CSE 323: Formative Research Report
Product Name: Do-Things

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2. Introduction

We have often had an experience where we have had to help our family members make use of various functions in smartphones. This is especially applicable to those who have not had that much experience with technology. A large proportion of these people seem to be of older age. Oftentimes, it is not enough to explain to them in the form of written or spoken instructions about what they have to do, because it is easy for them to get lost in the custom menus and interfaces that the various applications present. The most effective way has often been through direct demonstration. Our surveys also support this conclusion.

Technological illiteracy is a barrier to being able to take advantage of the benefits of smartphones. These benefits include socializing, access to information, and e-commerce. Despite the many benefits of using smartphones, existing products are targeted towards those who are already familiar with technology. It is important to address the needs of older, technologically illiterate people as we try to solve this problem.

Our solution will be an app called *Do-Things* that provides a platform for both easy remote access and the recording of actions into macros for future use. We will focus on recording direct finger gestures done by a remote helper. On the local user side, they have not only had the problem on their phone fixed, but now they have a convenient macro that they can use to repeat the process if they ever need to again.

The reason that we chose the use of gestures is because touch is the primary way that people interface with their phones. We have the flexibility to record and execute anything that can be done through the use of touch. A downside is that there may be issues with reproducibility as parts of the interface may change. Another option may be to use macros that hook onto phone functionality. However, we think that using touch is a worthwhile tradeoff considering the level of flexibility of gestures, that most older people do not seem to change the layout of their phones, and that we want the gesture recording functionality to be easy enough for the people that help them to use.

3. Background

Technology has been advancing at a very fast pace and some people have not been able to cope with the speed. They may fall behind because they are not able to learn as fast as the technology advances; they are content with the existing technology they use, or maybe because the technology has not been available or accessible to them for a long time.

The following articles may provide further insight into the background of the issue:

I. Research on Motivations and obstacles to smartphone use by the elderly[1]:

The use of phones has become ubiquitous and ingrained in modern society. It is a vital means for people not only to keep in touch with each other, but also to conveniently look up information online and perform functions such as navigating physically wherever they are.

Difficulties that people have in using phones can act as a barrier that prevents them from being able to fully utilize all the capabilities of the phone for their own well being. Research shows that many seniors are uncomfortable with their devices. This may be due to a number of reasons:

- Changes that come with age are often an impediment to the use of electronic devices.
- Mobile phones are originally designed for use by the younger generation.
- Various software interfaces that make navigation intimidating.

Outcomes of overcoming this barrier include heightened self-esteem and understanding the benefits of information retrieval and communication. Another strong motivation for seniors who use their mobile phones is that they feel safe using their phones and understand the phone's usefulness.

II. Teamviewer[2]:

Teamviewer is one of the best known companies that provides solutions to handle remote access and control of devices. They have implemented a function in their phone apps to allow another user to connect to

their phone. On Android, this feature is called QuickSupport. The name implies that the purpose of this software is to aid with remote assistance.

The way that this has been implemented is that first the connectee will open the app on their phone, access the feature, and be presented with a code *(See Figure 3.2.1)*. They will give this identifying code to the connector. The connector will input this code into their instance of the app. A pop up appears on the connectee side notifying them that another device is attempting to connect to their app. Once they accept this, remote access has been enabled and the connector gets full access to the connectee's phone.

