

Children On-screen Activity Monitoring Application

By

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A REPORT

SUBMITTED TO

Universiti Tunku Abdul Rahman

in partial fulfillment of the requirements

for the degree of

BACHELOR OF COMPUTER SCIENCE (HONOURS)

Faculty of Information and Communication Technology
(Kampar Campus)

June 2022

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SUBMISSION OF FINAL YEAR PROJECT /DISSERTATION/THESIS

It is hereby certified that Lam Chi Xiang (ID No: 19ACB00484) has completed this final year project/ dissertation/ thesis* entitled “Children On-Screen Activity Monitoring Application” under the supervision of Ts Dr Goh Hock Guan (Supervisor) from the Department of Computer and Communication Technology, Faculty/Institute* of Information and Communication Technology, and Ts Lai Siew Cheng (Co-Supervisor)* from the Department of Computer Science, Faculty/Institute* of Information and Communication Technology.

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I declare that this report entitled “~~TITLE~~ **Children On-screen Activity Monitoring Application**” is my own work except as cited in the references. The report has not been accepted for any degree and is not being submitted concurrently in candidature for any degree or other award.



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Date : 6/9/2022

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude and thanks to my supervisor, Dr Goh Hock Guan who has given me this bright opportunity to engage in a monitoring device on-screen project. Besides, he also provides some useful guidance on how to deal with the Final Year Project's report. Without the help of my supervisor, this project will be totally being a disaster for me.

A very big thank you also to my friends who always stand at my side during the hard times and give me support throughout the course. Without their support, it will be a tough time for me to complete the projects and they are also willing to share their knowledge from time to time when I faced problems.

Lastly and not forgotten, a million thanks to my parents and my family for their love, care, support and continuous encouragement throughout the course which inspired me to complete the study.

ABSTRACT

This project will be going to develop an interactive web application known as Children On-screen Activity Monitoring Application. Just like the name of the project, this is a parental monitoring application where it is specially designed to help parent to monitor their children on-screen activity during the online class in targeted devices. Since parenting children is not an easy job, hence the implementation of this system would provide a lot of conveniences to parent while saving time and cost instead of always keep an eye on their children.

The limitation of this system is it only will start monitoring Children On-Screen Activity when they are attending their online class in the virtual platform such as Zoom and it will automatically stop monitoring after the children finish their class. Hence, the main purpose of this system is to help parent to monitor their children on-screen behavior during their online classes and the system also will protect the privacy of children once they finished their class. This is due to monitoring children's activity for whole day could lead to children no longer believe on their parents and this will eventually affect the relationship between children and parents.

Agile development approach will be used throughout the development of this project to deliver a quality system within time and budget. The reason for choosing this methodology because it is an iterative approach which able to minimize the risk associated with the development of the application.

The target user of this system is child who will require to attend online classes during the Covid-19 pandemic. Database will also be implemented for the system to store the information of user and the information that extracted from the on-screen monitoring process and additional features such as keylogger and mouse tracker will be an advantage for this system to further keep track of children behaviour during the online class.

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CHAPTER 1

PROJECT BACKGROUND

In this chapter, background and motivation of our research will be presented including our contributions to the field, and the outline of the thesis. It also will explain about the current issues faced and the way to solve it in a common description.

1.1 Problem Statement and Motivation

The World Health Organization (WHO) has been announced the coronavirus disease known as Covid-19 as a global pandemic on March 11, 2020, because of its alarming level of spread throughout the world [1]. The danger and the seriousness of the pandemic caused the school around the world to make the difficult decision to close their doors and the sudden closure of the school for such a long period of time will affect students' future development because they will fall further behind from the syllabus as the time goes on. It is one of the fastest spreading diseases worldwide which has impacted more than 210 countries. The reason behind this is many people that already infected with Covid-19 only have very mild symptoms hence majority of them do not isolate themselves which led to the spreading of the disease. The first case of Covid-19 happened in Wuhan, China in December 2019 and at the end of 2020, there were already about 80 million cases of coronavirus worldwide. On 2 January 2021, the total of confirmed Covid-19 cases already surpassed 270 million and over 5.3 million deaths [2], an increase of 337% since 2020. It can spread so fast due to the tiny virus droplet that is expelled by the person that was already infected when they were in close contact with others like when talking, breathing, etc. [3]. Furthermore, the transmission of Covid-19 also can happen by indirect contact with the things that were previously used by the infected person. Besides, now there also exist 5 new variants of concern which are Alpha, Beta, Gamma, Delta and Omicron diseases.

The impact brings by the Covid-19 disease on the economic, social is devastating and in term of educational, it also resulted in the shutdown of schools across the world

including in Malaysia during the lockdown period. As a result, in order to solve the learning problem, it just shifts the way education is conducted from physical to distance learning at home which proved disruptive for parents, students and teachers at the beginning [4]. In order to accomplish the goal of distance learning at home, many online platforms such as Microsoft Teams, Zoom, Google classroom, etc. are letting teachers and students access to their services to provide them with a stable virtual classroom and this unconsciously leads to the rise of the online learning. Due to the development of vaccines for people to combat the coronavirus disease, the reported Covid-19 cases and deaths worldwide had declined significantly, but this is still not a suitable time yet to lower the guard. Hence, many schools still choose to conduct the class via online mode or in hybrid mode. This is one of the prevention strategies to keep students safe and protect their health from the outbreak of Covid-19.

Through online classes, students are also able to learn and gained knowledge just like in face-to-face classes. The effectiveness of online classes is just the same as the physical class especially for those students that have high self-discipline and the important role of online classes during the global pandemic is to ensure the continuity of education for all students. The replacement of traditional learning with online learning is absolutely the best choice to maintain the learning of children during the global pandemic in order to protect students' health risks and to slow down the spread of Covid-19. This will be the best platform for students and teacher to achieve a better balance of work and studies. To take advantage of online learning, children have more control over their learning especially for those children that prefer a quiet study environment. They able to explore to wide variety of learning method and learn on their own path. Even so, despite the all advantages of online classes, this method still raises some concerns among the parents because they clearly know and understand the downside for their children to applying e-learning for such a long period of time without the inspection of any parties. According to the previous research on the historical learning trends on how school-time affects learning, it is estimated that students would roughly fall 70% of the learning gains in reading during the pandemic of Covid-19 [5]. Besides, it is also found that online classes have their other downsides.

One of the biggest problems of online learning is not every student have high self-discipline to be paid highly concentrate during online classes, especially the school-aged child. This is especially true when the children do not get the proper guidance.

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Online class will require a child to be independent, have a good time-management skill and be discipline. However, majority of children tend to switch their screens to do other stuff such as listen to music, play games, watch movies, etc. during online classes due to inadequate self-regulation. This is the one of the biggest challenges of E-learning because children unable to stay focus on the computer screen for such a long period, they will be easily distracted by other sites although the teacher try his best to keep his class interactive. Unconsciously, children will have difficulty keeping up their progress in their studies and resulting in a bad grade during the examination. Hence, during this period, it is very important for parents to help their children to always stay focussed during online classes. Unconsciously, this will have required parents to spend more time keeping track of their children's learning progress in developing the building blocks of learning compared to the traditional learning way to prepare their children for success in the future. In this kind of situation, parents will need to be engaged themselves more in their children's development to motivate their children to learn in the online class. However, this will be a very tough situation for some parents who are busy with their own job and simultaneously still need to assist in their own children learning progress side by side during the online classes. This is almost an impossible action for parents who are working as full-time workers even as a part-time worker. Besides, by performing such action, it will also be troublesome for either children or parents because children will feel uncomfortable when supervised by their parents' side by side while for parents, they still have their own stuff to deal with and this is time-consuming for them. Thus, it is clearly seen that this will be a totally bad idea in the long-term run.

Hence, the crisis in this situation requires some innovative solutions in order to reduce the burden and the time of parents to monitor their children learning progress by reducing the involvement of parent in their children's education journey. One of the solutions to be proposed is to help parents to ensure their children stay on track with their online classes is by developing an automatic on-screen monitoring application. The main purpose is to help parents to monitor their children's activities automatically and let children have better concentration during the online classes. This type of application can also be known as parental control software which carries out the functionality of getting all the latest information recording their on-screen behaviour from the targeted device during the online class of children

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The motivation of the proposed system is to help the parent to keep their children's education is always on track in a more convenient way by constantly monitoring their on-screen behaviour during online classes.

1.2 Project Objectives

The thesis aim is to propose an enhanced version of the parental monitoring application for monitoring children's activities during online classes by creating an effective and convenient system which is known as the Children On-Screen Monitoring application. The proposed system will be able to reduce the involvement of parents to keep track in their children's education progress during the online class. The detail of the project aim is as follow:

1. To develop an on-screen monitoring application that is easy to operate with a more systematic workflow and reducing the manual works of parent to increase effectiveness

The proposed system is designed to be easy to use to increase its efficiency and effectiveness for the user. With the simplicity of the application, users can easily master the skill to fully utilize the monitoring application by login into the system and with just a few clicks by using the very famous design principle 3 clicks rule. Only with a few clicks, the monitoring application will be able to carry out its monitoring task or any other tasks that available. The system is designed to be easily set up, so it is suitable for all kinds of people, especially those people that are unfamiliar with the latest trend of technology. The proposed system will be user-friendly to the user because the system design will be neat and tidy, and all the navigation panels will be consistent and responsive by applying the kiss rule. This will be an application that able to satisfies user wants and needs.

2. To analyze the various potentials of on-screen monitoring module for studying children on-screen behavior during the online class

In the proposed system, a real-time quick report with a screenshot of children's activity will be generated and sent to their parents' smartphones once their children switch their screens to do other activities such as watching YouTube during the online class. Besides, with the mouse tracker functionality, parents can ensure their children are fully paying attention in front of the computer because the report will be sent to their parent's smartphone if children did not move their mouse within 10 minutes and few beep sounds will also produce by the targeted device to indicate the children move their mouse. Moreover, the keylogger functionality will also behave the same. It will send a record of all the keystrokes typed by the children and send it to parents after the online class ended. Furthermore, parents are also able to get details of their children's on-screen behavior history through the web application by retrieving all the history from the database. All the reports will be sent to parents' smartphones via social media applications such as Telegram and email.

3. To evaluate the productivity of the children on-screen activity monitoring application

The monitoring system also allowed users to run multiple functionalities of the Children On-screen Activity Monitoring application simultaneously. For example, users can choose to run the main monitoring functionality or run the sub-functionalities such as mouser tracker and key-logger functions at the same time. Hence, with various functionalities run at the same time, the monitoring process of children will also become more efficient and convenient for parents. All the history of children's behaviors during the online classes will be archived in the database letting the user be able to retrieve back the information whenever they want instead of just receiving a quick report from the application itself. Retrieval of the data from the database can be done faster because all the data in the database will be well organized to improve its performance.

1.3 Project Scopes

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This project is to develop a parental monitoring system from scratch and this system is only limited to the use of students. The basic hardware to develop the system can be either use a laptop or desktop with basic specification and the software that required is listed below.

- Visual Studio Code
- Python 3.10.2 (64-bit)
- Django

Visual Studio Code is being chosen as the integrated development environment (IDE) instead of other types of IDE that are available in the market to develop the application because it is not just lightweight but also very powerful. Visual Studio Code supports multiple different types of programming languages that up to hundreds of programming languages like C++, C#, Python, etc. which it makes the life of a programmer easier since it is also free and open source. Furthermore, Visual Studio Code also allow user to install extension to add more functionalities and additional services. By using this IDE, developer able to develop and debug a program easily. Next, Python 3.10 (64-bit) will be another important software that is required to develop the children's on-screen monitor application. This is because the monitoring system will be mainly built using the Python programming language in Visual Studio Code and a Python interpreter package is a must to work in the IDE in order to run the Python monitoring script. In addition, Python is easy to learn, and use compared to other language, and it also has a highly supportive community behind as the time goes on.

There exist a lot of frameworks available in the current market and in this project, Django will be chosen as the main development Python web framework for the system in order to build a secure and reliable website. This is due to Django being suitable for both the development of frontend and backend web applications and this feature makes it reduces the hassle of web development for developers. Furthermore, Django is written in Python which will the most suitable web framework to build the web application. The Django web application groups the code into URLs, View, Models and Templates where make the web application interactive and responsive to the users and every part of the architecture is independent of each other's. In short, in the frontend,

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Django helps in formatting and display while in the backend Django helps in processing user requests and making responses. The structure of the Django web application is shown as follow:

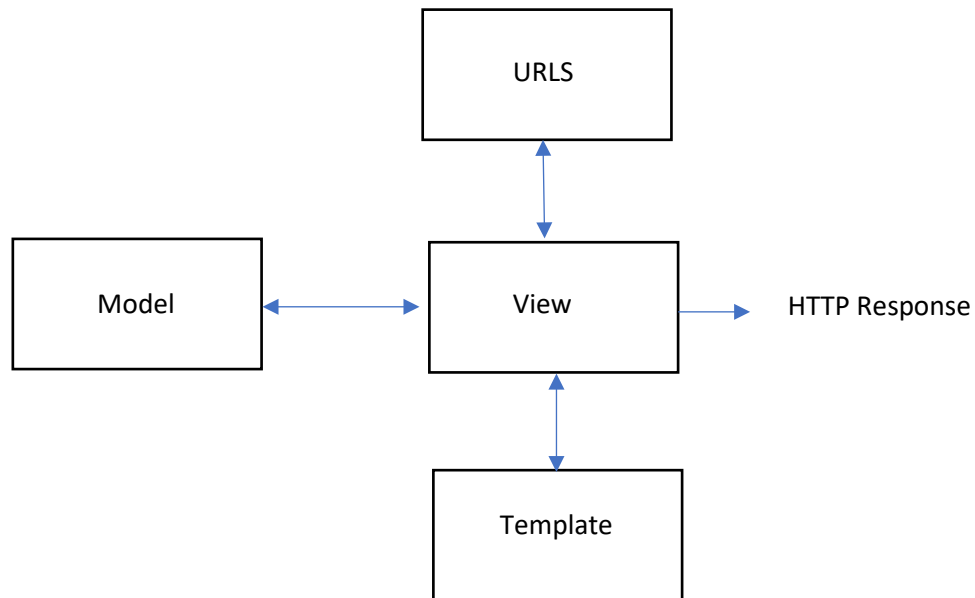


Figure 1.3. 1 Overview of the structure of the Django

Besides, with the use of Django, few programming languages will be used to develop the web application to carry out the monitoring task. The programming languages are listed below:

- Python
- HTML
- CSS
- JavaScript
- SQL

As mentioned before, the development of the project is mainly used the Python programming language because it is one of the fastest and most productive programming languages worldwide with a very systematic structure. Development of GUI, application and web system can be easy to be done by using Python since it is

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easy to use and learn compared to other programming languages. Furthermore, there exist many frameworks and libraries for the Python language which makes life easier. Hypertext Markup Language (HTML) is a language that must be used on a webpage because it let the browser knows the structure of the webpage. Besides HTML, Cascading Style Sheet (CSS) is almost a must to make the webpage look more attractive and pleasing to the users because CSS is used to format the display of the webpage by adding styling to it. In addition, Bootstrap as one of the open-source CSS frameworks will be used for the development of the project because it will be easier to customize the webpage. Moreover, in order to make the website able to function well and interactive with the user, JavaScript will be used in order to accomplish the goal since HTML and CSS are only able to do styling on the webpage but not interactive. In short, JavaScript able to create dynamic webpage instead of static. Last but not least, in order for the Children On-Screen Activity Monitoring web system to store all the monitoring information, Structured Query Language (SQL) will be used to manage the relational databases and carry out some tasks on it. Without SQL, it will be impossible for users to store and retrieve all the important information from the system.

There are also some proposed modules in the proposed system and the details are shown as follows:

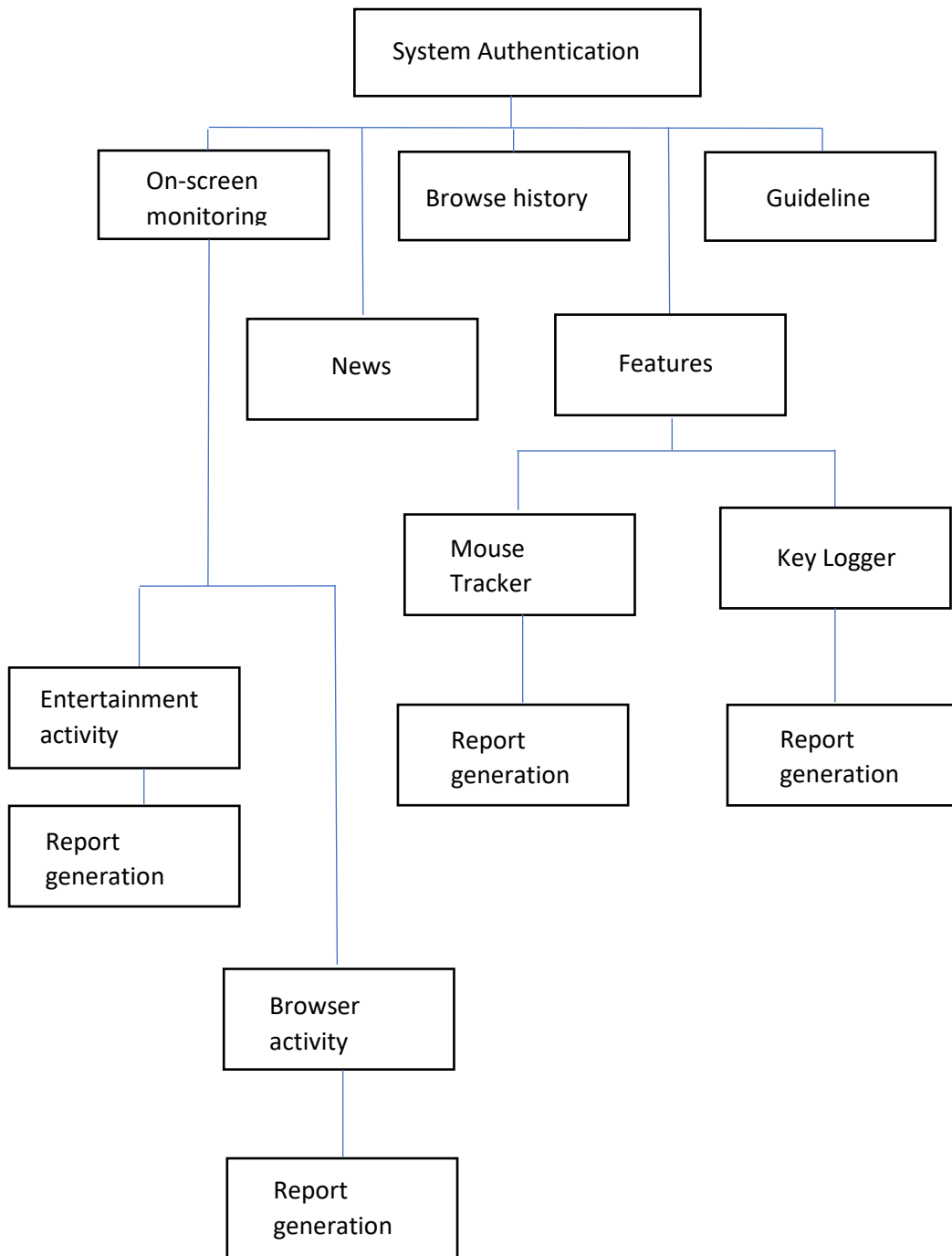


Figure 1.3.2: Overview of the proposed system

1. System Authentication

In this module, users such as parents need to register their own accounts if they are new users. After creating the account, they will be eligible to log in to the

system with their username and password. Every time users want to log into the system, it will require users to key in their username and password to prevent their child to log in to the system and close the on-screen monitoring module.

2. On-screen Monitoring

This is the module that carry out the main functionality of the system. By using one account, user able to monitor multiple on-screen activity of their children. After user click on of the start monitoring button, the application will carry out its task and start to automatic monitor the child's on-screen activity only during the online classes. The system will send message to parents if detected suspicious activity on targeted device.

3. Browser Activity

This is a module to detect whether the child is browsing the internet during the online class. The browser activity can be watching YouTube on the browser.

4. Entertainment Activity

This is a module to detect whether the child is carrying out some entertainment activity during the online class. The entertainment activity can be play game, watch movie etc.

5. News

The news module is a module that plays a role for the user to view the current Covid-19 cumulative confirmed cases. The cases can be shown in various formats, chart, map and table. Besides, in this module, users are also able to view and read the latest Covid-19 cases that are being provided.

6. Mouse Tracker

This is a module that can detect the mouse movement of the targeted device. It will generate a quick time report to the parent and produce a few beeps sounds if the child does not interact with the targeted device for a while.

7. Key Logger

Keylogger module is a module where it has the functionality to record the child device's keystrokes during the online class. All the recorded keystrokes data will be saved into a text file and send to parents after the end of online class.

8. Report Generation

The system will generate a real time report to inform the users via some social media platforms for when their children tend to switch their screen to do other activities such as entertainment activities and browser activities in the devices during the online classes. Different types of report can be generated like show the website link that visited by their children or even some screenshots of their activities in the devices.

9. Browse history

Besides receiving reports from the system, users also able to browse back all the history of their child on-screen activity if existed in the application itself. Hence, this eliminated the extra work for the users to look back for the history of their child on-screen activity from all reports that being generated previously.

10. Guideline

The guideline modules will provide the users' information on how to carry out the main functionality and sub-functionalities of the Children On-Screen Activity Monitoring application.

1.4 Main Contributions from the Project

The main contribution from the project is to help parents to keep their children's education is always on track by constantly monitoring their on-screen behavior during the online classes automatically without the need of supervise their children side by side. No one wants to stay behind the technology, hence by using the power technology,

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an innovation such as parental monitoring application able to help parent to be one step ahead on what their children are doing during the online classes, either they are stay focusing or just playing around.

This is significant important because not every parent can always keep an eye on their children either stay focused or not during the e-learning period. The attraction of the entertainment application such as video game will scatter children attention. Hence, instead of just paying attention to the teacher in the virtual classroom, they will tend to switch their screen to do other stuffs like playing video games. Once, they are addicted to it, it will be very hard for children to get rid from the video game and they will just play video game every time during the online classroom because it will just become a common practice for them to do so.

This absolutely is a bad situation because children's education is so important because the aim of education is to help children to build a solid foundation before they enter society and get success in the rest of their life. This is especially true for the children early childhood education because this will be the best time for them to develop their self-interest and during this time of period, their brains are growing and learning at a fast rate. This is also one of the ways to break the cycle of poverty in their life. Otherwise, majority of them will need to be suffered a lot in their life due to poor education in their early age. Thus, it is clearly seen that parental monitoring software is very beneficial to parent in reducing their burden to keep track on their children on-screen activity and beneficial for children development since they are the future of our country.

Furthermore, there exist some monitoring applications in the market that required a lot of work to setup the monitoring system. Majority of them need the installation of the monitoring application on both devices which are the parental device and child device. However, in the proposed system, the installation only required in the child's devices, and this absolutely will save the setup time and the installation storage.

The proposed monitoring system compared to the existing monitoring applications will be more flexible especially for users because the generated report will be sent to their

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social media platform which means they can always receive their children latest on-screen behavior. It is also a more convenient way for them since social media platform is a must for everyone in this era as they do not need to download another application in order to receive all the notifications.

Furthermore, after users have done the monitoring process, they can always view back all the history of their children's on-screen activity during the online classes such as the time when they switch their screen from the virtual classroom such as Microsoft Team, Zoom, etc. to do other things. In addition, with the mouse tracker function, parents can ensure their children pay full attention during class because the targeted system will produce few beeps sounds if the child does not interact with their computer. Thus, this can ensure children are always sitting in front of the computer to listen to the class. The keylogger functionality also give a big advantage for this monitoring compared to the existing monitoring applications. This function can ensure parents to keep track of the keywords entered by their child on the targeted device during the online class and sends the data to parents.

The most important characteristic of this monitoring system is all its functionalities will only be launched if it detects the existence of E-learning platforms such as Microsoft Teams, Zoom, Google Meet, Skype, etc.

1.5 Organization of the Report

The thesis was being organized into 7 different chapters. The outline was as follow:

- Chapter 1 Introduction
This chapter will be providing the setup for the whole report, it will summarize the understanding and some context about the topic. Information such as introduction, problem statement, motivation and contributions will have included in this section.
- Chapter 2 Literature Review
This chapter will provide the reader a more detailed understanding about the topic and build a solid foundation on it. Review about some existing systems and make some comparison of the system with the proposed system.
- Chapter 3 System Methodology
This chapter will describe clearly, how the modules can interact with each other. Top-down system designs diagrams will be included to provide all the necessary information such as the structure of the system. The functionalities of the system, the flow of the process, etc.
- Chapter 4 System Design
This chapter will be report about the preliminary works of the monitoring system and the related results obtained according to the works done
- Chapter 5 System Implementation
This chapter will be discussed about how the application will be set up, ensuring the application works well and meets the standard

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- Chapter 6 System Evaluation and Discussion

This chapter will be measured about the performance of the system by performing variety of testing to determine what achieve from the system itself

- Chapter 7 Conclusion and Recommendation

This chapter will be summing up all the important points including the problem, motivation and proposed solution from the thesis and the future enhancement that could be done for the monitoring system.

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Literature Reviews.

The purpose to conduct literature reviews is to identify the existing research that has been done to gain a better understanding of the area of study before carrying out a new research [6]. Hence, some similar parental monitoring systems that has been exist in the market will be reviewed to identify the strengths and weaknesses of the systems. In this literature review, some screen monitoring software will be selected to be reviewed.

2.1 Review of the Technologies

2.1.1 Hardware Platform

The definition of hardware platform is the combination of different set of hardware such as main memory, processor etc. to let the software applications to run. The list of the hardware platforms will be desktop, laptop, and smartphone.

A desktop computer is a personal computer that is specially designed to fit on a desk. The biggest advantage of a desktop computer will be it is very easy to customize and upgradable from time to time. Hence, as long as the hardware comes stronger, the overall performance of the desktop computer will become better. The disadvantage of a desktop computer will be it need access to power supply if the computer turns on. Besides, since a desktop computer designed to fit on a desk it will not easy to move around the computer.

Unlike traditional desktop computer, a laptop is a small personal computer to carry out daily tasks with a screen and keyboard. Compared to desktop computer, the main advantage of a laptop will be its mobility. Since it is lightweight and compact in size,

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these characteristics make it able to move around instead fixed on a position. Furthermore, the built-in battery in a laptop also make it able to carry out a task without need the existence of power supply and this also can prevent the accidently shutting down of the system. The disadvantage of a laptop will be difficulty in customization since it is already compact in size and majority of laptop has its own design and construction. Besides, the screen size of a laptop is also considerably small compared to a desktop computer.

A smartphone is a type of cell phone that includes the advanced functionality beside the basic functionality like phone calls and text messaging. The advantages of a smartphone will be it makes the communication between people become easier. On addition, smartphone also comes with a lot of useful apps that enable the user to do almost everything on a smartphone. However, since smartphone is small in size, its processing power also lesser compared to a computer.

In this project, laptop will be chosen to design the Children On-screen Monitoring application.

2.1.2 Firmware/ OS

Microsoft's Windows also known as Windows is an operating system (OS) developed by Microsoft is one of the most widely used computer OS globally. This is due to majority of people grew up by using Windows OS on their PCs and many available software available work on the Windows. The other cons of Windows will be it is very easy to use since every tasks can be carry out using Windows. However, the cons of Windows will be it required users to spend more resources like a faster processor in their computer hardware in order to achieve the best performance. Furthermore, compared to other operating systems, Windows has a poorer security, hence it is also more susceptible to virus.

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Since 2001, MacOS operating system has been designed and marketed by the American computer company, Apple Inc. MacOS is a very powerful and unique operating system (OS) because it is an OS specially designed to powers every Mac device only. It is very powerful because MacOS outcompete other operating systems exist in the market nowadays since it is more effective and efficient in term of computing operations. However, since MacOS only supports Mac devices and these kind of devices usually are very expensive.

Just like other operating systems, Linux is also an operating system founded by Finnish software engineer and the Free Software Foundation (FSF). Linux is also a very special OS because it can run either inside Windows or without Windows. On addition, Linux only consumes very little resources in order to carry out a task. Furthermore, since Linux is an open source operating system, there will always be a community support for troubleshooting. However, Linux is not that user friendly especially for beginner and certain hardware will not work with Linux too.

In the development of Children On-screen Monitoring application, Windows is chosen as the operating system since it is more widely used in the world and it is more convenient to be used.

2.1.3 Database

SQLite can be considering as a small and lightweight embedded SQL database engine since it is an in-process library that able to provide the functionality of a relational database management system. Unlike most other databases exist in the market, SQLite is serverless which indicate it does not a separate server in order to carry out its process. Besides, SQLite is also self-contained which means it does not need external dependencies and this feature also make it support cross-platform devices. It is also zero-configuration because it does not require any configuration file which means no administration is needed. In short, the noticeable features of SQLite will be serverless,

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self-contained and zero-configuration. However, SQLite has its own limitations like it only capable to handle low to medium HTTP traffic and the database size also restricted.

Oracle Database 12c is one of the high performance enterprise class database and it is also the first database that designed for the cloud [7]. The database itself is strong and powerful enough because it just provides almost all the functionalities that a client wants compared to other type of database. In addition, it also provides a great security standard to protect all the confidential information of a client and every transaction happened in the database itself is very responsive and quick. However, since Oracle 12c contains a lot of interesting features, it also makes it difficult to learn and apply it

MySQL is a relational database management system that is based on the structured query language (SQL) to organize all the data into one. The main advantages of MySQL will be it is freely available due to it is one of the most renowned open source database management system. In addition, it also is a cross-platform database server that able to support different type of languages. The limitation of MySQL database will be it unable to handle the transactions effectively and the data that store in the database sometimes will be corrupt.

In the development of the project, SQLite is chosen as the database to store, access, maintain and update all the data.

2.1.4 Programming Language (Python, C++, Java)

Python is a high level programming language that very suitable to use in Rapid Application Development. It is just a fastest growing and most popular in the world nowadays since it is easy to learn and develop. Moreover, Python provides almost all of the libraries to support the development of an application such as web development, game development, machine learning etc. Compared to other programming languages,

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Python can build an application faster with lesser code. The downside of Python will be the memory consumption is very high and it will not be the suitable choice when involve with some memory intensive tasks. Besides, since Python is an interpreted language, it also seems slower than other programming languages exists in the market.

C++ is a programming language also known as a middle-level language that able to run on a variety of different operating system platforms. C++ programming language is very powerful and fast because they are pre-compiled and does not need any special requirement when running the program. In addition, C++ also allow programmer to freely allocate the memory since there is no garbage collection. However, since there is no garbage collection, it also results in redundant data is being stored. Furthermore, C++ is also a language that very strict in the correctness of its syntax, hence any mistake in the syntax will resulting a series of errors.

Java is an object-oriented multipurpose programming language that uses Java Virtual Machine (JVM) to run the java programs. A very popular language widely used by people nowadays because it can be used to develop a wide range of different type of applications. When talk about speed and optimization, Java will be the best language to do so due to the existence of JVM. Besides, Java also uses a multi-threaded environment, hence every tasks can be handle quickly. However, due to Java programs run on JVM, it also means that it will consume more memory. In addition, Java uses intensive resource in order to run its program like it will need a higher processing and memory requirements.

Among all of the programming language, Python will be chosen as one of the programming language to develop the back-end of the web application.

