

Creativity in the Imperfections: GenAI as a Disruptive Inspiration

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Iconic design products often arise from embracing imperfections, like the marks of craftsmanship and authenticity found in the flaws of glassware. This position paper argues that generative AI (GenAI) imperfections or unrealistic results should be viewed as opportunities for creativity, not errors to correct. While GenAI often defaults to conventional designs due to its training data, true creative potential emerges when deviations challenge expectations. The paper details three explorations using GenAI for design tasks, particularly in industrial design, demonstrating how such disruptive imperfections could lead to novel design concepts and discussions. It proposes that accepting these imperfections can fuel design innovations and traditions, such as *provotypes* and speculative design concepts through *design friction*, suggesting that the most creative AI may be the one that generates the most unexpected and thought-provoking imperfections.

CCS CONCEPTS • Applied computing → Arts and humanities; • Human-centered computing → Interactive systems and tools

Additional Keywords and Phrases: AI, design tools, technology adoption

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1 INTRODUCTION

Generative AI (GenAI) tools are increasingly being integrated into the design process, primarily to enhance efficiency and accuracy [1]. Tools like ChatGPT or DALL-E can quickly generate a wide range of content, from wireframes to design prototypes [2], accelerating the design workflow. Much of the current discussion emphasizes how these tools support tasks by automating tedious, manual work [2,3], while also lowering costs by correcting mistakes and improving accuracy to reduce errors in the design process [4]. Many designers fear that complete automation could degrade their skills [1], leaving companies with design and technical solutions that lack the necessary facilitators and maintainers, ultimately hindering progress.

However, these models are not perfect and are prone to imperfections, including hallucinations. Hallucinations continue to puzzle both users and researchers. The causes range from poor training data to misleading prompts. Even with high-quality data and accurate prompts, Kalai and Santosh (2024) found that well-calibrated LMs can still produce hallucinations [5]. Similarly, certain design parameters, like aesthetics, are difficult to quantify in generative design tools, which may prompt designers to adjust the generated designs to improve their visual appeal [4] This friction, along with the unexpected

results it creates, has been found to both amuse and inspire creators [6,7]. Iconic products often emerge from embracing imperfections. For instance, the imperfections in Venetian Murano glass are seen as marks of authenticity and craftsmanship. Similarly, the adhesive used in Post-it Notes was a fortunate accident, originally developed while attempting to create a stronger glue for a different reason [8] and Kellogg's Cornflakes were discovered by mistake while making granola [9]. As technology enables composers and artists to refine their creations more than ever, many are increasingly embracing glitches, noise, and imperfections as part of their artistic expression [10]. There may even be satisfaction in owning, using, and admiring a one-of-a-kind product, being captivated by its unique character and how its 'flaws' contribute to its essential qualities [11]. Therefore, we argue that GenAI, like humans, should be allowed to make mistakes, even prompt the user with novel out-of-box results, as disruptions may lead to valuable and creative outcomes.

2 RELATED WORK

GenAI has expanded the creative toolkit, empowering individuals to engage in casual creation and explore new forms of expression [12]. Hekkert et al. (2003) noted that effective design outcomes often emerge innovation with familiarity to achieve the most effective outcomes [13]. Similarly, Feldman (2017) suggests that embracing creativity involves presenting designers with unexpected perspectives and ideas, similar to the 'happy accidents' of traditional artistic processes [6].

Epstein, Schroeder, and Newman (2022) from MIT Human Systems Laboratory investigated how GenAI could facilitate collaborative speculation on future utopias [12]. Their research utilized AI-generated imagery to visualize community-driven ideas, enhancing group dialogue and ideation. This approach harnesses AI's creative capabilities and integrates community feedback to shape and articulate collective visions for the future, potentially revolutionizing strategic planning in communities and organizations. By deliberately slowing down user interactions, design friction enhances mindfulness, increases understanding, and boosts satisfaction [14]. Whereas provotyping involves using provocative prototypes early in the design process to elicit reactions and inspire discussions about future possibilities [15]. Like critical design, it challenges conventional norms and encourages a more critically engaged public while promoting innovative design practices [16]. Similarly, collaborative ideation, helps stakeholders express and explore design ideas together from broad concepts to specific product features, fostering a more engaged design process and promoting a shift towards user-centered practices [6]. Both Speculative and Critical Design (SCD) focus on revealing underlying assumptions and exploring alternative values, forms, and representations. Speculative design is more future-oriented, asking "What if?" while critical design critically examines present-day systems and norms. Drawing from SCD, human-AI collaboration can help imagine and prototype alternative futures [17]. The application of these tools and theories can enable more successful GenAI usage, while tools and insight provided by GenAI can similarly improve traditional design practices.

