



# Kent Academic Repository

Panda, Swaroop, Komal, Farkhandah Aziz, Law, Effie Lai-Chong, Murad, Syed, Sun, Zhongtian, Summerill, Ben, Konu, Delali and Nguyen, Thuy-Vy (2025) *Exploring user acceptance of a fintech chatbot powered by LLMs among older adults*. In: BCS HCI '25: Proceedings of the 38th International BCS Human-Computer Interaction Conference. . pp. 420-431. ScienceOpen

## Downloaded from

<https://kar.kent.ac.uk/116734/> The University of Kent's Academic Repository KAR

## The version of record is available from

<https://doi.org/10.14236/ewic/BCSHCI2025.48>

## This document version

Publisher pdf

## DOI for this version

## Licence for this version

CC BY (Attribution)

## Additional information

## Versions of research works

### Versions of Record

If this version is the version of record, it is the same as the published version available on the publisher's web site. Cite as the published version.

### Author Accepted Manuscripts

If this document is identified as the Author Accepted Manuscript it is the version after peer review but before type setting, copy editing or publisher branding. Cite as Surname, Initial. (Year) 'Title of article'. To be published in **Title of Journal** , Volume and issue numbers [peer-reviewed accepted version]. Available at: DOI or URL (Accessed: date).

## Enquiries

If you have questions about this document contact [ResearchSupport@kent.ac.uk](mailto:ResearchSupport@kent.ac.uk). Please include the URL of the record in KAR. If you believe that your, or a third party's rights have been compromised through this document please see our [Take Down policy](https://www.kent.ac.uk/guides/kar-the-kent-academic-repository#policies) (available from <https://www.kent.ac.uk/guides/kar-the-kent-academic-repository#policies>).

# Exploring User Acceptance of a Fintech Chatbot powered by LLMs among Older Adults

|                                                                                      |                                                                |                                                                            |                                                                    |
|--------------------------------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------|
| Swaroop Panda*                                                                       | Farkhandah Aziz Komal*                                         | Effie Lai-Chong Law                                                        |                                                                    |
| Northumbria University                                                               | Teesside University                                            | Durham University                                                          |                                                                    |
| <a href="mailto:swaroop.panda@northumbria.ac.uk">swaroop.panda@northumbria.ac.uk</a> | <a href="mailto:F.Komal@tees.ac.uk">F.Komal@tees.ac.uk</a>     | <a href="mailto:lai-chong.law@durham.ac.uk">lai-chong.law@durham.ac.uk</a> |                                                                    |
| Syed Murad                                                                           | Zhongtian Sun*                                                 | Ben Summerill*                                                             | Delali Konu*                                                       |
| Durham University                                                                    | University of Kent                                             | Swansea University                                                         | University of York                                                 |
| <a href="mailto:syed.murad@durham.ac.uk">syed.murad@durham.ac.uk</a>                 | <a href="mailto:z.sun-256@kent.ac.uk">z.sun-256@kent.ac.uk</a> | <a href="mailto:bengsumm@gmail.com">bengsumm@gmail.com</a>                 | <a href="mailto:delali.konu@york.ac.uk">delali.konu@york.ac.uk</a> |
| Thuy-Vy Nguyen                                                                       |                                                                |                                                                            |                                                                    |
| Durham University                                                                    |                                                                |                                                                            |                                                                    |
| <a href="mailto:thuy-vy.nguyen@durham.ac.uk">thuy-vy.nguyen@durham.ac.uk</a>         |                                                                |                                                                            |                                                                    |

Many banks have shut their physical offices and shifted to online banking. Many will benefit from this transition, but older adults may be left behind due to their traditional views on money and technology. Without proper consideration of their needs and preferences, older adults may become marginalized in this digitalization process. In this paper, we investigate why older adults may or may not be comfortable with the technology-enabled ways of banking and their acceptance of a fintech chatbot. Towards this, we built a chatbot specifically designed to help older adults complete financial transactions such as money transfers, checking balances and managing their pensions. We developed this chatbot using human-centred design principles and inclusive and accessibility design methods. We incorporated Large Language Models (LLMs) into our prototype to enable users to engage in casual conversations with the chatbot to mimic chats with human bank advisors in physical venues. To assess the effectiveness of the prototype, we carried out user studies involving older adults. We analysed the study's results to identify the factors that contribute to the trust and acceptance of the chatbot and in online banking in general. We further extrapolate these findings to provide recommendations for designing fintech chatbots for older adults.

*Chatbots, Older Adults, Fintech, Voice Assistant, Large Language Models*

## 1. INTRODUCTION

Conversational agents, or chatbots, have emerged as valuable tools across diverse fields, demonstrating their efficacy in transforming the way we interact with technology. Chatbots have been successfully utilized in various fields such as e-commerce, finance, education, health, and entertainment (Shawar and Atwell (2007)). Chatbots have become increasingly popular in the fintech industry due to their versatility in various applications. They have proven to be useful in improving customer interaction and engagement, as well as optimizing customer service. Mogaji et al. (2021) noted the benefits of chatbots for enhancing interaction quality and customer engagement in fintech. Additionally, using chatbots in customer service has been shown to be cost-effective and time-saving (Scherer et al. (2015)). One of the most prevalent and impactful

applications of chatbots is providing online help for customers.

In the UK, many of the banks are moving towards digitizing financial services and therefore adopting different financial technologies (Espiner (2022)). This is in the wake of Covid-19 (Nguyen and Mogaji (2022)) when many banks have closed, and are continuing to close their physical offices. Customers can now open bank accounts without physically visiting a bank branch, thanks to the development of chatbots and other technologies. Some banks have shifted entirely to online banking, meaning that customers may not be able to speak to a human operator when they have a grievance. This shift towards online banking has made financial transactions more convenient and efficient. Customers no longer have to wait in long lines at the bank or fill out tedious paperwork. Instead, they can access their accounts from

\*Research conducted while working at Durham University

the comfort of their own homes and complete transactions in a matter of seconds.

