CYBERSECURITY AWARENESS MOBILE APPS FOR SECONDARY SCHOOL STUDENTS: LETSECURE

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ABSTRACT: As our world is connected through information technology, home internet users, including school students, are threatened by cyber-attacks. It leads to an increase in cybersecurity issues and cases. This proves that cybersecurity is receiving insufficient awareness. The most worrying part is when the pandemic Covid-19 outbreak occurred, more people spent their time working from home using the internet and spending their time by browsing the internet. The concern is more to those who are not aware of how bad and dangerous cybersecurity threats could happen to them. The objective of this paper is to study the current problem and awareness on cybersecurity of secondary school students that focuses on form 4 and 5 students in Malaysia. As part of the results, LetSecure is developed, which is a mobile application that can help to spread awareness about cybersecurity and cybersecurity as a career. In order to develop this system, surveys and interviews have been conducted. The data for surveys that have been collected are from secondary school students and interviews with counselors of SMK Sungai Pusu. The methodology that is being used for this application is System Development Life Cycle (SDLC) and the Object Oriented. LetSecure is developed focusing on the beginners level, which are secondary students and also for people who do not have any basics on cybersecurity or advanced technology. As a conclusion, this application will give benefits to secondary school students in terms of increasing their awareness on cybersecurity and to choose cybersecurity as a career for their future.

KEY WORDS: *Cybersecurity, Cybersecurity Career, Secondary School, Students in Malaysia, Mobile Application, System Development Life Cycle (SDLC)*

1. INTRODUCTION

Cybersecurity is one of the most crucial topics these days as the use of the internet is increasing rapidly. The most worrying part is when this pandemic outbreak occurred, people spend more hours on the internet, either working from home or attending online classes. During this pandemic, research has been made and found out that the percentage of people involved or being attacked in cyber crime are increasing because of the frequent use of the internet. They also tend to share their private information on social media that can lead to so many possibilities of data breach to them. Hence, To overcome the problems mentioned and as to increase the awareness of cybersecurity among users, LetSecure is one of the mobile applications that can be helpful for the internet users to know more about

the security of their data and information, and also the types of malware attacks that they can face when using the internet. The mobile application also provides information on how to protect the data from being breached or stolen by the data theft that can lead to misusing it for other things. It also helps the school teachers as the teaching resources. In order to give exposure to the secondary school to choose cybersecurity as a career option, this mobile application would also help. LetSecure is developed using Android Studio Code, flutter, HTML5 and CSS with System Development Life Cycle as the methodology.

2. Literature Review

With the advancement of technology today, we can see and notice how people are too attached and spend a lot of their time on smartphones and other technologies. Cybercrime is becoming more prevalent by the day. According to Amanda Finch (2019), she mentioned that the largest cyber attack in 2020 has already happened. Cybercrime-as-a-Service (CAAS) is expected to become a major cyber attack pattern in 2020. Ransomware and phishing, state -run hackers were operating around the clock and making money, passwords were leaked, advanced malware attacks continued to spread and data was breached. For example, one of the most detrimental to the brand was that of Capital One whose server breach revealed personal details belonging to some 106 million bank customers and applicants in the United States and Canada.

According to The Star (2020), it stated that cyber security cases rose by 82.5% since implementation of MCO. It will become a bigger risk for the users and can lead to cyber attacks because most of the people in Malaysia, especially employees and students, have online meetings or video conferencing through platforms like zoom or google meet. This could contribute to the higher number of cybersecurity cases. In the middle of 2020, there is a case where a zoom application faces security issues and disclosure of user data to third parties.

Apart from that, the number of secondary school students who are the victims of cyberbullying keeps increasing day by day. According to recent statistics from U-Report Malaysia, 28% of 6953 young people in Malaysia respondents reported they have been victims of online bullying, with 43% of them experiencing it through online gaming, private messages, and social media. They are also likely to fall with cybersecurity threats. What is more worrying in society is their lack of awareness on cybersecurity. In addition, with the progression of technology today, these cases are becoming more and more serious, also worrying for the one who is the victim. According to a survey done by Statia (2015) cited in Muniandy and Zarina Samsudin (2017) stated that the highest number of daily Internet usage in Malaysia showed that 73% of people between the age 16 to 24 years old. Students are the higher Internet users because they are included among the ages and they will have the highest possibility for them to get exposed to cyber attacks. The findings from the literature shows a crucial need for giving awareness on cybersecurity to the secondary school students who are soon entering adulthood.

