

COMP 4801 Final Year Project



THE UNIVERSITY OF HONG KONG
DEPARTMENT OF
COMPUTER SCIENCE

All-in-one mobile application for elderly Detailed Project Plan

Supervisor:

Professor Wu, Chuan

Group Member:

Ng Tsz Hei (3035780192)

Table of Contents

1.Project Background	3
2.Project Objective.....	5
2.1 Position Tracking.....	5
2.2 Calls filtering.....	5
2.3 Smartwatch connectivity.....	5
2.4 Fall detection	5
2.5 GPT integration.....	6
3.Project Methodology	7
3.1 Front end	7
3.2 Back end	7
3.3 Modeling of app structure	7
3.4 UI prototype	7
3.5 Version control and project management	7
3.6 Testing.....	8
4.Project Schedule and Milestones.....	9
5.References.....	10

1. Project Background

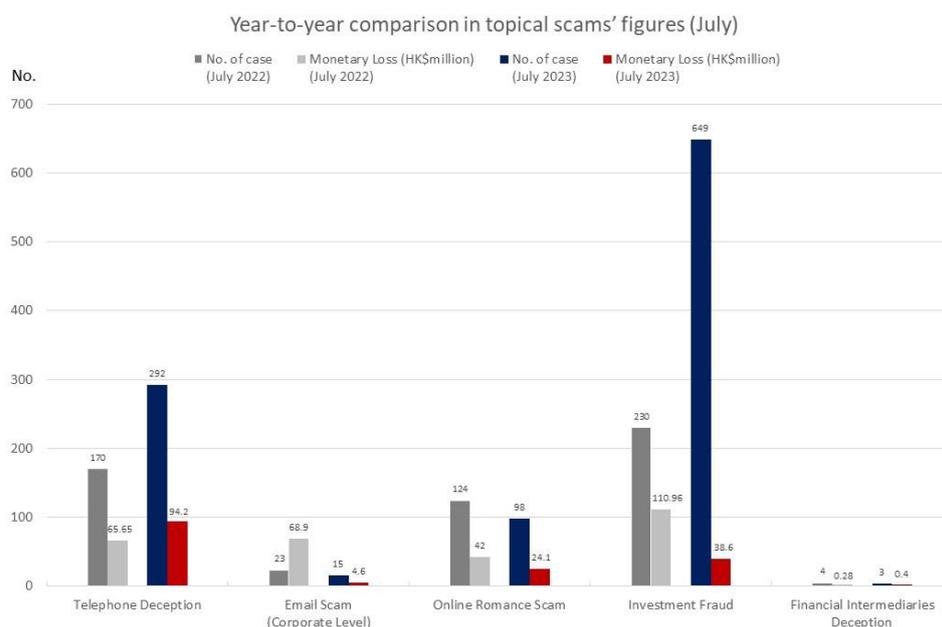


Figure 1 Year-to-year comparison in topical scams' figures (July) [1]

According to the Anti-Deception Coordination Centre of the Hong Kong government, the number of telephone deception cases rise from 170 to 292, with a 71.76% growth, from July 2022 to July 2023, while the monetary loss rises from 65.65 million to 94.2 million, with a 43.49% growth [1]. It shows that the frequency and money loss of telephone deception are surging in recent years and action should be taken to restrain the worsening situation. Besides, according to *Legislative Council Panel on Security Initiatives for Preventing and Combatting Deception Cases*, there are two types of prevalent modi operandi of telephone deception, which are “Pretend Officials” and “Guess Who”. In 2020, “Pretend Officials” cases accounted for about 57% of all telephone deception cases (1150 cases in total) and 30% of the victims were aged 61 or above, while “Guess Who” cases accounted for 43% of the cases, with 60% of victims aged 61 or above [2, p. 4]. In total, more than 40% of the telephone deception victims are elderly aged 61 or above, which is a significant portion and extra awareness is needed for such a worrying trend.

