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Table of Contents

1.0	INTRODUCTION.....	1
2.0	DETAIL STEP AND DESCRIPTIONS.....	2
3.0	DETAILED DESCRIPTION	2
4.0	DESIGN THINKING ASSESSMENT	4
5.0	DESIGN THINKING EVIDENCE	5
6.0	REFLECTION	17
7.0	THE TASK FOR EACH MEMBER.....	17

1.0 INTRODUCTION

Design thinking is a process whereby any inventors need to face to create a new thing or modify the existing application no matter you are from any field. This skill requires the inventors to have critical thinking to fulfill user's requirement and provide the solution to solve the problems.

Under the topic System Software, our report is mainly focus on one of the subtopics which is utility software.

UTILITY SOFTWARE

Utility software is system software designed to help to analyse, configure, optimize or maintain a computer. It is used to support the computer infrastructure, which is aimed at directly performing tasks that benefit ordinary users. After the interview with the one of Android users, we found that the user is facing the problem regards to utility system which is antivirus application.

Antivirus applications nowadays are provided in all gadgets, but they are still limited to provide all types of function required by users to fulfil the needs of user.

2.0 DETAIL STEP AND DESCRIPTIONS

Empathy

Empathy is the stage where we should understand the problems faced by our respondent. Our target was on middle-aged people who might face problems when using smartphones and we chose Aunty Cat as our respondent for interview. At the beginning of the interview, we asked our respondent about her personal information as this might be useful for us in identifying her problems and later asked about her experience and the problems faced when using smartphone.

Define

Define is the stage for us to identify the problems faced by the respondent. After we watched the interview video, we identified her problems by understanding and analysing her answers that gave in the interview session.

Ideate

Ideate is the stage for brainstorming where we can generate all possible solutions for the problem statement. In this stage, we suggested different solutions for the problems based on the 3 different categories which are rational, intermediate and radical.

Prototype

Prototype is the stage for us to select the most suitable idea from the possible ideas and turn the idea into products. After we had decided the solution, we started to do prototype. The prototype was the user interface of the antivirus application based on the design of security centre. The materials used for the prototype were coloured paper, ruler, coloured pencils, and binder rings.

Test

Test is stage where our product should be tested by our user and the feedback from the user is important as it can help us to identify the limitations of our product and further improve the product. After we completed the prototype, we demonstrated it and explained about the features of the antivirus application to the respondent. Besides that, we also asked for her feedback for the product.

3.0 DETAILED DESCRIPTION

PROBLEM

After the interview session, we found that the user was affected by the existence of unknown message on her social media and SMS. Besides, the user has trouble to do the regular scanning regularly. She would only do the scanning to the phone when her smartphone faced problem such as lagging. This is because she is busy with her household chores and often forget to do the scanning for her smartphone at certain period.

SOLUTION

After the discussion, we decided to modify the antivirus application in her smartphone which is called as Security Center. We decided to add the feature called as message filtering. This feature will help to scan and filter out the unknown and risky messages from the applications selected by the user. Besides, regular scanning feature is added to the antivirus application for user to setup how frequent the antivirus application will scan the system automatically. Therefore, user would not to do the scanning frequently by manual to maintain the system in safe condition.

TEAM WORKING

Our group have split ourselves into different task. Winson See Wen Xiang will mainly focus on the interview and test session and production of the video. Loo Zhi Xuen and Kong Hao Yang will focus on the content of the report and discuss the progress in creating the prototype of the antivirus application.

During the design thinking process, we face a lot of resistance especially we do not come out the idea at early time and cause our progress to become very slow. Besides, our team is hardly to find a suitable time for us to sit together to discuss about the design thinking due to different timetable and lots of activities after the class. Fortunately, each of us is clear about the task that we need to do and finally we manage to come out a complete report and videos.

4.0 DESIGN THINKING ASSESSMENT

4a. DURING THE END OF THE PROJECT DEMONSTRATION

At the end of the project, we found that design thinking was a process that need to be done in details as we need to think at the customer view and find the solution that fits with them. We would say that it is easy to create a new application, but it needs a lot of effort to ensure the application meet the needs from market and profitable.

