Haptic Remembrance Book Series

Elaine Czech
Keio University
Yokohama, Japan
czech_el@keio.jp

Mina Shibasaki
Keitaro Tsuchiya
Keio University
Yokohama, Japan
mina0415@kmd.keio.ac.jp
keitaro.tsuchiya@keio.jp

ABSTRACT

UPDATED—February 25, 2019. While having strong social networks is essential for good quality of life, socializing gets more difficult as we age even if we are surrounded by people in a nursing home setting. Care staff and family members want to be able to connect with residents/loved ones but have limitations (time constraints, unsure how), and it can be challenging to feel a connection to another resident who has differing abilities. We propose that through sharing strong positive memories, members of a nursing home community (residents, care staff, and families) will be able to build empathy for one another and thus strengthen their community bonds. By applying multi-modal technologies to a familiar medium, the book, we provided a means by which intergenerational users, from various backgrounds, could interact with and gain meaning from the content.

CCS CONCEPTS

• **Human-centered computing** → **User studies**; **Ethnographic studies**; *Collaborative content creation*; *Accessibility design and evaluation methods*; • **Social and professional topics** → **Seniors**.

Permission to make digital or hard copies of part or all 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'19 Extended Abstracts, May 4–9, 2019, Glasgow, Scotland UK

© 2019 Copyright held by the owner/author(s).

ACM ISBN 978-1-4503-5971-9/19/05.
https://doi.org/10.1145/3290607.3309685

Figure 1: Screen capture from a recording of one of our interviews conducted with nursing care staff in Japan.

Figure 2: Screen shot of one of two groups of retirees interviewed from the US. Both interviews had 8 participants.

Quotes from Interviews

"They want to be able to make friends quickly, but that is difficult... people come from such different backgrounds." -Nursing Home Director
"What brings them out their memories... link into what they loved, then they will become more social with you." -Care Staff Member
"My mother is 88, and she gets really lonely." -Family Member
"If my health deteriorates, I won't be able to [stay positive about life]" -Male, 70s

[1] Nursing Home Hyldemoer Hutte, Tokio Marine Nichido BetterLife Service Co.,Ltd. https://www.hyldemoer.com/.

KEYWORDS

Nursing home community, residents; Social interactions; Memories; Haptics

ACM Reference Format:
Elaine Czech and Mina Shibasaki, Keitaro Tsuchiya. 2019. Haptic Remembrance Book Series. In *CHI Conference on Human Factors in Computing Systems Extended Abstracts (CHI'19 Extended Abstracts), May 4–9, 2019, Glasgow, Scotland UK.* ACM, New York, NY, USA, 6 pages. https://doi.org/10.1145/3290607.3309685

INTRODUCTION

Despite being surrounded by people, loneliness and depression are two major factors which affect the quality of life of nursing home residents [5]. Residents come from various backgrounds, have differing levels of physical and mental ability, as well as an age range spanning up to 40 years – all of which can make it difficult to feel a sense of belonging. Care staff and family members try to fill the social needs of the individual, which can create a sense of guilt and compound negative feelings towards living. Through our research, we hope to strengthen community bonds within the nursing home setting and create a positive way to connect with others. Yet, for many individuals living in nursing home facilities, many popular social technologies are not accessible or accessibility to such technology is lost over time (due to loss of senses, physical ability, or the necessary mental capacity). With our Haptic Remembrance Book we incorporated technology into a familiar medium to give intergenerational users, from various backgrounds accessibility. The book helps users build empathy for the residents of a nursing home through reminiscing over positive life experiences.

OBSERVATIONS AND INTERVIEWS

The nursing home community is made up of three main social groups: the residents, care staff, and family members. Therefore, to create something that would prove beneficial to all members of this social network we began our study with observations and interviews.

Observations: We coordinated a series of observations of the residents of an assisted living home, Hyldemoer III[1], in Japan during their biweekly medical examinations to gain a general overview of their regular concerns. Many of the residents through their actions and comments were concerned with their appearance and other's perceptions; this negatively impacted their self-esteem. For some, these concerns led to hyper-awareness of one's health and a fear of decline. For others, it led to isolation and avoidance of social interactions with other residents. We thus concluded that socialization was a critical issue that needed addressing.

Interviews: We then conducted a series of group interviews with care staff as well as with sixteen individuals ages 60-75 who lived independently without assisted care (Figures 1,2). All interviews were transcribed verbatim and then analyzed. During our analysis, we determined, which critical

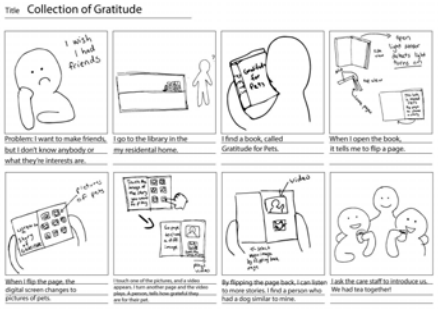

Figure 3: Storyboard for a book series based on sharing gratitude.

