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Towards a Design (Research) Framework with Generative AI

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ABSTRACT

This one day workshop will explore the use of Generative Artificial Intelligence (GenAI) in design research and practice. Generative technologies are developing rapidly and many designers are using them. Yet, there remains little published work on the use of GenAI in design. Our goal is to not only showcase the potential of GenAI for design, but to engage in discussions of its shortcomings and opportunities as they have been already articulated by scholars. By synthesizing both published and unpublished works, we will develop best practices, ethical considerations, and future research directions for the use of GenAI in design. We will explore a range of topics and themes, including leveraging the characteristics of GenAI for design, mapping the diverse applications of GenAI in design, envisioning a framework for design, and guiding future work on GenAI in design research. Ultimately, we hope to provide a roadmap for the integration of GenAI into the design research process and to encourage designers and researchers to explore the potential of GenAI in a thoughtful and deliberate way.

CCS CONCEPTS

• **General and reference** → **Design**; • **Human-centered computing** → *Interaction design process and methods*; • **Computing methodologies** → *Artificial intelligence*.



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1 BACKGROUND AND MOTIVATION

The growing accessibility of Generative Artificial Intelligence (GenAI), such as StableDiffusion¹ and ChatGPT², has led to a boom in “AI Art” and creative applications such as a text-to-UI creator [3], speculative architecture [7], text-to-image integration into Photoshop [2], and brainstorming apps [1, 5]. This radical accessibility has the potential to transform the creative field by helping designers generate, explore, and extend ideas faster by offering serendipity, surprise, and generate friction through its unpredictable outcomes. The emergence of new GenAI tools on a weekly basis show how GenAI opens up new creative modalities and opportunities for exploration, and therefore new opportunities for design research. In this workshop, we intend to assess the potential of GenAI in the context of design, with a focus on creating a comprehensive vision for the role of GenAI in design practice and avenues for design research. We aim to collaboratively develop this vision by synthesizing the work that is currently developing within the community, and that participants will share during the workshop. To emphasize, instead of introducing and exploring GenAI tools, we invite pioneering participants that have already used GenAI in some way. We intend to build on case studies that participants bring to the workshop to

¹<https://stability.ai>

²<http://chat.openai.com>

build a vision for GenAI in design together. The workshop is related to the conference themes of design methods and processes, and technological innovation. We welcome and encourage explorations of GenAI in creative practices beyond text-to-image models, including but not limited to: text, synthetic data, music, video, speech or code.

2 RELATED WORK

To put the workshop in perspective, we here briefly discuss what Generative AI is, how it is presently related to design, and address similar ongoing or past workshops and how the goals of this workshop may differ.

2.1 Generative AI

GenAI, also referred to as Generative Models (GMs), is a class of algorithms that can generate data that is similar to, but not a copy of, its input data. Common examples of GenAI are Variational Autoencoders (VAE) [14], Generative Adversarial Neural Networks (GAN) [10], and Denoising Diffusion Probabilistic Models (DDPM) [11]. These techniques have been applied in all sorts of domains, including but not limited to video creation [21], 3D modeling [19], synthetic data [18], and treating disease [23]. The recent developments in the field open up a plethora of possibilities for design research as it may, for instance, be used to augment limited real-world data, be used to generate research material, and facilitate novel experiences. As many note that GenAI may also be a threat to the creative industry [8], it is important that we assess the potential application areas and practices *now*.

2.2 GenAI & Design

Cascini and colleagues discussed the possibilities of using AI in design [6]. They note that the main potential of AI will be during the conceptual phase. However, a preliminary review by Hwang [13], which studied the current product landscape of AI-empowered co-creative tools, states that only a few of the tools supported the early stages of the creative process, which the author named the wandering and Q&A stages. Further, the types of tools studied were: 1) editors enabling ease-of-use content editing, 2) transformers helping to alter and convert content to a different modality (e.g., hand-drawn sketches to digital images), 3) blenders combining two or more creative elements into new ideas, and 4) generators, producing ready-to-use creative outputs.