2.1.5 Summary of the Technologies Review

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After reviewing all the available technologies from different aspects, for the hardware platform, a laptop will be the one chosen to develop the Children On-Screen Monitoring web application. The reason behind this is a laptop will be convenient to develop the system since it is able to move around and the web application also does not require high computing power of a computer to develop it from sketch. Second, for the operating system of a computer, Microsoft's Window will be chosen as the one to develop the monitoring web application instead of other available monitoring systems in the market since most people use the Windows operating system to carry out their daily tasks. Next, for the database, SQLite is chosen as the database in the web application to perform the CRUD operations because this is the default configuration database in a Django web framework. Last but not least, Python programming language which is a type of programming language that is suitable to use in Rapid Application Development will be selected to code the system from sketch since it has the characteristic to develop a functional application with lesser code compared to other programming languages.

2.2 Review of the Existing Systems/ Applications

2.2.1 Existing System A- Kickidler

Kickidler is an on-screen monitoring software established by the Tele Link Soft company in 2013 where its initial purpose is for an employer to monitor the live screen of his/ her employees in order to increase the productivity of an organization. According to Kickidler, it is very important to monitor the progress of an employee because studies have shown that almost 30% of staff time is spent on doing other kinds of stuff instead of carrying out their assigned duties.

Now, Kickidler also introduces a surveillance software that is specially designed for educational purposes to supervise the activity of a child on a computer screen during distance learning. By doing so, it is able to simulate the learning process of children in the online class. The monitoring system of Kickidler not only can record the on-screen

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activity of a child in real-time, but it also comes with a video recording as well. However, this option is only available if it is a premium version but not available in a free version. Furthermore, the application is also able to gather information on the amount of time a child spends on other applications and generate an interactive report card for the parent.

The other features of the Kickidler software will be taking a screenshot of the targeted device's screen, displaying the current activities of the children during the online class and also recording the key pressed by the children. Besides, it also allows the parents to take control of their children's computers by blocking them from using their mouse and keyboard. Kickidler application also allows parents to simultaneously monitor their children's on-screen activities at once as well as connected to different servers and this will be a significant feature for the parent that has more than one child.

Compared to the installation steps of the other similar monitoring softwares exist in the market, the installation of the Kickidler software will be slightly more complicated. 3 major steps must be followed in order to let the software fully function. The first step is to install a server in the targeted device for data storage, the second step will be to install a grabber application to get all the on-screen's information from the targeted device and the last step will be install the viewer application in the parent's device for the viewing purpose. In each of the major step, there still have some configurations that need to be done and all the detailed of the installation guidelines has been properly provided on the Kickidler website.

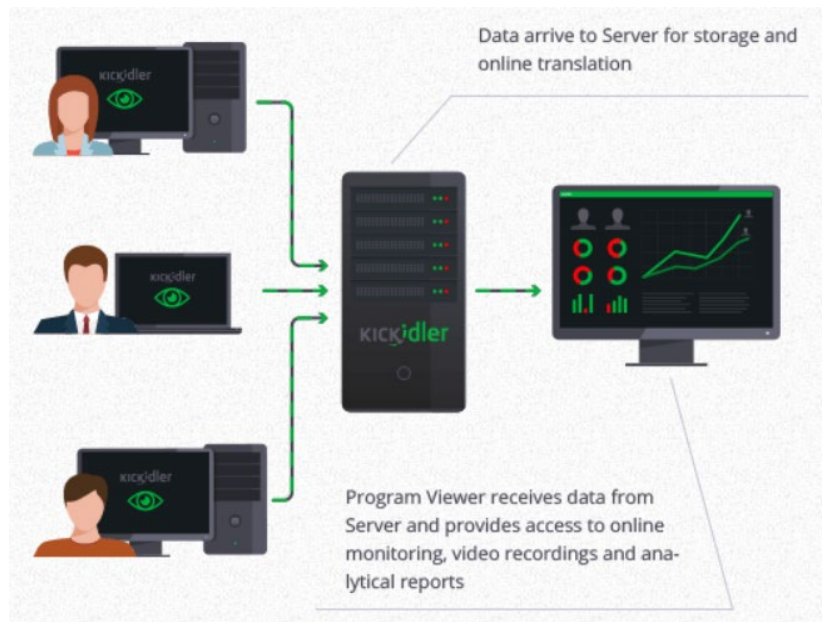


Figure 2.2.1.1: Process flow of Kickidler system [8]

From the above figure, after the grabber applications are installed on each of the computers, it will be able to collect all the on-screen activities of children and send them to the server site. The server will receive and store all the information. Then, the viewer application will retrieve all the information from the server site and display the related information to the users.

2.2.2 Existing System B- KidLogger

Kidlogger is an application that was developed by SafeJKA S.R.L company and started to contribute to the Surveillance Economy since 2001. It is a parental application that used by parents to keep track and collect their children activities. The mission statement of the application is to a create an application that is innovative and to provide a freely available cross-platform parental control software to every parent.

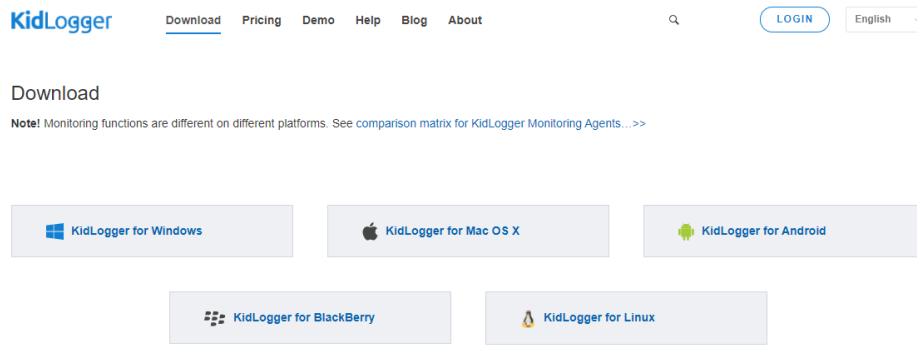


Figure 2.2.2.1: Screenshot of the Download Site for KidLogger

Even though the mission statement of Kidlogger is to provide freely available software to all parents but it still comes with 3 different types of versions which are basic, standard and professional. The standard and the premium version will require subscription fees while the basic version will be freely available to all. Although it comes in 3 different versions but they did not have many differences in terms of functionalities and the only differences are just the amount of devices that can be monitored, the duration to keep the log history and also the size of the disk space that is being provided. Hence, users can always choose to download which version based on their needs and actually the basic version is already good enough for an ordinary family to use. Figure below shows the 3 different types of version of Kidlogger with their available features.

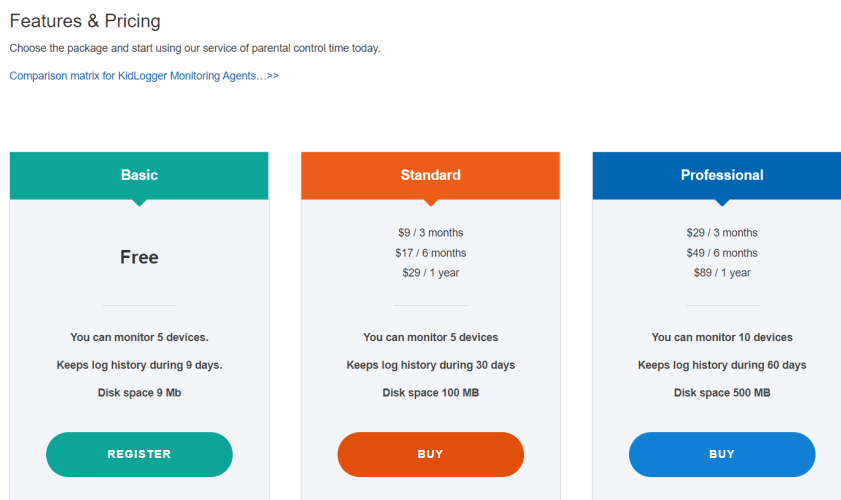


Figure 2.2.2 2 Screenshot of the version types for KidLogger

The Kidlogger application comes with a variety of powerful functionalities to monitor kids in cyberspace. The most fundamental functionality in this application will be time tracking, a feature to know how much time does a child spent on a targeted device and also the screenshot feature to capture the targeted device screen from time to time. The other strong features will be the web history monitoring, the keystrokes recording and also the messengers monitoring. The web history monitoring feature works with a variety type of different browsers such as Chrome, Opera, Safari, etc. to monitor the children's daily internet usage with their visited websites log. The key logger feature is a feature that is available in this application to record all the keystrokes and texts that have been types by the children on the targeted device. For the messenger monitoring, it is a feature that is specially designed to monitor chats and messengers log on to the targeted device when the children are chatting using the social media platforms.

In short, when a child uses the registered device, the KidLogger system will be generating a one log record when the victim does some activities such as switching the screen on the device and the log record includes the details like the starting time and the duration used after switching the screen. Besides, due to the global pandemic Coronavirus, KidLogger also improved its existing features on 3 March 2021 where in its latest version of the application, the child will be required to make some movement on the computer like moving the mouse for every 10 minutes during the online classes [9]. This is to ensure the child is always paying attention on the class but not falling asleep or doing other kinds of stuff.

In order to get started in the application, user will require to have an online KidLogger account. Then, in the targeted computer or smartphone, user need to install the KidLogger application and connect it with the account that being registered before by entering the email or the device ID. After the connection succeed and click on the start monitoring button, user will be able to get started to monitor the targeted device using the KidLogger.net dashboard online via the browser.

Dashboard

Account type: Professional until Apr 12, 2012 ([prolong](#))
30 devices. 30 days & 500 MB per device

Device name (Device ID)	First I
1 Nokia phone hwj-6G	Feb 3, :
2 Android tablet 4NL-lw	Feb 3, :
3 MacBook ysx-kr	Feb 1, :
4 LyudaWin7 vLL-dj-	Nov 1, :

Figure 2.2.2.3: Monitoring Registered Devices using KidLogger.net Dashboard Online

2.2.3 Existing System C- FamiSafe

FamiSafe is also a remote PC monitoring application that is able to get details of computer activity which was founded in 2018 by the Wondershare company. Just like the majority of existing parental monitoring applications in the market, the initial purpose of FamiSafe is to help parents to monitor their child's online activity 24/7 in order to provide them protection in the cyber world. This is very important since the internet is readily available to young fingertips on any gadgets. For FamiSafe application, it also supports multiple platforms making it can either run on a computer or a smartphone. However, unlike KidLogger, it does not come in a free version but required a user to subscribe to the application plan after 3 days of trial [10]. Figure below shows the plans that are provided by FamiSafe which are the monthly plan, annual plan and quarterly plan.

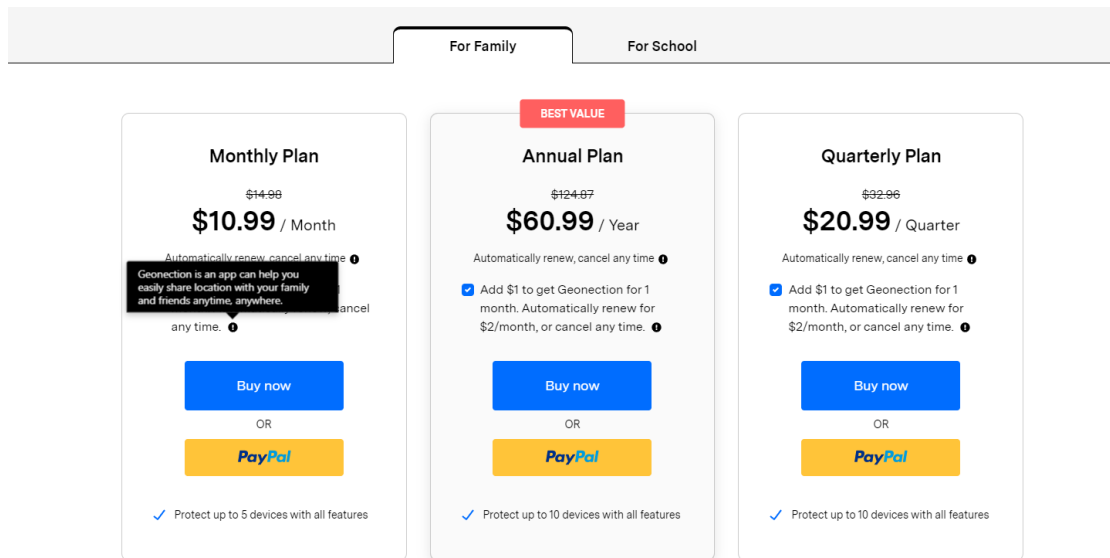


Figure 2.2.3.1: Screenshot of various plan of FamiSafe application

In the FamiSafe application, there also exist some important features in order to help the parenting job become easier. Similar to the KidLogger application, one of the features will be the activity report. A log record will be generated by the FamiSafe system when the child tends to carry out other activities such as watching movie, playing games, etc. and the user can always review all the on-screen activities on his device. The second important feature will be the smart time schedule where this feature will track the detail of a child's screen time on certain applications and allow parents to remotely block their children's digital device. For the FamiSafe application, it is not just an application to monitor children during their online class, but it is also specially designed to protect children's safety, hence it also contains some features like location tracking for parents to grasp their children's real-time location at any time. This feature is to ensure the children do not go to some strange or unsafe places.

Three major steps are required to set up the FamiSafe to monitor a child computer's activity. The first major step is a user required to install the application on his device and also in the child's device, then register for a FamiSafe account. After that, a pairing code will appear and the user will need to connect their child's device by pairing the code that has been provided. The last step is the user can set rules that are being provided by FamiSafe to control his child daily computer's activity in the FamiSafe

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dashboard application. Figures below show the download sites for parental and child devices.

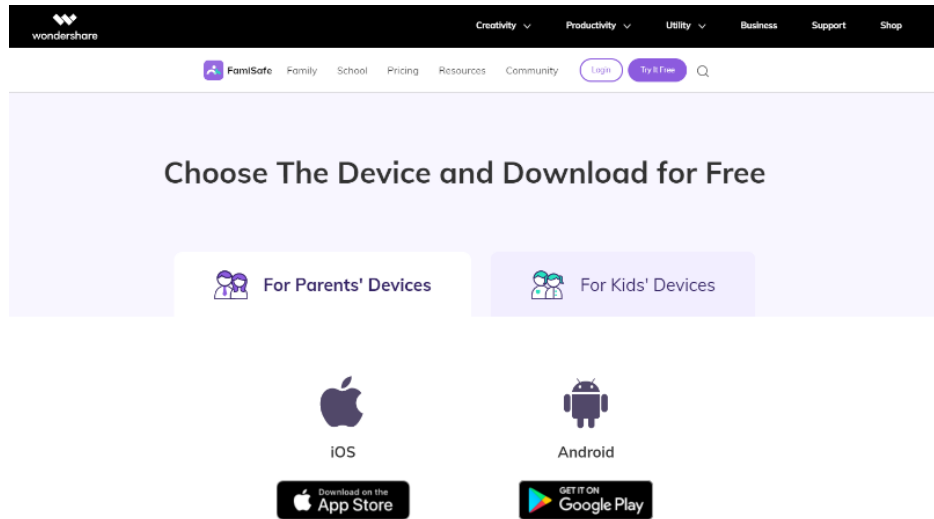


Figure 2.2.3.2: Screenshot of the Download Site for Parents' Devices

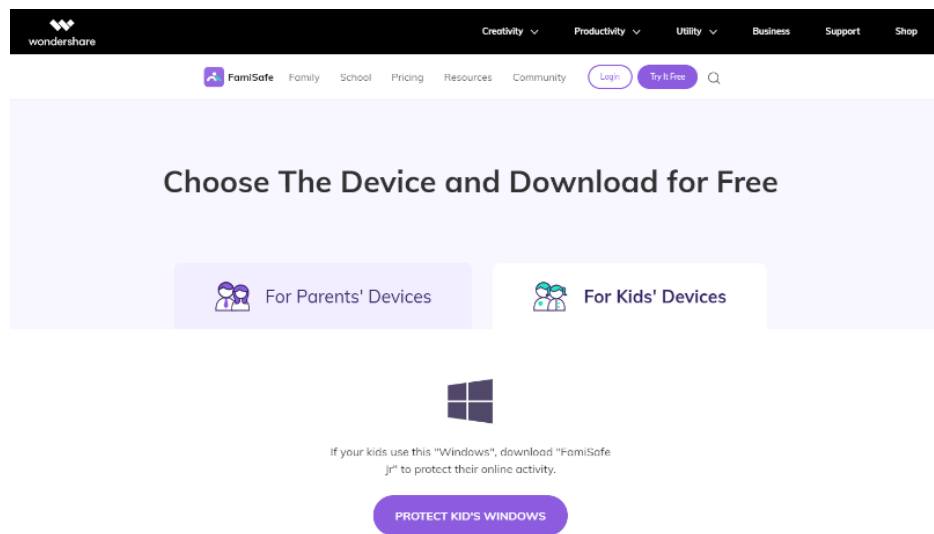


Figure 2.2.3.3 Screenshot of the Download Site for Kids' Devices

2.2.4 Existing System D- Qustodio

Last but not least, the last reviewed system will be the Qustodio which was founded by Eduardo Cruz, Josep Gaspar and Josh Gabel in 2012 and they still led the company until today. Their objective to found Qustodio is to provide an online safety and digital wellbeing service to parents because they know the importance to keep children's safety in the cyber world since they are parents too. The Qustodio application comes in free version and premium version and there still exist a lot of differences between these two types of versions. The most distinct part will be the free version of Qustodio can only protect a single device while the premium version of Qustodio can protect more devices at the same time according to the pricing and it also provides at least more 8 features like location tracking, application controls 30-day activity report, etc. compare to the free version. Figure below shows the site to purchase a premium version of Qustodio.

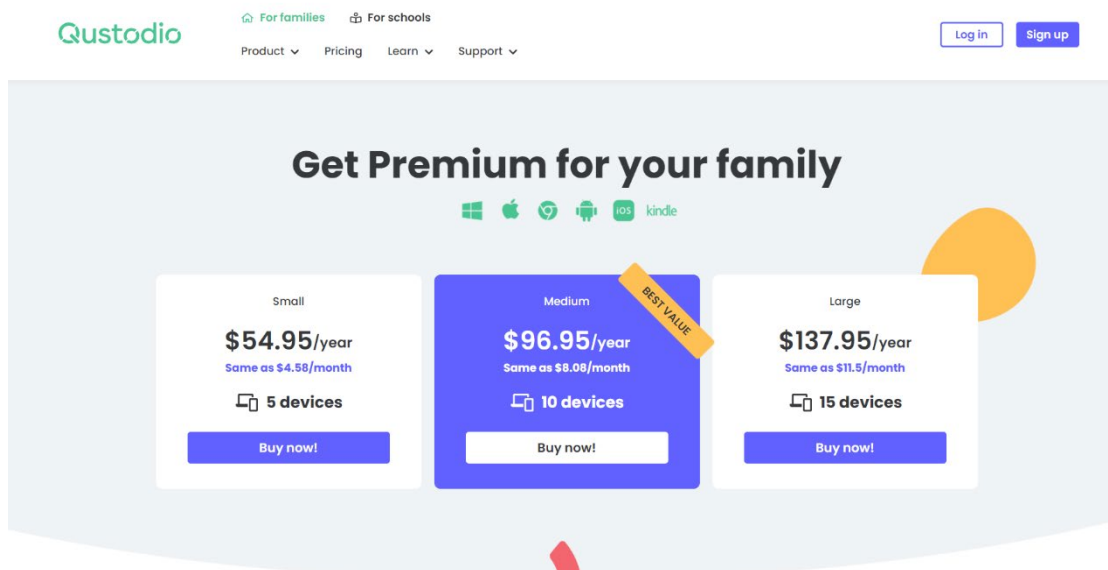


Figure 2.2.4.1: Screenshot of various plan of Qustodio application

Even though the free version of Qustodio only consists limited of functionalities, but it is already enough to handle daily usage. It limits the monitoring to only one device and the logs can keep for only seven days. The features of the free version of Qustodio is such as screen time monitoring, daily time limits, smart web filtering and web search and also daily and weekly email reports. For a parental control application, the most

fundamental will be the screen time monitoring. The function of screen time monitoring in Qustodio allows the parent to check their child's activity timeline and the total of on-screen time. The next function will be the daily time limit where it allows parent to set up consistent time limits and screen-free periods to avoid children addicted to digital device such as a computer. One of the very powerful features provides by the free version of Qustodio is the smart web filtering and web search, a very great function to let the child visit a friendly website but not the harmful ones like the website that attempts to install malware that will destroy the computer. The last feature in the free version of Qustodio will be the daily and weekly reports. In this feature, parents able to receive detailed of all the child on screen's activities every day and a summary of the weekly report will also be generated and sent to parents through email.

The setup for Qustodio is also quite easy compared to other children's on-screen monitoring applications. A user only needs to download, install the application and grant all the required permission such as the usage access. Then, the user will need to register for an account and add a name for the particular device. The connection can be easily done between the parent's device and the targeted device by using the same Qustodio account. Figure below shows the download sites for parental and child devices for

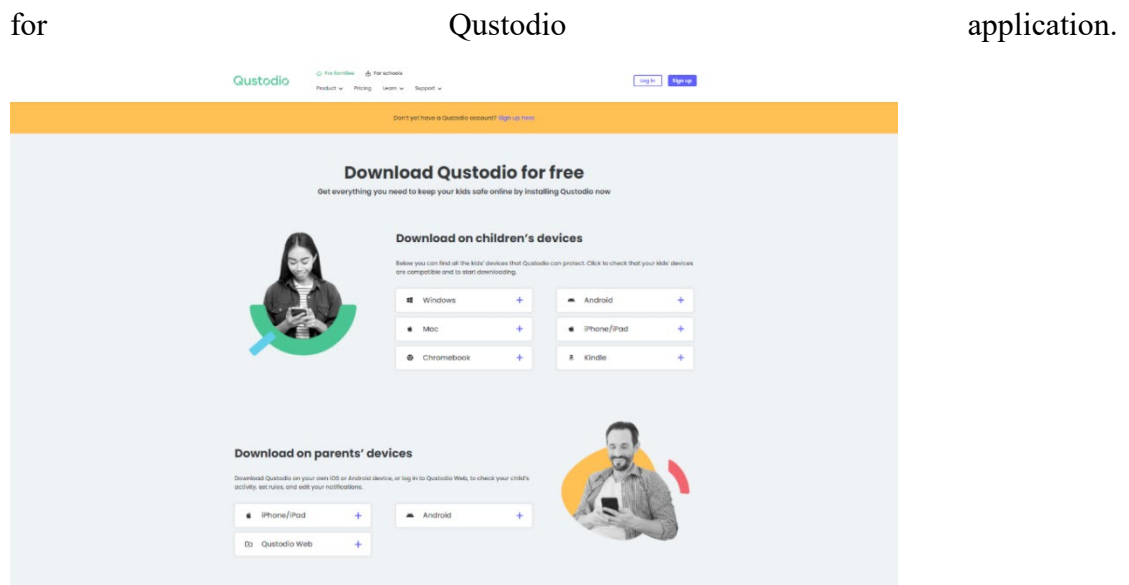


Figure 2.2.4.2: Screenshot of download site of Qustodio application

2.2.5 Critical Remarks and Comparison of Existing System

This section discussed the strengths and limitations by comparing the previous system that have been reviewed.

Existing System	Advantages	Disadvantages	Critical Remarks
KidKidler	<ul style="list-style-type: none"> ✓ Record child on screen activity in real time ✓ Support video recording ✓ Generate an interactive report card ✓ Record key pressed by child ✓ Take screenshot of child's device ✓ Ease to use 	<ul style="list-style-type: none"> ✗ Complicated installation steps ✗ Required user to subscribe for premium version to unlock more features ✗ Breach of child privacy 	
Kidlogger	<ul style="list-style-type: none"> ✓ Support multiple operating systems ✓ Take screenshot of child's device ✓ Support keystrokes recording ✓ Keep track of child daily internet usage ✓ Monitor all the message sent by child ✓ Generate log reports 	<ul style="list-style-type: none"> ✗ Complicated installation steps ✗ Bad interface design of the system ✗ Breach of child privacy 	

	<ul style="list-style-type: none"> ✓ Sufficient user guidelines have been provided to install the application 		
FamiSafe	<ul style="list-style-type: none"> ✓ Support multiple operating systems ✓ Generate log records when child do other stuffs ✓ Track child total on screen time ✓ Support location tracking ✓ Good user interface design ✓ Installation steps comparatively easy 	<ul style="list-style-type: none"> ✗ Required installation on both devices, user device and targeted device ✗ Does not come in free version, required user subscribe for the application 	According to the review and rating in Google Play given by users, the system always provides false information and missing chunks of data. Sometime, it will sent false alert to user although the targeted device already turn off.
Qustodio	<ul style="list-style-type: none"> ✓ Monitor total on screen time of child ✓ Support the feature of setting daily time limit ✓ Support the feature of smart web filtering ✓ Generate daily and weekly reports to user 	<ul style="list-style-type: none"> ✗ Required user to subscribe for premium version to unlock more features ✗ Limited functionalities in the free version ✗ Only tracks time activity social media apps 	

Table 2.2.5.1: Comparison of strengths and limitations between different system

2.3 Concluding Remark

In a thesis, a literature review is a very important section for the reader to get an overall understanding of the topic since the idea behind the literature review is to collect and summarize the arguments and ideas from a particular field of study. A very important part to conduct first before carrying out new research because it will also give some familiarity of knowledge in the study field.

In the literature part of this thesis, some existing technologies and parenting systems have been reviewed to analyze and identify their strengths and limitations. Reviewing technologies before carrying out a new research is very important to identify which type of technologies will be the most suitable one before starting to develop the application. For example, if the program requires fast execution time, C++ programming language should be the best choice to use since it is a compiled language without garbage collection.

For the existing parenting systems that exist in the market nowadays, each of them has its own pros and cons. Hence, in this study, the main purpose will be to find what is wrong with the existing system and what will be the best way to improve it in the new research. By paying attention to all these details, the newly developed system will be more complete and perfect.

CHAPTER 3 Proposed Method/ Approach

3.1 System Development Models

There were few system development models that used by software development teams in order to successfully navigate to the System Development Life-Cycle (SDLC) [11]. Each model follows a series of different phases which will guides the software developer to successfully develop the software since SDLC used to give a rigid framework to define the stages. Thus, the main purpose to apply SDLC during the development of the project is to develop a high quality software to end users.

3.1.1 System Development Model 1 (Waterfall model)

The waterfall model is a very renowned model in software engineering and it is a linear-sequential approach to the System Development Life-Cycle (SDLC) [12]. It is the first process model to be introduced and each phase must be completed before proceeding to the next phase. This is due to the outcome of the finished phase will become the input for the next phase accordingly.

The strength of the waterfall model it is simple and quite easy to understand especially for a beginner since every phase is processed and is done one at a time. By using this approach, the progress of the whole project development will be easier to be measured because all the required requirements are already defined early in the project. Hence, the project will be able to complete before the deadline of the project.

The disadvantage of this model will be it is not suitable for a complex or high-risk project. Besides, it also does not allow any changes in requirements although requested by the user during the development of the project because the requirements must be well documented and clear before the beginning of the project.

Therefore, the characteristic of the waterfall model will make it more suitable for small and secure projects. The figure below shows the SDLC of a waterfall model.

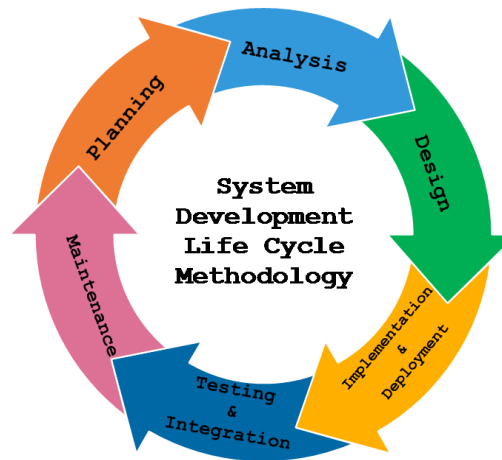


Figure 3.1.1 1: SDLC of a waterfall model [13]

3.1.2 System Development Model 2 (Agile Model)

The agile model is an SDLC approach based on incremental and iterative development. It can also be considered as the mainstream methodology applied by software developers in this modern-day to deliver the customer a better product at the end of the day. The methodology of the agile model is breaking a big task into a few smaller tasks in an iterative way, each passing through the SDLC phases.

The pros of the agile model will be it is more flexible especially compared to the waterfall model because it allows for adapting to any inevitable changes during the development of the project, hence the overall risk of the project can be minimized. In addition, the agile model is also able to produce a high-quality product in a shorter period of time because it is an iterative approach.

The cons of the agile model are poor resource planning because the requirements can be changed from time to time, hence it is unpredictable the end result of the product. Furthermore, the main disadvantage of the agile model will be a lack of documentation so developers can easily get confused when moving toward the next stages. The figure below shows the SDLC of an agile model.



Figure 3.1.2.1: SDLC of an agile model [14]

3. 1.3 System Development Model 3 (Spiral Life Cycle Model)

The spiral life cycle model is a type of model which incorporates both the prototype and waterfall model with more emphasis on risk analysis. A spiral life cycle model consists of 4 different phases, planning, design, construct and evaluation in iterations called Spirals. However, this model is not so well-known compared to other types of SDLC models because it is pretty costly to use and not suitable to apply on small projects [15].

The advantage of the spiral life cycle model is it is very flexible because it always has room for customer feedback and applies the required changes. Furthermore, since the risk evaluation is proper, the risk to develop a project can be lowered as low as possible. For example, if a risk had been discovered, then alternate solutions will be provided to solve the problem.

The disadvantage of the spiral life cycle model is it is costly for small projects because it will require more documentation as it has intermediate phases. Besides, the whole spiral life cycle process can be very complex and lead to the project being unable to finish within the schedule given by the customer.

Therefore, the characteristic of the spiral life cycle model will make it more suitable for large and critical projects. Figure below shows the SDLC of a spiral life cycle model.

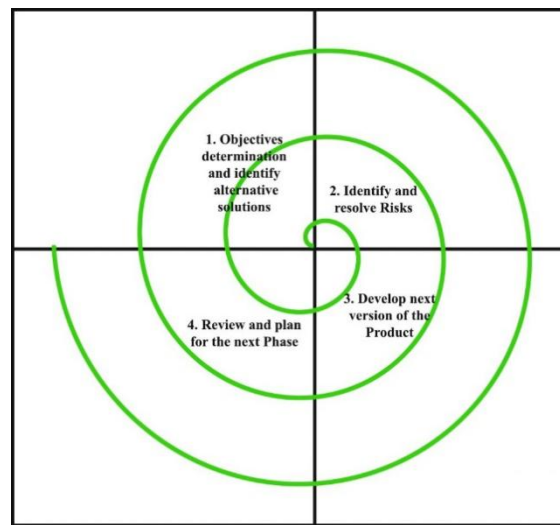


Figure 3.1.3.1: SDLC of a spiral life cycle model [16]

3.1.4 System Development Model 4 (Prototype Model)

Unlike other system development models, the prototype model is a type of SDLC approach that delivers a prototype of software to test the concept. A prototype of a software means although the software itself is incomplete, but it includes some important functionalities of a system with some possible outcomes when interacting with the users. It is an important step of a design process to use in all design disciplines [17].