3. Methodology

3.1 System Development Life Cycle (SDLC)

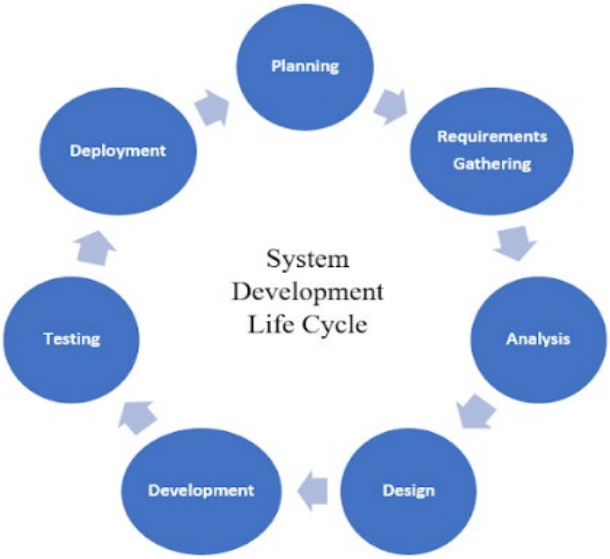


Fig. 1. System Development Life Cycle.

Figure 1. Shows the methodology that has been implemented to this system. SDLC has been implemented for this system and there are seven phases which are planning, requirement gathering, analysis, design, development, testing and deployment. SDLC is chosen because of the nature of flexibility that allows changes in the middle of the process. As shown in the figure, phases in the circle will be in the cycle where the phases can be done and go back to the phases when needed.

3.2 Implementation of the SDLC

Table 1. shows the description of all the phases in the SDLC and brief explanation on how the phases have been implemented in the proposed system.

Table 1: System Development Life Cycle

SDLC PHASE	SDLC DESCRIPTION	PROPOSED SYSTEM PHASE
Planning	Find out the problems and get ideas on the project. Determine also the targeted user.	- Determine the problem statement and target user for the system. - Summarise about the cybersecurity topics. - Doing research by reviewing the existing systems in Literature Review and comparing the functions and features that can implement and need to be improved.

Requirements gathering	Gather all the requirements and data for the project.	- Conducting a data collection with targeted users - Interview the counsellors of SMK Sungai Pusu and use questionnaire for survey to the students of SMK Sungai Pusu
Analysis	In this stage, analyse all the requirements that have been gathered to ensure the new system meets users expectations.	- Analyse the data collection and visualise it through charts and graphs. - Come out with the findings from the data collection. - Draw the system analysis design and diagram for the proposed system.
Design	This stage is where the developer has to come up with the system design.	- Design the system and its features. - Create the prototype based on the design that is being made.
Development	For this stage is where the actual system is being built.	- Built the system using mobile application development . - Make sure all the functionalities and features are being well developed.
Testing	To determine whether the proposed system meets the user requirements.	- Conducting the User Acceptance Test (UAT). - Fix the errors.
Deployment	Deliver the system to the user to use it.	- Evaluate the system by getting the feedback from the users.

4. DATA COLLECTION

4.1 Method

In order to fulfill the objective, the researchers has conducted the data collection which are interviewing the counselors of SMK Sg Pusu and conducting surveys with the students. The school had been closed according to the Pandemic Covid-19 Movement Control Order (MCO). Hence, the list of questions for surveys had been given to the students of SMK Sg Pusu through google form which contain open and closed-ended questions. The survey is being conducted in order to know the students' awareness and knowledge on cybersecurity. The respondents consist of students with the range of age from 15 to 17 years old.

The Interview sessions were conducted with two counselors from SMK Sg Pusu virtually via Zoom platform for about 30 minutes for each interviewee on 24 and 25 November 2020. In school, the counselors are the people who are responsible to give advice and guidance to the students on their future paths after finishing school. All the personal information of the interviewees were kept anonymous.

