MEETING THE COMMUNICATION NEEDS OF AN AGING SOCIETY
PROMOTING POSITIVE COMMUNICATION BETWEEN OLDER ADULTS AND THEIR
FAMILY MEMBERS

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THESIS

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Abstract

We are living in an era of highly developed communication technology. Nowadays, communication designs and tools are making it easier for people to connect with each other, using mobile phones, email, applications and social media sites, etc.

Research has shown that for older adults, staying in contact with people around them is crucial for their mental and physical health. They want to know about their family members, such as the well-being of their adult children (WRVS). Communication technologies are helping more people to communicate. However, older adults are not benefiting from them due to their problems with using the technology (Catherine, et al). According to research, most interface designs are too complicated for older adults to use because aging has a particular effect in digital design. At the same time, they hope to have reciprocal and frequent communication with their family members. As for younger generations, they are addicted to such communication technologies, but they don’t always take the initiative to connect with older adults in their family.

“Nexa” is the Latin word for “connection”. The designer intends to build Nexa, an application that is simple enough for older adults to use for communication and motivates other family members to participate in sharing their lives with their older relatives. Low-effort use, multiform messages, and reciprocal communications are realized in this design.
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Chapter 1 – Background and situation

1.1 Growing numbers of older adults and their communication needs

The population of elderly people has grown as a proportion of the overall population, and it is likely to grow even more in the future. Currently, the proportion of Americans age 65 and over comprises nearly 13 percent of the U.S. population, and by 2030, those over age 65 will make up 20 percent of the U.S. population. Among this population, nearly 75% experience loneliness because of a lack of communication with their family members (WRVS). Research has shown that for older adults, staying in contact with people around them is crucial to their mental and physical health, and they want to know about their family members, such as the well being of their adult children (Karimi, Azmina, Neustaedter). Loneliness and social isolation can be issues for everyone, but these factors can significantly affect the lives of older adults, especially those who have lost their friends.
or family (WRVS). It is imperative that this problem to be addressed so that older adults will not continue to experience problems caused by isolation (Figure 1.1).

1.2 Older adults and the use of the technology

Online technologies have greatly improved our lives by facilitating distant communications between people, but older adults cannot benefit from it (Catherine, et al). The research reveals that the large number of over 75 years olds whose children live a substantial distance away from them. For 10 percent among these people, their nearest child lives more than an hour's drive away, which is 40 miles plus. For those whose relatives do not live close to them, connecting with their family members necessitates the use of technologies such as Skype, Facebook, or even telephones (WRVS). Most elder people do not know how to take advantage of these technologies apart from telephones to contact their loved ones because the design of commonly used software is simply inappropriate for them to use. Furthermore, a lack of confidence and skills has also been a factor that prevents them from trying to use modern software (Dickinson, et al). The fact that they cannot use online technologies means that they lose connection with their distant family members or friends and become socially isolated.
The number of seniors who go online has grown significantly compared to the past, but many are still not able to take advantage of online technologies. According to data released by Pew Research Center, approximately six in ten seniors were able to use online products.
in 2013, whereas only one in ten seniors could use them in 2000 (Figure 1.2). Those who use technologies are relatively wealthy, well educated, or younger compared to other elders. Digital products can be expensive for some people and as a result, only affluent individuals can afford and use them. As mentioned earlier, seniors with physical problems or disabilities cannot properly operate devices that require actions such as pushing small buttons or identifying similar icons. So, even though there are more seniors who use technologies, there still remains a large number of older adults who are disconnected from the world of digital tools and services.

Besides, the type of digital devices that seniors typically own is different from what other adults have. Smartphones that have various functions are widely used by adults, but tablets or e-book readers are more common for older people (Figure 1.2). The larger size of tablets and e-readers is the main reason why they are more popular with seniors than smartphones. Some of those devices are not capable of contacting others. For example, e-readers are normally designed just for reading digital books. So, even among those who have access to digital products, some of older adults still cannot use them to connect to their family members or friends, and the problem of feeling lonely persists.
Chapter 2 – Literature Review

2.1 Age-related changes in older adults

<table>
<thead>
<tr>
<th>SENSE</th>
<th>Visual decline</th>
<th>Read text, instructional manuals; Perceive small icons on toolbars; Read e-mail locate information on complex screens</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Auditory decline</td>
<td>Detect alerting sounds, ringtone Conduct speech communication</td>
</tr>
<tr>
<td>MOBILITY</td>
<td>Reduced flexibility</td>
<td>Use input devices, such as a mouse or keyboard (Speech recognition may be preferable)</td>
</tr>
<tr>
<td></td>
<td>Slower response time</td>
<td></td>
</tr>
<tr>
<td>COGNITION</td>
<td>Decreased cognition</td>
<td>Learning new skills or procedures Recall of complex procedures or instructions Performance of concurrent activities Locating information on complex displays</td>
</tr>
</tbody>
</table>

*Figure 2.1: Age changes and the influence of using technologies*

Declining physical abilities as a result of aging is an important issue that prevents older adults from using available technologies (Watering). Significant aspects can be described as follows (Ben) (Figure 2.1):

**Vision decrease** (Watering):
- Width of visual field
- Light sensitivity
- Color perceptions
- Resistance to glare
- Dynamic and static acuity
- Contrast sensitivity
- Visual search and processing
- Pattern recognition
**Hearing (Ben), (Siewe, Y, J):**
Hearing decrease starts around middle age. It mostly results in hearing loss for high frequency sounds and sounds in general around the age of 50 or 60.

**Motor skills (Watering):**
As people get older, their motor skills change and affect their lives. Some of the changes are:
- Decreased speed of movement
- Subtle decline in strength and endurance
- Changes in balance and coordination
- Possible extrapyramidal signs (involuntary movement, tremor, restlessness, etc.)
- Poor posture.

**Cognitive changes (Watering):**
Aging also affects people’s learning capabilities. Memory is closely related to learning how to use electronics such as computers. Research shows that Age Associated Memory Impairment (AAMI) mostly affects “fluid” memory, which is used to learn the use of computers. Additionally, other research shows that elderly people have a hard time retracing and navigating a route. To compensate for the negative effects of AAMI, elderly people use strategies such as writing down the sequence of actions on paper. It takes time but is an effective method for remembering things.

Visual decline makes it difficult for them to read text and small icons, or locate information on complex screens. Auditory decline impedes the detection of alert sounds and ringtones. Impaired mobility results in difficulties in using input devices, such as a mouse or keyboard. Decreased cognition weakens their abilities to acquire the skills necessary to use modern technologies (Watering). All of these have contributed to difficulties in using modern technologies that are familiar to young adults.
2.2 Design guidelines for older adults

With these difficulties in using computer technologies for elderly people, several key points should be paid attention when designing interfaces specifically for this group of people. But these design guidelines also benefit all users, not just for the elderly.

1. Simple design
Functions and interfaces should be as simple as possible. Only vital functions should be included and any functions with no evidence of usefulness should be discarded. Layered menus can be problematic for older people or those with impaired motor skills and memory because layered menus require users to remember invisible options and a sequence of actions and to physically carry out those actions. Minimizing the functionality and simplifying the structure of the interface help these people use the product.

2. Gesture design
Gestures such as “drag & drop” can be a problem for those with restricted motor skills and novice users (Watering). Introducing multiple ways of manipulating objects is a possible solution.

3. Accessibility
Larger than average clickable targets, such as 32 and 26 pt, are easier for older users to identify and click. Font size should also be larger than normal (at least 14-point) (Dickinson, et al).

Text colors with high contrast to the background help them read the text more easily (Dickinson, et al). The design should provide immediate feedback to inform the user of the current situation.
4. **Immediate feedback**
Often with common application, feedback is not always provided until the user finishes the last step in the sequence for common applications. When designing for older adults, the effect of an action can be shown on screen immediately to tell the user which step they are currently at.

5. **Keep consistency**
To achieve minimal confusion in navigation, the interface should be consistent. Clear conventions for elements such as positions of buttons and information can be implemented and the use of scroll bars, especially nested scroll bars, can be avoided (Dickinson, et al).
2.3 Related communication design for older adults

2.3.1 Sending and sharing stories on one side

Case example 1: Aura Frame

A smart frame that automatically displays the best photos from a phone (Figure 2.2).

Figure 2.2: Aura Frame

Figure 2.3: The app of Aura Frame

https://itunes.apple.com/ca/app/aura-frame/id990062908?mt=8

The outstanding part of Aura Frame's design is that it intelligently links with a mobile app and does well on transforming, updating new photos and displaying photos. The sender can decide which photo to display on the Aura Frame remotely (Figure 2.3). But it has no functions designed for the receiver to reply back to the sender. Under such occasion, lack of interaction between two sides would easily make the sender side less motivated to share photos.
Case example 2: Mago

Japan’s Mago Channel helps grandparents stay connected with far-off grandkids.

Figure 2.4 Mago Channel and the ‘house-shaped’ product

This design is targeted at helping senior generations connect with young people. A television channel called Mago can directly broadcast videos and photos from the sender. Younger users can use an app to broadcast messages to seniors’ home TVs. When a new message comes in, a ‘house-shaped’ window lights up to alert users (Figure 2.4).

An advantage of this design over the Aura Frame is the notification the younger users will receive when their grandparents start watching the Mago Channel. Such a design provides instant feedback, which creates motivation to use it.

2.3.2 Synchronous and direct communication

Case example: Nucleus

*Nucleus is designed to make staying connected easy: the perfect home intercom* (Figure 2.5).

![Figure 2.5 Nucleus](https://nucleuslife.com/)
Nucleus enables users to connect across the house or across the globe. After easily installing it on the wall, people can make direct video calls with just one click. Nucleus works room-to-room, home-to-home, and mobile-to-home.

The limitation of this design is that it is not targeted at sending asynchronous messages and sharing life events. People can only connect when they have spare time at the same time.

2.3.3 Engaging both sides: older adults and children

Case study: “A story before bed”

A service that enables parents or grandparents to record a children’s book online with audio and video (Figure 2.6).

