

Digital Death: an Interactive Exploration of Mourning over the End of Digital Existences

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Abstract

In this age of virtualized interactions, the concept of mourning is becoming a digital heritage independent of the physical demise of individuals. How can we redefine the states in which life persists and mourn for it in this digital era? This project explores how digital death and mourning can be experienced in a physical interaction. We designed and implemented a multimedia installation that engages the audience in a ceremony taking them into a virtual obituary space. We used the termination of data to simulate death, allowing visitors to create their own last words and photos and interact with the last words and photos provided by previous visitors. An Atom and Vue.js-based website allows visitors to create their own custom tombstones using this information, while a projector shows a sense of the digital cemetery by showing a generative AI-created video. We also conducted a preliminary qualitative study on audience participation in digital mourning. This work highlights a future where end-of-life has a digital manifestation.

Keywords

Digital Death, Digital Heritage, Web Interaction Design, Data, Digital Funeral, Anthropology, Cyberthanatology

Introduction

Nowadays, the network public social platform has gradually entered the personal life of a vast number of netizens. When people die, their information will remain on social networking sites, and the extremely private practice of mourning is gradually coming into public view. There are three deaths in a man's life: the death of the body, the sacrifice of the grave, and the last time one's name is

mentioned [16]. Today, because of the existence of social platforms on the Internet, the definition of the third death is blurred, and the concept of digital immortality is gradually emerging. If the data of the deceased is not erased from the servers of the social media software, a digital legacy will be formed on social media platforms. From the perspective of the third level of death, digital heritage makes “digital immortality” a reality. Therefore, we want to build a digital tombstone in virtual space, based on the theme of digital immortality.

To this, we designed an art installation that will lead them into a virtual cemetery, where they will leave their identities and words of farewell to the world, thus simulating the digital legacy of the deceased in time, through an interactive last message that does not inform the viewer of the timing mechanism and where the termination of the message simulates the sudden death of the life, and where the rest of the participants will repeat the above actions. The viewer has the right to view all of the deceased's information and see the last words they left behind in the world, and all of the tombstones in the electronic cemetery are the last words written for the electronic identity. The last words just written will be displayed first and viewers can click on them to see them. This project will help to understand the evolution of mourning practices in the digital age while exploring the potential of digital platforms to provide meaningful experiences in blurring the boundaries between life and death.

In this project, we explored two questions:

1. How do we design physical installations to narrate the concept of digital death?
2. What are visitor's perceptions and attitudes towards digital death?

Background

In the past thirty years, people have become increasingly interested in the topic of death and dying. Scholars in the fields of social sciences, media research, anthropology, psychology, and medicine have explored the social and personal significance of death, attempting to address taboos related to this survival concern [5] & [6]. During the research phase, we initially examined how people's attitudes towards death have changed in the era of Internet 3.0. We then analysed the current trends of green and digital funerals and further explored how digital funerals can be better integrated into our work.

The Transformation of People's Attitude towards Death

As Sayer [12] mentioned, "Death was a taboo in the 20th century". Until the last century, people were generally afraid of death [11], dared not openly discuss it [12], and even used religious stories to beautify and "escape" death. However, in the last few decades of the 20th century, the emergence of the Internet constituted a turning point in transforming technology-driven phenomena related to death experiences [2]. The digital identity system was invented, and people began to organise the digital heritage of the deceased in virtual space. The electronic information generated by the living was presented in an equal medium and manner, placing the cognition of life's existence in external memory, blurring the boundary between life and death. Thus, death is no longer a taboo topic.

The Relationship between Green Funeral and Digital Funeral

Humans worldwide have been exploring sustainable funeral methods since the origin of green funerals in the UK in the 1990s. Under the exploration of saving space and material resources, the digital funeral has become one of the most powerful development directions for environmentally friendly mourning methods [11].

As Fournier [7] mentioned in her book: "Green burial is a way of caring for our dead with the least possible environmental impact". According to the 2017 National Funeral Directors Association [8] (NFDA) Consumer Awareness and Preferences Survey, 53.8 per cent of respondents indicated an interest in exploring green funeral services. The personal internet identity archives of deceased individuals can be searched and viewed anytime, anywhere, with hard disk or network storage replacing physical cemeteries and digital identities replacing physical bodies. Digital funerals intersect with green funerals because they offer environmentally friendly methods for memorialisation and remembrance. Digital funeral platforms enable individuals to create online memorials, share memories and condolences, and reduce the carbon footprint associated with physical funeral events. Despite the widespread use of traditional methods, green funerals have undoubtedly become a new trend in funeral services

by providing ecologically sustainable, cost-effective, and more healing solutions for loved ones [13].