Unfortunately, this shift towards online banking may create challenges (Lee (2014)) and frustration (Heinz et al. (2013)) for older adults who may find it difficult to transfer money, shop online, manage their pensions, or access other digital services. Older adults are at risk of marginalization if these technologies aren't designed based on their needs and preferences and act as barriers (Gitlow (2014); Lee and Coughlin (2015)). The risk arises when technological advancements such as AI overlook physical and cognitive changes. Sin et al. (2021) conceptualize the notion of Digital Design Marginalization where they suggest that many online services, such as personal finance, healthcare and shopping, are inaccessible to underrepresented users due to non-inclusive design and this causes a digital divide.

Overall, with many banks being digitized and bank branches being physically closed, the older adult population could find it difficult to access financial services, as they may lack trust in emerging technology (Giorgi et al. (2022); Aly et al. (2024)), and thus are digitally marginalized. Older adults are defined as individuals who are over the age of 65 (Vroman et al. (2015); Age UK (2023); Singh and Bajorek (2014)). Given this background, the research questions (RQs) that we pursue in this paper are, **RQ1:** What aspects of fintech do older adults trust and distrust? **RQ2:** How to design and develop a fintech chatbot, using principles of inclusive and accessible design, that is customized and usable for older adults? **RQ3:** What are recommendations for developing fintech specifically for older adults?

The contribution of our work is thus threefold; Enhancing the understanding of factors influencing older adults' acceptance of and trust in online banking chatbots, providing insights into whether the use of burgeoning LLMs can ameliorate or undermine older adults' trust in fintech chatbots and leveraging our research findings to stimulate further research work on exploring the design of online banking services specifically catered for older adults to ensure their acceptance and trust.

## **2. BACKGROUND & RELATED WORK**

### **2.1. Older Adults & Online Banking**

Older adults often exhibit a conservative attitude towards both technology and money (Kurniawan et al. (2006); Vaportzis et al. (2017); Darzins et al. (2010); Vines et al. (2011)). These attitudes are rooted in a combination of generational experiences,

established habits, and concerns about change. Older adults even prefer to continue using traditional financial practices, such as storing money in their home wardrobes (Iwashita (2022)), despite the potential dangers of theft or fire and the long waiting time in physical bank offices (Jin et al. (2021)).

Recently, Age UK conducted a survey with older adults aged 65 years and above and identified several key findings (Age UK (2023)). It was identified that around 58% older adults now use online banking to manage their main bank accounts, although there is still a substantial segment who either lack access to digital banking or aren't comfortable with it. Three-quarters of older adults expressed a preference for conducting at least one transaction in a physical branch. Overall, 31% reported feeling uncomfortable with the idea of online banking due to lack of trust, fear of fraud, and lacking IT skills. Nowadays, fintech is rapidly moving towards AI-driven technologies. Older adults are eager to learn and use AI-driven products but lack decent learning avenues (Shandilya and Fan (2022)). They use knowledge from social networks and workplace contacts (Reneland-Forsman (2018)) to adopt AI-driven technology. Privacy (Harris et al. (2022)) was the major concern for older adults who never use smart (AI-driven) technology. There is thus a significant opportunity for banks to utilize AI-driven technologies (Hassan et al. (2023); Rahman et al. (2023)) to accommodate varying levels of technological familiarity, address privacy concerns, and incorporate a human touch for personalized support which can play an important role in shaping older adults' acceptance towards AI-based online banking.

### **2.2. Older Adults & Chatbots, Voice Assistants, and LLMs**

Chatbots have been designed and adapted for older adults. Nestore (El Kamali et al. (2020)) is a chatbot that acts as a coach to support and promote older adults well-being. Similarly, Fridolin (Weber et al. (2023)) is a chatbot for dietary management aimed at fostering nutritional well-being among older adults. Yeonheebot (Ryu et al. (2020)), a mental health care chatbot for older adults decreased anxiety levels by 36% and depression levels by 18% with constant use and simple repeated interactions. Similarly, preliminary studies suggest that Charlie (Valtolina and Marchionna (2021)), a chatbot designed for older adults to provide companionship and preventive mental healthcare, is considered to be polite, smart, charming, helpful and reliable. Voice assistants have also become increasingly popular as conversational agents. They can be highly effective for older adults facing vision limitations and they offer convenience and thus

we aim to integrate a voice assistant in our app. Voice assistants have been shown to be used by older adults to access online health information (Pradhan et al. (2020)); it helps lower the technology barrier for them. Voice-based companionship also positively affects the loneliness of older adults (Ryu et al. (2020)) by reducing feelings of isolation and enhanced emotional connection. Voice Assistants need to be adapted for older adult users though. Older adults have had various challenges (Sayago et al. (2019)), such as knowing what to say to a chatbot, conversational styles. There is a need to design user-friendly interfaces (Mitzner et al. (2010)) that accommodate age-related changes in speech patterns and cognitive abilities. Our goal is to integrate a voice assistant into our chatbot adapted for older adults. The popularity of large language models (LLMs) is on the rise, and it would be intriguing to observe the ways in which older adults engage with them. By offering natural language interactions, these models may serve as user-friendly interfaces for individuals with varying levels of technological literacy. For instance, LLMs can provide provide emotional benefits to socially isolated individuals (Jo et al. (2023)). LLM-based conversational companion system for older adults can also provide companionship and help reduce feelings of loneliness (Alessa and Al-Khalifa (2023)). Based on these promising findings, we use an LLM to improve the user experience of this chatbot.

### 2.3. Design Methods for Older Adult Users

As we aim to design for older adults, we investigated various inclusive and accessible design methodologies. To develop our design considerations, we looked at different user-centered design methods such as user personas (Pruitt and Adlin (2010)), scenarios (Gudjonsdottir and Lindquist (2008)), dialogue management (Molich and Nielsen (1990)), prototypes and user studies. We also explore principles (Kascak et al. (2014); Farage et al. (2012)) for inclusive and accessible design that include 1) Equitable use, 2) Flexibility in Use, 3) Simple and Intuitive use, 4) Perceptible Information, 5) Tolerance for Error, 6) Low Physical Effort and 7) Size and Space for Approach and Use. Similarly, some heuristics for design, inclusive of age-related challenges (Harrington et al. (2017)), include providing alternate means of interaction such as speech input; using fonts and images that are legible; using buttons, keys, and icons so as to select without error and providing adequate contrast between background colors, images, and text. Older adults tend to have visual and hearing limitations. It is thus important to realize the kind of technology and visual design that is suitable for older adults. Some recommendations (Koebel et al. (2021); Panda and Law (2024)) include organizing the content and structure of the chatbot's

information clearly and simply, without overwhelming or intimidating the user with too many features or sensory stimuli, concise and simple messages, large fonts and high contrast and high fault tolerance for touch and voice interaction.