For people who live apart from their children or grandchildren, they can record themselves reading a book for their children through the “A Story Before Bed” platform. The recording includes audio and video that are synchronized with the turning of the pages of the book,
which autoplay so the viewer can watch the pages turn automatically when the reader turns them (Takeuchi, Lori, Reed Stevens), (Hillel Cooperman).

A Story Before Bed is a platform that motivates people on both generational sides to communicate. It narrows down the gap between older adults and little children and also elevates their engagement.

2.3.4 Finding time/scheduling

People who are geographically scattered have less time to communicate. However, due to busy schedules on one or both sides, it’s sometimes difficult to know the availability of the other side and schedule a common time to talk. Finding a time to contact family members can be difficult when people are busy. They feel happy when spending time with loved ones and doing things together, but busy lives leave them with little time to share their moments (Hyesook). It takes a lot of effort for them to find a time for deep communication. Therefore, designs that emphasize finding time allow people to effortlessly find a time for communicating with their family members.
Case study: Shared family calendars

Unlike previous research that only allowed adult children to check on their older parents, the “shared family calendars” revealed a desire for more symmetric communication, so that older adults could see what their children and grandchildren were doing. The method is to design the calendar interface by tiling multiple calendars next to each other and synchronizing their navigation. Everyone can see all of the calendars, but individuals can hide the ones they don’t want to see to make more room for the others (Catherine, et al) (Figure 2.7). After a research group conducted a field study about the product, it highlighted some important lessons. The awareness of family members’ schedules is important to both children and aging parents. Troubleshooting use of the product is not easy in reality.
2.3.5 Awareness systems

Awareness systems are a class of Computer Mediated Communication (CMC) systems that support individuals in maintaining a peripheral awareness of each other’s activity with low effort and over medium to longer periods of time (Romero, et al).

Case study 1: Lampshade Intentional presence lamp

![Image of lampshade]

*Figure 2.8 Interface of 'shared family calendars'*

*From “Casablanca: designing social communication devices for the home”, 2001.*

This awareness system design provides friends or family with an indication of a user’s presence when the user explicitly activates the device. When both users indicate their presence, the lampshade becomes a collaborative decoration. One user selects a solid color for the upper region and a foreground image for the lower region of the shade. This foreground image would be the representation in the upper region for the other user’s lamp (Hindus, et al) (Figure 2.8).
Case study 2: I just clicked to say I love you

![Image of product boxes with LED indicators]

*Figure 2.9 Product and color indicator of 'I just clicked to say I love you'*

*From "I just clicked to say I love you: rich evaluations of minimal communication", 2006.*

This design is for lovers who are in long-distance relationships. These boxes are designed to be used in pairs, one for each member of a couple. When the button on one box is pressed, the LED on the other shines brightly, and then fades over time (Kaye). The color changes in this design provide notification to couples, and the clicking behavior indicates the presence of a partner for the participants (Figure 2.9).

**Integrated analysis of the related designs**

- Realizing reciprocal communication in communication design is an important goal to achieve. Many products have done excellent work in enabling one side to send or share details about their lives, but they don’t provide functions for giving instant feedback or replies to the sender. Not knowing whether the receiver has viewed the message or not can easily decrease both sides’ communication and their engagement with the product.
• Synchronous and asynchronous communication are two methods of communication. Direct videos or phone calls are forms of synchronous communication, which is the most straightforward way for people in distant locations to connect with each other. However, for people who have busy schedules or those who are in different time zones, it’s difficult to conduct synchronous communication all the time. In this case, sending asynchronous messages would improve the quality and frequency of connection.

• Seeking a way to evoke topics and elevate engagement for both sides can narrow the gap between people in different generations. Having a common thing to play with or to talk about can also motivate their further positive communication.

• Scheduling is a significant problem among people in distant places. Making the scheduling process smooth and easy is a design goal.
2.4 Current communication and social media applications

Before studying design, the researcher also studied popular communication and social media applications. Facebook and Snapchat are two social media platforms that are commonly used for communication. The following paragraphs describe how their function use and design differ in two aspects.

Function use

Even though they are used for similar purposes, their functions are distinctive to a certain extent. Facebook and Snapchat can be compared in terms of the following aspects: visibility and persistency of personal information (Utz, Sonja, Muscanell, Khalid). Facebook has high visibility and persistency. Users can easily choose what information to post to the public and what should be set as private. All information is saved on the Internet unless the users delete it and can be accessed indefinitely by other uses. On the other hand, Snapchat has low visibility and persistency. Photos and texts sent to others are automatically deleted after recipients viewed them, so the messages are ephemeral. They are not visible and persistent to anyone once they are deleted. Therefore, the above comparisons indicate that Facebook lacks privacy due to the visibility and persistence of old data, whereas the ephemerality of Snapchat makes it more private in communicating with other users and displaying oneself.

Three functional regions also explain the differences in the functionalities between Facebook and Snapchat, namely performance region, exhibition region, and personal region (Zhao, et al). A performance region is where users decide and manage what to display for current self-presentation needs. An exhibition region focuses on constructing one’s identity in the long-term through managing past data. A personal region is where people archive their personal memories and thus has significant personal value. Both social media platforms have good performance regions since users can freely choose what they want to show to the public. However, Facebook has very large exhibition and personal regions, whereas Snapchat has virtually none. As mentioned above, Facebook allows users
to store past data and provides the freedom to decide what to present to the public, but messages and posts in Snapchat are ephemeral, deleted after they are viewed (Bin, et al). Analysis from these three regions show that Snapchat has stronger privacy than Facebook.

**Design**

In terms of interface design, Facebook and Snapchat differ greatly from each other and their distinctive designs have different effects in terms of encouraging users to communicate with others. Facebook is a multifunctional platform, so users can not only share their moments in the form of text and photos, but they can also view information such as others’ posts, news, and nearby events. Snapchat, on the other hand, focuses on personal message sharing. The software turns on the camera when it is opened and the user can take pictures and videos with no additional steps. It even calls itself a camera company because the company focuses on products that are highly related to the use of cameras (Malik). With such an interface, users are greatly motivated to share their moments with others using photos or videos, promoting communication among friends, family members, and others close to them. A comparison between different designs shows that designs can have great impact on how users behave, especially their motivations to initiate communications with others.

**Integrated analysis of the communication applications**

1. The function regions that the social media applications possess can be divided into performance region, exhibition region, and personal region. These three aspects have different impacts on how people manage their social media accounts. It is worth considering how to incorporate these factors into communication design.

2. High visibility and persistency will cause privacy issues if the application is open to the public.

3. The design of the application interface can significantly influence the use of the product in mental and physical aspects.
Chapter 3 - User studies with older adults

In order to come up with a truly useful design to solve existing issues, the researcher conducted a series of field research to gain a better understanding of the issues. The researcher conducted interviews with seniors about their attitudes towards communication, methods of keeping in touch with their loved ones, problems that they experienced when using currently available communication tools, and their expectations about communication. In addition, 15 face-to-face interviews and 33 questionnaires (Appendix) were collected so that the researcher could learn more about problems that are highly relevant to the design (Figure 3.1).
3.1 Process and goals

The researcher aimed to understand four main points about the target users:

- **Thoughts and attitudes**
  Understand participants’ attitude towards communication. Explore how they experienced communication.

- **Methods and tools**
  Understand how participants keep in touch with various important people in their lives. What types of communication tools and designs they currently use.

- **Problems**
  Observe how participants use different communication tools. Pay more attention to the process and barriers.

- **Needs**
  Discover participants’ real communication needs. Ask about possible expectations. Encourage participants to create their own directions.

**Several supporting research questions were:**

- Are you satisfied with your current communication situation? Please rate the level from 1 (least satisfied) to 5 (most satisfied).
  - If yes, what moments made you happy? Any communication experience that made you feel not very satisfied?
  - If no, what are your problems and needs?

- Who do you contact most? How do you connect with different groups of people? Do you use different methods?

- What tools do you use to communicate with others under remote situations? What’s the frequency? Do you have any difficulties using them?
- Devices: Regular phone, smart phone, computer, tablet
- Methods: Text, Email, Facebook, Skype, Facetime, others

3.2 Process and methodologies

From April to September 2016, the researcher contacted and visited two senior living apartments, Inman Place and Parkview Senior Apartments in Champaign, IL, and one senior learning community, the Osher Lifelong Learning Institute. The researcher recruited participants by going to their social activities and giving basic introductions with flyers, followed by asking people who were interested in the projects to sign up for the user interview. The researcher tried to build a long-term relationship with participants for further feedback.

- Asking questions: questionnaire (Figure 3.2) and notebook
- Getting inspired answers: designed research diagrams (Figure 3.3)

  The designed diagrams were the materials for participants to answer. To avoid questions that limited participants’ responses, the designed research diagram used only a few words, such as “hopes”, “fears”, “who”, “when”, and “how” to guide participants to provide useful answers.

- Voice recording: iPhone 6
- Video recording: iPhone 6
- Photos: iPhone 6
- Behavior observation and recording: notebook and iPhone 6
Communication Experience Questionnaire

Part 1. Basic Info
Date: __________________ Place: __________________ Subject Code: __________________

Age: ___________________ Gender: ___________________

Education Level: __________________ Limitation: __________________

Part 2. “Communication”
1. Are you satisfied with your current communication situation? Please rate the level.
   ○ ○ ○ ○ ○
   *If yes, which communication moments make you happy?
   Is there any experience make you feel not very satisfied?
   *If no, what’s your communication needs?

2. Who do you contact most? How do you connect with different groups of people? (different family members; friends; previous colleagues; doctors...)

Figure 3.2 Questionnaire

<table>
<thead>
<tr>
<th>WHO, WHEN, HOW YOU COMMUNICATE WITH?</th>
<th>HOPES</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHO</td>
<td>WHEN</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FEARs</th>
</tr>
</thead>
</table>

Figure 3.3 Designed research diagrams
3.3 Findings and analysis

Figure 3.4 Completed questionnaire

Figure 3.5 Analysis Excel file
With all the questionnaire outcomes (Figure 3.4), notes, and voice recording gathered, the researcher transcribed all the important responses of each individual participant into a Microsoft Excel file (Figure 3.5). After that, the researcher used different colors to classify and group the responses into several different points, which provided crucial findings. The summary showed that they had many similar problems and expectations.