4.1.1 Interview Session

Table 2: Interview Session With Counselor 1

Questions	Answers
1) What is your opinion about the awareness of cybersecurity on the students?	At school we do have some programs with the students in order for them to know more about internet security and recently we also do a program about cyberbullying. In term of the student awareness, I can say based on counseling itself, we have several cases about cyberbullying where the students have faced cyberbullying through social media and maybe the awareness is there but I can't go too specific because we don't have any data about it but according to the counseling session we do with the students we can see that the students were aware about their safety in social media.
2) The programs that are organized by the school, did you invite a speaker from outside?	If a program is about giving talks to students in terms of technology, cybersecurity and so on we normally invite speakers from outside to give talks and advice to the students about it because we are not really experts about it. But in a small group of students there are also ICT teachers who give explanations about it in a class and if we form a big group of students usually we will invite speakers from outside who would be more expert about it.
3) How did you input some awareness or give suggestions to the students for example like students want to further their studies and have some interest to further their studies in the IT or cybersecurity field. So how did you talk to them to convince them?	Actually in SMK Sungai Pusu, but actually since form 1 the students have elective subject basic of science computer and then once they in form 4 and form 5 and there is one class offer elective subject of science computer. So through the lesson in class maybe they got some knowledge about the science computer and IT field. But for the counseling itself, if they come and talk to us about their future career, we will brief them a bit as well as we know. But for further explanation we will invite outside speakers to give more detailed explanations about the courses they want to further.
4) Did you use any application about cybersecurity that gives you more information about your internet security?	No, as myself I haven't used any of the applications or websites about cybersecurity and technology.
5) As a counselor and also a user of the proposed application, what did you concern and what did you want the application to have basically to help the students and teachers as the user?	Yes, if the application that can identify the cyberbullying, if someone intrudes our data something like that. As I have a session with the students, basically the students that are facing cyberbullying are among teenagers where they get bullied in terms of sharing inappropriate pictures on social media, hate comments and viral personal issues like that so maybe there's an app that can prevent that from happening to the students especially teenagers.

6) Did you face any cyber attack before this?	Cyber attacks that are too serious never happen to me but sometimes I've received some calls from private or anonymous numbers. All I do is I didn't answer the call and just ignored it.
7) If you were involved in a case like getting a phone call or messages from strangers how did you know what you should do next? Where did you get all the information about the cyber attacks?	Like if I got a call from a scammer, usually I just hang up the phone because psychologically I can know what the person talks and have something fishy about the conversation. I just use my feelings about it.
8) Where did you get information about cybersecurity at websites or other sources?	Yes, usually I got and read it from what people shared through group whatsapp and facebook.So I got it from there and most of it I read on facebook.

Table 3: Interview Session With Counselor 2

Questions	Answers
1) What is your opinion about the awareness of cybersecurity on the students?	The students' awareness on cybersecurity has been increasing since the Covid happened. One of the students messaged me to request a talk about cyberbullying. I think this student is experiencing it.
2) Are there any programs that are related to cybersecurity at school that are organized by the counselors?	There is no program that is organized by the counselors because we are focusing on the mental health and personality of the students. But, the teachers who teach the subject computer science held the programs or talks related to cybersecurity for the students.
3)In terms of career on cybersecurity, how did you manage to influence the student?	In my observation, students who take the subject computer science are more interested in this career because they are more exposed and tend to be in this field. Most of them choose this subject because they are interested in it.
4) Have the students asked the teacher for their opinion to continue their studies/ their career in the IT field?	Yes, the students come and ask us which university offers the IT course if they want to pursue this field. They are also concerned about what subject they need to improve in order to pursue their studies in that field.
5) Have you tried any application in mobile phone or any websites related with cybersecurity?	Personally I never tried any application related to cybersecurity.

6) Where did you get information such as cyber attacks around you?	Usually I get information from readings on current issues such as the money lost in the bank. And any news in social media.
7) Did you face any cyber attack before this?	I have an experience where I got a link from Celcom that told me that I won an Iphone. I tried to click the link for several attempts. Then I feel some suspicion and then I ignore it.
8) Where did you get information to prevent this cyber attack?	Usually, advertisements on television that give awareness to the people such as getting a call from court. We need to double confirm whether the call is valid or not.
9) Do you have any preferable features or functionalities that you want in the new application?	In my opinion, not everyone understands the term and has awareness. An educated person must understand the term but not everyone understands it. My suggestion would be more effective if there is a video,short acting, advertisement that is related to cybersecurity so that everyone can understand the message on it.

Based on the interview with the two counselors of SMK Sg Pusu, the researcher concluded that the students and the teachers are still not aware of what cybersecurity is about. They know the situation based on the news but they do not know the right terms on cybersecurity and how to prevent from being one of the victims. It shows that they are not being exposed widely in cybersecurity.