3 EXPLORING GENAI-DRIVEN DISRUPTIONS

To examine whether errors from GenAI could spark creativity, we explored different designs, using either ChatGPT 4.0 or Midjourney V6.1. The purpose was to see if these "mistakes" could be leveraged for ideation and creativity. Two of the design prompts, focusing on product and device design, were selected from a range of general design brief categories [18], as depicted in Figure 1. While the third design aimed to provoke discussion and ideation. Each design was produced by the researcher within a strict one-hour window, promoting rapid brainstorming with the AI-tool and preventing it from advancing to the next stage of product development. These designs are not intended for immediate use or as finished products but serve as starting points for further development. Rather than evaluating functionality, the focus was on how

imperfections, such as incompleteness, defects, or a flawed, blemished, or unfinished state [10] could shape the process and introduce novel elements to the design.



Figure 1: Merged-leg stool (top left), cat tower stool (bottom left), hexagonal solar panel (top middle), retractable panels (bottom middle), digital afterlife prompt (top right), holographic death street (bottom right).

In the first exploration (seen in Figure 1), using a standard design school brief for a stackable stool [19, 20], ChatGPT generated visually appealing designs but struggled with the stackability concept, often adding extra legs or seating layers. This error inspired the concept of a U-shaped stackable leg design. However, ChatGPT consistently rendered the legs as round PVC pipes, which led to the idea of a dual-purpose stool that could function as both a chair and an animal house, with stackable elements interlocking like PVC pipes.

The second exploration focused on redesigning solar panels for private households. Initially, the model suggested a hexagonal shape, prompting consideration of a jigsaw puzzle-like roof. However, compared with existing designs, it became clear that hexagonal panels were not a novel concept [21]. Despite the temptation to explore puzzle-like designs further, the tool was challenged to generate something more unexpected. The result was abstract shapes reminiscent of existing futuristic concepts. By shifting the focus toward functionality, it led to the tool to struggle with combining abstract features and functionality, resulting in floating panels, ultimately inspiring the creator of an idea about retractable solar organic fabric-like panels that function like canopies, providing shade and generating energy. Although not entirely novel, as similar designs exist, this concept was intended as a starting point for discussions about modularity.

In the third exploration, the objective was to craft an image that would stimulate thought, discussion, and ideation on themes like environmental issues, war, and death. The concept of a digital afterlife was explored, as depicted in Figure 1. While most images featured screens or holograms, it was the notable absence of humans in one particular picture that inspired further exploration. This led to the development of a compelling image, showing a world dominated by holograms where humans are incidental, and death is the central theme of a society obsessed with death.

4 DISCUSSION

This paper explored how GenAI mistakes can fuel creativity rather than be seen as imperfections, through three explorations using ChatGPT 4.0 and Midjourney V6.1. The first and third explorations, which embraced unexpected outcomes, led to more innovative ideas, while the second, constrained by conventional thinking, allowed less room for exploration. The value of GenAI may lie not just in what it generates, but in the imaginative space created by its mistakes and omissions. These gaps offer creators the opportunity to explore new possibilities beyond AI's limitations. Such moments of inaccuracy are particularly valuable as they introduce design friction or could serve as prototypes, which are crucial for critical and speculative design, allowing creators to challenge conventional approaches and foster innovation.

A notable limitation of GenAI was its reliance on training data, which often leads to conventional outputs. For instance, ChatGPT initially defaulted to traditional designs for a stool, with innovation only emerging from its mistakes. When tasked with producing unconventional designs, the AI struggled, resulting in abstract, but familiar outputs based on conventional patterns from the dataset. The most creative GenAI might be the one that makes the most mistakes.

As the "Designing with AI" workshop at NordiCHI 2024 approaches, this exploration serves as a foundation for further discussions on the role of GenAI disruptions, extending from industrial to interaction design. The goal is to challenge the focus on mitigating limitations and, instead, deepen the understanding of the possibilities outside of GenAI's constraints, highlighting how critically engaging in iterative and disruptive processes can drive innovation.

5 CONCLUSION

The literature research and exploration detailed in this paper highlight how GenAI's imperfections or deviations from traditional outputs can spark creativity, enabling the development of novel design concepts. In conclusion, the value of GenAI lies in the space between expectation and accuracy. By focusing at times less on what the AI gets "right" about the prompt and more on the moments it slows the creative process, prompting reflection on its errors or unexpected results., creators are granted the freedom to invent, speculate, and envision possibilities beyond both the humans and GenAI tools limitations.

Furthermore, by critically engaging with AI's limitations and embracing iterative and disruptive design processes, rather than simply mitigating these limitations, an environment can be fostered where disruption is not just anticipated but actively pursued as the key to unlocking GenAI's full creative potential.

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