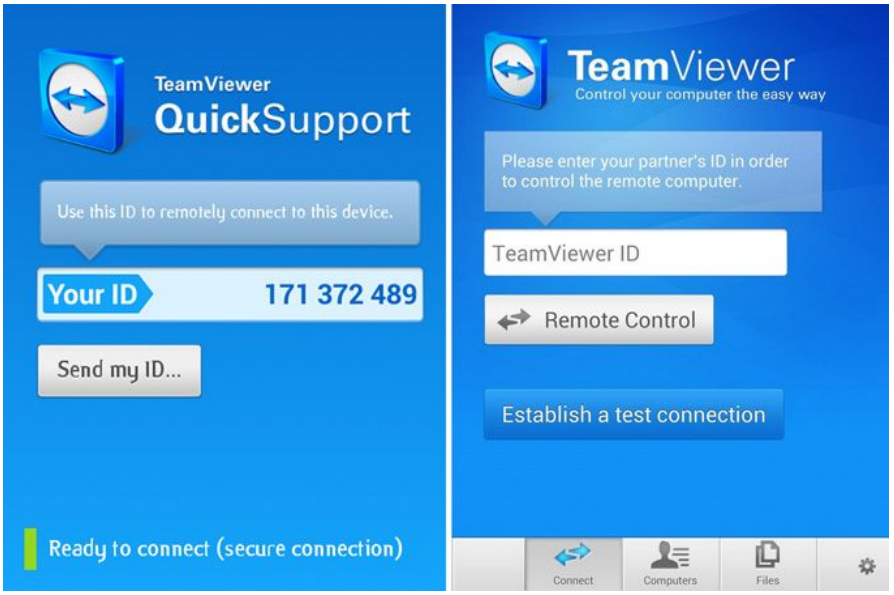

Figure 3.2.1 An ID has to be shared to allow remote assistance from another person

Advantages	Disadvantages
+ Very simple usability. Interface just requires you to enter the code displayed on the device you want to connect to. + Able to take remote control of the other phone without any additional technical settings or app permissions that other similar apps require.	- Lacks macro capability. Means that you have to repeat the same steps every time the same problem comes up. - Inconvenient to have to send the code every time. Could just connect once and remember the connection. - Lacks voice and other communication options.

Table 3.2.2 Advantages and Disadvantages of using TeamViewer

III. Clickmate[3]:

An app geared towards mobile gamers that allows for the recording and playback of macros. It has an install base of 100,000 users and a comparatively simple interface when judged against its peers. Upon opening the app, it is possible to select multiple different options for recording macros *(See Figure 3.3.1)*. Once one has been selected, a transparent, floating toolbar (that contains the functionality to record, play, and access macros) is created and this is used to manage the macros.

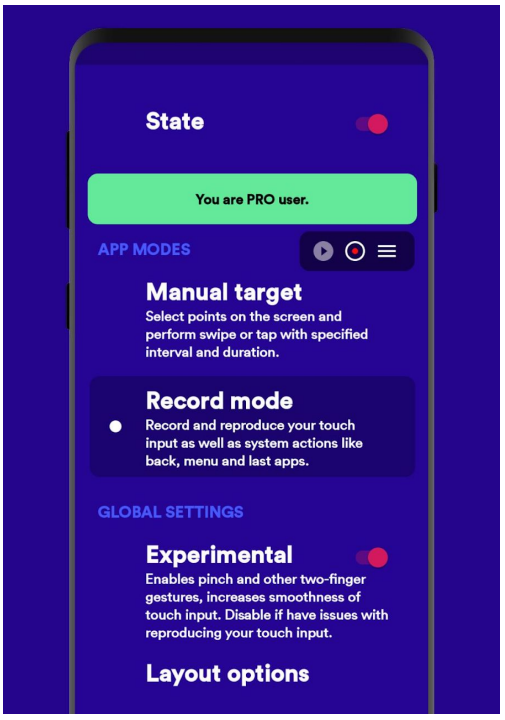

Figure 3.3.1 Different options to records macros in ClickMate

Advantages	Disadvantages
+ Multiple options to record. Either done through direct touch recording or by recording what specific actions are taken with regards to the android system. + Very simple floating interface to start/stop recording.	- Cumbersome macro save/load interface. Options screen is only accessible from the toolbar and not the main app, but this is not made clear. Macros must be manually loaded individually and played. There is no indication as to where the macro should begin and no explanation can be included with the macro. - Originally meant as a way to automate repetitive tasks in games, so there are a lot of other extraneous features that clutter the interface such as anti-clickjacking which is meant to handle cases where games can detect automation, controls on the durations of the presses, and other features.

Table 3.3.2 Advantages and Disadvantages of using Clickmate

IV. Siri Shortcuts[4]

This is a major tech company's attempt to incorporate some degree of automation and custom control into their devices. This feature makes it possible to program Siri to execute tasks when commanded to do so. What makes this feature interesting is that the sheer scope of functions that is possible to program into Siri means that it can be used as a meaningful option to execute and handle capabilities that might otherwise require a lot of navigation.