3.4 Findings about the problem of device use

Based on the researcher’s observation of older adults’ using different devices, such as, mobile phone, tablet, computer, etc. The researcher found that they had a number of problems of using these technologies. They also felt that the technology has changed too fast for them to catch up with.

“I’m not satisfied with the current situation. Technology has changed faster than I can keep up with.”

“When I was working it was easier to keep up with new developments in hardware, software, apps, as the changing technology was necessary to learn for business. Also there was IT support and firewalls to protect from viruses and malware. But after retirement, it becomes increasingly difficult to become aware of and proficient in new technology advances.”
Username and Password

“I never can remember my username or password. So if it becomes difficult and frustrating at the beginning, I would just give up (Figure 3.6)”.

Figure 3.6 Username and password problem found from the interview

Texting

Most of the participants found it very difficult to type on cell phone keyboards, but found it easier to type on iPads because of the larger buttons (Figure 3.7).

Figure 3.7 Texting problem found from the interview
**Voice**

“Siri always brings surprising results.”

“Is there a way that the design can help transferring between voice texting and speech?”

“Oh, can I send a voice message? I didn’t know that.”

- **Voice recording in messaging functions**

  ![Voice recording problem found from the interview](image)

  *Figure 3.8 Voice recording problem found from the interview*

Based on the research, only one technically proficient man knew how to use voice messaging without additional help. Most of the other participants did not even know there was such a function due to the small size of the icon and the corner placement of the function on the screen (Figure 3.8). However, even being told, it was still difficult for them to use this voice messaging function because the interactive method (hold the button to record or double click to start and stop recording) was difficult for them to learn.

**Complicated gestures**

Based on the researcher’s observation, some participants had difficulty with scrolling on the iPhone/iPad. One participant mentioned that the sensitivity of the current device is sometimes not a good thing for older groups to use.
Instructions

About 90 percent of participants mentioned their eagerness for having instructions. Some of them were constantly asking me how to use specific functions on their phone or tablet. Some of them told me that they felt a lack of confidence if they could not find step-by-step instructions. They grew up reading paper instructions no matter what electronic devices or furniture they bought (Figure 3.9). However, being unable to find any step-by-step paper instructions for digital products and the applications installed on their smart phones or tablets made them feel constantly frustrated.

"There are no instructions nowadays that are step-by-step."

"When I got my first iPhone, I tried to find the instruction book in the box, but there is no such thing in it."

"I once bought a Dummies book for iPhone, but the book is not for beginners who know nothing. I cannot understand some terminologies..."

"Sometimes I tried to Google answers, but so many outcomes came out and it's hard to find the right one."
“I rarely get new apps because I’m not sure what they would do for me and what I should do with them.”

“I need a channel to learn technology from the very beginning to keep up with the world.”

“The instructions for use are not always clear.”

“If you go to the store selling digital products, everyone would tell you ‘play with it’... But I’m afraid of breaking it.”

“There is a service providing technical support for people who have IT problems. They can even go to your home if needed. Although the service charges some money, but I would love to pay for it (Figure 3.10).”

![FYXIT Pamphlet](image)

**Figure 3.10 FYXIT-The pamphlet of the service which provides technical support.**

**Terminology**

“Sometimes I cannot understand the word (terminology).”
Other function use

- Complexity and simplicity

“I don’t want to have too many options (buttons), like Windows 10, too many things are on it, I don’t want it.”

“The new design is better to be simple and limited to certain functions. If there is an interactive tutorial to teach me how to use it, that would be perfect.”

The Skype interface is somewhat complicated for older adults. One of the participants could not find her desired contact quickly and did not know how to add a new contact. Another participant had another problem, saying, “The Skype is very confusing for me… Some features are on my PC but are not on Mac.”

- Picture sharing

“How to send pictures and videos? How can I find the newest pictures posted from her on Facebook?”

- Transition

“How to transfer photos from email to my phone?”

Tracking

- Positive voice

People have different views about tracking. One participant mentioned the “Life 360” app which enables her to see her son’s location (Figure 3.10).

“My son helped me set up this to see his location. He just wants me to know when he is back home so that I can give him a call.”
Based on this dialogue, it can be found that there is also a problem with **scheduling**.

![Apps related with tracking found from the interview](image)

**Figure 3.11** Apps related with tracking found from the interview

Another participant mentioned an app that helps her see her newborn grandchild’s activity through real-time remote video recording. She feels good to have this kind of technology (Figure 3.11).

---

**-Negative voice**

“I don’t need a tracking function and I want my own space. I don’t want people checking up on me and I won’t check up on them.”
Analysis

The top factors under device use can be listed as follows:

1. Texting problem
   It’s very hard for most of the participants typing keyboard on the the small size mobile phone, but better on the tablet because of the larger button.

2. User name & password problem
   Participants mentioned that they never can remember the username or password. They would just give up at the very beginning if it’s difficult and frustrating.

3. Hoping for instructions
   About 85 percent participants mentioned about the eagerness of instructions. Some of them constantly asked how to use specific functions on their phone or tablet. Some expressed the negative effect of lacking confidence without the step by step instructions.

4. Interest in sharing multiform messages
   Participants expressed much more excitement when they talked other forms of messages they received besides texting, such as pictures, videos. They also showed extreme curiosity about how to send pictures, videos or voice messages to other people.
3.5 Findings about the problem of communication

The researcher asked individuals to rate the satisfaction level of their communication on a scale from 1 (least satisfied) to 5 (most satisfied).

The summary shows that 42 percent of the participants have fairly low satisfaction with their communication situations, while 33 percent rate their satisfaction as neutral (Figure 3.12). The outcomes indicate that they have serious problems and needs related to communication. Some key findings are listed as follows:
**Scheduling**
Participants mentioned that they hope to get some ideas of their family members’ availability, so that they can contact them when they are free.

“I don't know when other people are available. I don't want to bother, maybe they are busy in meeting or driving. So I seldom make calls directly but prefer texting or leaving voice messages.”

“There are too many things on digital calendars. So I would prefer paper calendar to use.”

**Reciprocal and frequent communication**
Reciprocal communication is a process of “give and take” in people’s social relations. Older people might feel more engaged if they have a more equal role in communication with those they care about (Choudhury, et al). In family relationships, asymmetry is the norm, with older adults giving more and their children and grandchildren appreciating the benefits of being on the receiving end (Siân E., Harper, Sellen).

Hoping for more reciprocal and frequent conversation can also be seen during the interviews.

“I hope to have more frequent communication with families. When I feel like it’s not only ‘small talk’ (conversation like 'how are you doing'), I would feel good.”

**Connecting with young people**
Some participants mentioned that they could seldom get connected with their young grandchildren directly. The most frequent situation was seeing and talking with their grandchildren only when their parents brought their children to see them.

“How can I connect with my grandchildren?”
During the interview, the researcher found that participants expressed more curiosity and excitement when they talked about or showed the pictures, videos, or personalized emoji they received from other people (Figure 3.13). In addition, the participants are extremely curious about learning how to send multiform messages, such as pictures, videos, or voice messages. They expressed that they want to not only receive but also send such messages to others so that they can share their lives reciprocally.
The top factors under communication can be listed as follows:

1. **Hope for more reciprocal and frequent communication**
   Participants mentioned that they might feel more engaged if they have an equal role in communication with those they care about.

2. **Scheduling problem**
   Participants wanted to get ideas of the family member’s availability so that they can contact them when they have free time.

3. **Hope to connect with their grandchildren**
   Participant hoped to get chances to connect with their grandchildren. Some can only get ideas of their life from their parents.

4. **Want to communicate with family members but afraid of bothering**
   Older adults want to connect and communicate with their children or grandchildren but are always afraid of bothering them.

After having the outcomes of their top communication problems and expectations, the research found that most of the factors are related with the people who communicate with them. If the side of the young people doesn’t always talk with them, the older adults’ expectations cannot be met with a product design. So the researcher decided to conduct a quick interview with the side of young people.
3.6 Process and findings for young people

After an initial chat with some students, the researcher found that most young people don’t always contact their grandparents or even parents on their own initiative. The researcher then conducted user research asking two main questions to young people about the reasons and the expectations for communication with their elders (Appendix). Overall the researcher got 16 answers (Figure 3.14).

Several supporting research questions were:

- Do you usually communicate with your parents/grandparents? How often do you contact or communicate with them?
- Please list any reason(s) that would make you feel anxious or unwilling to contact them.
- Do you have any expectation to promote positive and delightful communication between you and the important older adults in your family? (If ..., I would like to talk and share more with my parents/grandparents.)
Some interesting findings were discovered after interviewing 16 students studied at University of Illinois at Urbana-Champaign.

The frequency of contacting their parents and grandparents from high to low are: mother; father; grandparents.

