



FACULTY OF COMPUTING

SECP1513 Section 04

Lecturer: Dr. Muhammad Iqbal Tariq

DESIGN THINKING REPORT

GROUP: TECHLE

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1. Introduction

Design thinking is a human-centered design process which focuses on collaboration between designers and users, bringing innovative solutions based on how real users think and act. It features five stages which are Empathize, Define, Ideate, Prototype and Test.

For our design thinking project for this course, our topic is ‘Cybersecurity’, so our group designed a scam-call protection app called Scam Killer. We came up with a project outline, researched the existing similar apps, conducted a survey and interviewed someone from the telecommunications industry to get their opinions before finally coming up with the prototype. This report shows how we completed all the phases for the design thinking process.

Scam Killer is a scam call protection app that notifies users of suspected scam calls and also allows them to report and block suspicious calls. The features that make it distinct from other similar apps is the ability to share suspicious callers with the user community of the app and the voice changing feature. The voice changing feature allows users to receive suspicious calls while altering their voices, preventing scammers from getting a hold of the users’ real voices.

2. Detail Steps and Descriptions

Empathy:

Empathy is the ability to comprehend the challenges encountered by various people groups. Once we were assigned the topic of Cybersecurity, we tried to understand what ongoing problem we could tackle through the application we were trying to create. After a bit of research and group discussion, we decided to create a scam-call-detecting application because of the rise of scam calls that are occurring at the moment. Our clients are all mobile phone users who want to be protected against the rising amount of scam calls and they can use our platform to protect themselves. We also interviewed Ms. Loshanah Sathiaseelan, Senior Advisor Engineer in After Sales Maintenance of Huawei Technologies, about her experience dealing with scam calls and her opinion about our app.

Define:

Define is the stage where we try to pinpoint and recognize the problems faced by our clients. Through phases one and two we researched, collected data, and interviewed people trying to figure out what possible problems our app could tackle. We figured out that many people nowadays face scam calls from the same number and that many of those scam calls record our voices to fool our loved ones into giving out crucial pieces of information.

Ideate:

Ideate is the process of brainstorming possible solutions for the problems that we have listed. In this stage, we decided to create a scam call-detecting platform that can report scam call numbers. Our app filters calls and displays a pop-up alert for reported scams. If a number is flagged as a scam over 90% of the time, the security team is notified. The app will also feature a shared blacklist where others can see which numbers are scam-calling numbers. Additionally, our app includes a voice-changing feature for users to protect against voice cloning attempts by fraudsters during unknown calls.

Prototype:

The prototype stage involves choosing the most desirable solutions from the range of potential ideas and turning them into our desired product. Once the solutions were determined, we initiated the prototyping process, which consisted of developing the user interface for the scam call-detecting application. To create the prototype we used paper and colored pens and pencils. The theme of our app is purple and white. Our prototype consisted of the main page with our logo, a menu page that consisted of our various features, a contact list that includes the users' contacts and a shared black list with scam calling numbers, a settings page, a feedback page, a calling page with voice changing option and a page that consist of the recording of the call.

Test:

The testing stage involves us presenting the application to our users and classmates for their feedback which is crucial for identifying potential limitations and enhancing the product further. After we completed the prototype we presented it to our classmates and explained to them why we created our app, the features of our app, and how our app is different from other scam call-detecting apps. We also presented the application to Ms. Loshanah for her feedback on our application.

3. Detailed Description

Problem

Scam calls have become a pervasive issue, preying on unsuspecting individuals and causing financial and emotional distress. The rise of technology has made it easier for scammers to record and manipulate user's voices, making it challenging to determine who are talking to and potentially using the cloning voice for fraudulent activities. Traditional methods of identifying scams, such as phone call blocking features, may be insufficient as scammers frequently change their tactics and use various phone numbers to deceive users.

Solution

After doing research about the features available in the scam call apps on the market, we realized that there are no applications that contain the useful features such as a phone number reporting system, call recording and voice changer feature in an app. So, we decided to combine all the features into an app. Firstly, we offer a platform for users to report scam call numbers. It avoids the user picking up the phone call and our application will pop up an alert message to the user when receiving the call. We also built a block share list that requested from the survey to allow the user to let the user check how many times that the phone number was being reported and the IP address of the phone call. Alert message also given when receiving a phone call that is reported more than 50 times.

We also interviewed a telecommunications engineer from Huawei Technology, Ms Losh sanah Sathiaseelan to ask her opinion about the voice changer features. Voice changing feature is used to alter receiver call's voice for privacy when receiving unknown calls. This safeguards against fraudsters attempting to clone the user's voice for deceptive calls to family and friends to extract money.

Teamwork

Our group decided to slip ourselves into different tasks. At the beginning, Fatema and Taqia were going to interview the guest from Huawei Technology while Yee Teng and Xin Ying were doing research on the market and doing some comparison between our application and the apps on the market to make our apps stand out between them. Wei Lam and Karen were constructing a survey form and distributing it to friends and family to ask their opinion and suggestion about the scam call apps.

During the design thinking process, we faced a lot of resistance. For example, we were giving different opinions when discussing the features of the apps so it was hard to decide our final app

features. We were very thankful to Mr Iqbal, our course lecturer was giving a lot of support and suggestions for us to smoothen our process in developing and designing the application.

4. Design Thinking Assessment

4.1 During the start of the design thinking phase

At the early design thinking phase, we were lacking ideas on designing new features for the application we want to create. After that, we decided to do a survey on google form to collect ideas from responders to find the features that are useful to them. Besides, we also face problems on how to manage our time well because we have other subjects that need us to study on. Luckily, we manage to complete the project together and overcome this problem by communicating and cooperating with each other.

4.2 During the end of the project demonstration

At the end of this design thinking phase, we found out that the main thing about the design thinking is to help our customers to solve their needs and make their life better. We put a lot of effort into getting to know what their requirements are for a network security application and we try to figure out what we can do about it. It is challenging to design a useful application for everyone.