The strengths of the prototype model are it is good to use when the user requirement is unclear because usually a prototype often failed when tested, hence developers will figure out the error and refine it based on the feedback of the user. In short, the problem of the system can be detected earlier and faster users feedback leads to a better solution. Simultaneously, through the process of prototype, users will also have a greater understanding of what is going on with the project.

The limitations of the prototype model are it is a slow and time taking process. Moreover, the prototype model will also increase the complexity of the project beyond

the original plan because the requirements of customers are changing from time to time. Figure below shows the SDLC of a prototype model.

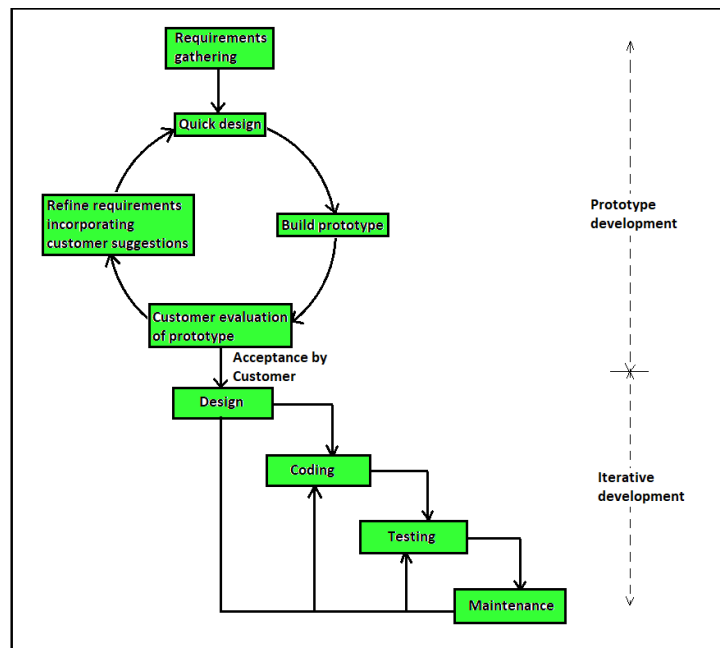


Figure 3.1.4.1: SDLC of a prototype model [18]

3.1.5 Selected Model

After conducting some studies on the suitable methodology in this chapter, the agile model will be chosen instead of other types of models available. It is very important to choose for a suitable methodology in order to be able to deliver a successful system within the time given. The reason behind choosing the agile model to develop the Children On-Screen Monitoring system since by the nature of the system, this system should be flexible and respond to any changes requested by the customer. Hence, it would be wise to use the agile model to develop the system so the system is able to help in adapting to any inevitable changes during the development of the project to minimize the overall risk of the project. The agile development model can be differentiated into 6 phases which are planning, analysis, design, implementation, testing and maintenance which are interleaved within each other instead of separate.

1. Planning

- Identify problem and risk. Then proposed a solution to overcome the problem.

2. Analysis

- Define user's requirement and expectation, study how the proposed better than existing products in the market. Various of method can be used to collect user requirement such as interview.

3. Design

- Delivery of the system design and the desired output. Some diagram such as UML will be included in this section.

4. Implementation

- Develop the system and accept all the flexible changes

5. Testing

- Test the system using various method to deliver a functional product like using alpha testing which required developer runs the application as a real user.

6. Maintenance

- Fix the error that occur and update the system from time to time

3.2 system Requirement

3.2.1 Hardware

The hardware involved in this project is a computer and an android mobile device. A computer needs to write the Python monitoring coding to develop an application that can monitor the computer's screen and generate all the important information that is required. A mobile device is needed to test whether the report that is being generated from the monitoring application can send out to a mobile device to be viewed.

Description	Specifications
Model	Asus Tuff Gaming F15
Processor	Intel Core i5-11400H @ 2.70 GHz
Operating System	Window 10 64-bit
Graphic	NVIDIA GeForce RTX 3050
Memory	8GB DDR4 RAM
Storage	512GB SSD

Table 3.2.1. 1: Specifications of laptop

Description	Specifications
Model	Samsung Galaxy A9
Processor	Qualcomm Snapdragon 660
Operating System	Android 10
Graphic	Adreno 512
Memory	6GB RAM
Storage	128 GB

Table 3.2.1. 2: Specifications of an android mobile device

3.2.2 Software

The software used to develop the Children On-Screen Monitoring System is shown as below:

Description	Tools
Operating system	Window 10 Home Single Language
Internet browser	Google Chrome, Microsoft Edge, Mozilla Firefox
Integrated Development Environment	Visual Studio Code
Support web framework	Django
Support programming language	Python 3.10.2
Front-end Framework	Bootstrap
Database	SQLite

Table 3.2.2. 1: Specification development of application

Description	Tools
Operating system	Minimum: Window 7 Recommended: Window 10 or latest
Internet browser	Google Chrome, Microsoft Edge, Mozilla Firefox
Network	Broadband internet connection

Table 3.2.2. 2: Specification requirements to run the application

3.3 Functional Requirement

A functional requirement can be defined as how the application should be performing in order to achieve the desired goals [19]. It is very important to have a clear functional requirement in order to make sure the system behaves correctly without missing any functionalities.

User requirements:

- Users should be able to register or login into the system
- Users should be able to start the monitoring for the targeted device in the system
- Users should be able to cancel the monitoring for the targeted device in the system
- Users should be able to start the mouse tracker function for the targeted device in the system
- Users should be able to cancel the mouse tracker function for the targeted device in the system
- Users should be able to start the keylogger function for the targeted device in the system
- Users should be able to cancel the keylogger function for the targeted device in the system
- Users should be able to view and read the latest Covid-19 cases
- Users should be provided with guidelines on how to run the system
- Users should be able to receive notification from the system through email
- Users should be able to receive screenshots from the system through email
- Users should be able to view the on-screen history in the system
- Users should be able to delete the historical data in the system

3.4 Project Milestone

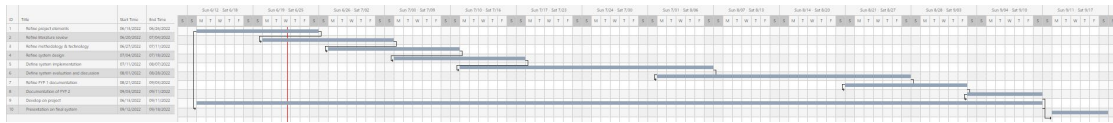


Figure 3.4. 1: Gantt Chart of project milestone shows in week time

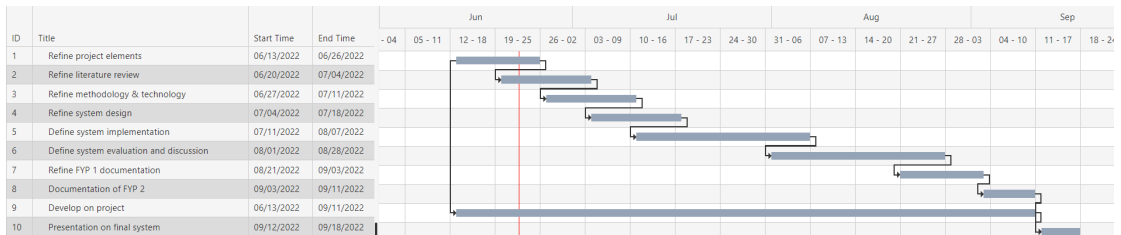


Figure 3.4. 2: Gantt Chart of project milestone shows in month time

3.5 Estimated Cost

Items	For FYP Development	For Commercialization
Hardware		
❖ Laptop/ Desktop	RM 4000.00	RM 4500.00
❖ Smartphone	RM 1900.00	RM 1999.00
Integrated Development Environment		
❖ Visual Studio Code	RM 0.00	RM 0.00
Database		
❖ SQLite	RM 0.00	RM 0.00
Browser		
❖ Google Chrome/ Mozilla Fox/ Microsoft Edge	RM 0.00	RM 0.00
Supporting Framework		
❖ Bootstrap	RM 0.00	RM 0.00
❖ Django	RM 0.00	RM 0.00
Programming Language Package		
❖ Python 3.10.2	RM 0.00	RM 0.00
Total	RM 5900.00	RM 6499.00

Table 3.5. 1: Overall budget to develop the project

Based on table 3.5.1, it is clearly seen that the overall budget to develop the Children On-Screen Monitoring system is RM 5900 FYP project development. Although cost of FYP development is about RM 5900, but it is being very common for a university student to have a laptop or a smartphone to deal with their homework or other kind of stuffs, especially during this pandemic of Covid-19. For the total cost of commercial development of the project, the total cost will be approximately about RM 6499.00. The reason behind this is normally a company will provide their employees to use a desktop computer to develop an application because it is more powerful and smoother.

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Normally the pricing of a desktop is higher than a normal laptop hence in this situation will be assuming the company provided employees mid-range desktop which approximately priced at RM 4500. For the pricing of the phone is estimated at RM 1999 because it is assumed that the employee from the IT company uses a mid-range smartphone instead of a high-end smartphone. For this project, a budget laptop or desktop will be great enough to develop the software because an average performance processor already able handle the program from sketch. Besides, Visual Studio Code is a completely free source code editor for development operations made by Microsoft that can be used with a variety of programming languages. In order to code the program using Python programming language, a Python package is also required to be downloaded to use in the Visual Studio Code. Besides, two types of the framework have also been used to develop the project in the Visual Studio Code to deliver a useful web application which is Bootstrap and Django. Since the framework is open source, hence both of them are free to use. Furthermore, by default the configuration of Django is using the SQLite as the database, hence the database also does not require any cost. In short, without costing the developer any fees, this project is still able to deliver a functional and reliable monitoring system to the end-users.

3.6 Concluding Remark

In this chapter, will be discussing about the proposed method and approach which will study about different system development models, system requirements, functional requirements, project milestones and the estimated cost to develop the system from a sketch.

As mentioned before, there were quite plenty of system development models to be used in order to deliver a software application successfully to fulfill the requirement of the System Development Lifecycle (SDLC). The factor to applying a system development model during the implementation of a system is to help in reducing unnecessary costs and time during the development. By following a systematic way, it enables a developer to develop a reliable and high-quality system within the timeframe. However, it is also very important to choose for a suitable model before proceeding to the next stage, in this case, the agile development model will be chosen as the one to develop the Children On-Screen Activity Monitoring application since this is a short-term project and should be able to adapt for any inevitable changes in the future.

For the section of system requirement, it will just be a section that discuss about what will be the hardware and software used to develop the project. Next, the section that will be discussed in this chapter is the functional requirement. A clear functional requirement is able to help the developer to identify for the expected system service and its response toward the inputs.

For the project milestone which is also one of the sections in this chapter also plays a significant role to ensure the project can be done within the timeline given by dividing a big task into a few subtasks and solving it within a specific amount of time. Lastly will be the estimated cost will describe about the price of resources to develop the system from the sketch. This is very important because if underestimate the cost estimation of a project, then it may eventually lead to the failure of the project.

Chapter 4: System Design

The main purpose of system design is to provide developer adequate information about the way of the implementation of the system, how each component will interact with each other [20].

4.1 System Architecture

4.1.1 Network Diagram and Description

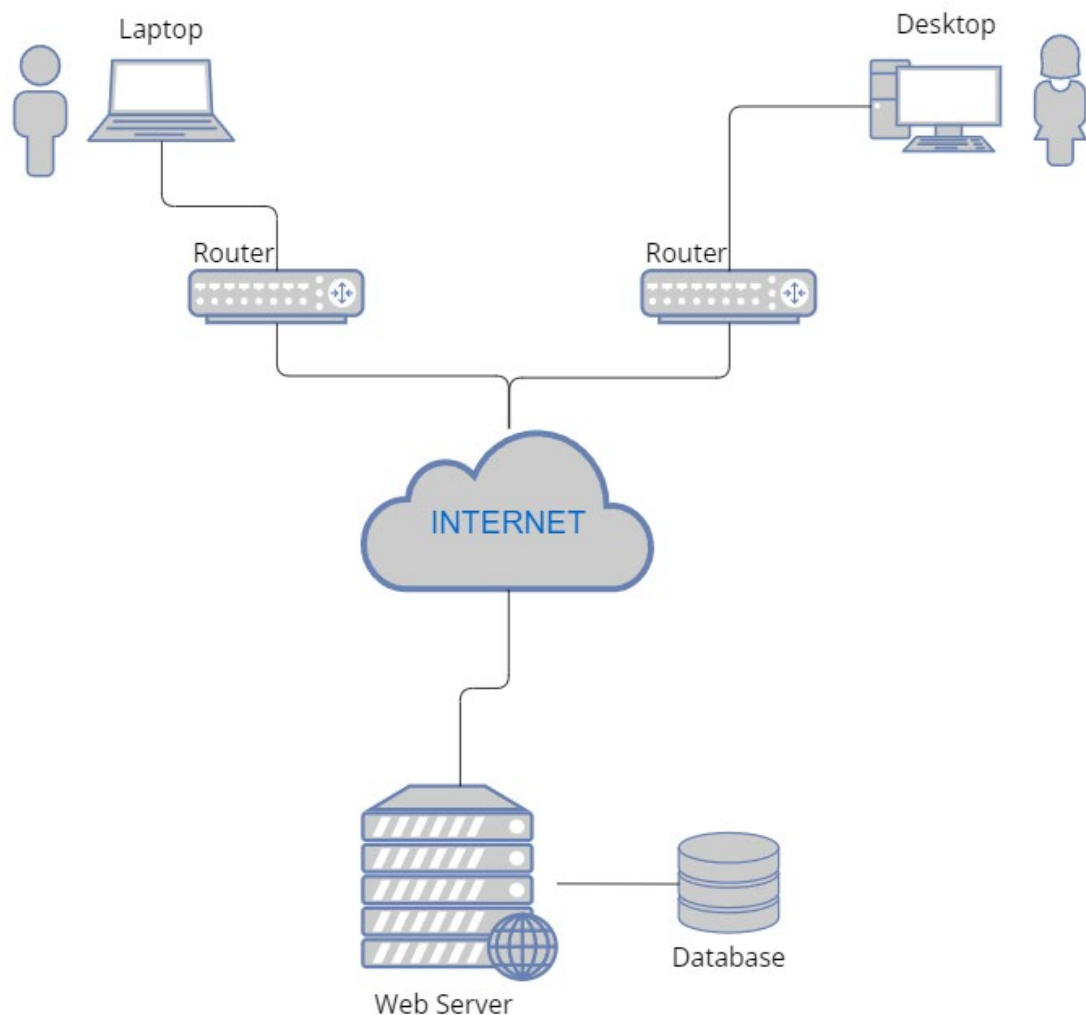


Figure 4.1.1. 1: Network diagram of Children On-Screen Monitoring Application

Figure above shows how the web application will be working through the internet. First of all, the user will be required to log in to the system using a browser like Google Chrome to open up the Children On-screen Monitoring web application. Every interaction of the user with the browser will interact through the internet in order to access some service like the browsing history of the on-screen activities. The data will be retrieved by the webserver from the database and displayed it back to the end-user in the static webpage format. In short, the webserver plays an important role to receive a request and giving a response to the request.

4.1.2 UML Diagrams and Descriptions

Use-case Diagram

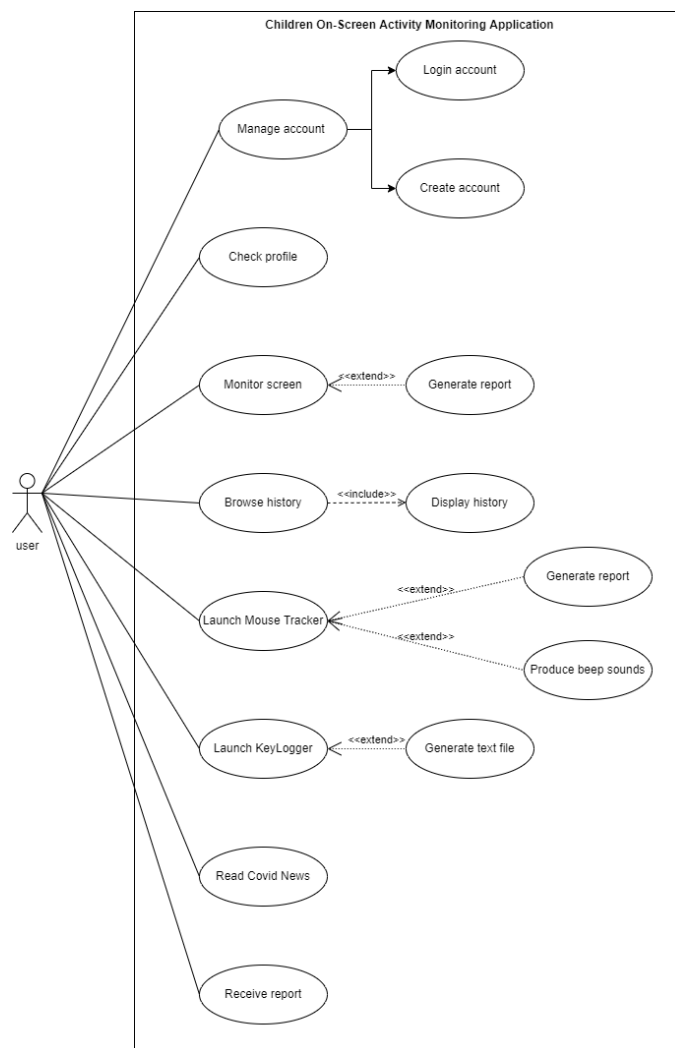


Figure 4.1.2.1: Use case diagram for proposed system

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Figure above shows the overall scope of the system and the interaction between user and system. It shows how a user can carry out the task in the Children On-Screen Activity application. Firstly, user able to manage their account by directly logging into the system if he/ she is an existing user or by creating a new account if he/ she is a new user. After login into the system, the user can check his profile. User can monitor the computer screen and the application will generate a report if necessary to do so. Besides, the user can read the latest Covid-19 cumulative confirmed cases with some latest provided news. Moreover, a user can launch the mouse tracker function to detect for children's mouse movement and the system will produce a few beeping sounds and send report to user if necessary. The user is also able to browse all the previous history that exists and receive a report from the system.

Activity Diagram

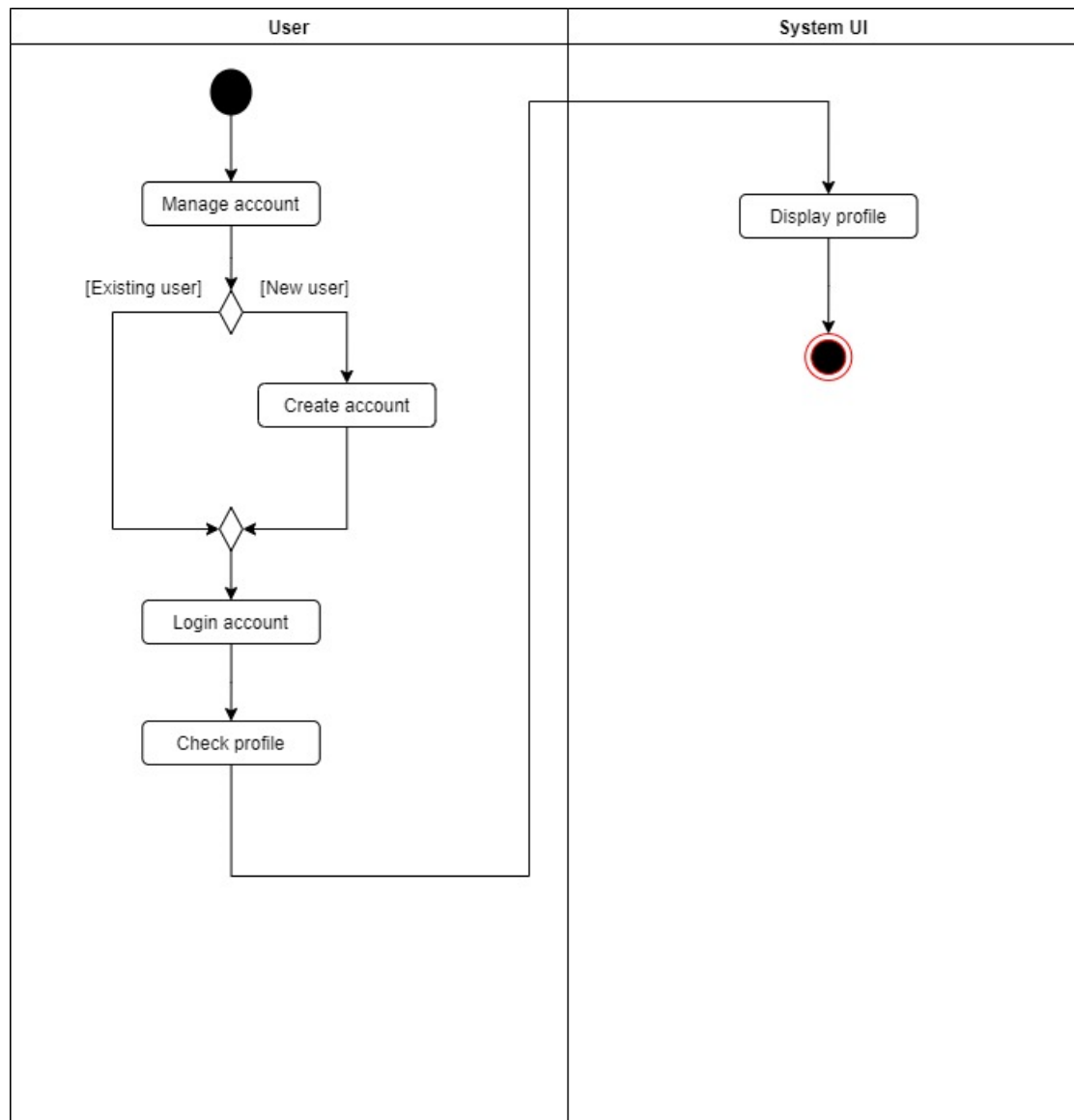


Figure 4.1.2. 2 : Activity diagram of checking profile module

Figure 4.3.2.1 shows the activity diagram of checking profile process. According to the diagram, after user login into the system, he/ she can always view their own profile.

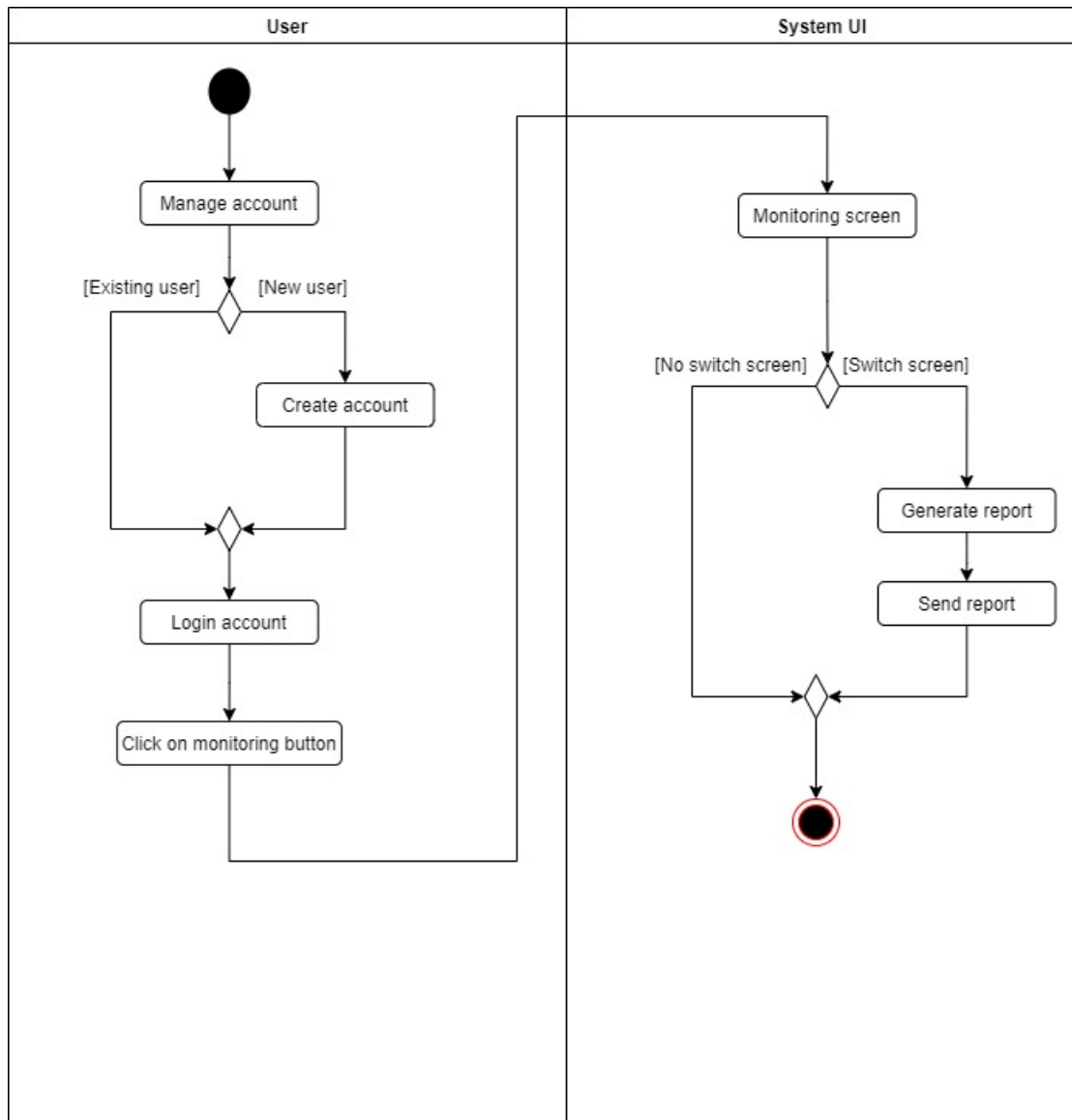


Figure 4.1.2.3: Activity diagram of monitoring screen module

Figure 4.3.2.2 shows the activity diagram of monitoring screen process. From the diagram, after user login into the system, he/ she can click on the monitoring button in order to start the monitoring process. If the system detected targeted device tends to change the computer screen from the online platform such as Zoom to other application, then the system will generate report and send the report to user.

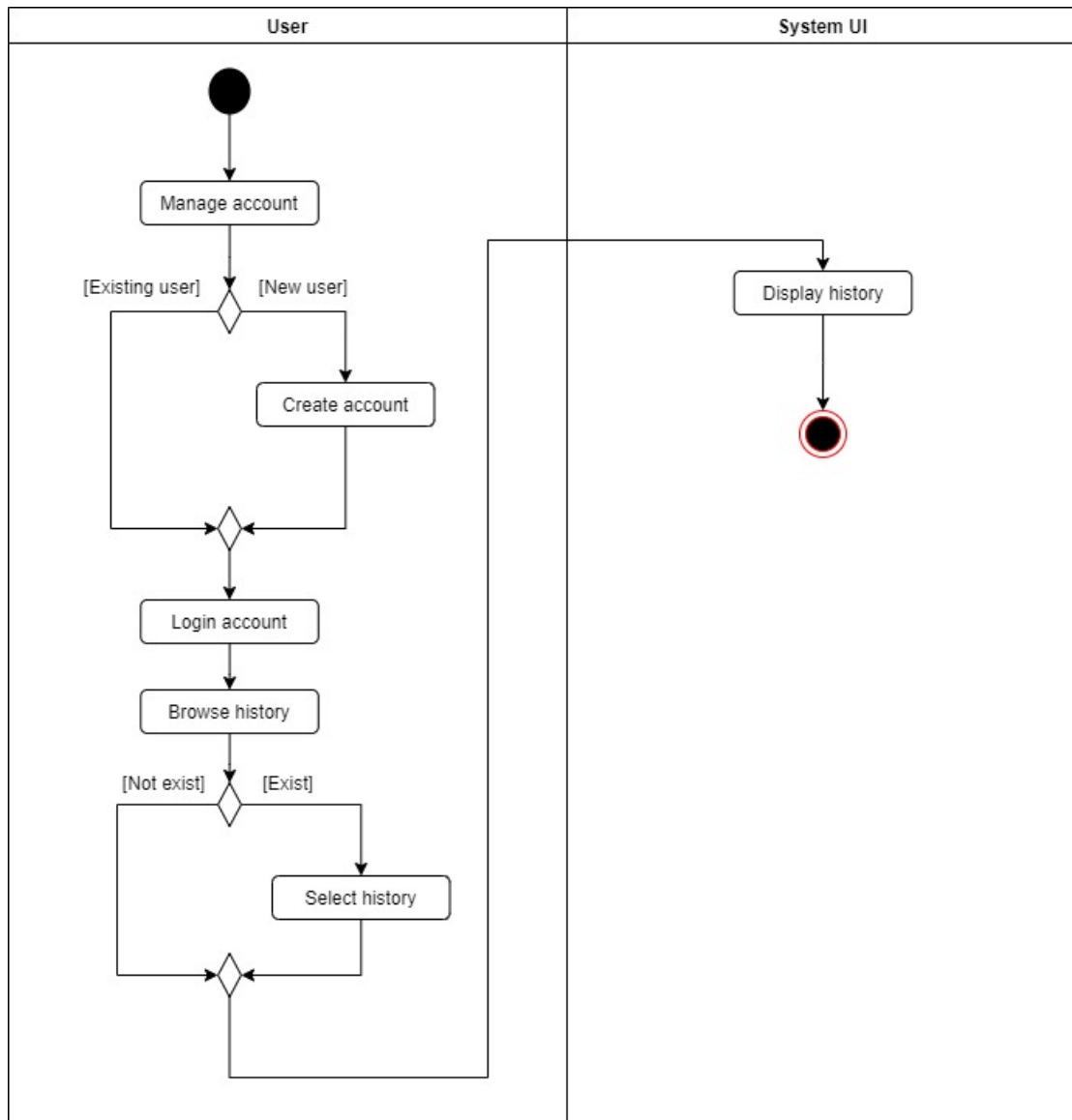


Figure 4.1.2. 4: Activity diagram of browsing history module

Figure above shows the activity diagram of the browsing history process. From the diagram, after the user login into the system, he/ she will be eligible to browse the history. If the history exists and hasn't been removed by the user, then the user can select the desired date to view the particular history. If the history is not existing, then the system will inform the user.