There are different answers and voices regarding why young people feel anxious or unwilling to contact the older adults in their family. But very interestingly, many answers from different students can be summarized into the same reason. Top answers are listed as follows:

1. “We don't have much to say” - because students and older adults have different information intake, students found that the lack of communication between them and the older adults is due to a lack of topics.
2. “When I was overloaded” – participants mentioned that when they are overloaded with work or tired, they feel stressed about contacting and talking with family members.
3. “Time difference” - some students have problems of living geographically far from their parents/grandparents. Under this situation, there is the issue of time zone difference. It is difficult for them to schedule a suitable time to conduct a long conversation.
4. “Hard to find a good time” – Due to busy schedules on one or both sides, and the difficulty of finding and scheduling a good time to call, it becomes hard for them to start conversations with people in remote locations.
The top three expectations about positive communication with older family members can be listed as follows:

1. “Easy way to share photos and videos” – The young people hope to have a simple and easy design that enables grandparents to learn how to share their lives.
2. “Say hi instead of talking for more than half an hour” – They hope that there is a way to express that they miss their family members frequently and briefly instead of conducting a video call for more than half an hour.
3. “Multi-conversations happening at the same time” – To avoid being unable to give an immediate reply to older adults, they expect to have multi-conversations with other family members at the same time, i.e., group discussions.
Chapter 4 - Design definition

Based on the results obtained from older adults, the researcher discovered some problems and categorized them into two sections, namely the “communication” and “device use” problems. For communication, the researcher found that most of the seniors hope to get involved in more frequent and reciprocal communication. Even if they contact their distant family members, the communication is infrequent; moreover, they feel that the exchange of information with their family members is not balanced. Oftentimes, they can share a lot of stories that happened in their lives but do not get enough responses. Such an imbalance makes them feel that they are not engaged in a mutual, positive communication. Seniors also genuinely hope to contact their young family members, such as their grandchildren. They are emotionally connected to their grandchildren and expect to know more about their lives. However, most of the time, seniors can only get an idea of their well being through their parents and cannot directly connect to them. Through this kind of communication, seniors do not feel a strong connection with their grandchildren and cannot express their emotion in a way that they expect to. Additionally, even though they truly hope to contact their family members, their concern that it may bother family members has prevented them from taking the initiative to contact family members. They
are mostly free during the day, but young adults are busy doing things such as studying for courses, working, and taking care of their children. Even in the evenings or during weekends, younger people’s schedules are usually occupied and they do not have much free time. Being aware of their situations, seniors are afraid of interrupting their lives and thus choose not to contact them. The researcher found that many seniors were hoping to know their family members’ availability so that they can contact them during their free time without bothering them.

The researcher also found that in addition to the issues about communication, older adults also experience problems with the function of currently available technologies, in terms of both devices and applications. It was found that older adults cannot easily operate devices that have small buttons due to age-related physical decline. Weakened memory often caused them to easily forget usernames or passwords and as a result, they just give up using these technologies. Additionally, older adults find it hard to learn to use many devices because there are insufficient instructions. For younger people, learning to use digital products can be very easy and intuitive, but older adults cannot adapt to the constantly changing ways of using digital products. The researcher found that many older adults hoped that there could be more instructions for using the devices.

For younger adults, the main problem is that they are not willing to take the initiative to contact their older family members because they are just too busy to take time to contact seniors, or there are few topics that they can talk about with seniors. The major challenge for younger people is how to motivate them to contact older people.

The researcher also found that there is something common within both groups of people. First, they both like multiform messages such as videos, images, and voice messages compared to typing words. Verbal messages can be monotonous for younger people and hard to read for older people, but these issues can be resolved with multiform messages. Second, a lack of topics is a problem for both young and older adults. Because of different ages and experiences, it is hard for them to find common topics to talk about. Third, the timing of contact is what they both care about. A scheduling platform can be helpful in
finding an ideal time to contact each other; asynchronous communication can also be used to avoid time conflicts (Figure 4.1).

Design Guidelines
A platform that promotes positive and reciprocal communication between older adults and their family members. The principles are making low effort design, enabling sharing multiform messages, enhancing motivation and solving time problem.
Chapter 5 – Design iterations and user testing

5.1 Initial design ideation and user testing

5.1.1 Initial design ideation

The initial design ideation consists of three main parts – “contacts”, ”schedule”, and “instructions” (Figure 5.1).
Contacts

The “contacts” interface is extremely simple and clean. The main buttons on the interface represent different contacts (Figure 5.3). The design ideation came from a 90-year-old’s modified iPad interface (Figure 5.2). To make it easier for her to reach out to her family members, her children made their profile pictures appear on the screen as individual icons with the help of a specific app. In this case, there is no need for her to deal with complicated interactions to reach out to her family members; she can just click specific profile icons.

Schedule

An calendar-based scheduling interface.

Figure 5.2 Modified iPad interface

Figure 5.3 Interface design of “Contacts”

Figure 5.4 Interface design of “Schedule”
The schedule section design came from the user need for making appointments. The idea was to enable easy video call scheduling (Figure 5.4).

**Instruction**

*Figure 5.5 Interface design of “Instruction”*
By clicking the instruction button on the top-right corner of the screen, a page with explanations about the function use for the current page will appear (Figure 5.5).
Click the button to start recording.

Figure 5.6 Interface design of Voice Recording process
The three images above show the process of recording voice messages. One key feature is that there are clear instructions at each step that tell older people how to operate the interface (Figure 5.6). Even if some procedures seem very easy and intuitive for younger people, older users cannot understand the meaning of all of the icons. Brief instructions at each step tell them what they should do in order to proceed to the next step.

Another feature is that there is no need to hold the button while recording the message. Most of the voice messages require users to hold the button but do not explicitly tell the users to do so. As a result, older people cannot anticipate the action of holding the button and thus fail to record their voice messages. By eliminating the need to keep their fingers on the button, they can start recording with one simple click. When the users finish recording, the only thing they need to do is to tap the button again. As mentioned above, all necessary actions are explicitly shown on the screen.
However, even with these features to help older people record and send voice messages, sometimes they still get confused. As shown in the right image, tapping the white bar with a triangle icon allows users to replay the voice message they just recorded. They can listen to the voice message and if not as expected, they can re-record another one. During the user test, the researcher found that some users did not understand the purpose of the white bar. Therefore, they were unable to take advantage of this replay function.

**Design for young people – improve motivation**

![Interface design for young people](image)

*Figure 5.7 Interface design for young people*

The above images are two different concepts for younger people (Figure 5.7). The one on the left tells younger users how long it has been since their last talk with other users. There is a time for each conversation to tell users exactly how long since the last time they contacted the person. The color of the bar also changes along with the length of the time since the last talk.
The other two images refer to the reminder sent to younger people. It is in the form of a pop-up window that asks the users if they want to set a time for chat or send messages such as pictures. This is to motivate younger people to initiate communication with older people.

The concept for this design was to motivate young people to contact older adults in their family. But the designer later received feedback that this kind of notification might generate guilt for the younger generation.

In the interfaces shown above, younger people can add hashtags in their messages and the system automatically provides explanatory information about those keywords to older people. The goal is to narrow the gap between two generations (Figure 5.8).
5.1.2 First round of user testing (Figure 5.9)

Users have problems with
Recognizing icons (i.e., photo album) in the conversation page.
Understanding of the replay button.

Users have different views of
Scheduling a time to have a video chat with family members.

Users show positive views about
Instruction button always on the screen - makes them feel confident about using the application.
"Embedded knowledge" function.
Sharing pictures during video calls.
5.1.3 Evaluation

1. Based on the different views that participants have, designing the scheduling calendar as a first layer main function is unnecessary.

2. The design of the contact and message sections is easy to understand, but some functions and icons are difficult for older adults to understand. The design of this part is not extremely engaging for young people to start communicating with older adults.

5.2 Modified content structure (Figure 5.10)
The application consists of four main parts.

1. **Moment** – a photo/video easy sharing dashboard

2. **Message** – a message topic-generating dashboard

   These two channels realize the concept of multiform communication, such as photo, video, voice, and handwritten messages. They also solve the scheduling problem since photo/video sharing and the message board is a form of asynchronous communication, which does not require people to be there at the same time. The photo/video sharing and message board method can generate topics among family members and narrow down the gap between older adults and the youth. The interface design itself can also motivate people to constantly share new stories.

3. **Direct video calls and quick scheduling**

   Different from the first two sections, this function realizes synchronous communication. In consideration of scheduling problem people mentioned, a quick scheduling function is reached in the design.

4. **Instructions**

   The step-by-step interactive tutorial entry is always on the top-right corner of the interface, which meets the needs of older adults. Also, some function use descriptions are displayed onscreen when users arrive at some specific operation.
5.3 Updated design iteration through user testing

5.3.1 Last round of user testing (Figure 5.11)

![Figure 5.11 The scene of last round of user testing](image)

Users have problems with

- Some wording (terminology) of the button or function descriptions: ‘Sharing’, 'Play', 'Switch camera', 'Message board'.
- 'Message' section interface makes users a little confused: should be simpler.

Users show positive attitudes about

- Instruction button always on the screen.
- 'Moment' section: photo and video sharing functions make users excited to tell their own stories.
Chapter 6 – Final design

“Nexa” – a family-based communication application

Why is it named “Nexa”?
"Nexa" is the Latin word for "connection". The intention with the design of Nexa was to build an application that is simple enough for older adults to use for communication and motivates other family members to participate in sharing their lives with older adults.

Why family-based design?
According to studies of social media applications, if posts and shared information about daily life are open to the public, the high visibility and persistency will raise privacy concerns for users. In addition, based on the user research on the need for communication on the part of both older adults and young people, a family-focused application is in high demand. The family-based design can also restrict posts and shared material to intimate groups.
6.1 Interface and function introduction

**Moment**

*Moment is a photo/video easy sharing dashboard.*

![Figure 6.1 Interface design of "Moment" dashboard (one contact)](image)

The homepage is a photo/video based dashboard, called ‘Moment’. It consists of several parts, the contact bar on the left; The photo/video message board on the right; ‘Send Moment’ and ‘Slideshow’ button on the button; The video call/scheduling and the instruction entry are always on the top right of the screen (Figure 6.1).

The Moment section motivates people on both side to share their daily life on their own initiative. The whole interface design keeps the design guideline of “simple interface” and “large accessibility”. To make it easy for users to find the family contacts, all the contacts or
family group are on the left column, which enables users to select the person to contact easily and quickly. For each contact, it shown as a profile picture and a full name below it. The family group contact realizes the expectation of ‘multi-conversation happening at the same time’ (Figure 6.2). And the “add contact” function is always on top of the contact bar. The right part of the interface is the image/video sharing dashboard. Users can easily check the images or videos they received. With the images/videos tiled on the screen, such interface design itself would motivate users to share more about their daily lives and recall previous moments.

![Image of the interface design of “Moment” dashboard (family group)](image)

*Figure 6.2 Interface design of “Moment” dashboard (family group)*

The design of the Moment section achieved these goals:
- Multiform messages sharing
- Time issue solved – asynchronized message sharing
- Topic triggered
- User motivated
Receive Moment and give response

When new moment messages come in, a pop-up window will display on the screen displaying the profile picture and the name of the sender (Figure 6.3).

