Figure 1: Slots-machine-like device used by older adults

Figure 2: Graphical interfaces in the slots-machine-like device.
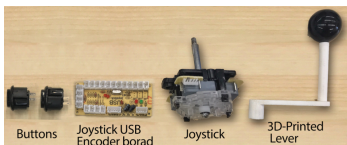

Figure 3: Hardware inside Slots-machine-like device.

Story-Me: Design of a System to Support Intergenerational Storytelling and Preservation for Older Adults

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Abstract

In this paper, we present our ongoing work Story-Me, which consists of a slots-machine-like device used by older adults, and a cellphone application used by their children. It aims to facilitate intergenerational story-sharing regarding life story and family memento story, between older adults living in nursing home and their children. A detailed description of the system is firstly reported, a preliminary evaluation was further conducted, conclusion and future research agenda are in the final part.

Author Keywords

Older adults; storytelling; tangible interface.

CSS Concepts

• Human-centered computing~Human computer interaction (HCI)   • Human-centered computing~Collaborative and social computing   • Social and professional topics~Seniors

Introduction

The aging society is coming, the worldwide population over age 65 is expected to more than double from 357 million in 1990 to 761 million in 2025[9]. With up to 50% of those over the age of 85 likely to be placed in a nursing home at some point in their lives [19]. However, they have limited involvement in social connections, and social isolation is widespread among them [18]. Our research focuses on one subset of
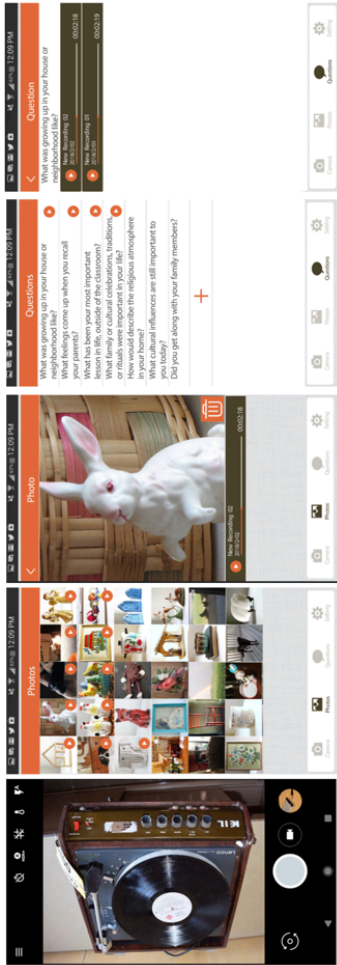
Figure 4: It contains four tabs, Camera, Photos, Questions, and Setting. The young could take photos of family mementos and customize trigger questions, as well as listen to related stories told by the older adults.

social interaction: intergenerational storytelling. Given that one of the most precious characteristics of older adults is their memory of events, people and places [6], storytelling could act as an effective way to keep them stay in touch with their children.

Recently, new practices on sharing personal content have emerged with the rapid growth of online sharing services, such as Flickr and Facebook. However, story sharing and preservation are still problematic for older adults, especially those living in a nursing home. First, despite that sitting together to communicate face-to-face is the most common and enjoyable way to share stories and mementos[13], a growing number of older adults move to nursing home, and live separately with their children. Video call (such as Skype and iChat)helps to a certain extent, but older adults and their children's daily schedules are antisymmetric [21]. It also needs to be pre-scheduled and is less familiar to old adults[1]. Second, Instant messenger applications (WhatsApp and Messenger) help to share the stories in some degree, but these platforms are more about the "now" moments and less about the past moments [16], and they are multipurpose and are designed for smart-phone users. Our target group is the aged non-tech-savvy people: Internet and social media use drop off significantly for people age 75 and older[23] —Only 34% of people in the G.I. Generation (born in 1936 or earlier) use the Internet, and 21% have home broadband [15].

Related Work
The experience of using the technology of each older adults is unique, and their level of technological mastery varies [8]. Therefore, they could be roughly divided into non-tech-savvy and the tech-savvy group.

Our target group is older adults in the nursing home, according to our contextual inquiry, most of them are non-tech-savvy users.

Regarding intergenerational storytelling, current applications are mostly smartphone applications or website, which are inaccessible for the non-tech-savvy elderly users. Since TUI (Tangible user interface) has been identified as having great potential to improve older adults' acceptance of technology acceptance [20], applications supporting story sharing for non-tech-savvy older adults mostly adopt tangible interface.