## 3. THE DESIGN AND DEVELOPMENT OF THE FINTECH CHATBOT PROTOTYPE

### 3.1. Design Considerations

#### 3.1.1. Visual Design

Font sizes are a crucial aspect of mobile app design, as they can have a significant impact on user experience. Text that is too small can be difficult to read, while text that is too large can make it difficult to fit all necessary information on a small screen. Striking the right balance can make the app more accessible and user-friendly for a wider audience. It's important to consider the context in which the text is being presented and adjust the font size accordingly to ensure that users can easily read and engage with the content. Thus, when designing a chatbot for older adults, it is important to take font sizes into consideration. Though optimal font sizes are crucial for the functionality and usability of the interface, larger fonts are preferred by older adult users (Koebel et al. (2021)). This is because as people age, their eyesight may deteriorate, making it harder for them to read smaller text. For the layout and the interaction design we followed recommendations from (De Barros et al. (2014)). For the layout, these include incorporating ample spacing between items, the design being minimalist and utilizing icons accompanied by text. In terms of interaction design, we implemented a back button for users to return to the homepage, and we employed a scrolling mechanism enabling users to navigate information within a page.

#### 3.1.2. Voice

Using a voice assistant in a chatbot can greatly enhance the user experience (Pradhan et al. (2020)). By allowing users to interact with the chatbot using natural language, a voice assistant can make the conversation more intuitive and engaging. It is important to design the chatbot's response rate (words per minute) carefully to ensure that they are both accurate and appropriate. Additionally, it's important to consider the potential privacy implications of using a voice assistant and to ensure that users are aware of how their data is being used and stored. In our chatbot, we used Google Assistant for voice-to-text conversion and we took measures to ensure that the text-to-voice feature maintains an appropriate response rate tailored for older adults.

### 3.1.3. Style of Conversation

Conversational styles are important in chatbots because they help to create a more natural and engaging user experience (Koebel et al. (2021)). Chatbots that use conversational language and respond in a human-like manner can make users feel more comfortable and encourage them to engage more with the chatbot. In addition to functionality and efficiency, conversational styles play a crucial role in establishing a connection between the user and the chatbot. By using an appropriate tone, the chatbot can create a more comfortable and personalized experience for the user. Moreover, the use of appropriate language and tailored responses based on the user's needs can help to build trust in the chatbot's capabilities. In our chatbot, we employed a conversation style that is friendly and very human-like.

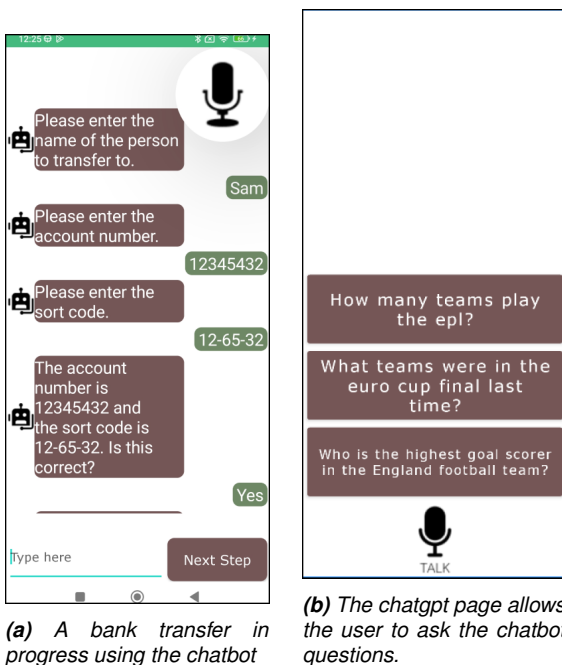


Figure 1: Screenshots from the chatbot

### 3.1.4. LLMs as a Design Material

We aimed to enhance the user experience of the chatbot by integrating ChatGPT (OpenAI (2022)), a state-of-the-art large-language model (LLM) from OpenAI, into our prototype. ChatGPT operates on a transformer-based architecture (Vaswani et al. (2017)) that enables it to generate human-like text response based on received inquiry. This LLM has been trained on vast amounts of dialogue, books, papers, news and thus allow it to provide nuanced and contextually relevant response to users' inquiries. The idea behind using LLMs as a design material (Holmquist (2017)) is to replicate the user experience of in-person banking in our chatbot. An older adult, while visiting a bank in-person, is able to talk to people nearby (and bank

employees) about random topics like weather, sports or travel. LLMs have been fairly successful (Wu et al. (2023)) in generating coherent answers to such casual conversations. Hence, we have added this feature so that the older adults can have general conversations with the chatbot. However, in the development of such AI-driven communications, it raises inherent safety and privacy concerns (Shahriar and Hayawi (2023); Gupta et al. (2023); Hussain et al. (2021)), particularly in the sensitive domain of financial services. There exists a potential hazard wherein older adults might inadvertently input certain sensitive information, possibly of a financial nature. Therefore, the app is curated to respond exclusively to specific domains of inquiry; such as food, sports and weather. Questions from other domains are systematically filtered out to prevent unintended information dissemination.

## 3.2. Development

Our fintech chatbot was developed exclusively for Android operating systems using the Android Development Studio (Yener and Dundar (2016)). Leveraging the reliable Google Assistant (Berdasco et al. (2019)) within Android, we implemented speech-to-text conversion capabilities. Our seamless integration with ChatGPT (Ray (2023)) is facilitated through the use of API keys (Lappalainen and Narayanan (2023)), ensuring a smooth and efficient interaction for users on the Android platform.