*Figure 6.3 Interface design of “Receiving Moment”*
Figure 6.4 Interface design of “Giving Response” for video Moment
For video messages, the bottom pause button, progress bar, and the top-right close button will always be on the screen with no need for users to touch the screen to make them appear (Figure 6.4). Such design decreases the confusion for older adults if they want to pause or quit the video playback.

Figure 6.5 Interface design of “Giving Response” for image Moment
Figure 6.5 (cont.)
At the end of the video/image playback, a group of pre-programmed message reply buttons will show up, which enables users to easily reply back to the sender with simple one-click. A texting input box with an obvious red voice recording button is right below the pre-programmed message buttons. Such interaction design improves the probabilities for users to reply back and provide senders a hint that the receiver has read the messages. Knowing from instant feedbacks, the sender can get more motivated to share photos and videos since they know that the product is in use and the receiver is interested in the contents. This design ideation also satisfies the expectation of having reciprocal communication that older adults mentioned (Figure 6.5).

**Send Moment**

![Figure 6.6 Interface design of “Sending Moment”](image)

*Figure 6.6 Interface design of “Sending Moment”*
By clicking the ‘send moment’ button on Moment dashboard, options to take a photo, record a video, or choose from the photo album will be displayed. An important design consideration here is the descriptive explanation shown along with the icons. This comes from the user testing findings, which indicates that older adults have problems with recognizing icons (Figure 6.6).

**Slideshow**

![Slideshow](image)

*Figure 6.7 Button of “Slideshow”*

When older adults are not doing sending or receiving Moment, they can also choose to display photos or videos on the device and use it as a digital album by clicking the “Slideshow” button on the bottom right corner (Figure 6.7).
Once “Slideshow” mode is activated, the images and videos will play automatically and randomly (Figure 6.8). The Slideshow function realizes the goal of ‘presence of family members’ when people are geographically scattered but hope to feel connected all the time.
Message

Message is a message topic-generating dashboard.

![Image of Message dashboard with text messages and photos]

Figure 6.9 Interface design of “Message” dashboard

The Message dashboard displays different message boards simultaneously. The message includes multiple forms – texting messages, handwriting/doodling messages, voice messages and photos attached, which also follows the design ideation of multiform communication (Figure 6.9). The reason of designing the Message section as a form of message board can be described in two aspects.

1. Encourage users to generate topics

   By sending message boards, users can create any topics they want to talk about. Conversations related to the specific topic will appear under the particular message board.
2. Make it easier for people to find and manage previous messages.
   To find a specific topic, users can directly go to that message board, with no need to do excessive scrolling.

The design of the Message section achieved these goals:
- Multiform messages sharing
- Time issue solved – asynchronous message sharing
- Topic triggered
- User motivated

**Message board**

![Figure 6.10 Interface design of “Message board”](image)
After clicking a specific message board, users can conduct dialogues or check previous conversations. A special concept here is the design concept of the embedded information – the system can generate related photos after highlighting a keyword by users (Figure 6.10). This concept is to reduce the gap between older people and the younger generation. Based on the interviews with younger people, they said that they don’t have much to discuss with older adults because of their different information intake, which means that they don’t have many topics. A common scenario is that older adults cannot catch up with the current trend for technologies, news or popular slangs between young people. So if the younger side wants to explain a specific word to older adults, they can simply highlight that word and the system will generate related pictures for older adults to view and understand. Related technology has already been realized by some other applications, for instance, Google Assistant, Google Allo (Figure 6.11), Slack (Figure 6.12), etc.
Sending Message

Figure 6.11 Google Allo

Figure 6.12 Slack

Figure 6.13 Interface design of “Sending Message”
The design also follows the principle of ‘simple interface design’, ‘simple gesture design’ and ‘large accessibility’. Based on the user research, the designer found that most older adults don’t know how to use the voice message sending function. Some of them are not even aware of such a function because of the tiny size of the voice button and the inconspicuous position of the button. Also the gesture design of voice recording usually requires users to hold the button to record or double click the button to start and stop recording with no instructions, which also increase difficulties to older adults. For the current design, the size of different message inputting buttons is large enough to be recognized. The current position of voice recording and handwriting button is very obvious for older adults to see and use (Figure 6.13).

![Interface design of “Voice Recording” process](image-url)
At the same time, the problems they have with texting have brought difficulties. The interviewed participants showed great interest in learning the use of voice recording. The current human interaction design of voice recording is not convenient and understandable for older adults to use. For example, the holding gesture for recording voice messages makes it very difficult for them to finish recording. Considering all of the above factors, some design features are as follows (Figure 6.14):

1. The designer enlarged the size of the button and limited the number of buttons, only keeping the function of voice recording, writing/doodling and attaching photos. The designer also took consideration of their aging problem about cognition and vision decline.
2. The one-sentence instruction is always on the screen, which takes into consideration their decreased cognition and memory skills. This design also received positive feedback from the users during user testing.
Instruction

Step-by-step interactive tutorial entry is always on the top right of the interface (Figure 6.15).

From the literature review on older adults’ aging problems, the designer learned that they have decreased cognition and memory skills. Based on the field observation of interviews, the designer found that they had considerable problems with learning and remembering new skills. Importantly, about more than 80 percent of the participants mentioned their expectations of having instructional tutorials in current new products. In consideration of the great need for instructions, the designer devised the instruction function and made it an important entry that is always there in the system, instead of only appearing once at the beginning of the walkthrough section.
After clicking the instruction/help button, a list of instructions will show up (Figure 6.16).

Figure 6.16 Interface design of the instruction list

- Find my contacts
- Send an image/a video
- Send a topic/message
- Start a video call
- Make an appointment for a video call
- Slide show the photo album
Figure 6.17 Interface design of the interactive instructions
When entering the instruction mode, the system will guide users step by step to achieve their goal. Following the step instructions, users can interact with the system according to the hints (Figure 6.17).

**Video call and Scheduling**

*Make direct video calls or quickly schedule video calls.*

Based on the user research, people mentioned many scheduling and time issues for communication. For synchronous communication, it is difficult for people to find a common time to talk. Accordingly, the designer designed a quick scheduling function under the video call section.

**Receive invitation**

*Figure 6.18 Interface design of “Receiving invitation”*
When other people send an invitation, a pop-up window will appear showing the date and time. A series of pre-programmed reply buttons will be displayed on the screen for users to give a quick reply (Figure 6.18).

**Send invitation**

To send a scheduling invitation, users can click the video call button, and selection buttons for “start a call” and “schedule a time” will appear (Figure 6.19).

![Figure 6.19 Interface design of selecting “making direct call” and “scheduling”](image-url)
Figure 6.20 Interface design of “Scheduling” process
The designer tried to make the design of the invitation process as simple as possible. According to the user interviews, some people mentioned that it is not possible to add family appointments in the calendar because if other, more important working affairs come, choosing not to conduct a family video call can easily happen. Under this situation, designing a scheduling system with a recent time period would work better. The designer limited the scheduling timeframe to the following week. The first step is to select a possible day, and the next step is to select a time. The interface design enables all the buttons to be displayed at one time so that the user can select day and time with just one click (Figure 6.20).

### 6.2 User Scenarios

#### 6.2.1 The side of older adults

Marsha, 75, who is curious about using new technologies to connect with her family members. However, with the fast-paced developing tools and applications but lack of instructions, she felt helpless to learn and remember. The new application design - Nexa, solves her problems and satisfies her expectation for communication with family members.

**User scenario 1 – receive moment & reply back & Slideshow**

When Marsha was watching TV, she received a Moment photo from her granddaughter, Aileen. She clicked the “open” button with excitement and checked all the pictures Aileen wash sharing with her. At the end of viewing, she replied her a message expressing the love for all those pictures with only one click.

After going back to the main Moment dashboard, Marsha checked previous photos she received from Aileen and clicked “Slideshow” to make it as a digital frame and place the tablet on the table.
User scenario 2 – send moment
Marsha wanted to share her lunch with her family group. She first found the “family group” on the left column and clicked the “Share Moment” button. Following the description of the icon, she took a photo of the food she was eating, and sent the picture successfully with no any barriers. Five minutes later, she received a feedback saying “I can't wait to join you mom!” from her daughter in the family group.

User scenario 3 – receive message & reply back
Marsha received a Message from Aileen asking how to make delicious Italian pasta, she opened the message she received and replied back with voice messages following by the step by step voice recording instructions. The next day at noon, she decided to make Italian pasta as well, so she went back to that message board and attached some photos sending back to Aileen.

User scenario 4 – schedule a call & follow instructions
Marsha hadn’t seen her son for about two weeks so she wanted to have a video call with him. But under the situation of not knowing when her son is available, she decided to make a quick schedule with her son. However, since there had been long time for her not using “scheduling a call” function, so she forgot how to do it. By clicking the question mark icon on top of the navigation bar, she followed the step by step interactive instruction and successfully finished the scheduling task.

6.2.2 The side of young people

Aileen, 25, who is a graduate student in college and would like to always connect with her family members and share her life with them in a more private space. The new application design - Nexa, meets her need and satisfies her expectation.
**User scenario 1 – share moment**
Aileen was travelling and wanted to share some videos with her grandma. So she clicked “Send Moment” and quickly took a video of the beautiful surroundings with a laughing selfie at the end. After finishing the recording, she sent out the video clip to her grandma and received a reply saying: “It’s an amazing place! Send me more pictures!”

**User scenario 2 – schedule a video call**
Aileen wanted to schedule a video call with her grandma after finishing the trip. But with the tight schedule in school, she had to plan out a good time to call. After checking her own calendar, she opened the Nexa and did a quick scheduling by just selecting a day and then a time. Half an hour later, she received a message from her Grandma selecting that she would like to have a call with her at that time.

Andrew, 22, who is an undergraduate student in college and doesn’t always take his initiative to connect with his grandparents and other family members due to the lack of topic. Nexa motivates him to communicate more with his family members.