There are applications focusing on improving older adults' connections with other fellow residents, through story sharing: a tangible system aiming to help residents in the nursing home make connections with their fellow residents through sharing stories[14]. Using landscape tangibles as proxy objects to aid storytelling and reminiscence for older people in the nursing home [2]. There are applications focusing on improving their connections with people outside: Interactive Gallery, a tangible installation placed in nursing home aims to facilitate story sharing between older adults and citizens from local communities[12]. Regarding applications supporting intergenerational communicating, there are applications designed for co-present sharing, for example, Cueb is a set of interactive digital photo cubes with which parents and teenagers can explore individual and shared experiences and are triggered to exchange stories [7]. For the family members over a distance, Tejinder et al. explore how families would make use of a video system that permitted sharing everyday life over extended periods of time between multiple locations. There are studies focusing on enhancing communication within
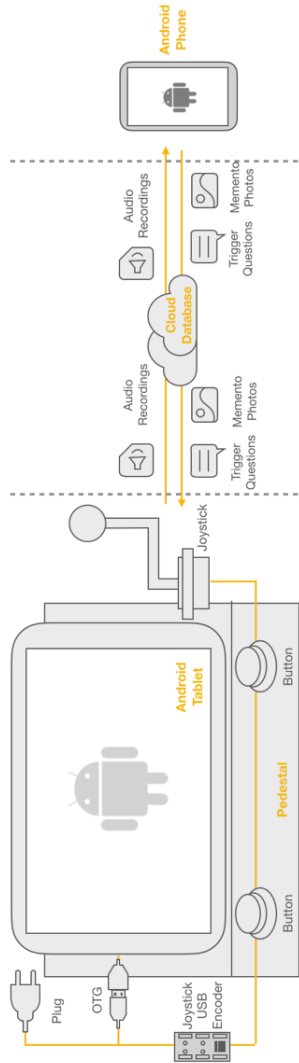
Figure 5: Architecture of the Story-Me

remote family members through sharing photos [3], there are also applications aiming to strengthen family connectivity through ambient awareness [5]. Margot et al. explore how older adults' favorite objects (for example kettle and tea box) could be augmented to help them to connect with adult children living remotely[4]. Specifically for intergenerational storytelling for non-tech-savvy elderly users, related work includes Storybox, a tangible device that allows sharing photos, tangible artifacts, and audio recordings of everyday life between grandparents and remote grandchildren (below the age of ten) [22].

For our study, our target group is older adults in nursing homes who live separately with their children. Our Story-Me system integrates life story and memento story sharing: it explores how their children provide the older adults explicit memory triggers (trigger questions and photos), through a tangible device, and bring them a familiar user experience, via an intergenerational cooperation manner.

THE STORY-ME SYSTEM
Before the Story-Me system, we have conducted two studies[10][11],as is shown in Figure 7. Our overall concept of the system in this paper is: older adults act as story content producer, while their children are memory trigger (including trigger questions and family memento photos) providers. The whole process is achieved by intergenerational collaboration, which brings intergenerational communication and conversation. Figure 5 shows its architecture. The slots-machine-like device is used by the older adults (Figure 1 and 3), and it utilizes with the metaphor of slots machine, we hope this tangible interface employing metaphor and intuitive interaction could enhance

familiarity and simplicity for them. It has two graphical interfaces: the "Photo interface" and "Question interface". Vintage style is applied in the interface elements and fonts. Its fonts are rendered in huge and bold fonts considering the fading eyesight of the elderly. The "Photo interface" displays one specific memento. It would be switched to next/previous photo by pulling down/pushing up the handle. The "Photo interface" would be switched to "Recoding interface" if the REC/STOP button is pressed. In the "Recoding interface", a dynamic recording icon and timer widget are placed to provide real-time feedback. The cellphone application is used by the young, as shown in Figure 4.

PRELIMINARY EVALUATION
Participants, Procedure and Methodology
Our preliminary evaluation mainly focused on usability aspects. It was conducted with four older adults from a Dutch nursing home, and four young adults. The demographics were: three female older adults, aged 83, 85, and 88. One male older adults aged 82. Two young female adults aged 31 and 33. Two young male adults aged 32 and 33.