4b. DURING THE TRANSITION BETWEEN DESIGN THINKING PHASES

At the early of Design Thinking process, we faced some difficulties which were lack of ideas and lack of time and occasions for us to discuss about the project due to busyness of our studies for other subjects. Although we faced these challenges, we still managed to complete our task in each phase by cooperating with one another with the spirit of team-working.

5.0 DESIGN THINKING EVIDENCE

5a THE SAMPLE WORK



Figure 5.1: Interview in the Empathy stage



Figure 5.2: Discussion for Define and Ideate stages

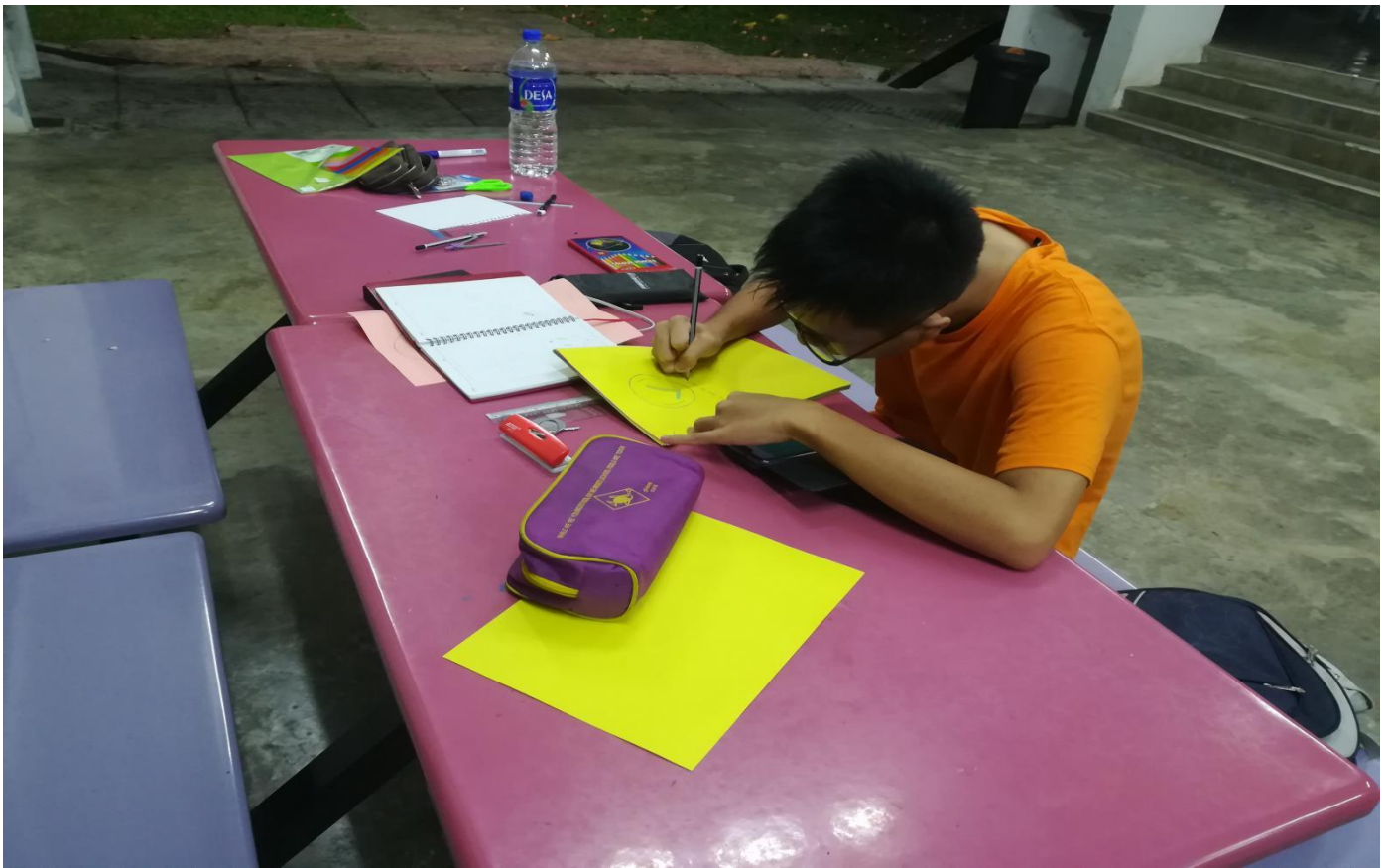


Figure 5.3: Prototype stage



Figure 5.4: Getting feedback from the respondent in the Test stage

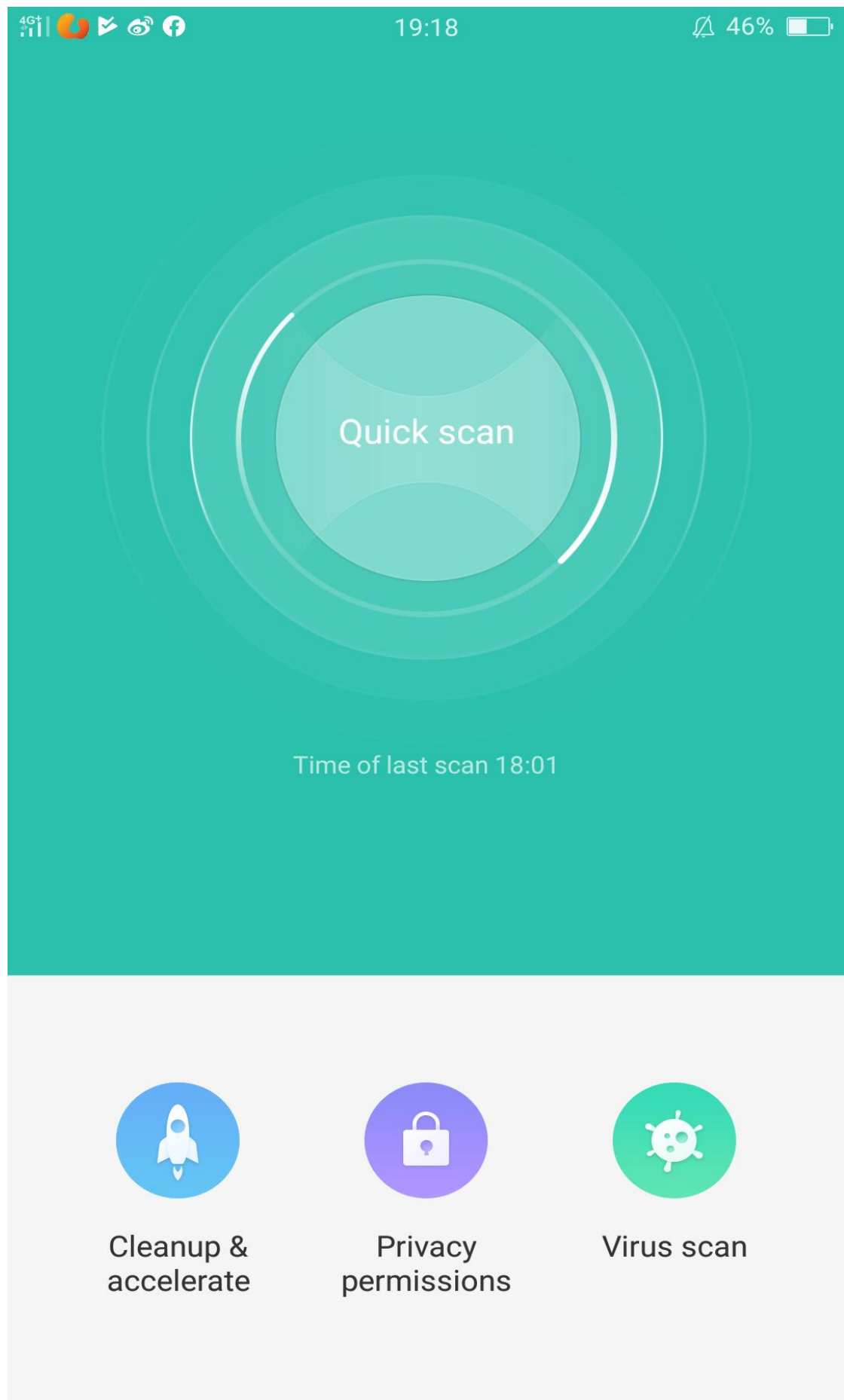


Figure 5.5: User interface of Security Centre



Figure 5.6: Logo & user interface of the modified antivirus application