The Application of Web 3.0 Era Products in Digital Funerals

In the Web 3.0 era, virtual cemeteries have become a new trend. With the increasing entanglement between the concept of human death and numbers, digital funerals have discovered various new possibilities in human-computer interaction research. Current research often focuses on exploring and designing practical techniques for funeral scenes commemorating loved ones or inheriting digital artefacts [11]. For example, the existing "digital death" technology also includes a "DeadSocial" tool that provides DIY resources for online browsing of death, bereavement, and commemorative events; A remote-controlled robot that supports Skype and can remotely attend funerals ("CARL", Orbis Robotics); And commercial commemorative websites that integrate social media aesthetics and features such as "social buttons" to share sadness [10]. In fact, with many countries worldwide adopting physical distance measures, using digital space has become one of the only options for holding funeral ceremonies or obtaining support or professional support [6].

The diversified digital funerals have changed how humans handle death, shifting from traditional standardised forms to more personalised practices at the time, space, and social levels.

Case Study

Based on the creative direction and background of the project, we referenced and analysed related art projects. This paper includes the connection between green burial and digital burial, the digital products of the Web 3.0 era, i.e., the art medium constructing the future world, and the influence of art and design on the change of modern people's view of death.

Green Burial and Digital Burial

The technological advances made by humankind mean we can think of alternatives to traditional funerals. In today's digital world, where everyone has a vast amount of digital data and a digital personal Internet profile.

Digital Memorial Cemetery consists of archived USB memory sticks that allow family and friends to collect the deceased's digital data onto a small storage drive (Figure 1a). People who have lost a loved one can visit and remember them at any time, and after a quick computer search, they can find the desired bit of memory stick, take it to a separate room, and view all the pictures, videos, songs, and other data [15] & [4].

Build a Future World via Media Art

As the virtual world, the digital age has taken over the natural world and life, leaving behind the ruins of human civilization. Designer Jojo Zan, a digital fashion artist and designer, uses VR and AR as a medium of expression and as her key to building a “bridge” between the digital and physical worlds. She creates models through digital sculptures and overlays them in natural environments using AR to create contrasts between the past and the future. Inspired by Buddhism, ruins, and sacred monuments of ancient Rome, she created a 3D digital sculpture and AR installation called Digital Legacy, which imagines and builds a scenario of a future world. Jojo’s work addresses the relationship between human technological development and the environment, mapping pollution and waste in the virtual space of the physical world or digital waste [9].

The project aims to awaken the forgotten persistence in everyone’s mind by looking at the virtual world of Tansu and reflecting on how humans have been drawn to the virtual world and the digitization of information for generations, ignoring its impact on the present and the end times [9].

The Change in View of Death Through Art and Design Influence

Funeral" always gives us gloomy, sad, and rainy images, and the traditional "monument" Lu gives us a heavy and severe visual feeling. Japanese designer Ava Kishi reinterprets the monument's meaning in her work "After the Rain." Aya Kishi has created a rainbow gravestone for those who have passed away, incorporating a series of optical prisms in the centre of the gravestone so that when the rain clears. The sunlight passes through the prisms, and a rainbow of visible light is projected on the ground like a beam of light from heaven as if it is a response from loved ones on the other side of the world. It soothes people's sadness after losing their loved ones and alleviates their pain [5].

Methods

Based on the case studies, we simulate the process of “digital death” by designing a well-designed physical installation, which includes a complete set of web page interactions and video projection, adopting the layout of a realistic spiritual hall in terms of appearance. After the audience experiences the process, qualitative analysis is conducted on the results by collecting textual data from within the work and interviews with the audience.

Web Page Interaction Coding

This section adopts front-end project frameworks such as Vue + Elementui Vant. We mainly focused the content on

one page and used v-if to control the display of page content. To enable users to experience the process of "taking photos", we have called on the front camera of the user's device to obtain the headshot of the tombstone. At the same time, the setInterval() function is used in the last words section to implement the timing function, allowing the page to pause for 30 seconds before jumping. In the end, users can receive a digital tombstone with personal information. In addition, users can also browse other people's tombstones and achieve electronic tomb sweeping while diving deeper into “digital death”.

