

Designing Virtual Funerals as a Design Fiction: A Film-Based Exploration of Near-Future Memorial Rituals

Daisuke Uriu
College of Design Engineering
Shibaura Institute of Technology
Tokyo, Japan
uriu@shibaura-it.ac.jp

Shun Arima
Cyber Civilization Research Center
Keio University
Tokyo, Japan
arima-shun@keio.jp



Figure 1: A scene from the Design Fiction film “*Sorewa katsute attakara*,” that we created: The funeral venue of the Suda family.

Abstract

This paper explores the design and future potential of virtual funerals, enabling both in-person and remote participation, with options to digitally revisit and update the memorial site. While virtual funerals gained prominence during the COVID-19 pandemic and are often seen as temporary, the authors argue that they hold long-term value across different contexts. To investigate future funeral practices, we created a Design Fiction film depicting our concept of virtual funerals in Japan using Diegetic Prototypes—hypothetical

technologies that envision a future in which these practices are normalized. Key themes include hybrid attendance, virtual memorial spaces, and technologies that bridge in-person, remote, and revisiting participants. The authors and a professional crew created the film collaboratively to illustrate these speculative elements. This paper details the film’s production, its design rationale, and the broader implications for how HCI design and technology could shape future mourning and memorialization practices.

CCS Concepts

• **Human-centered computing** → **Human computer interaction (HCI)**.

Keywords

Mourning, Memorialization, Remembrance, Death Ritual, Virtual Funeral, Spirituality, Thanatosensitivity, Design Fiction, Diegetic Prototype, Research through Design

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).

CHI '25, Yokohama, Japan

© 2025 Copyright held by the owner/author(s).

ACM ISBN 979-8-4007-1394-1/25/04

<https://doi.org/10.1145/3706598.3713399>

ACM Reference Format:

Daisuke Uriu and Shun Arima. 2025. Designing Virtual Funerals as a Design Fiction: A Film-Based Exploration of Near-Future Memorial Rituals. In *CHI Conference on Human Factors in Computing Systems (CHI '25)*, April 26–May 01, 2025, Yokohama, Japan. ACM, New York, NY, USA, 19 pages. <https://doi.org/10.1145/3706598.3713399>

1 Introduction

Makoto, a bridal photographer, decided to photograph the funeral of his friend's father. At the funeral venue, a round portrait of the deceased is placed at the center, surrounded by square flower displays, with digital screens positioned along the edges (Figure 1). In-person mourners sit on chairs, while remote mourners appear on the digital displays. As Makoto focuses on the deceased, he is reminded of his own father's funeral two years ago. Given his own complicated feelings toward his father, he was unable to fully respect his father's death at the time. However, he now revisits the virtual memorial site, where he discovers an old, living memory of his father.

This is the synopsis of a Design Fiction [83] film we created.¹ In the film, we aimed to illustrate *virtual funerals*, which refer to funeral ceremonies that people attend meaningfully using online or digital tools [53]. During the COVID-19 pandemic, various restrictions led to the widespread adoption of virtual funerals worldwide. While academic reports on the subject are limited, some funerals were conducted entirely virtually on platforms such as Zoom, YouTube Live, and Facebook Live. Others adopted a hybrid model, allowing both in-person and online mourners to participate. In the early stages of the pandemic, there were successful reports of entirely virtual funerals (e.g., [7, 52]); however, most hybrid funerals were negatively reported, often associated with the sadness of COVID-19-related deaths (e.g., [2, 49, 72, 76]).

Currently, as virtual funerals are increasingly viewed as a temporary, traumatic response to the pandemic, the design and technological insights behind them risk being forgotten. However, we believe there are further design opportunities in this area. This study aims to calmly analyze the significance of virtual funerals, now that the impact of the COVID-19 pandemic has subsided, and to explore the future of funeral practices from the perspective of HCI design.

Uriu and colleagues previously reported, in their study conducted in Japan [97], that organizing a (hybrid) virtual funeral presents numerous challenges. Funerals often occur unexpectedly, making it nearly impossible to prepare thoroughly in many regions. Managing the specific procedures for each region or religious denomination is challenging enough, and overseeing the systems for a virtual funeral adds a level of difficulty. Additionally, no two deaths or funerals are alike; while design patterns exist, every funeral is inherently unique. To address the challenge of creating new design patterns for virtual funerals as Research through Design (RtD) [105], we have chosen to employ cinematography to generate specific scenes, narratives, and prototypes that are depicted in a film.

Our film introduces the concept of virtual funerals we created, and this paper outlines the design, process, and rationale behind the film, including specific prototypes for the virtual funerals featured in the narrative. The film can be considered a form of “Design

Fiction,” which speculates on a plausible future rather than presenting entirely imaginary science fiction [82, 83]. It incorporates “Diegetic Prototypes”—fictional designs and technologies depicted as fully functional within the film [8, 45]. Drawing on the role of Design Fiction in HCI design research [9–11], this paper offers new perspectives and implications for designing near-future funeral practices.

As mentioned before, funeral design for a specific individual is a unique and non-repeatable process, which complicates the refinement of methodologies tailored for this purpose. Aside from proposing a new design concept for virtual funerals as an RtD contribution, this paper identifies a key finding: a design methodology for addressing critical real-world issues where failure is not an option, as demonstrated by our approach to funeral design via a Design Fiction film. The paper details the design process and rationale behind the film's creation includes a literature review and analysis of existing virtual funeral case studies, and provides summaries of the film and its scripts. It also highlights the Diegetic Prototypes used in the film and shares lessons learned from production. Through a detailed case study, we explore the implications of this approach for designing future virtual funerals, offering a methodology applicable to other high-stakes, real-world challenges, such as funeral design. Both the film and this paper encourage reflection on how society might maintain bonds with deceased individuals in the near future.

2 Literature Review**2.1 Virtual Funerals**

2.1.1 Worldwide Discussions. As mentioned, Uriu et al. [97] shared their experience with funeral webcasting in Japan at the CHI '21 conference, where they faced technical difficulties and resorted to using Zoom on smartphones instead of their planned 360-degree telepresence system. They highlighted the need for “remote funeral conductors,” specialists who not only use the technology but also understand funeral procedures and participate as mourners. Despite the availability of technologies for funeral webcasting, the authors noted that there are still design opportunities to enhance the virtual funeral experience, particularly in the facilitation of collaboration among participants using online/virtual technologies.

Although research about virtual funerals within the HCI community is limited, there have been several discussions on this topic in other fields since the COVID-19 pandemic. Multiple researchers interpreted that virtual funerals during the pandemic were adopted reluctantly as an “alternative” to in-person funerals, rather than being considered a desirable method (e.g., [18, 21, 77, 78, 101]). Even more serious, “virtual farewells,” the experience of losing a loved one without saying goodbye in person, were reported as a traumatic phenomenon worldwide. Riley et al. [77, 78] reported various negative opinions about these funerals from funeral directors, religious practitioners, and attendees (mourners and bereaved family members) on such online/virtual/hybrid funerals held in the UK during 2020–2022. On the other hand, Chen [18] surveyed 519 American adults who lost loved ones between January 2020 and June 2021. The study found that individuals who used virtual communication methods for farewells experienced higher levels of grief and psychological distress compared to those who had in-person farewells. Academic articles, in Spain [39] and the UK [38], showed

¹The information about this film, including details about screenings and related events, can be found on the website: <https://interfuit.info>.

that the absence of a final farewell in person can cause deep grief for the bereaved. News articles also report on the sadness of virtual farewells and funerals worldwide (e.g., [2, 49, 72, 76]).

In contrast, there are positive opinions on virtual funerals from researchers who have discovered their unique and irreplaceable features. MacNeil et al. [53] comprehensively reviewed articles about virtual funerals published by 2021 and reported how virtual funerals accommodated more people than in-person ceremonies. This is because there are no limitations on the number of attendees, physical distance, travel costs, schedules, diseases, and even religious rules (e.g., females being prohibited from joining funerals in some religious cultures) on online virtual platforms. From the perspective of grief care, Burrell and Selman [16] revealed that virtual/online funeral opportunities may support the mental conditions of bereaved family members, compared to being completely deprived of the opportunity to have a funeral, by screening articles about COVID-related funerals.

Particularly highlighted by its success were the virtual funerals, in which all congregants participated online. Mackenzie [52] reported on his friend who lost her mother in November 2020 and, with other family members, held a “completely DIY virtual funeral” via Zoom. This funeral allowed participation from the deceased’s 85-year-old and 100-year-old siblings, as well as over ten grandchildren, including those abroad, who otherwise could not have attended in person. One of the organizing sisters, a clergy member, created a program as fulfilling as a traditional funeral. After the ceremony, there was time for everyone to chat, and those who missed it could watch the recording. Bitusikova [7] reported on a fully virtual Jewish funeral held in London, UK, in 2020, highlighting its outcomes and significance. Jewish traditions require burial within 24 hours and a seven-day mourning period called *Shiva*, both of which pose challenges in modern life. Virtual technology allowed for a more intimate and heartfelt execution of the funeral, burial, and *Shiva*. The report noted that friends and relatives who would have otherwise been unable to attend could participate, with everyone metaphorically seated in the “front row.” While, Frydman et al. [29] proposed a structured procedure for virtual funerals via video conferencing: 1. Preparation, 2. Setting the stage, 3. Saying Goodbye, 4. Conclusion & Supporting Family. They emphasized that virtual funerals should maximize immersion and include key elements expected in traditional funerals for each culture.

However, hybrid funerals, where both virtual and in-person attendees are present, pose numerous challenges. As noted, Uriu et al. [97] shared their experiences conducting a hybrid funeral in Japan, encountering several difficulties. Pitsillides and Wallace [75] reviewed the impacts of communication technologies during the pandemic and emphasized the need for more user-friendly technologies in actual funeral settings. Similarly, Riley et al. [78] illustrated how funeral conductors and directors in the UK struggled to manage attendees with varying levels of digital literacy. Despite these challenges, they also reported that some took initiatives to enhance the experience, such as a Christian minister who encouraged online mourners to light a candle at home, mirroring the in-person ritual. In another case, at a family’s virtual funeral, both in-person and online attendees participated by drinking a shot of the deceased’s favorite whiskey simultaneously. Additionally, one funeral director organized a ceremony where the bereaved family placed potted

plants on the coffin, which were then passed to those watching online who could not attend in person. While these unique endeavors bring inspiration to our designs, a concrete design direction for hybrid funerals has not yet been established, and further research is needed.

2.1.2 Local Contexts in Japan. Similar to other countries mentioned above, Japan also had virtual funeral services during the COVID-19 pandemic. Some leading funeral companies launched online webcasting services on their websites (e.g., [40]). However, some of these virtual funeral pages have already been deleted without any announcements to customers. One of the authors personally interviewed a company’s president who worked with many funeral companies across Japan; he mentioned that most companies stopped offering virtual funeral services after the pandemic period.

As far as we know, the funeral company “Oono-sousai” in Oita Prefecture was the most proactive in conducting virtual funerals. During the pandemic, the company handled over 50 virtual funerals using tablet computers [70] and developed a service using avatar robots for remotely attending funerals [71]. Believing that virtual funerals would become standard infrastructure, all of their services were offered free of charge. However, since mid-2023, there have been no more requests for virtual funeral services from their customers, and the research and development using avatar robots have currently been halted.

Our film tells the story of Japanese funerals in the future. However, there is no strong demand for virtual funerals in today’s Japan. Rather, the existence of virtual/remote funerals is gradually being forgotten by people after the pandemic. Globally, virtual funerals have been recognized as having universal value that should be utilized even after the pandemic. On the other hand, hybrid virtual funerals place a significant burden on funeral staff, and their design patterns have not been optimized. This study, based on these contexts and the authors’ belief that “virtual funerals will be a necessary method in the next decade and can contribute to the mourning experiences of many people with the emergence of more desirable designs,” is an attempt to express a design exemplar [105] through creating the film.

2.2 Mourning and Memorialization in HCI

Since Massimi and Charise [57] introduced the concept of “thanatosensitive design,” which focuses on design issues related to mortality, dying, and death in 2009, research on mourning and memorialization has expanded in multiple directions within the HCI community. One of the most common topics in this area is how to manage digital possessions belonging to the deceased and transfer them to the bereaved [15, 32, 33, 41, 57, 58, 60, 62, 64]. Massimi and Baecker [56] began exploring design directions to support the grief of the bereaved, and since then other researchers have consistently been exploring design frameworks and opportunities in thanatosensitive design [1, 19, 26, 58, 74]. Recently, discussions on online memorials have gained attention across various research fields beyond HCI (e.g., [3, 17, 81]). Furthermore, emerging topics include the use of generative AI technologies to support the grief of the bereaved [104] and the implementation of funeral and interment rituals in the metaverse [48]. Focusing specifically on funerals, Moncur et al. [58] reported how funeral directors and

chief mourners used HCI-related technologies in the UK in 2012. However, it seems that Japan's funeral industry is lagging even further behind, compared to where the UK was ten years ago. Most funeral staff in Japan still lack digital literacy and adaptation to modern technologies, although no empirical research results can support this observation.