Figure 5.7: User interface for message filtering and regular scanning



Figure 5.8: User interface for accelerate & cleanup and virus scan

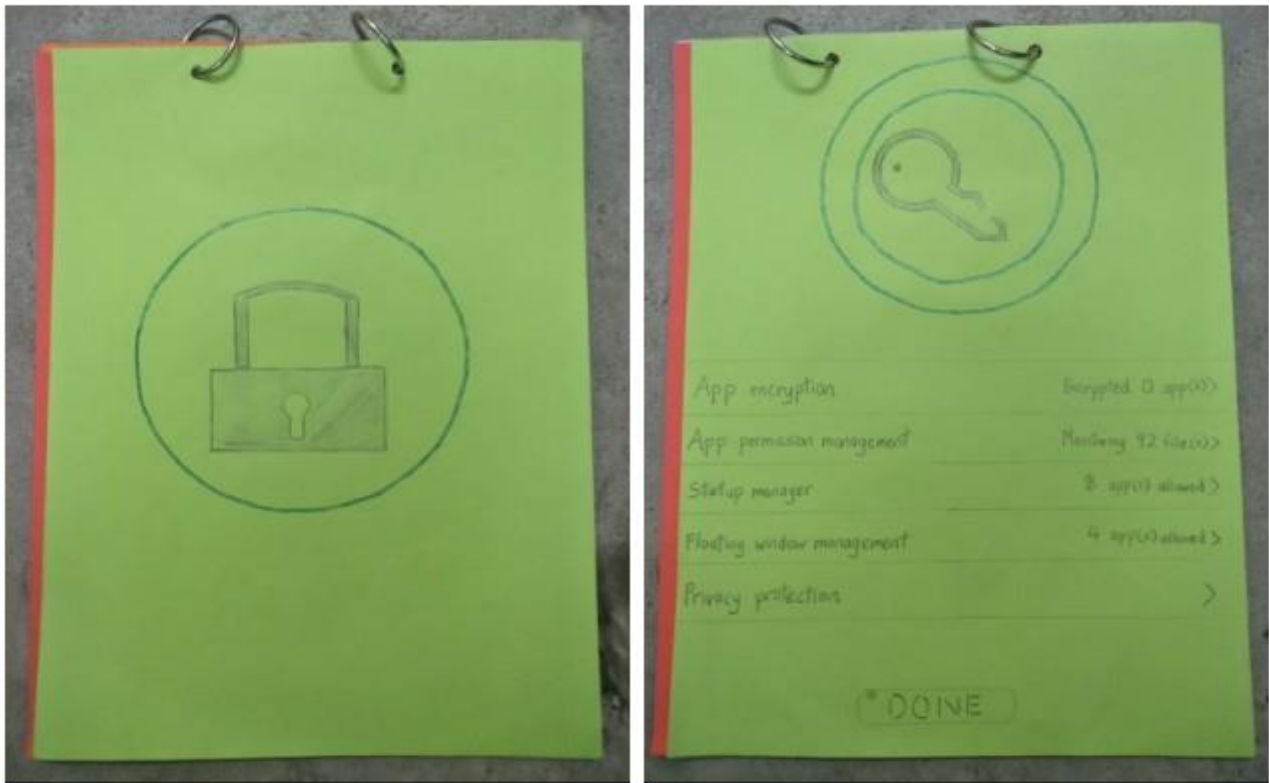


Figure 5.9: User interface for privacy permissions

5b RECORD FOR EACH PHASE

Empathy

The table below shows the questions and answers that obtained from the interview.

Table 5.1: Details for interview session

Questions	Answers
What is your name?	Aunty Cat
What is your age?	50 years old
What is your occupation?	Housewife
Are you an Android user?	Yes
What brand your smartphone is?	OPPO
How long you been as Android user?	7 to 8 years
What are the functions of the smartphone that you usually use?	I usually use social media such as Facebook and WhatsApp and also SMS.
Do you ever receive messages from unknown sources?	Yes, especially from WhatsApp and SMS.
What are the messages mainly about?	The message is mainly about the promotion of the products. But, after I press into the link, it is mainly about online gambling, pornography and swindled promotion.
Does this type of messages affect your daily use?	Yes, this type of messages is annoying and sometime also causes my phone to have problems such as lagging.
Do you install any antivirus applications in your smart phone?	Yes, it is called as Security Centre which is automatically available in OPPO smart phone.
Does the antivirus application have the function that help you to filter the messages?	Nope, that's why I always accidentally browse this type of unhealthy websites through the link in the messages.
How frequent you scan your phone?	I will only scan the phone once the phone got problems such as lagging.
Do you think it is a bother for you to scan the phone regularly such as once per day?	Yes, this is because I'm busy with my household chores and easy to forget to scan my phone regularly by manual.