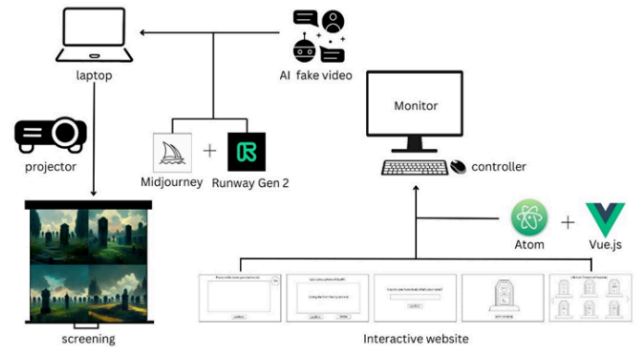


Figure 1. System Diagram, the project is mainly implemented through web page and video projection, which utilises AI to create images and videos, Adobe Illustrator for web page design, and programming language for web page interaction

Interview Procedure

The nicknames, avatars, the death time of digital identities of each participant, as well as the last words they wrote within the specified time, will be recorded in the backend database of the digital cemetery. Data Acquisition and Analysis interviews were conducted with a group of 50 participants of different kinds (age groups, careers, hometowns, etc.) after they had experienced the whole system of our project in person to examine their feelings and thoughts about digital death.

Interview Problems Design:

1. Are you willing to try the “digital death” project
2. How do you feel about dying in the face of someone else's/your own digital identity?
3. What improvement suggestions do you have for the work?

Data Collection and Qualitative Analysis

The data relating to the audience's “names, photos, and last words” will be organised in a table, and we will take the interview notes, coding them into 3 major points, which are “choosing to use real names or nicknames”, “seriousness of taking electronic posthumous photos”, and “tendency of posthumous content” (Figure 2).

The name on the tomb	True name of not?	The picture of the posthumous photo	Serious or not	Last words on the tomb	What's it about?
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Figure 2. Tombstone Information Collection Form

Interview Content

The content of the interview will also be recorded in writing and analysed one by one:

1. Understanding the concept of “digital death” - Using a comparison with the original design intention to investigate the effectiveness of the work;
2. The feeling of facing the death of others/their own digital identity - Collecting the audience's thoughts on the theme of the work;
3. Suggestions for improvement of the work - make timely adjustments to the work based on the suggestions.

Design

Interactive Web Experience

The correlation between works and creative backgrounds and concepts:

1. Nicknames and avatars - the construction of digital identity (a personal incarnation whose end of updating implies its destruction)
2. Digital tombstone - a continuation of individual life spirit, a symbol of existence proof, and a carrier of digital heritage
3. Digital Cemetery - a virtual place that holds the attempt to achieve electronic immortality



Figure 3. One of the Expected webpage effects, with Y2K internet page style

GenAI Video Projection

This section uses Midjourney and Runway Gen 2 to create GenAI animations (Figure 4). Firstly, enter the desired keywords in the Midjourney, such as “/imagine prompt: The middle scene, on the right of the painting, is a long-haired man wearing a robe, his back, surrounded by tombstones, a sunny day, blue sky and white clouds,

among the trees”, and a series of reference images will appear. By adjusting several times, we could achieve the desired final effect.



Figure 4. One of the GenAI pictures generated by Midjourney is about a man wearing a robe, surrounded by tombstones

After saving the image, open Runway Gen 2 and use the Text to Video function to automatically generate a series of videos by importing the previous image. It generates four clips at a time, and we choose the one that best fits. Besides, in order to achieve better results, we will adjust the input keywords. In the end, export different clips separately and then put the videos into the editing software Adobe Premiere for editing.

Concept Diagram

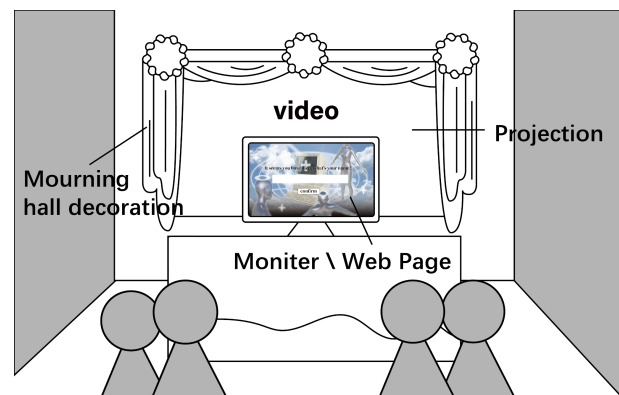


Figure 5a. Schematic design of the layout of the exhibition



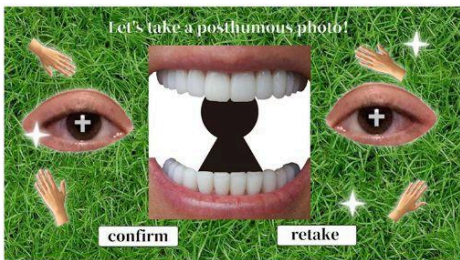
Figure 5b. 3D rendering of the installation, with video on the back decorated with a death symbol and website for people to enter digital death tombstones on the pedestal

User Interaction

The user experience process can be referred to the following (Figure 6): When users experience computer web page interaction, the projected video will be rotated.