Despite the emergence of technology-enabled funerals since the COVID-19 pandemic, there remains a lack of support for funerals in HCI design research, as well as in the design of future funerals with HCI technologies. However, we can refer to several studies on the design of research products [67], especially those focusing on domestic memorialization and after-funeral rituals published in the last decade [44, 59, 62, 66, 92, 96, 99]. Uriu and other researchers have been investigating ways to integrate physical rituals, using objects commonly associated with spiritual practices, such as candles [92, 96], incense smoke [94], and flowers [91]—with viewing photos of or related to the deceased [92, 94, 96] and a virtual memorial [91]. Photos of the deceased are a key element in mourning and memorialization. Moncur et al. [59] created StoryShell, a tangible object that allows a bereaved parent to curate digital photos of a deceased child. Similarly, Wallace et al. [99] designed ReFind, a small, rounded photo viewer that curates the deceased's old photographs for everyday contexts. More recently, Kim et al. [44] explored the possibility of using different modalities such as odor and haptics (e.g., heartbeats [28]), and Jørgensen et al. [41] developed Anekdot, a handheld system that allows users to sense a deceased person's recorded location metadata.

Meanwhile, graves and columbaria, which primarily serve to bury bodies, are increasingly integrating HCI technology, particularly in response to land shortages in urban areas. Japan, while slower to adopt HCI technology for funerals, is known for its high-tech columbaria, which features machine-operated systems and digital memorial displays [93]. HCI design researchers have also been exploring concepts for future graves [34, 35] to enhance the experience of visiting cemeteries [34]. Notably, Häkkinen et al. [36] developed VR content that allows users to visit graveyards virtually, providing access to sites that would otherwise be unreachable. This approach shares a philosophy closely aligned with our concept of virtual funerals. Overall, while the scope of thanatosensitive design has expanded to include practices such as domestic memorialization and visiting columbaria or graveyards, the rise of virtual funerals in response to COVID-19 has further elevated public awareness of these approaches. However, the exploration of how HCI technology can be applied to funeral design remains limited.

2.3 Research through Creating a Design Fiction with Diegetic Prototypes

2.3.1 Design Fiction and Diegetic Prototype. The term “Design Fiction” can be traced back to American science fiction writer Bruce Sterling's book *Shaping Things* [82], where he claimed that Design Thinking [43] significantly influenced his science fiction writing. Sterling asserted that he had been writing Design Fiction for many years, explaining that while science fiction draws upon the grandeur and credibility of science, Design Fiction is more grounded in realism and practicality.

The concept of Design Fiction became linked to the field of HCI when Sterling contributed a cover story titled “Design Fiction” to *Interactions* in 2009. In this article, he noted that while science fiction and design both originated in the 20th century, they evolved in different directions and rarely influenced one another. With the rise of the Internet, however, the boundaries between the two began to blur as consumers and audiences merged into the role of “users.” Sterling concluded that a deeper integration of science fiction and design is necessary and that Design Fiction is essential for pushing the boundaries of imagination in real-world design projects.

Furthermore, Julian Bleeker [8] defined Design Fiction as a blend of scientific facts, design, and science fiction, describing it as a unique form of authorship that combines storytelling with the material creation of objects. This approach creates socially contextualized objects that tell their own stories. Bleeker emphasized that Design Fiction supports both creative action and reflection, aiming to offer insights that encourage fresh ways of thinking about how ideas come to life through a blend of fact and fiction. Rather than limiting design or production, Design Fiction serves as a tool to imagine more livable near-future worlds.

Bleeker, citing Kirby [45], also used the term “Diegetic Prototypes” to describe fictional technologies in Design Fiction that are portrayed as fully functional within a film, making them seem realistic, necessary, and beneficial to viewers. This rhetorical advantage often surpasses that of real prototypes, encouraging funding and development of new technologies. Kirby argued that by embedding these fictional technologies into everyday life in films, they gain social context, aiding in their diffusion and acceptance.

In a 2012 interview [12], Sterling emphasized the importance of Diegetic Prototypes in Design Fiction, stating: “*It's the deliberate use of Diegetic Prototypes to suspend disbelief about change. That's the best definition we've come up with. The important word there is diegetic. It means you're thinking very seriously about potential objects and services and trying to get people to concentrate on those rather than entire worlds or political trends or geopolitical strategies. It's not a kind of fiction. It's a kind of design. It tells worlds rather than stories.*” This approach allows designers to focus on potential technologies and their impact on society, encouraging critical reflection on how change can be visualized and understood through fictional prototypes.

2.3.2 Applying Design Fiction in HCI Design Research. Building on the concepts of Design Fiction and Diegetic Prototypes from the late 2000s, HCI researchers have explored various media beyond film [31, 100], including interactive theater [98], websites [79], design probes [61], storyboards [73, 88], memos [103], and even fictional research papers [51]. Markussen and Knutz [55] have also redefined Design Fiction from a “poetics” perspective, proposing new prototyping methods. These studies highlight the value of Design Fiction, demonstrating its potential for innovation and its ability to offer critical insights into the future of design.

Emphasizing the importance of Design Fiction in RtD projects, Mark Blythe [9] argued that Design Fiction enables the exploration of future possibilities and provides a critical perspective on prototypes, going beyond the constraints of actual prototype creation. This approach serves as a valuable tool for predicting outcomes,

assessing the impact of technology on people, and shaping the direction of research. Blythe also classified common narratives used in Design Fiction into three categories—Overcoming the Monster, Voyage and Return, and Quest—demonstrating how these plots help portray technology as an integral part of society rather than merely a solution [10]. Blythe and Encinas [11] further highlighted that Design Fiction explores the future in diverse ways, incorporating not only scientific predictions and critical perspectives but also imaginative elements such as ambiguity and magic. However, challenges including reviewers potentially failing to recognize the work as fiction, the ambiguity of evaluation criteria, and ethical concerns regarding the intentionally misleading nature of Design Fiction have been raised [50, 51].

The creation of Design Fiction alongside the design of Diegetic Prototypes has generally been positively received within the HCI community. However, the approach of creating films as Design Fiction remains relatively rare [31, 100], and there is a need to further develop practical insights regarding their effectiveness and the themes they address.

2.3.3 Design Futuring and Evaluating Near-Future Concepts. The approach of illustrating near-future design concepts, known as “Design Futuring,” encompasses techniques like Design Fiction and Critical/Speculative Design (CSD) and has generated ongoing discussions on how best to evaluate its outcomes. Baumer et al. [6] argued that Design Fiction does not adhere to a single fixed evaluation criterion, but instead incorporates various methodologies that produce diverse academic and design contributions. They emphasize the importance of selecting an evaluation framework that aligns with the specific type of knowledge the Design Fiction aims to generate. Kozubaev et al. [47] proposed five reflective modes within Design Futuring, aiming at envisioning future scenarios, critiquing current conditions, and exploring alternatives—thereby enhancing the quality of Design Futuring. This framework supports continuous researcher reflection on their stance, the influence of their future visions, and their relationship to reality throughout the design process. In this paper, we apply their methodology to clarify the implications of the authors’ reflections, linking them to future design endeavors.

CSD has been criticized as a closed discourse, primarily confined to cultural elites [87, 102]. Dunne and Raby’s designs [27], in particular, have faced critique for emphasizing concerns and anxieties, with calls for clearer visions of preferable futures that empower society to make positive choices [87]. Furthermore, as CSD is integrated into market frameworks and commercial use, there is concern that its original critical intent will be lost [102]. Unlike CSD, aimed at provocation, this study does not seek to create entirely new funeral or mourning practices. Instead, it combines existing elements to depict near-future scenarios within a Design Fiction film, providing researchers, funeral professionals, and the public with a shared platform to reflect on the future of funerals. This approach introduces a new design methodology that expands public and stakeholder engagement, moving beyond traditional speculative design frameworks.

Overall, this paper offers a concrete example of designing virtual funerals for the near future, making a methodological contribution through the creation of Design Fiction. It directly advances

thanatosensitive design by illustrating the value of integrating the RtD approach with Design Fiction filmmaking and the development of essential Diegetic Prototypes. Our methodological insights also shed light on addressing sensitive and private design issues within the HCI community. While outside the primary scope of this paper, we additionally outline a research framework that suggests how Design Fiction creation can contribute to and inform future design practices with the involvement of film audiences.

3 Methodology

3.1 Motivation and Background

The primary motivation of this research is to explore the future of funerals and present a concrete design example. During the COVID-19 pandemic, funerals around the world were thrown into disarray. While the inability to be present at the final moments of a loved one was tragically interpreted by several articles, the concept of virtual funeral attendance through technology also appeared (e.g., [18, 21, 77, 78, 101]). In Japan, the setting of our research, funerals have been on a declining trend even before the pandemic. There were cases during the pandemic where only a few people attended funerals in person, and even today, as the pandemic has subsided, the trend of ‘smaller funerals’ continues [46]. Will this trend persist, or will some new form of funeral emerge in the future? We focused on the virtual funeral, which emerged during the pandemic, and began this research with the thought that a world where virtual funerals are commonplace might represent one of the preferred states [105] for funeral practices and related memorial rituals.

With this motivation, the authors collaborated on a film about virtual funerals, marking the start of this project. The reason for choosing film production as a methodology was to address the highly sensitive and distinct nature of funerals as a design subject. A funeral is an event composed of various actions, rituals, and rites, intricately interwoven and performed by multiple stakeholders. Therefore, it is highly challenging to adopt the typical design approach of creating a working prototype, having users interact with it, and conducting a proof of concept. Furthermore, it is practically impossible to conduct trial and error in the real-world context of funerals, where failure is not an option. Thus, we believed that the most appropriate method was to develop a Design Fiction through a collaborative design process, allowing design researchers to engage in discussions while creating the work. We intentionally chose film as a medium accessible to the general public, aiming to foster concrete and constructive discussions on near-future funeral design among researchers, funeral industry professionals, and the public following the film’s completion. In planning this project, we drew inspiration from recent studies [63, 68], sharing their vision of opening up HCI research to broader audiences through full-scale film production. With this in mind, we, both well-versed in design research, particularly RtD, with one specializing in designing for mourning and memorialization (the first author) and the other in film production (the second author), adopted the methodology of conducting this research through a first-person narrative recording approach, referring to previous work [22, 23, 97, 99].

To prepare for the filming, we communicated about the film’s elements over about a month and a half. Early in the planning

stage, the first author shared abstract images and broad concepts, including:

- **Collaboration between in-person and remote attendees:** Seamless cooperation, with in-person participants representing remote attendees in tasks such as offering flowers on their behalf.
- **A system supporting flexible participation:** Usable by funeral staff and families, adaptable to large and small groups, allowing engagement before, during, and after the ceremony, including memorial services.
- **Sharing memories of the deceased:** Facilitating the exchange of personal memories and experiences among family, friends, colleagues, and online attendees.
- **Freedom from traditional schedules:** Enabling participation without being bound by specific dates of the wake or funeral.
- **Reference to existing works:** Citing Tanseisha's VR Ceremony system [85] as an example, though noting its limitation of a one-year viewing period due to lack of update functionality. We also shared other related works listed in the Literature Review.

As we exchanged questions and ideas, the second author, in his role as director, initially drafted the screenplay, incorporating speculative technologies such as remote transmission of scents and widespread AI use, reflecting his background in science fiction, where imagination often takes precedence over technological feasibility. However, the first author did not intend for the film to speculate or advocate for futuristic ideas. Instead, his goal was to carefully analyze existing works, designs, and technologies and integrate these insights into the film, creating a bridge between contemporary funerals and the envisioned future depicted in the film. As discussions progressed, the focus gradually shifted.

While the Diegetic Prototypes featured in the film were technically feasible with existing technologies, the true innovation lay in how they were seamlessly integrated into the context of funerals, remembrance, and mourning practices. The team ultimately decided to center the film on the natural integration of technology into everyday life, particularly in funeral and memorial rituals. This shift became the guiding principle of the project. Ultimately, five core themes were established during the collaborative process:

- (1) **No boundary between virtual and physical:** Creating a funeral/memorial space that seamlessly connects physical and virtual environments. In the film, both venues coexist, and these blended settings are fully accepted by all participants.
- (2) **Recognition and Interaction:** Enhancing how virtual and in-person mourners recognize and interact with each other. Given the challenges of conducting hybrid funerals in previous works (e.g., [53, 77]), the film intentionally highlights this aspect in the script.
- (3) **Continuity of Rites:** Ensuring a smooth and connected flow of funeral and memorial practices before, during, and after the ceremony. While virtual funerals and online memorial services have been separated until now, this film proposes a service that is seamlessly connected and continuous.