5.1 Design Thinking Evidence

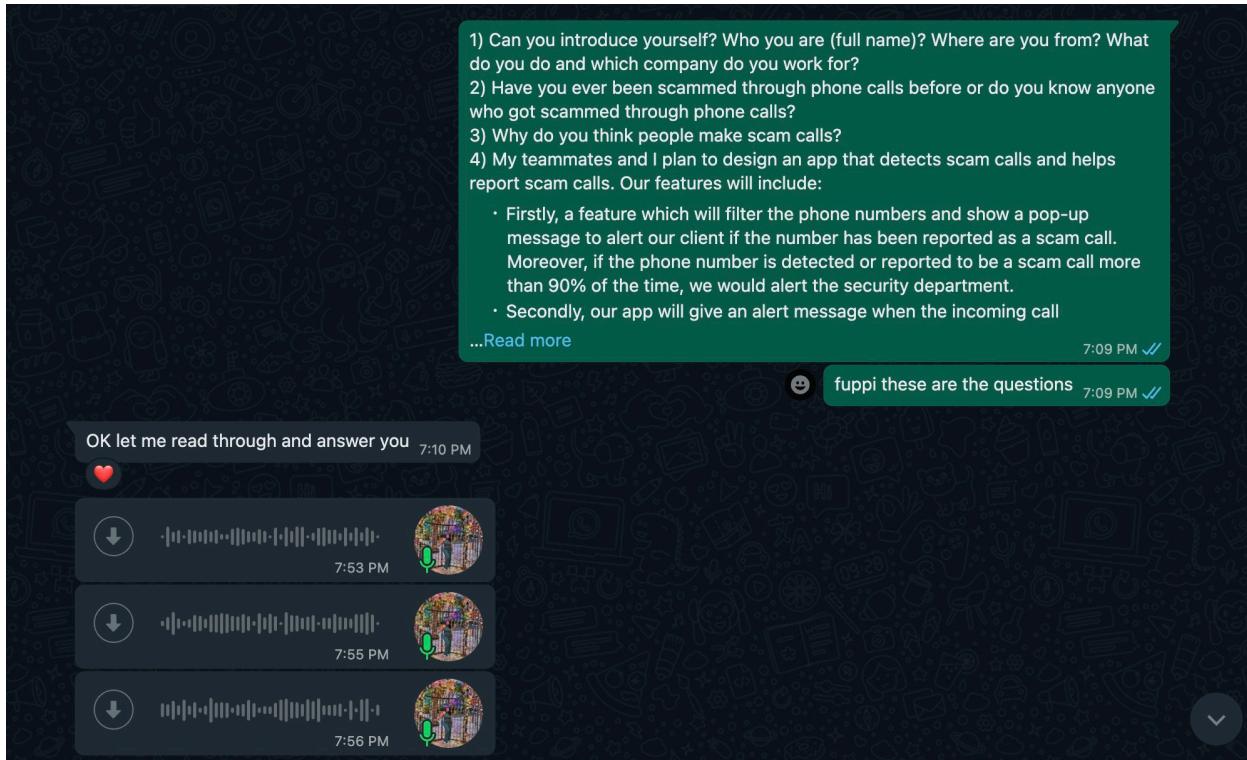


Figure 5.1 : Interview in the Empathy stage



Figure 5.2: Discussion for Define and Ideate stages



Figure 5.3: Prototype stage

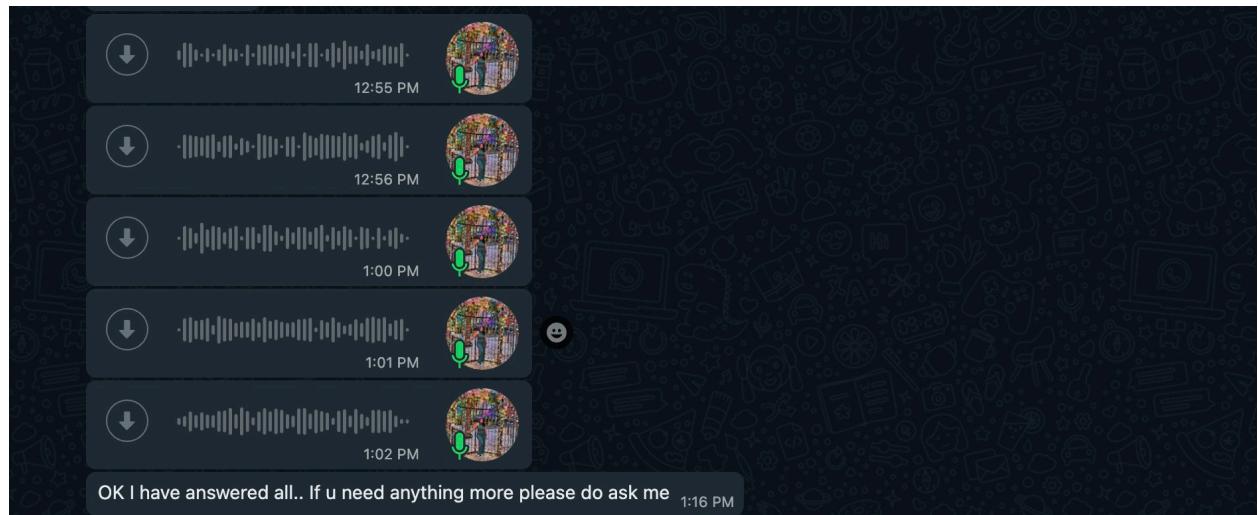


Figure 5.4: Getting feedback from user in Test stage

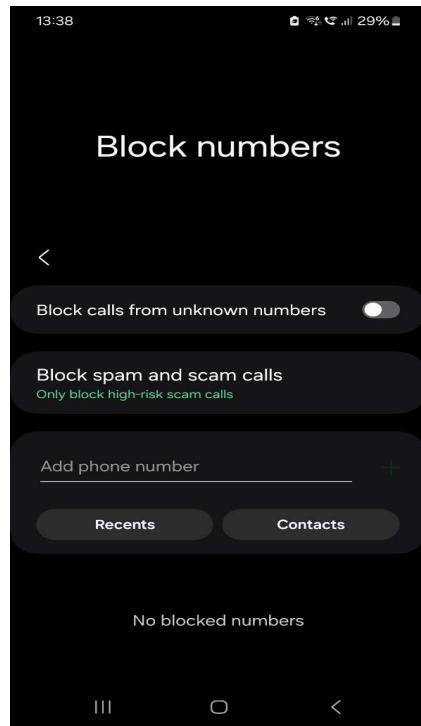


Figure 5.5: User interface of the feature of blocking scam call in the default phone app

