Interactive Polaroids: Slow Design for Technology-Mediated Reflection

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Abstract

Digital photography require new solutions for interacting with large photo collections. In a time of information overload, there may be a need to move away from smartphone solutions toward a more minimalistic approach. This paper provides a review of the current trends in slow design and technology-mediated reflection. Based on previous research on slow technology for interaction with digital photo collections, I present a new design suggestion: The Interactive Polaroid; An interactive photo frame where the photo fades away over time and require a shaking action to be replaced with a new one. The design process is described from the perspective of borrowing affordances from existing objects. Finally, I present some suggestions for future research based on the final prototype for the project.

Author Keywords

Slow Technology; Interaction Design; Design; Technology-Mediated Reflection

CSS Concepts

• Human-centered computing~Interaction Design

Introduction

During the past 30 years, the rise of digitalization has changed the way we store information. For most people, filing cabinets and photo albums are a thing of the past, now replaced with hard drives and cloud services that are can store immense amounts of data. A natural result of this change is that our ways of interacting with this data changes as well.

For photography, a lot has changed with digitalization [21]. Digital photos do not only offer easier storage in the shape of a few megabytes on a hard drive compared to half a page in a photo album; The cost of taking a picture has changed as well. When analogue photography was the only option, the cost varied between $7-$25 per roll of film, depending on type of film and camera [9]. Nowadays, the net cost of taking a digital photo is essentially zero, allowing people to take as many pictures as they like, be it professional photography or selfies, until they achieve a picture they are happy with. Naturally, this change has led to a huge increase in number of photos taken. In 2017, approximately 1.3 billion digital photos were taken in the world [3]. The changes in information sizes puts huge demands on the design community to come up with new creative ways to handle the amounts. The solutions vary from large, multi-adaptable systems for management and filtering [29][30] to more philosophical approaches, often drawing inspiration from the slow design movement [5][27].

This paper provides an overview of previous research done in the field of slow design for interaction with digital photographs. Based on the findings, a new contribution to the design space is presented: The Interactive Polaroid, a digital photo frame inspired by the look and affordance of a polaroid photo. Finally, I present some examples as to how future research based on the presented design could provide new knowledge within the field.

Background and Related Work

TECHNOLOGY MEDIATED REFLECTION AND INFORMATION OVERLOAD

To steer through the ocean of stored information, social media services have recently begun implementing reminders to guide interaction with memories of past events. The social media service Facebook's "On this Day" function regularly displays past events from your wall [18].Large tech companies such as Apple and Google have incorporated functions in their photo library services that automatically generate memories from your collection [10][33]. The Timehop app takes it one step further by accessing multiple social media accounts and presenting a daily journey through the events and memories that occurred on a specific day over the past years [23]. Another interesting point of view for this is the social aspect of image interaction. We enjoy looking at images of memories together with friends and family, and many aim to design photo displays that accommodate this [7][15]. An especially impressive approach to this challenge is the Cherish system, which aims to use image recognition to allow the user to display images from different social contexts based on who will be coming to visit next [22].

Reminiscing about past memories is a happiness-inducing activity [2], and the effect has been present in studies focusing more closely on technology-mediated

reflection (TMR) as well [19]. It is healthy for humans too look back at old events, feel nostalgic and reflect over what these moments meant to us. At the same time, the Information Age and continuous digitalization continues to lead us toward Information Overload. The multitasking and constant information filtering of technology today causes cognitive overload and technostress [1]. Constant social media updates and notifications is one of the contribution factors to this [11][24].

With the effects of Information Overload in mind, one conclusion is that even if technology-mediated reflection is a good thing, the effects may be stronger if the medium used is not the smartphones or computer that contain the more stressful experiences as well. Instead of incorporating more functionality into smartphones, a better approach might be to look for meaningful interactions with technology in more isolated forms.

Slow Design and Photo interaction

The slow design movement is an active response to the increased stress and information overload we can find in society today. Hallnäs and Redström describes the aim of the philosophy to be a way to create alternatives to technology as a mean solely used for productivity [14]. Instead, slow technology should be a way for users to slow down activities to make room for reflection and mental rest, generating interactions that may bring more meaning to the users [12].

Odom et al. provide valuable insight into how to use slow technologies to manage digital consumption [27]. Their Photobox is designed to be a natural part of the home environment that occasionally prints out photographs from the user's digital collection. A long time field study of the Photobox showed that slow interaction with photographs was a successful way to open up participants to new, reflective experiences with their photographs, as well as to make the participants reflect over the role interactive technology has in their lives [28].