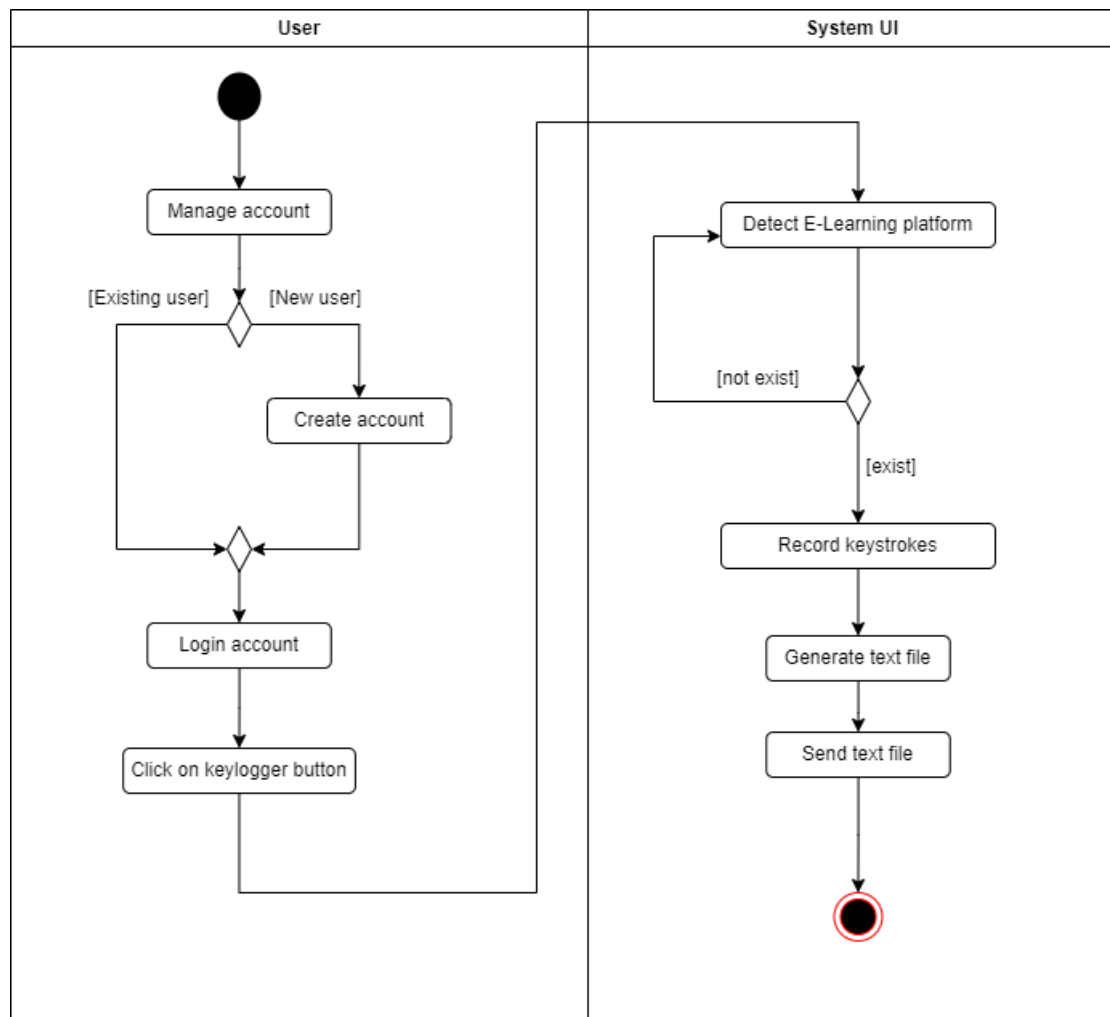


Figure 4.1.2. 5: Activity diagram of keystrokes module

Figure above shows the activity diagram of the keylogger function process. From the diagram, after the user login into the system, he/ she can click on the keylogger button in order to start the keylogger process. If the system online learning platform such as Zoom, Microsoft Teams, etc. then the system will start to record all the keystrokes and all the recorded data into a text file. Afterward, this text file will be sent to parents via Telegram.

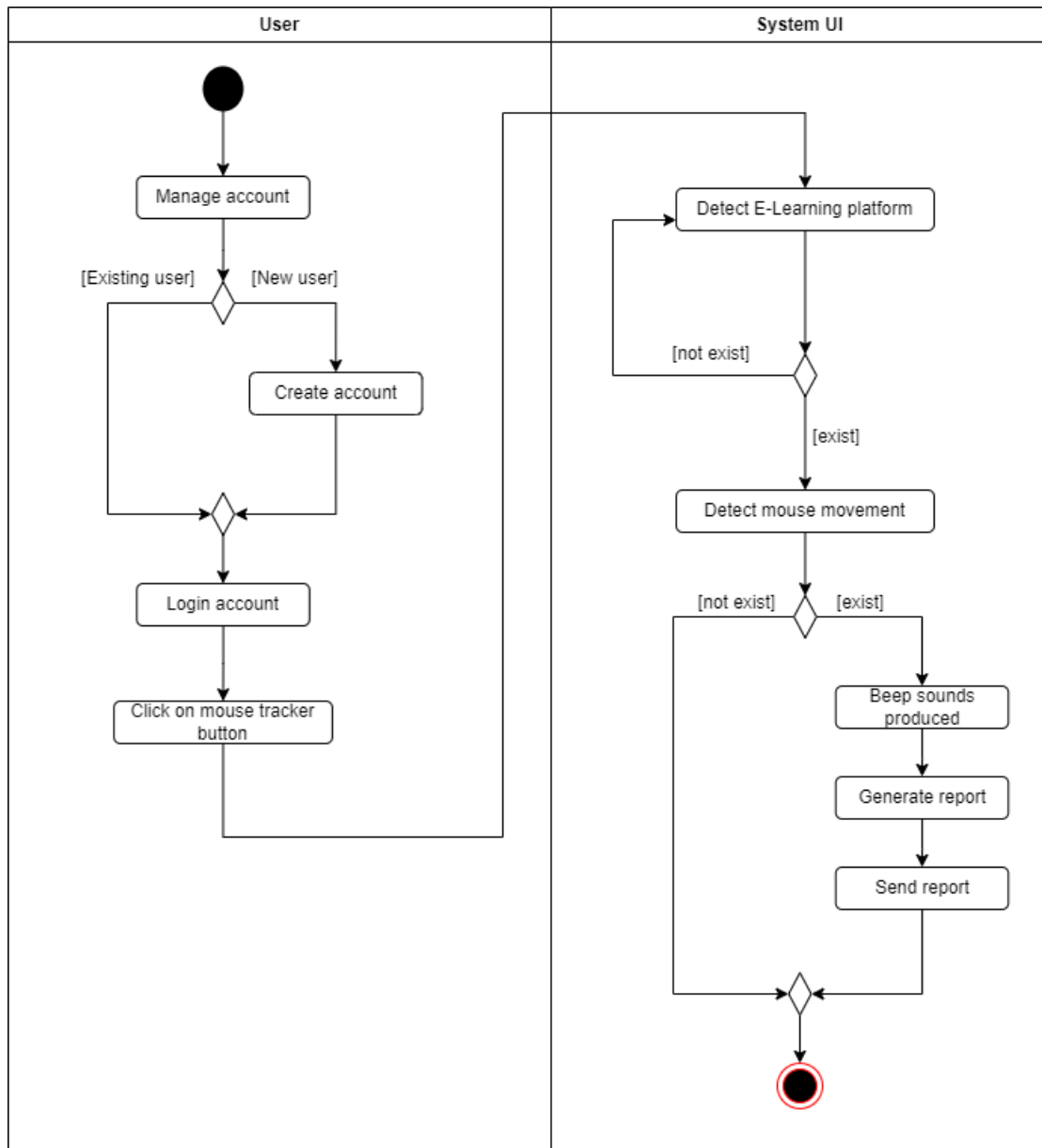


Figure 4.1.2. 6: Activity diagram of mouse movement module

Figure above shows the activity diagram of the keylogger function process. From the diagram, after the user login into the system, he/ she can click on the mouse tracker button to start the mouse tracker process. If the system online learning platforms such as Zoom, Microsoft Teams, etc. then the system will start to detect the children's mouse movement. If the children do not interact with the mouse for approximately 10 minutes, then the targeted device will produce a few beeping sounds and generate a quick report to inform parents that their children have not interacted with the mouse for 10 minutes.

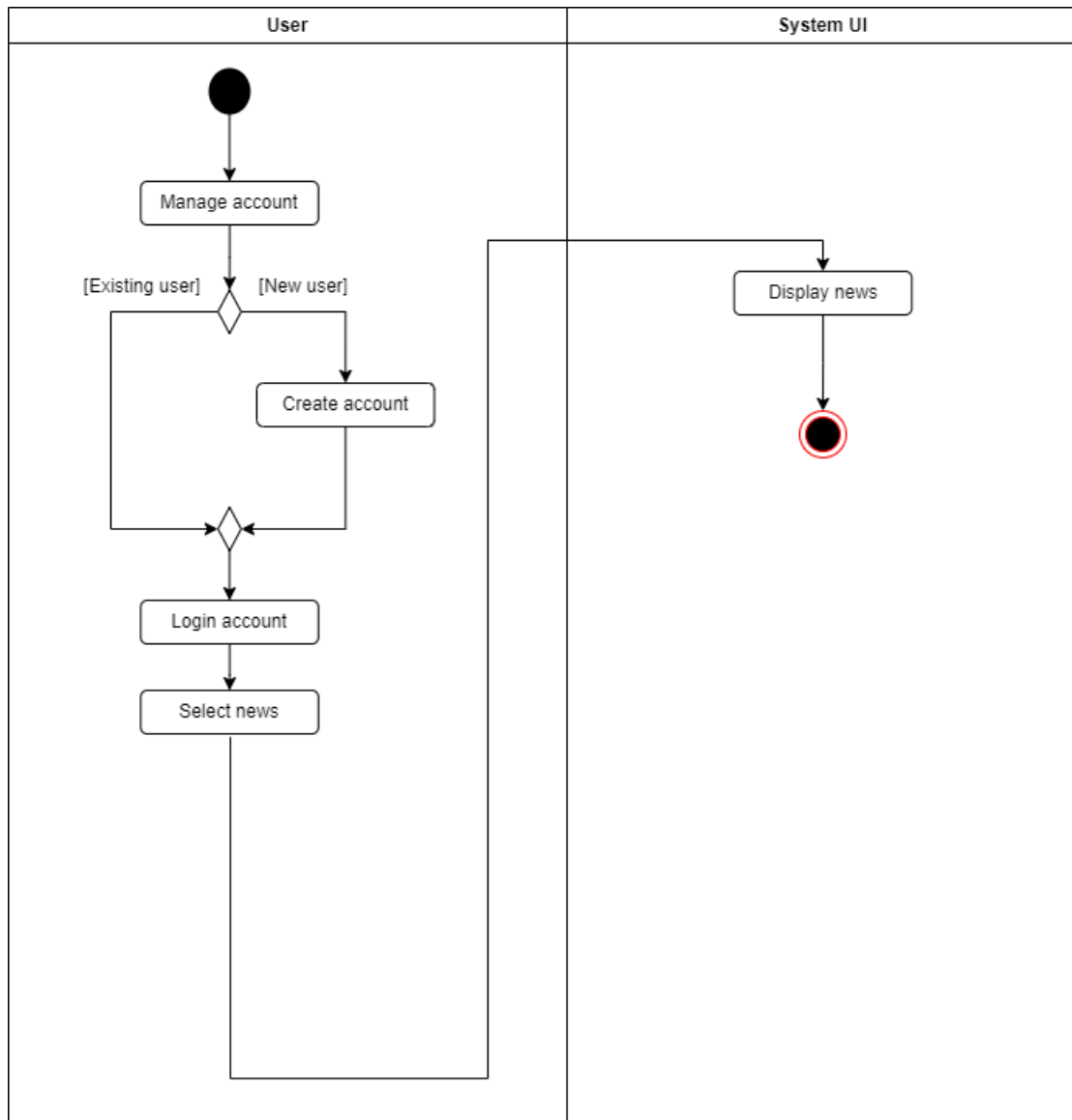


Figure 4.1.2. 7: Activity diagram of news module

Figure above shows the activity diagram of the browsing history process. From the diagram, after the user login into the system, he/ she will be eligible to select for the news module. Then, all the available Covid-19 latest news will be shown to user.

Sequence Diagram

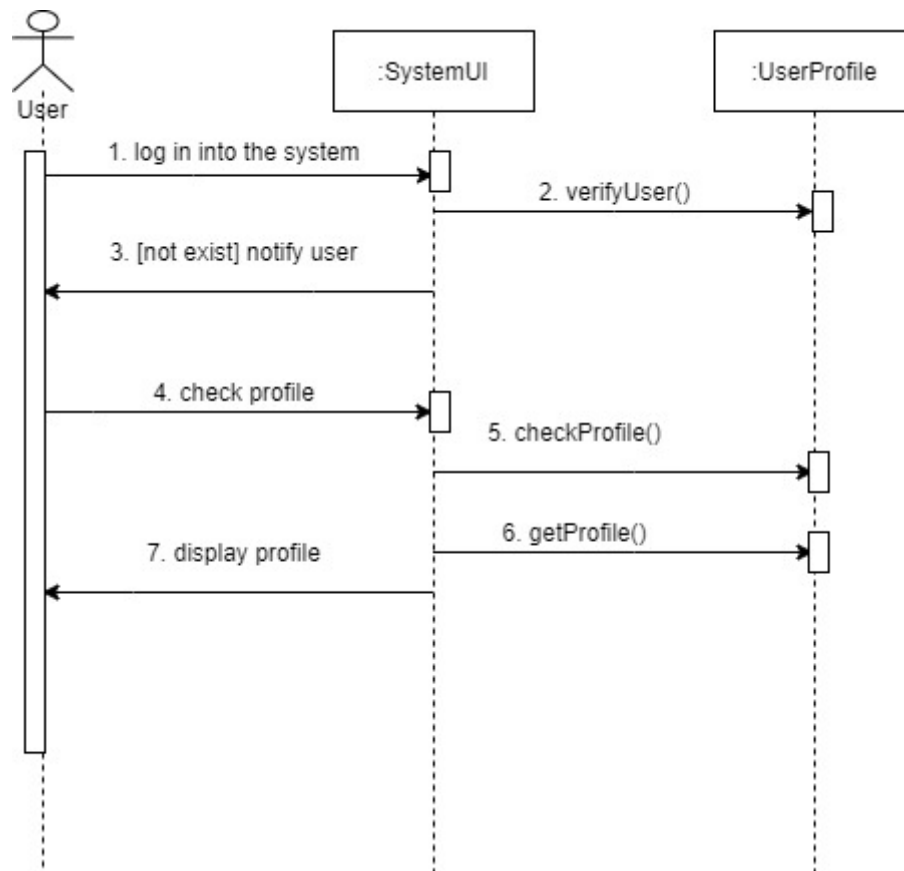


Figure 4.1.2. 8: Sequence diagram of checking profile module

Figure above shows the sequence diagram of the checking profile process. According to the diagram, after the user login into the system, the system will verify whether the user exists. If the user is not existing, then the system will notify the user to register an account or key in the correct username and password. After that, the user can check his/her profile. The system will get all the profile information and display the information to the user.

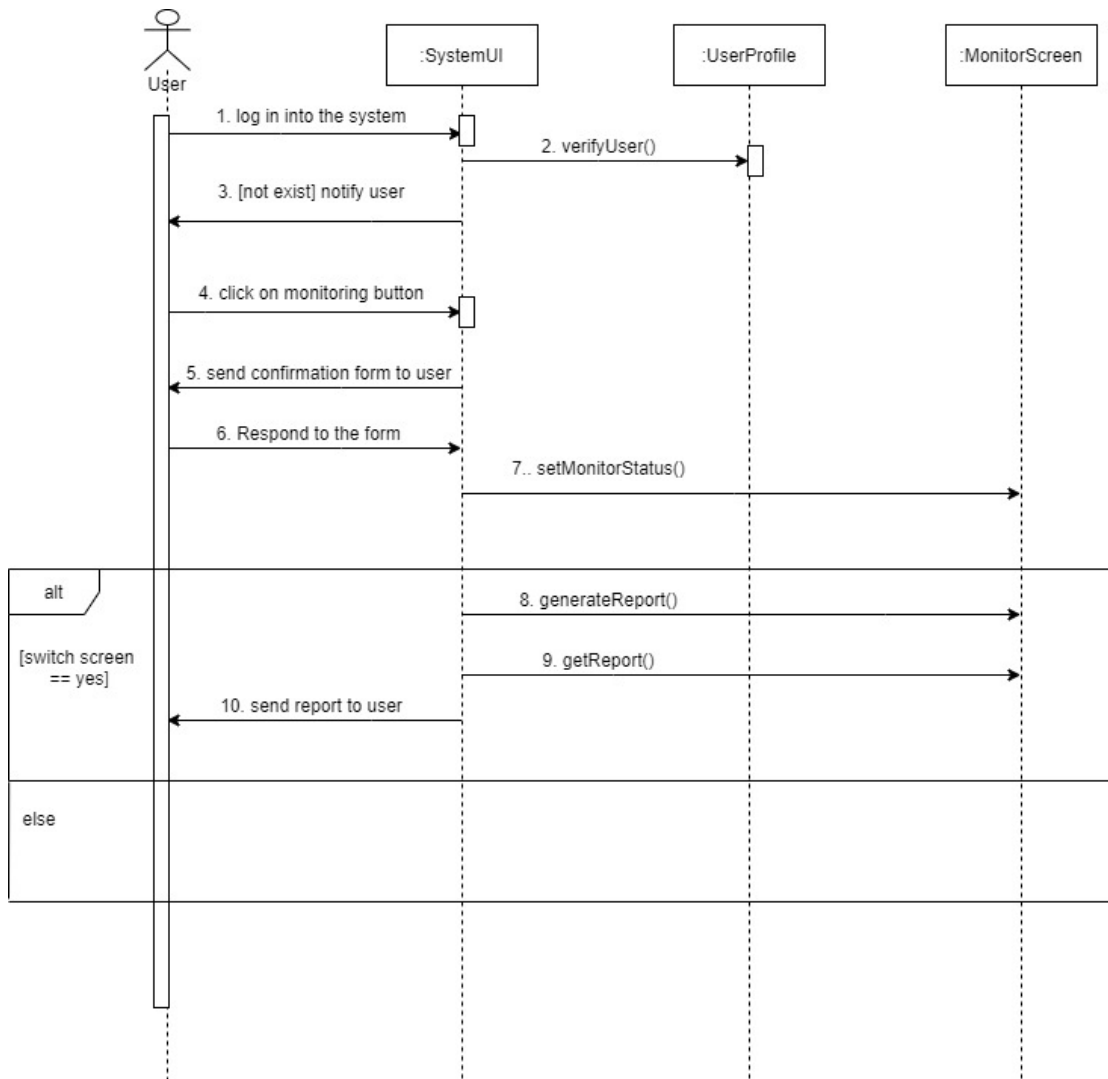


Figure 4.1.2. 9: Sequence diagram of monitoring module

The figure above shows the sequence diagram of the monitoring screen process. From the diagram, after the user login into the system, the system will verify whether the user exists. If the user is not existing, then the system will notify the user to register an account or key in the correct username and password. After that, the user can click on the monitoring button in order to start monitoring the screen. Before the system starts to monitor the screen, it will require the user to make confirmation whether really start to monitor the screen. After getting the confirmation from the user, it will set the monitoring status and start the monitoring process. If the targeted device tends to change the computer screen from the online platform to do other activity, then the system will automatically generate a report and send the report to the user through the social media platform.

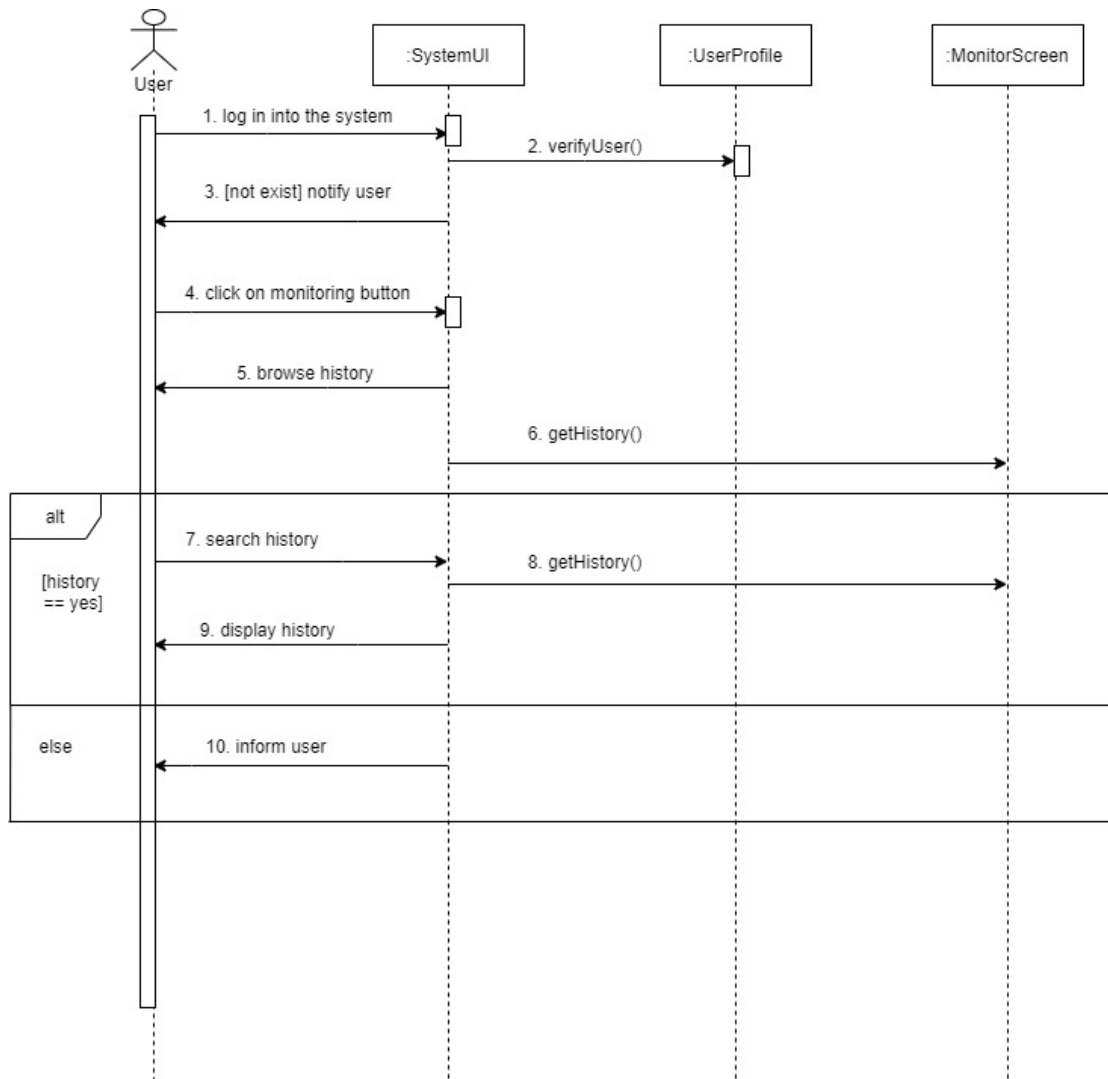


Figure 4.1.2. 10: Sequence diagram of history module

The figure above shows the sequence diagram of the browsing history process. From the diagram, after the user login into the system, the system will verify whether the user exists. If the user is not existing, then the system will notify the user to register an account or key in the correct username and password. After that, the user is able to browse the history that was generated previously. If the history data is not empty, then the system will allow the user to choose a date to display the reports that are being generated on that day. It will get the history data and display it back to the user. If the history is empty, then the system will notify the user no history can be shown.

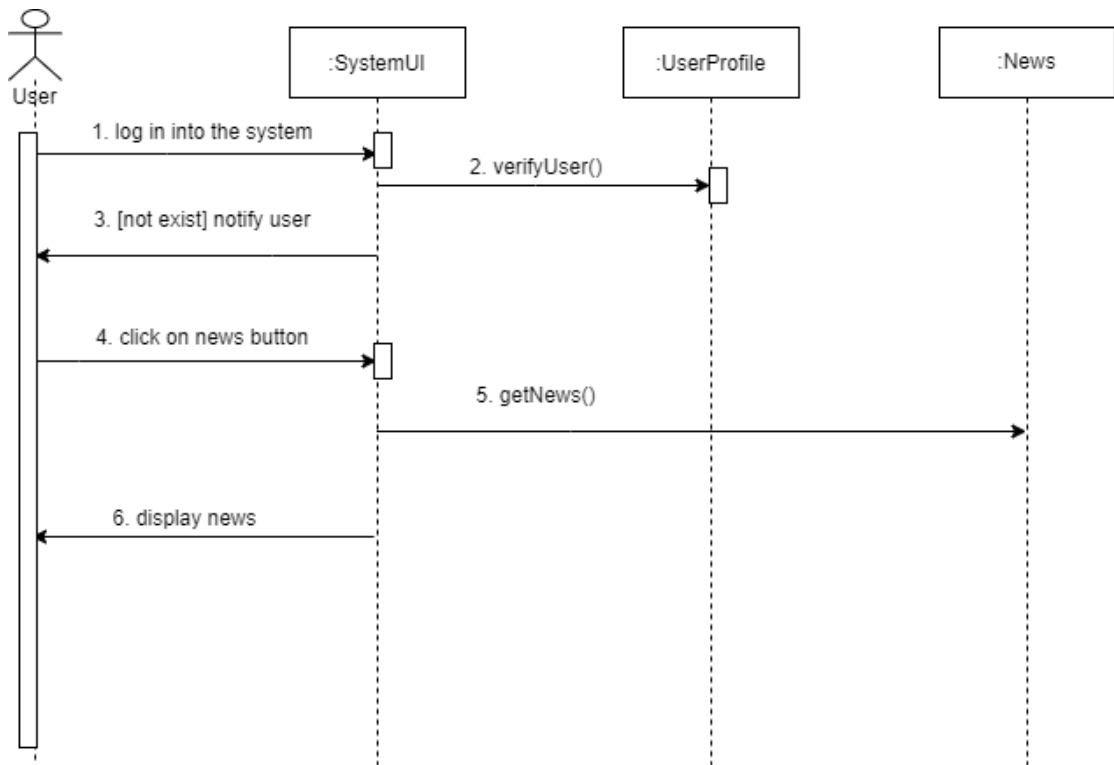


Figure 4.1.2. 11: Sequence diagram of news module

Figure above shows the sequence diagram of the checking profile process. According to the diagram, after the user login into the system, the system will verify whether the user exists. If the user is not existing, then the system will notify the user to register an account or key in the correct username and password. After that, the user can click on the news button and start looking for the cumulative confirmed Covid-19 cases and the latest provided news.

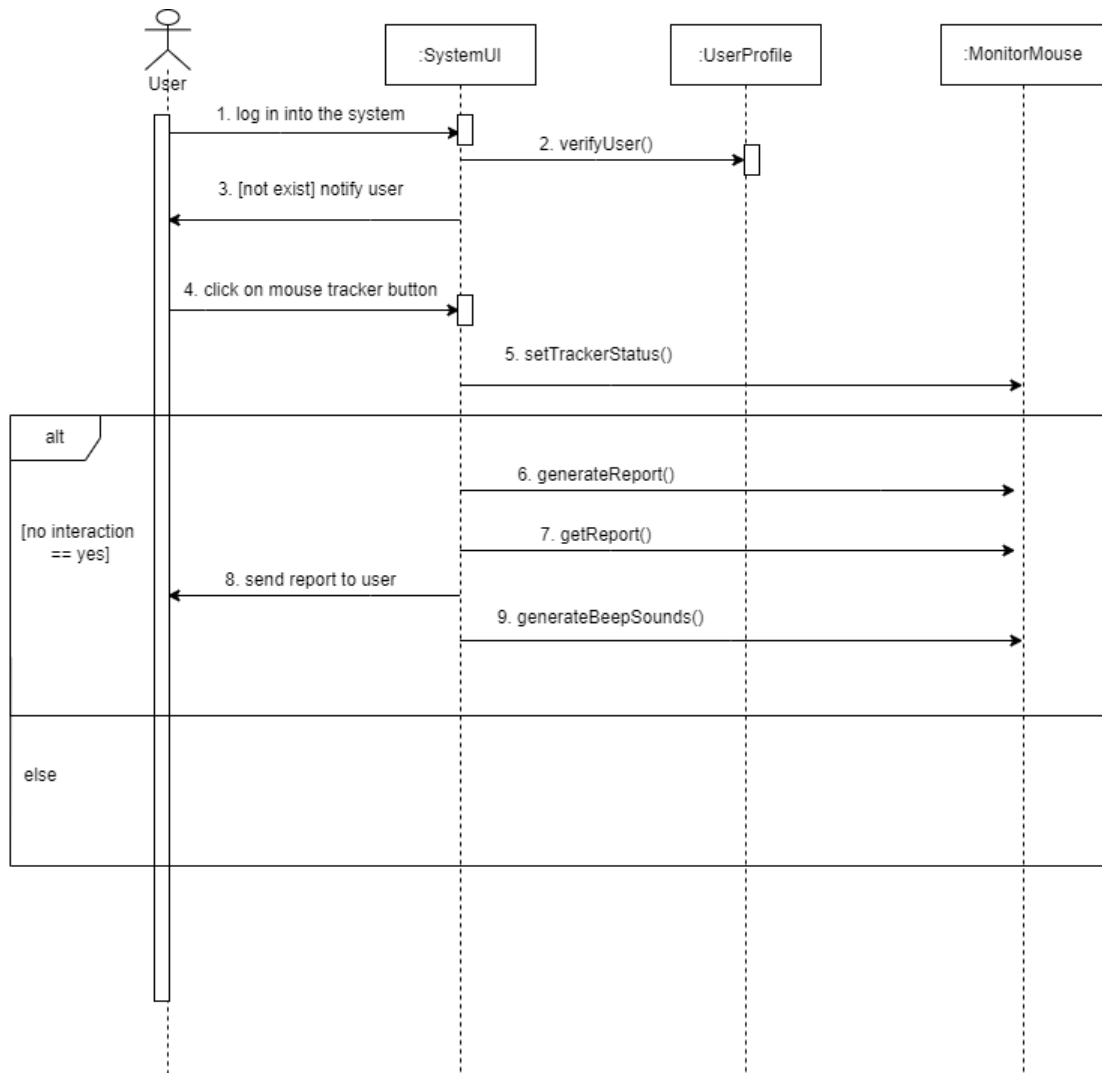


Figure 4.1.2. 12: Sequence diagram of mouse tracker module

The figure above shows the sequence diagram of the mouse tracker function process. From the diagram, after the user login into the system, the system will verify whether the user exists. If the user is not existing, then the system will notify the user to register an account or key in the correct username and password. After that, the user can click on the mouse tracker button in order to start keep track the movement of mouse. If the targeted device detected the existence of E-learning platforms, then the device will start to detect for the interaction of children with the mouse. If no interaction detected within 10 minutes, then the device will produce a few beeping sounds and send a quick report to parents.