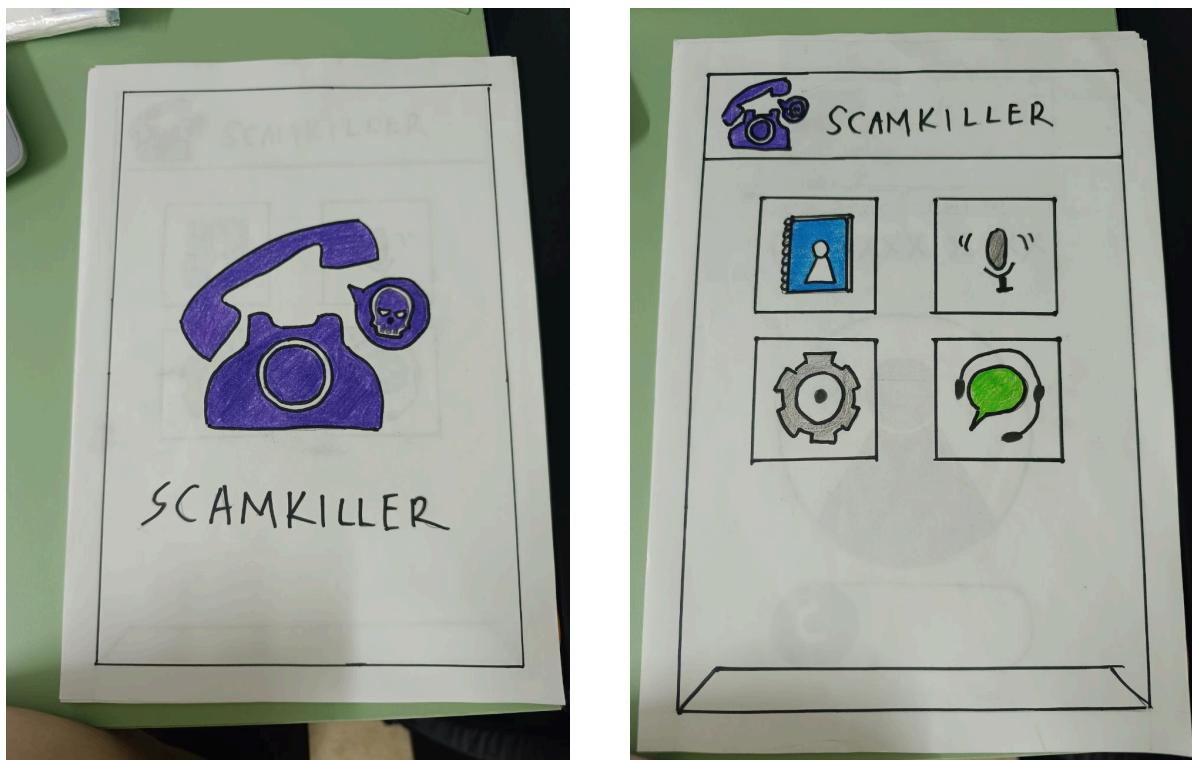


Figure 5.6: Logo and user interface of menu in scam call app

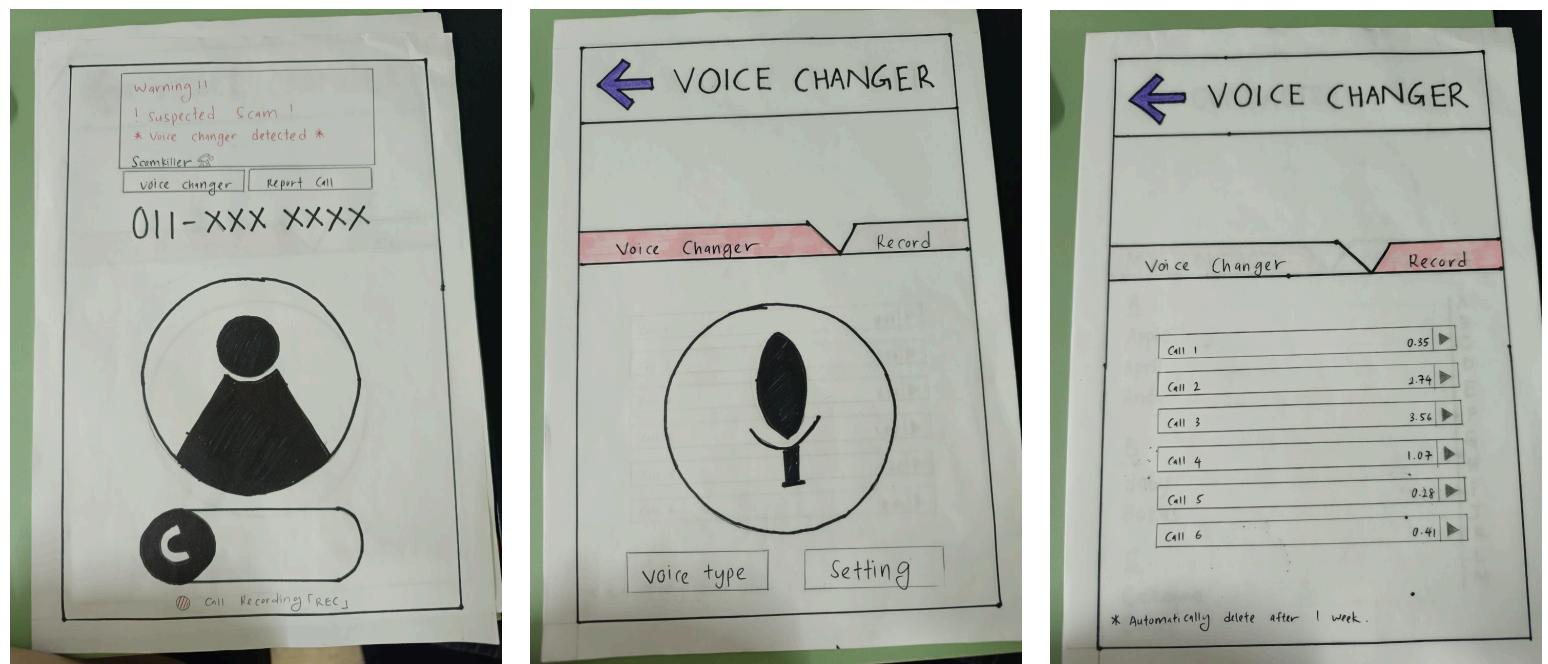


Figure 5.7: Voice changing feature in scam call app

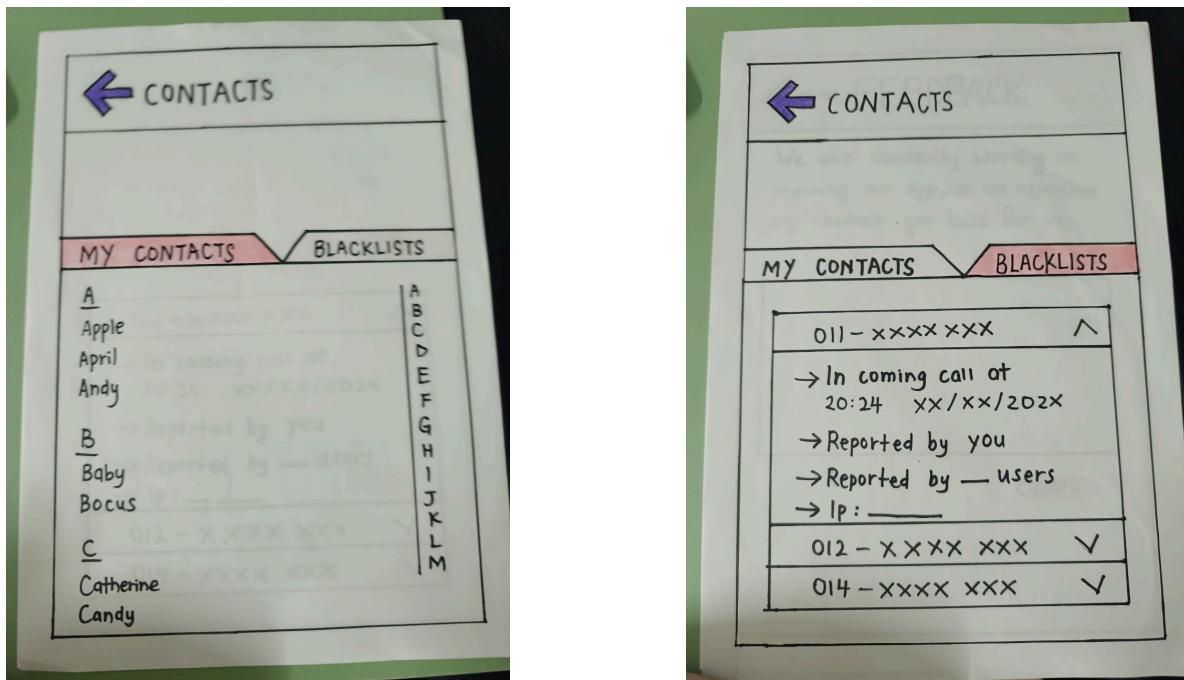


Figure 5.8: Contact list in scam call app

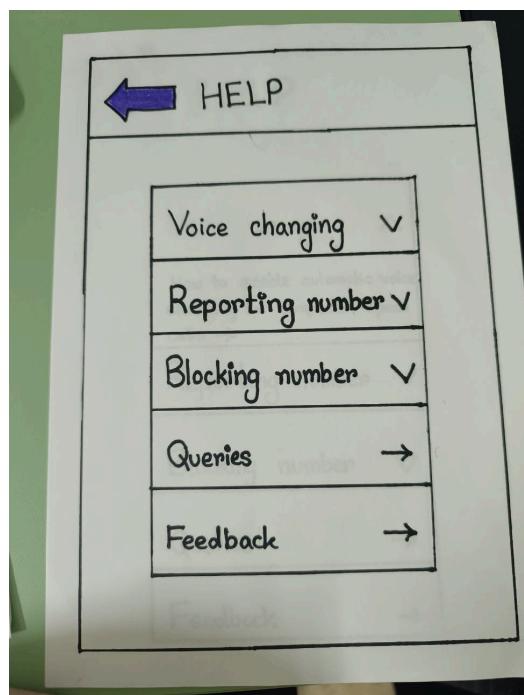


Figure 5.9: Help page in scam call app

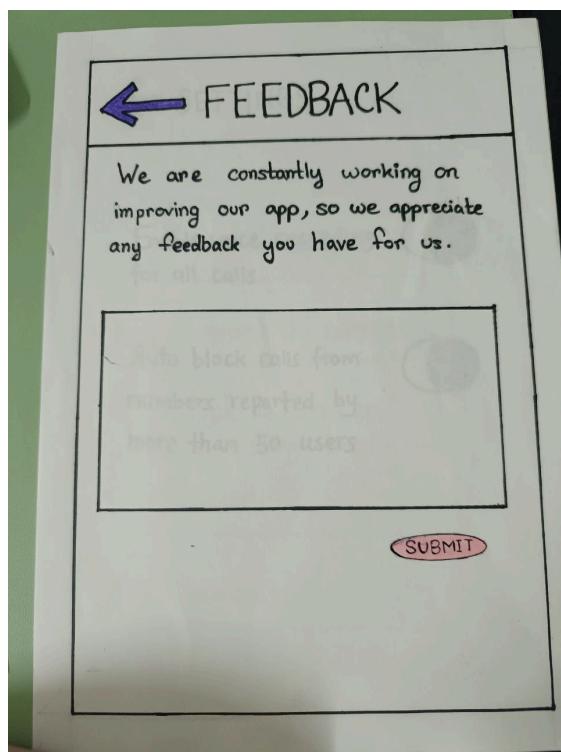


Figure 5.10: Feedback page in scam call app

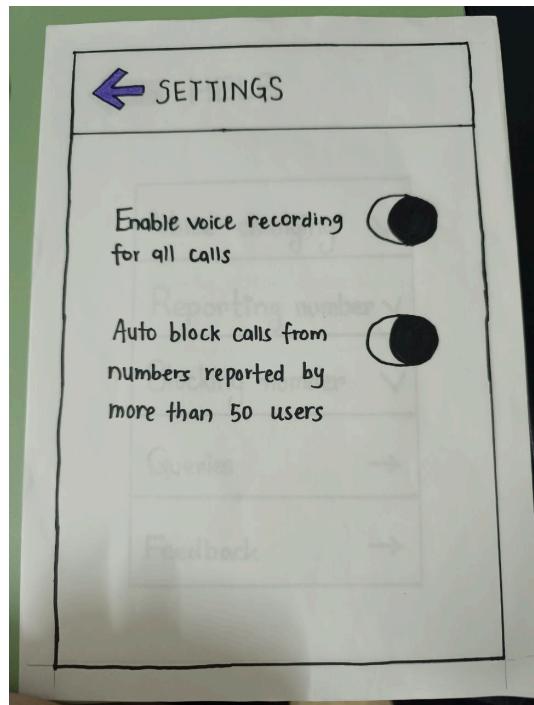


Figure 5.11: Setting page in scam call app

5.2 Record for each phase

Empathy

Table 5.1 shows the questions and answers that were obtained from the interview.

Interviewer personal information

Name : Ms. Loshanah Sathiaseelan

Occupation : Telecommunications engineer (Huawei Technologies as a Senior Advisor Engineer in After Sales Maintenance)

Job Scope : Communicate with all clients who are using hardware and software of Huawei Technologies in Southeast Asia

Table 5.1: Details for interview session

Questions	Answers
1. Have you ever been scammed through phone calls before or do you know anyone who got scammed through phone calls?	<ul style="list-style-type: none">- Yes, but not successful due to working at telecommunication company and more concern on the aspect of cyber security- Currently in Whatsapp that offers part time jobs is a scam
2. Why do you think people make scam calls?	<ul style="list-style-type: none">- The society easily fall in the trap of scam calls- “You have a transaction”, “You won a prize” or “You’ve been summoned to court” will stimulate the curiosity of the majority- Don’t check the authenticity of the link, or the sources (click or answer first before they check)- Causing the scammers scam successfully
