
Design Daydreams: Juxtaposing Digital and Physical Inspiration

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Abstract

Design Daydreams is part of a suite of new computational design tools that integrate ambiguity and juxtaposition into the systems that we use to discover new ideas. Using a low-tech augmented reality system to visually overlay digital images on top of objects, the Design Daydreams augmented ‘post-it note’ fluidly extends the inspiration designers find online into the physically-interactive and collaborative brainstorming environment. Feedback suggested that the low-fidelity of the tool provided a natural ambiguity that left room for interpretation as designers juxtaposed digital and physical concepts together to create new ideas.

Author Keywords

Computational creativity tools; augmented reality

CSS Concepts

• **Human-centered computing~Interactive systems and tools** • Human-centered computing~Mixed / augmented reality

Introduction

Creativity often comes from crossing the boundaries between existing conceptual schemas [8]; reframing ideas into new contexts, new scales and new functionalities. Openness to chance, ambiguity and seeming irrelevance have often been embraced by

Reframe creative prompt

tool: using text from a user's notes and readings, Reframe creates randomized prompts to juxtapose concepts in new ways (<https://reframe.media.mit.edu/>)

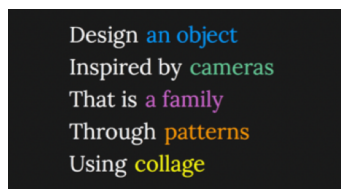


Figure 1: Screenshot of Reframe tool in use

Looking Sideways

exploration tool: drawing from diverse online sources, Looking Sideways provides laterally connected text and images for every search query (<https://sideways.media.mit.edu/>)



Figure 2: Screenshot of Looking Sideways tool in use

designers as ways to achieve this reinterpretation of concepts [10]. Especially in the earlier, more exploratory phases of the design process, using design methods and tools that allow for less literal responses [7] or juxtapose different patterns of thinking [3] can provoke creative leaps and inspire novel ideas [5].

Today, many of the tools we use in our creative process are digital. Traditionally, these computational tools have been better suited to more well-bounded deductive activities in the latter phases of the design process [1]. However, the growing accessibility of digital technologies such as genetic algorithms and machine learning allow computation to also be used in earlier, more abstract explorations [16]; design activities that have traditionally used very analog tools, e.g. pen and paper [1]. While these digital tools can allow us to quickly access vast arrays of content, over-reliance on these efficiency-based technologies that quickly guide us to converge on a few specific, quantitatively better solutions is potentially very creatively problematic [4], leading designers down algorithmically-driven rabbit holes that can contribute to the homogenizing of design [9]. Especially in the early exploratory stages of the design process, designers collect inspiration from a range of sources—visual images from online collections, physical samples from their environment, conceptual reinterpretations from conversations in their studios. Moving seamlessly between these physical and digital media is crucial to enable the serendipitous encounters that the imperfection and tangibility of the analog world can often unexpectedly inspire [2,11].

How can we extend the traditional analog tools that designers use to generate new designs in the early stages of the creative process with digital means, without forsaking the serendipity so valuable to creative inspiration?

Design Daydreams is part of a suite of unconventional computational tools for design and creativity that integrate ambiguity and seeming irrelevance into the systems that we use to discover new ideas. Rejecting the reliance on overly optimized 'intelligent' technologies to present answers to our creative questions, our previous work developing the Looking Sideways and Reframe tools integrated juxtaposition and randomness into online tools for exploring digital inspiration sources and generating creative prompts [13,14] (detailed in sidebar). Design Daydreams takes these tools further by using a low-tech augmented reality (AR) system to take inspiration images found in the digital domain and visually juxtapose them to objects in the physical world, enhancing the opportunity for the serendipitous encounters that can inspire new interpretations and design ideas.

Design Daydreams augmented post-it notes

Insights from studies investigating the Reframe and Looking Sideways tools led to the development of the Design Daydreams tool [14]. While the ambiguity and randomness of both tools were beneficial at helping designers reinterpret concepts and consider new associations, the screen-based interaction limited the seamless use of these tools in more collaborative settings such as brainstorming, where interactions are carried out around tables, using paper, post-it notes and physical inspiration material; as one designer mentioned, "[design] research activities are horizontal".

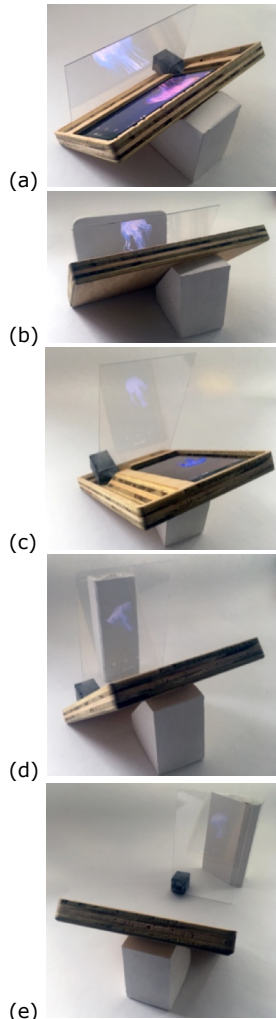


Figure 3: Design Daydreams holder in (a,b) horizontal, (c,d) vertical & (e) separated positions

In order to bring the rich digital inspiration material from the Reframe and Looking Sideways tools off the screen, we experimented with several technologies: projection mapping, commercial AR headsets and mobile AR apps. However, as other researchers have noted [15], while these systems allow for detailed tracking of the objects they are augmenting with high-resolution imagery, we found them to be cumbersome and inaccessible to most designers. We wanted these digital images to feel like the proverbial 'post-it note'; a small fragment of an idea quickly encapsulated visually on a simple piece of paper that can be moved around and juxtaposed to other media, similar to Weiser's iconic 'scrap computing' Pads [17].