You can write down your name in the box, and then clicks "confirm" to the next page.

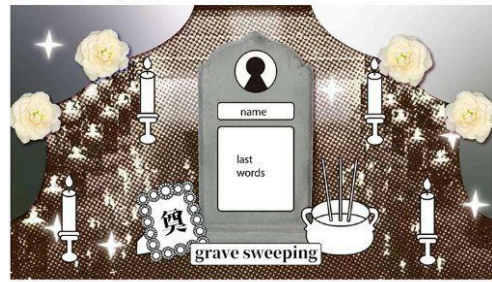


The front camera of the computer will turn on, click "confirm" to take a posthumous photo here. if you are not satisfied, click "retake" to have a new photo.



Write down your "last words" in the box, here you can create a personalized digital tombstones.

Figure 6. Detailed Audience Operation Instructions, help to experience the five sequential web pages



There will be a tomb according to the photo and last words you uploaded before. Then click "grave sweeping" to the cemetery.



By clicking on the arrows on the left and right sides below the webpage, you can browse the tombstones in the digital cemetery. You can also click different tombs to send flowers. To restart, you can click "Reincarnation", and then it will back to the first page.

Figure 6. Detailed Audience Operation Instructions, help to experience the five sequential web pages

Outcome

The final work was successfully exhibited on the 9th floor of the Creative Media Cent at City University of Hong Kong and PMQ exhibition in Sheung Wan, Hong Kong (Figure 7).



Figure 7. People are experiencing "digital death" in the exhibitions (left) CityU exhibition (right) PMQ exhibition

Qualitative Results

Back to the top of the questions, we had half of 50 participants fill out an online questionnaire right after completing a full interactive experience with our work. We observed and analysed their last words and post-viewing feedback and answered by following.

Visitors Feel Curious and Fresh about Digital Death

Based on the on-site observation of the exhibition, visitors were curious about our work. From the data side of the website, we found that some visitors left their digital death records more than once, indicating that visitors were pleased to leave their last photos and words on our website. In addition, from the photos and last words, it is observed that many people look forward to the world after digital death, and smiling faces accompany such last words.

Through the online questionnaire, we have asked participants to rate how happy they felt when taking their last photos. Even on our questionnaire (Figure 8), people were much happier with the act of taking a last photo and writing a last word than they were with the seriousness of it. It shows that the direction of our work from this conceptual point of view has achieved the desired effect.

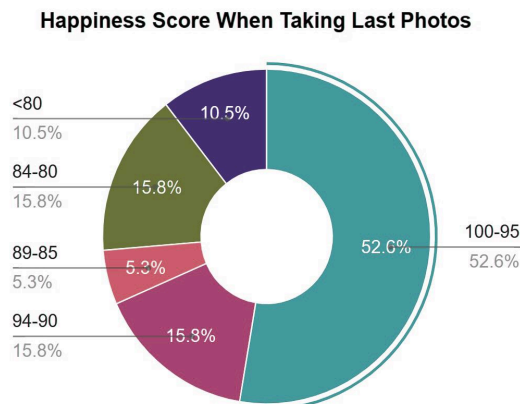


Figure 8. Distribution of population data from questionnaire results on participants' happiness when taking last photos

Visitors Are More Likely to Vent Their Real Emotions in Their Digital Identities And Escape from Reality For A Short Period through Digital Death

We collected the database of the last word shown on the website. Some may suggest that people feel bad when bombarded with information in their digital lives and usually do not have a good quality of life. Also, they feel excited to meet the world of digital death like: "Hello

world" and "Hello new world" in their last words at our installation.