- (4) **Dual Features of Remembrance and Memorialization:** Integrating the sharing of memories with the deceased alongside rituals of mourning and honoring. Existing funerals, such as those displaying photo collages, already feature this aspect, and the film explores how these features will coexist in virtual funerals.
- (5) **Embodied Rituals:** Incorporating actions that enhance embodied, ritualized experiences in virtual funerals. Regarding previous works [20, 65, 69, 80, 86, 89], we believe that remote and virtual mourners require embodied rituals beyond simply watching a video stream. Thus, the film illustrates specific embodied rituals for remote mourners.

The final plot of the film reflects the integration and combination of these themes, while also designing and showcasing several Diegetic Prototypes, which will be described in the next section.

3.2 The Authors' Positions and Film Production Staff

This study is an RtD project centered on creating a Design Fiction film, led by the first and second authors in a *designer-researcher* role [68, 105]. The first author initiated the project, drawing on his expertise in HCI design, particularly in mourning and memorialization practices, including funerals. The second author joined to contribute his film production expertise and HCI research background, using the project to explore a reflective design methodology through Design Fiction. The Funeral Supervisor and Installer were recruited through the first author's network, while the Film Production Team and Cast were assembled via the second author's network and open calls.

Both authors plan to screen the completed film for the production staff, other researchers, funeral professionals, and the public. The first author aims to use feedback from these screenings to design a practical new form of virtual funeral. The second author intends to apply the insights to refine design methodologies and enhance future Design Fiction projects. Below is an overview of the production staff involved in the film.

- **Director:** The second author has extensive knowledge and experience in video production, along with a foundational understanding of HCI design research. He served as the director and also partially funded the film production.
- **Producer:** The first author has conducted RtD on mourning and memorialization for many years. He initially planned this film production project and primarily secured the funding² to assemble the team, thereby enrolling as the producer for this film.
- **Funeral Supervisor:** She has worked at a funeral company in Tokyo for about eight years, where she has conducted meetings with bereaved families and Buddhist priests, as well as managed and hosted funeral ceremonies. In addition to traditional Buddhist funerals, she has extensive experience with non-religious funerals, equipping her with a deep knowledge of funeral practices.

²As mentioned in the Acknowledgments, the first author received a research grant focused on remote and virtual funerals in the context of the COVID-19 pandemic. This filmmaking project was conducted as part of the funded research. However, both authors also contributed personally to cover some of the production costs.

- **Installer:** He works as an installer, managing the setup of large-scale installations for exhibitions and other events. Additionally, having previously created films and installation works focused on the theme of death, he was responsible for constructing the Diegetic Prototypes of the funeral venues in this film.
- **Film Production Team:** The filming team, led by the director, was responsible for roles such as camera operation, location scouting, casting, designing Diegetic Prototypes, and other managerial tasks. The team consists of 18 members, with additional support from a few part-time members.
- **Cast:** Some roles were cast through staff recommendations, while others were filled via an open call on a casting website. The project's purpose was explained during casting, and only those who agreed with the goals of the project participated in the film.

3.3 Film Production Process

3.3.1 Writing the Script. The screenplay for this film was entirely written by the director. Throughout the process, the producer, the funeral supervisor, and other staff members provided feedback on draft versions of the script. The producer offered comments on the scenes and Diegetic Prototypes, collaborating with the director to solidify the concept of the virtual funeral. The funeral supervisor provided the director with insights into the rituals and rites of contemporary Japanese funerals and suggested improvements for the funeral-related elements in the screenplay. The director then integrated the feedback, refining the screenplay into a polished film.

3.3.2 Italian-style Script Reading. The acting approach—how we directed actors to perform—for this film was based on the “Italian-style script reading [13, 42].” This style has been adopted by directors such as Jean Renoir and Ryusuke Hamaguchi [4, 37]. A key feature of this approach is that actors are prohibited from expressing emotion when delivering their lines during rehearsals before filming. Actors are only allowed to convey emotion during the actual shoot, requiring them to repeatedly read lines in a neutral tone during rehearsals.

There are several reasons for employing this approach. First, it prevents actors from resorting to stereotypical performances. When emotions are added in rehearsals, the acting and character portrayals often become conventional. By delaying emotional expression until filming, Renoir and Hamaguchi believed more authentic and natural performances to emerge [4, 13, 37]. Another reason is to emphasize embodied reactions during filming. Repeated practice of emotionless dialogue during preparation allows actors to speak lines without preconceived intent. This enables them to focus on the immediate context, surroundings, and the actions and words of fellow actors. This aligns with Robert Bresson’s concept of “automatism [14],” which aims to capture unconscious and natural embodied reactions rather than intentional expressions.

This Italian-style acting approach results in restrained, natural performances and allows directors to incorporate the physical reactions of actors on location (e.g., at a funeral venue) into the film. We found this approach appropriate for our serious Design Fiction

film about virtual funerals, as Design Fiction should present technologies and concepts as naturally integrated into life. Additionally, given the solemnity of funerals, we adopted this acting method to present the scenes as though they might genuinely exist shortly.

3.3.3 Crafting Diegetic Prototypes. A special small team was organized by the director and producer to craft the Diegetic Prototypes necessary for expressing a world where virtual funerals have become widespread. The details of them will be described in the next section. The director managed how the prototypes functioned within the overall story and in each scene, while the producer focused on directing the aspects related to the concept of virtual funerals. The team included the funeral supervisor, who also served as a graphic designer, and the installer with extensive experience in large-scale exhibition set design.

3.3.4 Shooting. The main filming took place over four days. During the shoot, we first reviewed the actors’ movements and lines for each scene, after which the director of photography and the director collaborated to determine camera angles and shot composition. While it is common for directors to create storyboards or previsualizations in advance, for this shoot, we chose not to pre-determine the angles to prioritize the actors’ natural performances on set. Rehearsals and script reading sessions were conducted over six days in total. As mentioned in 3.3.2, the actors rehearsed their lines repeatedly without expressing emotion until the actual filming, holding back their emotions until just before the final take. Following the main shoot, we spent an additional three days capturing supplementary footage that could not be filmed during the main shooting days.

3.3.5 Editing. The director also handled the editing, which took about three weeks alongside the filming. Some scenes required VFX (Visual Effects) work, such as the monitors in the funeral hall displaying remote attendees, so the VFX processing was carried out in parallel with the editing. Since there were no major changes to the film’s structure or storyline, the editing process generally followed the script.

3.4 Data Collection

The primary data referenced in this paper comes from our collaborative Slack channel, shared Google Drive documents, as well as photos and videos captured throughout the design process, including Zoom recordings of our discussion meetings and footage from the shooting days. All of our meetings were video recorded, transcribed, and documented in shared Google documents. The total length of these video recordings is approximately 15 hours. The footage from the filming amounts to about 1 hour and 52 minutes, which is securely shared on Vimeo with the authors and film production staff. Although some conversations were not recorded, we made efforts to document as much as possible on our Slack channel. We repeatedly reviewed our discussion records but did not use any formal qualitative analysis method to analyze the documents, as these records served both the purpose of paper writing and film creation. We felt that conventional qualitative coding methods might overlook important ideas and elements that emerged through our discussions. Therefore, we relied on our creative intuition to produce the film and describe this paper without relying on formal



Figure 2: Left: Makoto is preparing to go to work, with the monitor showing the second anniversary of his father’s death. Right: He is talking to his mother remotely, after the ceremony.

data analysis. The film script, written by the director (the second author), was composed and edited in Japanese using a LaTeX environment and shared with other film production members as a PDF. The script was revised seven times, reflecting feedback and requests from other members. All versions have been archived, and we referred to them during the paper-writing process. The final script contains about 12,000 words in Japanese. Whenever we quote or introduce content from the script, we translate it into English as needed.

The total runtime of the film is approximately 38 minutes after editing and finalization. We organize multiple screening events over time. The information is available at <https://interfuit.info>.

4 The Film

4.1 Title and Concept

We titled this film “*Sorewa katsute attakara* (in Japanese): *Interfuit* (in Latin, ‘that-has-been’ in English).” The title draws inspiration from Roland Barthes’ book *Camera Lucida: Reflections on Photography* [5], which played a significant role in shaping the film’s creation. In that book, Barthes stated that *Interfuit* is the essence of photography, explaining that *Interfuit* means “*what I see has been here, in this place which extends between infinity and the subject (operator or spectator)*” [5, p.77].

Camera Lucida is a dialectical exploration of the nature of photography, where Barthes reflects on photographs of his deceased mother. We believe that Barthes’ narrative structure and themes share much in common with our interpretation of virtual funerals portrayed in this film. Consequently, the central concept of the film is to depict a series of time lapses in how we remember and reflect on a deceased person through technology, and how the characters’ thoughts and emotions evolve throughout the film.

4.2 Synopsis of the Script

The film opens with the main character Makoto Aira, a bridal photographer, remotely attending the second anniversary of his father’s death³ at his home. At the beginning of the film, Makoto

does not take the ceremony seriously, reflecting his lack of respect and appreciation for his deceased father (Figure 2).

In the next scene, Makoto receives a phone call from his friend, Tomonari Suda, asking him to photograph his father’s funeral ceremony, even though Tomonari’s father is still alive. This request reminds Makoto of his own father’s passing. As Makoto searches for his *mofuku*⁴ and touches it, memories of his past resurface (Left in Figure 4). Makoto’s father’s funeral (Figure 3) was very small, with only a few in-person attendees, while his father’s business associates and distant relatives attended remotely (Right in Figure 4). Although Makoto’s mother assured him it was acceptable to attend remotely, he chose to attend the funeral in person. While preparing for the funeral, Makoto searched for a suitable photo for the *iei* portrait⁵ but could not find one in the limited time available. Reluctantly, the Aira family accepted the funeral company’s suggestion to create an AI-generated portrait of his father using suboptimal photos (shown on the left in Figure 6, Figure 3). Ultimately, despite being a professional photographer, Makoto was unable to take any photos during the funeral, and he struggled to resolve his complex emotions toward his father in the real-time setting.

In the middle of the film, Makoto hears from his mother that his father’s virtual funeral venue is still accessible and that he can revisit the website. When Makoto accesses the venue, he discovers a recently posted message that was not there two years ago (Right in Figure 8). Quietly moved, Makoto learns stories of his father in his younger years that he had never known. The message includes words of gratitude from the wife of a couple whom his father had photographed around the time they got married, along with attached photos. These photos showed that, although his father was not in the pictures, “he was there” as the photographer. Gradually, Makoto begins to respect his father’s life, after two years since his death.

Makoto returns to his parents’ home to search for old photos once more. Finally, he finds his old digital camera, surprisingly containing data from that time, including the first photo Makoto

³In Japan, this memorial service is called *sankaiki*, which means the third anniversary. This expression includes the day of death as the first year, so the *sankaiki* is held after

two full years have passed. However, for simplicity in this paper, we will refer to it as *the second anniversary* of his death.

⁴In Japan, when attending funerals, mourners are required to wear completely black suits and neckties (for men), called *mofuku*.

⁵The portrait of the deceased prepared for the funeral altar in Japan [90]



Figure 3: At Makoto’s father’s funeral, all mourners are filling the casket with flowers to prepare for the departure.

had ever taken of his father. At this moment, Makoto receives a phone call from Tomonari informing him that Tomonari’s father has died. Makoto agrees to photograph the upcoming funeral ceremony to resolve his complex feelings towards his father.

At the Suda family’s funeral, Makoto directs his camera toward Tomonari’s father lying in the casket. As he looks through the lens, Makoto feels as if his father is standing before the camera (Figure 5).

In the final scene of the film, Makoto sits quietly in his room, facing his computer screen. An archival video of his father’s funeral plays, but this time, his late father’s *iei* portrait has been replaced by a photograph Makoto took during his childhood. The film ends with Makoto silently watching the screen (Figure 10).

4.3 Rationale behind the Scripts

In the story of this film, we decided to depict a two-year passage of time to portray the changing emotions, particularly for the protagonist, Makoto, toward a deceased loved one. The film begins with the scene of Makoto’s father’s second death anniversary, and a flashback to the father’s funeral from two years earlier is included in the middle. Additionally, this passage of time emphasizes the benefit of the virtual funeral feature, which allows Makoto not only to attend in real time but also to revisit the funeral at a later date.

The theme of this film is deeply connected to photography, virtual technology, and other media technologies. Therefore, Makoto’s profession was made that of a professional photographer, and his late father also had photography as a hobby. In Japan, weddings and funerals are generally seen as opposite events, as reflected in

the Japanese phrase “*kankon-sōsai*” (ceremonial occasions). Hence, Makoto’s profession as a bridal photographer aligns with this duality.