Borrowing affordances

Another solution for slow technology-mediated reflection is the Chronoscope, an interactive photo-display inspired by the shape of a telescope, microscope or kaleidoscope [5]. The thought process behind the inspiration was that the shape would remind the user of items that enable the user to see what they usually cannot. Similarly, they designed controllers on the Chronoscope to resemble the focus controllers on a microscope.

Hallnäs and Redström argue that one of the most important factors of slow design is a simplicity in shape and material [14]. Chang et. al. further extend this by exploring what happens when design students are challenged to minimize the number of inputs and outputs [4]. Their findings indicate that the challenge of a minimalistic approach makes designers generate ideas with interactions related to different usage metaphors. This fits well into the philosophy of both slow- and tangible design. For physical products, the balance between the physical representation and the underlying digital information is considered to be one of the key factors of a successful tangible user interface [20][26]. To base interactions on existing conventional systems, such as a notebook app resembling a physical notebook in shape and functionality, is called skeuomorphism in GUI design [6]. The style used to be

Figure 1: Photos hung on the walls in one participant's home. The photos occasionally fall down. When putting them back up, the participant would take some time to look at the images.

a standard convention for smartphone applications but lost its trend-factor in the past years as users become more comfortable with interacting with technology. When technology fluency increases and digital products become more complicated, the metaphors of old technology tend to become forced, creating unnecessary excise for the users instead of easing their understanding. The trap of extended metaphors is easier to avoid when designing minimalistic products, although there is still a risk of the users expecting too much of a product if the design is based on a representation that is more complex than the current design [17].

Designing The Interactive Polaroid

The inspiration for the Interactive Polaroid came from explorative formative interviews and guided tours [13] focusing on mindful interaction with objects in the home environment. Out of the seven participants, aged 21-30, three mentioned having photos on their walls. When asked how often they looked at the pictures, both participants replied that they often forgot that the pictures were there, but were reminded to look at them when they had visitors coming over, or when the pictures occasionally fell down and had to be put back up (Figure 1). These events reminded the participants that the photographs still existed and made them take a few moments to interact with them, a very non-technological approach to the previously described technology-mediated reflection.

The insights from the formative research led us to create a framework for the design: *A digital photo frame meant for social interaction, that would occasionally remind the users that it still existed.*

Photo Affordances
Similar to the design process for the Chronoscope [5], we took inspiration from existing objects to provide a framework for the interaction. For the Interactive Polaroid, the inspiration was, to little surprise, the polaroid picture. Polaroid cameras have been around since the 1950's [30] and rose in popularity again during the 2010's [25]. Although most people today do not own a polaroid camera, the shape of a polaroid picture is classic enough to be recognized as a retro photography by most. On top of that, the polaroid comes with its very own affordance, the shake.

The shaking motion originates from the original polaroid pictures, where the shake helped the image develop and dry quicker. Since the 60's, the shake has no longer been necessary as the photos instead dry beneath a layer of plastic film. Still, people continue to shake the images, even though the movement can actively worsen the development of the photo [29].

For many types of old analogue photographs, time will make the photo fade away. In both design and culture, fading objects has become a representation of things being forgotten as time passes. We decided to use this symbolism to represent our interactive photo becoming more and more forgotten over time. After some time of displaying a photo, the image will fade away, thereby indicating to the user that it is time to take a moment to look at the photos again. For polaroid photos, the shake symbolizes development, to make an image appear. The polaroid-like frame would then naturally create an affordance for the user to shake the frame to make a new image appear. Like putting an image back up after it has fallen to the floor, the user can then take

a moment to look at the picture that appears and thereby gain a moment of conscious remembering.

Holding on to the form factor
To successfully borrow the affordances from a polaroid photo to our design, our aim was to design something that corresponded to the existing object as much as possible. Naturally, it would be close to impossible to implement a functional prototype that would hold to the form factor of a polaroid photo precisely. A classic polaroid has a size of 108x88x0.3mm, and weighs only a couple of grams. Especially when taking the thickness and weight of the photo into account, the prototype would not be able to hold to the same dimensions. Still, we wanted to design something that would remind the user of a polaroid to as great a degree as possible.

Another important aspect of the design is that it is somewhat wireless. One of the advantages of physical photos is that it is easy to pass them around in a group and change their placement in the home. This would be difficult to achieve if the prototype was too clumsy, or if it needed to be permanently attached to an electric outlet. The prototype would work best if it was wireless, meaning it would need a power bar to power the technical components.