Define

The table shows the problems faced by the respondent.

Table 5.2: Problems faced by respondent

Problems	Descriptions
Receiving the unknown messages frequently such as in WhatsApp, Facebook and SMS.	<ul style="list-style-type: none"> Lots of spams received by the users which is about fake promotion, online gambling website and pornography
Unable to maintain the regular scanning manually	<ul style="list-style-type: none"> Only perform scanning when her phone has technical problems such as lagging Hard to remember to run a quick scan over the phone due to the busyness of household chores.

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 a reminder application to remind her for regular scanning Suggest the respondent to ignore messages from unknown sources. 	<ul style="list-style-type: none"> Adding the extra features of regular scanning and message filtering into antivirus application existed in the phone. 	<ul style="list-style-type: none"> Develop a new antivirus application which mainly specified for regular scanning and message filtering

Prototype

In our discussion, we decided to use the solution from the intermediate category instead of either one of the other two categories based on the reasons listed in the table below.

Table 5.4: Prototype selection

Categories	Reasons
Rational	<ul style="list-style-type: none">● Providing a reminder application for our respondent might be the fastest way to solve the respondent's problem, but it probably will not be lasted for long time as the respondent might stop using reminder application due to annoyance of the reminder application.● Ignoring messages from unknown sources might can reduce the chance of browsing unwanted websites through link in the messages, but it cannot completely prevent the respondent from receiving messages from unknown source and being affected by those messages.
Radical	<ul style="list-style-type: none">● Creating a new antivirus application which specified for regular scanning and message filtering is completely impossible as we are lack of knowledge and experience in developing antivirus application.

Therefore, we decided to modify the antivirus application, "security centre" existed in our respondent's smart phone by adding extra functions of regular scanning and message filter. The design of the user interface of the antivirus application was based on the design of user interface of the "Security Centre" as shown in below.