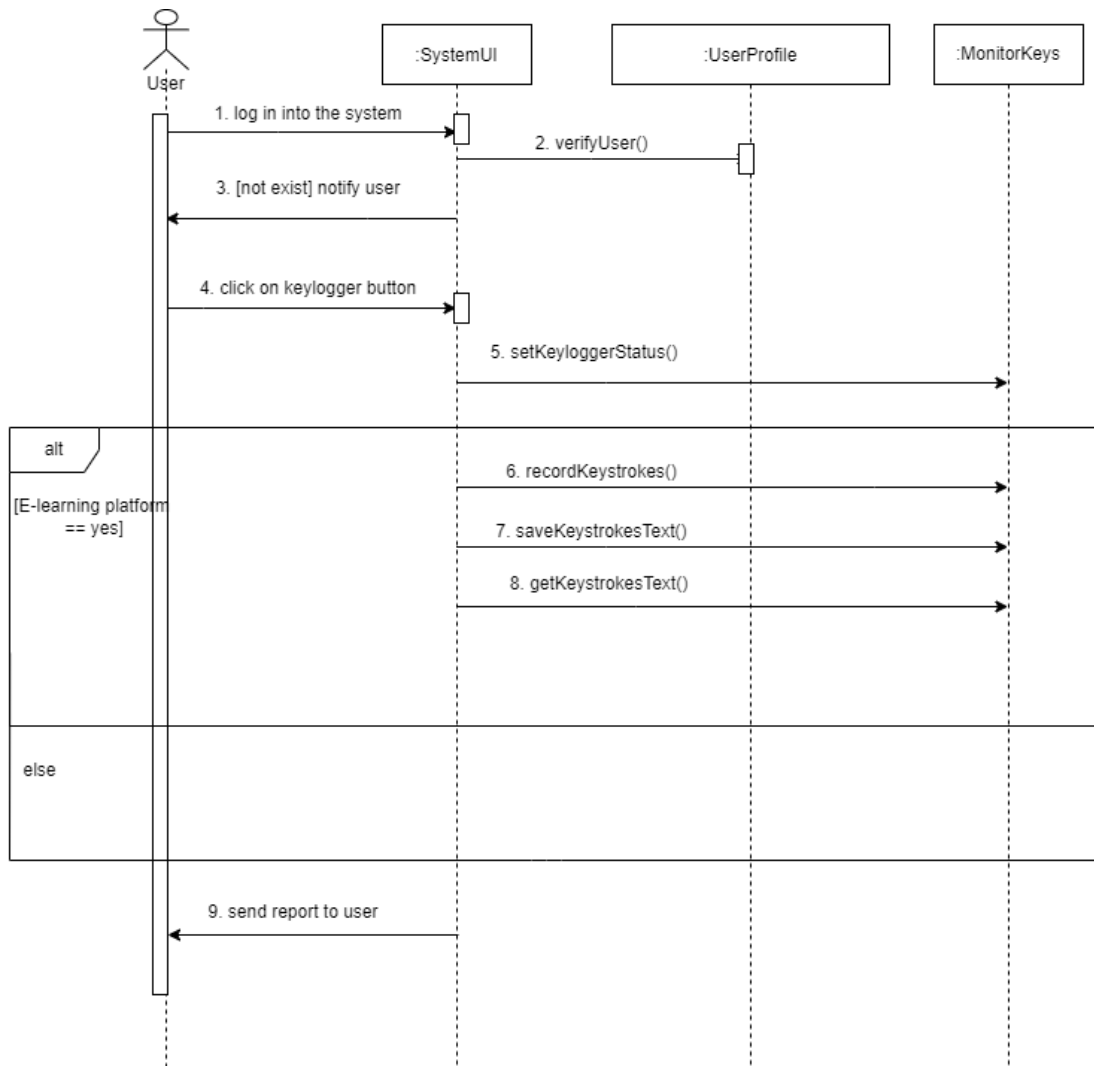


Figure 4.1.2. 13: Sequence diagram of keylogger module

The figure above shows the sequence diagram of the keylogger function process. From the diagram, after the user login into the system, the system will verify whether the user exists. If the user is not existing, then the system will notify the user to register an account or key in the correct username and password. After that, the user can click on the keylogger button in order to start recording the keystrokes. If the targeted device detected the existence of E-learning platforms, then the device will start to record all the keystrokes typed by the children. After the end of the online class, then the system will automatically stop the recording keys session and saved all the previously recorded keystrokes into a text file. Then, the text file will be sent to parents via Telegram.

4.2 Functional Modules in the System

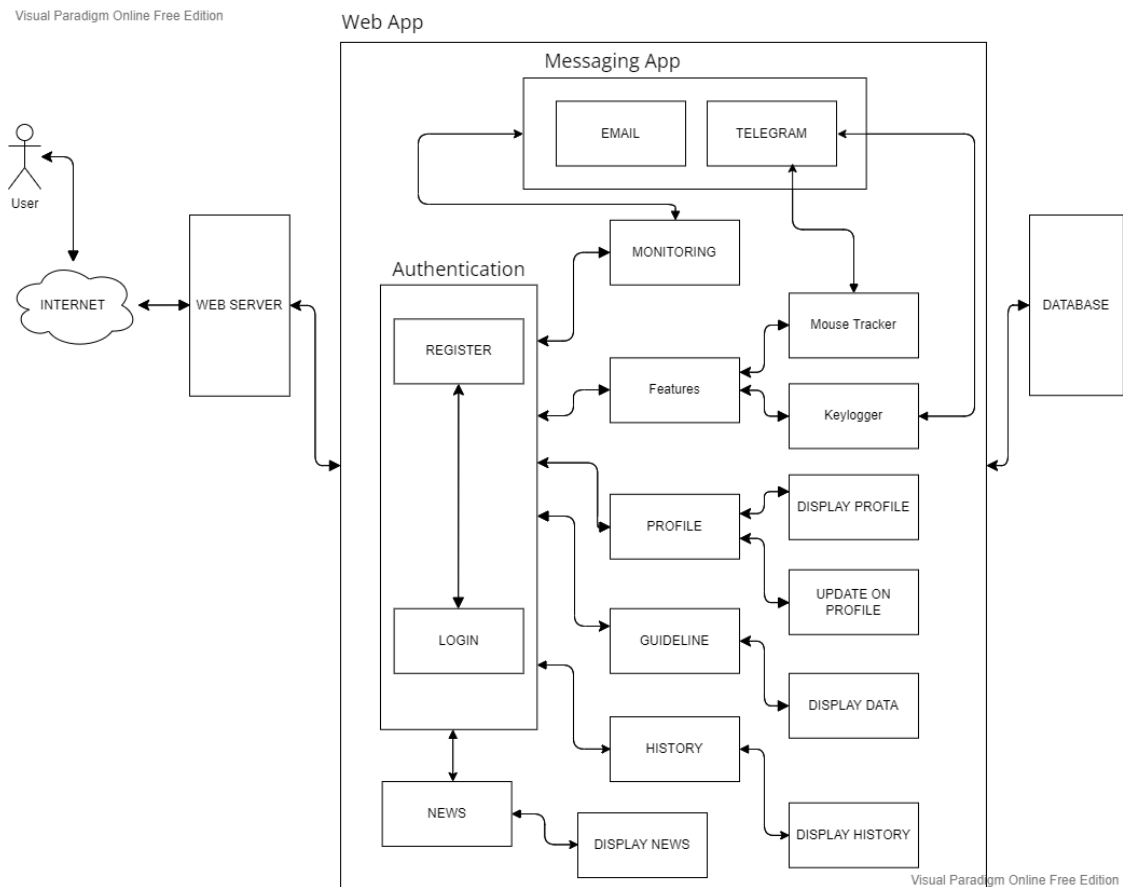


Figure 4.2. 1: Block Diagram of Children On-Screen Monitoring System

According to the figure above, before users can access the Children On-Screen Monitoring system, they would be required to authenticate and authorize by the system. Then, they will be able to access all the functionalities in the system. If they start the monitoring function, it will trigger the system to detect some suspicious activities like watching YouTube, playing games, etc. when the targeted device is running the e-learning platform simultaneously. If some suspicious activities exist, the system will notify the users by sending them an email once and a Telegram message for every time interval. For features module, it consists of two functionalities which are the mouse tracker and keylogger function. The mouse tracker function allows users to track their children's mouse movements during the existence of online classes. If children do not interact with the computer for about 10 minutes, then the computer system will produce a few beeping sounds to inform children to interact with the computer and a quick report

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will also be sent to users. For keylogger functionality, instead of tracking mouse movement, it will record the keystrokes typed by the children during the online class and save it into a text file. Afterward, this text file will be sent to users via telegram. If the users access the history functionality, then they can view the statistical history of the monitoring activities that happened in the targeted device. For the profile functionality, it will let the users display their personal information or make some changes to it. Lastly, the guideline functionality will allow the users to learn how to use the system to carry out the monitoring tasks.

4.3 System Flow

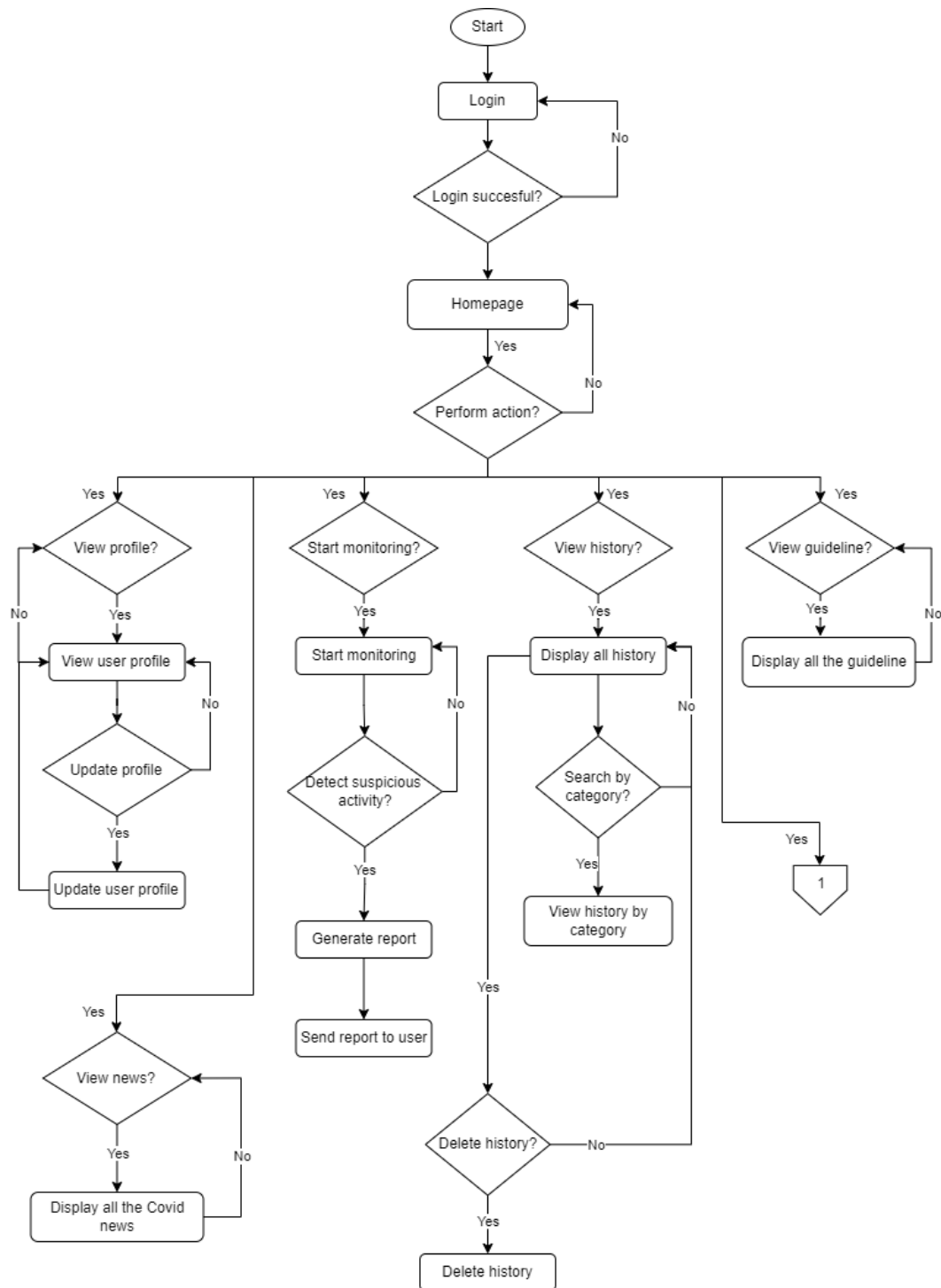


Figure 4.3.1: System flow diagram of Children On-Screen Monitoring Application

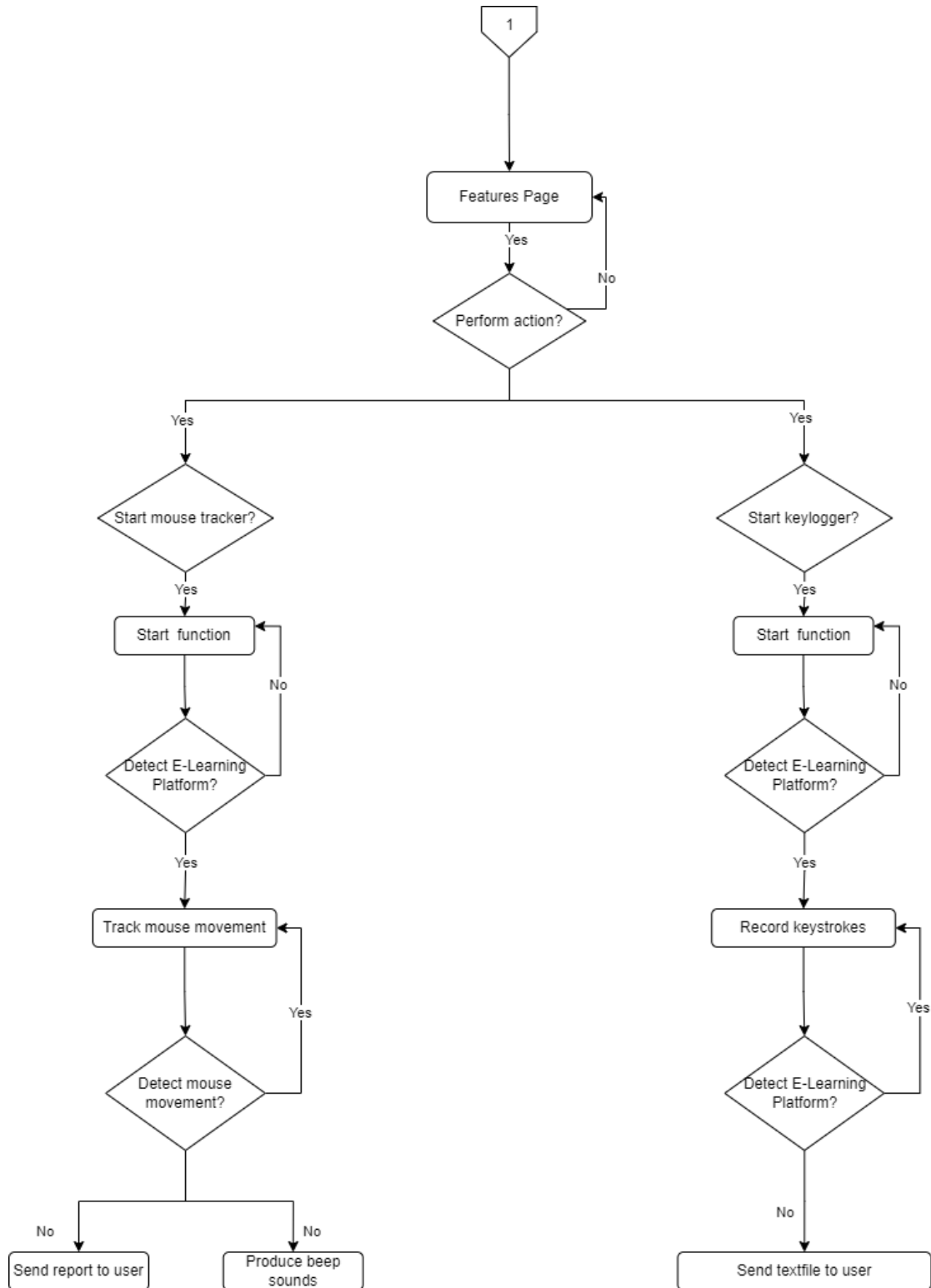


Figure 4.3. 2: System flow diagram of Children On-Screen Monitoring Application

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According to the system flow diagram above, after users' log in successfully, they will be directed to the homepage. According to their preferences, they can perform different types of actions such as view user profile, start monitoring process, start mouse tracker process, launch keylogger process, read news, view history or view for guidelines. Each different action will lead them to each different operation.

4.4 Database Design

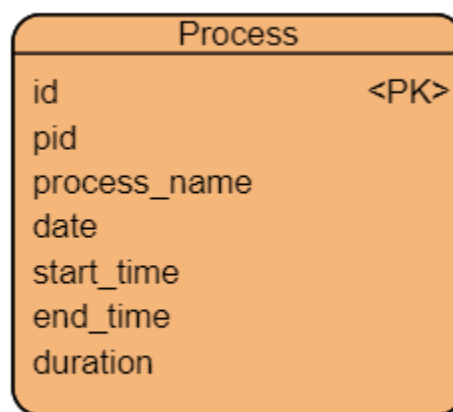


Figure 4.4.1: Entity Relationship Diagram of Children On-Screen Monitoring System

According to the ERD diagram above, the monitoring data that will be stored in the database will be a unique id value, the process PID, process name, the date of the process created, the start time and the end time of a process with its duration.

4.5 GUI Design

Before developing a program, designing a good user interface is very important in order to cope with the user requirements and be able to support all the functionalities provided to the user. Some rules like the 3-click rule, kiss rule, etc. will be implemented in order to keep the Graphical User Interface Design as clean as possible to increase the user's experience with the system and create a strong bond between them.

4.5.1 Graphical User Interface Design of Authentication Page

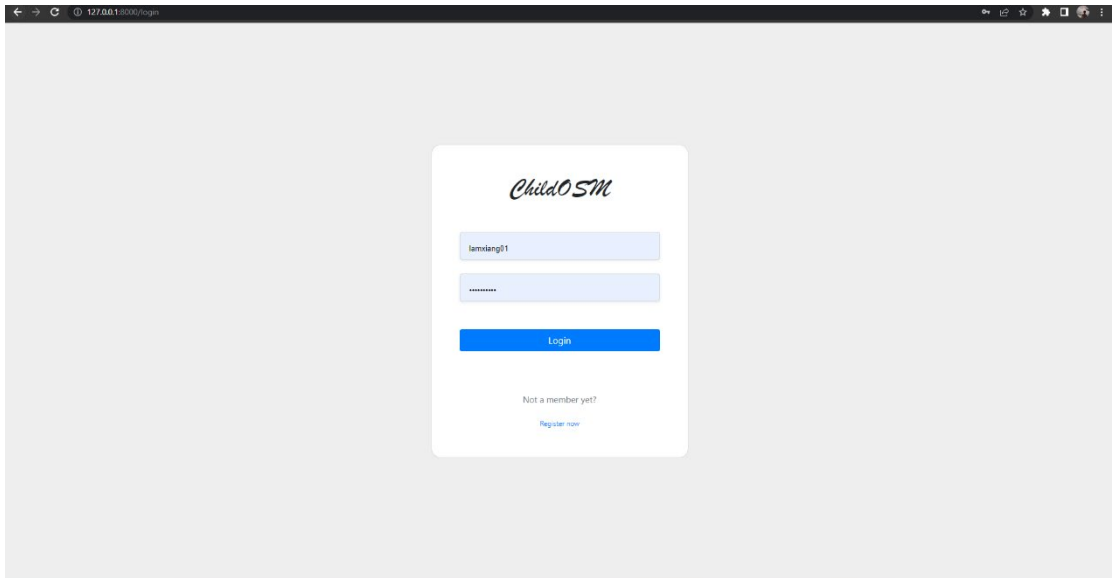


Figure 4.5.1.1: User Interface Design of Sign In page

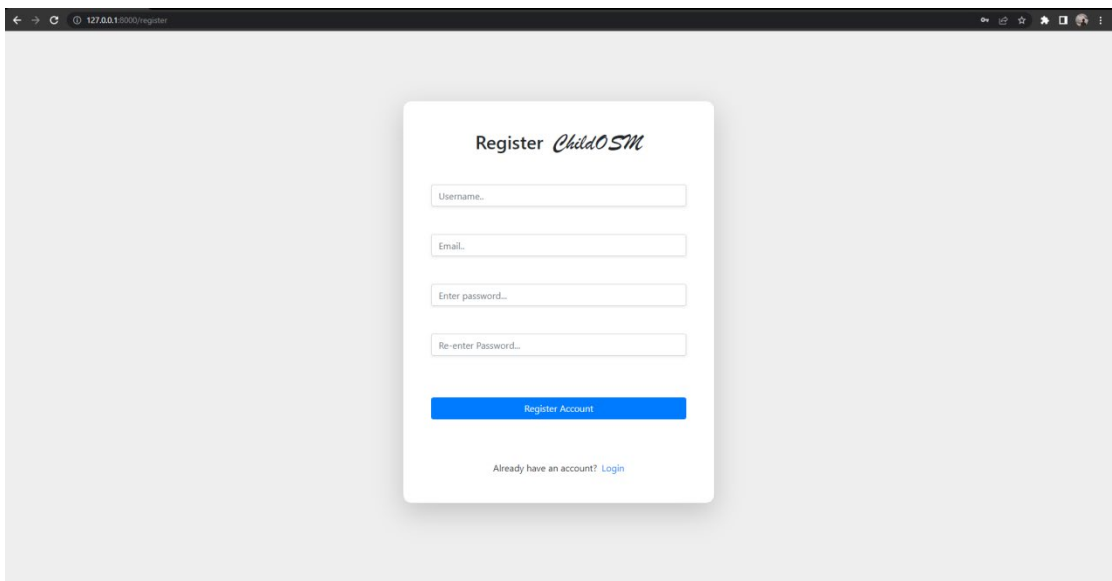


Figure 4.5.1. 2: User Interface Design of Sign-Up page

4.5.2 Graphical User Interface Design of Monitoring Function Page

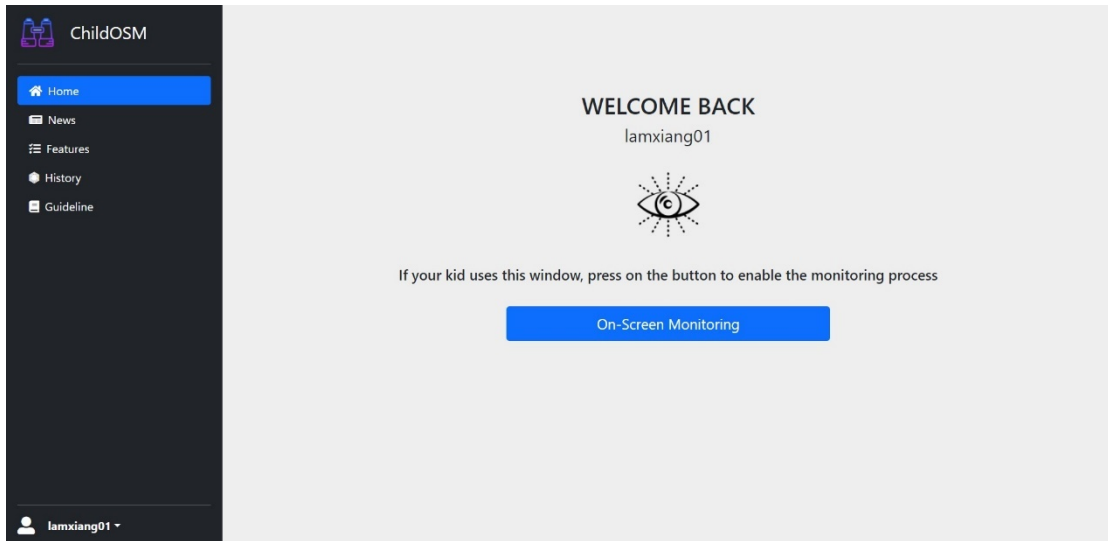


Figure 4.5.2.1: User Interface Design of Enable On-Screen Monitoring Function

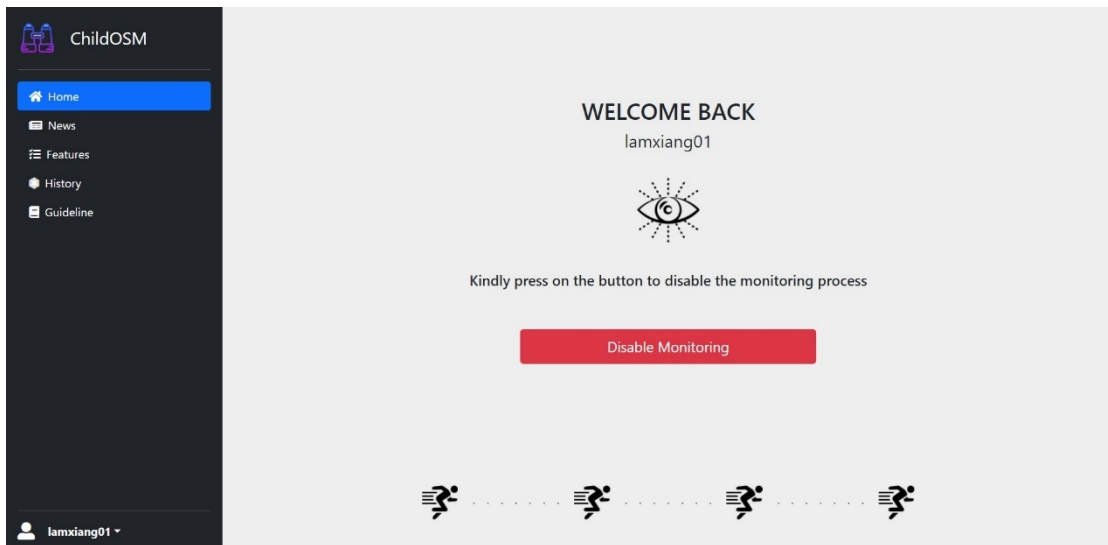


Figure 4.5.2.2: User Interface Design of Disable On-Screen Monitoring Function

4.5.3 Graphical User Interface Design of History Page

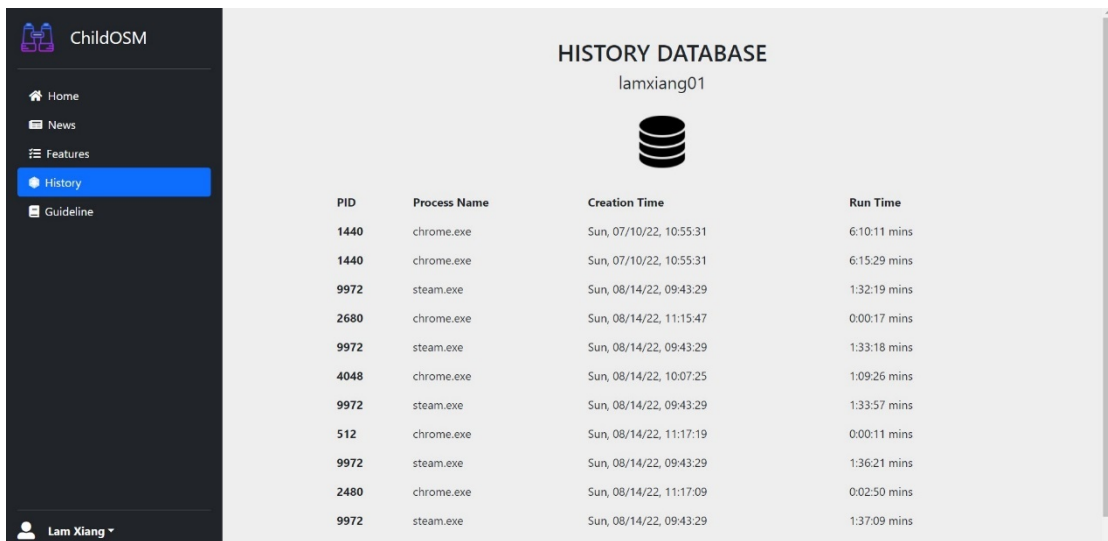


Figure 4.5.3.1: User Interface Design of History module

4.5.4 Graphical User Interface Design of Guideline Page

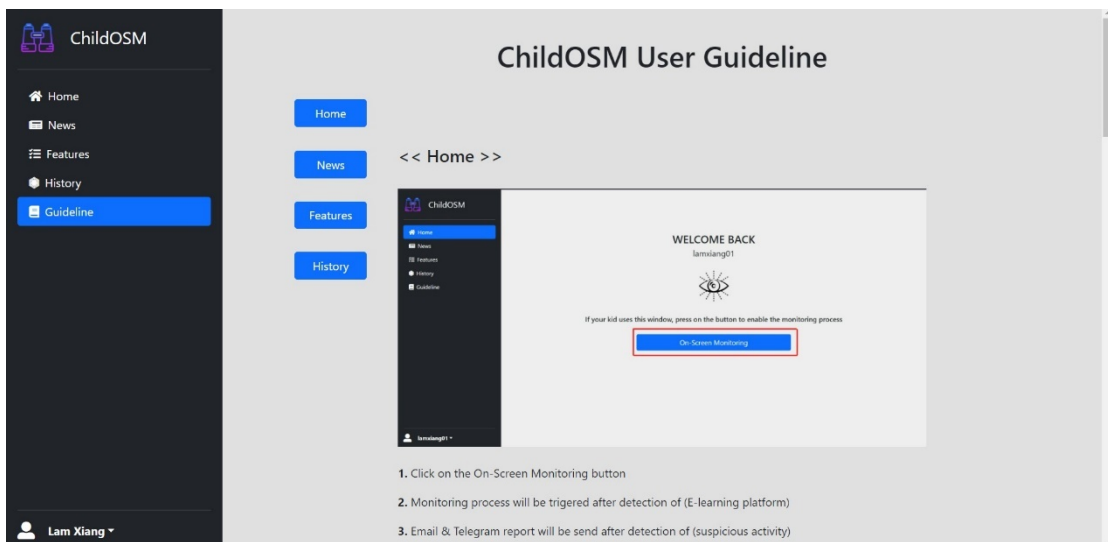


Figure 4.5.4.1: User Interface Design of Guideline module

4.5.5 Graphical User Interface Design of News Page

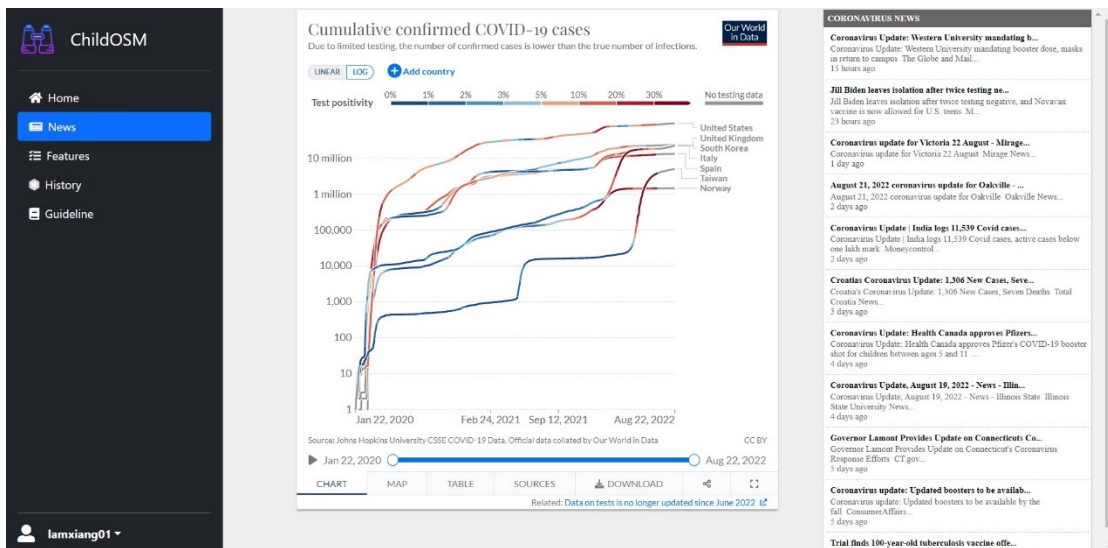


Figure 4.5.5. 1: User Interface Design of News module

4.5.6 Graphical User Interface Design of Features Page

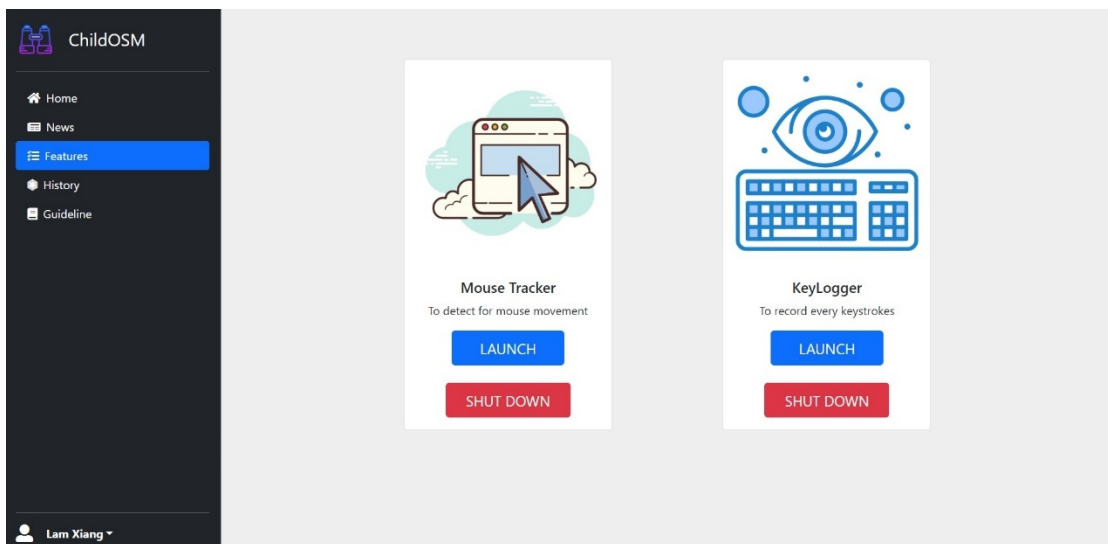


Figure 4.5.6. 1: User Interface Design of Features module

4.5.7 Graphical User Interface Design of Profile Page

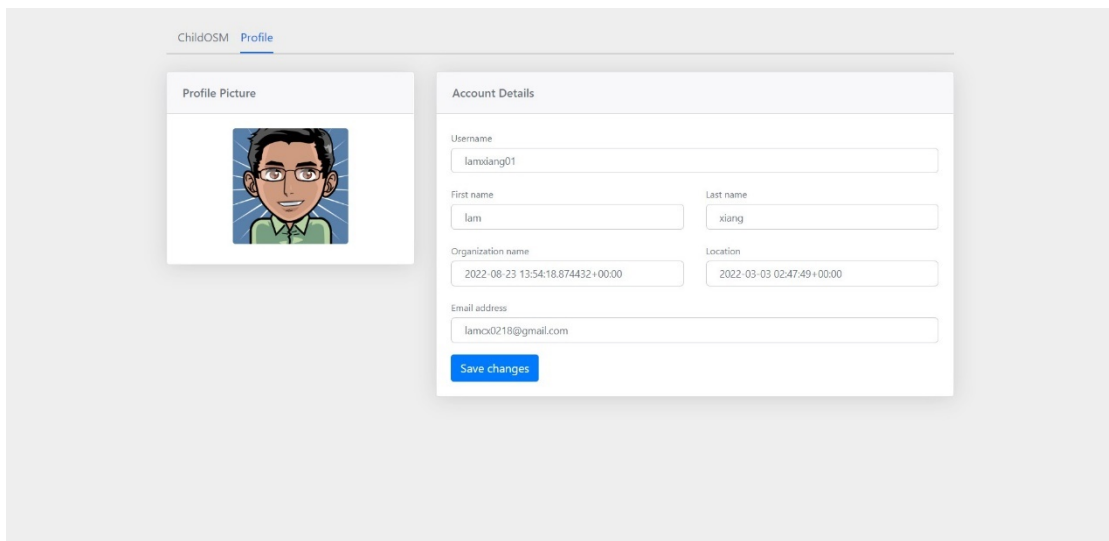


Figure 4.5.7. 1: User Interface Design of User profile module

4.6 Concluding Remark

In this chapter, the system design will be the chapter that provides the developer the foundation knowledge on the way of the implementation of the project by providing the workflow of the developed system with some diagrams. The first section in this chapter is the system architecture. The system architecture is very crucial because it gives an opportunity for the reader to gain more understanding of the system and how will the components interact with each other including the developer himself before starting the coding part [21]. The system architecture can be considered the foundation of an application.