3. My teammates and I plan to design an app that detects scam calls and helps report scam calls. Our features will include: - filter the phone numbers and show a pop-up message	<ul style="list-style-type: none">- Already have a number of apps where they try to do this function where they can block/filter scam calls- Interesting part about our app is the voice changing function- Scammers make fake video calls and use the user's voice to make scam calls- Altered voice changing is a step up- Usually receive a call from a seemingly familiar

<ul style="list-style-type: none"> - scam calls more than 90% of the time, alert the security department. - detect scam calls will have alert to activate voice changing app (alter the tone and pitch of users to protect privacy) 	<p>number that's not from the parents' voice so the user will realize it is a scam</p>
<p>4. Are there any other features you would want to see in our app that would help to prevent scam calling?</p>	<ul style="list-style-type: none"> - Can identify that the background of video call is not real - Focus on how to use the voice changing
<p>5. Is there a specific feature of the app you are most likely to use?</p>	<ul style="list-style-type: none"> - Feature a mechanism with real IP numbers. (there are real IP apps from which you can call any number, and your number doesn't have to be a fully registered number)
<p>6. Will you recommend our apps to others?</p>	<ul style="list-style-type: none"> - A good app especially the voice changing feature
<p>7. Why do you think an app such as ours is important/ helpful?</p>	<ul style="list-style-type: none"> - Target the way to strengthen cybersecurity for users globally - Fake calls, fake SMS, fake video calls these are some things need to fight in the future