4.1.2 Questionnaire

From the results of the survey, the researchers managed to get 100 respondents.

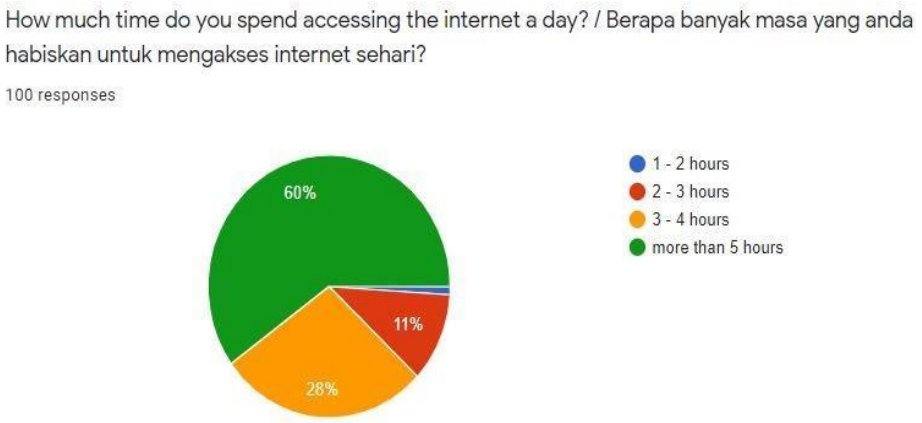


Fig. 2. Time spending on Internet

Most of the respondents spend more than 5 hours accessing and browsing the internet a day. The possibility for the students to be involved or being one of the cyber crime victims is also higher.

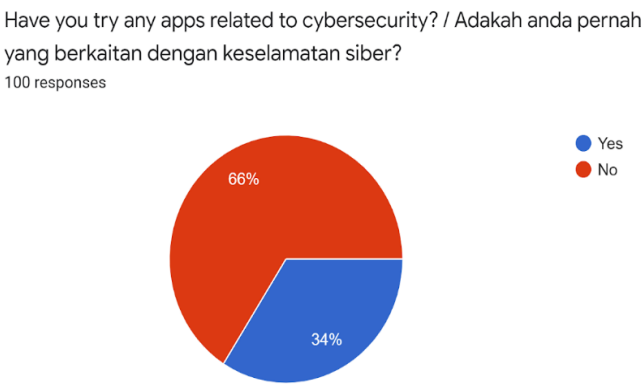


Fig. 3. Apps Related Cybersecurity

There are 66 respondents that have not tried any application that is related to cybersecurity. Only 34 respondents have tried the application.

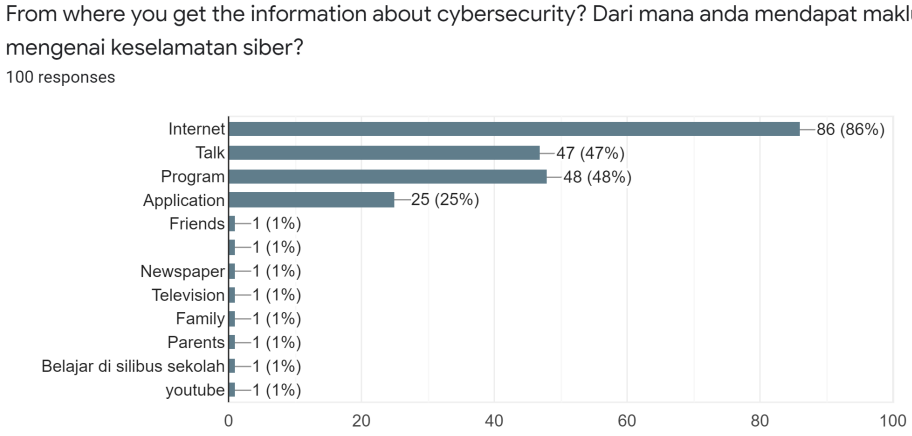


Fig. 4. Source of information about cybersecurity

The largest count of respondents who get information about cybersecurity is through the internet. Followed by a program and talk event at school. It shows that the students also refer to the internet to know about cybersecurity information.