The second section of this chapter is discussing the functional modules in the system. Next, will be the system flow, a section that briefly discusses about how the application will be run and what decisions and the process will be executed. This is particularly a very useful section for readers to understand how the system interactions work. It is able to describe the data just by showing all the branches and loops in a diagrammatic way.

Lastly will be the Graphical User Interface (GUI) design to describe how the interface look of the application and where the button and the navigation panel will be put for users to access it. A great user interface is very important to ensure that the interface itself provides consistency for the user to navigate through different functionalities in the web application. A good user interface design can attract more people to use the application because everything is simple and easy to understand.

Chapter 5: System Implementation

5.1 Hardware Setup

In this development of the project, only software is required to develop the project, hence there is not any hardware involved except the need for a pc to develop the parental monitoring application from sketch.

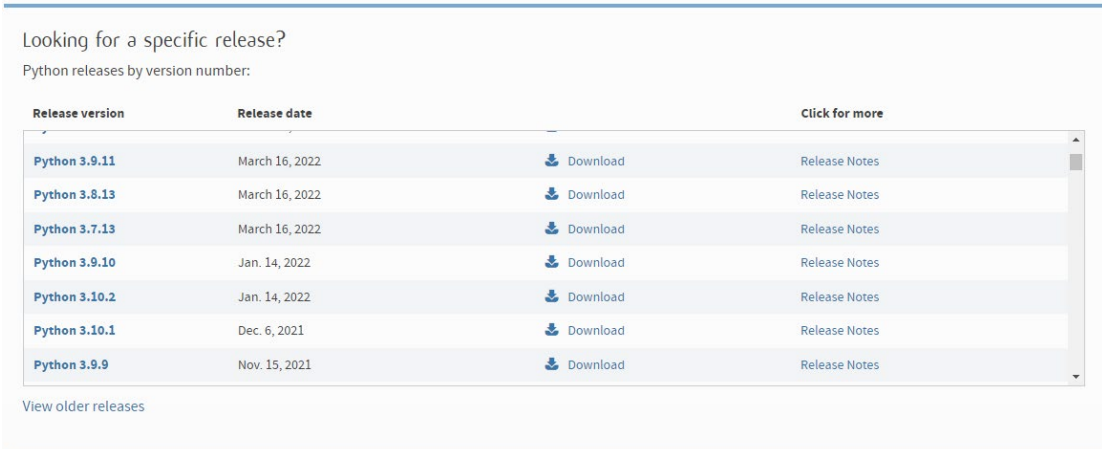
5.2 Software Setup

5.2.1 Python

In order to write and run the written code in python, a Python executable installer must be installed in the computer system. The official site to install Python is: <https://www.python.org/downloads/>

Step 1 – Select a version of Python to install

In the official site of Python, it has been provided with various versions of available Python to be installed by the users according to their preferences. In this project, Python version 3.10.2 will be used.



Looking for a specific release?
Python releases by version number:

Release version	Release date	Click for more	
Python 3.9.11	March 16, 2022	Download	Release Notes
Python 3.8.13	March 16, 2022	Download	Release Notes
Python 3.7.13	March 16, 2022	Download	Release Notes
Python 3.9.10	Jan. 14, 2022	Download	Release Notes
Python 3.10.2	Jan. 14, 2022	Download	Release Notes
Python 3.10.1	Dec. 6, 2021	Download	Release Notes
Python 3.9.9	Nov. 15, 2021	Download	Release Notes

[View older releases](#)

Figure 5.2.1. 1: Various version of available Python installer

Looking for a specific release?
Python releases by version number:

Release version	Release date		Click for more
Python 3.9.11	March 16, 2022	Download	Release Notes
Python 3.8.13	March 16, 2022	Download	Release Notes
Python 3.7.13	March 16, 2022	Download	Release Notes
Python 3.9.10	Jan. 14, 2022	Download	Release Notes
Python 3.10.2	Jan. 14, 2022	Download	Release Notes
Python 3.10.1	Dec. 6, 2021	Download	Release Notes
Python 3.9.9	Nov. 15, 2021	Download	Release Notes

[View older releases](#)

Figure 5.2.1. 2: Python version 3.10.2

Step 2 – Download Python Executable Installer

After choosing the correct version of Python that is required, click on the Download and various executable installers will be listed. Each executable installer has its own specification to be run in a different type of operating system. Window installer (64-bit) will be used in this development of the project. Figure below shows the various version of Python Executable Installer.

Files

Version	Operating System	Description	MD5 Sum	File Size	GPG
Gzipped source tarball	Source release		67c92270be6701f4a6fed57c4530139b	25067363	SIG
XZ compressed source tarball	Source release		14e8c22458ed7779a1957b26cde01db9	18780936	SIG
macOS 64-bit universal2 installer	macOS	for macOS 10.9 and later	edced8c45edc72768f03f66cf4b4fa27	39805121	SIG
Windows embeddable package (32-bit)	Windows		44875e70945bf45f655f61bb82dba211	7541211	SIG
Windows embeddable package (64-bit)	Windows		f98f8d7dfa952224fca313ed8e9923d8	8509629	SIG
Windows help file	Windows		342cabb615e5672e38c9906a3816d727	9575352	SIG
Windows installer (32-bit)	Windows		ef91f4e873280d37eb5bc26e7b18d3d1	27072760	SIG
Windows installer (64-bit)	Windows	Recommended	2b4fd1ed6e736f0e65572da64c17e020	28239176	SIG

Figure 5.2.1. 3: Python version for window

Step 3 – Install Executable Installer

The whole process of installation may take about a few minutes and after the installation is successful, it will indicate the setup was successful as shown in the figure below.



Figure 5.2.1. 4: Indication of successful installation

Step 4 – Check installation

To ensure the Python whether successful install in the computer system, a command 'python' can be typed in the command prompt and the command prompt will be displayed if the python exists in the computer system.

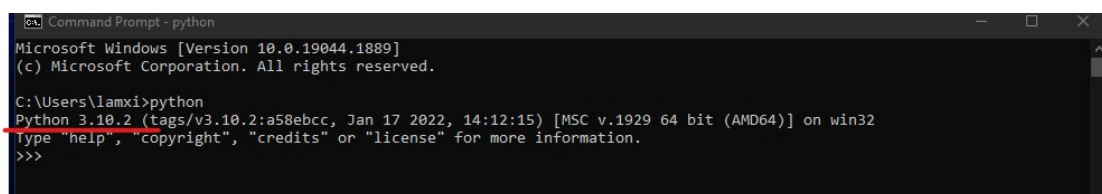


Figure 5.2.1. 5: Checking the existence of Python in computer system

5.2.2 Visual Studio Code

In order to write the python source code, Visual Studio Code is being chosen as the source code editor to write code and debug code that runs on PC. The official site to install Visual Studio Code is: <https://code.visualstudio.com/download>

Step 1 – Download Visual Studio Code

The window version Visual Studio Code will be installed since the computer system is running in the Window 10 operating system. The size of the Visual Studio Code is approximately about 79 Mb.

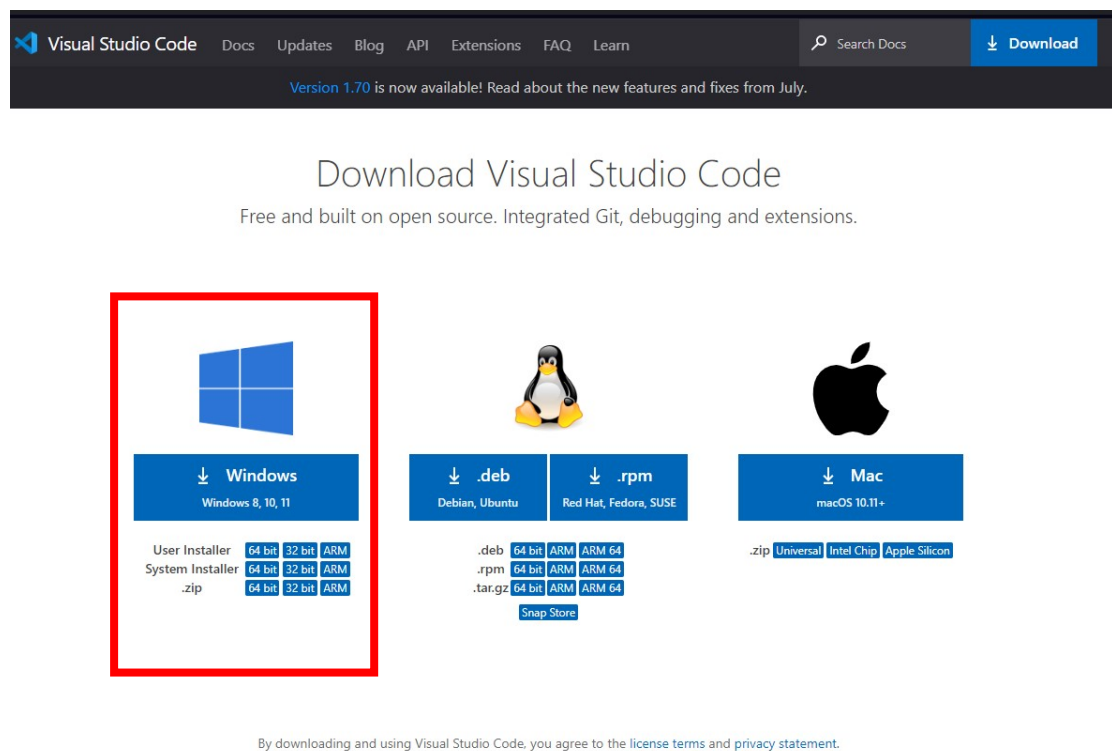


Figure 5.2.2. 1: Download site of Visual Studio Code

Step 2 – Check installation

The whole installation process less than 1 minute. After success to install the Visual Studio Code application, try to open the Visual Studio Code to ensure the source editor able to run in the system. Figure below shows the image of the Visual Studio Code main page.

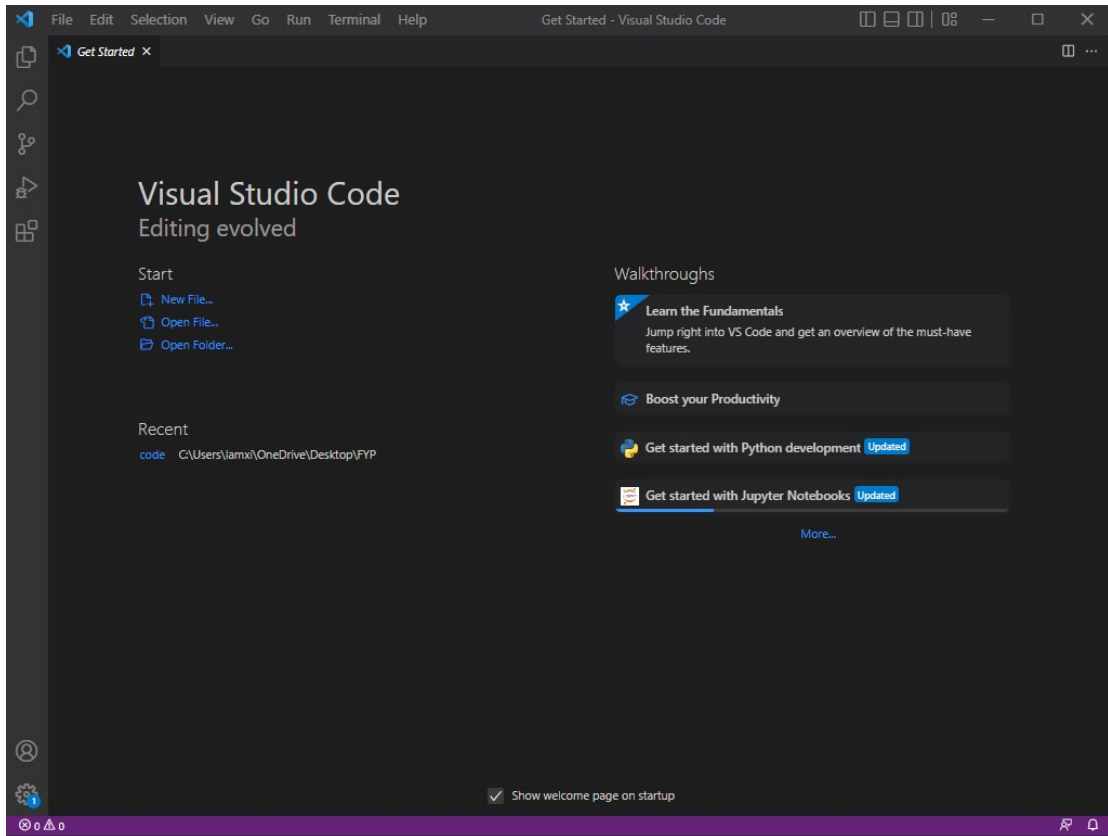


Figure 5.2.2. 2: The main interface of Visual Studio Code

5.3 Setting and Configuration

5.3.1 Set up Python in Visual Studio Code

Step 1 – Find and copy the path of Python file

Firstly, go to the Windows search bar and type 'python.exe', then click on the open file location. Afterward, the system will direct to open the file location of python.exe. Right-click on the python.exe file and click on the properties and copy the current pathway.

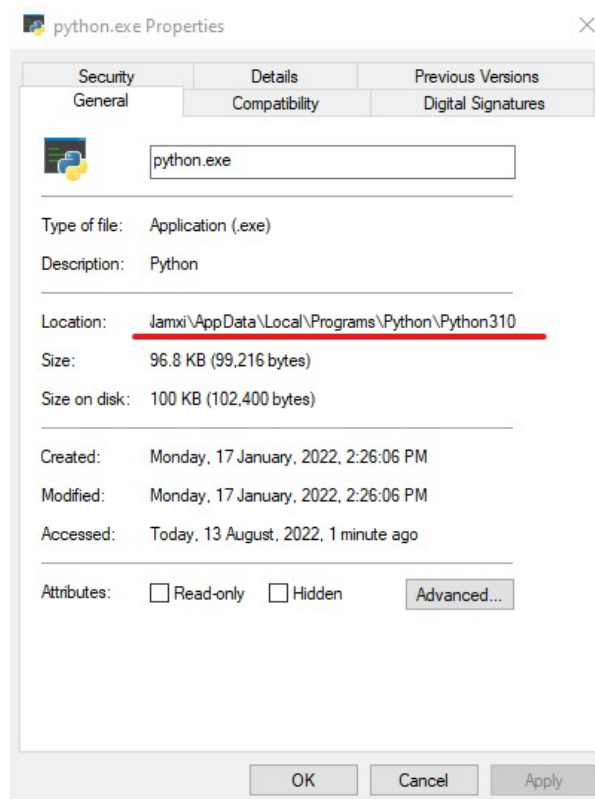


Figure 5.3.1. 1: The location of python.exe file

Step 2– Look for Environment Variable

Before able to run Python in Visual Studio Code, this step is a must before able to write Python code in the source code editor. Firstly, go to Windows search bar and type 'System', inside the Related Settings section, click on the Advanced System Settings. Then click on the Environment Variables button in the page that shown up. Figure below show the look of Advanced System Settings in Windows.

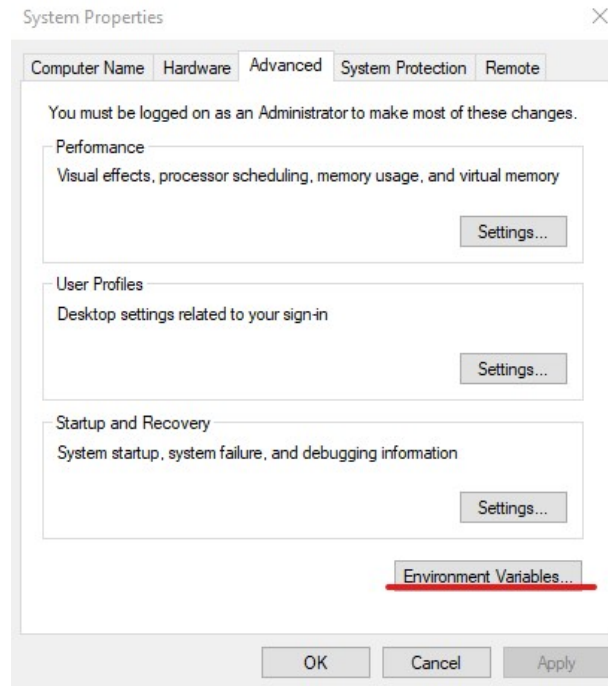


Figure 5.3.1. 2: System Properties of a Windows OS computer

Step 3 – Open Environment Variables

After clicking on the Environment Variables button, proceed to the system variables section and choose for the Path variable. Click on the Edit button to modify the environment variable.

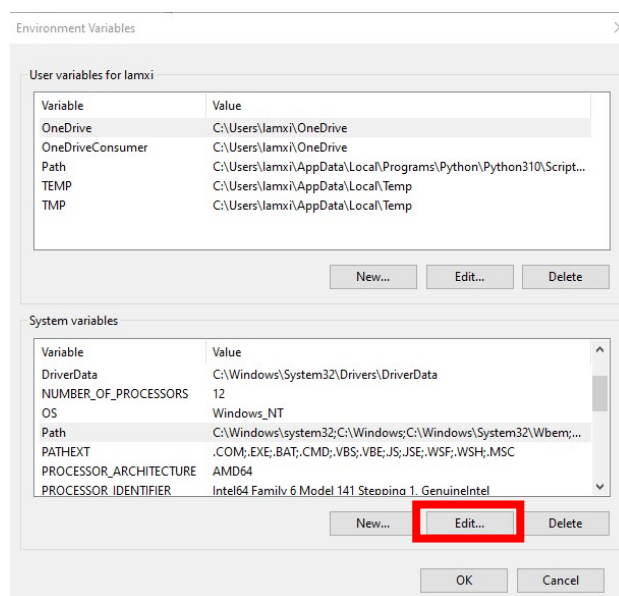
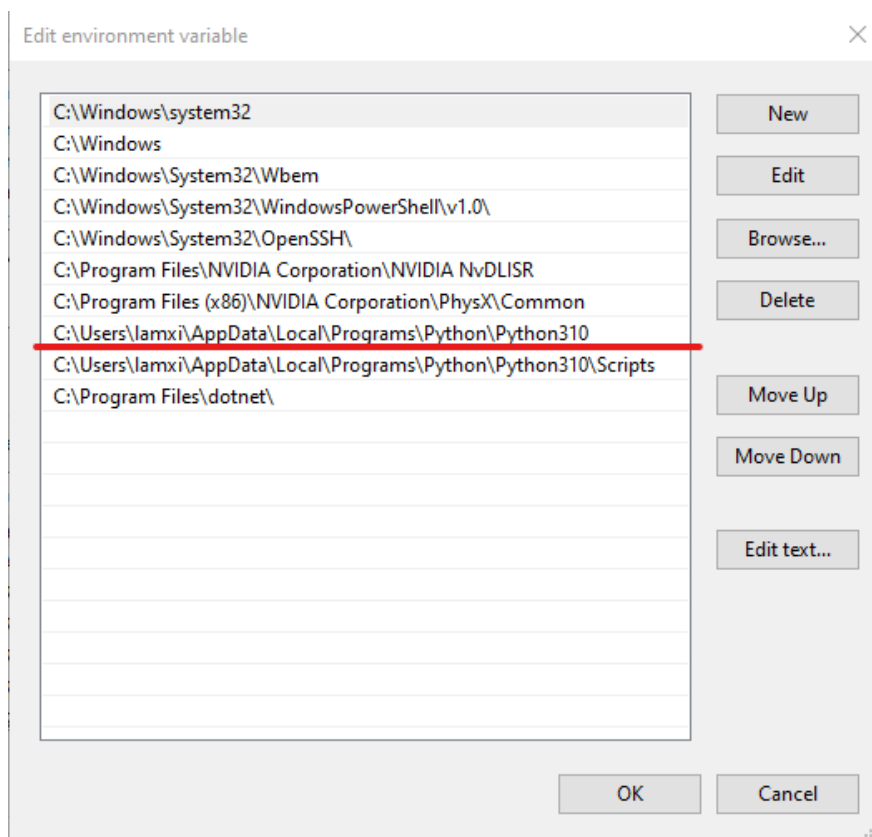


Figure 5.3.1. 3: Environment Variable of a Windows OS computerStep 4 – Paste the pathway into the Environment Variables

In the section of the Edit environment variable, click on the new button and paste the pathway that was copied before into the new row provided. After clicking on the ok button to apply for the latest changes.

**Figure 5.3.1. 4: Setting up the pathway in environment variable**

Step 5 – Download Python extension in Visual Studio Code

Open the Visual Studio Code application and proceed to the extension section. Go to the provided search bar and type ‘python’. Then a list of Python extensions will be displayed and click on the first Python extension. This official Python extension is from Microsoft and then just click on install to install the extension. Then, the extension will be automatically installed into the system.

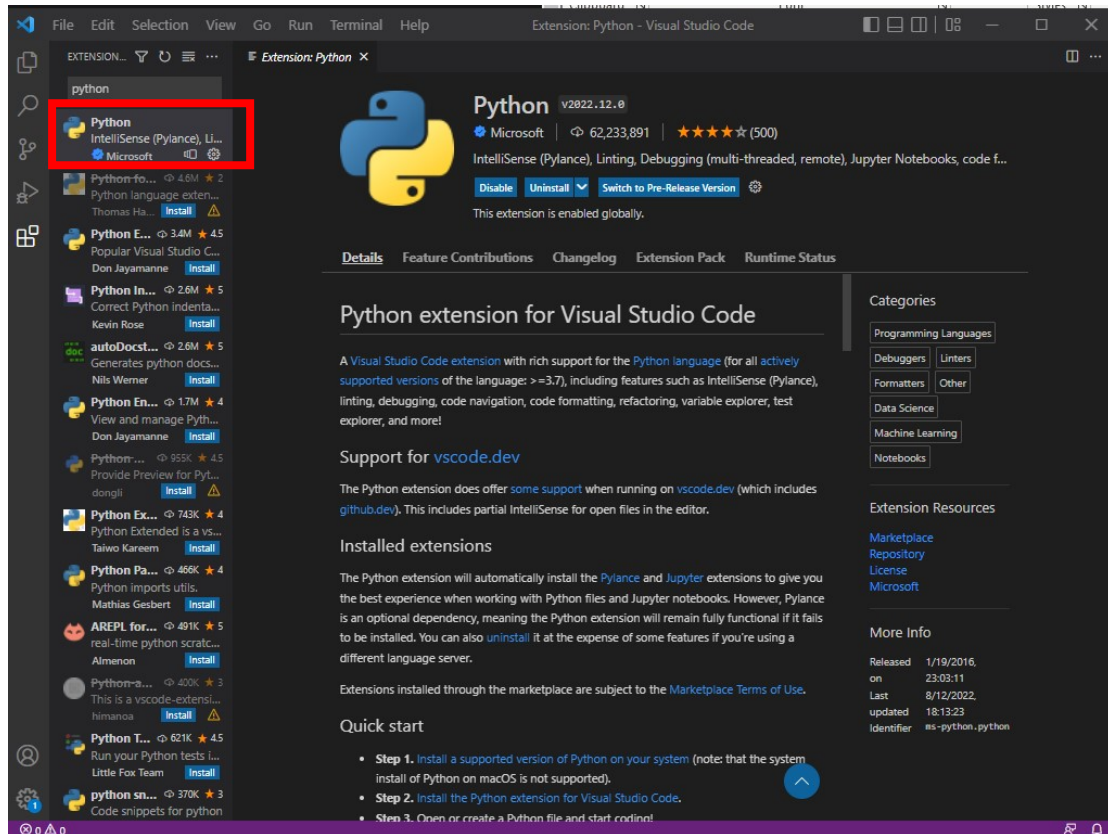


Figure 5.3.1. 5: Python extension in Visual Studio Code

Step 6 – Start to write Python code

After going through all the steps above, now the source code editor will be able to start to write Python script and run it.

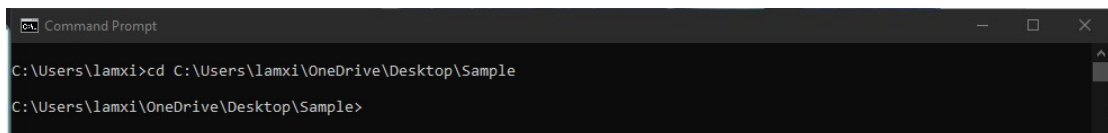
5.3.2 Set up Django Project in Visual Studio Code

Step 1 – Create a folder

Firstly, create a folder with the desired name on the Desktop of a computer system. In this example, a folder named Sample will be created and put onto the Desktop.

Step 2 -The use of command prompt to create virtual environment

Then, open the command prompt of the computer system and change directory to the location of the folder that created previously by using the command cd.



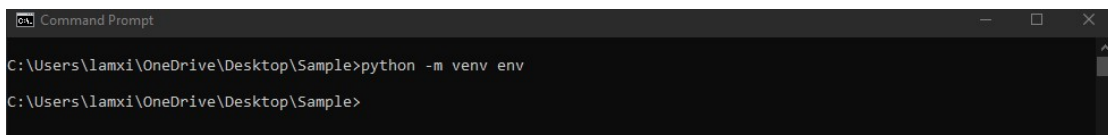
```

C:\Users\lamxi>cd C:\Users\lamxi\OneDrive\Desktop\Sample
C:\Users\lamxi\OneDrive\Desktop\Sample>

```

Figure 5.3.2. 1: Guideline to set up Django project in command prompt

After that, use the command `python -m venv env` to create a virtual environment.



```

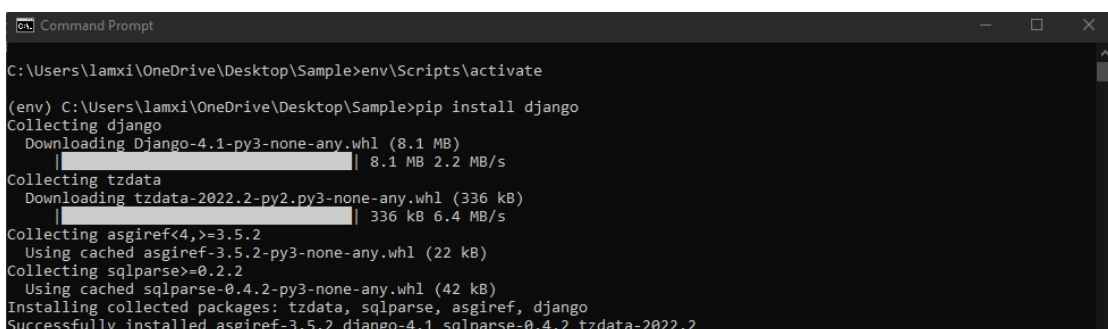
C:\Users\lamxi\OneDrive\Desktop\Sample>python -m venv env
C:\Users\lamxi\OneDrive\Desktop\Sample>

```

Figure 5.3.2. 2: Guideline to set up Django project in command prompt

Step 3 -Download Django package

Before download the Django package, activate the virtual environment by using the command `env\Scripts\activate`. Then download the Django package into the virtual environment by using the command `pip install Django`.



```

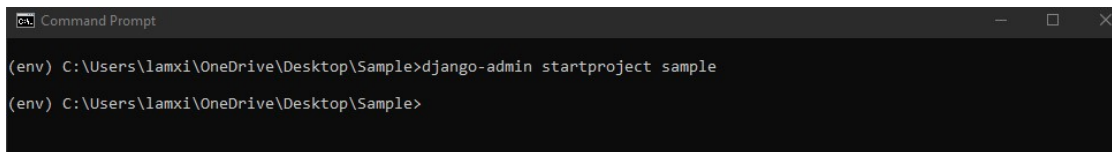
C:\Users\lamxi\OneDrive\Desktop\Sample>env\Scripts\activate

(env) C:\Users\lamxi\OneDrive\Desktop\Sample>pip install django
Collecting django
  Downloading Django-4.1-py3-none-any.whl (8.1 MB)
    |#####| 8.1 MB 2.2 MB/s
Collecting tzdata
  Downloading tzdata-2022.2-py2.py3-none-any.whl (336 kB)
    |#####| 336 kB 6.4 MB/s
Collecting asgiref<4,>=3.5.2
  Using cached asgiref-3.5.2-py3-none-any.whl (22 kB)
Collecting sqlparse>=0.2.2
  Using cached sqlparse-0.4.2-py3-none-any.whl (42 kB)
Installing collected packages: tzdata, sqlparse, asgiref, django
Successfully installed asgiref-3.5.2 django-4.1 sqlparse-0.4.2 tzdata-2022.2

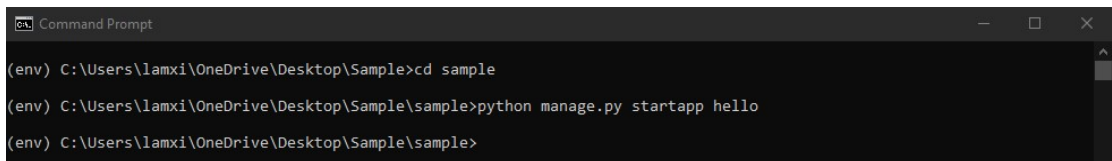
```

Figure 5.3.2. 3: Guideline to set up Django project in command promptStep 4 – Start Django project

Next, start the Django actual project by write the command Django-admin startproject sample. Then start to start an application using this project, we firstly change directory into the sample project created just now by using the command cd sample. Then in order to start an application, use the command python manage.py startapp hello.