Additionally, to convey that the integration of virtual and remote streaming technologies into funerals is not something special but rather a normal part of the world in the film, and to illustrate a variety of designs, we included the funerals of two different families in the movie. By featuring a scene where elderly individuals and others attend the funeral remotely (e.g., Figure 6), the film demonstrates that these technologies are accepted by people of all generations.

The virtual funerals we propose in this research offer not only the advantages of remote attendance and the ability to revisit the ceremony later, but also the benefit of gathering memories of the deceased over time in a single cyberspace. It is not always possible for everyone connected to the deceased to bring memory items to the funeral at the same time (i.e., during the ceremony itself). However, if there is a “space” where they can post memories whenever they find or recall something about the deceased, it increases the likelihood of discovering “unknown memories” about the person. For this reason, the film includes a scene where Makoto discovers that an episode about his father was posted in the virtual venue two years after his father’s funeral. The film does not explicitly reveal why Makoto initially struggled to respect his father. However, it portrays that without the presence of the virtual funeral site, which allows for re-experiencing the funeral, Makoto’s feelings toward his father would not have changed. While new designs and



Figure 4: Left: Makoto is touching the *mofuku* (mourning clothes), which reminds him of his father’s funeral day. Right: One of the deceased’s colleagues is giving a speech remotely.



Figure 5: Left: Makoto is focusing on Tomonari’s father in the casket. Center: The view from Makoto’s perspective, as in-person mourners say farewell to the deceased. Right: Makoto’s father is standing, holding a camera.

technologies are not absolute solutions, the film illustrates their potential to bring about changes in people’s inner lives.

Although this film speculates about the future, we did not intend to depict virtual technology or digital data as all-powerful; instead, we aimed to portray their limitations as well. By combining newer technological elements with familiar, everyday aspects, including people’s emotions and communication, in realistic yet fictional scenarios, we sought to create an opportunity for audiences to reflect on the future experience of funerals. For instance, Makoto is reminded of his father by touching the mourning cloth *mofuku*, a tangible object with cultural meanings. Additionally, when searching for a photo of his father, it takes longer to find the digital version compared to the tangible printed photos. These elements align with findings highlighted in previous research within the HCI community, which emphasize the connection between tangible or embodied experiences and the evocation of memories [20, 65, 69, 80, 86, 89]. Alongside showing the convenience of AI-generated *iei* portrait, the film also portrays Makoto’s somewhat negative reaction, underscoring the duality of this speculative technology. AI-generated imaging will evolve shortly, and we aim to provide an opportunity to consider its pros and cons within a contextual scenario—specifically, a funeral.

4.4 Diegetic Prototypes in the Film

The Diegetic Prototypes [82, 83] play a particularly important role in expressing the virtual funerals depicted in this film, and we introduce these prototypes while articulating the intentions behind their

design. Most of these prototypes have physical forms and appearances, embodying aspects of product design, but their significance is only realized within the script of the film and the scenarios depicted in each scene. Additionally, by coexisting with other props featured in the film, they come together to form a near-future experience that feels real.

4.4.1 In-person Venues. As shown on the left in Figure 6, the funeral and second-anniversary memorial service⁶ for the Aira family were conducted according to the traditional rituals of the Jodo Shinshu Hongwanji sect, though the family is not particularly devout. They opted for a relatively simple venue, reflecting the recent trend in Japan toward private or family-only funerals [46]. However, a 48-inch monitor was set up during the casketing ceremony, as well as during the funeral and farewell ceremonies, to display the remote attendees. Additionally, a camera was installed at the back of the venue to broadcast the event, with video recorded by tablet computers simultaneously streamed and archived.

In contrast to the Aira family, the Suda family’s funeral was conducted in a non-religious style that has gained popularity in Japan in recent years. As shown in Figure 1, an altar was set up in the corner of a glass-walled room with views of high-rise buildings and apartments. A circular monitor with a diameter of 750 mm at the center of the altar displayed an *iei* portrait of the deceased, with floral square displays measuring 750 mm in height and 1310 mm in width arranged on the inner sides, and digital displays of

⁶The *sankaiki* Buddhist memorial service, held two years after the funeral in Japan

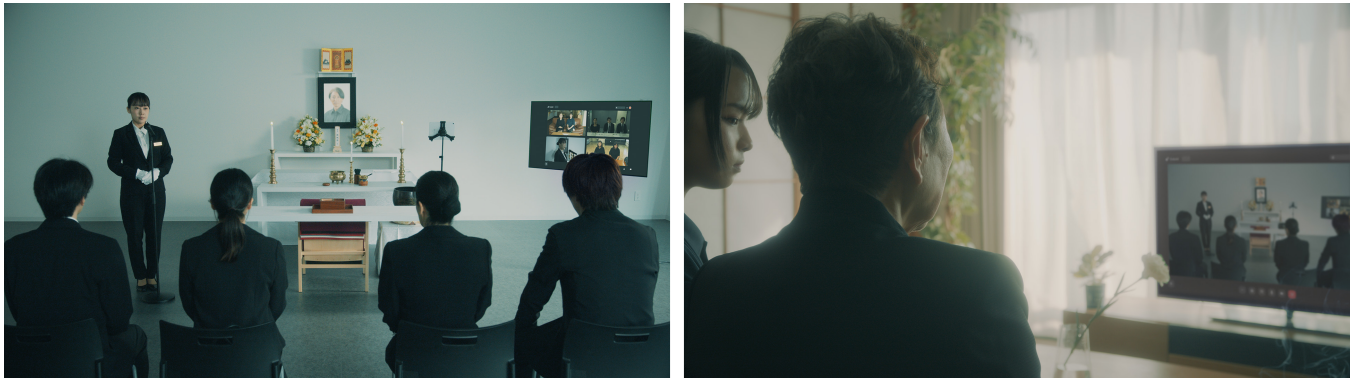


Figure 6: Left: The Aira family’s ceremony venue. Right: Makoto’s grandmother is remotely attending the funeral ceremony.

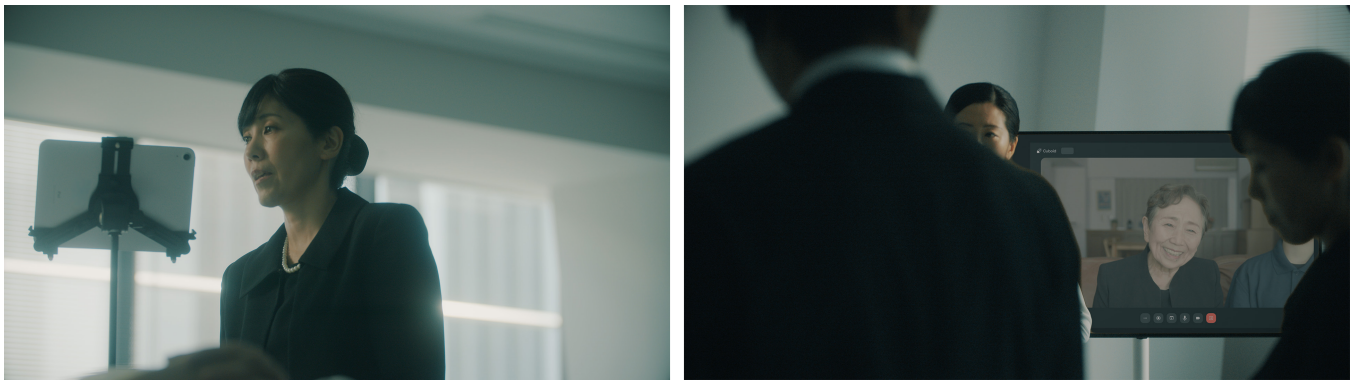


Figure 7: Left: During the casketing, Makoto’s mother is speaking to her mother-in-law (the deceased’s mother) through a tablet. Right: The grandmother is calling out to the deceased from her home.

the same size suspended on the outer sides. This combination of a circle and square is inspired by a previous work designed by the first author, where the circle represents the afterlife and the square represents the living world in Japanese Buddhism [92]. These digital displays showed various content during different stages of the ceremony, including the presence of remote attendees, messages sent to the virtual venue, and photos and videos reflecting the life and memories of the deceased. Similar to the Aira family’s venue, a camera was installed at the back, with the footage captured by multiple tablet computers simultaneously streamed and archived.

The equipment installed in both physical venues is not unique, but the integrated system—synthesizing all cameras, microphones, displays, and apps on the tablet computers—is essential. This system is supposed to be operated by funeral hall staff and in-person mourners (Figure 7). This design model is partly inspired by systems used in music clubs and Christian churches for real-time and archival webcasting services. The working model, in which funeral staff and in-person mourners collaboratively video-shoot using tablet computers, is derived from Oono-sousai [70], which successfully conducted hybrid funerals during the COVID-19 period.

Digital displays are installed to indicate the presence of remote attendees, but in both venues, they are placed beside the altar. This arrangement allows in-person attendees to focus on the *iei* portrait

during the memorial rituals. Special care is taken to ensure that the digital displays do not enter the line of sight during rituals, such as incense offerings at the Aira family’s funeral or flower dedication at the Suda family’s ceremony.

4.4.2 Virtual Venues. The virtual funeral venues (Figure 8) include the following features:

- (1) **Remote Attendance:** Mourners can participate remotely in real-time ceremonies (e.g., casketing ceremonies, funerals, farewell ceremonies, memorial services, etc.), with usability comparable to remote conferencing systems like Zoom.
- (2) **Message Posting and Sharing:** Mourners can post and share messages for the deceased.
- (3) **Content Posting and Sharing:** Mourners can post and share photos or videos featuring the deceased or memories with the deceased, along with annotations.
- (4) **Revisiting after the Funeral:** All mourners can access the virtual venue even after the physical venue has been dismantled. They can browse video recordings of the ceremonies and continue using the message and content posting features (2 and 3).

Functions 2 and 3 can be used before, during, and after the funeral, making the virtual funeral venue a hub for remembering and



Figure 8: Left: A staff member from the funeral company is showcasing the virtual funeral venue. Center: Makoto is scanning a QR code to access the virtual venue. Right: Two years later, Makoto is revisiting the site and comes across an unknown message.



Figure 9: Left: A remote mourner is opening a Package Kit for the remote ritual items. Right: Two remote mourners are praying for the deceased while offering flowers and incense.

honoring the deceased, extending beyond the ceremonies themselves. Existing online memorial sites, such as Facebook Memorialized Accounts, typically do not integrate with funeral services, leading to a disconnect between special events like funerals and memorial services, and the daily practice of remembering and honoring the deceased.

As noted, a VR ceremony service has recently been launched in Japan [85], offering a metaverse memorial site. However, this platform operates independently of in-person funeral or memorial venues and other online memorial services. It also limits access to one year, lacking features for ongoing maintenance or updates.

In contrast, this study proposes a design that integrates remote attendance at ceremonies (Function 1), access to archived events (Function 4), and the capabilities of an online memorial (Functions 2 and 3). The design's value is demonstrated through the story of Makoto, the protagonist, who revisits his late father's virtual venue two years after his death, rekindling a psychological connection and bond with him (Figure 1).

The platform also incorporates user-controlled privacy settings for posts and shared content related to Functions 2 and 3. Users can specify whether the content is visible to family members and other attendees or remains private. This feature reflects findings from prior research [91], which emphasized the need to distinguish between personal remembrance activities and community-oriented interactions centered around the deceased.

While the virtual venue employs account systems and security measures commonly found in modern web services, it is designed

to allow access without requiring an account. However, achieving greater persistence and implementing stronger privacy protections are challenges that remain outside the scope of this research.

4.4.3 Packaged Kits for Ritual Items. As shown in Figure 9, a package containing ritual items, such as flowers, a vase, incense sticks with a holder, and instructions for joining the virtual funeral venue is delivered to remote mourners. This design model is inspired by previous works [91, 94]. Although these ritual items lack interactive functionality, they help synchronize the funeral rituals between the in-person and remote venues. For instance, the same scented incense sticks are burned, and both sets of mourners perform identical floral ceremonies. We believe that remote mourners can still benefit from embodied rituals as a substitute for in-person attendance, aligning with the insights of Sas et al. [80], and supported by other research [20, 24, 25, 54, 65, 69, 86, 89].

4.4.4 Portrait of the Deceased. For the Aira family's funeral, an *iei* portrait was created using generative AI, as the family members were unable to provide suitable photos. This element speculates on experiences that could arise soon. However, the main character, Makoto, a professional photographer, was dissatisfied with this outcome, feeling as though his role was being supplanted by AI.

