



Thangnngch18753

## FINAL PROJECT



PROJECT: Y.DOCTOR

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# **I. Introduction**

Act as the author of the entire report. I will report back on the whole research and implementation of the Y.Doctor app. The report has 8 sections. In the first part, I will analyze the needs of the market and the problems that need to be solved today for health care. In the second part, I will present a series of popular technologies today and choose the most suitable technology for the project. Third part I will collect and analyze user requirements for Y.Doctor. Part 4 I will present about the design of the project such as ERD, Design... Next I will implement Y.Doctor and present my project. Finally, get the results of the project and give my evaluations and comments about the project. The following is the presentation of the Y.Doctor project.

# **II. Literature Review**

## **1. Health care**

### **1.1 Overview health care**

Medicine is a field of applied science concerned with the art of healing, which includes a variety of health care methods aimed at maintaining and recovering the body from the prevention and cure of disease.

Until now, many researchers believe that the history of medicine may have been born with the history of disease and the history of the physician. In La Grotte des Trois Frères, a painting about 17,000 years ago depicting a retired witch is healing. Medicine is divided into four main periods (**Richardson 2021**)

#### **1- Spiritism Medicine**

In ancient times, between 3500 - 1500 BC. The ancient Greeks believed that illness was "divine punishment" and that healing was a "gift from the gods." It was recognized that the mind played an important role in healing, and it may also be the sole cause of the disease. In those ancient times, Roman medicine was heavily mythical. Whenever sick, the Romans went to the temple to pray to the gods: Minerva, Diana, Hygiea. Although medicine in this period was less effective because it was based on superstition, so there was no significant progress for a long time, but it is not necessarily ineffective because they affected the psychology of most people in the period. and healing by psychology, human emotions to this day is still a fairly effective method to alleviate some human diseases.

#### **2- Empiric Medicine**

This is the period when brilliant and brilliant doctors in scattered parts of the world accumulate their own experiences, put those experiences into medical examination and treatment, and make the treatment more effective. They observe, gain experience, and heal based on personal or passed down experience. This period flourished in the Central - India region.

### **3- Scientific Medicine**

Separate religion and medicine, build medicine on material basis, based on specific observation of signs of disease. Illness is a natural phenomenon of the body, there is no mysterious magic to cause it.

The basic principle of healing is mainly to support the body's natural resistance, to avoid all that interferes with the patient's ability to self-heal and natural health. Her treatment is very cautious "Do not do anything boldly. Even though the doctor cannot do anything for the patient, he must not cause any harm to them".

### **4- Stage of Modern Medicine**

Modern medicine is a new movement that aims to establish the most effective diagnostic and therapeutic process by means of "systematic review" and "meta-analysis" according to statistics. It developed thanks to the advancement of modern information science to help collect and analyze huge volumes of data and evidence according to standards, and then disseminate it to health care or disease prevention services. One problem with this "optimal" approach is that it can be seen as a dramatic approach, which means that it will generate many different ratings. The Cochrane Partnership Program report, the 2001 opinion movement, found that of the 160 "systematic reviews" of Cochrane, based on at least two commenters, 21.3% were equal. The evidence was incomplete, 20% was ineffective and 22.55% of the evidence was positive.

Thereby showing us that medicine has been an essential part to help people overcome and survive in this world. In the past there have really been great influences and threats to human development such as the Black Death pandemic that occurred in Asia and Europe in the fourteenth century, which culminated in Europe in 1346-1351, with the death toll in Europe and Asia between 75 and 200 million. The corona pandemic has also had nearly 500 million infections and caused a worldwide economic recession.

Number of cases <b>491 CHILDREN</b> +777 FEMALE	Number of deaths <b>6.15 CHILDREN</b> +1,643	
Place	Number of cases ↓	Number of deaths
 USA	80.1 KIDS +4.927	980 FEMALE +39
 India	43 CHILDREN	521 FEMALE
 Brazil	30 CHILDREN +7.210	660 FEMALE +39
 France	25.3 KIDS	139 WOMEN
 virtue	21.7 KIDS	130 WOMEN

*Figure 1: Statistics on the Covid 19 pandemic.*

## 1.2 Health care today and future

Today, medicine has become a science and an indispensable service to take care of human health or further contribute to the protection of existence for the whole human race. Around the world, there have been about 1,05,000 different large and small hospitals since 2019. The care service and the development of the industry are also enhanced day by day due to the constant research and development of the medical staff. Pandemics of the past likened to the "black death" can now be completely cured easily.