Visitors Engage with Digital Death Using Humour as A Way to Reference Their Brief Digital Nature

In the interactive act of writing last words, the audience's words had different styles, but most of them were light-hearted. Some said "Finally I became an angel" "I don't want to die so young" "Goodbye World" "Bring wine to me" to simulate a sense of leaving the world. Some of them used lyrics, iconic slogans (e.g., "To be continued"), or blessing phrases (e.g., "Enjoy another life" "Hello new world") to show an open and relaxed attitude. While others left profanity or sarcasm to vent, or used a joking tone (e.g., "Need more sleep" "Deadline fighters come to an end") as if it were a game. There's also a few of them who haven't completed thinking about what they were going to say, didn't finish their message before the time limit, or left a blank screen. Those kinds of last words represented how they felt about the digital death. Visitors celebrating their digital identities came to an end at the funeral of a digital death in a relatively relaxed and fun atmosphere. Visitors celebrating their digital identities ended at the funeral of a digital death in a relatively relaxed and fun atmosphere we constructed. It also shows they do not have a sense of crisis towards the end of digital death. The quick and easy decision of deleting and clearing digital information with a single click, the occasional sudden crash, and the blocking of data are ignored when the data can still be recovered or reconstructed and are not heading toward the death of the numbers. It is as if the death of numbers can be repeated. However, when we imagine the trend ahead of time that numbers, like flesh, will always be on the verge of extinction and will never be resurrected, it will force people to think about the future impact of digital death.

Discussion

Digital Death Interactive Experience Engagement

The Human lifespan will eventually lead to death, and the conceptual art of digital immortality can be derived from our case study research and analysis above that many artworks have been created on related themes. For example, 'The Digital Legacy' by Shuhan Zan [9]. As for the conceptual art of digital death, it has never been proposed.

Being the first to propose this concept into an art interactive installation, we constructed a new world for the digital identity of human beings. Imagine that data was like human beings, going to their deaths unannounced and without warning, whereas some people can prepare for their deaths. Viewing the last words and mourning flowers of other deceased digital identities around as a dead digital identity in a digital graveyard is akin to painting a soul

floating through the dusty world after a human life dies. The AI-produced video portion of the project will illustrate the entire process from information overload to digital death. Afterwards, the participant can receive a talisman to return to the real world. Our holistic interactive art installation enhances the visitor's experience of hovering between life and death in the digital world.

Limitations and Weaknesses

1. Technical Limitations

Interactive installations usually rely on technology and our technical limitations cause our functionality and effectiveness—problems such as websites being delayed once they have too many tombstones. So, we set the upper bound of tombstones as nine on the website; the first one will be deleted when participants are more than 9. However, this also prevents our database from being collected. These hardware failures, software errors, or compatibility issues affect a small quantity of user experience, and they can not visit all the tombstones in the digital cemetery. This would suggest a database of such data that can show the list of all visitors to our site, and explore their commonalities, comments, and impressions.

2. Ethical Considerations

Exploring the issue of digital death raises ethical questions. When we talk about a digital form dying but not the physical form, it refers to the cessation or loss of access to one's digital assets while the person is still alive. This can occur due to account suspension or deletion, hacking or unauthorised access, technological failures or data loss, or legal or administrative actions.

On the other hand, physical death refers to the permanent cessation of life in the physical body. When someone physically dies, but their digital presence continues to exist, it can create a digital form that outlives its physical counterpart—for example, posthumous online presence, digital legacy, memorials, digital replicas, or avatars.

This existence of a digital form after physical death raises complex ethical, legal, and emotional questions, as it blurs the boundaries between the physical and digital realms and challenges traditional notions of mortality and identity.

So, although for digital death, we must carefully handle sensitive information and personal data and respect participants' privacy. However, ensuring the ethical framework of the device and obtaining informed consent from participants pose challenges.

Future Work

1. Virtual Reality (VR) and Augmented Reality (AR)

Integrating VR and AR technologies can create an immersive experience, allowing participants to explore and interact with virtual representations of the concept of digital death. For example, users can browse a virtual memorial space or interact with augmented objects related to the deceased.

2. Biofeedback and Emotion Sensing

Future devices may incorporate biofeedback and emotion-sensing technology to measure participants' emotional responses and adjust the experience accordingly. It could enhance the immersive and personalised nature of the installation, creating a more empathetic and engaging encounter.

3. Blockchain and Cryptography

Implementing blockchain technology and cryptography can address data integrity, security, and privacy concerns in interactive installations related to digital death. These technologies help ensure the confidentiality of personal information and digital assets.

Conclusion

This project further explores the future significance of "digital death" based on "digital mourning" and "digital immortality", contributing to understanding the evolution of information death in the digital era. Between the boundaries where humans aspire to create eternity, we attempt to use new-age web interaction technology and the interactive mode of AI video production, simulate the demise of life with the termination of information through interactive rituals that mourn the digital identity of in the cybernetic space, and provides a meaningful interactive experience for the form of mourning in the digital legacy, exploring the influence, randomness and inevitability of digital death.

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