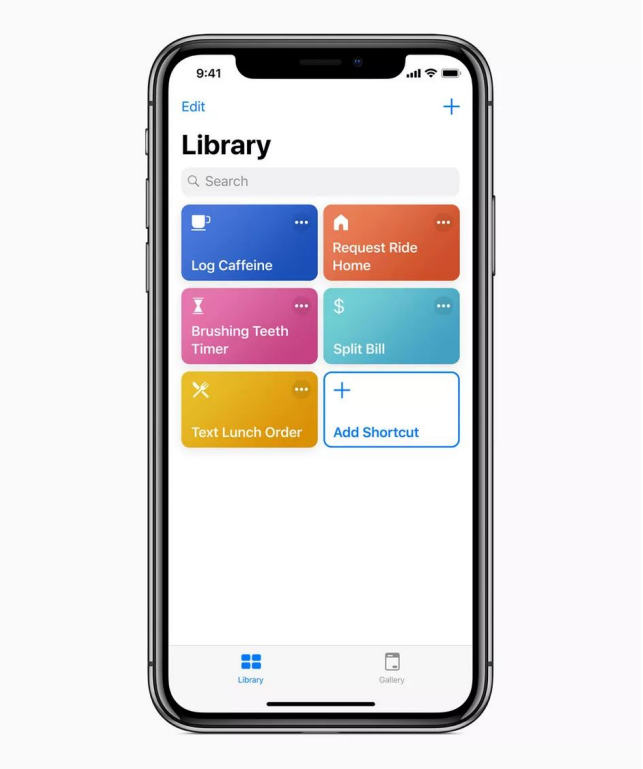

Figure 3.4.1 The simple interface of Siri Shortcuts

Advantages	Disadvantages
+ Already built into the device with all the necessary permissions and functionality. No need to install anything from an external source. + Uses an already existing platform, Siri, that people might already find comfortable working with.	- The primary focus of this feature is not for the sake of accessibility per se, but more for improving the capabilities of a personal assistant. To that end, the only way to access commands, however complicated they might be, is to ask Siri to do something. - Difficult to properly program without familiarity of what it's capable of. - Limited by the features that have been built into it. If it's not capable of using an app in some certain way, there is no way to add that capability into the system. - Lacks remote access, which means that the only way to set things up for a less technologically inclined person is to have direct access to that person's phone.

Table 3.4.2 Advantages and Disadvantages of using Siri Shortcuts

4. Target Users

Since our idea was meant to solve the problems of both providing help and receiving help, we were also required to do research on two different user groups who will represent each type of user-experience. Although our potential users are anyone who has some kind of digital illiteracy or difficulties using smartphones or who is required to resolve any technical problems remotely, we specifically chose two of the following groups to conduct more thorough and detailed research.

The primary user group (Group A): the older members of families around the age of over-50 (parents or grandparents) . In terms of user activity, they will be mostly reusing the recorded macros (shortcuts) rather than creating new macros.

The secondary user group (Group B): will be the helpers to the group A, mostly aged around 20 to early 40s (younger members of the families). In the app, they will be required to resolve the issues through remote access and create macros inside the phone.

The overall interface will be mostly based on user-expectations and preferences of primary user group A since group B is more likely to adapt to any kind of simpler interface built for group A.

5. Formative User Research

We chose different research methods for each target group. The primary target group A (the older people) already have difficulties accessing any kind of digital platforms, and to accommodate that, interviewing is the most suitable option to keep our research on their needs as less technical and more comprehensive as possible. Interviewing also allowed us to ask more open-ended questions and get insights in a more qualitative manner. For target group B (the younger people), we used online surveys as they may be more familiar with using digital interfaces to submit information. By surveying group B we were able to quantitatively determine what their needs are and get information from a larger number of people.

I. Interview of Group A

Participants: three females ranging from 40 - 60 years old were recruited. Our criteria was mainly the age and the usage of smartphones in their daily life. Two of the participants were having issues in using their smartphones and asking for help from family members frequently. The other participant is from the same age group having similar issues but was able to resolve it by browsing online by herself. We thought it would be valuable to have insights from both perspectives of requiring help for issues and being able to resolve issues independently.

Procedure: all of the interviews were conducted using audio call or video call and the interviewer was writing down the insights and answers they discovered. As a final approach, the notes were combined, shared and discussed to collect useful findings and relevant evidence of the existing problem.
(*See Appendix A for interview questions and notes).*

Results:

- In terms of the interface, it should be available in the native language and they would prefer simpler apps and texts rather than a lot of features with complicated icons they don't recognize.All of them prefer bigger and cleaner font size and colors. One of the participants would prefer similarity to existing physical gadgets she has got used to (for example, phone books or notebooks)
- One of the participants said she used to ask other family members regarding the problems but these days learning resources have got better and she is now able to resolve things by herself.
- The participants prefer or only ask for help in person than calling someone on the phone for help. For example, if they have urgent tech problems outside of home or if there is no family member around, they do not mind asking for help from neighbors and even strangers. Although they would prefer the help from family members, they tend to avoid a phone call at all costs and the reason is that they are afraid that they might make things worse and they don't want to go through the struggles of following instructions through the phone.