Going up with the continuous development of the times in the past 100 years, medicine has also made many breakthroughs in areas such as transplants, curing some extremely difficult diseases such as HIV cancer and many other breakthroughs. Now when a world pandemic occurs, people can also come up with a clear way to prevent the pandemic.

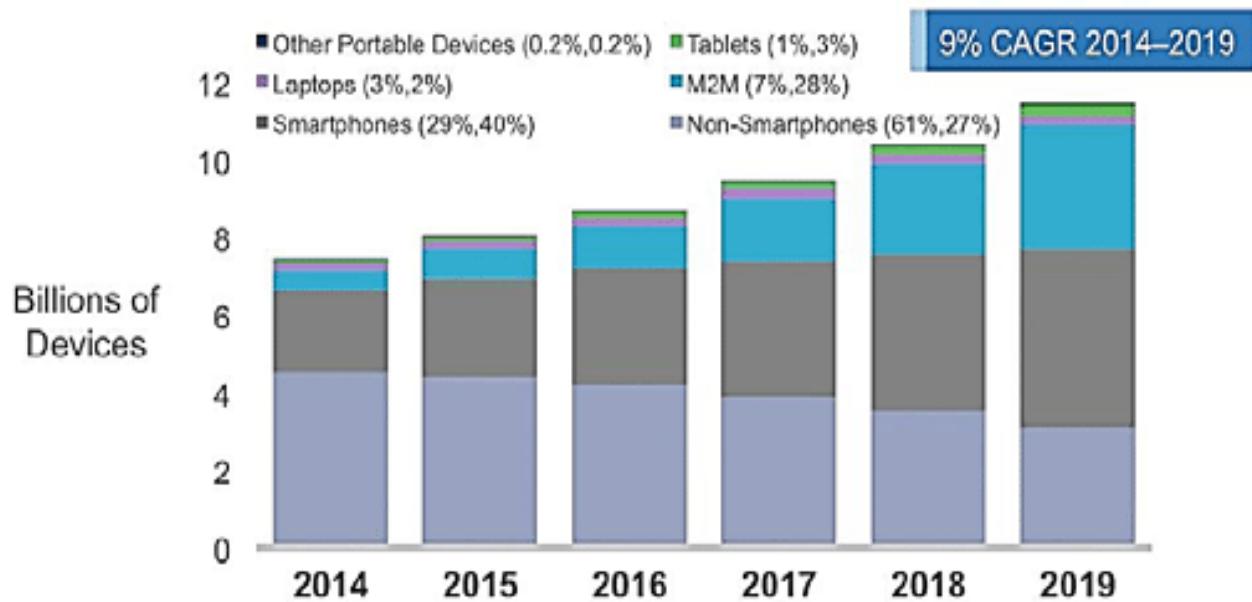
In the future, people will be able to cure any disease and also be able to replace any part of the body when they are damaged, life expectancy will be increased.

## 1.3 The development of technology

Since the development of the internet, there is too much information, including medical information. Among them, there is valuable information, there is little value information, even there is false, subjective information (accidentally or intentionally). This also creates a bad habit for some patients, when in pain, it is usually better to google to check the disease than to go to the medical center.

Around 2013, the popularity of Mobile Web-app increased, technology was also updated to increase user experience. Since 2019, Mobile App has grown strongly. They bring solutions to users' lives, increasing the personal experience with the help of artificial intelligence.

According to statistics, 70% of traffic comes from mobile devices, about 75% of emails are opened on this device. The compactness and convenience have changed the behavior of users. (Salesforce 2021).



*Figure 2: Statistics of devices used.*

from companies with mobile apps. This can be easily seen when today, the trend of buying on e-commerce platforms such as Shopee, Tiki and Lazada has become popular. Statista even claims that by 2022, user spending on the App Store will grow to \$157 billion.

According to research, the market for digital healthcare will be worth \$509.2 billion by 2025.