In the final scene of the film, we (highly fictionally) depict Makoto's father's portrait being replaced with a different photo—one taken by him when he was young—that was discovered after the funeral ceremony (Figure 10). Typically, the *iei* portrait in Japan is prepared before the funeral and remains in use permanently afterward. While

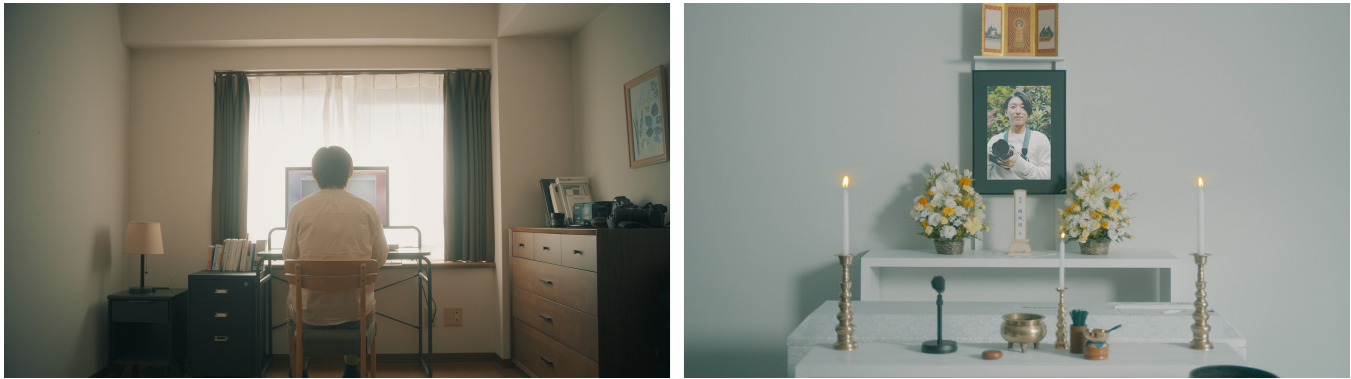


Figure 10: Left: Makoto is watching the archived funeral video, accessing the virtual memorial site of his late father. Right: Makoto’s father’s portrait is replaced with a photo of his father taken by him when he was young.

this is rather a “Fantasy Prototype” intended for Critical/Speculative Design [9, 84], it also envisions a future where virtual funerals are widely accepted, and the portrait of the deceased could change depending on who is viewing it.

4.5 Findings through the film Creation

4.5.1 How to Design Diegetic Prototypes. All the Diegetic Prototypes were created during the filming process, rather than beforehand. Additionally, none of the prototypes were created by a single individual; rather, they were completed through collaboration among members with different expertise, experiences, and roles.

The physical funeral venues for the Aira and Suda families were collaboratively designed by the director, producer, installer, and funeral supervisor. The installer consulted the director about the characters, family views on funerals, and the deceased’s personality. Using this input, the installer created rough sketches, which the director and producer reviewed to refine the overall design direction. The funeral supervisor thoroughly evaluated the plans, finalized product details, and dimensions, and advised on final adjustments, including prop selection.

The Packaged Kits were mainly designed by the funeral supervisor, who constantly consulted with the director about the scenes and locations where they would be used. Appropriate items, such as incense sticks and holders, fresh flowers, vases, and packaging boxes, were selected. For the Aira family, which aimed for a modest funeral, simpler items were chosen, while for the Suda family, slightly more expensive flowers and vases were selected, reflecting the subtle differences in the setting.

The Diegetic Prototypes were not standalone futuristic products but were carefully designed to align with Japan’s existing funeral practices, blending naturally into the cultural context to form cohesive virtual funeral designs. While some props were “ready-made,” prepared based on the director’s instructions, creating Diegetic Prototypes required significant collaboration and effort to seamlessly integrate with these elements, enhancing narrative realism.

4.5.2 Unpredictable Imagery: Methodological Insights into Aesthetics and Reality. Interestingly, the director and producer had contrasting reactions to the filming of the funeral scenes. The director found himself both surprised and in awe when reviewing the footage of

the funeral scenes, despite having meticulously planned and filmed them himself. Shortly after filming the funeral scenes, he shared his thoughts with the cast and crew, saying, “*While part of it was made possible thanks to the abilities of the cast and production team, I feel that the special time and space captured on camera were created by the rigorous rites, physical actions, and rituals inherent in funeral ceremonies.*” While, the producer, who had been preoccupied with the creation of the Diegetic Prototypes right up until filming began, felt a sense of relief that the shooting had finished successfully, along with a rather bland thought that everything they had prepared had been properly captured on camera. This contrasted sharply with the director, who was focused on the overall narrative flow of the film and the creation of each scene.

These contrasting and unpredictable reactions to the filming can be attributed to the unique methodology we employed. As mentioned in 3.2, our film production team was composed of individuals with diverse areas of expertise. The director, along with the production team and cast, brought a filmmaking background, while the producer, funeral supervisor, and installer contributed their deep knowledge of mourning and memorialization practices. This combination of film production and specialized expertise had a significant influence on the creation process.

As noted, the director adopted the Italian-style acting approach, focusing on each cast member’s cultural understanding of funerals and their personal experiences with mourning and confronting the deceased. With this approach, the actors interacted with the Diegetic Prototypes and other props on camera, conveying genuine emotions rather than delivering contrived performances. To ensure the accuracy of funeral-related actions, rituals, and etiquette, the funeral supervisor provided detailed guidance during the production. These integrated performances were entirely unpredictable during rehearsals and only emerged for the first time in front of the production team during the actual filming.

Although the film cannot be fully “evaluated” until it is seen by an external audience—one who can react, empathize, or resist certain scenes—it is important to note that no one involved in the production believes that the final product is free from unpredictable elements. However, this evaluation falls outside the scope of this paper, which is an obvious limitation.

Ultimately, the film’s creation process demonstrated how funeral rituals, Diegetic Prototypes, and design-driven collaborative dynamics intertwined to produce meaningful outcomes. By integrating aesthetic imagery with realistic speculation, the project not only deepens our understanding of the creative process but also sheds light on the evolving nature of funeral and memorial practices. Framed through the lens of HCI design and emerging technologies, it explores how digital mediation continues to reshape the ways we commemorate, memorialize, and remember the deceased.

5 Discussion

5.1 Designing Virtual Funerals

The concept of virtual funerals depicted in the film encompasses several elements, creating a unified experience for the mourners. Broadly, they include: 1) remote participation in hybrid funerals (or memorial services), where both remote and in-person attendees coexist, 2) viewing archived videos of the funeral or memorial services, and 3) an online memorial that can be used continuously before, during, and after the funeral. The film envisions a near-future experience in which these three components are seamlessly integrated into everyday life and widely accepted by society.

We have also highlighted the preferred ways of conducting hybrid funerals in the film. The “completely virtual funeral,” where all attendees participate online—a model that was successfully reported in several prior studies [7, 52]—was not addressed in this research due to its reduced demand following the pandemic. In contrast, hybrid funerals, which have faced significant challenges in many regions, continue to maintain relevance (e.g., [53, 78]). There remains much room for discussion on how hybrid funerals can be implemented in a more desirable form [75, 97]. We believe that the concrete scenes of hybrid funerals in the film serve as Design Fiction, demonstrating how they can be arranged and applied to future real-world funerals.

In addition to creating this film with a team of various specialists, we incorporated the findings from related works into our scenarios. In the scene of “the final farewell before the departure to the crematorium” reported by Uriu et al. [97], the voices of remote attendees were streamed into the physical venue via a smartphone running Zoom, allowing their presence to be felt alongside in-person attendees. We have also designed Diegetic Prototypes that not only integrate remote streaming and recording equipment into the venue but also display the presence of remote attendees, allowing them to be felt within the funeral space. Additionally, we adopted tablet computers for funeral staff and attendees to ensure accessibility for everyone. While this approach is not groundbreaking in terms of technology or design, it is a method employed by Oono-sousai [70], a local funeral company with experience in conducting more than 50 remote-attended funerals. Particularly in Japan, where the preparation period for funerals is short, it is crucial that all stakeholders involved in the funeral process use familiar devices [97].

Concerning these aspects, our film shows that there is a potential for new design interventions in funeral venues to bring the depicted vision to life. However, the design models presented are limited examples, and it is anticipated that diverse variations will emerge as the demand for such designs grows in the future.

5.2 Methodological Implications for Thanatosensitive Design

As mentioned in the literature review, most thanatosensitive design [57] research in the HCI community focuses on domestic and personal memorialization and remembrance after funeral ceremonies [35, 44, 59, 66, 92, 94, 95, 99], leaving room for further exploration on how to design future funerals. Since or after COVID-19, discussions about virtual funerals have been more prominent in other research areas (e.g., [16, 18, 53, 77, 78]) than in HCI (design) research, with the notable exceptions of [75, 97]. One of the main challenges of this research was how to design technology-supported funerals that align with the contemporary needs of people in different regions. In our case, the location is Japan.

To address this issue as an RtD project, we adopted a methodology that synthesizes multiple approaches: creating a Design Fiction film while designing Diegetic Prototypes through the film production process, and incorporating an autobiographical research approach. This was necessary because actual funerals are highly sensitive and private, where failure is unacceptable, making it difficult to apply iterative design through trial and error, as is common in typical design methodologies.

While fragmented visions of virtual funerals exist, as discussed in 3.1, it is not feasible to prototype or conduct iterative experimentation with actual funeral practices. As Blythe [9] observed, “*The use of Design Fiction helped identify weak ideas without discarding them and also helped identify whether particular prototypes would be likely to answer research questions.*” In this research, the process of creating a Design Fiction allowed us to refine vague ideas into concepts that were both concrete and compelling, ultimately driving the project to completion.

This achievement came from collaboration between the authors and the film production team, who worked together to design Diegetic Prototypes during the film’s production. While the technical elements in the film were not groundbreaking, the scenes and story were strikingly vivid. For the team, the process resulted in virtual funeral depictions that, though fictional, felt surprisingly realistic and emotionally powerful.

The autobiographical approach is well known for being suitable for addressing long-term, intimate, private, and other challenging issues [22], as demonstrated by Wallace et al. [99], who autobiographically explored highly private and sensitive domestic memorialization rituals. In our case, as a Design Fiction, we aimed to depict how the main character, Makoto, gradually comes to terms with his late father through the virtual funeral and memorial site. This scenario demonstrated how the Diegetic Prototype supported his emotional and spiritual journey. Furthermore, this paper also provides an autobiographical account of how we created our film, offering insights and implications for future design research. Our integrated methodology can be used to design for mourning, memorialization, and remembrance, as well as other sensitive and private design issues that are difficult to test in real-world settings.

This study presents a research methodology for thanatosensitive design through the creation of Design Fiction. Despite the recognition of the necessity for thanatosensitive design, the highly sensitive and private nature of this theme has slowed progress and posed challenges in establishing a standardized methodology. Researchers

have adopted various approaches, such as developing bespoke products in close collaboration with the bereaved [44, 60], or employing autobiographical methods [99]. The authors, along with invited members including professionals in mourning and memorialization and film production experts, collaborated to conduct design-driven experimentation, developing necessary Diegetic Prototypes during the filmmaking process. Documented as an RtD outcome, this paper captures their collaborative experiences and findings. While the study specifically addresses the complex theme of funeral design, its insights are equally applicable to the design of post-funeral mourning practices.

5.3 Design Fiction and Diegetic Prototypes

This study also provides a concrete example that underscores the value of Design Fiction in HCI design research. While previous studies have shown the usefulness of Design Fiction in HCI Design and RtD projects [9–11], this project stands out for tackling the challenging topic of virtual funerals. The resulting film depicted a world that neither the authors nor the production team could have fully anticipated, showcasing a “chemical fusion” that emerged from the integration of diverse expertise and perspectives.

Although our firsthand experience alone cannot empirically explain the emergence of these results, we propose several key implications. First, the authors, both deeply experienced in design research and RtD, shared a strong commitment to generating novel concepts through design thinking. This aligns with the philosophy of RtD, in which researchers take an active role in the design process [105]. What distinguishes this study is its holistic embrace of Design Fiction, culminating in the production of a full-fledged film directed by an experienced filmmaker.

Moreover, we argue that the involvement of an RtD expert on mourning and memorialization (the producer) and the funeral supervisor with in-depth knowledge of Japanese funeral practices significantly enhanced the film’s ability to present a credible vision of the future. The collaborative process of screenplay creation, combined with the precise design of Diegetic Prototypes, highlights the potential of this methodology to provide meaningful insights into envisioning the future of everyday living. This is especially relevant for sensitive contexts where failure is unacceptable, such as funeral design.

6 Limitation and Future Work

This research through film production was made possible precisely because it was an independent production, free from the constraints of commercial interests, unlike other commercial films, including those featuring Critical/Speculative Designs [102]. Of course, making a film requires a certain amount of money, but at the same time, significant insights can be gained from a film of a scale that two researchers can manage and focus on creating their work.