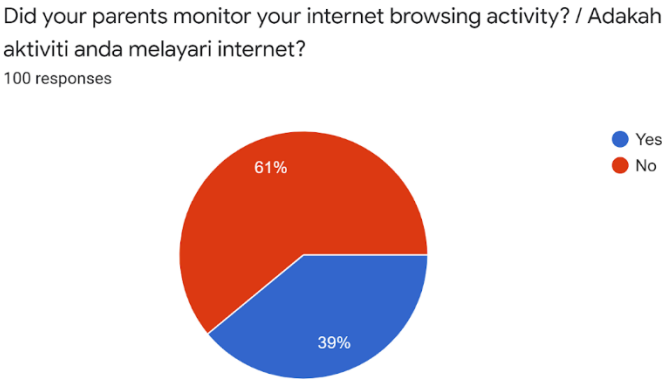


Figure 5. Parents Monitoring their Child

From the survey, only 39 parents monitor their children's browsing activity and most of the parents did not monitor their children's browsing activity.

5. RESULTS

5.1 Analysis and Design

5.1.1 Use Case Diagram

From the data that have been obtained, they are analyzed by using object oriented analysis. Figure 6 shows the use case diagram for the system and the actor that will participate for each of the use cases.

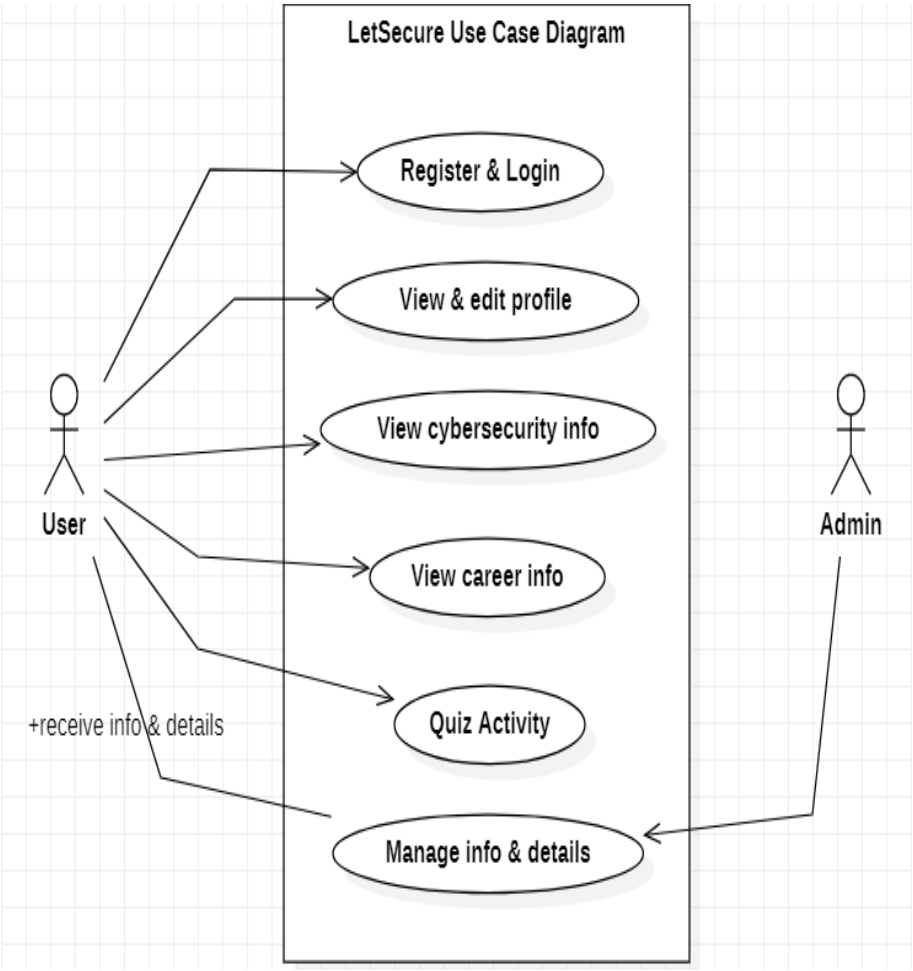


Figure 6. Use Case Diagram

5.1.2 Class Diagram

Figure 7 shows the class diagram for the system