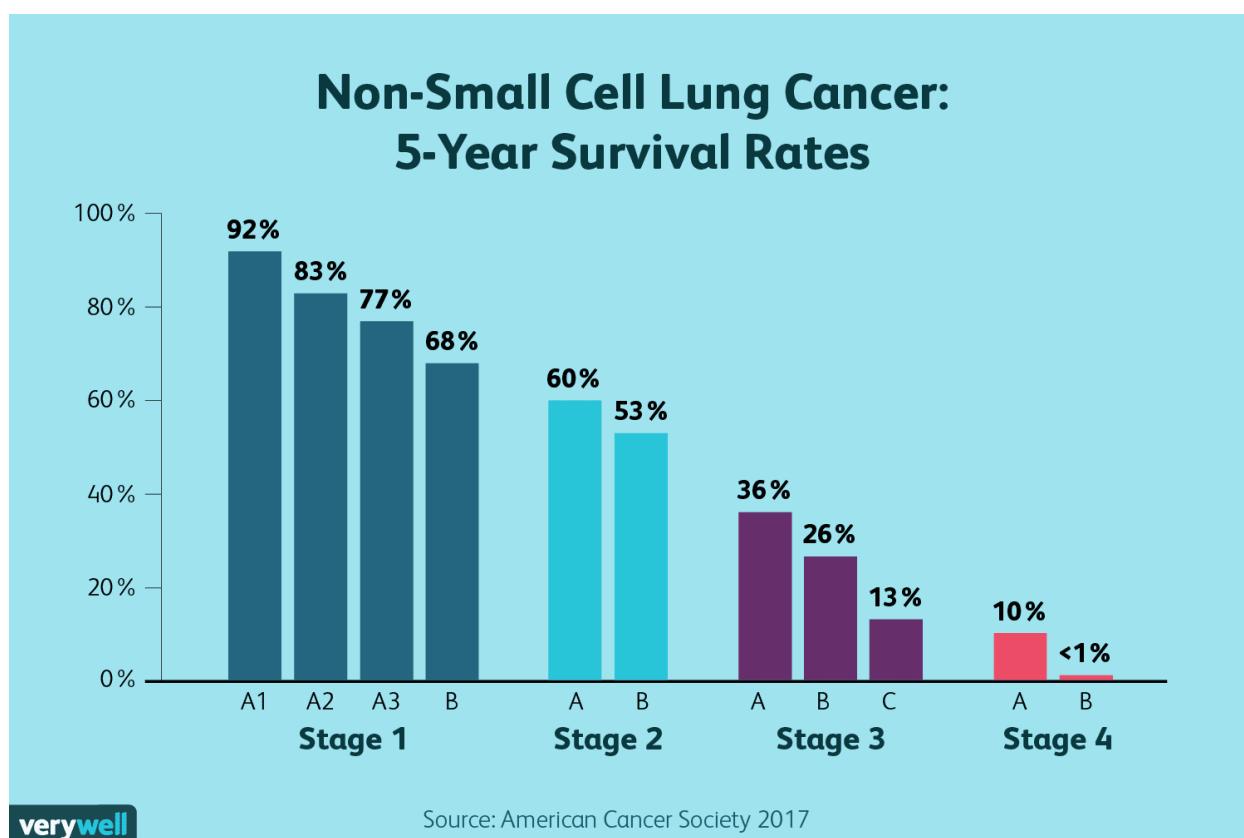
Along with the progress of the times and technology, now patient information and medical history can be saved and managed easily. People can also easily find doctors' hospitals or medical information through some current healthcare apps.

In the future, people can also find breakthrough technologies in information technology in the medical field such as giving AI deeper support when helping surgeons, doctors predict diseases and make surgical decisions. techniques to patients based on previous data they have learned.

#### 1.4 Health care and existing problems

Currently, the world is developing more and more in the field of information technology as well as in the field of medicine. Most information can be learned and read through social networks such as Google, Facebook and most human diseases can also be cured in modern medicine. Although the fruits of technological and medical development are obvious, we also have extremely complex problems with regard to human health care. Information about treatment, disease diagnosis, disease signs can be searched on Google, Facebook but unfortunately there is a lot of false information from non-professionals, possibly intentionally or unintentionally. Besides the sense of health, the survival skills of many people are also quite weak. For example, most people in less developed countries even developed and developing countries are quite vague about their health. Usually when they feel pain or fatigue, they go to the doctor.

Cancer is one of the diseases that are very difficult to cure at the present stage, but if they are detected in time and are still in the early stages, the survival rate is still very high, specifically with Lung cancer rate. is 92% for early stage and first year detection, will be less than 1% for late stage and detect after 4 years.



*Figure 3: Unrecovered rate of cancer.*

In terms of life skills, most people need basic medical skills such as: CPR, first aid for wounds and handling when children are choking. These skills are also extremely important because in case a

person is suffocated by drowning or by ingesting a foreign body, there will not be enough time to bring the patient to the hospital because after only 3-5 minutes there is no oxygen. the human brain will begin to die.