However, this aspect inevitably represents a limitation for other researchers referencing this study. For example, the director typically works as a professional filmmaker, producing content commissioned by clients for remuneration. In this study, we compensated the filming crew and cast with standard-level payments. The installer also received remuneration based on the number of days worked. However, no payment was made to the funeral supervisor,

who is a relative of the producer and voluntarily contributed to this project.

It is reasonable for researchers not to receive extra payment for their production activities. However, when other researchers reference this paper and attempt to conduct research through the production of Design Fiction films, their expenses will likely exceed those incurred in our work. Skilled film production teams exist worldwide, and if financial constraints are not a concern, excellent outcomes can be achieved through careful collaboration with them. However, as exemplified by the funeral supervisor in our case, securing personnel who enhance the film’s realism and provide expertise in design-related issues is more crucial than having abundant financial resources. Furthermore, researchers engaged in RtD projects must possess a deep understanding of the theme, insightful perspectives, and strong project execution capabilities.

In our case, we utilized the director’s skills and experience to their fullest extent, sparing no financial resources for the filming process. This aspect is critical to the final quality of the film and significantly influences the impression it leaves on the general audience, who may not distinguish whether it is a research prototype or a professional work meant for theatrical release. However, on the other hand, the high-quality images achievable with the latest smartphones demonstrate that, with proper ingenuity, students or individuals with foundational training in design and art education can produce sufficiently adequate video and audio recordings for their purposes.

The most important implication of this research is assembling a team with the necessary expertise to address design challenges and rigorously reviewing their work while creating Diegetic Prototypes and scenarios where these prototypes come into play. This process cannot be achieved solely with financial resources; it requires the abilities expected of researchers involved in RtD projects [30, 105].

Another limitation of this research is that the production of the film we undertook must be emphasized as merely an intermediate step in our RtD research process. This is not only because this paper does not provide an objective evaluation of the film itself, but also because we have yet to undertake the work of translating the feedback on the film into the actual design of new funeral practices. Our aim is not to question the “validity” of the Diegetic Prototypes or the concept of virtual funerals depicted in the film. For future work, we plan to conduct research through film screenings, targeting three main audiences:

- (1) **All individuals involved in this film’s production, as well as other researchers, film directors, and creators:** Feedback from this group will be documented as findings related to HCI design research derived from the Design Fiction production process, forming the foundation for our next research project involving the creation of a Design Fiction film. It also helps improve how filmmakers contribute to HCI design research.
- (2) **Funeral service providers:** If they resonate with our design concepts, we will seek partners to collaboratively deliver these services to their clients and work toward realizing near-future funerals. If they point out challenges or areas for improvement, we aim to co-create more practical design concepts through dialogue.

- (3) **The general public interested in the film as a work of art:** While their evaluation of the film as a cinematic work will be reflected in the director's future projects, reactions of empathy or rejection toward funerals as cultural, spiritual, emotional, and personal experiences will depend on each viewer's background. As researchers with an academic perspective, we aim to go beyond simple metrics of support or popularity and conduct surveys to deeply understand the relationship between individual viewers and the film.

7 Conclusion

This research proposes a vision for the future of virtual funerals by integrating HCI design and technology with contemporary funeral rituals in Japan. Through the creation of a Design Fiction film, we illustrate how virtual funerals can offer meaningful experiences for both in-person and remote mourners while enabling continuous memorialization through digital archives. As virtual funerals, initially adopted during the COVID-19 pandemic, risk fading from memory, this study emphasizes their potential as more than a temporary solution. By blending Research through Design (RtD) with Design Fiction and the creation of Diegetic Prototypes, we demonstrate how the sensitive, emotional, and ritualistic aspects of mourning, memorialization, and remembrance can be thoughtfully addressed. This paper is accompanied by the film, and we hope readers will watch it and reflect on how future funerals and memorial practices might evolve in their own cultures, regions, and personal experiences.

Acknowledgments

We express our deepest gratitude to everyone who contributed to this film-based exploration research. Special thanks go to Amico Uriu as the Funeral Supervisor and Hiroaki Takahashi as the Installer. We are sincerely thankful to the Film Production Team and talented Cast for their dedication and hard work. Finally, we appreciate the Shibaura Institute of Technology for providing the filming locations. This work was supported by JSPS KAKENHI Grant Number 22K18447.

References

- [1] Ruben Albers, Shadan Sadeghian, Matthias Laschke, and Marc Hassenzahl. 2023. Dying, Death, and the Afterlife in Human-Computer Interaction. A Scoping Review.. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems* (Hamburg, Germany) (CHI '23). Association for Computing Machinery, New York, NY, USA, Article 302, 16 pages. <https://doi.org/10.1145/3544548.3581199>
- [2] Ségolène Allemandu. 2020. *In this Covid-19 era, families live-stream funerals on Facebook*. <https://www.france24.com/en/20200417-in-this-covid-19-er-families-live-stream-funerals-on-facebook> Accessed: 2024-7-23.
- [3] Michael Arnold, Martin Gibbs, Tamara Kohn, James Meese, and Bjorn Nansen. 2017. *Death and Digital Media*. Routledge. 188 pages.
- [4] Film at Lincoln Center. 2021. Ryūsuke Hamaguchi on Drive My Car | NYFF59. <https://youtu.be/-18rVXCD1f0?feature=shared>. Accessed: 2024-9-5.
- [5] Roland Barthes. 1981. *Camera Lucida: Reflections on Photography*. Hill and Wang.
- [6] Eric P. S. Baumer, Mark Blythe, and Theresa Jean Tanenbaum. 2020. Evaluating Design Fiction: The Right Tool for the Job. In *Proceedings of the 2020 ACM Designing Interactive Systems Conference* (Eindhoven, Netherlands) (DIS '20). Association for Computing Machinery, New York, NY, USA, 1901–1913. <https://doi.org/10.1145/3357236.3395464>
- [7] Alexandra Bitusikova. 2020. COVID-19 and Funeral-by-Zoom. *Urbanities—Journal of Urban Ethnography* (2020), 51–55. <https://www.anthrojournal-urbanities.com/vol-10-suppl-4-september-2020/>
- [8] Julian Bleecker. 2009. *Design Fiction: A short essay on design, science, fact and fiction*. https://systemsorienteddesign.net/wp-content/uploads/2011/01/DesignFiction_WebEdition.pdf
- [9] Mark Blythe. 2014. Research through design fiction: narrative in real and imaginary abstracts. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Toronto, Ontario, Canada) (CHI '14). Association for Computing Machinery, New York, NY, USA, 703–712. <https://doi.org/10.1145/2556288.2557098>
- [10] Mark Blythe. 2017. Research Fiction: Storytelling, Plot and Design. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems* (Denver, Colorado, USA) (CHI '17). Association for Computing Machinery, New York, NY, USA, 5400–5411. <https://doi.org/10.1145/3025453.3026023>
- [11] Mark Blythe and Enrique Encinas. 2016. The Co-ordinates of Design Fiction: Extrapolation, Irony, Ambiguity and Magic. In *Proceedings of the 2016 ACM International Conference on Supporting Group Work* (Sanibel Island, Florida, USA) (GROUP '16). Association for Computing Machinery, New York, NY, USA, 345–354. <https://doi.org/10.1145/2957276.2957299>
- [12] Torie Bosch. 2012. *Sci-Fi Writer Bruce Sterling Explains the Intriguing New Concept of Design Fiction*. <https://slate.com/technology/2012/03/bruce-sterling-on-design-fictions.html> Accessed: 2024-9-9.
- [13] Giséle Braunberger. 1969. La direction d'acteur par Jean Renoir. https://www.imdb.com/title/tt0163603/?ref_=fn_al_tt_1. Accessed: 2024-9-5.
- [14] Robert Bresson. 1977. *Notes on the Cinematograph*. Éditions Gallimard.
- [15] Jed R. Brubaker, Lynn S. Dombrowski, Anita M. Gilbert, Nafiri Kusumakaulika, and Gillian R. Hayes. 2014. Stewarding a legacy: responsibilities and relationships in the management of post-mortem data. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Toronto, Ontario, Canada) (CHI '14). Association for Computing Machinery, New York, NY, USA, 4157–4166. <https://doi.org/10.1145/2556288.2557059>
- [16] Alexander Burrell and Lucy E. Selman. 2020. How do Funeral Practices Impact Bereaved Relatives' Mental Health, Grief and Bereavement? A Mixed Methods Review with Implications for COVID-19. *OMEGA—Journal of Death and Dying Omega (Westport)* 85, 2 (2020), 345–383. <https://doi.org/10.1177/0030222820941296>
- [17] Candi K. Cann. 2015. *Virtual Afterlives: Grieving the Dead in the Twenty-First Century* (Material Worlds Series). University Press of Kentucky. 212 pages.
- [18] Cliff Yung-Chi Chen. 2022. Grieving During the COVID-19 Pandemic: In-Person and Virtual “Goodbye”. *OMEGA - Journal of Death and Dying Omega (Westport)* (2022). <https://doi.org/10.1177/00302228221090754>
- [19] Janet X. Chen, Francesco Vitale, and Joanna McGrenere. 2021. What Happens After Death? Using a Design Workbook to Understand User Expectations for Preparing their Data. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (Yokohama, Japan) (CHI '21). Association for Computing Machinery, New York, NY, USA, Article 169, 13 pages. <https://doi.org/10.1145/3411764.3445359>
- [20] Elaine Czech, Mina Shibasaki, Keitaro Tsuchiya, Roshan L. Peiris, and Kouta Minamizawa. 2020. Discovering Narratives: Multi-sensory Approach Towards Designing with People with Dementia. In *Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) (CHI EA '20). Association for Computing Machinery, New York, NY, USA, 1–8. <https://doi.org/10.1145/3334480.3375209>
- [21] Kathrin Boerner Deborah Carr and Moorman Sara. 2020. Bereavement in the Time of Coronavirus: Unprecedented Challenges Demand Novel Interventions. *Journal of Aging & Social Policy* 32, 4-5 (2020), 425–431. <https://doi.org/10.1080/08959420.2020.1764320>
- [22] Audrey Desjardins and Aubree Ball. 2018. Revealing Tensions in Autobiographical Design in HCI. In *Proceedings of the 2018 Designing Interactive Systems Conference* (Hong Kong, China) (DIS '18). Association for Computing Machinery, New York, NY, USA, 753–764. <https://doi.org/10.1145/3196709.3196781>
- [23] Audrey Desjardins, Oscar Tomico, Andrés Lucero, Marta E. Cecchinato, and Carman Neustaedter. 2021. Introduction to the Special Issue on First-Person Methods in HCI. *ACM Trans. Comput.-Hum. Interact.* 28, 6, Article 37 (dec 2021), 12 pages. <https://doi.org/10.1145/3492342>
- [24] Tanja Döring, Axel Sylvester, and Albrecht Schmidt. 2013. A design space for ephemeral user interfaces. In *Proceedings of the 7th International Conference on Tangible, Embedded and Embodied Interaction* (Barcelona, Spain) (TEI '13). Association for Computing Machinery, New York, NY, USA, 75–82. <https://doi.org/10.1145/2460625.2460637>
- [25] Paul Dourish. 2001. *Where the Action Is: The Foundations of Embodied Interaction*. The MIT Press. <https://doi.org/10.7551/mitpress/7221.001.0001>
- [26] Dylan Thomas Doyle and Jed R. Brubaker. 2023. Digital Legacy: A Systematic Literature Review. *Proc. ACM Hum.-Comput. Interact.* 7, CSCW2, Article 268 (oct 2023), 26 pages. <https://doi.org/10.1145/3610059>
- [27] Anthony Dunne and Fiona Raby. 2013. *Speculative Everything: Design, Fiction, and Social Dreaming*. MIT Press. <https://books.google.co.jp/books?id=9gQyAgAAQBAJ>
- [28] Sara Eriksson and Preben Hansen. 2017. HeartBeats: A Speculative Proposal For Ritualization of Digital Objects. In *Proceedings of the 2017 ACM Conference*