## 4. USER STUDIES

Our user studies consisted of four sessions, which were held in collaboration with Age UK – a national organisation supporting older adults. These sessions were held in a local community centre and were conducted fortnightly. We adopted an agile participatory design and development approach (Duque et al. (2019); Kuoppamäki et al. (2023)) for the chatbot. The idea was that we first developed an initial version of the prototype and tested it on a small group of users. We collected and analyzed results from this user study and used it to improve and adapt the prototype. Further, we used this improved prototype and conducted another user study with a different set of users to avoid the effect of repeated experiences in reengaging the same participants. We have done this with four groups of users and thus four rounds of prototype improvement.

### 4.1. Participants

In total, twelve participants (6 male and 6 female) took part in the user study. Each of the four sessions consisted of 6, 1, 1, 4 participants respectively. Recruitment of participants was done by the distribution of flyers in public spaces and by posting

advertisements online and at local community centers. Participants were aged between 66 to 84 years (Mean = 73.75, SD = 4.85) and were all native-English speakers. Notably, while initially, fourteen participants agreed to participate, two chose not to proceed after reading the information sheet about the study, and data related to these individuals were excluded from analysis. Older adults involved were provided with raffle tickets for a chance to win prizes valued at £20.

## 4.2. Apparatus & Procedure

The fintech application was installed on devices running Android version 13, including both smartphones and tablets. Six participants used a smartphone, while the remaining six utilized a tablet device. The institutional ethics review board approval was obtained before conducting the research and user studies. The participant recruitment message consisted of details about the event and a registration link that older adults could use to register online before attending the event in person. Older adults who registered online for the event visited the community center and attended the research stall named 'Your Banking Companion'. The two researchers initially welcomed the participants, introduced themselves, and answered any questions participants had about the research project. Before starting a user-based evaluation session, the researchers obtained formal consent followed by collecting demographic data such as age and gender. In the beginning of the session, the researcher interviewed participants with nine questions on their attitudes towards money, banking and technology. These questions (Table 1 - Appendix) pertained to various aspects such as smartphone usage, digital banking experience, technology-based money management, familiarity with the new technology, and experience with chatbots and AI-based interactive systems.

The participants then received a concise introduction to the fintech application and its features on the smartphone device designated for testing. Participants were then asked to transfer money to a fictional account with name (Sam), account number (12345432), sort code (12-35-68), given amount (£100), and time of transfer (2:00 PM). The bank transfer process was designed with careful consideration of the procedure employed within existing and established banking applications. We incorporated voice confirmation for both the bank account number and sort code to bolster security; tailoring to the needs of older adults. Then participants interacted with the chatbot through a set of five informal and casual questions. The researchers initially demonstrated how the chatbot responds to casual questions. These questions included, 'What all is included in an

English Breakfast', 'What is the best time to visit the lake district', 'On which month does Scotland have the lowest rainfall', 'How to make apple pie in a few steps', 'Suggest some good restaurants in Paris'. Participants were free to select any or all of the five questions they wanted to ask the chatbot using the voice assistant (i.e., pressing the microphone symbol). Finally, participants responded to nine open-ended questions (in Table 2- Appendix) concerning their overall interface experience, encountered challenges, and suggestions for improvement. The evaluation also involved the observation of older adults, with audio recordings made for subsequent analysis. Since the testing sessions were conducted fortnightly, the feedback from participants in each session was used to adapt and improve the research prototype for the upcoming sessions. The sessions lasted for about 20-25 minutes.

## 5. RESULTS

We analysed the qualitative data that we collected from the user study with the twelve participants, a small but acceptable sample size (Caine (2016)).

### 5.1. Attitude Survey

#### 5.1.1. On using smartphones

Many participants indicated that their use of smartphones was more out of necessity than convenience. P1 commented that *"Dealing with smartphones can be quite challenging these days, as they seem to constantly evolve with each update, often doing their own thing. I've even resorted to paying £10 a month to a helpful book or perhaps a tech support company for access to technical experts who can assist me in understanding the ever-changing technology."* P2 stated that *"I don't use every functionality but can get by the essential activities"* P7 pointed out that smartphones were uncomfortable because *"To use them efficiently you have to be able to think smartly, quickly, clearly and use your hands. When you get older, hand-eye coordination gets worse and thus there are practical issues while dealing with smartphones"*

Two participants highlighted concerns regarding scam calls and security issues associated with smartphones. P1 said, *"the presence of scam emails and other security concerns only adds to my unease in using these devices."* P4 remarked that *"Because of scam emails and stuff, I also feel uncomfortable (using smartphones)."*

#### 5.1.2. On banks closing their physical offices

Every participant voiced their dissatisfaction with the closure of physical bank branches, citing a variety of reasons for their disapproval. P1 stated that *"It's*

quite clear that these institutions are driven by their financial models, compelling them to adopt these changes in order to stay competitive, which is both shocking and outrageous. Personally, I don't endorse this direction. Online banking assumes access to facilities that not everyone has. While it works well for straightforward transactions, when things get complex, like a foreign transaction, it's essential to have a physical branch to turn to." P7 said that "Pure example for business to enlarge margins at the cost of alienating adults". P2 remarked that "At least one physical branch should remain. ". P3 commented "Banking online is assuming that you have facilities which not everybody has. That is fine if things are straightforward. But if it isn't, you need a physical branch to go to"

Some participants mentioned that they wanted to meet and talk to people. P6 suggested that "I like to be able to talk to somebody. ". P12 pointed out that "They are lovely buildings. I like visiting banks". P8 said "I prefer to talk to people. (while doing financial transactions)". P4 said that "This shift is very disheartening for me since I value the ability to have a face-to-face conversation with someone when needed. The downside of closing physical banks is that when you're unsure where to seek help, it becomes challenging to navigate through financial matters. It's not entirely user-friendly or conversational."

#### 5.1.3. On Technology & Money

Participants had mixed responses to whether they would prefer cash over card. One participant responded that they preferred cash but used cards as they had become used to it. P6 said that "I like both; cash and contactless. Credit/Debit Card while large purchases.". P8 said that "If you asked me a year ago, I would say no to contactless cards. But it has become routine, it has become normal.". Participants had some obstacles using (debit or credit) cards too. P8 commented on using cash "I prefer to do what I am doing.". P7, while comfortable using debit cards, stated that "I will go against it if cash is abolished altogether."