2.3 Generative AI Workshops

The number of workshops on Generative AI at Human-Computer Interaction and Design conferences indicate immense community interest around GenAI and its human implications. For example, GenAICHI 2023 [16] explores generative AI's interactions with humans, ethical considerations, and collaboration possibilities. Another workshop at CHI2023 concentrates on AI's role in collaborative ideation between humans [20]. HAI-GEN focuses on the challenges and opportunities of using deep generative models to enhance human-AI co-creation [24] and lastly, a Computational Creativity Workshop discussed co-creativity through work-in-progress and position papers [4].

Our workshop builds on this work, focusing on examples of GenAI use in design research contexts. We aim to gather researchers' and designers' experiences to reflect on this topic. Contrary to previous workshops, our focus is less about exploring future purposes, and more focused on already existing, "weak signal", design practices. In other words, we focus on GenAI in design processes and the community's early explorations to understand the best practices and move towards a design framework.

Within the cross-section of GenAI and design, we seek workshop participant contributions from any domain, and focused on any aspects of the design process. To illustrate the variety of our approach, the workshop organizers will share their published and ongoing work that can serve as a reference. Some of these examples are a study on using generative AI to overcome design fixation in the context of human-robot interaction [12], testing the emotional alignment of GPT-3, DALL-E, and Stable Diffusion [15], AI-generated 3D-printed sculptures [9], using LLM to create stories from the perspective of nonhumans with the aim to reflect on how to design for more-than-human futures [17], and a practical workshop aimed at subverting the biases in the dataset of Large Language Models for re-framing innovation discourse [22].

3 TOPICS AND THEMES

In this workshop, we aim to synthesize both published and unpublished works to develop best practices, ethical considerations, and future research directions for using Generative Artificial Intelligence (GenAI) in design. To achieve this goal, we will explore the following topics and themes:

(1) Leveraging the Characteristics of GenAI for Design

What are the key characteristics of GenAI that are relevant to design, such as serendipity, ease of use, and unpredictability, and how can they be leveraged to enhance design research and practice? What is the role of explainability in this regard?

(2) Mapping the Landscape of GenAI Applications in Design

How can we map the diverse applications of GenAI in design along relevant dimensions to GenAI insights into the potential of GenAI to transform and impact design?

(3) Envisioning a Framework for using GenAI in Design Research

How can we effectively leverage generative models for understanding and researching human experiences, while also developing a design framework to narrow and target their capabilities for practical utility beyond novelty?

(4) Guiding Future Work on GenAI in Design Research

How can we create shared scenarios and a vision for the potential of GenAI in design research with a focus on identifying specific use-cases and how they have affected the research process? And what are the best practices, ethical considerations, and future research directions needed to further explore the potential of GenAI in design, and how can we offer suggestions and recommendations to advance the field of GenAI in design?

We believe that this workshop will be a valuable opportunity to learn from one another and to push the boundaries of what is possible in design research, and we look forward to a productive and engaging discussion.

4 WORKSHOP CALL

The year 2022 saw a boom in the field of Generative Artificial Intelligence (GenAI). The radical accessibility of these technologies has the potential to transform the creative field including design practice and design research. For instance, by helping designers generate, explore, and extend ideas more quickly, or by offering serendipity, surprise and generative friction through its unpredictable outcomes. It is also likely that GenAI will open up new creative modalities and possibilities for creative exploration, as well as new opportunities for design research. Despite these potentials and advancements, there remains little published academic work on the topic. In this workshop, we intend to take stock of the (potential of) GenAI in the context of design, with a focus on creating a comprehensive vision for the role of GenAI in design practice and avenues for design research. We aim to collaboratively develop this vision by synthesizing the work that is currently developing within the community and that participants will share during the workshop. Rather than introducing and exploring tools, we ask participants to present their own cases, so we can build together upon our own experiences with GenAI in design.

Participants should submit a 2- to 4-page position paper (including references) in the ACM Extended Abstracts Format. The proposals should contain authors' (initial or preliminary) experiences and reflections using GenAI in creative practices. The proposals should be emailed to w.l.a.vandermaden@tudelft.nl. We will select papers based on their relevance, quality, and diversity. We will limit the size of the workshop to 25 participants. At least one author of each accepted submission must attend the workshop and all participants must register for both the workshop and for at least one day of the conference.

ACKNOWLEDGMENTS

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