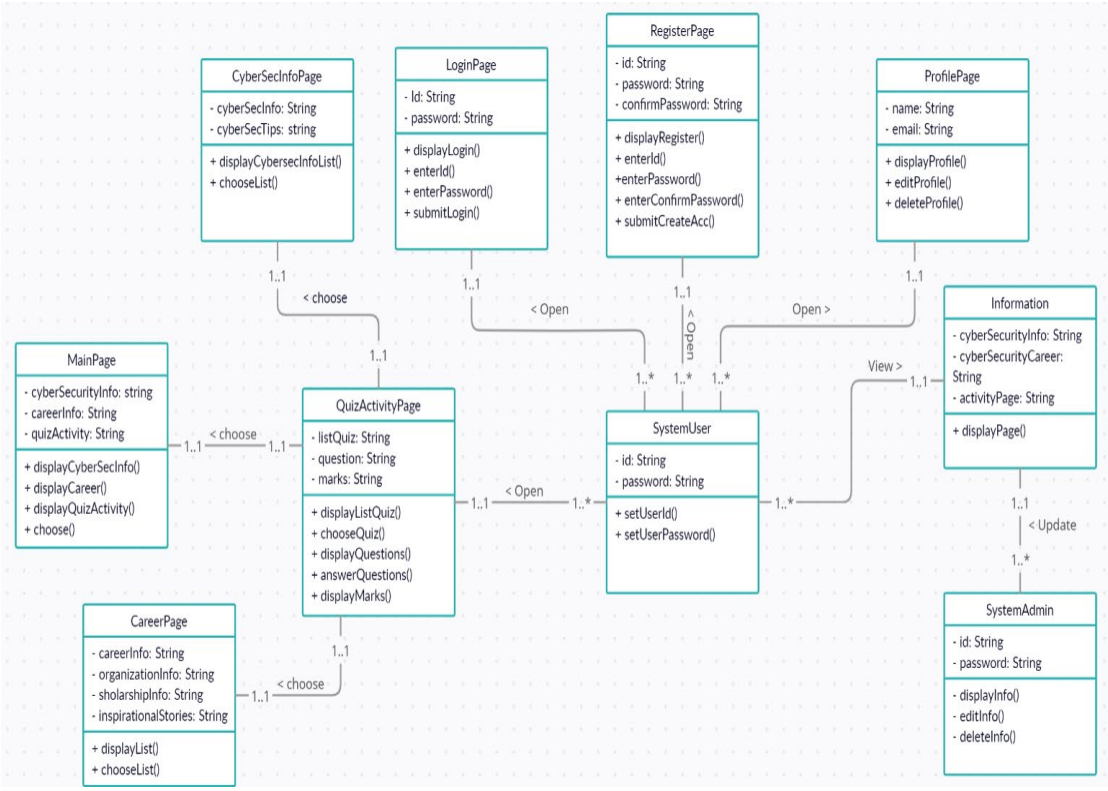


Fig. 7. Class Diagram

5.2 System Development

For the development of the system, flutter has been implemented as the framework, firebase as authentication and firestore to store the database. Other than that, android studio also is used for writing the codes and to develop the application. Figure 8 is the statechart diagram for the system, screenshots of the main features for the LetSecure application and a brief description of the system.

5.2.1 Statechart Diagram

Figure 8 shows the statechart diagram for the system. It shows the flow of the user once they login to the system until logout state.