Conclusion

Features that we already have in our apps :

1. Voice changing
2. Scam caller detector
3. Scam call reporter

Features that recommended to have in our apps:

1. Background changing features (to identify the real background of the scammers so that we can realize the scammer easily)
2. Focus more detail on the voice changing features as it is the core of the app
3. Feature a mechanism with real ip numbers

Data Analysis from Survey Form

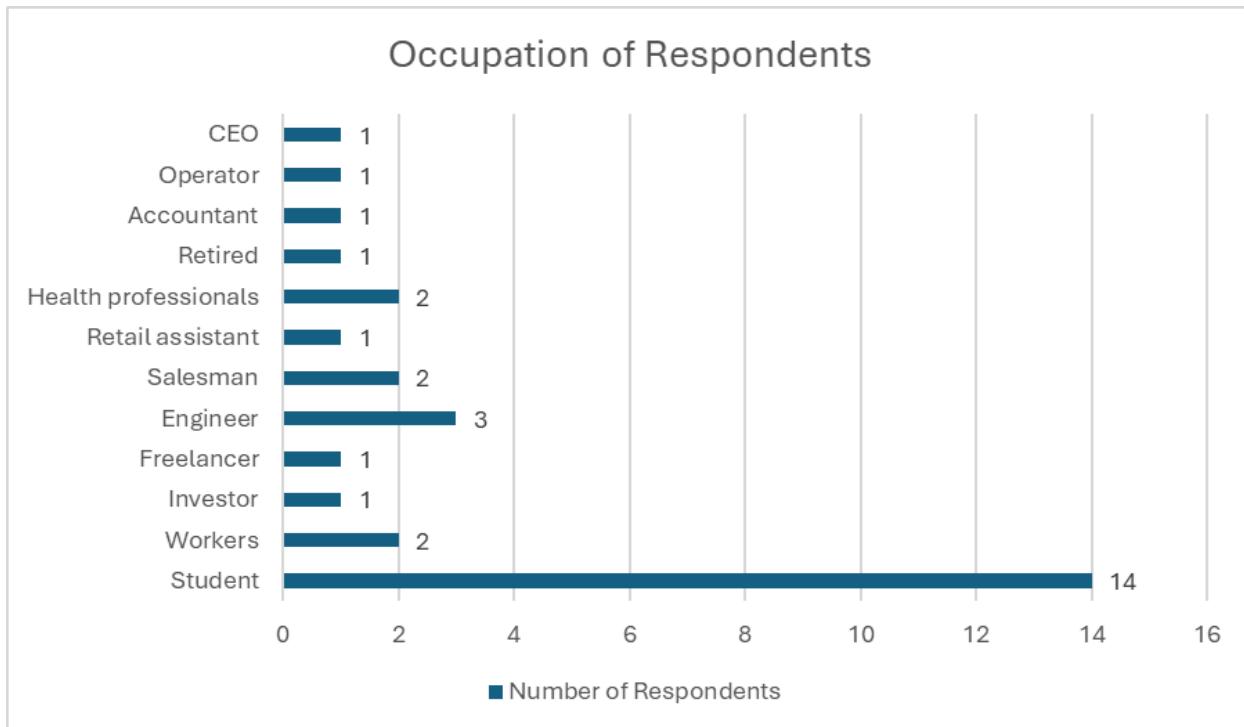


Figure 5.12.1: Occupation of respondents

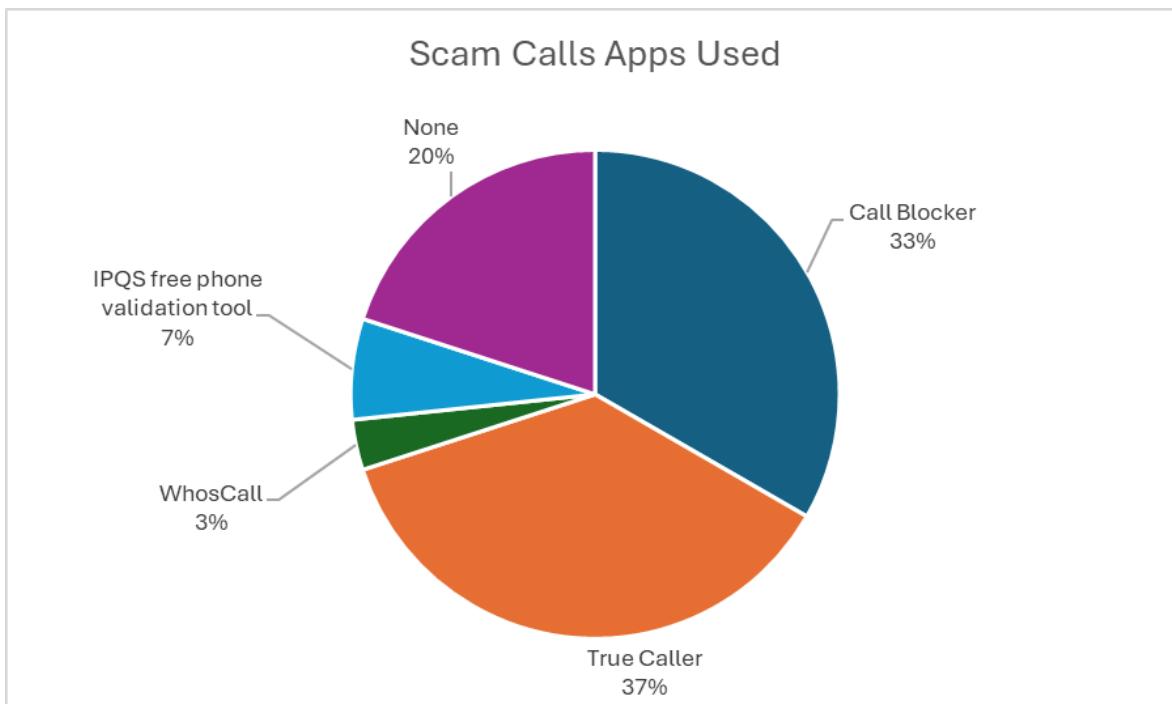


Figure 5.12.2: Scam calls apps used by respondents

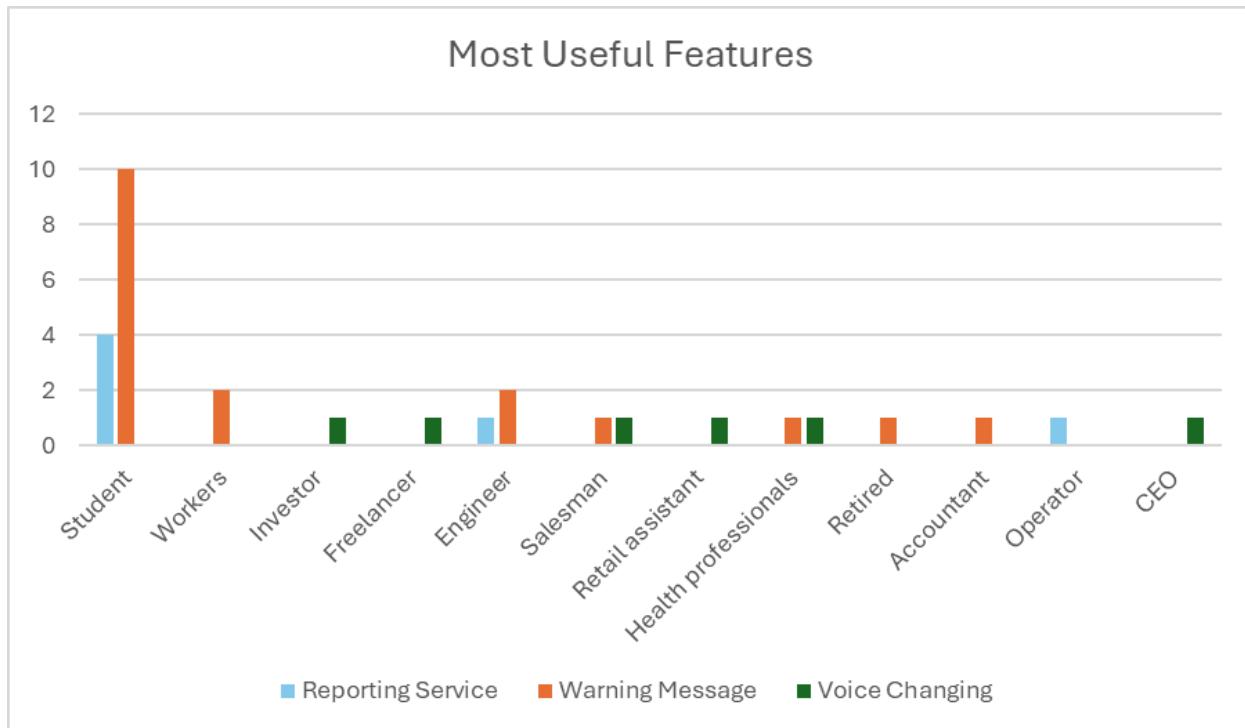


Figure 5.12.3: Most useful features for respondents

Features suggestions from respondents :

1. Report service after receiving scammed calls (with evidence like recording through app)
2. Scanner to scan changes on phone
3. Anti-fraud measures or tips inserted
4. Unknown number calls can be sent directly to voicemail if the user wants
5. Auto block scam calls
6. Track caller location
7. Allow users to contribute to a shared blocklist
8. Good connection with phone calls
9. Scam call notifications
10. Auto end calls

Features Comparison of Scam Call Apps

App Name	Whos Call	True caller	Phone's Built-in Spam-Blocking Tools	Nomorob o's key spam-blocking	Robo killer	AT&T ActiveArmor	Verizon Call Filter Plus	Google call screening
Caller identification	✓	✓	✓		✓	✓	✓	
Call - blocking	✓	✓	✓		✓	✓	✓	
Call - recording		✓						
SMS Message Filtering	✓							
Does not access or transmit call log data				✓				
Detect robot callers and telemarkets				✓				
Sends unknown callers directly to voicemail						✓		
Integrates with additional digital security protection services						✓		

Automatic real-time call transcriptions								✓
Unknown Caller Query	✓							
Number Reporting	✓							
URL scanner	✓							

Define

The table shows the problems faced by the respondent.

Table 5.2: Problems faced by respondent

Problems	Descriptions
Voice phishing using scam calls	<ul style="list-style-type: none"> Scammers detect the user's voice and use it to make scam calls and scam the user's friends and family.
Blocking scam call feature in default phone app is too strict	<ul style="list-style-type: none"> The feature to block scam calls in default phone calls will sometimes block unknown phone calls which has a high possibility that the phone calls is friends' or families' new phone number

Ideate

The table shows the possible solutions that can be used to solve our respondent's problems

Table 5.3: Recommended solutions

Rational	Intermediate	Radical
<ul style="list-style-type: none">• Provide pop-up reminder to remind user that it is a scam call• Suggest user to block the incoming call which suspect that it is a scam call instead of answering	<ul style="list-style-type: none">• Add new features allow user to choose between continue the call with voice changer or report the call when receive scam call• Provide a pop-up note to remind user that the incoming call has a high possibility that it is a scam call• Provide voice recording to record the conversation of scam call and ip to ease the police tracking	<ul style="list-style-type: none">• Develop and create a new scam call app which mainly focus on the feature to detect scam call and allow user to change their voice and record the whole conversation when answering scam call

Prototype

During our discussion, our group has decided to use solutions from the intermediate category instead of the rational and radical category. The reasons we chose intermediate category are stated as below:

Table 5.4: Prototype selection

Categories	Reasons
Rational	<ul style="list-style-type: none">• Provide a pop-up reminder is the easiest way and the most common way to solve the problem which is user answering scam call but sometimes user tend to accept the call due to curiosity or thought that it is a new phone number from families and friends• Suggest user to block incoming call which suspected is a scam call but there are possibilities that the numbers are not scam call and it might be user's friends or families new phone number
Radical	<ul style="list-style-type: none">• Create or develop a new scam call app is very challenging as for now we lack of skills and knowledge to develop a scam call app which really effective to block and filter scam calls in the default phone app

As a conclusion, we make a decision to modify existing scam call apps after surveying up to 11 scam call apps by adding an extra and brand new features which is voice changing feature and ip tracking. The interface and the design of the voice changing and ip tracking feature is as below:

