AI

The culture and heritage of communities are a priority to Ocean View community. Preserving culture is preserving the community’s identity that recognises language and local dialects, stories, and practices as carriers of cultural continuity and future generation [28]. Ocean View envisioned futures where their cultural identity is not erased or misrepresented but represented accurately and meaningfully within the large language models. This was demonstrated in the argument of the older participants who feared that as technology advances and becomes more intelligent, their culture is at risk of being valueless in the face of technological advancement. They revealed the need to reclaim their identity and have the implementation of AI systems to support their culture and

heritage. This forward-thinking approach was systematically and comprehensively classified in the application areas and development directions of AI to develop a vision for the future that uses AI to preserve cultural assets [36].

Our findings highlighted the local dialect as one of the cultural values the community envisioned in the future of AI. The officially recognised languages taught in the schools of the community are English and Afrikaans. However, it emerged during the workshop that the primary, or “home” language of most of the participants is Afrikaaps. Afrikaaps is a contested language recognised by some as a dialect or local slang of Afrikaans, but also arguably a distinct language of its own, spoken primarily by Coloured communities in the Western Cape [1, 34]. Afrikaaps was identified as absent in mainstream communications and completely excluded from current AI systems. Its absence was seen by participants as both an erasure of cultural identity and a missed opportunity for recognition and representation in AI design. The speculative artefacts created in our workshops directly responded to this gap. Participants designed scenarios in which voice automation and educational tools interacted in Afrikaaps, embedding their dialect, stories, and humour into the imagined functionality of AI systems. These artefacts exemplify how the community envision AI as technical and cultural infrastructure, a medium through which heritage can be preserved, reclaimed, and transmitted across generations, but only if local ways of speaking are recognised and reflected in the technologies. This vision complicates mainstream narratives of AI development, which often prioritize globally dominant languages and standardized cultural references, leaving hyperlocal expressions at the margins [35, 52, 101].

This raises tension about inclusivity in AI, whether all languages, dialects, and cultural practices can realistically be represented in AI models, since all communities want their culture to be represented in LLMs. However, the current infrastructures rely on massive datasets that create systemic barriers for underrepresented communities [11, 91, 109]. A culturally aligned AI is trusted and embraced by the communities it is intended to serve, robust, less prone to the risks of bias and developed in a truly inclusive manner [84, 100], ensuring that technological progress does not come at the cost of cultural erasure but rather contributes to a richer, more just, and more equitable society [84].

Consequently, the community’s aspiration for accurate representation confronts the risk of superficial inclusion. A model might be trained to process lexical items of a dialect but remain incapable of grasping its cultural context, historical nuances, or appropriate pragmatic use. Automating language learning may diminish the richness and authenticity that comes from human speakers who carry cultural histories in their speech [66]. Studies have demonstrated that AI-generated content often lacks the nuanced cultural context and authenticity present in human-created materials [22, 42, 118], hence, a study within the HCI community has advocated for cultural consideration in AI systems for the Global South towards integrating cultural values into AI designs to enhance the acceptance and efficient utilisation of these technologies in these region [5]. AI models, optimized for efficiency and coherence, could inadvertently overlook deep-rooted cultural contexts. This risks a new form of misrepresentation where the language is present, but its cultural soul is absent, or worse, distorted. Therefore, the tension extends

beyond mere inclusion to questions of agency and power in the process of representation. The desire to be represented necessarily raises the question of who controls that representation.

This suggests that cultural and heritage preservation is not peripheral but central to how low-income communities conceptualize AI, and meaningful preservation may necessitate a shift away from universal inclusion within a single model to fostering a multitude of culturally grounded implementations, thereby aligning AI development with the principles of cultural sovereignty and continuity. The Ocean View community’s speculative visions challenge this trajectory and point towards AI as a potential site of cultural preservation rather than cultural erasure.

6.2 Affordable AI

Despite the global expansion of AI technologies, many marginalized communities continue to rely on basic devices due to their affordability and accessibility. This reliance, however, restricts their ability to meaningfully engage with the latest AI technologies, which often assume access to high-end and advanced hardware and smartphones, stable connectivity and the financial capacity to sustain recurring data subscription costs [81, 86]. Our findings reveal that while participants acknowledge the potential value of AI technologies, they expressed concerns about the prohibitive costs associated with affording smartphones capable of running modern applications, high data prices, and the unstable broadband infrastructure in the community. Importantly, many AI systems today are free at the point of use if users already possess a smart device. However, these conditions do not hold in many low-income settings. High data costs in sub-Saharan Africa remain among the most significant barriers to digital participation [46, 67]. Participants described how their current income status prevents them from affording high-speed hardware or advanced devices. We argue that free access to AI tools does not automatically translate into equitable or meaningful engagement, except owning a compatible smart device and maintaining reliable internet connectivity, conditions that are often unattainable for residents in Ocean View. Access alone is insufficient if it reproduces dependence on high infrastructures. In their vision of AI futures, they imagined artefacts that were easy to use, affordable across socioeconomic groups, inclusive of both older and younger users, and capable of functioning offline.