We therefore chose a low-tech AR technique using the Pepper's ghost illusion [6] as a simpler technology more fitting to the ad hoc style of early brainstorming. Using a mobile device in a simple carved wooden holder with a transparent film positioned at 45 degrees to the screen, users can create the illusion of overlaying digital images or text on their mobile device onto objects viewed through the film (Figure 3). Styled to feel more like an object a designer would have on their desk than a piece of technology (Figure 4), this low-fidelity format is more accessible and feels as instantaneous and creative as how designers intuitively use post-it notes to represent and assemble fragments of ideas in a brainstorm.

Connecting Design Daydreams to the Looking Sideways exploration tool, these augmented 'post-it' notes enable the inspiration images that are returned in the user's searches to be taken off the screen and become visual inspiration cues overlaid on simple 3D shapes and real world objects (Figure 5). Designers can position the

Design Daydreams holders horizontally, vertically and with the film at a distance from the holder to manipulate how the augmented image interacts with the physical objects behind the viewer (Figure 3).



Figure 4: Components of Design Daydreams augmented post-it notes (clockwise from top left): carved wooden holder, 45 degree wedge, transparent film with concrete corner weight, simple 3D shapes on which to overlay images, mobile phone

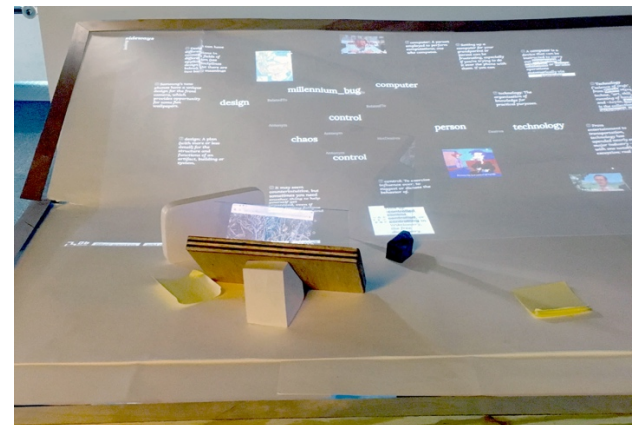


Figure 5: Design Daydreams augmented post-it note in use with Looking Sideways tool on a brainstorming table.

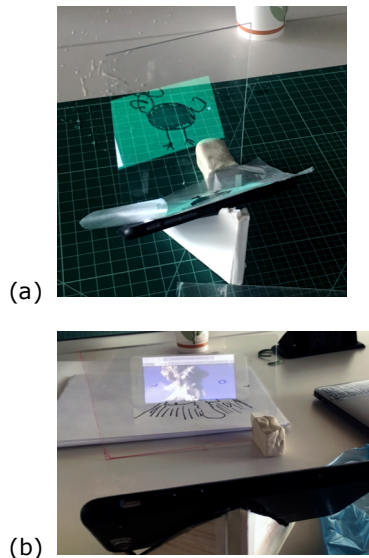


Figure 6: Examples of how designers have created 'mixed media' inspirations and design ideas using Design Daydreams in an ideation session: (a) physical sketch laid over mobile device to add to projected digital image, and (b) completing a physical sketch on a piece of paper with a digital animation

Discussion

Early feedback from student and professional designers about the creative inspiration potential of using Design Daydreams in an early ideation session was positive. The fluid transferal of digital content found in the Looking Sideways tool to the augmented post-it notes allowed designers to quickly imagine what a certain pattern, object, animation, etc. could be like when juxtaposed to a physical object. In one workshop, designers used Design Daydreams to imagine logo designs on a form specific to a certain project, as well as overlaying images onto general objects around them to inspire new applications for the imagery, e.g. one designer unexpectedly imagined how an image he found could be a new pattern for a colleague's T-shirt.

Easily moving and sharing the augmented post-it notes with their colleagues allowed the designers to control the viewing angles and seamlessly change their perspective across the whole brainstorming table, providing a more natural 3D viewing of different inspiration sources i.e. screen, paper, object and augmented image overlay. The accessibility and flexibility in which Design Daydreams can be used allowed designers to take a truly 'mixed media' approach to their inspiration exploration and ideation: one designer sketched an image on a piece of film and laid it on top of their mobile device to add an additional layer to the digital image projected onto physical objects (Figure 6a), while another drew half of an image on some paper and completed the 'sketch' with an animation projected through the augmented post-it note (Figure 6b).

The low-fidelity of the tool was appreciated as the 'fuzziness' provided a natural ambiguity that left room

for interpretation and encouraged a more open and reflective inspiration process. Designers considered digital images in augmented post-it note for longer than when viewed on the screen, often taking the images for a walk around the room to discover new serendipitous juxtapositions to be inspired by.

Combined with previous feedback about the Reframe and Looking Sideways tools, we are excited about the potential of the Design Daydreams tool to further integrate the essential creative qualities of ambiguity and juxtaposition into the digital tools we use during ideation activities and extend the inspiration they generate back into the real world. Through our development of the Design Daydreams system in connection with the Looking Sideways and Reframe tools, we hope to further explore how the rich wealth of online digital information can become as seamless a part of the early stages of the design process as the humble post-it note.

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