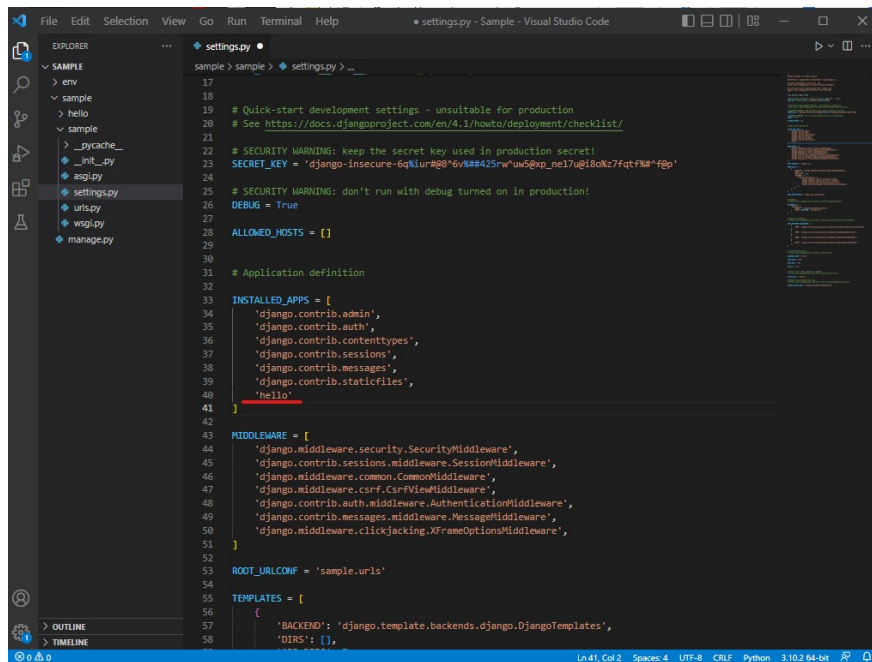
```
Command Prompt
(env) C:\Users\lamxi\OneDrive\Desktop\Sample>django-admin startproject sample
(env) C:\Users\lamxi\OneDrive\Desktop\Sample>
```

Figure 5.3.2. 4: Guideline to set up Django project in command prompt

```
Command Prompt
(env) C:\Users\lamxi\OneDrive\Desktop\Sample>cd sample
(env) C:\Users\lamxi\OneDrive\Desktop\Sample\sample>python manage.py startapp hello
(env) C:\Users\lamxi\OneDrive\Desktop\Sample\sample>
```

Figure 5.3.2. 5: Guideline to set up Django project in command promptStep 5 -Add pathway

In this step, using the Visual Studio Code to open the folder Sample that created in step 1. Then go to settings.py under the directory sample and go to the section INSTALLED_APPS and add the hello folder name.



```

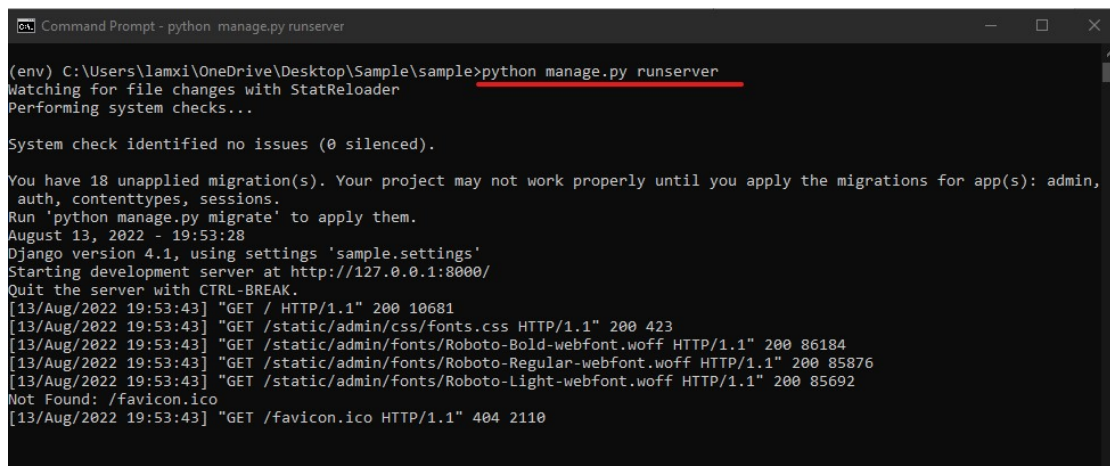
17
18
19 # Quick-start development settings - unsuitable for production
20 # See https://docs.djangoproject.com/en/4.1/howto/deployment/checklist/
21
22 # SECURITY WARNING: keep the secret key used in production secret!
23 SECRET_KEY = 'django-insecure-6qkiur#0@*6vk##42snw*ud9@p_ne17u@i80kz7Fqt-Fk8*f6p'
24
25 # SECURITY WARNING: don't run with debug turned on in production!
26 DEBUG = True
27
28 ALLOWED_HOSTS = []
29
30
31 # Application definition
32
33 INSTALLED_APPS = [
34     'django.contrib.admin',
35     'django.contrib.auth',
36     'django.contrib.contenttypes',
37     'django.contrib.sessions',
38     'django.contrib.messages',
39     'django.contrib.staticfiles',
40     'hello'
41 ]
42
43 MIDDLEWARE = [
44     'django.middleware.security.SecurityMiddleware',
45     'django.contrib.sessions.middleware.SessionMiddleware',
46     'django.middleware.common.CommonMiddleware',
47     'django.middleware.csrf.CsrfViewMiddleware',
48     'django.contrib.auth.middleware.AuthenticationMiddleware',
49     'django.contrib.messages.middleware.MessageMiddleware',
50     'django.middleware.clickjacking.XFrameOptionsMiddleware',
51 ]
52
53 ROOT_URLCONF = 'sample.urls'
54
55 TEMPLATES = [
56     {
57         'BACKEND': 'django.template.backends.django.DjangoTemplates',
58         'DIRS': [],

```

Figure 5.3.2. 6: Define new pathway in Visual Studio Code

Step 6 -Run the Django server

After finished the previous step, back to command prompt and type the command `python manage.py runserver` to run the Django application.



```

C:\Users\lamxi\OneDrive\Desktop\Sample\sample>python manage.py runserver
Watching for file changes with StatReloader
Performing system checks...

System check identified no issues (0 silenced).

You have 18 unapplied migration(s). Your project may not work properly until you apply the migrations for app(s): admin,
auth, contenttypes, sessions.
Run 'python manage.py migrate' to apply them.
August 13, 2022 - 19:53:28
Django version 4.1, using settings 'sample.settings'
Starting development server at http://127.0.0.1:8000/
Quit the server with CTRL-BREAK.
[13/Aug/2022 19:53:43] "GET / HTTP/1.1" 200 10681
[13/Aug/2022 19:53:43] "GET /static/admin/css/fonts.css HTTP/1.1" 200 423
[13/Aug/2022 19:53:43] "GET /static/admin/fonts/Roboto-Bold-webfont.woff HTTP/1.1" 200 86184
[13/Aug/2022 19:53:43] "GET /static/admin/fonts/Roboto-Regular-webfont.woff HTTP/1.1" 200 85876
[13/Aug/2022 19:53:43] "GET /static/admin/fonts/Roboto-Light-webfont.woff HTTP/1.1" 200 85692
Not Found: /favicon.ico
[13/Aug/2022 19:53:43] "GET /favicon.ico HTTP/1.1" 404 2110

```

Figure 5.3.2. 7: Run Django project in command prompt

Step 7 -Run in web browser

Afterward, copy the URL that has been provided in the command prompt and paste the URL into any available web browser. Then, a message will be indicated if the Django

project success to be deployed. If successful to deploy, then can start to work on the project itself by creating more a interesting template and Python script.

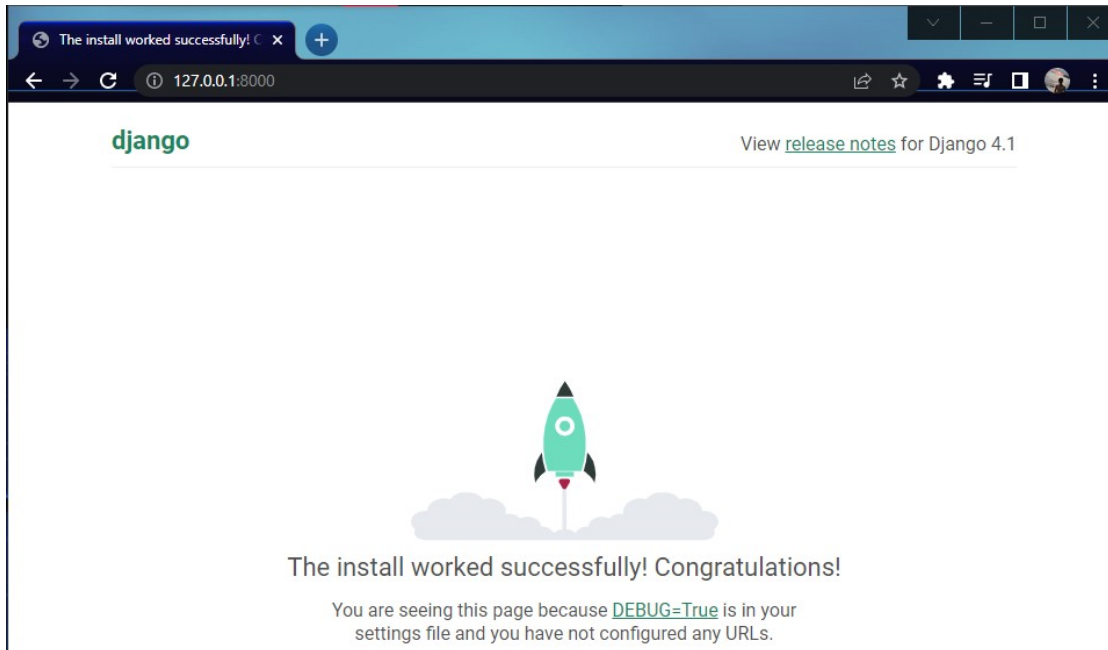


Figure 5.3.2. 8: Deploy Django project using web browser

5.4 System Operation

5.4.1 Authentication

If a user is a totally new user to the Children On-Screen Activity Monitoring application, then he/she would be required to register for an account before being able to login into the application. Figure below shows the register page of Children On-Screen Activity Monitoring application.

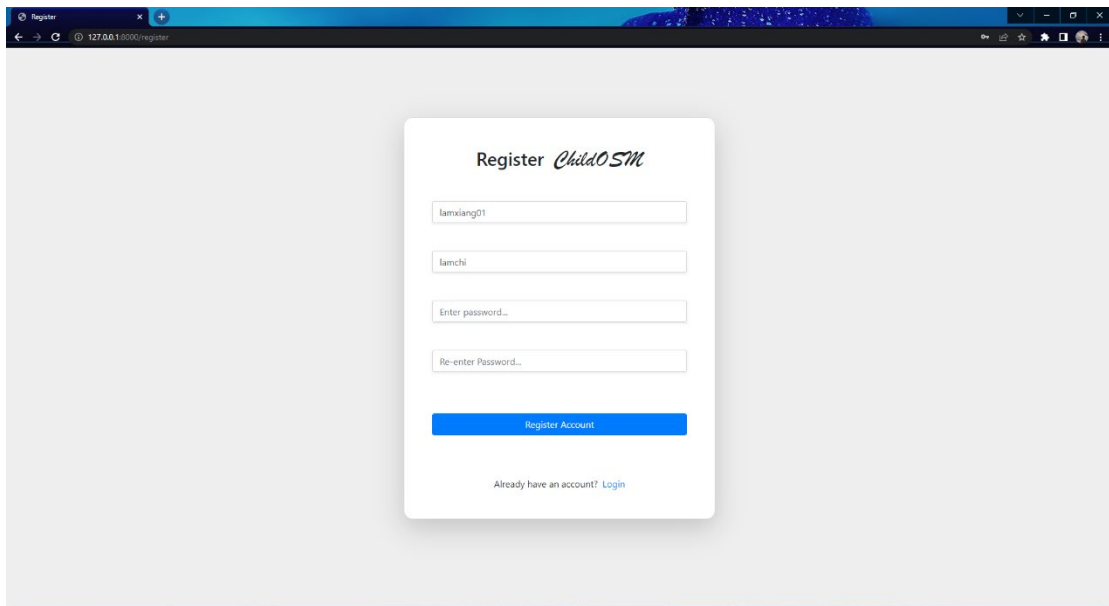


Figure 5.4.1. 1: Registration page of Children On-Screen Activity Monitoring application

After a user register an account, he/she can proceed to the login page. In this section, users are required to verify their identity by entering their username and password. Only a valid user with correct username and password able to access to the functionalities of Children On-Screen Activity Monitoring application.

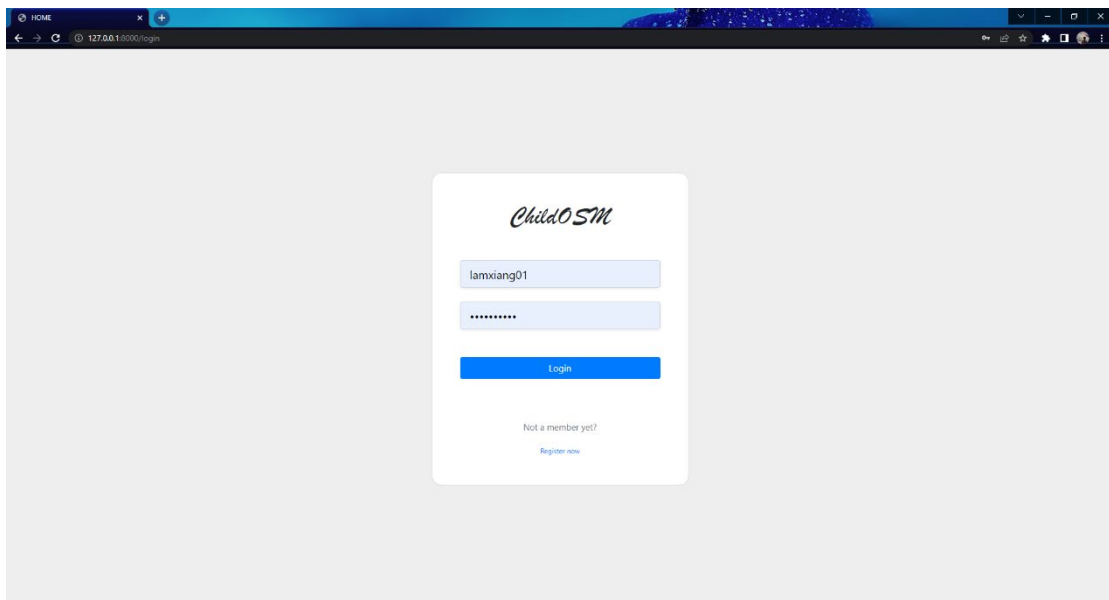


Figure 5.4.1. 2: Login page of Children On-Screen Activity Monitoring application

5.4.2 On-Screen Monitoring Functionality

After user's login into the application, they will be automatically directed to the main page of the Children On-screen Monitoring application.

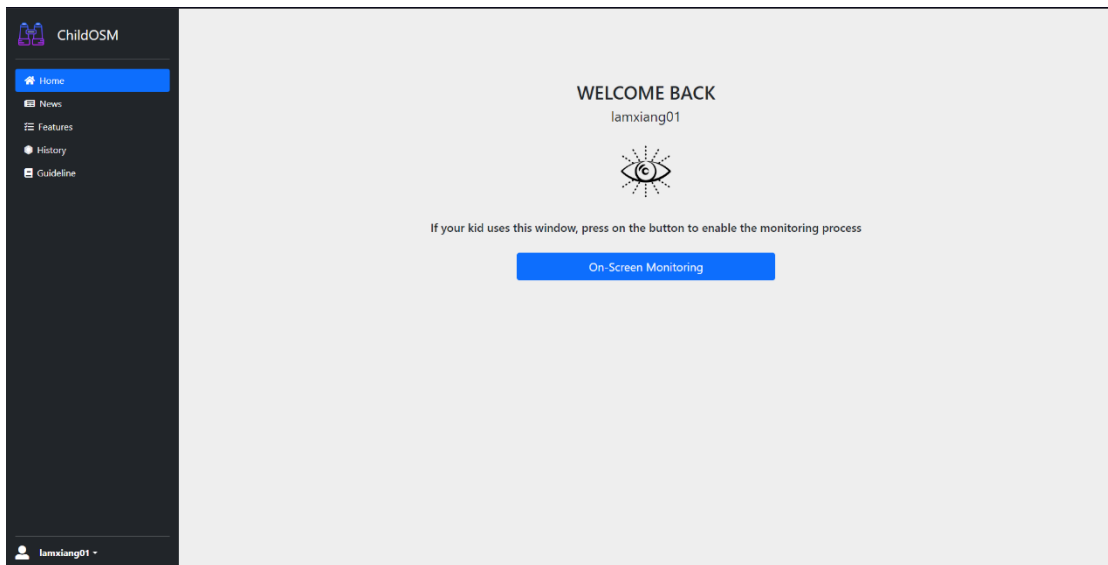


Figure 5.4.2. 1: Enable monitoring process page of Children On-Screen Activity Monitoring application

The monitoring will be started after users click on the On-Screen Monitoring button and the interface pattern will be changed after the click.

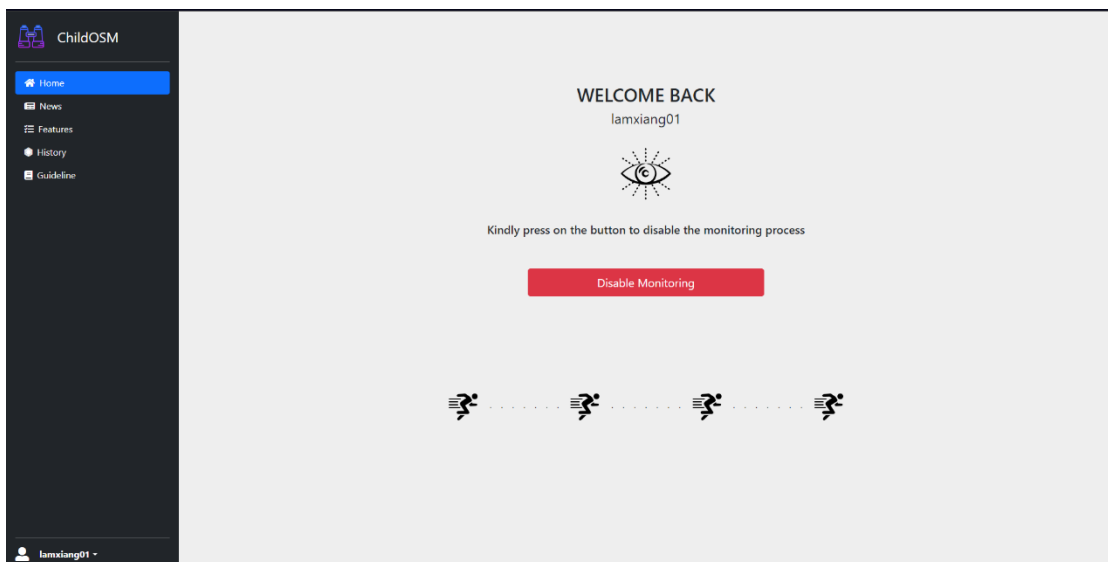


Figure 5.4.2. 2: Disable monitoring process page of Children On-Screen Activity Monitoring application

CHAPTER 5

After clicking on the button, it also indicates the application starts the monitoring process of children during the online class. The application will start to detect the existence of online E-learning platforms such as Microsoft Teams, Zoom, Google Classroom etc. If any of these E-learning platforms does not exist, the system will only keep checking for these platforms and will not do anything. If any of these E-learning platforms exist in the targeted computer system, then the system will start to detect suspicious activities that may be carried out by the children during the online class. The suspicious activities can be differentiated into two different types of categories, entertainment activity and browser activity. The entertainment activity is such as YouTube, Steam, Origin, etc. while the browser activity is like Google Chrome, Firefox, Microsoft Edge, etc. If children do not carry out any suspicious activity, then the system will not do anything, however, if the system was able to detect the existence of this activity, then it will trigger another functionality by sending a message to parents to notify them that their children do not fully pay attention during the online class and try to carry out other tasks via email and telegram.

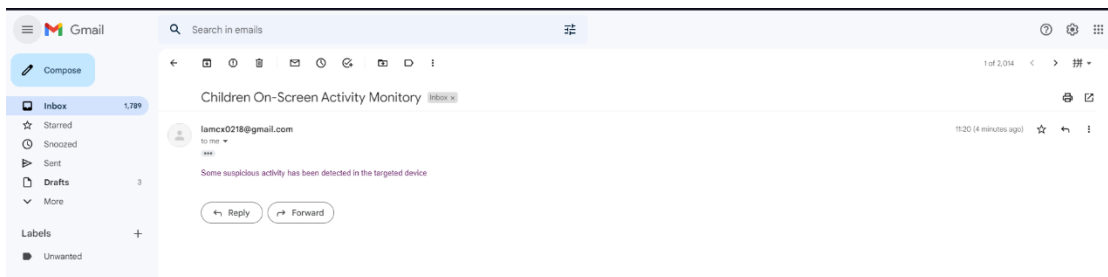


Figure 5.4.2. 3: Notification in email

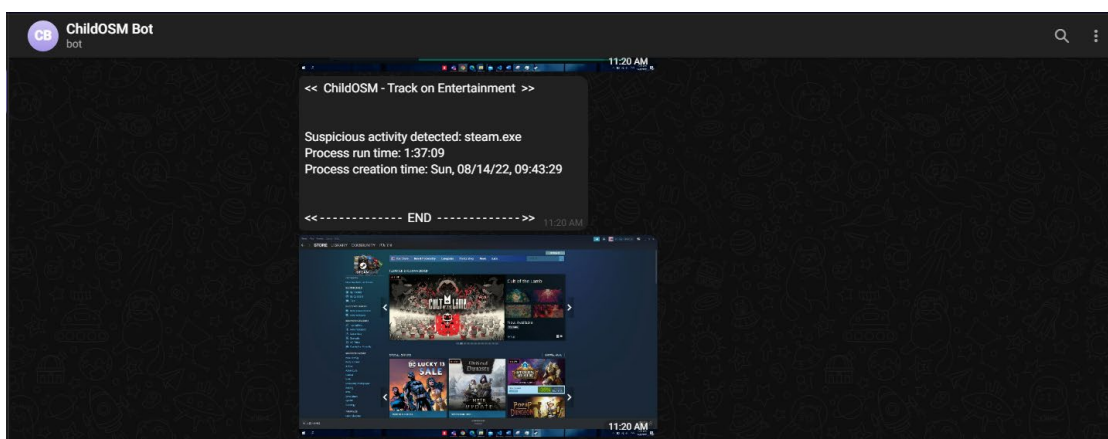


Figure 5.4.2. 4: Automated report generated in Telegram with screenshot

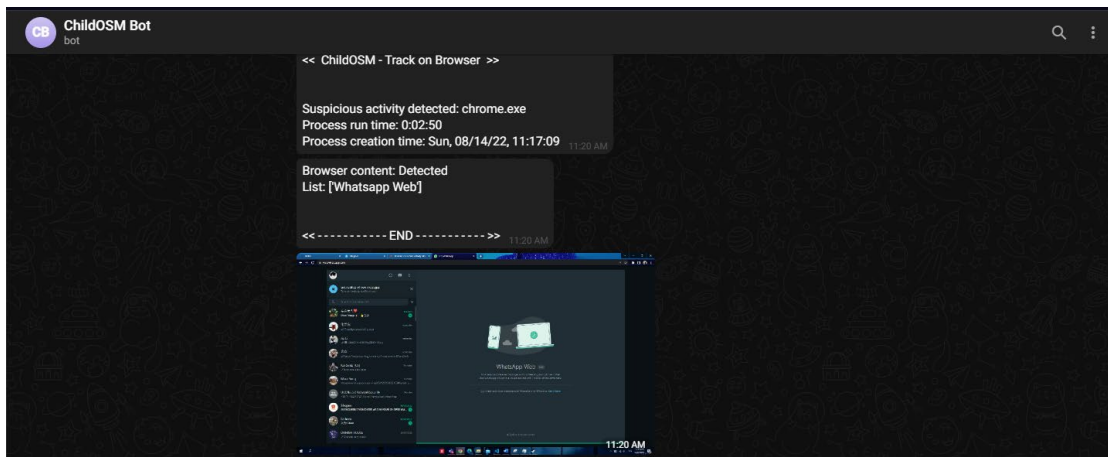


Figure 5.4.2. 5: Automated report generated in Telegram with screenshot

5.4.3 News Functionality

In this news module, users can view the latest news of Covid-19 with its cumulative confirmed cases since this application is specially designed to overcome the disadvantages of online classes during the pandemic.

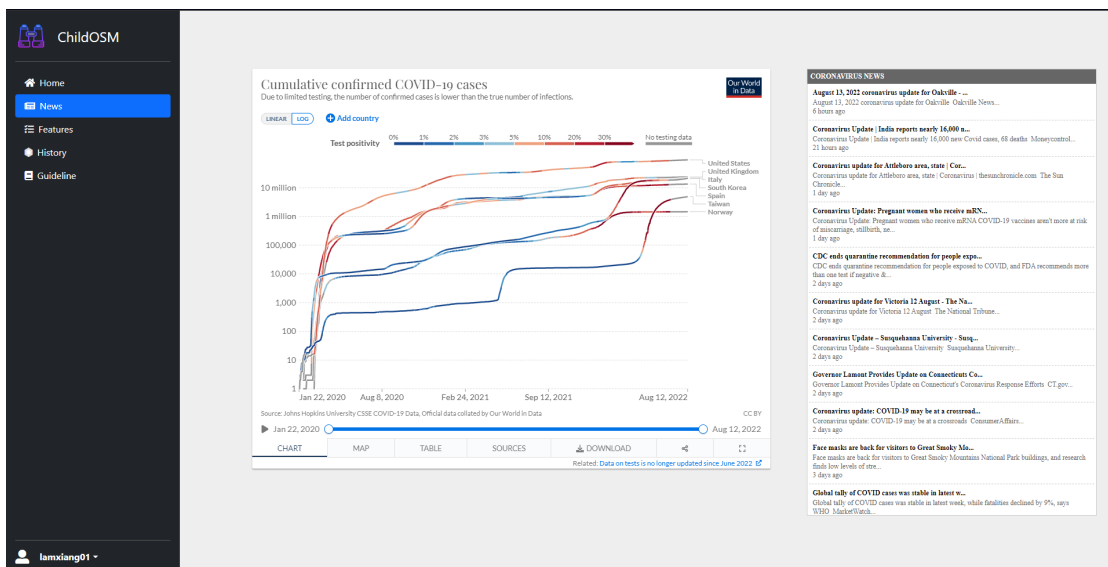


Figure 5.4.3. 1: News module page of Children On-Screen Activity Monitoring application

5.4.4 Mouse Tracker Functionality

In the Feature module, it consists of two functionalities which are a mouse tracker and a keylogger. Users can simply trigger the functionality of the mouse tracker by clicking on the LAUNCH button and cancel it by clicking on the SHUT DOWN button.

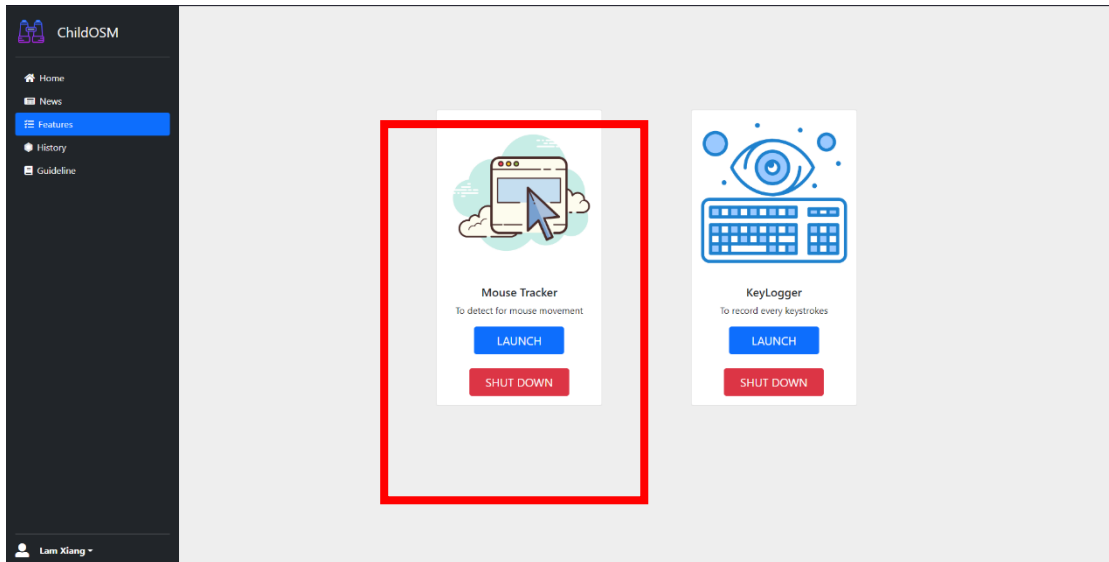


Figure 5.4.4. 1: Mouse Tracker page of Children On-Screen Activity Monitoring application

After the user launches the mouse tracker functionality, the system will automatically detect for the existence of the E-learning platform. If the E-learning platform exists, then it will trigger its functionality. The basic idea of this mouse tracker functionality is to detect the mouse movement of children every 10 minutes. If a child does not move his/ her mouse for about 10 minutes, then the system will send a telegram report to the parent and the targeted computer system will also produce a few beeps sound to inform the child to move his/her mouse.