Connectivity inequality further exacerbates these constraints. Existing AI systems are typically optimised for resource-rich environments where continuous connectivity, robust infrastructure, and high computational power are assumed [57]. Under such conditions, AI solutions risk excluding low-income users or offering only partial utility. Consequently, technological systems frequently fail to meet the everyday realities of marginalized communities, reinforcing the digital divide and limiting access to education, healthcare, and economic opportunities [17]. Although community networks and locally owned wireless infrastructures have been explored as alternatives [37, 71, 88, 92], the costs of compatible devices and reliable internet access continue to render these options inaccessible to many.

The participants reimagined AI futures that operate in data-constrained, resource-limited environments without imposing additional financial burdens. Their visions emphasized affordable,

lightweight, offline-capable AI artefacts that could function on the basic devices already common in their households. This reflects a broader demand for connectivity-aware and resource-efficient infrastructures that align with the material realities of marginalized communities. Emerging work on TinyML and on-device AI, where models are compressed or specialized to run without continuous internet access, offers promising directions for such contexts [112].

This calls for a rethinking within AI, HCI, and Information and Communication Technologies for Development (ICT4D) research towards designing community resource-aware and context-aware AI systems. Such approaches embrace a situated perspective, acknowledging that equitable AI futures require more than providing affordable or free access to interfaces. They require enabling communities to meaningfully use, adapt, and, where possible, own the systems they interact with. Rather than replicating assumptions from resource-rich settings, future AI infrastructures must be intentionally aligned with local constraints, community priorities, and the lived realities of low-income environments [98]. This re-visions AI as inclusive, resource-efficient, and community-driven context-aware AI solutions, advancing more equitable pathways for marginalized communities navigating the evolving AI ecosystem.

6.3 Leveraging AI for Socio-Economic Advancement

While the discussion around the rapid evolution and omnipresence of AI is already rich, the community-driven vision is enthusiastic about AI technologies as a pathway for improving the quality of life and enabling upward socio-economic mobility. From our findings, Ocean View community expressed a strong desire to use AI as a means of self-development and upward socio-economic mobility, moving from their current low-income status toward more stable middle- or high-income categories. This aspiration motivated participants to imagine AI artefacts that could directly support everyday opportunities for livelihood improvement. For instance, in the third workshop, they envisioned AI systems that could assist with creating and printing curriculum vitae, provide guidance on job applications, or connect them to income-generating activities. Beyond employment, participants also speculated about AI's potential to mediate access to essential services such as schools, government support, and community resources, domains where they often feel excluded or underserved.

As AI technologies and designs advance, with the potential to address systemic inequities and contribute to society and the quality of living [41], yet marginalized communities, such as low-income populations, remain largely excluded from its benefits. In low-resource settings, challenges such as limited infrastructure, digital illiteracy, and lack of inclusivity in design processes hinder the full realisation of AI's potential to solve societal problems [64, 81]. In articulating these visions, they highlighted that AI should not only mirror the needs of privileged groups but instead be designed to address their material realities and aspirations for social mobility.

In addition, the implementation of AI raises concerns about its negative impact in low-income contexts [63, 85, 95, 116]. AI systems are designed to offer efficient, effective and scalable solutions to the community, thereby automating services by deploying AI tools. This demonstrates threats to the already precarious situations and

source of livelihood for the community. During the workshops, participants voiced apprehension that although they acknowledged AI's capacity to support tasks, they found it uncreative and lacking the innovative qualities they value in their professions and more critically, they feared that the automation of key services might erode the value of their skills and displace them from their primary sources of livelihood. Similarly, oppositions argue that AI threatens the uniqueness of human-made work, reduces the value of human creativity, and risks violating artists' copyrights [26, 32, 69], and as its impact may gradually take away the artists' market and job [97]. This dynamic was evident in the artefacts participants developed, which acknowledged the potential of AI as a technological intervention while explicitly articulating boundaries around its appropriate use, operations and functions. Rather than treating AI as a universal solution, participants delineated limits on its operations and functionalities, particularly in domains tied to their creativity, expertise, and sources of livelihood. These boundaries reflect a deliberate effort to ensure that AI systems designed for their communities would not further exacerbate precarity or displacement, but instead support and alleviate existing challenges [114]. In this sense, participants' design choices foregrounded protection of human skills and community value as central criteria for AI adoption. These findings highlight the challenges of techno-solutionist narratives positioning AI as a neutral or inevitable remedy for complex social problems, often overlooking the socio-cultural, political, and economic realities of marginalized contexts, and may inadvertently reproduce or intensify existing inequalities [12, 44, 93]. Participants' articulation of boundaries on AI designs can therefore be understood as legitimate expressions of agency, through which communities actively negotiate where AI should and should not intervene in their lives, but rather, a pathway for socio-economic advancement.

This reflects a broader concern with the socio-economic disparities that define marginalized communities, advocating for power-shifting approaches to AI that focus on developing and elevating the community for upward mobility [15, 16, 79]. The development of AI systems for marginalized communities must be approached with ethical and contextual sensitivity, ensuring sustainable livelihoods, rather than disrupting vulnerable economic ecosystems. Envisioning AI as a means of addressing local socio-economic challenges reframes AI design for development situated within community-defined aspirations for socio-economic advancement, ensuring that AI systems support not only efficiency but also equity and livelihood transformation.