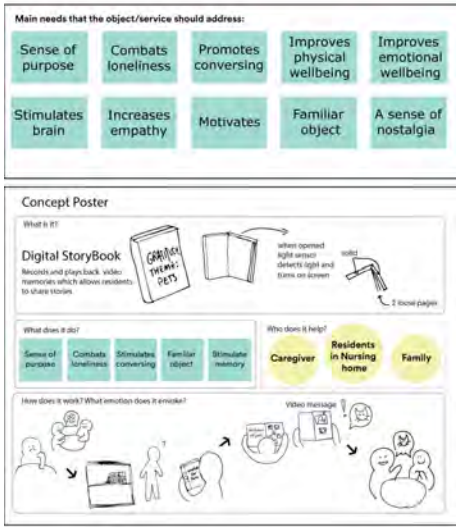

Figure 4: [Top] The primary needs we used to categorize each storyboard. [Bottom] Concept poster for book series (see 3), with its categorization.

[2]Mediva Inc.http://worldwidemediva.com/

social and psychological issues affected the older individual's social community. Care staff, while they wanted to provide the best for every patient, were often overworked physically and emotionally. Family members wanted their loved ones to receive the best care possible but did not always have the mental strength or time to visit them. Furthermore, family members expressed feeling a sense of missing out. Such sentiment emerged if they had grown up without grandparents or if they were unable to record their loved one's history before they passed away. Finally, our interviews confirmed many of the same things we had noticed during our observations. Older individuals feared their health declining and losing independence/being a burden to others. These fears, or sometimes realities, then led to social interaction issues either due to physical or mental incapacities or succumbing to stereotypes. Finally, we had to determine an appropriate solution that would prove beneficial to the three main social groups of the nursing home community. Since an understanding of technological devices varied, we concluded that incorporating technology into a familiar analog item would be most accessible. Furthermore, we needed to consider the age demographics, as well as physical and mental capacities of the users, and create something that would appeal to users across a spectrum.

RELATED WORKS

HCI research developing design guidelines and various products and services benefiting those within the nursing home community is not new. Desmet and Pohlmeyer [2] stated that designs should promote possibility, balance elements of pleasure and virtue with personal significance, be customizable, promote active involvement, and have a lasting impact on the user. While Fronemann et al. [3] added that works need to be accessible and seamlessly integrate into the users' daily life. These design principles led to exploring ways to incorporate technology into everyday objects (FLOW pillow [1], Messaging Kettle [7], Augmenting Print Media [4], Audio-Enhanced Paper Photos [6]) and intergenerational usage in which the burden of learning new technology falls on the younger generation (Ticket to Talk [8]). Many of these studies also incorporated social components which met the older individual's social needs and provided them with a sense of purpose. Ticket to Talk [8] addressed the family's desire to record and learn about their loved one's history. However, the technological nature of the work made it inaccessible by the older individual on their own. Kang et al. [4] and Piper, Weibel, and Hollan [6] focused on the older individual as the main user and used printed media with technological components (audio recordings, digitizing) as a means of generating social connections. While successful in addressing multiple members of the nursing home community, both solutions had potential accessibility issues, particularly for residents with dementia or Alzheimer's. Based on the success of these studies, we decided that collaborative design would be crucial.

DESIGN WORKSHOP

For our initial ideations, we performed a 2-part workshop with Mediva Inc.[2], a health care consulting

Figure 5: Pages from Haptic Remembrance Book 1: Grateful for our pets.

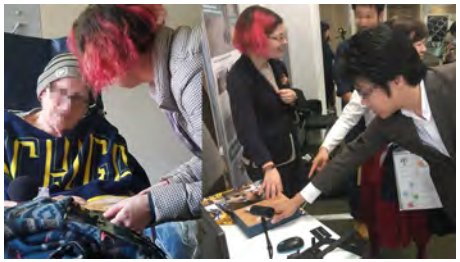

Figure 6: [Left] Demonstrating book to a resident at Lourdes [Right] and to visitors at Keio Media Design Forum.

Feedback from Demonstrations

"My grandfather had Alzheimer's disease and I think this could have an incredible impact on that community! " -Female, 20s

"This is a great design. I think it would be very comforting." -Female, 60s

and medical service operation company based in Tokyo, Japan. In the 1st part of the workshop, we presented an overview of our findings. Then we had all the participants create storyboards considering how they would promote a positive frame of mind and enrich social interactions in nursing homes (Figure 3). We analyzed the storyboards by creating a series of 13 concept posters. The concept posters allowed us to visually categorize each idea based on the ways they promoted positive aging and how they affected the various members of the nursing home community (Figure 4). In the end, we were able to categorize the ideas into four groupings: expanding ability, self-motivating, archiving people, and creating empathy. For the 2nd part of the workshop, we performed a design sprint and asked everyone to write down or draw as many ideas as possible on post-its that could fit under the four categories. Through group discussion, we were able to address potential issues that could arise with each design, particularly issues of accessibility. We decided to go forward with developing a haptic book that would allow residents to share, record, and experience their own stories in a new way.