- Companion Publication on Designing Interactive Systems* (Edinburgh, United Kingdom) (DIS '17 Companion). Association for Computing Machinery, New York, NY, USA, 218–222. <https://doi.org/10.1145/3064857.3079149>
- [29] Julia L. Frydman, Eugene W. Choi, and Elizabeth C. Lindenberger. 2020. Families of COVID-19 Patients Say Goodbye on Video: A Structured Approach to Virtual End-of-Life Conversations. *Journal of Palliative Medicine* 23, 12 (2020), 1564–1565. <https://doi.org/10.1089/jpm.2020.0415>
- [30] William Gaver. 2012. What should we expect from research through design?. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Austin, Texas, USA) (CHI '12). Association for Computing Machinery, New York, NY, USA, 937–946. <https://doi.org/10.1145/2207676.2208538>
- [31] Marco Gilardi, Patrick Holroyd, Carly Brownbridge, Phil L. Watten, and Marianna Obrist. 2016. Design Fiction Film-Making: A Pipeline for Communicating Experiences. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems* (San Jose, California, USA) (CHI EA '16). Association for Computing Machinery, New York, NY, USA, 1398–1406. <https://doi.org/10.1145/2851581.2892280>
- [32] Rebecca Gulotta, William Odom, Haakon Faste, and Jodi Forlizzi. 2014. Legacy in the age of the internet: reflections on how interactive systems shape how we are remembered. In *Proceedings of the 2014 Conference on Designing Interactive Systems* (Vancouver, BC, Canada) (DIS '14). Association for Computing Machinery, New York, NY, USA, 975–984. <https://doi.org/10.1145/2598510.2598579>
- [33] Rebecca Gulotta, William Odom, Jodi Forlizzi, and Haakon Faste. 2013. Digital artifacts as legacy: exploring the lifespan and value of digital data. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Paris, France) (CHI '13). Association for Computing Machinery, New York, NY, USA, 1813–1822. <https://doi.org/10.1145/2470654.2466240>
- [34] Jonna Häkkinä, Ashley Colley, and Matilda Kalving. 2019. Designing an interactive gravestone display. In *Proceedings of the 8th ACM International Symposium on Pervasive Displays* (Palermo, Italy) (PerDis '19). Association for Computing Machinery, New York, NY, USA, Article 4, 7 pages. <https://doi.org/10.1145/3321335.3324952>
- [35] Jonna Häkkinä, Ashley Colley, Matilda Kalving, and Meri-Tuulia Forsman. 2022. Exploring pervasive displays for cemeteries and memorial sites. *Personal and Ubiquitous Computing* 26, 3 (2022), 737–747. <https://doi.org/10.1007/s00779-019-01359-1>
- [36] Jonna Häkkinä, Petri Hannula, Elina Luiro, Emilia Launne, Sanni Mustonen, Toni Westerlund, and Ashley Colley. 2019. Visiting a virtual graveyard: designing virtual reality cultural heritage experiences. In *Proceedings of the 18th International Conference on Mobile and Ubiquitous Multimedia* (Pisa, Italy) (MUM '19). Association for Computing Machinery, New York, NY, USA, Article 56, 4 pages. <https://doi.org/10.1145/3365610.3368425>
- [37] Ryusuke Hamaguchi, Tadashi Nohara, and Tomoyuki Takahashi. 2015. *Kamera no mae de enjirukoto: Eiga Happy Hour text shusei* (Acting in front of a camera: "Happy Hour" film text compilation) (in Japanese). SAYUSHA.
- [38] Jeffrey R Hanna, Elizabeth Rapa, Louise J Dalton, Rosemary Hughes, Tamsin McGlinchey, Kate M Bennett, Warren J Donnellan, Stephen R Mason, and Catriona R Mayland. 2021. A qualitative study of bereaved relatives' end of life experiences during the COVID-19 pandemic. *Palliative Medicine* 35, 5 (2021), 843–851. <https://doi.org/10.1177/02692163211004210>
- [39] Carlos Hernández-Fernández and Carmen Meneses-Falcón. 2022. I can't believe they are dead. Death and mourning in the absence of goodbyes during the COVID-19 pandemic. *Health & Social Care in the Community* 30, 4 (2022), e1220–e1232. <https://doi.org/10.1111/hsc.13530>
- [40] Hibiya Kadan. 2020. *Free internet live streaming & Paid remote funeral service*. https://www.hibiya-lsp.com/covid-19_measures/remote-sogi/ (in Japanese) Accessed: 2024-7-24.
- [41] Michael Nørgaard Jørgensen and Tom Jenkins. 2023. Designing Anekdot: Investigating Personal Metadata for Legacy. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems* (Hamburg, Germany) (CHI '23). Association for Computing Machinery, New York, NY, USA, Article 153, 14 pages. <https://doi.org/10.1145/3544548.3581495>
- [42] Damien Keller. 2013. La Direction d'acteurs par Jean Renoir ou les métamorphoses incertaines. *Filmer l'artiste au travail* (2013), 149–159.
- [43] Tom Kelley and Jonathan Littman. 2001. *The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm*. Harper Collins Business.
- [44] Jieun Kim, Daisuke Uriu, Giulia Barbareschi, Youichi Kamiyama, and Kouta Minamizawa. 2024. Maintaining Continuing Bonds in Bereavement: A Participatory Design Process of Be.side. In *Proceedings of the CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) (CHI '24). Association for Computing Machinery, New York, NY, USA, Article 1002, 15 pages. <https://doi.org/10.1145/3613904.3642386>
- [45] David Kirby. 2010. The future is now: Diegetic prototypes and the role of popular films in generating real-world technological development. *Social studies of science* 40, 1 (2010), 41–70.
- [46] Megumi Kondo-Arita and Carl B. Becker. 2023. Changing Funerals and Their Effects on Bereavement Grief in Japan. *OMEGA - Journal of Death and Dying* (2023). <https://doi.org/10.1177/00302228231158914>
- [47] Sandjar Kozubaev, Chris Elsdon, Noura Howell, Marie Louise Juul Søndergaard, Nick Merrill, Britta Schulte, and Richmond Y Wong. 2020. Expanding modes of reflection in design futuring. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. 1–15.
- [48] Pengfei Leng, Xu Lang, and Zhigeng Pan. 2023. The Future Value of the Metaverse for Funeral and Interment. In *2023 International Conference on the Cognitive Computing and Complex Data (ICCD)*. 334–339. <https://doi.org/10.1109/ICCD59681.2023.10420677>
- [49] Sara Li. 2020. *Zoom funerals are a new reality in quarantine. This is what they're like*. <https://www.insider.com/zoom-funerals-are-a-new-reality-during-the-coronavirus-pandemic-2020-5> Accessed: 2020-9-17.
- [50] Joseph Lindley and Paul Coulton. 2016. Peer Review and Design Fiction: "Great Scott! The quotes are redacted". In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems* (San Jose, California, USA) (CHI EA '16). Association for Computing Machinery, New York, NY, USA, 583–595. <https://doi.org/10.1145/2851581.2892568>
- [51] Joseph Lindley and Paul Coulton. 2016. Pushing the Limits of Design Fiction: The Case For Fictional Research Papers. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (San Jose, California, USA) (CHI '16). Association for Computing Machinery, New York, NY, USA, 4032–4043. <https://doi.org/10.1145/2858036.2858446>
- [52] Peggy Mackenzie. 2020. *Mom's virtual memorial was beautiful and gave us the closure we needed*. Retrieved Sep 1, 2024 from https://www.thestar.com/life/relationships/mom-s-virtual-memorial-was-beautiful-and-gave-us-the-closure-we-needed/article_2ea050d2-9888-5281-86e3-17812130b637.html
- [53] Andie MacNeil, Blythe Findlay, Rennie Bimman, Taylor Hocking, Tali Barclay, and Jacqueline Ho. 2021. Exploring the Use of Virtual Funerals during the COVID-19 Pandemic: A Scoping Review. *OMEGA—Journal of Death and Dying Omega (Westport)* 88, 2 (2021), 425–448. <https://doi.org/10.1177/00302228211045288>
- [54] Robert B. Markum, Sara Wolf, Caroline Claisse, and Michael Hofer. 2024. Mediating the Sacred: Configuring a Design Space for Religious and Spiritual Tangible Interactive Artifacts. In *Proceedings of the Eighteenth International Conference on Tangible, Embedded, and Embodied Interaction* (Cork, Ireland) (TEI '24). Association for Computing Machinery, New York, NY, USA, Article 5, 22 pages. <https://doi.org/10.1145/3623509.3633353>
- [55] Thomas Markussen and Eva Knutz. 2013. The poetics of design fiction. In *Proceedings of the 6th International Conference on Designing Pleasurable Products and Interfaces* (Newcastle upon Tyne, United Kingdom) (DPPI '13). Association for Computing Machinery, New York, NY, USA, 231–240. <https://doi.org/10.1145/2513506.2513531>
- [56] Michael Massimi and Ronald M. Baecker. 2011. Dealing with death in design: developing systems for the bereaved. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Vancouver, BC, Canada) (CHI '11). Association for Computing Machinery, New York, NY, USA, 1001–1010. <https://doi.org/10.1145/1978942.1979092>
- [57] Michael Massimi and Andrea Charise. 2009. Dying, death, and mortality: towards thanatosensitivity in HCI. In *CHI '09 Extended Abstracts on Human Factors in Computing Systems* (Boston, MA, USA) (CHI EA '09). Association for Computing Machinery, New York, NY, USA, 2459–2468. <https://doi.org/10.1145/1520340.1520349>
- [58] Wendy Moncur, Jan Bikker, Elaine Kasket, and John Troyer. 2012. From death to final disposition: roles of technology in the post-mortem interval. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Austin, Texas, USA) (CHI '12). Association for Computing Machinery, New York, NY, USA, 531–540. <https://doi.org/10.1145/2207676.2207750>
- [59] Wendy Moncur, Miriam Julius, Elise van den Hoven, and David Kirk. 2015. Story Shell: The Participatory Design of a Bespoke Digital Memorial. In *Proceedings of the 4th Participatory Innovation Conference* 2015. 470–477.
- [60] Wendy Moncur and David Kirk. 2014. An emergent framework for digital memorials. In *Proceedings of the 2014 Conference on Designing Interactive Systems* (Vancouver, BC, Canada) (DIS '14). Association for Computing Machinery, New York, NY, USA, 965–974. <https://doi.org/10.1145/2598510.2598516>
- [61] Renee Noortman, Britta F. Schulte, Paul Marshall, Saskia Bakker, and Anna L. Cox. 2019. HawkEye - Deploying a Design Fiction Probe. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (Glasgow, Scotland UK) (CHI '19). Association for Computing Machinery, New York, NY, USA, 1–14. <https://doi.org/10.1145/3290605.3300652>
- [62] William Odom, Richard Banks, David Kirk, Richard Harper, Siân Lindley, and Abigail Sellen. 2012. Technology heirlooms? considerations for passing down and inheriting digital materials. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Austin, Texas, USA) (CHI '12). Association for Computing Machinery, New York, NY, USA, 337–346. <https://doi.org/10.1145/2207676.2207723>
- [63] William Odom, Samuel Barnett, Nico Brand, Minyoung Yoo, Henry Lin, and Jordan White. 2024. Negotiating Conceptual and Practical Frictions in Making the Capra Short Film: Extending a Research through Design Artifact with