6.4 Technical Feasibility

This study's speculative co-design approach enabled participants to envision AI futures that respond directly to their lived realities, cultural contexts, and socio-economic challenges without the constraints of technical feasibility. This allowed participants to generate artefacts that challenge the status quo of AI technologies while revealing concerns about what would be required to realise such systems in practice. The artefacts developed in this study therefore operate along a continuum of technical feasibility, illustrating both the potential and the limitations of current AI infrastructures.

The coexistence of feasible and non-feasible concepts demonstrates how speculative co-design empowers communities to imagine AI systems that address goals and values often overlooked by mainstream AI development. While some ideas remain aspirational, their articulation offers directionality by signalling the sociotechnical roles AI ought to fulfil in contexts marked by inequality, linguistic diversity, and resource scarcity. For instance, the AI dance stylist would require breakthroughs in AI embodiment and creative intelligence. Conversely, the Afrikaaps chatbot (such as NA-AIm and Jongetjie Chatbot), although feasible with the current wave of LLM, raises practical considerations regarding how to collect sufficient Afrikaaps data ethically and how to ensure the chatbot doesn't reinforce biases. Similarly, the gym fitness bot must be evaluated for its efficacy across diverse users and whether it truly improves access to fitness or possibly creates new digital divides if not made affordable.

Across all these directions, a common thread is the need for a critical, justice-oriented lens in AI research. The community's visions demonstrate AI designs that surface new possibilities, enrich understanding of local priorities, and expose gaps in current AI trajectories. These speculative artefacts therefore serve not only as conceptual provocations but also as concrete research prompts that can inform culturally grounded, inclusive, and contextually relevant AI innovation. For the AI research community, these visions serve as both critique and guidance, offering concrete starting points for near-term prototypes and signalling longer-term challenges that require sustained technical innovation.

7 Limitations

This study presents limitations that could inform future research directions. Our findings are limited to the perspectives of participants affiliated with Black Equations and Art Vibrations Inc. II in Ocean View. As recruitment was facilitated through our research partners. This represents only a small segment of the broader community, therefore, the insights may not fully capture the diversity of perspectives within the context. We call for wider engagement with interdisciplinary and marginalized groups, such as low-income, in speculating on AI futures, to ensure a broader range of voices and experiences towards informing the design of AI systems. While the number of participants decreased across the workshops, primarily due to caregiving responsibilities and irregular work schedules, this meant that not all participants were able to engage in every stage of the design process. However, the contributions from those who were present offered rich and diverse insights that significantly strengthened the study. Future studies could identify effective strategies to mitigate participants' loss during research activities. Furthermore, studies could benefit from exploring more AI tools, such as artist-centred AI tools that could enhance the idea of the resident artists or the different categories of participants in the study. Additionally, our engagement foregrounded AI as the focus of reimagining activities for the community. While our engagement approach was instrumental in eliciting rich insights into possible AI futures for the community, grounded in participants' values and needs, future studies could incorporate more open-ended ideation and speculative prompts that encourage participants to extend their

imaginings beyond AI-centric solutions, particularly when working with marginalized communities. Such approaches would help ensure that participants are not guided toward envisioning technological solutions alone, but are also supported in articulating equitable and contextually relevant future imaginaries. By addressing these limitations and expanding the scope of research, future work can contribute to a more nuanced and inclusive reimagining solution for marginalized communities.

8 Conclusion

This paper explored a speculative co-design approach to reimagining the future of Artificial Intelligence within a low-income community in South Africa. We focused on collective vision with the marginalized community in Ocean View, South Africa, who have experienced historical exclusion in shaping how AI should be designed. Our findings reveal participants' perceptions about AI, which informed a collective vision of AI designs that embed the community's local language and culture as well as services aimed at improving the community's economic opportunities. Based on these insights, we identified directions for ethical AI design for marginalized communities that recognise and preserve cultural identity, needs for affordable AI designs, and the potential of AI for their socio-economic advancement as trajectories within AI research.

This work contributes to HCI, AI, and design research by offering novel speculative visions of AI futures that centre community voices. It advocates for approaches to AI design that move beyond top-down models toward community-centred pathways for societal transformation and socio-economic advancement. Ultimately, this paper underscores the need for AI research and practice to engage with marginalized communities as co-creators of their technological futures.

Future work involves implementing chatbots that embody some of the design ideas presented in this paper. This includes developing an Afrikaaps large language model and adding functionalities that align with the services requested by the community. Many of these desired features are already technically feasible with existing AI tools, but remain out of reach due to financial barriers and limited digital skills. Addressing this gap calls for both policy interventions and design advocacy to ensure equitable access to AI tools and the internet for marginalized communities. Importantly, this community has already benefited from AI literacy training conducted during Workshop 1, and members have expressed a strong interest in sharing these skills with others. Future work will therefore include adapting our workshop protocol into a broader AI literacy program that can be made accessible to the wider community. Through this paper, we aim to advance the conversation on society-centered artificial intelligence and contribute to building more inclusive AI for all.

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