Apart from telephone deception, since elderly are physically more vulnerable and they may be suffering from geriatric diseases like Alzheimer's disease and dementia, which lead to decline of memory and thinking, elderly missing and accidents like fainting are worrying events we need to pay attention to. Besides, elderly may require assistance in problem solving in daily life and fitting into the fast-changing society, but their family members may not be

available anytime to offer help. It is preferable to have someone always available to give them advice on problems like how to travel to a specific destination and help them narrow their gaps to the society.

As solutions to the problem stated above, there are already some existing smart phone applications published in the market, for example, for dealing with telephone deception, there are spam-blocking and anti-deception apps like whoscall; for dealing with elderly missing, there are location-tracking applications like Google Family Link; for measuring the health condition of the elderly, there are health-related apps like Apple Health. However, these applications are not specifically designed for the elderly, so their design language may not match the need for the elderly, for example the font size is not big enough, the user interface is not simple and intuitive enough, the control is too complicated or the instructions are not clear, which cause difficulty in learning and using the apps for the elderly. Besides, it is problematic for elderly users to manage multiple applications at once. Thus, an all-in-one application that is elderly friendly is a better solution to help the elderly resolve the aforementioned problems.

2. Project Objective

This project is to develop an all-in-one, cross-platform mobile application specialized for the elderly to cope with the issues mentioned above and better protect the elderly's personal and property safety, as well as make their lives easier. The related documentation like detailed specification, uml diagrams, UI design, and testing methodology will also be the deliverables. The main features of the application are as follows.

2.1 Position Tracking

The application will keep uploading the GPS position of the user (elderly), which will be visible to connected users (family members), so that in case of missing, we can know the approximate location of the user and it can assist searching.

2.2 Calls filtering

All the incoming calls will be scanned and compared to a list of identified scam calls, scrapped from a website called HKJunkCall, which records suspicious phone numbers in Hong Kong. If the incoming call is an identified scam call or it is a high-risk call like calls from overseas, the application will take appropriate action, like issuing a warning or directly blocking the call, depending on the desired handling way provided by the user. If the elderly accept suspicious phone calls, a reminder will be issued to connected users, such that they can spot the potential scam before it is too late.

2.3 Smartwatch connectivity

The application will connect to the user's smartwatch and keep monitoring the body status of the elderly, such that in case there are dangerous situations, like the user is having a very high blood pressure or heart rate, the application will inform the connected users to take subsequent actions like calling for emergency services.

2.4 Fall detection

The application will make use of the accelerometer of the smart phone to detect suspicious falling cases or even car accidents by tracking the velocity of the phone. In case the user is suspected of falling, the application will show a confirmation button to the user in order to identify if they are safe. If the user does not click the confirmation button for a certain period of time, like 30 seconds, the application will inform the connected users to take subsequent actions.

2.5 GPT integration

The application will integrate GPT models as a chatbot, such that the users can be given advice to handle problems they encounter in daily life, as well as assisting the elderly to better adapt to the fast-changing society.

3. Project Methodology

3.1 Front end

React Native will be used for building the user interface of the application. React Native is an in-class Javascript library for building user interfaces. It supports cross platform features, by wrapping native code and interacting with native APIs via React's declarative UI paradigm and JavaScript, which means the application can execute seamlessly in both Android and IOS smartphones [3].

3.2 Back end

Firebase will be used for the database and server of the application. Firebase is a high-performance and stable app development platform that provides cloud services for general backend usages, for example database setup, server hosting, authentication, and analytics about the users [4].

3.3 Modeling of app structure

Lucidchart will be used for drawing UML diagrams, namely use case diagram, sequence diagram, and class diagram. Lucidchart is an intelligent diagramming application that enables team collaboration and communication[5]. Use case diagram provides a high-level overview of the relationships and interactions between actors (users) and systems. Sequence diagram shows the order in which objects interact and represents runtime scenarios [6]. Class diagram describes the system structure by modeling its classes, attributes, operations, and relationships between objects [7].

3.4 UI prototype

Figma will be used to design the Graphical User Interface for the application. Figma is a UI design application that enables designing realistic interactive prototype for quick iteration of flows and states. It has high team visibility which enables team cooperation, as well as providing tools for turning the UI prototype into real code [8].