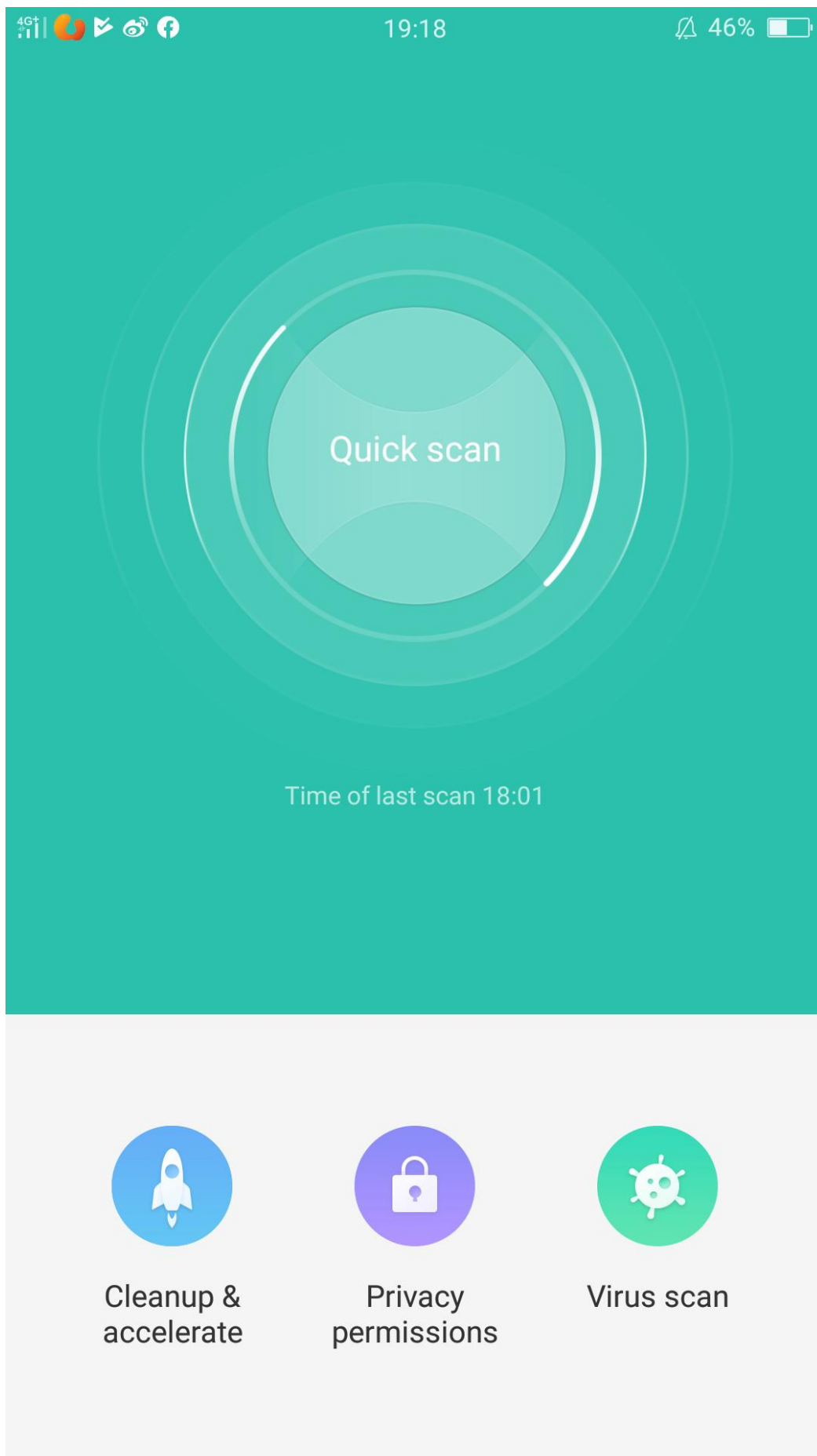


Figure 5.10: User interface of Security Centre

The table below shows the characteristics of the modified antivirus application.

Table 5.5: Features for modified antivirus application

	Characteristics	Description
EXISTING FUNCTIONS	Quick Scan	A button that help the user for memory cleanup, trash removal, update and backup and security protection.
	Cleanup & Accelerate	Function as full cleanup and file management.
	Virus Scan	Detect the existence of malicious software and malicious file.
	Privacy Permission	Perform as app encryption, app permission management.
EXTRA FUNCTIONS	Regular Scanning	Setup frequency of scanning the system automatically by the antivirus application.
	Message Filter	Scan and filter out unknown and risky messages from the social media applications selected by user and SMS.

Test

After we finished the prototype, we decided to demonstrate our product to Aunty Cat. We explained in detail about the benefits of the functions of message filtering and regular scanning to her. She gave us a positive feedback that this solution would benefit her and the old folks in maintaining the system security and performance of her mobile phone.

6.0 REFLECTION

- a) Our dream is to think out of box and listen to the words from the community to create the software that would make the quality of lifestyle improved. At the same time, it would not become the weapon for the unauthorized users to manipulate it to implement some illegal activities to benefit itself.
- b) From the prototype we created, we found that it is hard to build up a new software as there are a lot of existing software in the world that are performing well. So, we learned that as a software engineer, instead of trying to create a new software, we must also help in modify the existing software to reduce the resources used and able to help the community to solve their problem efficiently.
- c) For me, I would try to check out the trend of communities nowadays to find what they need from the application to perform their task. Therefore, critical thinking exercises must be more implemented in the daily lifestyle to ensure we would figure out the solution when we meet any resistance in daily life.

7.0 THE TASK FOR EACH MEMBER

Name		See Wen Xiang	Kong Hao Yang	Loo Zhi Xuen
Tasks	Interview, Discussion, Prototype and Test Sections	Interview (Empathy) &Test	Producing Prototype	
		Discussion for Define and Ideate Stages		
	Documentation and Presentation	Editing Videos	Slides Presentation	
	Report	Introduction	Detail Description for Each Phase	Detail Description About Problems, Solution and Team Working
			Assessment Point	
		Design Thinking Evidence		
		Merge and Compile the Report	Reflection	

Video link: <https://youtu.be/fHLqH62fZUQ>