- Video. In *Proceedings of the 2024 ACM Designing Interactive Systems Conference* (Copenhagen, Denmark) (DIS '24). Association for Computing Machinery, New York, NY, USA, 2866–2881. <https://doi.org/10.1145/3643834.3660739>
- [64] William Odom, Richard Harper, Abigail Sellen, David Kirk, and Richard Banks. 2010. Passing on & putting to rest: understanding bereavement in the context of interactive technologies. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Atlanta, Georgia, USA) (CHI '10). Association for Computing Machinery, New York, NY, USA, 1831–1840. <https://doi.org/10.1145/1753326.1753601>
- [65] William Odom, Abigail Sellen, Richard Banks, David Kirk, Tim Regan, Mark Selby, Jodi Forlizzi, and John Zimmerman. 2014. Designing for slowness, anticipation and re-visitation: a long term field study of the photobox. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Toronto, Ontario, Canada) (CHI '14). Association for Computing Machinery, New York, NY, USA, 1961–1970. <https://doi.org/10.1145/2556288.2557178>
- [66] William Odom, Daisuke Uriu, David Kirk, Richard Banks, and Ron Wakkary. 2018. Experiences in Designing Technologies for Honoring Deceased Loved Ones. *Design Issues* 34, 1 (01 2018), 54–66. https://doi.org/10.1162/DESI_a_00476
- [67] William Odom, Ron Wakkary, Youn-kyung Lim, Audrey Desjardins, Bart Hengeveld, and Richard Banks. 2016. From Research Prototype to Research Product. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (San Jose, California, USA) (CHI '16). Association for Computing Machinery, New York, NY, USA, 2549–2561. <https://doi.org/10.1145/2858036.2858447>
- [68] William Odom, Jordan White, Samuel Barnett, Nico Brand, Henry Lin, Minyoung Yoo, and Tal Amram. 2024. Capra: Making Use of Multiple Perspectives for Capturing, Noticing and Revisiting Hiking Experiences Over Time. In *Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) (CHI '24). Association for Computing Machinery, New York, NY, USA, Article 804, 27 pages. <https://doi.org/10.1145/3613904.3642284>
- [69] William Odom, John Zimmerman, Jodi Forlizzi, Ana López Higuera, Mauro Marchitto, José Cañas, Youn-kyung Lim, Tek-Jin Nam, Moon-Hwan Lee, Yeoreum Lee, Da-jung Kim, Yea-kyung Row, Jinmin Seok, Bokyung Sohn, and Heather Moore. 2013. Fragmentation and transition: understanding perceptions of virtual possessions among young adults in Spain, South Korea and the United States. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Paris, France) (CHI '13). Association for Computing Machinery, New York, NY, USA, 1833–1842. <https://doi.org/10.1145/2470654.2466242>
- [70] Oono-sousai. 2021. *DX Demonstration Experiment of Funerals Using Avatars in the NHK broadcast* (March 23, 2021). <https://www.youtube.com/watch?v=xK5-3nWBv8> (in Japanese) Accessed: 2024-9-11.
- [71] Oono-sousai. 2022. *Oono-sousai [Avatar Funeral] Promotional video*. <https://www.youtube.com/watch?v=rGXGnAnLd5I> (in Japanese) Accessed: 2024-7-24.
- [72] Charles Passy and Berger Paul. 2020. *Funerals in the Age of Coronavirus: No Hugs, But Plenty of Virtual Alternatives*. <https://www.wsj.com/articles/funerals-in-the-age-of-coronavirus-no-hugs-but-plenty-of-virtual-alternatives-11585145174> Accessed: 2020-9-17.
- [73] Melina Petsolari, Seray B Ibrahim, and Petr Slovak. 2024. Socio-technical Imaginaries: Envisioning and Understanding AI Parenting Supports through Design Fiction. In *Proceedings of the CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) (CHI '24). Association for Computing Machinery, New York, NY, USA, Article 98, 27 pages. <https://doi.org/10.1145/3613904.3642619>
- [74] Stacey Pittsillides. 2019. Digital legacy: Designing with things. *Death Studies* 43, 7 (2019), 426–434. <https://doi.org/10.1080/07481187.2018.1541939>
- [75] Stacey Pittsillides and Jayne Wallace. 2021. *Physically distant but socially connected: streaming funerals, memorials and ritual design during COVID-19*. Routledge, 60–76. <https://doi.org/10.4324/9781003125990-4-6>
- [76] Ryan Prior. 2020. *Funerals go virtual in the pandemic. Here's how to plan one with meaning and honor the dead*. <https://edition.cnn.com/2020/04/16/health/virtual-funerals-coronavirus-wellness/> Accessed: 2024-7-23.
- [77] Jennifer Riley, Vikki Entwistle, Arnar Arnason, Louise Locock, Rebecca Crozier, Paolo Maccagno, and Abi Pattenden. 2023. Why does funeral attendance matter? Revisiting 'configurational eulogies' in light of the COVID-19 pandemic in the UK. *Mortality* (2023), 1–22. <https://doi.org/10.1080/13576275.2023.2225029>
- [78] Jennifer Riley, Vikki Entwistle, Arnar Arnason, Louise Locock, Paolo Maccagno, Abi Pattenden, and Rebecca Crozier. 2023. Hybrid funerals: how online attendance facilitates and impedes participation. *Mortality* (2023), 1–19. <https://doi.org/10.1080/13576275.2023.2201421>
- [79] Ronda Ringfort-Felner, Robin Neuhaus, Judith Dörrenbächer, Sabrina Großkopp, Dimitra Theofanou-Fülber, and Marc Hassenzahl. 2023. Design Fiction in a Corporate Setting – a Case Study. In *Proceedings of the 2023 ACM Designing Interactive Systems Conference* (Pittsburgh, PA, USA) (DIS '23). Association for Computing Machinery, New York, NY, USA, 2093–2108. <https://doi.org/10.1145/3563657.3596126>
- [80] Corina Sas, Steve Whittaker, and John Zimmerman. 2016. Design for Rituals of Letting Go: An Embodiment Perspective on Disposal Practices Informed by Grief Therapy. *ACM Trans. Comput.-Hum. Interact.* 23, 4, Article 21 (aug 2016), 37 pages. <https://doi.org/10.1145/2926714>
- [81] David. Sisto and Bonny McClellan-Broussard. 2020. *Online Afterlives: Immortality, Memory, and Grief in Digital Culture*. MIT Press.
- [82] Bruce Sterling. 2005. *Shaping Things*. MIT Press. <https://books.google.co.jp/books?id=fluqQgAACAAJ>
- [83] Bruce Sterling. 2009. Cover story: Design fiction. *Interactions* 16, 3 (may 2009), 20–24. <https://doi.org/10.1145/1516016.1516021>
- [84] Bruce Sterling. 2013. *Fantasy Prototypes and Real Disruption*. <https://nextconf.eu/2013/07/bruce-sterling-fantasy-prototypes-and-real-disruption/> Accessed: 2024-9-1.
- [85] Tanseisha. 2021. *VR Ceremony*. <https://www.vr-ceremony.com/> (in Japanese) Accessed: 2024-9-6.
- [86] Alice Thudt, Uta Hinrichs, Samuel Huron, and Sheelagh Cappendale. 2018. Self-reflection and personal physicalization construction. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. 1–13.
- [87] Cameron Tonkinwise. 2014. How we intend to future: review of Anthony Dunne and Fiona Raby, speculative everything: design, fiction, and social dreaming. *Design Philosophy Papers* 12, 2 (2014), 169–187.
- [88] Federico Truchia, Hemal Ranawaka Arachchige Dias, Takaharu Suzuki, and Georgia Mackenzie. 2023. Beyond 5G: Envisioning the Future of Mobility in Japan Through Design Fiction. In *Proceedings of the 2023 ACM Designing Interactive Systems Conference* (Pittsburgh, PA, USA) (DIS '23). Association for Computing Machinery, New York, NY, USA, 2109–2122. <https://doi.org/10.1145/3563657.3596115>
- [89] Wenn-Chieh Tsai, Po-Hao Wang, Hung-Chi Lee, Rung-Huei Liang, and Jane Hsu. 2014. The Reflexive Printer: Toward Making Sense of Perceived Drawbacks in Technology-Mediated Reminiscence. In *Proceedings of the 2014 Conference on Designing Interactive Systems* (Vancouver, BC, Canada) (DIS '14). Association for Computing Machinery, New York, NY, USA, 995–1004. <https://doi.org/10.1145/2598510.2598589>
- [90] Daisuke Uriu, Ju-Chun Ko, Bing-Yu Chen, Atsushi Hiyama, and Masahiko Inami. 2019. Digital Memorialization in Death-Ridden Societies: How HCI Could Contribute to Death Rituals in Taiwan and Japan. In *Human Aspects of IT for the Aged Population. Design for the Elderly and Technology Acceptance: 5th International Conference, ITAP 2019, Held as Part of the 21st HCI International Conference, HCII 2019, Orlando, FL, USA, July 26-31, 2019, Proceedings, Part I* (Orlando, FL, USA). Springer-Verlag, Berlin, Heidelberg, 532–550. https://doi.org/10.1007/978-3-030-22012-9_38
- [91] Daisuke Uriu, Noriyasu Obushi, Zenda Kashino, Atsushi Hiyama, and Masahiko Inami. 2021. Floral Tribute Ritual in Virtual Reality: Design and Validation of SenseVase with Virtual Memorial. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (Yokohama, Japan) (CHI '21). Association for Computing Machinery, New York, NY, USA, Article 628, 15 pages. <https://doi.org/10.1145/3411764.3445216>
- [92] Daisuke Uriu and William Odom. 2016. Designing for Domestic Memorialization and Remembrance: A Field Study of Fenestra in Japan. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (San Jose, California, USA) (CHI '16). Association for Computing Machinery, New York, NY, USA, 5945–5957. <https://doi.org/10.1145/2858036.2858069>
- [93] Daisuke Uriu, William Odom, and Hannah Gould. 2018. Understanding Automatic Conveyor-belt Columbaria: Emerging Sites of Interactive Memorialization in Japan. In *Proceedings of the 2018 Designing Interactive Systems Conference* (Hong Kong, China) (DIS '18). Association for Computing Machinery, New York, NY, USA, 747–752. <https://doi.org/10.1145/3196709.3196801>
- [94] Daisuke Uriu, William Odom, Mei-Kei Lai, Sai Taoka, and Masahiko Inami. 2018. SenseCenser: an Interactive Device for Sensing Incense Smoke & Supporting Memorialization Rituals in Japan. In *Proceedings of the 2018 ACM Conference Companion Publication on Designing Interactive Systems* (Hong Kong, China) (DIS '18 Companion). Association for Computing Machinery, New York, NY, USA, 315–318. <https://doi.org/10.1145/3197391.3205394>
- [95] Daisuke Uriu, Takahiro Ogasawara, Naohito Shimizu, and Naohito Okude. 2006. MASTABA: The Household Shrine in the Future Archived Digital Pictures. In *ACM SIGGRAPH 2006 Sketches* (Boston, Massachusetts) (SIGGRAPH '06). Association for Computing Machinery, New York, NY, USA, 151–es. <https://doi.org/10.1145/1179849.1180038>
- [96] Daisuke Uriu and Naohito Okude. 2010. ThanatoFenestra: Photographic Family Altar Supporting a Ritual to Pray for the Deceased. In *Proceedings of the 8th ACM Conference on Designing Interactive Systems* (Aarhus, Denmark) (DIS '10). Association for Computing Machinery, New York, NY, USA, 422–425. <https://doi.org/10.1145/1858171.1858253>
- [97] Daisuke Uriu, Kenta Toshima, Minoru Manabe, Takeru Yazaki, Takeshi Funatsu, Atsushi Izumihara, Zenda Kashino, Atsushi Hiyama, and Masahiko Inami. 2021. Generating the Presence of Remote Mourners: a Case Study of Funeral Webcasting in Japan. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (Yokohama, Japan) (CHI '21). Association for Computing Machinery, New York, NY, USA, Article 629, 14 pages. <https://doi.org/10.1145/3411764.3445617>
- [98] Leena Ventä-Olkkonen, Netta Iivari, Sumita Sharma, Tonja Molin-Juustila, Kari Kuutti, Nina Juustila-Cevirel, Essi Kinnunen, and Jenni Holappa. 2021. Nowhere

- to Now-here: Empowering Children to Reimagine Bully Prevention at Schools Using Critical Design Fiction: Exploring the Potential of Participatory, Empowering Design Fiction in Collaboration with Children. In *Proceedings of the 2021 ACM Designing Interactive Systems Conference* (Virtual Event, USA) (DIS '21). Association for Computing Machinery, New York, NY, USA, 734–748. <https://doi.org/10.1145/3461778.3462044>
- [99] Jayne Wallace, Kyle Montague, Trevor Duncan, Luís P. Carvalho, Nantia Koulidou, Jamie Mahoney, Kellie Morrissey, Claire Craig, Linnea Iris Groot, Shaun Lawson, Patrick Olivier, Julie Trueman, and Helen Fisher. 2020. ReFind: Design, Lived Experience and Ongoingness in Bereavement. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) (CHI '20). Association for Computing Machinery, New York, NY, USA, 1–12. <https://doi.org/10.1145/3313831.3376531>
- [100] Jinyi Wang, Oskar Juhlin, and Nathan Hughes. 2017. Fashion Film as Design Fiction for Wearable Concepts. In *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems* (Denver, Colorado, USA) (CHI EA '17). Association for Computing Machinery, New York, NY, USA, 461. <https://doi.org/10.1145/3027063.3049782>
- [101] Samuel S.Y. Wang, Winnie Z.Y. Teo, Chee Wai Yee, and Yong Woon Chai. 2020. Pursuing a Good Death in the Time of COVID-19. *Journal of Palliative Medicine* 23, 6 (2020), 754–755. <https://doi.org/10.1089/jpm.2020.0198>
- [102] Matt Ward. 2019. Critical about Critical and Speculative Design. <https://speculativeedu.eu/critical-about-critical-and-speculative-design/>. Accessed: 2024-11-6.
- [103] Richmond Y. Wong. 2021. Using Design Fiction Memos to Analyze UX Professionals' Values Work Practices: A Case Study Bridging Ethnographic and Design Futuring Methods. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (Yokohama, Japan) (CHI '21). Association for Computing Machinery, New York, NY, USA, Article 93, 18 pages. <https://doi.org/10.1145/3411764.3445709>
- [104] Anna Xygykou, Panote Siriaraaya, Alexandra Covaci, Holly Gwen Prigerson, Robert Neimeyer, Chee Siang Ang, and Wan-Jou She. 2023. The "Conversation" about Loss: Understanding How Chatbot Technology was Used in Supporting People in Grief.. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems* (Hamburg, Germany) (CHI '23). Association for Computing Machinery, New York, NY, USA, Article 646, 15 pages. <https://doi.org/10.1145/3544548.3581154>
- [105] John Zimmerman, Jodi Forlizzi, and Shelley Evenson. 2007. Research through design as a method for interaction design research in HCI. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (San Jose, California, USA) (CHI '07). Association for Computing Machinery, New York, NY, USA, 493–502. <https://doi.org/10.1145/1240624.1240704>