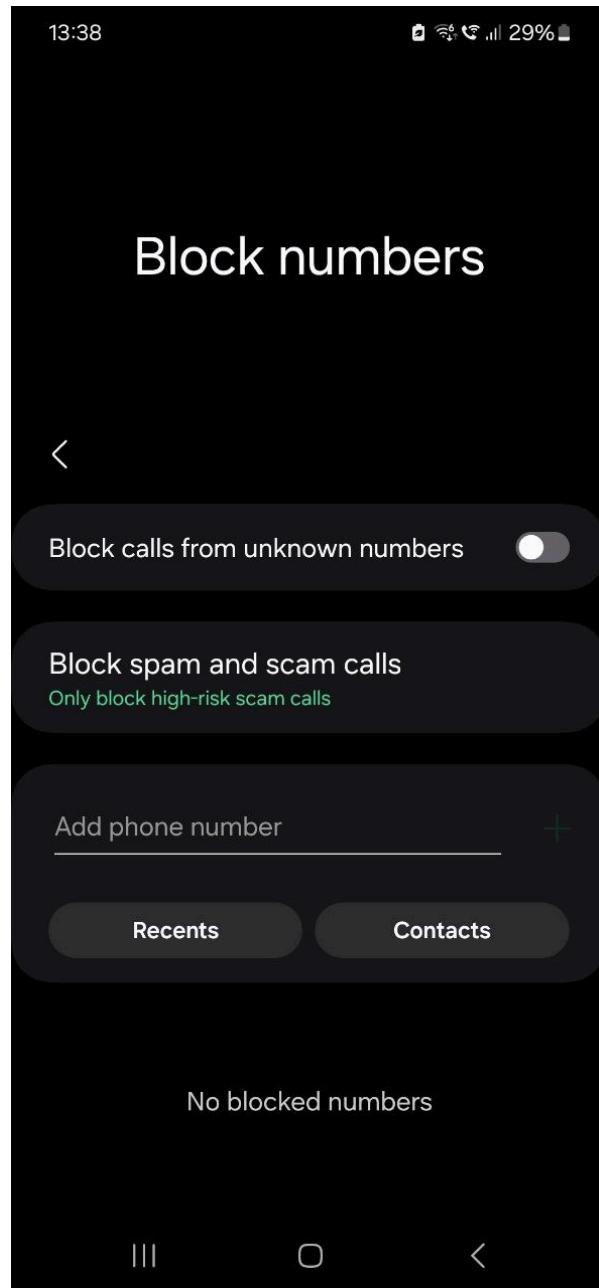


Figure 5.12.4: User interface of the feature of blocking scam call in the default phone app