When developing the prototype, this created a choice between creating a larger case that would contain all parts of the prototype, including a power bar, or creating a slimmer case that would stay truer to the shape of a classic polaroid, with the disadvantage of requiring an external connection to a power bar. To solve this dilemma, two separate cases were constructed and tested. The larger one could hold all technical components, including the power bar, and

measured 110x140x50mm. The smaller one required an external power bar and measured 110x70x30mm *(Figure 2).*

METHOD
In a final evaluation, four design students, aged 23-26 with equal number men and women, were asked to evaluate the two prototypes. They were first introduced to the larger prototype, and later to the smaller one, after one of the researchers moved the technical components to a new case. The participants were urged to think aloud during the evaluation and participated in a small questionnaire afterwards, where they were asked to choose between the two cases.

RESULTS
Two out of four participants preferred the slimmer design to the larger one. Those who preferred the larger one explained that this was because its shape reminded them of a Gameboy console, and because the added weight of the power bar moved around inside the case and provided more haptic feedback than the smaller one. None of the participants expressed any thoughts about the change in flexibility based on whether the power bar was stored inside the case or not. All four said that the smaller one reminded them more of a polaroid photo both in shape and in how they executed the shaking interaction.

Figure 2: Left: Polaroid picture, 108x88x0.3mm. Center:Polariod-similar prototype, 110x70x30m. Right: Wireless prototype, 110x140x50mm.

TAKEAWAYS
The purpose of evaluating the different cases was to decide whether to prioritize shape or interactivity for the prototype. As no participants expressed concerns about the fact that the more polaroid-shaped case required an external power source, we concluded that the most important part of the design was its familiar shape. The larger prototype, described as "Gameboy"-like, did not offer the same affordance for the shaking motion. However, participants did express a desire to have buttons on the larger prototype to make it resemble a Gameboy even more. This suggests that the different visual cues from the different cases may have altered the perceived affordances of the prototype and

that the overall division between the two cases may have had more to do with the preerence of Polaroid vs. Gameboy than the differences between the cases.

Final Prototype
The final prototype for the Interactive Polaroid was created using a refined version of the case from the smaller case in the evaluation. The inside of the case holds a Raspberry Pi with a square image display. An inertial measurement unit (IMU) was used to detect the shakes.

The frame will hang in the home, displaying a single image. After about a week, the image fades away to

black, leaving the frame empty. When the user notices the empty frame, they can pick it up shake it to make a new image appear.

The back of the case was suited with magnets to mount the prototype on magnetic surfaces such as the fridge, a place where images are often displayed. A magnetic back was chosen to make it easy to pick up the prototype, shake it, and put it back.

Future Research

Previous studies in slow design and technology-mediated reflection suggest that the Interactive Polaroid may be a promising contribution to the design space. However, more research is needed to evaluate the significance of the project and further develop the product.

With the Photobox, Odom et. al. aimed to design a photo-viewing product that would last and create meaningful interactions for a long time [28]. They conducted a probing, long-term study to evaluate the design and describe many interesting events that occurred as the participants got more and more used to having the product in their homes.

For the Interactive Polaroid, a long-term study should focus on the users' reaction to the product as it loses its novelty and becomes a background object in the home environment. As a product designed to be temporarily forgotten, the true significance of the project cannot be measured while the user is continuously aware of its existence. The time passing between fade-out and shaking should be registered to learn how long it takes for the user to re-engage with the user, and interviews or diaries should be conducted

to learn how the users relationship with the product develops over time. Grosse-Hering et.al. suggest that increased product attachment can improve the meaningfulness of the interactions with a product over time [12].

Another aspect to explore further is which images should be displayed in the frame. The sparse display of the Interactive Polaroid does not allow for advanced filtering between different categories, and the frame's main intention is not to work as an advanced imaging system. Still, there are many interesting use cases. One that comes to mind is to make use of the photo-flow from the photo-sharing app Instagram, especially as the service was originally designed with a retro-photography theme in mind [16].

Finally, it would be interesting to further explore the significance of form for the Interactive Polaroid's affordances to further evaluate the efficiency of the shaking motion as a representative gesture. Perhaps, future iterations of the prototype can lead to a slimmer, even more polaroid-like shape to further carry the reference of a polaroid photo.

Conclusion

The Interactive Polaroid is a new attempt to design a digital photo display. It builds on the frameworks of slow design and skeuomorphic affordances and attempts to offer a stress-free, socially inviting way to interact with digital photo collections. More research is needed to truly understand the implications of the project and continue the development of the product.

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