HAPTIC REMEMBRANCE BOOK 1: GRATEFUL FOR OUR PETS

The design of the book can be divided into two parts: function and technology, and content (Figure 5).

Function and Technology: When using a book, one flips the pages to reveal new content; thus we decided to mirror this effect by using hall sensors which would be triggered by magnets attached to each page. This way as each page was turned it would automatically play the content of the open page. Sound recordings are played using a DFPlayer Mini. To make the content more immersive, we incorporated a VP2 actuator into the book's base. The actuator would allow for us to transmit not only sound recordings of content but also haptic sensations. The whole system was run by an Arduino Uno and powered using a 5000mAh mobile battery.

Content: We wanted the book to serve as a means for facilitating conversations, so we designed it to include stories from various participants connected by an over-arching theme. Each participant would record a story related to the theme. The recording would be transcribed on the left-hand page and accompanied by a photo of the storyteller on the right. When a user views these pages, they will also be able to hear the audio recording. The proceeding two pages would then include a tangible element with a haptic sensation on one page and simulating image on the other related to the story told on the previous pages (e.g., the actuator will play the sound of a cat purring, which can be heard and felt when touching the tangible element, felted wool). For our prototype had two participants, a male and a female both over the age of 60 and non-nursing home residents: one talked about their cat and the other their dog.

Demonstrating and Feedback: We first exhibited this prototype at the Keio Media Design Forum, in November 2018, Japan (Figure 6). We demonstrated the book to over 20 visitors of varying ages

	Age	Condition
Marie	100	Short-term care, recovery
Margaret	96	Long-term care, visual impairment and mild dementia
Jeff	89	Long-term care, bed-bound
David	75	Multiple Sclerosis
Saul	100	Short-term care, recovery

Table 1: Participants (pseudonyms used to protect their identities)

Figure 7: Showing off the drawing David provided for the book.

Figure 8: When showing David the other pages, he shared his own stories. When he saw a story about chickens, he told us about the ones his father raised.

[3]Lourdes Senior Community https://www.lourdesseniorcommunity.org/

(younger than 10 to over 60) and backgrounds. Visitors with pets were drawn to the content of books while others took to heart the situation in which the books would be used. Many felt the design was very appropriate for our demographic although concerns about visual and auditory limitations were raised. We also demonstrated the book to various residents and care staff at the Lourdes Senior Community in Michigan, United States and observed their reactions. Their reactions proved to be similar to those received during the Forum exhibition. Those with pets were excited to share their own stories, while those without were more intrigued by the technology.

HAPTIC REMEMBRANCE BOOK 2: GRATEFUL FOR FRIENDS AND FAMILY

Taking the feedback received from the demonstrations into consideration, we decided to enlarge the pages of the book from approximately 5.5 in x 8 in to approximately 8.5 in x 11 in. and reduced the base containing the technology. These changes forced us to reconfigure the components and replace the Arduino Uno with a Pro-Micro. We also made efforts to increase the volume level in our program. Besides these changes, the book's content layout and technology remained the same. Another significant change with this prototype was that we were able to collaborate with five residents living within the Lourdes Senior Community[3]. For ethical considerations, we had all participants (residents or their power of attorney, family members, and care staff) sign both a participation consent form and a video/image release.

Interviews and Collaborative Content Design: To gather content for the book, we interviewed five residents, two females and three males, ages ranging from 75-100, and of varying degrees of physical and mental capabilities (Table 1). During each interview, we asked the residents to share their passions and interests with us and organically found that all the stories revolved around friends and family. With more lucid residents we talked about their page design and what sort of haptic experience they would wish to see portrayed (Figure 7). With others, we had the help of family and friends who would fill in stories and provide images. After meeting with the residents, we polished up the story recordings into 20-25 second sound clips, transcribed each clip, constructed haptic components, and prepared images. Then we added all of these components into our book format.