3.5 Version control and project management

Github will be used for version control and project management. Github is a website and cloud-based service that helps developers store and manage their code, as well as track and control changes to their code. It utilizes Git, an open-source, distributed version control system that allows every developer to have the entire codebase and history in their own computers. The version control is implemented by branching and merging. Branching means duplicating the source code in a new branch so that changes can be made in the new branch

without affecting the original main branch. Merging means that developers merge the finished and well-tested code back into the main branch and make it official. Every branching and merging action will be tracked and can be reverted if necessary. Github also provides statistics on project progress and contribution for project management [9].

3.6 Testing

React Native testing library will be used for unit testing and integration testing. Unit testing is a kind of software testing that focuses on the smallest individual unit or component of a software system in order to validate each unit is working and the requirement is satisfied [10]. Integration testing is the process after unit testing to test whether the interface between two units or modules interacts and transfers data correctly, so that no error arises when merging different units together [11]. The user acceptance tests will be done manually. User acceptance test is done by real end users to check if the application fulfill their requirements in real world scenario and whether the user experience is satisfactory [12].

4. Project Schedule and Milestones

Date	Task	Estimated number of learning hours
Sep – Oct 2023	Project plan & detailed specification	15
Nov – Dec 2023	UML models and UI design	50
Dec 2023 – Jan 2024	Preparation of interim report and presentation	30
Dec 2023 – Jan 2024	App development	200+ (including reading documentation)
Feb 2024 – March 2024	Testing, debugging, and continuous integration of potentially new features	50
March 2024	Preparation of final report and presentation	30
April 2024	Preparation of poster and 3-minute video	5

*The project website will be updated as the project progresses (estimated 5 learning hours).

*Total estimated learning hours is 385 hours.

5. References

- [1] Anti-Deception Coordination Centre, *Scam Statistics*
<https://www.adcc.gov.hk/en-hk/statistic.html> (accessed: Oct 1, 2023)
- [2] Security Bureau, Hong Kong Police Force, *Legislative Council Panel on Security Initiatives for Preventing and Combatting Deception Cases*, May 2021
<https://www.legco.gov.hk/yr20-21/english/panels/se/papers/se20210601cb2-1110-3-e.pdf>
(accessed: Oct 1, 2023)
- [3] React Native official website
<https://reactnative.dev/> (accessed: Oct 1, 2023)
- [4] Firebase official website
<https://firebase.google.com/> (accessed: Oct 1, 2023)
- [5] Lucidchart official website
<https://www.lucidchart.com/> (accessed: Oct 1, 2023)
- [6] Lucidchart , *Introducing Types of UML Diagrams* | *Lucidchart Blog*
<https://www.lucidchart.com/blog/types-of-UML-diagrams> (accessed: Oct 1, 2023)
- [7] Lucidchart , *UML Class Diagram Tutorial*
<https://www.lucidchart.com/pages/uml-class-diagram> (accessed: Oct 1, 2023)
- [8] Figma official website
<https://www.figma.com/> (accessed: Oct 1, 2023)
- [9] Kinsta, *What Is GitHub? Kinsta A Beginner's Introduction to GitHub*, Dec 13, 2022
<https://kinsta.com/knowledgebase/what-is-github/> (accessed: Oct 1, 2023)
- [10] GeeksforGeeks, *Unit Testing* | *Software Testing*, 06 Feb, 2023
<https://www.geeksforgeeks.org/unit-testing-software-testing/> (accessed: Oct 1, 2023)
- [11] GeeksforGeeks, *Software Engineering* | *Integration Testing*, 06 Apr, 2023
<https://www.geeksforgeeks.org/software-engineering-integration-testing/> (accessed: Oct 1, 2023)

[12] GeeksforGeeks, *Software Testing – UAT (User Acceptance Testing)*, 29 Mar, 2023
<https://www.geeksforgeeks.org/software-testing-uat-user-acceptance-testing/> (accessed: Oct 1, 2023)