- One of the participants has privacy concerns or worries about giving her phone to someone she does not know and would rather get help from someone she knows, for example, a family member.
- One of the participants has problems remembering the instructions and tips since she needs to use those features very rarely and simply does not have time to learn.

II. Survey of Group B

Participants:

Our participants were recruited through the SUNY group chat. This was done because they were all young college students who have likely helped someone with smartphone issues. The similar backgrounds also mean that we are more likely to get consistent results.

Procedure:

All of the responses were recorded through surveys. The results were discussed in our group to determine potential interpretations and account for our varying perspectives.

Results:

- A majority of respondents reported that they helped others on a moderately frequent basis, with the age range of those receiving help in the 40+ range.
- Our results indicate that most people find the task moderately hard, but manageable. We do not have to provide a solution that makes an impossible task possible, but just have to make the process easier.
- Of the process, the aspect that people found the most difficult was overwhelmingly with explaining the solution. Making the explanation easier would significantly aid the overall process.
- Most people helped in person, while a significant minority have tried remote methods. Most people also prefer giving in-person explanations, as it is easier to communicate, faster, and allows for direct control. It appears then that they overcame the barrier of explanation through direct action. Our solution makes both explanations easier and allows for direct demonstrations to be performed remotely.
- 60% of respondents definitively stated that they were having to deal with repetitive issues. The ability to record macros means that they would at least be able to alleviate this issue.
- One of our final questions was with regards to what kind of apps the person receiving aid needs the most help with. The top three most popular categories were to do with Settings, Social Media, and General Functions. The good thing about these three categories is that they generally have very stable interfaces. It is true that content on Social Media might update frequently and that the way that Settings and General Functions look might be different from phone to phone, but as long as the interfaces are consistent over time it is possible to create our touch based macros with them. The flexibility of touch macros allow for this.

6. Conclusion

Based on the findings of both research methods, it was confirmed the majority of our potential users prefer to help or get help in person because of accessibility and direct control. This shows that a service that can replace in-person demonstration in this specific demographic and situation almost does not exist or is not widely used at the moment. From competitive analysis, we have known that there have been other similar apps that provide either remote assistance or macro playback functionality but not both in the same app and they were not built or designed for this specific use. In conclusion, if we are able to integrate these two functionalities into one seamless experience with a tailor-made interface for our potential users, there is a chance that we will be able to provide a working solution that can close the technical barrier between older and younger generations.

7. References

1. Mcgaughey, R. E., Zeltmann, S. M., & Mcmurtrey, M. E. (2013). Motivations and obstacles to smartphone use by the elderly: developing a research framework. International Journal of Electronic Finance, 7(3/4), 177. doi: 10.1504/ijef.2013.058601
2. Remote Support, Remote Access, Service Desk, Online Collaboration and Meetings. (n.d.). Retrieved from https://www.teamviewer.com/en/
3. Clickmate - Macro Touch Repeat, Autoclick [NOROOT] - Apps on Google Play. (n.d.). Retrieved from https://play.google.com/store/apps/details?id=com.inscode.autoclicker&hl=en
4. Use Siri Shortcuts. (2019, October 29). Retrieved from https://support.apple.com/en-us/HT209055

8. Appendix

A. Survey results: https://docs.google.com/forms/d/1KHRc5nhBoJ_ozAceSbQ1BM8ONqlZa0BnzUlMedTXe8I/viewanalytics

B. Interview questions and notes: *https://docs.google.com/document/d/1Bkz0oay81QmosdC0FyRuJ8OmB5d7Ixn-nahLHncwe1Y/edit?usp=sharing*

C. Notes and feedback from the initial in-class critique on March 23:
   - The critic himself had helped his parents with their smartphones issues.
   - The main problem he had was that his parents could not remember the solution
   - He thought they could not remember because they do not know what they were doing
   - He suggested we could make our macros more descriptive and pedagogical. He mentioned tags as an example.