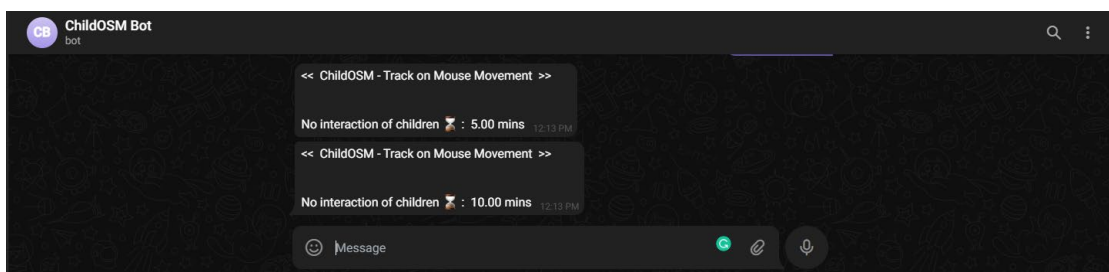


Figure 5.4.4. 2: Quick report generated in Telegram

5.4.5 Keylogger Functionality

The Feature module, it consists of two functionalities which are a mouse tracker and a keylogger. Users can simply trigger the functionality of the keylogger by clicking on the LAUNCH button and cancel it by clicking on the SHUT DOWN button.

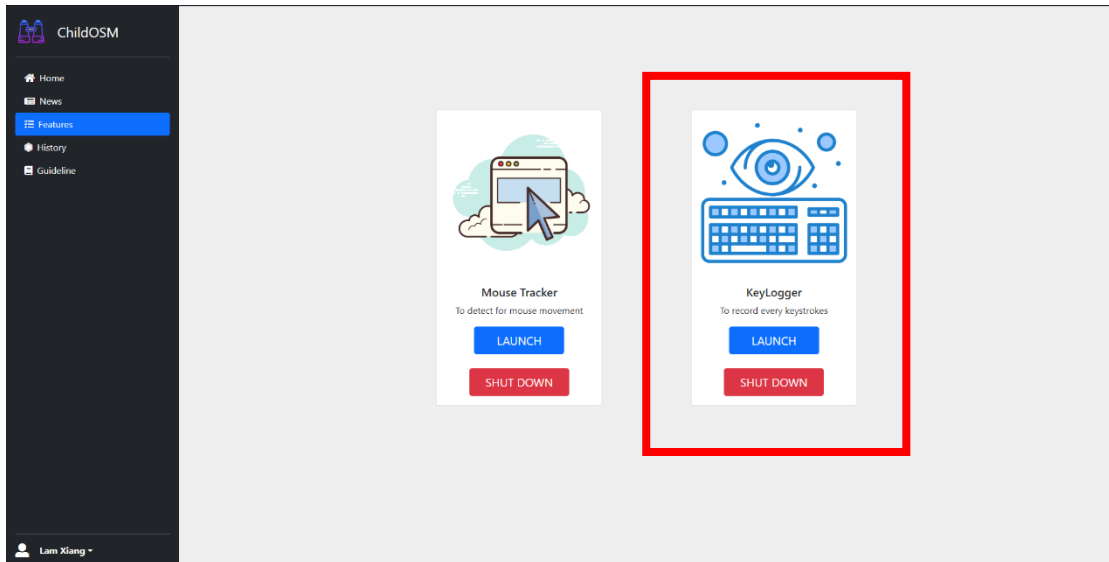


Figure 5.4.5. 1: Features page of Children On-Screen Activity Monitoring application

After the user launches the mouse tracker functionality, the system will automatically detect for the existence of the E-learning platform. If the E-learning platform exists, then it will trigger its functionality. The basic idea of this keylogger functionality is to monitor the keystrokes of children. It will record all the keystrokes typed by a child during the online class and will send a text file to the parent via telegram once the system was unable to detect for the E-learning platform which also indicates children finished their online class. The keylogger will not record any keystroke after the online class is finished to protect the privacy of children.

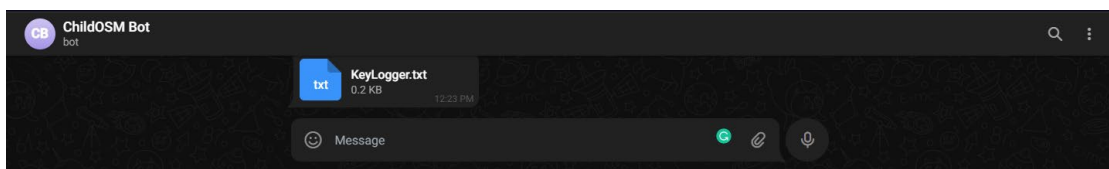


Figure 5.4.5. 2: Text file generated in Telegram



Figure 5.4.5. 3: The content of the keylogger text file

5.4.6 History Functionality

By clicking on the History button on the system, a user will be able to view all the history data that was created before during the monitoring process of children.

PID	Process Name	Creation Time	Run Time
1440	chrome.exe	Sun, 07/10/22, 10:55:31	6:10:11 mins
1440	chrome.exe	Sun, 07/10/22, 10:55:31	6:15:29 mins
9972	steam.exe	Sun, 08/14/22, 09:43:29	1:32:19 mins
2680	chrome.exe	Sun, 08/14/22, 11:15:47	0:00:17 mins
9972	steam.exe	Sun, 08/14/22, 09:43:29	1:33:18 mins
4048	chrome.exe	Sun, 08/14/22, 10:07:25	1:09:26 mins
9972	steam.exe	Sun, 08/14/22, 09:43:29	1:33:57 mins
512	chrome.exe	Sun, 08/14/22, 11:17:19	0:00:11 mins
9972	steam.exe	Sun, 08/14/22, 09:43:29	1:36:21 mins
2480	chrome.exe	Sun, 08/14/22, 11:17:09	0:02:50 mins
9972	steam.exe	Sun, 08/14/22, 09:43:29	1:37:09 mins
2480	chrome.exe	Sun, 08/14/22, 11:17:09	0:03:34 mins

Figure 5.4.6. 1: : History module page of Children On-Screen Activity Monitoring application

5.4.7 Guideline Functionality

Users always able to view the provided guideline in order to get fully access to the application. A guideline able to guide user throughout the whole system.

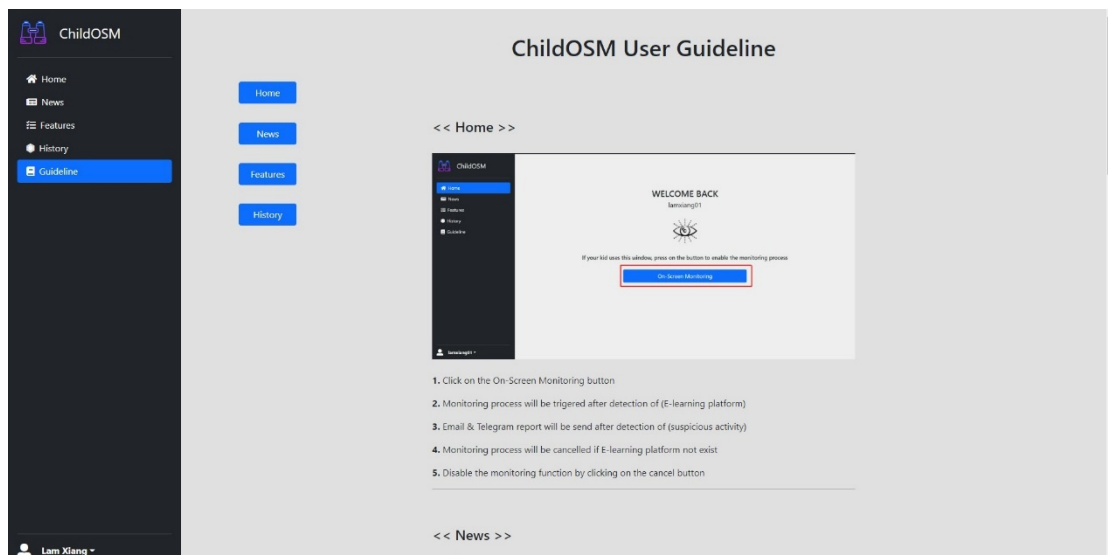


Figure 5.4.7. 1: Guideline module page of Children On-Screen Activity Monitoring application

5.4.8 User Profile

Users can view and edit their personal information in the Children On-Screen Activity Monitoring application in the profile section.

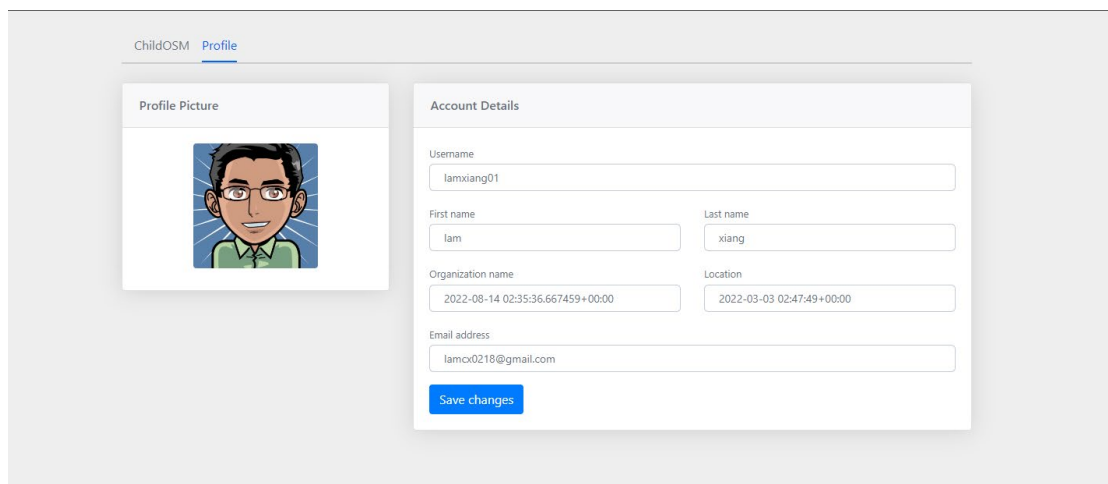


Figure 5.4.8. 1: User profile page of Children On-Screen Activity Monitoring application

5.5 Concluding Remark

This chapter will be discussing the implementation of the system which consists of three different sections hardware setup, software setup and system operation.

Since Children On-Screen Monitoring application is a fully software-based application, hence this system does not involve any hardware in order to carry out its monitoring task. For the part of software setup, Python executable installer is a must in order to develop the application using Python code and Visual Studio Code will play a role as an integrated development environment (IDE) to write and debug the Python code. Furthermore, the use of Visual Studio Code also causes the setup process of the Django web framework to become easier to be done.

Next, the section that will be discussed in this chapter is system operation. Hence, this section will be discussing how the system will be worked. The Children On-Screen Monitoring system consists of a few functionalities. The main functionality will be the monitoring module on the home page while the sub-functionalities are the news function, mouse tracker function, keylogger function, history function and guideline function. Each of these functions will carry out its specific task to ensure children are paying full attention during the online class and are not distracted by any external factors.

Chapter 6: System Evaluation and Discussion

6.1 System Testing and Performance Metrics

After the implementation of the system, system testing is a must to guarantee the quality of the system before deliver to the end user in order to prevent any potential bugs. This is a very important phase to ensure the system improves its quality of the system based on the software requirement specifications. Hence, this is very critical to meet customer satisfaction because it helps the application perform better and provides a greater user experience.

Verification testing is a type of system testing that is able to check the quality of the delivery system and whether fulfilled the requirements or not. This type of testing is to ensure the module of the system works as desired and correctly for the user. There are a few methods to carry out verification testing and system testing must be completed before it is deployed to the end user.

One of the methods to carry out the verification testing process is to conduct unit testing. This is a type of testing method that tests every single module of the system and can help in finding bugs early making the debugging process easier. The purpose of unit testing is to make sure all the components work as intended and to ensure no errors should occur during the usage of the system. By listing out the test case description, the verification testing will be able to detect all the hidden possible defects in the system to minimize the errors as low as possible.

The performance metric to be measured during the process of the test case is the performance of the system. The performance of the system consists of two main factors which are the accuracy and the stability of the system. These two factors are vital aspects in system performance testing because of a robust application that is nearly crash-free able to enhance the user experience.

6.2 Testing Setup and Result

6.2.1 Verification Testing- Unit Testing:

Authentication Module:

Test Case	Test Case Description	Test Data	Expected Result	Pass/ Fail
1.	Check response when user register for an account by input all the details	Username: lam Password: 123	Registration should be successful	Pass
2.	Check response when user register for an account by input an empty username with a password	Username: Password: 123	Registration should be fail and an alert message will be pop up to notify the user about the empty field	Pass
3.	Check response when user register for an account by input a username with an empty password	Username: lam Password:	Registration should be failed and an alert message will be pop up to notify the user about the empty field	Pass
4.	Check response when user register for an account by did not inputting any values	Username: Password:	Registration should be failed and an alert message will be pop up to notify the user about the empty field	Pass
5.	Check response when user login into an account by input all correct details	Username: lam Password: 123	Login should be success and directed to the man page	Pass
6.	Check response when user login into an account by input an incorrect	Username: lcx Password: 123	Login should be failed	Pass

	username with a correct password			
7.	Check response when user login into an account by input a correct username with an incorrect password	Username: lam Password: 1234	Login should be failed	Pass
8.	Check response when user login into an account by did not inputting any values	Username: Password:	Login should be failed	Pass

Table 6.2.1. 1: Unit testing of authentication module

On-Screen Monitoring Module:

Test Case	Test Case Description	Test Data	Expected Result	Pass/ Fail
1.	Check response when user click on the monitoring button without the existence of E-learning platforms	Click on the monitoring button	System should not trigger for any actions although suspicious activities exist in the PC	Pass
2.	Check response when user click on the monitoring button with the existence of E-learning platforms	Click on the monitoring button	System should trigger for actions by detecting suspicious activities in the PC	Pass
3.	Check response when user cancel the monitoring button	Click on the monitoring button again	System should stop the monitoring functionality	Pass
4.	Check response when system detected for suspicious activity during the activation of monitoring function	Open Email and Telegram	User should be able to view quick report and screenshots that sent by the system	Pass

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Table 6.2.1. 2: Unit testing of on-screen monitoring module**News Module:**

Test Case	Test Case Description	Test Data	Expected Result	Pass/ Fail
1.	Verify response when user clicks on another graph format such as map	Click on the map button	System should change the current graph format to map format	Pass
2.	Verify response when user clicks on the link of the provided news	Click on the link on one of the news	System should redirect user to the news page	Pass

Table 6.2.1. 3: Unit testing of news module**Mouse Tracker Module:**

Test Case	Test Case Description	Test Data	Expected Result	Pass/ Fail
1.	Verify response when user click on the mouse tracker button without the existence of E-learning platforms	Click on the mouse tracker button	System should not trigger for any actions	Pass
2.	Verify response when user click on the mouse tracker button with the existence of E-learning platforms	Click on the mouse tracker button	System should trigger for actions by detecting the movement of mouse in the PC	Pass

3.	Verify response when system detected for no movement of mouse during the activation of mouse tracker function	-	System should send report to user and produce a few beeping sounds	Pass
4.	Verify response when system detected for the existence movement of mouse during the activation of mouse tracker function	-	System should not trigger any actions	Pass
5.	Verify response when user cancel the mouse tracker button	Click on the shutdown button	System should stop the mouse tracker functionality	Pass

Table 6.2.1. 4: Unit testing of mouse tracker module

Keylogger Module:

Test Case	Test Case Description	Test Data	Expected Result	Pass/ Fail
1.	Verify response when user click on the keylogger button without the existence of E-learning platforms	Click on the keylogger button	System should not trigger for any actions	Pass
2.	Verify response when user click on the keylogger button with the existence of E-learning platforms	Click on the keylogger button	System should trigger for actions by recording all the keystrokes of the PC	Pass

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3.	Verify response when user cancel the keylogger button	Click on the cancel button	System should stop the keylogger functionality	Pass
4.	Verify response when system detected for the end of E-learning platform during the activation of keylogger function	-	System should send a text file that recorded all the keystrokes to user	Pass

Table 6.2.1. 5: Unit testing of keylogger module

Guideline Module:

Test Case	Test Case Description	Test Data	Expected Result	Pass/ Fail
1.	Verify response when user click on the home button	Click on the home button	System should direct user to home's section guideline	Pass
2.	Verify response when user click on the news button	Click on the news button	System should direct user to news's section guideline	Pass
3.	Verify response when user click on the features button	Click on the features button	System should direct user to feature's section guideline	Pass
4.	Verify response when user click on the history button	Click on the history button	System should direct user to history's section guideline	Pass

Table 6.2.1. 6: Unit testing of guideline module

6.3 Project Challenges

During the development of the Children On-Screen Monitoring application, there were a few project challenges that were faced. The first challenge that was faced was to set up the virtual environment for the Django web framework in Visual Studio Code. The reason behind this is the whole process will be required to follow the guideline provided by the Django documentation. There would be plenty of commands and rules to be followed. The setup of the Django project can be considered successful and activated if it manages to run the command *python manage.py runserver* by outputting an address that is able to redirect to the browser window. The second challenge would be the way to create a template and the way to implement it in Django. This is due to every single created template will be required to specify its path in some files to fulfil the requirement in the Django project.

The next project challenge was writing a Python script that can carry out the main task, the monitoring task. The challenge would be how to write a script that can start automatically start the on-screen monitoring and how to keep track of the desired process when a user opens YouTube, it will be able to keep track of it to generate a quick report and send it to the user through email and Telegram. Moreover, some additional functionality such as how to detect the browser contents of a user was also a big challenge for this project. This is because the server IP address such as YouTube always changes from time to time, hence some methods are required to be used in order to keep track of the current server IP address. Furthermore, other challenges would be integrating the Python script into the Django project so the script can be run in the background when running on the Django project since the Django project is specially designed for web applications such as e-commerce platforms but not for an application to run background script.

Furthermore, the other project challenge was developing a mouse tracker function that is able to detect the interaction of children with the mouse from time to time during the existence of E-learning platforms. This functionality should allow the application to send a quick report and produce a few beeping sounds if the children do not interact with the targeted device. Another functionality such as keylogger was also one of the

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project challenges. The challenge in this module was it must be able to detect the existence of E-learning platforms and trigger its functionality to record all the keystrokes typed by the children. Then, it should append all the data to a text file and send it to the parent after the online class ended.

The last project challenge was the way to kill all the background running tasks such as monitoring tasks. This is because modules such as the monitoring module, mouse tracker module and keylogger module all run in different python scripts. Hence, when running all these scripts together in the background, all of them will be running in python.exe format and this will be a quite tedious situation if only want to stop one module to be running. The reason behind using the command such as `taskkill /F /IM python.exe` will not be suitable in this situation because it will tend to kill all the running module tasks simultaneously since all the running tasks are python.exe.

6.4 Objectives Evaluation

At this stage, after the project's success developed from the sketch, previous objectives that had been set will be evaluated. This is important to ensure the system meets the requirements that had been designed before to fulfill the needs of customers by examining the outcome of the system.

1. Objective 1: To develop an on-screen monitoring application that is easy to operate with a more systematic workflow and reducing the manual works of parent to increase effectiveness

Event related to: Reducing the workflow of the system and make it run in a systematic way				
No.	Solution	Description	Advantage	Achieved?
1.	Modules that allow user easily perform authentication process	Register the monitoring system by only filling necessary data and user can easily login into the system by filling username and password	Fast authentication process	✓
2.	Navigation panel that allows user easily navigate throughout the functionalities of the system	The navigation panel arranges all the functionalities of the monitoring system in a systematic way and placed vertically in	Improve overall user experience	✓

		the left side of the system		
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Table 6.4. 1: The solution regarding objective 1 in the monitoring system

2. Objective 2: To analyze the various potentials of on-screen monitoring module for studying children on-screen behavior during the online class

Event related to: Parent able to keep track of children on-screen activity process in various way				
No.	Solution	Description	Advantage	Achieved?
1.	Monitoring module that monitors the on-screen activity of children	If children carry out suspicious activity during the online class, then the system will generate a quick report that contain the information such as the process name, process creation and running time and direct the report to parent	Quick access to children's on-screen activities during the online class	✓
2.	Mouse tracker module that able to keep track the mouse	If the children do not move their mouse within 10 minutes, then the system will generate a quick report to inform parent and	Ensure children pay fully attention during the online class	✓

	movement of children	targeted system will also produce beep systems to notify children to move their mouse		
3.	Keylogger module that able to record the keystrokes of children	During the online class, this function will record all the keystrokes typed by the children in the targeted device and after the end of the class, a text file that contain the recorded keystroke's data will be sent to parent	Create a full transparency and honesty among children and parent	✓

Table 6.4. 2: The solution regarding objective 1 in the monitoring system

3. Objective 3: To evaluate the productivity of the Children On-screen Activity Monitoring application

The monitoring system also allowed users to run multiple functionalities of the Children On-screen Activity Monitoring application simultaneously. For example, users can choose to run the main monitoring functionality or run the sub-functionalities such as mouser tracker and key-logger functions at the same time. Hence, with various functionalities run at the same time, the monitoring process of children will also become more efficient and convenient for parents. All the history of children's behaviors during the online classes will be archived in the database letting the user be able to retrieve back the information whenever they want instead of just receiving a quick report from the application itself.

Retrieval of the data from the database can be done faster because all the data in the database will be well organized to improve its performance.

Event related to: To increase the productivity of user when using the Children On-screen Activity Monitoring application				
No.	Solution	Description	Advantage	Achieved?
1.	Allow user to run multiple functionalities of the Children On-screen Activity Monitoring application simultaneously	User can run can choose to run the main monitoring functionality or run the sub-functionalities such as mouser tracker and key-logger functions at the same time.	Enhance performance and efficiency of the monitoring system	✓

Table 6.4. 3: The solution regarding objective 1 in the monitoring system

6.5 Concluding Remark

In this chapter, the chapter system evaluation and discussion will be the chapter that discussed the performance of the system to measure how successful is the system. The first section in this chapter is the system testing and performance metrics. This main idea of this section is to discuss what kind of testing should be performed to test the performance of the system and what will be the metrics to measure.

The second section of this chapter is discussing the testing setup and results in the system. This section will be discussing is the system can work as it intended to and how well is the performance of the system. The software can be considered a defect if some requirements are not met. Hence, this is one of the crucial sections to ensure the system works as expected and minimize the errors as low as possible to guarantee the quality of a product.

Next, will be the project challenges, a section that briefly discusses the challenges faced during the development of the project. Lastly will be the objectives evaluation that evaluates whether the system meets the initially planned objective or not. A great system should meet all the initial designed objectives.

Chapter 7: Conclusion and Recommendation

7.1 Conclusion

The implementation of the Children On-Screen Activity Monitoring application will be playing a very important role to keep track of child on-screen activities in the online class, especially during the global pandemic of Covid-19. This is to ensure children can pay full attention during the class to learn and gain knowledge just like in the face-to-face class.

With the existence of this application put into practice, parents will not need to monitor their children from time to time manually during the online class which may take a lot of effort and time to do so. Furthermore, this situation will be more troublesome if parents need to monitor more than 1 child at the same time. Unconsciously, this will become a tough situation for parents who are busy with their own job or other kinds of tasks.

Therefore, in order to solve this problem, a web application known as the Children On-Screen Activity Monitoring application will be created to help parents to monitor their children's on-screen activity automatically which is accessible by parents anytime. The web application will be easy to use as it has a very user-friendly interface design to help parents to perform their desired operations as fast as they could such as screen monitoring. When the system detects suspicious activity done by children, then the system will automatically generate a quick report and send it to parents through email. The function of mouse tracking and keylogger will also be an advantage of this system to further keep track of children's activity to improve the overall experience of the user towards the application.

In a nutshell, the Children On-Screen Activity Monitoring application will be a very convenient software for parents by reducing their workloads by making the monitoring process easy.

7.2 Recommendation

Every system has its own strengths and limitation. If the Children On-Screen Monitoring system is put into practice in real life, a few limitations can be discovered in the system itself. In order to enhance the user experience of the user towards the monitoring application, future enhancement of the system is a must to produce a nearly perfect system as time goes by.

Table below shows some recommendations for enhancing the system in the future. The recommendations for improving the Children On-Screen Monitoring are not limited to the recommendations provided in the table below, but there are still more ways to further improve the system to become more robust and user-friendly.

No.	Recommendation	Description	Advantage
1.	Create a desktop monitoring application	The Children On-Screen Monitoring application is a web-based application instead of a desktop application. By creating a desktop application, users have more choices to choose for their desire-based application.	<ul style="list-style-type: none"> - Faster response time - Can work in offline mode - More secure
2.	More choices of social media platform	The current development of the project only allows the use of email and Telegram to send a report to the parent. Therefore, more variety of social media platforms such as WeChat, WhatsApp, Messenger, etc. allows users to choose for their desired social media platform.	<ul style="list-style-type: none"> - User-friendly - Increase overall user experience - More flexible

3.	Detection for browser content	It is noticeable that the Children On-Screen Monitoring application only can detect for a few browser contents but not all contents can be detected. Hence, less information can be provided to the parent.	- Provide user more monitoring information
4.	Enhance keylogger module	Although the current keylogger module can work well but it consumes a huge amount of memory resources of a computer system. Hence, enhancement of this module is very important to make the computer system work smoothly by reducing memory usage.	- Reduce memory consumption - Allow computer work smoothly without the need of good amount of RAM
5.	Providing multi-language support	Current development of the system only provides the English language for users to interact with the application. Providing multi-language support will increase the usage of the application itself since some users do not understand English.	- Establish a deeper connection and engagement with user - Provide more diverse app experience

Table 7.2. 1: Recommendation on enhancing Children On-Screen Activity Monitoring applicat

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Appendix

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: 2, 3	Study week no.: 2
Student Name & ID: Lam Chi Xiang 1900484	
Supervisor: Dr Goh Hock Guan	
Project Title: Children On-Screen Monitoring Application	

1. WORK DONE

The refinement of project elements such as the problem statement, project objective, etc. has been done in order to deliver a reliable and high-quality software at the end of the project. Furthermore, the development of the project has been started.

2. WORK TO BE DONE

Develop on the additional function, the detection of browser content of the monitoring system.

3. PROBLEMS ENCOUNTERED

No problems had been encountered

4. SELF EVALUATION OF THE PROGRESS

The progress can be considering as smooth and well

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: 2, 3	Study week no.: 4
Student Name & ID: Lam Chi Xiang 1900484	
Supervisor: Dr Goh Hock Guan	
Project Title: Children On-Screen Monitoring Application	

1. WORK DONE

The detection of browser content of the project has been done. The refinement of methodology and technology also been completed.

2. WORK TO BE DONE

Start to code the system for more functionalities such as mouse tracker function and keylogger function

3. PROBLEMS ENCOUNTERED

The detection of browser content unable work everytime.

4. SELF EVALUATION OF THE PROGRESS

All the tasks finished within the timeline

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: 2, 3	Study week no.: 6
Student Name & ID: Lam Chi Xiang 1900484	
Supervisor: Dr Goh Hock Guan	
Project Title: Children On-Screen Monitoring Application	

1. WORK DONE

Mouse tracker module has been done and more improvement has been done on the current report.

2. WORK TO BE DONE

Start code for the other module functionality such as keylogger.

3. PROBLEMS ENCOUNTERED

Need to figure out the correct way to kill the module that is running in the background

4. SELF EVALUATION OF THE PROGRESS

Progress is a little slow but still manage to complete it

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: 2, 3	Study week no.: 8
Student Name & ID: Lam Chi Xiang 1900484	
Supervisor: Dr Goh Hock Guan	
Project Title: Children On-Screen Monitoring Application	

1. WORK DONE

Keylogger module has been done but still has little buggy. The keylogger feature and mouse tracker feature has been integrating with the Django project. The modification on the GUI design section in the report has been done since there were additional features added into the system.

2. WORK TO BE DONE

Code the project for more basic functionalities such as the user profile module, news module and guideline module

3. PROBLEMS ENCOUNTERED

By launching the keylogger module will make the computer lag

4. SELF EVALUATION OF THE PROGRESS

Everything is running smooth and well

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: 2, 3	Study week no.: 10
Student Name & ID: Lam Chi Xiang 1900484	
Supervisor: Dr Goh Hock Guan	
Project Title: Children On-Screen Monitoring Application	

1. WORK DONE

The system implementation chapter has been defined and completed. All the hardware setup, software setup, setting and configuration of the system in the report has been defined. The system able to operate well in this stage.

2. WORK TO BE DONE

Finalize the report and continue for the development of the project.

3. PROBLEMS ENCOUNTERED

No problems had been encountered

4. SELF EVALUATION OF THE PROGRESS

Progress still considers acceptable

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: 2, 3	Study week no.: 12
Student Name & ID: Lam Chi Xiang 1900484	
Supervisor: Dr Goh Hock Guan	
Project Title: Children On-Screen Monitoring Application	

1. WORK DONE

Report had been finalized and the system also almost completed.

2. WORK TO BE DONE

Continue to the development of the project

3. PROBLEMS ENCOUNTERED

Ways to improve and debug monitoring system in this current stage

4. SELF EVALUATION OF THE PROGRESS

The progress is on track at this stage




Supervisor's signature



Student's signature

POSTER



FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY

CHILDREN ON-SCREEN ACTIVITY MONITORING SYSTEM

PROJECT OVERVIEW

A parental monitoring software that is known as Children-On Screen Activity Monitoring application that specially designed to help parents to monitor their children's on-screen behaviour during the online class. The replacement of traditional learning with online class during the pandemic of Covid-19 lead to the innovation of this project to assist parents to keep track of their children's learning progress and attitude, since it will be a tough situation for some parents who are busy with their jobs.

RESEARCH OBJECTIVE

- To assist parents to monitor their children on-screen behaviour by reducing manual works
- To develop a useful friendly monitoring system that is easy to operate for parents

METHODOLOGY & DESCRIPTION

01


USER AUTHENTICATION
Register a ChildOSM account and require user authentication before login

ENABLE MONITORING FUNCTION
Start the monitoring on-screen process by pressing on the button

DETECTING EACH RUNNING PROCESS
Each application runs in targeted device will be detected

TRIGGER MONITORING FUNCTION
If detect e-learning application is running, system will start to determine suspicious activity

GENERATE REPORT
Report will be generated and send to user (Email & Telegram) if suspicious activity detected on targeted device



CONCLUSION

Children On-Screen Monitoring application plays an important role to help parent to monitor children's on-screen behaviour during the online class. This is important to ensure children pay full attention during the class to learn and gain knowledge just like in the face to face class



Project Developer

Lam Chi Xiang

Project Supervisor

Dr. Goh Heck Guan

PLAGIARISM CHECK RESULT

PLAGIARISM CHECK RESULT

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