The study was comprised of the following three steps. Step one, we asked them to sign a consent form, introduced our research goal to them, and showed them a video covering all the usage scenarios of the Story-Me system. Step two, we released three tasks, which contain all the basic operations of the device and the mobile app. Tasks of the device used by older adults: (1) Choose one trigger question, record and send the audio. (2) Choose one memento photo, record and send the audio. (3) Open an incoming message. Tasks of the mobile app used by the young: (1) Add one trigger question. (2) Add a photo of memento. (3)
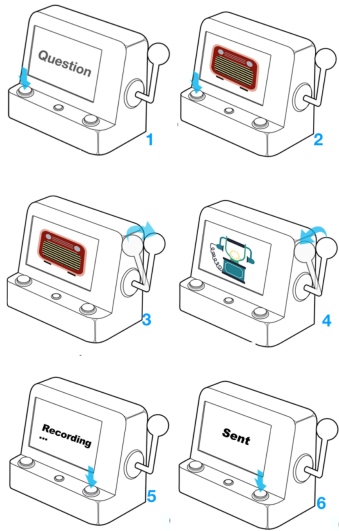
Figure 6: Interacting with Story-Me device. (1) Press the left button to switch between photos and questions. (2) (3) (4) Pull down/push up the knob to switch to the next/previous photo/question. (5) Press the right button to start recording stories related to the questions/photos (6) Press the right button again to save and send the recordings.

Open an incoming message, and listen to the recordings. Every participant was asked to perform all the tasks in an order that was randomized for each participant. Step three, we interviewed with them, and thanked all the participants for their contributions.

The methodology was observation combined with an interview. During the evaluation, they were observed to gain further insight into their interaction with the system. After that was a semi-structured interview, and the following topics were discussed with them: *(1) Would you like to use it? and why? (2) Do you think it could facilitate intergenerational story sharing? why? (3) Do you understand the concept of it? (4) Do you find it easy to use? What is the most difficult part? (5) Other comments.*

Result
Regarding the slots-machine-like device, overall, the older adults felt the device was designed in a simple way: simple function and operation. They thought the handle operation was natural and was consistent with their cognition. They understood its concept and accepted it. During the observation, we discovered some of the elderly users encountered difficulties when performing the task (3) Open an incoming message. Since the prototype was Android-based, the opening notification was still touch-screen based. Some of them needed to be reminded to use the touch screen to operate, while elderly participant (*83,F*) with the tablet using experience was familiar with this task and didn't require instructions. Based on the observations and interviews, the following improvements need to be made. First, as suggested by participants, a paper instruction for use was necessary, as demonstrated with the previous literature, that older adults prefer

text-based instruction over one-on-one training and learning through trial and error[17]. Second, audio uploading time will last significantly longer if the recording is long. For example, a two-minute audio takes half a minute to upload. Therefore, feedback such as "uploading, please wait" and "uploaded successfully" were necessary. Third, all the questions and photos should be able to be played in a loop.

Regarding the cellphone application, generally, the young participants felt it was easy to use. They appreciated the idea that mixes mobile phone features with tangible interfaces to provide accessibility support to the older members of families and believed it could enable stronger intergenerational collaboration. The following are suggestions for improvements: add number mark to the audio icons to specify their numbers. Audio files should be named by date and time. Questions and audios should be displayed in reverse chronological order.

CONCLUSION AND FUTURE WORK
We have reported the ongoing work Story-Me. The preliminary evaluation suggested that it had the potential to facilitate intergenerational story sharing. We will optimize our prototype based on user feedback, and conduct a long-term field study. The following research questions will be relevant: *What stories would older adults like to share? What stories are their children interested? How to facilitate older adults to tell these stories? How to involve the young generation?*
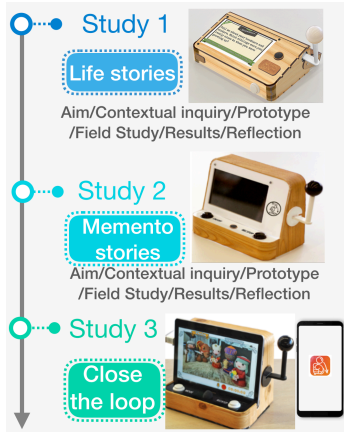
Figure 7: Prototypes of the three studies. Study 1 investigated older adults' life stories, and study 2 investigated their memento stories. Each study procedure consisted of contextual inquiry, design guidelines, prototype, implementation, and field study. Prototype in this paper is part of study 3.

Study 1 and 2 focused more on the older adults' sides, while in study 3, we further involve the young generation by designing a cellphone app for them. All the three prototypes built on the metaphor of slots-machine, and this tangible interface employing metaphor were accepted by older adults in study 1 and 2.

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