**User scenario 1 – share photos/videos**
Since Andrew felt that he had different information intake with his grandparents, so sometimes he didn’t know what to say with them. With the easy photo/video sharing design, he found that he has more topics with them based on their life photos/videos. Every time opening Nexa, the incoming messages from family groups and photo/video based dashboard design all make him more motivated to share his life photos and videos with family members.

**User scenario 2 – embedded photos**
In one message Andrew sent to his grandma, he wrote “I went to see the movie ‘The fast and the furious’ with my friend yesterday!” To help his grandma understand more about
his world – the movie at this time, he highlighted the name of ’The fast and the furious’, and the system directly embedded the related pictures, which included the movie photos, the related stars and the director, etc. On the side of his grandma, she checked the photos that the system embedded, and found some actors she knew. Then they started a conversation based on the actors and the movie. The embedded information function narrowed the gap between her and Andrew.
Chapter 7 - Conclusion

Initially triggered by the author’s own experience with the changed communication situation between her and her grandmother, this thesis investigated older adults’ communication habits and their problems with using devices for communication. The literature review indicates that the older adults’ use of digital tools continues to increase. However, age-related changes create limitations for them when using new communication technologies. Further research revealed that older adults’ communication problems should be paid serious attention because of the fast-growing population of older adults and the health problems that poor communication would bring for an increasingly large proportion of the population.

In this thesis, face-to-face interviews, behavior observations, and data analysis of older adults helped with understanding their problems with communication and device use. These interviews provided older adults’ real communication problems when talking with family members. In this case, without knowing young people’s attitudes, just designing a product for the elderly cannot fully serve the problem. The following interviews with young people further narrowed down the design direction. The research indicates that most young people don’t take the initiative to connect with the older adults in their families. The top reason is that different information intake leads to a lack of shared topics and interests among different generations. The design for young people should aim at enhancing their motivation and generating topics of discussion.

As to the design solution, Nexa is a family-based application that is simple enough for older adults to use for communication and motivates other family members to participate in sharing. This thesis proposes a new idea that communication problems between older adults and the younger generations in their families should be solved by devising simple designs targeted at older adults while enhancing motivation for young people. As for the design outcomes, by creating a simple photo/video sharing dashboard and message boards, the application realizes multiform communication sharing, topic
generation, and asynchronous communication. By creating direct video calls and a quick scheduling function, it also enables synchronous communication and solves the scheduling issue. The tutorial instruction enhances the ease of use for older adults. Some detailed design, such as embedding related pictures in the system, narrowed the gap between older adults and young people; enlarged voice recording/doodling buttons with instructions make it easier for older adults to learn and use. The intelligent and preprogrammed buttons increase the opportunities to reply back and promote the reciprocal communication. The overall design also follows the design guidelines for older adults – simple interface design, easy gesture design, larger accessibility, immediate feedback, and consistency.

In this thesis, the author focused on the digital interaction design for older adults’ communication problems. Further studies would explore other methods to solve these problems. Developing the current design, does the current color design best meet the needs of their visual decline changes? Can some relationships happen between the moment and the message board sections? Thinking farther beyond the current form, can voice interaction (hands-free gesture) technology better help older adults to communicate with people and use devices? All of these studies are what the author will continue to explore further for this meaningful topic.
Works Cited

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Appendix A: User Research Materials

Communication Experience Questionnaire

Part 1. Basic Info

Age ___________ Gender ___________
Education Level _________________________________
Limitation _________________________________

Part 2. “Communication”

1. Are you satisfied with your current communication situation? Please rate the level.
   ○ ○ ○ ○ ○

   *If yes, which communication moments make you happy?
   Is there any experience make you feel not very satisfied?

   *If no, what’s your communication needs?

2. Who do you contact most? How do you connect with different groups of people? (different family members; friends; previous colleagues; doctors...)
3. What tools do you use to communicate under remote condition? What’s the frequency? Do you have any difficulties using them?

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4. What tools do your peer (people who you connect a lot) always use? Do they influence your device experience? Why or why not?
HOPES

FEARS
Questions for the young generation

1. Do you usually communicate with your parents/grandparents? How often do you contact or communicate with them?

2. Please list any reason(s) that would make you feel stressful or unwilling to contact them?

3. Do you have any expectation to promote a positive and delightful communication between you and the important older adults in your family? (If......, I would like to talk and share more with my parents/grandparents.)
Appendix B: IRB Application

University of Illinois at Urbana–Champaign

IRB Application
Application for Review of Research Involving Human Subjects

This Section is for Office Use Only

UIUC IRB Protocol No. ___________________________ Track: _________________

Exempt under 45 CFR §46.101(b) ☐ (1) ☐ (2) ☐ (3) ☐ (4) ☐ (5) ☐ (6) Reviewer 1: _________________
Expedite, Category ☐ (1) ☐ (2) ☐ (3) ☐ (4) ☐ (5) ☐ (6) ☐ (7) ☐ (8) ☐ (9) Reviewer 2: _________________

All forms must be completed, signed by the RPI, and submitted by FAX, Email, or single-sided hard copy. Please type responses; handwritten forms will not be accepted. Please, no staples!

☐ Initial Submission, date of submission ________________
☐ Revised IRB-1, date of revised IRB-1 ________________

1. RESPONSIBLE PROJECT INVESTIGATOR (RPI) The RPI must be a nonvisiting member of UIUC faculty or staff who will serve as project supervisor at UIUC. For other research team members (including those from other institutions), please complete the Research Team Attachment and provide with the completed application. Include all persons who will be 1) directly responsible for the project’s design or implementation, 2) recruitment, 3) obtain informed consent, 4) involved in data collection, data analysis, or follow-up.

Last Name: Weightman First Name: David
Academic Degree(s): Professor
Dept. or Unit: School of Art and Design Office Address: Room 128 Mail Code: ______________________
Street Address: 408 East Peabody Drive City: Champaign State: IL Zip Code: 61820
Phone: 2177783742 Fax: ______________________
E-mail: diw@illinois.edu
UIUC Status: Nonvisiting member of (Mark One) ☐ Faculty ☐ Academic Professional/Staff

Training ☐ CITI Training, Date of Completion, ________________
☐ Additional training, Date of Completion 1

2. PROJECT TITLE
The communication needs of an aging society

3. FUNDING Indicate whether this research is funded by, or application has been made for, a grant, contract, or gift.

3A. STATUS ☐ Research is not funded and is not pending a funding decision (Proceed to Part 4).
☑ Research is funded (funding decision has been made).
☐ Funding decision is pending. Funding proposal submission date: ________________

3B. SOURCE(S) If the research is funded or pending a funding decision, mark and name all sources:

Type of Funding—check all that apply
Name of Source
☐ UIUC Department, College, or Campus
(includes Research Board and Campus Fellowship Training Grants)
☐ Federal
(from federal agencies, offices, departments, centers)

1 Additional CITI modules may be required depending on subject populations or types of research. These include: (i) research enrolling children; (ii) research enrolling prisoners; (iii) FDA regulated research; (iv) data collected via the internet; (v) research conducted in public elementary/secondary schools; and, (vi) researchers conducted in international sites
3. PROPOSAL: Attach a complete copy of the funding proposal or contract. □ Attached

Sponsor-assigned grant number, if known: 

Title of Funding Proposal or Contract, if different from Project Title in Part 2:

3D. FUNDING AGENCY OFFICIAL, IF ANY, TO BE NOTIFIED OF IRB APPROVAL

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<thead>
<tr>
<th>Last Name</th>
<th>First Name</th>
<th>Salutation</th>
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<td>Office Address:</td>
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<td>Street Address:</td>
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<td>Phone:</td>
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4. FINANCIAL INTERESTS: Indicate below if any investigators or any members of their immediate families have any relationships, commitments, or activities with the sponsor of this research that might present or appear to present a conflict of interest with regard to the outcome of the research. (If a financial conflict of interest exists, please submit the UIUC approved conflict management plan. If you have questions about conflict of interest contact the Office of the Vice Chancellor for Research at 217-333-0034.)

- Ownership, equity or stock options
  - □ Has been disclosed to the UIUC campus OR □ has not been disclosed to the UIUC campus

- Personal compensation such as royalties, consulting fees etc.
  - □ Has been disclosed to the UIUC campus OR □ has not been disclosed to the UIUC campus

- Intellectual property such as patents, trademarks, copyright, licensing, etc.
  - □ Has been disclosed to the UIUC campus OR □ has not been disclosed to the UIUC campus

- Other conflict of interest:
  - □ Has been disclosed to the UIUC campus OR □ has not been disclosed to the UIUC campus

□ No conflicts exist

5. SUMMARIZE THE RESEARCH. In LAY LANGUAGE, summarize the objectives and significance of the research.

Facing with an aging society, the need for communicating and interacting with people is fairly important for elderly people. The market for using design and technology to meet their communication need is big. But not much enough and satisfied design is being created. In another aspect, a better communication tool for elderly people will be beneficial for their health in many aspects. With not much enough communication with people around, elderly people will easily feel lonely. And loneliness has been linked with depression, solitary… However, lots of barriers exist in elderly people because of their health characteristics, such as, the declining sensory, cognitive, and physical abilities… In this case, how to use design and technology to help elderly people get a better communication experience is the focus of this topic.

The project needs recruiting some senior people for interview. The process would be finding the possible senior living house or community which are interested in my topic and could provide me access to reach out residents or senior people. Also, the research may need recruit some students to know how they connect with senior people in their family or other resource.

---

2 Clarify whether or not sponsor requires specific language in the contractual agreement that impacts human subjects research

3 Clarify whether or not the sponsor requires the protocol adhere to ICH GCP (E6) standards
6. PERFORMANCE SITES  
Including UIUC sites, describe ALL the research sites for this protocol. For each non-UIUC site, describe: Whether the site has an IRB. Whether the site has granted permission for the research to be conducted. Contact information for the site. If the site has an IRB, whether the site's IRB has approved the research or planned to defer review to a UIUC IRB. 