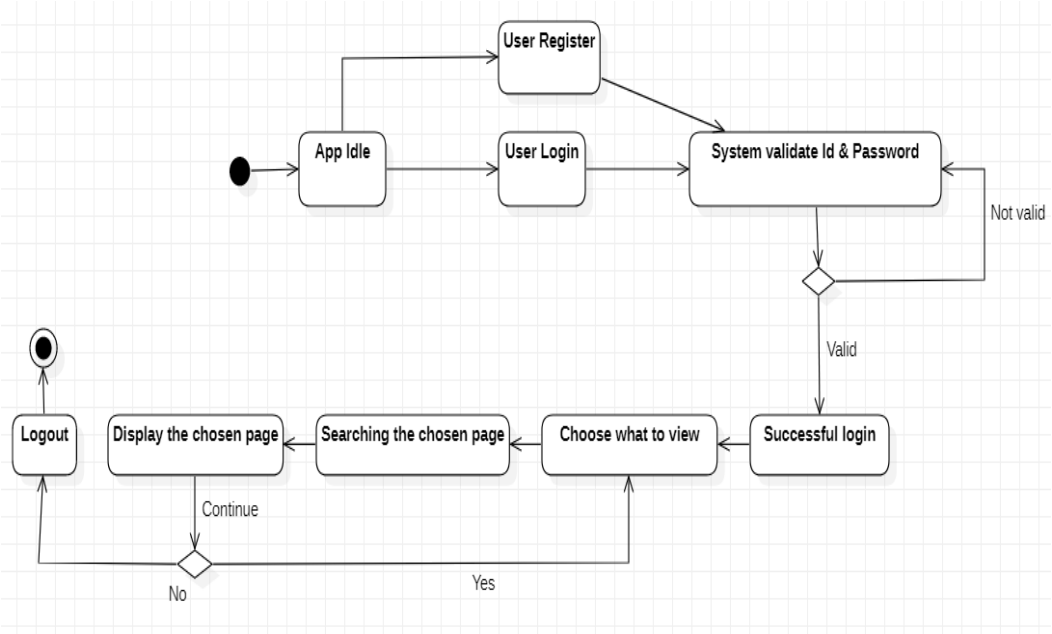
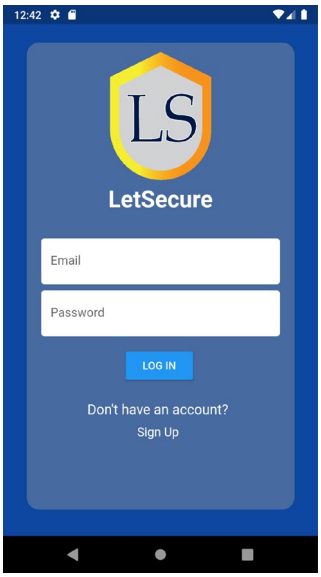


Fig. 8. Statechart Diagram

5.2.2 User Interface Design

Table 4 shows the screenshots of the applications of the features and functions that are in the LetSecure Application and a brief description of the features.

Table 4: Screenshots of LetSecure

Screenshots of the Systems	Descriptions
 Fig. 9. Login	The login page requires the user to login before they can enter the applications and needs to have an account in order to enter the email and password that have been created in the signup page.

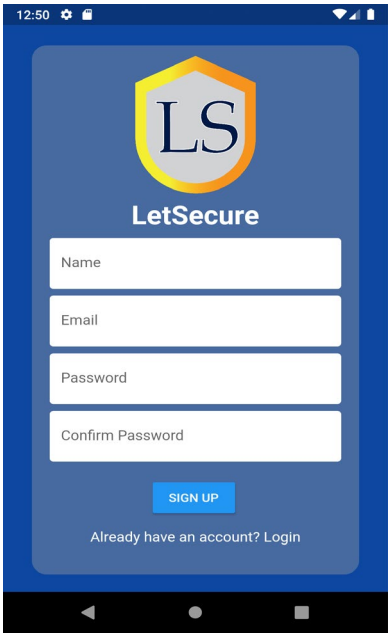


Fig. 10. SignUp

For the signUp page, users need to register first and by creating an account for the application. Based on the email and password that have been registered, users will use it when they want to login to the application.

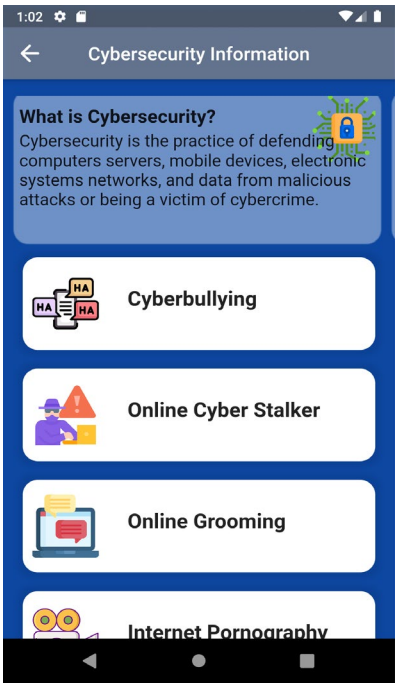


Fig. 11. Cybersecurity Info

Cybersecurity information is one of the main features of the apps where it provides options of cases or cyber-attacks related to cybersecurity for users to choose. In this page also, have options for users to know cybersecurity organizations in Malaysia. Users can learn more about cybersecurity information on this page.