Reveal and Results: On the day we went to reveal the book we were only able to meet with two of our five participants. One had been only in short-term rehabilitation care and had returned home, and two were incapacitated due to health issues. Despite these limitations, we were pleased to find that book elicited appropriate reactions from our users and care staff. One user, Margaret, 96 years old, who suffered from limited vision and mild-moderate dementia, was falling asleep before presented with the book. However, upon hearing the stories and getting to interact with the haptic content, she became talkative and animated (Figures 9, 10). Our other user, David, 75 years old, suffered from multiple sclerosis, but besides some muscle weakness was cognitively lucid. While he found the haptic

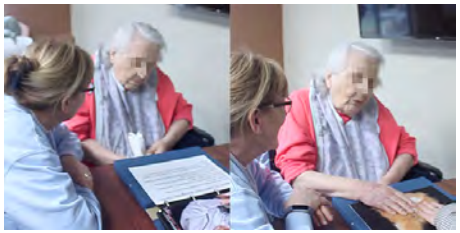

Figure 9: [Left] Before seeing the book, Margaret was falling asleep. [Right] After viewing began, she became talkative and animated.

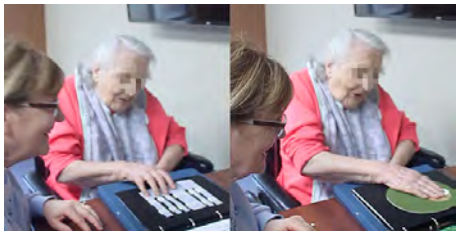

Figure 10: Margaret enjoyed interacting with all of the pages.

Acknowledgements

We would like to thank our professors Kouta Minamizawa and Roshan Peiris. We would also like to thank Kanoko Oishi, Dr. Chiaki Mishima, everyone at Mediva Inc., and the staff and residents at Hyldemoer Hutte for their valuable insights. Additionally, we would like to thank David and Omega Barks and everyone at the Lourdes Senior Community (especially our participants!). We would like to thank Nancy, Paul and Chris Czech, Tania Hidayat and Yurike Chandra for their countless hours of support. Finally, Carmela Farrugia, our sunshine and inspiration.

content amusing, he reacted more towards the story content (Figure 8). When the story about a pet cat played, he mentioned the cat he had had, and when the story about chickens came up, he told us about how his dad had also raised chickens. By talking about these stories, he began to open up and tell us even more stories about his past and current daily life. Care staff had similar curiosities and enjoyed learning things they had not known about some of their residents.

CONCLUSION AND FUTURE WORK

By working within our target community from the start (observing life within a nursing home, ideating with medical professionals, and finally collaborating with residents) we feel that helped us to create a solution fitted for our target users. Our Haptic Remembrance Books have shown to be engaging and accessible to a variety of users (residents in a nursing home, their families, and care staff), are personalized and empowering for nursing home residents (telling their stories) and encourage social engagement (interacting with stories to the best of the user's ability). One major limitation of our study was that we were unable to see the extent of engagement over time. Another limitation was accessibility to a greater number of residents. While we were able to work with residents of varying backgrounds their willingness to participate may have skewed the positive results we saw. For our next step we plan to give more design control to the residents. We hope this will enable us to work with more residents. We plan to streamline the components and create a book-building toolkit which will allow residents to record and build their own story content. Allowing for greater self-expression.

REFERENCES

[1] Margot Brereton, Alessandro Soro, Kate Vaisutis, and Paul Roe. 2015. The Messaging Kettle. *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems - CHI 15* (Apr 2015).

[2] Pieter M. A. Desmet and Anna E. Pohlmeyer. 2013. Positive Design: An Introduction to Design for Subjective Well-Being. *International Journal of Design* 7, 3 (Nov 2013), 5–19. http://www.ijdesign.org/index.php/IJDesign/article/view/1666/595

[3] Nora Fronemann, Kathrin Pollmann, Alicia Weisener, and Matthias Peissner. 2016. Happily Ever After. *Proceedings of the 9th Nordic Conference on Human-Computer Interaction - NordiCHI 16* (Oct 2016).

[4] Kai Kang, Jun Hu, Bart Hengeveld, and Caroline Hummels. 2018. Designing an augmented print media system to promote social interaction in nursing homes. *Proceedings of the Sixth International Symposium of Chinese CHI on - ChineseCHI 18* (Apr 2018).

[5] World Health Organization. 2017. Mental health of older adults. https://www.who.int/news-room/fact-sheets/detail/mental-health-of-older-adults.

[6] Anne Marie Piper, Nadir Weibel, and James Hollan. 2013. Audio-enhanced paper photos. *Proceedings of the 2013 conference on Computer supported cooperative work - CSCW 13* (Feb 2013).

[7] Xipei Ren, Vincent Visser, Yuan Lu, Rens Brankaert, Serge Offermans, and Hugo Nagtzaam. 2016. FLOW pillow. *Proc. of the 18th International Conference on Human-Computer Interaction with Mobile Devices and Services Adjunct - MobileHCI 16* (Sep 2016).

[8] Daniel Welsh, Kellie Morrissey, Sarah Foley, Roisin Mcnaney, Christos Salis, John Mccarthy, and John Vines. 2018. Ticket to Talk. *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems - CHI 18* (Apr 2018).