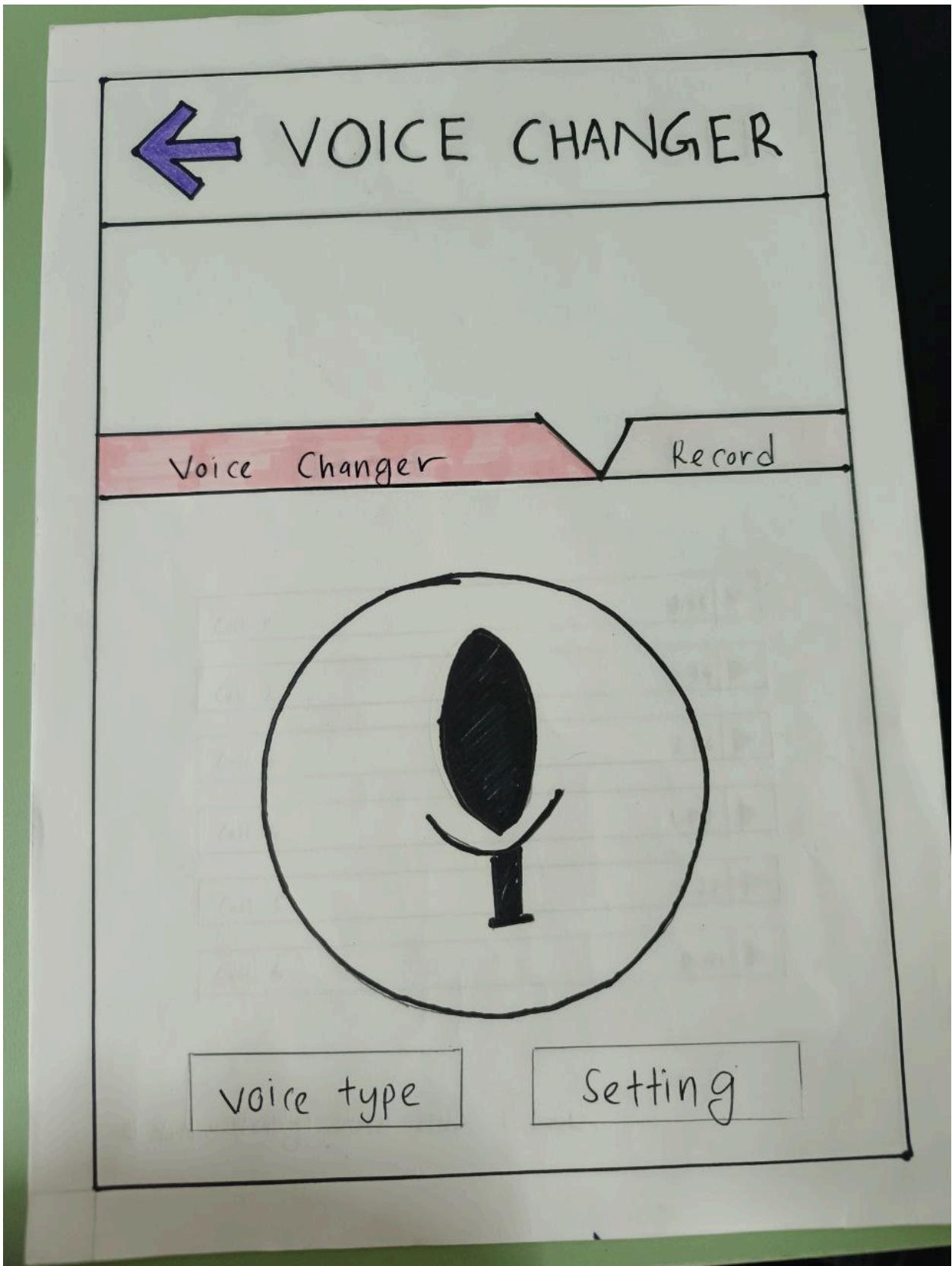


Figure 5.12.5: Voice changing feature interface

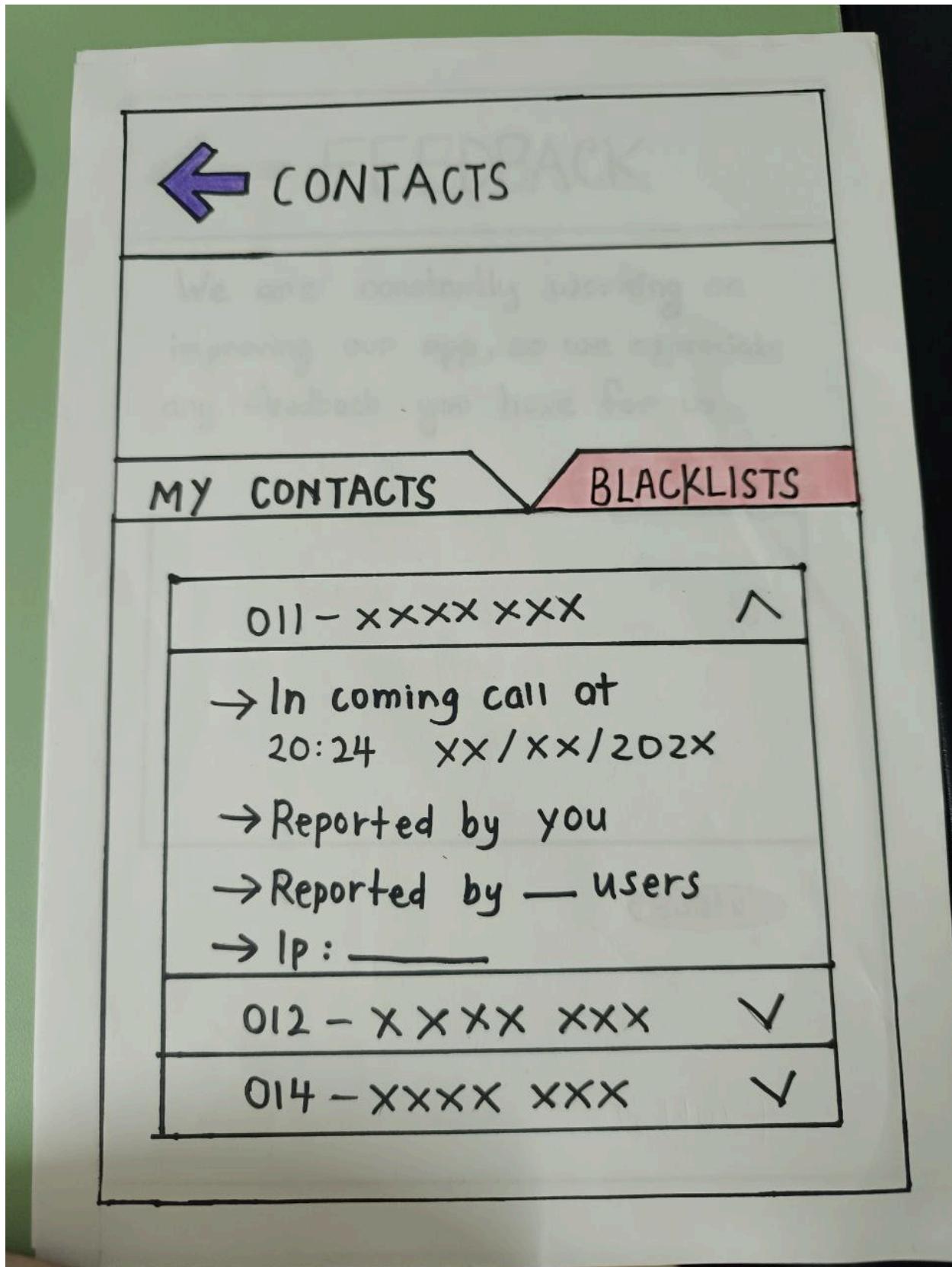


Figure 5.12.6: Ip tracking feature interface

The table below shows the characteristics of the modified scam call application.

Table 5.5: Features for modified scam call application

	Characteristics	Description
Existing functions	Scam call detector	A feature that can detect scam calls and warn user to not answer the call
	Scam call blocker	Immediately block call that suspected to be scam call to protect users' privacy
	Call recording	To record the call and if it is scam call it can be a proof to hand to the police
	Detect robot callers and telemarketer	To detect the call and if it is robot callers or telemarketer, it will hang up the phone immediately
Extra functions	Voice changing feature	To allow the user to continue the conversion with suspected scam calls which different frequency compare to the original sound
	Ip tracking feature	To track the ip address of the scam caller and record the ip address, if it is scam call, the ip address will ease the tracking for the police

Test

After we have completed the prototype, we have demonstrated our product to our Technology and Information System class in section 4. We have explained the new features and compared the differences between the existing scam call features. We have also answered the questions asked by our professor, Dr Iqbal and some students. We have also explained and demonstrated our scam call app to Ms. Loshanah Sathiaseelan as we do not have a chance to meet her physically and she has given us positive feedback and she supports our applications as she stated that these days there are many scammers scamming through calls. Hence, she hopes to have a scam call application that really helps the majority to filter and block scam calls effectively.

6. Reflection

Wei Lam: Participating in this project let me learn about the process of developing an application and solving the client's problems to meet their needs. I clearly understand that teamwork is crucial in design thinking projects. I appreciate my teammates who put a lot of effort into this project. Good teamwork is essential from the beginning to the end for developing a useful application. Additionally, I also appreciate the help from Dr. Iqbal, who gave us advice and opinions about the scam call features. I will take it as an inspiration for me to become a software developer and improve myself from time to time.

Karen: It was a new experience for me to design something new, I felt satisfied when we had done our project. I learned about the importance of working in a group and how to cooperate with team members well. Based on the design thinking project, I get to know the process of designing an application and I think this experience will help in the future.

Taqia: It was a great experience to do this project with my fellow classmates. This was the first time I had to work with a team through so many stages of the project. It was a satisfying experience to see each of the phases getting completed and seeing our various ideas coming together and solidifying. Through this project I had to do a lot of teamwork, and it was great to see how the seemingly difficult tasks became easier when we all broke it down and attempted it together. The design thinking process gave me a glimpse into how to develop app interfaces keeping the users in mind.