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<th>Performance Site</th>
<th># Male</th>
<th># Female</th>
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<td>1. Inman Place</td>
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<td>2. Parkview Senior Living Apartment</td>
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<td>3. OLLI community</td>
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<td><strong>TOTALS</strong></td>
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For non-UIUC sites, documentation of IRB approval is: 

- Attached
- Will Follow
- N/A

List and describe any additional Performance Sites information on an attachment and check here: ☐

7. DESCRIBE THE HUMAN SUBJECTS  

7A. SECONDARY DATA ONLY? If this research only involves the analysis of data that has already been collected from human subjects and no new data collection will occur, check here: ☐

7B. MATERIALS OF HUMAN ORIGIN? Will this research involve the collection, analysis, or banking of human biological materials (e.g., cells, tissues, fluids, DNA)?  ☐ Yes ☐ No If you attach Appendix C, the Biological Materials Form.

7C. ANTICIPATED NUMBERS How many subjects, including controls, will you study in order to get the data that you need? If you plan to study disproportionate numbers of a given sex, race, or minority group, provide scientific rationale in Part 11.

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<th>Performance Site</th>
<th># Male</th>
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<td><strong>TOTALS</strong></td>
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List Anticipated Numbers for additional Performance Sites on an attachment and check here: ☐

7D. AGE RANGE Mark all that apply. Researchers planning to include children in research projects involving more than minimal risk must provide written documentation of the benefits that are likely to accrue to a child participating in the project. This should include information gathered on adults, if it exists, or an explanation about why it does not exist.

- 0–7 years
- 8–17 years
- 18–64 years
- 65+ years

If applicable, written documentation of benefits for including children in more than minimal risk research is attached.

7E. SPECIAL OR VULNERABLE POPULATIONS Mark groups that will be targeted by design. Also indicate groups likely to be involved in the research even though they are not targeted by design.

- None of the following special populations will be targeted
- Children (age < 18 years)
- Neonates
- Fetuses (in utero)
- Neonates
- In vitro fertilization subjects
- Pregnant or lactating women
- Inpatients
- Mentally disabled or cognitively impaired persons
- Adults with legal guardians
- Persons with limited civil freedom (e.g., prisoners)
- Specific racial or ethnic group(s)— describe: 
- Low income or economically disadvantaged persons

3 of 11
IRB-1 04/08/2013
7F. If you checked any of the groups in question 7E, describe additional safeguards included in the protocol to protect the rights and welfare of special or vulnerable populations.

For senior people interview, I will use large size font on my questionnaire to guarantee that they can see the texts clearly.

8. RECRUITMENT

8A-1 RECRUITING PROCEDURES Specifically describe the systematic procedures for finding and recruiting subjects or requesting pre-existing data or materials. 1) State whether any of the researchers are associated with the subjects (e.g., subjects are students, employees, patients). 2) Name any specific agencies or institutions that will provide access to subjects or subject data. 3) Who will contact the prospective subjects? 4) Who gives approval if subjects are chosen from records? 5) Describe solicitation through the use of advertising (e.g., posters, flyers, announcements, newspaper, radio, television, Internet), face-to-face interaction, direct mail or phone contact, classrooms, subject pools, health care registries, patient referrals, and institutional “gatekeepers,” as applicable.

The project needs recruiting some senior people for interview. The process would be finding the possible senior living house or community which are interested in my topic and could provide me access to reach out residents or senior people. Also, the research may need recruit some students to know how they connect with senior people in their family or other resource.

1) I will not recruit students that I’m currently teaching. And I have no relationship with elderly people.
2) Agencies or institutions that will provide access to subjects:
   1. Inman Place
   2. Parkview Senior Apartments
   3. OLLI community
3) Aileen Bai
4) Subjects themselves
5) The recruiting process for senior people: attending their social meeting (ex. coffee time), using flyers to introduce the project and conducting face-to-face conversation. Then, asking for those who are interested my project signing up for the interview, trying to build a long-term relationship.
   The recruiting process for students: using flyers to students in different classes and ask for those who are interested in the project to answer the questionnaire.

8 A-2 Attach final copies of recruiting materials including the final copy of printed advertisements and the final version of any audio/taped taped advertisements and check here: Attached ☒ Will Follow ☐

8B. WITHHELD INFORMATION Do you propose to withhold information from subjects prior to or during their participation? ☐ Yes ☒ No

If yes, describe what will be withheld, justify the withholding (address risks, provide rationale), describe the debriefing plan, and attach a labeled copy of a written debriefing form, to be provided to subjects. ☐ Debriefing Attached ☐ Will Follow ☒

8C. PROTECTED HEALTH INFORMATION (PHI) The IRB must address the privacy and use of health information that is created, received, or housed by health care providers, health plans, or health care clearinghouses and that identifies or could be used to identify an individual. During either recruiting or data collection, will you use or have access to such information that is related to the past, present or future health or conditions of a living or deceased individual, provision of health care to the individual, or the payment for the provision of health care to the individual? ☐ Yes ☒ No
8D. SCHOOL-BASED RESEARCH If subjects will be recruited from Illinois public or private elementary or secondary schools, additional deadlines and procedures apply. Criminal background clearances might be required. Special consideration must be given to the exclusion of protected populations. Please contact the Office of School–University Research Relations (OSURR) (217.244.0515 or http://www.ed.uiuc.edu/BER/OSURR.html) for more information. Mark one:

☐ Illinois schools will be used
☐ Illinois schools will not be used

9. INCLUSION AND EXCLUSION CRITERIA Address all four of the following items in explaining who will and will not qualify for participation and how that determination will be made: (1) Describe procedures to assure equitable selection of subjects. Justify the use of any special or vulnerable groups marked in Part 9E. Selection criteria that target one sex, race, or ethnic group require a clear scientific rationale. (2) List specific criteria for inclusion and exclusion of subjects in the study, including treatment groups and controls. (3) Name and attach copies of measures and protocols that will be used to screen applicants. (4) Explain how the inclusion/exclusion criteria will be assessed and by whom. If special expertise is required to evaluate screening responses or data, tell who will make this evaluation and describe their training and experience.

(1) The target should be American who age 60 and above with standard aging
(2) Exclusion criteria: severe disabled seniors
   ex. deaf, completely blind, paralysis of one or both arms, aphasia, stroke or cognitive impairment (such as can’t hold a conversation)
(3) "recruiting flyer"
(4) I will make annotation on the flyers about my target user, so that they can understand my target group before signing-up. Also, I can recognize their ability and health condition during the interview process. If someone who is not within my target user criteria, I will finish our first interview politely without building a long-term interview relationship.

10. RESEARCH PROCEDURES: Using LAYMAN’S LANGUAGE, specifically describe what the participants (treatment groups and controls) will do and where the research activities will take place. Give approximate dates and durations for specific activities, including the total number of treatments, visits, or meetings required and the total time commitment. (For schools-based research where class time is used, describe in detail the activities planned for nonparticipants and explain where (e.g., in a classroom, in a private area) both participant
   s and nonparticipants will be located during the research activities. Include a concise description of procedures, locations, time commitments, and alternate activities on the relevant consent and assent forms.)

Participants will answer questions about some basic situation and their communication and device-use experience. Also, based on "#3" on Questionnaire, demonstration of using different communication devices is needed. I will observe how they use communication tools and take notes about their using behavior, reflection time, and problems. During the whole process, I may use phone to make photos or videotaping to record the process. After collecting all the data, I will analyze and summarize the outcomes, to see whether some similar behavior and problems happen among different senior people.

The research activities will take place at senior living apartments and communities:
1. Inman Place
2. Parkview Senior Apartments
3. OLLI Community

Total number of visits for each interviewee: 1-5
Total time commitment for each interviewee: 20-30min

11. EQUIPMENT Will any physical stimulation or physiological data acquisition equipment be used with the subjects?
   ☐ Yes ☐ No If yes, attach Appendix A, the Research Equipment Form.

12. DEVICES Will any devices be used with the subjects?
   ☐ Yes ☐ No If yes, attach Appendix B-1.
13. DRUGS AND BIOLOGICS  Will any drugs or chemical or biological agents be used with the subjects?
☐ Yes  ☐ No  If yes, attach Appendix B-2.

14. MRI AT BIC  To use the Beckman Institute Biomedical Imaging Center (BIC) in human subject's research, you must obtain prior approval from the BIC (217.244.0600; bmrf@bmrf.bmrf.uiuc.edu) and use BIC-approved screening and consent forms. Attach:
- BIC approval  ☐ Attached
- BIC screening form  ☐ Attached
- BIC consent form  ☐ Attached

15. MEASURES  If subjects will complete questionnaires, surveys, interviews, psychological measures, or other measures, however administered, the IRB must review and approve the measures. List all such measures here and attach complete, labeled copies (including translations, if applicable) to this application:
- Measure 1: Questionnaires  ☐ Attached  ☐ Will Follow
- Measure 2:  ☐ Attached  ☐ Will Follow
- Measure 3:  ☐ Attached  ☐ Will Follow
- Measure 4:  ☐ Attached  ☐ Will Follow
List additional Measures on an attachment and check here: ☐

16. SUBJECT REMUNERATION  Will subjects receive inducements or rewards before, during, or after participation?
☐ Yes  ☐ No
If yes, will payment be prorated for partial participation?
☐ Yes  ☐ No
If remuneration will be given, for each subject group:
(1) specify the form of remuneration, including $, course credit, lottery, gift certificate, or other;
(2) state the $ amount or the approximate $US value, or the course credit and its percentage of the final grade;
(3) explain the remuneration plan, including whether and how prorating will be made for partial participation;
(4) for lotteries, include (a) the number of prizes, (b) the nature and value of each prize, (c) the approximate odds of winning, (d) the date(s) of the drawing(s), and (e) how winners will be notified, by whom, and by when; and
(5) include all this information on the relevant consent forms.

17. SUBJECT OUTLAY  Will subjects incur costs for research-related procedures (e.g., longer hospitalization, extra tests), use of equipment, lost compensation, or transportation (over 50 miles)?
☐ Yes  ☐ No  If yes, describe here:

18. CONFIDENTIALITY OF DATA  Answer each of the following to describe methods that will ensure the confidentiality of individually identifiable data. Confidentiality is required unless subjects give express, written permission to have their identifiable information published, presented, or shared.