#### 5.1.4. On Chatbots and AI

Many participants were familiar with chatbots, and they held varied, and sometimes strong, opinions about them. P10 remarked that "I hate chatbots. They never answer the questions properly. They provide generic answers.". P11 said, "I didn't like it as I didn't know who was in the other end.". P12 commented "Ridiculous, stupid. They give stock answers. Have to ring up someone anyway."

Many participants did not trust chatbots and other AI-driven applications. P1, while reluctantly trusting chatbots, said that "I haven't yet been scammed."

P8 said "I don't trust AI. There are bits of it that are helpful; like finding out diseases. I object to the fact that I am controlled. ". P12 said that "Alexa, Siri spy on you. So I don't trust them". P4 commented that "I use system ... But I don't trust it. I still use it for music and weather.". From the responses to the attitudes on money, banking and technology, it became evident that users generally preferred conducting banking transactions in-person. This preference can be rooted in various factors, including the trust associated with face-to-face interactions, the availability of assistance in case of difficulties, and the opportunity for social interaction. Additionally, it was observed that many users opt for contactless cards (or cards with PIN) primarily for the sake of convenience and familiarity, rather than a strong sense of trust in these methods. Furthermore, the findings revealed mixed opinions among users concerning chatbots and AI. Some users expressed concerns about privacy, believing that these AI tools might be spying on them by listening to their private conversations. Despite these reservations, users acknowledged using chatbots and AI for convenience, such as searching for music or obtaining weather information, even though trust levels in these technologies varied.

## 5.2. Bank Transfer using the app

Multiple participants (P10, P12) who used smartphones complained about the size of the keyboard. They suggested that their large fingers prevented them from effectively using the smartphones and the application. One of the participants (P9) used a stylus to use the keypad of the smartphone. P1 said "I am glad you are here! ". Some participants appreciated the use of voice, while one of them P10 was uncomfortable as many chatbots previously misheard the person's voice. P10 suggested that "I don't like to speak as they mishear; accent maybe I talk fast. I would like to type 1 or 2. ". P1 and P6 were confused with the send button. Thus, after the first session, we modified the "send" button to a "next step" button. From our observations, we found that most participants could perform the banking transfer without any major difficulties. The tablet/smartphone was a bottleneck, with some users wanting a larger keypad while one user used a stylus for touch because of large fingers. In the initial session, some participants were confused by the "send" button; not knowing that it was meant to send the data to the chatbot. After this was pointed out by two participants, we modified it to "Next Step". We did not observe any confusion from other participants regarding this. One participant was slightly startled by the voice; probably because the participant didn't expect the voice confirmation during the bank transfer.

### 5.3. Casual Conversations using the app

We observed that most of the participants enjoyed utilizing the ChatGPT features. It appeared that the novelty of being able to ask ChatGPT casual questions was well-received, and for many, it was a feature they hadn't encountered previously. We observed them to be amused by the questions and pleased by the answers provided by the chatbot. Notably, one participant (P7) expressed confusion about the concept of asking pre-set questions word by word and desired more freedom in formulating and posing questions. Another participant P8 wasn't convinced by ChatGPT's answer on the best time to visit Lake District, for instance. One participant, P12, didn't understand the utility of this feature and suggested *"I won't talk to people in a bank queue. I am just standing. I prefer looking at them."* We anticipated that certain answers might be extensive, making it challenging to display them effectively as a single block of information on the interface. Therefore, starting from the third session onward, we implemented a control on the amount of text displayed as a single block of information. Hence a longer answer would be presented to users in separate, distinct sections.

### 5.4. Survey after completing tasks in the chatbot

#### 5.4.1. Overall experience of the application

All of the participants had a decent experience with the chatbot and they did not have any significant obstacles while doing the bank transfer task. P1 comparing this chatbot with other existing banking apps commented that *"It is as good as any other application and it works"*. Commenting on the usability, P6 stated that *"It was easy to use"* and P9 remarked that *"It seems like a good product."* Some participants encountered unique challenges and they attributed that to their own physical conditions. P8 suggested that *"It was okay. But it isn't something I want to do, as my hearing isn't very good. I have vision problems too."* P5 stated that *"It was easy to use apart from I wasn't quite sure whether I have to speak to it or press the microphone button."*

#### 5.4.2. On visual design and the voice assistant

All the participants found the visual design and the conversations to be pleasant. Commenting on the visual design, P2 remarked that *"It is uncluttered"*. P1, P6 and P7 mentioned *"it is clear"* and P8 said that *"it is easy"*. P10 pointed out that the visual design choices were *"not necessary"* and could take up more space. P7 stated that *"The voice was clear"*. Some participants also appreciated the use of a voice assistant in the bank transfer task. P2 commented that *"The voice activation is good for people with sight improvement"*. One participant, P7,

was skeptical about voice recognition technology and commented that *"It needs to get used to the voice of the person who is using it."*

No negative feedback was received specifically regarding the interaction design of the chatbot. From our observations in Sections 5.2 and 5.3, it was noted that users could effortlessly scroll through the chatbot as needed. Additionally, the majority of participants were able to easily identify the microphone icon for engaging in voice interaction with the chatbot.

#### 5.4.3. On whether they would use the app in their daily lives

There were mixed responses from participants when asked whether they would use this chatbot once fully developed. Some participants (P1, P2, P9, P11) were keen to try it out when developed and tested. P6 opted to utilize the app over an extended period and for various purposes, including online shopping, before making a decision.

Some participants wouldn't use it at all; each for different reasons. P3 stated that *"No. It is just another thing to master. It won't be worth the effort. Not more intuitive but the principle of having more technology to sort out the emergence of newer technology."* Many participants faced challenges in placing trust in both the chatbot and the device on which it was installed. P5 remarked *"I wouldn't use it. I am not sure whether I should trust it on when it is in my phone."* P4 was hesitant, *"At the moment, I am hesitant to use it for banking. If the application is in my phone and it is tracked or I lose my phone then it is a risk."* P8 commented *"No, for the same reason. I don't trust Chatbots/AI."* Other comments included: *"I haven't got the right kind of intellect"* (P11); *"No, I couldn't be bothered"* (P12); *"This app won't make any difference to the people opposed to online banking"* (P10).