Fatema: The course and the design thinking project helped me to get an inkling of what a possible career path as a software engineer could look like. The goal of the project was to create a product that was different from existing products in the industry while also being able to tackle the issue that was presented to us. As an incoming software engineer, I realized that the end goal is not always creating an app that is different from others but creating an app that constantly improves on others' work and keeps up with new challenges that are arising. The project helped me to be a critical thinker and leader along with giving me an understanding to see the threat from a user's point of view. However, improvements are always necessary and I think there are some that our product could go through such as connecting it with a security system that could catch the scam callers.

Yee Teng: From my point of view, by doing this design thinking, we have known the importance of fulfill user's request. By achieving user's request, we can have a better app compare to the existing one. Besides, we have known the importance of doing surveys by comparing the features with other existing apps before developing an app as the survey will make our app special and the users may want to try our app's new feature. This project also taught us that every app developed is to help the user and make technology useful to the future .

Xin Ying: Taking part in this group project has been a valuable and interesting experience. I have more opportunities to collaborate with different respondents and team members to enhance my communication skills. Our team members contributed fairly, which made the tasks to be done efficiently. I appreciate the strengths each member has and the collaboration that made our project done successfully. I aim to apply the lessons learned in this project, especially communication skills and design thinking skills in my future. To sum up, this experience has not only contributed to my academic knowledge but has also enriched my understanding of teamwork and collaboration.

7. Task for Each Member

Task for each member

	Wei Lam	Karen	Taqia	Fatema	Yee Teng	Xin Ying		
Phase 1 (Proposal)	Benefit of the idea	Existing tech/system used by client	Client background	Compilation and formatting	Problem with existing tech	Proposal idea to overcome problem		
Phase 2 (Information Gathering & Analysis)	Creating survey		Interviewing client		Analyzing data			
Phase 3 (Prototype presentation, Video, Report)	Prototype design and drawing, presentation			Prototype presentation and video				
	Report							
	Detailed descriptions include problem, solution and team working	Design thinking assessment points	Introduction, task of each member, putting it together	Detail step and descriptions in design thinking and evidence for each phase	Design thinking evidence			

Video link:

https://drive.google.com/file/d/17pDYFuSb_4BxA_Amb8MKVue9yGBAs_KP/view?usp=drivesd