18A. CHECK IF USED IN DATA COLLECTION:  ☒Audio tapes/Video tapes  ☐Still photos  ☐Other imaging
18B. DATA COLLECTION  Explain how the data will be collected. If anonymous data collection is proposed, provide details of how investigators will not have the ability to trace responses to subject identities. For multiphase data collection or if multiple contacts will be made with subjects, specifically explain the subject tracking and coding systems.

Address the confidentiality of data collected via e-mail, databases, Web interfaces, computer servers, and other networked information, as applicable.

| Questionnaire: The name of the interviewee will not displayed on the questionnaire, which will be substituted as a subject code. |
| Photo: Most of the pictures are not identifiable. The content would be different devices, interfaces, or these things with interviewee’s hands. For the pictures which are identifiable, they are kept in my personal computer, and can only published after getting consent from the interviewee. |
| Audio recording: only for transcription. |
| Video: Used for recording some device-using process by senior people, which mostly will not be published. Only for few of them which are quite important for the result, and also being consented from the interviewee, will may be published. |

18C. DATA SECURITY  Describe how and where the data be kept so that the data remain confidential.

Some data which is related with the device-use for communication will be collected.
Data will be saved in my personal computer, which is password protected.
Data that saved in cell phone is temporary, which will be transferred to personal computer.
Date that saved in Google Drive / Box is password protected, which will be deleted.

18D. STAFF TRAINING  Describe the training and experience of all persons who will collect or have access to the data.

The researcher has done some researches with people who are not sensitive and vulnerable. The process includes, asking and answering questions, observing, etc.

CITI training

18E. DATA RETENTION  How long will the data be kept?

3-5 years after the completion of this study.

18F. DISSEMINATION OF RESULTS  What is(are) the proposed form(s) of dissemination (e.g.; journal article, thesis or academic paper, conference presentation, sharing within industry or profession)?

thesis, presentation, design, exhibition

Photos may be disseminated in thesis, presentation and exhibition.

OHRP states that data must be kept for at least 3 years after the completion of this study.

18G. PRIVACY  Describe provisions to protect the privacy interests of subjects.
Interview will be conducted one to one or in a small group (2-5 people), which will avoid feeling of frustration and embarrassment in front of others.

18H. INDIVIDUALLY IDENTIFIABLE INFORMATION Will any individually identifiable information, including images of subjects, be published, shared, or otherwise disseminated? ☐ Yes ☐ No

If yes, subjects must provide explicit consent or assent for such dissemination. Provide appropriate options on the relevant consent documents.

19. INFORMED CONSENT: University policy requires the execution of a comprehensive, written document that is signed by the subject (or the subject’s authorized representative) as the principal method for obtaining consent from subjects. The language in the document must be understandable to the subject or the subject’s legally authorized representative.

An investigator may request a Waiver or Alteration of Informed Consent or a Waiver of Documentation of Informed Consent (e.g., online consent, oral consent). If requesting a waiver please complete the appropriate waiver form at: www.irb.illinois.edu and submit it with the IRB Application for review.

Children must assent (or, voluntarily agree) to participation and a parent must separately consent on behalf of their child (i.e., two different forms are generally required). Children under age 8 may assent either orally or passively, depending on their level of maturity. Children 8–17 years old should sign a written form unless the UIUC IRB approves a different process.

19A. TYPE OF CONSENT Check all that apply and attach one copy of each relevant form, letter, or script on university letterhead. Include translations, if consent will be obtained in a foreign language. Use headings, headers, or footers to uniquely identify each document and associate it with the subject group for which it will be used.

☐ Written informed consent (assent) with a document signed by
  ☐ adult subjects ☐ parent(s) or guardian(s) ☐ adolescents aged 8–17 years
  ☐ Waiver or Alteration of Informed Consent (Attach waiver form.)
    ☐ adult subjects ☐ parent(s) or guardian(s) ☐ adolescents aged 8–17 years
  ☐ Waiver of Documentation (signature) of Informed Consent (Attach waiver form.)
    ☐ adult subjects ☐ parent(s) or guardian(s) ☐ adolescents aged 8–17 years

19B. USE OF PROXY Will others (e.g., next of kin, legal guardians, powers of attorney) act on behalf of adult subjects in giving consent to participate in this research? ☐ Yes ☐ No If yes, describe in Section 20D.

19C. USE OF PROXY OUTSIDE THE UNITED STATES If a proxy is used in research conducted outside Illinois, provide justification (e.g., statement of an attorney or copy of applicable law) that the proxy is authorized under the laws of the jurisdiction in which the research will be conducted to consent to the procedures involved in this protocol.

19D. CONSENT PROCESS Describe when and where voluntary consent will be obtained, how often, by whom, and from whom. If cognitively impaired subjects (including children under age 8) will be involved, explain how the subject’s
understanding will be assessed and how often; include the questions that will be asked or actions that will be taken to assess understanding.

Describe any waiting period between informing the prospective subject and obtaining the consent. Describe steps taken to minimize the possibility of coercion or undue influence. Indicate the language used by those obtaining consent. Indicate the language understood by the prospective subject or the legally authorized representative.

If the research involves pregnant women, fetuses, or neonates, indicate whether consent will be obtained from the mother, father, or both. If the research involves children, indicate whether consent will be obtained from: Both parents unless one parent is deceased, unknown, incompetent, or not reasonably available, or when only one parent has legal responsibility for the care and custody of the child; or from one parent regardless of the status of the other parent.

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<tr>
<th>Explain the study and the direct benefits for them; allow for questions; sign if they agree; permission for use of photos, video clips, etc.</th>
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20. RISKS

20A. DESCRIPTION Specifically describe all known risks to the subjects for the activities proposed and describe the steps that will be taken to minimize the risks. Include any risks to the subject’s physical well-being, privacy, dignity, self-respect, psyche, emotions, reputation, employability, and criminal and legal status. Risks must be described on consent forms.

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<tr>
<th>Possible frustration and embarrassment due to the topic being discussed. I would try to conduct one-to-one interview or small group (3-5 people) interview.</th>
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</thead>
</table>

20B. RISK LEVEL: ☑️ No more than minimal risk

☐ More than minimal risk

☐ More than minimal risk

( the probability and magnitude of harm or discomfort anticipated for participation in the proposed research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests).
20C. Data Monitoring Plan: If you checked that the research is more than minimal risk, describe the provisions for monitoring the data to ensure the safety of subjects (Who will periodically monitor harms and benefits experienced by subjects to ensure that the relationship of risks to potential benefits remains unchanged? How often will monitoring occur? What analyses will be performed? If appropriate, what criteria will be used to stop the research based on monitoring of the results?)

21. BENEFITS Describe the expected benefits of the research to the subjects and/or to society.

This research will provide a solid understanding of the current situation of the communication among elderly people, which will be an essential basis for the further design process. The result will help build a more efficient and easily used way for senior people to communicate with people and overcome the loneliness.

22. RISK/BENEFIT ASSESSMENT Weigh the risks with regard to the benefits. Provide evidence that benefits outweigh risks.

Little risks would appear in the project. The emotion of the interviewee may be influenced in the process of the interview. From the perspective of the benefits, the project will be beneficial to senior people with their communication and health.

If additional Risk/Benefit information is attached, check here: ☐

23. Is this a multi-center study in which the UIUC investigator is the lead investigator of a multicenter study, or the UIUC is the lead site in a multi-center study. Yes ☐ No ☑

If yes, describe the management and communication of information obtained that might be relevant to the protection of subjects, such as: unanticipated problems involving risks to subjects or others, interim results and protocol modifications.
24. INVESTIGATOR ASSURANCES: The signature of the Responsible Project Investigator is required (scanned or faxed signatures are acceptable). Other investigators are also responsible for these assurances and are encouraged to sign.

I certify that the information provided in this application, and in all attachments, is complete and correct.

I understand that I have ultimate responsibility for the protection of the rights and welfare of human subjects, the conduct of this study, and the ethical performance of this project.

I agree to comply with all UIUC policies and procedures, the terms of its Federal Wide Assurance, and all applicable federal, state, and local laws regarding the protection of human subjects in research.

I certify that

• the project will be performed by qualified personnel according to the UIUC IRB-approved protocol.

• the equipment, facilities, and procedures to be used in this research meet recognized standards for safety.

• no change will be made to the human subjects protocol or consent form(s) until approved by the UIUC IRB.

• legally effective informed consent or assent will be obtained from human subjects as required.

• Unanticipated problems, adverse events, and new information that may affect the risk–benefit assessment for this research will be reported to the UIUC IRB Office (217.333.2670; irb@illinois.edu) and to my Departmental Executive Officer.

• I am familiar with the latest edition of the UIUC Handbook for Investigators, available at www.irb.illinois.edu, and I will adhere to the policies and procedures explained therein.

• student and guest investigators on this project are knowledgeable about the regulations and policies governing this research.

• I agree to meet with the investigator(s), if different from myself, on a regular basis to monitor study progress.

• if I will be unavailable, as when on sabbatical or other leave, including vacation, I will arrange for an alternate faculty sponsor to assume responsibility during my absence. I will advise the UIUC IRB by letter of such arrangements.

I further certify that the proposed research has not yet been done, is not currently underway, and will not begin until IRB approval has been obtained.

<table>
<thead>
<tr>
<th>Responsible Principal Investigator</th>
<th>Date</th>
<th>Investigator</th>
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<td>Investigator</td>
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25. (OPTIONAL) DEPARTMENTAL ASSURANCE To be completed by the RPI’s Departmental Executive Officer or their designee.

The activity described herein is in conformity with the standards set by our department and I assure that the principal investigator has met all departmental requirements for review and approval of this research.

<table>
<thead>
<tr>
<th>Departmental Executive Officer (or designee)</th>
<th>Date</th>
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</table>

* For units that conduct scientific merit review, the signature above documents the following:

1. The research uses procedures consistent with sound research design.
2. The research design is sound enough to yield the expected knowledge.