#### 5.4.4. On making the app more usable for them.

Many participants (P1, P3, P6, P7, P10) wanted more information on the balance and pensions page. P2 wanted a comparison to the previous month's expenditures. P10 wanted more information on interest rates. Some other suggestions included Christmas expenditures and pension amounts from different sources.

The overall finding was that all participants found the app acceptable. Many expressed a desire for additional time using the interface to build trust and incorporate it into their daily routines. A subset of participants viewed it as just another thing to learn and indicated that they would not be using such an application. Another finding evident in both the attitudes survey and this interaction design survey

was that acceptance and trust were influenced by the specific devices on which the application was installed. Therefore, the level of acceptance and trust is contingent not only on the chatbot but also on the device itself.

## 6. DISCUSSIONS AND FUTURE WORK

### 6.1. Revisiting Research Questions

**RQ1:** *What aspects of fintech do older adults trust and distrust?* We conducted an exploratory survey asking older adults about the different problems that they have regarding online banking and fintech. We found out that many older adults are upset with banks closing down their physical offices. They preferred to visit in-person branches for a variety of reasons. They trust smartphones and online banking out of convenience, necessity and because they haven't been scammed yet. In general, our findings indicate that older adults engage with various aspects of fintech primarily out of necessity, relying on these technologies and becoming accustomed to their use over time. Trust in fintech among older individuals appears to stem from pragmatic considerations, driven by practical needs and a lack of negative experiences (like being scammed) rather than deep-seated confidence in the technology itself.

**RQ2:** *How to design and develop a fintech chatbot, using principles of inclusive and accessible design, that is customized and usable for older adults?* We designed and developed a fintech chatbot based on design principles from existing literature. We adopted a very simple visual design to facilitate older adults to do basic financial tasks. We added a voice assistant for better usability. We also incorporated a ChatGPT feature that enables older adults to have casual conversations with the chatbot. To assess the effectiveness of our design, we evaluated this app with older adults, tasking them with some specific actions such as conducting a bank transfer and asking specified casual questions to the chatbot. The results of our evaluation were overall positive, with nearly all participants reporting a commendable and satisfactory experience with the application. This not only affirmed the success of our design choices but also highlighted the usability of the application for older adults, a group that often faces challenges in adapting to new technologies.

**RQ3:** *What are recommendations for developing fintech specifically for older adults?* We analyze the results of the user study and identify some suggestions:

- The chatbot should have large font sizes and a minimalist design. It should closely resemble existing banking apps, ensuring a familiar user

interface that doesn't introduce new learning challenges for older adults. (from 5.4)

- Incorporating voice functionality into the chatbot would be beneficial, particularly for older adults experiencing vision limitations. (from 5.4)
- The application's privacy and security features should be evident, allowing users to easily discern that transactions and financial information are both secure and private. (from 5.1)
- Using LLMs and foundation models can help enhance the user experience of the chatbot. Tech-savvy older adults can find such interactions pleasant and amusing. (from 5.4)

### 6.2. Future Work

Recruiting older adult participants proved to be a difficult task for this study. This predicament, we suppose, arises from the personal financial considerations inherent in the project. Two participants refused to take part in the study after they learned that it was about online banking. One of the participants was completely opposed to banks closing down their physical offices. She held the belief that her input might inadvertently further contribute to the decision of banks closing down their physical branches. Another participant presumed that the study aimed at persuading them to use or even buy a new application and, consequently, was unwilling to provide insights for the development of new application or opinions on fintech. Another limitation is the restricted use of the LLM feature, as it currently only permits users to ask highly specific questions. The restricted content access serves as a guardrail to protect older adults from disclosing personal information to ChatGPT, especially it would likely be the first time they exposed to this new technology.

Our future work aims to enable older adults to pose casual inquiries; while carefully considering privacy, security and ethical considerations. We also aim to tailor different versions of the prototype to cater to the varied preferences and needs of older adults, ensuring a more inclusive and user-centric design. To comprehensively evaluate the usability and impact of our technical solution, we plan to conduct additional rounds of both in-person and online user studies with older adults. Furthermore, while we employed the qualitative method in this study, we will apply mixed-methods approach to garner both qualitative and quantitative data with a larger sample of older adults. We aim to develop a predictive model for older adults' trust in AI technology like chatbots, exploring research questions such as the relation between emotional trust in this context Glikson and Woolley (2020) and how trust evolves over time De Visser et al. (2020).