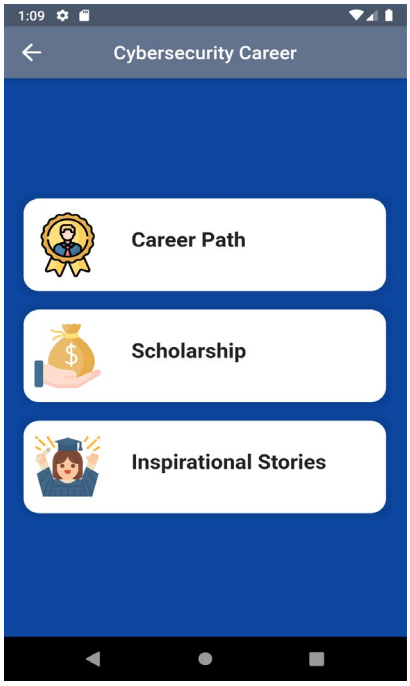


Fig. 12. Career Info

For this page, we are focusing on career information. This is where all the information to pursue a career in IT or cybersecurity related fields will be provided. Other than that, we also include scholarships opportunities for the user to apply, especially the students and inspirational stories from people who have been in the cybersecurity related field. The stories will give some encouragement especially for the students to know more about cybersecurity.

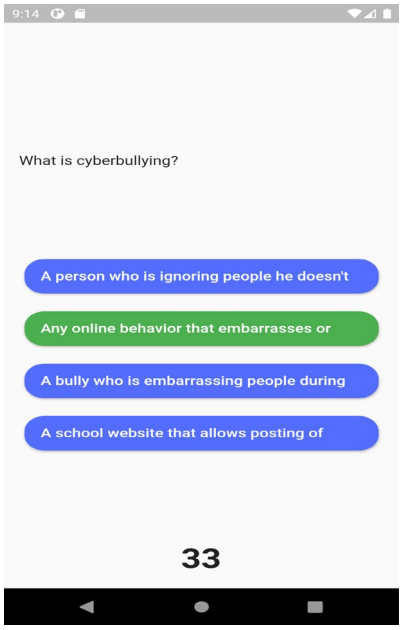


Fig. 13. Quiz Activity

For the quiz and activity page, the users can answer all the questions provided on the page and they can know how well they know about cybersecurity by testing their knowledge doing the activities.

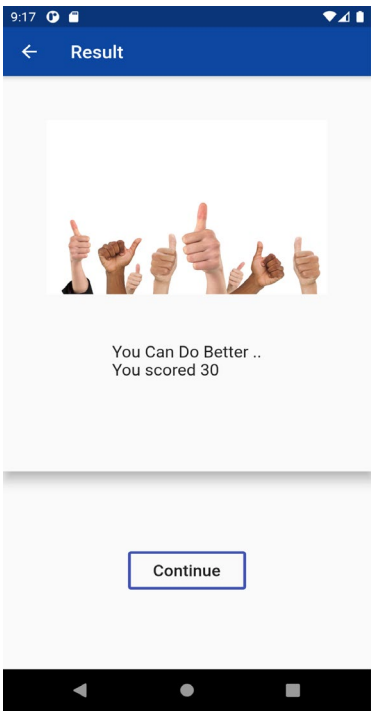


Fig. 14. Result Page

This is a result page for the quiz activity part. Users can know what their results are after finishing answering the questions. Users can know how much their scores are for each of the quiz activities that they do.

5.3 Significance Works

The number of cybersecurity cases is increasing from time to time especially during the current situation which is changes in lifestyle of the people where they spend more time using the internet and gadgets. With the development of this application would be one of the ways to increase the awareness on cybersecurity especially among the students and also teachers. It hopes that the idea of developing this application will decrease the number of cybersecurity cases among students. This application helps them to easily access information that are related with cybersecurity information on social media such as the types of threats, the organizations of cybersecurity in Malaysia and the career on cybersecurity. There is also an interesting feature to evaluate users' understanding and to test their level of knowledge by playing quizzes. There is a list of questions about cybersecurity and the user needs to answer correctly.

5. CONCLUSION REMARKS

In conclusion, the advancement of technology today perhaps makes everyone overlook cyber threats . The internet is now becoming a daily necessity but the usage must be controlled. More applications are needed to spread the awareness of cybersecurity to society. All parties need to cooperate in disseminating the awareness to the young generations. To prevent any undesirable events such as deepfake, cyberbullying, sexual harassment in social media and many more. The secondary school students are more

exposed to be one of the victims of cyber threats. This mobile application is currently completed as the high fidelity prototype and targeted to be commercialized.

ACKNOWLEDGEMENT

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