## REFERENCES

- Age UK (2023, May). The Impact of the Rise of Online Banking on Older People. Report.
- Alessa, A. and H. Al-Khalifa (2023). Towards designing a chatgpt conversational companion for elderly people. *arXiv preprint arXiv:2304.09866*.
- Aly, H., K. A. Byrne, and B. Knijnenburg (2024). Perceived trustworthiness of human vs. ai instructors in digital privacy education for older adults. In *Companion Proceedings of the 29th International Conference on Intelligent User Interfaces*, pp. 107–112.
- Berdasco, A., G. López, I. Diaz, L. Quesada, and L. A. Guerrero (2019). User experience comparison of intelligent personal assistants: Alexa, google assistant, siri and cortana. *UCAmI 2019*, 51.
- Caine, K. (2016). Local standards for sample size at chi. In *Proceedings of the 2016 CHI conference on human factors in computing systems*, pp. 981–992.
- Darzins, P., G. Lowndes, J. Wainer, K. Owada, and M. T. Mihaljcic (2010). *Financial abuse of elders: A review of the evidence*. Monash University.
- De Barros, A. C., R. Leitão, and J. Ribeiro (2014). Design and evaluation of a mobile user interface for older adults: navigation, interaction and visual design recommendations. *Procedia Computer Science* 27, 369–378.
- De Visser, E. J., M. M. Peeters, M. F. Jung, S. Kohn, T. H. Shaw, R. Pak, and M. A. Neerincx (2020). Towards a theory of longitudinal trust calibration in human–robot teams. *International journal of social robotics* 12(2), 459–478.
- Duque, E., G. Fonseca, H. Vieira, G. Gontijo, and L. Ishitani (2019). A systematic literature review on user centered design and participatory design with older people. In *Proceedings of the 18th Brazilian symposium on human factors in computing systems*, pp. 1–11.
- El Kamali, M., L. Angelini, M. Caon, O. A. Khaled, E. Mugellini, N. Dulack, P. Chamberlin, C. Craig, and G. Andreoni (2020). Nestore: Mobile chatbot and tangible vocal assistant to support older adults' wellbeing. In *Proceedings of the 2nd conference on conversational user interfaces*, pp. 1–3.
- Espiner, T. (2022, Nov). Hsbc to close 114 uk branches as more people bank online.
- Farage, M. A., K. W. Miller, F. Ajayi, and D. Hutchins (2012). Design principles to accommodate older adults. *Global journal of health science* 4(2), 2.
- Giorgi, I., F. A. Tiroto, O. Hagen, F. Aider, M. Gianni, M. Palomino, and G. L. Masala (2022). Friendly but faulty: A pilot study on the perceived trust of older adults in a social robot. *IEEE Access* 10, 92084–92096.
- Gitlow, L. (2014). Technology use by older adults and barriers to using technology. *Physical & Occupational Therapy in Geriatrics* 32(3), 271–280.
- Glikson, E. and A. W. Woolley (2020). Human trust in artificial intelligence: Review of empirical research. *Academy of Management Annals* 14(2), 627–660.
- Gudjonsdottir, R. and S. Lindquist (2008). Personas and scenarios: Design tool or a communication device? *From CSCW to Web 2.0: European Developments in Collaborative Design Selected Papers from COOP08*.
- Gupta, M., C. Akiri, K. Aryal, E. Parker, and L. Praharaj (2023). From chatgpt to threatgpt: Impact of generative ai in cybersecurity and privacy. *IEEE Access*.
- Harrington, C. N., L. Ruzic, and J. A. Sanford (2017). Universally accessible mhealth apps for older adults: towards increasing adoption and sustained engagement. In *Universal Access in Human–Computer Interaction. Human and Technological Environments: 11th International Conference, UAHCI 2017, Held as Part of HCI International 2017, Vancouver, BC, Canada, July 9–14, 2017, Proceedings, Part III* 11, pp. 3–12. Springer.
- Harris, M. T., K. A. Blocker, and W. A. Rogers (2022). Older adults and smart technology: facilitators and barriers to use. *Frontiers in Computer Science* 4, 835927.
- Hassan, M., L. A.-R. Aziz, and Y. Andriansyah (2023). The role artificial intelligence in modern banking: an exploration of ai-driven approaches for enhanced fraud prevention, risk management, and regulatory compliance. *Reviews of Contemporary Business Analytics* 6(1), 110–132.
- Heinz, M., P. Martin, J. A. Margrett, M. Yearns, W. Franke, H.-I. Yang, J. Wong, and C. K. Chang (2013). Perceptions of technology among older adults. *Journal of gerontological nursing* 39(1), 42–51.
- Holmquist, L. E. (2017). Intelligence on tap: artificial intelligence as a new design material. *interactions* 24(4), 28–33.

- Hussain, M., M. W. Nadeem, S. Iqbal, S. Mehrban, S. N. Fatima, O. Hakeem, and G. Mustafa (2021). Security and privacy in fintech: a policy enforcement framework. In *Research anthology on concepts, applications, and challenges of FinTech*, pp. 372–384. IGI Global.
- Iwashita, N. (2022). Why fintech is not changing Japanese banking. *Asian Economic Policy Review*.
- Jin, X., E. Kuang, and M. Fan (2021). "too old to bank digitally?": A survey of banking practices and challenges among older adults in China. In *Designing Interactive Systems Conference 2021*, pp. 802–814.
- Jo, E., D. A. Epstein, H. Jung, and Y.-H. Kim (2023). Understanding the benefits and challenges of deploying conversational AI leveraging large language models for public health intervention. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*, pp. 1–16.
- Kascak, L. R., C. B. Rébola, and J. A. Sanford (2014). Integrating universal design (UD) principles and mobile design guidelines to improve design of mobile health applications for older adults. In *2014 IEEE international conference on healthcare informatics*, pp. 343–348. IEEE.
- Koebel, K., M. Lacayo, M. Murali, I. Tarnanas, and A. Çöltekin (2021). Expert insights for designing conversational user interfaces as virtual assistants and companions for older adults with cognitive impairments. In *International Workshop on Chatbot Research and Design*, pp. 23–38. Springer.
- Kuoppamäki, S., R. Jaberibrahem, M. Hellstrand, and D. McMillan (2023). Designing multi-modal conversational agents for the kitchen with older adults: A participatory design study. *International Journal of Social Robotics* 15(9), 1507–1523.
- Kurniawan, S., M. Mahmud, and Y. Nugroho (2006). A study of the use of mobile phones by older persons. In *CHI'06 extended abstracts on Human factors in computing systems*, pp. 989–994.
- Lappalainen, Y. and N. Narayanan (2023). Aisha: A custom AI library chatbot using the ChatGPT API. *Journal of Web Librarianship*, 1–22.
- Lee, C. (2014). Adoption of smart technology among older adults: Challenges and issues. *Public Policy & Aging Report* 24(1), 14–17.
- Lee, C. and J. F. Coughlin (2015). Perspective: Older adults' adoption of technology: an integrated approach to identifying determinants and barriers. *Journal of Product Innovation Management* 32(5), 747–759.
- Mitzner, T. L., J. B. Boron, C. B. Fausset, A. E. Adams, N. Charness, S. J. Czaja, K. Dijkstra, A. D. Fisk, W. A. Rogers, and J. Sharit (2010). Older adults talk technology: Technology usage and attitudes. *Computers in human behavior* 26(6), 1710–1721.
- Mogaji, E., J. Balakrishnan, A. C. Nwoba, and N. P. Nguyen (2021). Emerging-market consumers' interactions with banking chatbots. *Telematics and Informatics* 65, 101711.
- Molich, R. and J. Nielsen (1990). Improving a human-computer dialogue. *Communications of the ACM* 33(3), 338–348.
- Nguyen, N. P. and E. Mogaji (2022). Redefining banking service delivery: Information technology adoption by UK banks amid the COVID-19 pandemic. In *Management and Information Technology in the Digital Era*, Volume 29, pp. 95–110. Emerald Publishing Limited.
- OpenAI (2022). ChatGPT: Conversational language model. Accessed: January 15, 2024.
- Panda, S. and E. L.-C. Law (2024). Using semi-formal models to design a fintech chatbot for older adults. In *37th International BCS Human-Computer Interaction Conference*, pp. 14–20. BCS Learning & Development.
- Pradhan, A., A. Lazar, and L. Findlater (2020). Use of intelligent voice assistants by older adults with low technology use. *ACM Transactions on Computer-Human Interaction (TOCHI)* 27(4), 1–27.
- Pruitt, J. and T. Adlin (2010). *The persona lifecycle: keeping people in mind throughout product design*. Elsevier.
- Rahman, M., T. H. Ming, T. A. Baigh, and M. Sarker (2023). Adoption of artificial intelligence in banking services: an empirical analysis. *International Journal of Emerging Markets* 18(10), 4270–4300.
- Ray, P. P. (2023). ChatGPT: A comprehensive review on background, applications, key challenges, bias, ethics, limitations and future scope. *Internet of Things and Cyber-Physical Systems*.
- Reneland-Forsman, L. (2018). 'borrowed access'—the struggle of older persons for digital participation. *International Journal of Lifelong Education* 37(3), 333–344.
- Ryu, H., S. Kim, D. Kim, S. Han, K. Lee, and Y. Kang (2020). Simple and steady interactions win the healthy mentality: Designing a chatbot service for the elderly. *Proceedings of the ACM on human-computer interaction* 4(CSCW2), 1–25.

- Sayago, S., B. B. Neves, and B. R. Cowan (2019). Voice assistants and older people: some open issues. In *Proceedings of the 1st International Conference on Conversational User Interfaces*, pp. 1–3.
- Scherer, A., N. V. Wunderlich, and F. Von Wangenheim (2015). The value of self-service. *MIS quarterly* 39(1), 177–200.
- Shahriar, S. and K. Hayawi (2023). Let's have a chat! a conversation with chatgpt: Technology, applications, and limitations. *arXiv preprint arXiv:2302.13817*.
- Shandilya, E. and M. Fan (2022). Understanding older adults' perceptions and challenges in using ai-enabled everyday technologies. *arXiv preprint arXiv:2210.01369*.
- Shawar, B. A. and E. Atwell (2007). Chatbots: are they really useful? In *Ldv forum*, Volume 22, pp. 29–49.
- Sin, J., R. L. Franz, C. Munteanu, and B. Barbosa Neves (2021). Digital design marginalization: New perspectives on designing inclusive interfaces. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, pp. 1–11.
- Singh, S. and B. Bajorek (2014). Defining 'elderly' in clinical practice guidelines for pharmacotherapy. *Pharmacy practice* 12(4).
- Valtolina, S. and M. Marchionna (2021). Design of a chatbot to assist the elderly. In *International Symposium on End User Development*, pp. 153–168. Springer.
- Vaportzis, E., M. Giatsi Clausen, and A. J. Gow (2017). Older adults perceptions of technology and barriers to interacting with tablet computers: a focus group study. *Frontiers in psychology* 8, 1687.
- Vaswani, A., N. Shazeer, N. Parmar, J. Uszkoreit, L. Jones, A. N. Gomez, Ł. Kaiser, and I. Polosukhin (2017). Attention is all you need. *Advances in neural information processing systems* 30.
- Vines, J., M. Blythe, P. Dunphy, and A. Monk (2011). Eighty something: banking for the older old. In *Proceedings of HCI 2011 The 25th BCS Conference on Human Computer Interaction*. BCS Learning & Development.
- Vroman, K. G., S. Arthanat, and C. Lysack (2015). "who over 65 is online?" older adults' dispositions toward information communication technology. *Computers in Human Behavior* 43, 156–166.
- Weber, P., F. Mahmood, M. Ahmadi, V. von Jan, T. Ludwig, and R. Wieching (2023). Fridolin: participatory design and evaluation of a nutrition chatbot for older adults. *i-com* 22(1), 33–51.
- Wu, T., S. He, J. Liu, S. Sun, K. Liu, Q.-L. Han, and Y. Tang (2023). A brief overview of chatgpt: The history, status quo and potential future development. *IEEE/CAA Journal of Automatica Sinica* 10(5), 1122–1136.
- Yener, M. and O. Dundar (2016). *Expert Android Studio*. John Wiley & Sons.

## A. APPENDIX

### A.1. TABLES - USER QUESTIONNAIRES

| Question                                                                                                                                                                                                                                   | To explore Older Adults attitudes towards |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| What is your opinion of banks closing their physical (in-person) offices?<br>Do you manage (noting down and keeping track of expenses) your money?                                                                                         | Money and Banking                         |
| Can you tell us how digital banking operates? How is it different from in-person banking?<br>Are you comfortable and secure while using your contactless debit card for purchases?<br>Would you use technology-based ways to manage money? | Technology and Banking                    |
| Are you interested in and looking forward to new technology?<br>Are you comfortable using smartphones or digital tablets?                                                                                                                  | Technology and AI                         |
| Are you familiar with chatbots?<br>Do you trust AI-based interactive systems? And any specific reason for that?                                                                                                                            | Conversational Agents                     |

**Table 1:** The interview questions on older adults' attitudes towards money, banking and technology

| Question                                                                                                                                                                                                                         | To discern the app's                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| How was the overall experience while working with the interface?<br>Did you face any obstacles while using the interface?                                                                                                        | User Experience                      |
| Was the description of the workings of the interface satisfactory?                                                                                                                                                               | Demonstration by the two researchers |
| Was the chatbot pleasing to view?                                                                                                                                                                                                | Visual Design                        |
| Were the conversations with the chatbot pleasant?                                                                                                                                                                                | Use of Voice Assistant & LLMs        |
| Would you use this chatbot in your daily life? Why?<br>Do you want any other information on balance or on pensions?<br>Would you recommend this chatbot to your elderly acquaintances? Why?<br>Any suggestions for improvements? | User Acceptance                      |

**Table 2:** The interview questions on the user interaction design of the app