In short, our problem is our sense of health care as well as basic medical skills in life, besides the problem of filtering true and false information to learn. It's a big challenge to take care of your own health. To solve this problem, I will create a social network here where people can take care of their own health, they can access essential health care services and save time. Besides, they can also talk to doctors, AI quickly about the problems they face. The purpose of the social network is to create a group of people who want to take care of themselves and their families' health, access life skills shared by other patients and doctors, create an AI that learns the Patient questions and treatments from doctors help patients diagnose their illness and find solutions.

## **2. Review of Technologies**

### **2.1 Front-end**

#### **2.1.1 Java**

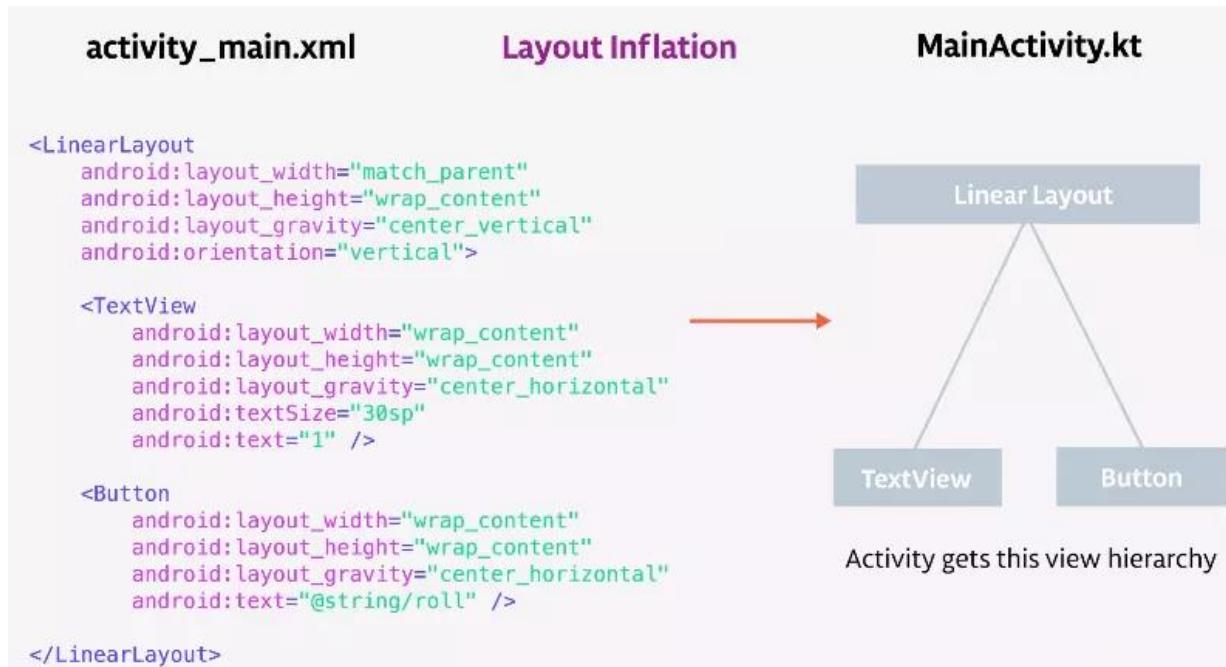
##### **Overview**

Java is one of the object-oriented programming languages. It is used in the development of software, websites, games or applications on mobile devices.

Java was started by James Gosling and his colleagues at Sun Microsystem in 1991. Java was originally created for the purpose of writing software for home products, and was named Oak.

##### **XML on Android**

The Android platform is an open source mobile development platform. It gives access to all aspects of the mobile device it runs on, from low-end graphics, to hardware such as the camera device on the phone.



*Figure 4: Overview java front-end.*

## Easy to develop

Java is a very easy language to learn and understand in creating and developing projects. Java is a suitable choice for cross-platform applications, requiring only a JVM virtual machine. Android depends on Java – the Android SDK includes many of the Java standard libraries. Java has a huge open-source ecosystem, partly due to Google's take on the Java virtual machine (JVM) for Android. Java has the highest development speed. In short, java is a language that has a lot of reference projects and is an easy language when we choose to develop on the android platform.

## Performance

Java applications are tightly coupled, they tend to be lighter even with analog signals. A java application that contains standard computations in code that works fast on the user's device with very good specifications. Has the highest development speed – Java ensures the application build process.

## Security

Flexibility – security – robustness is the trademark of this language.

Java is a really safe language. It ensures immunity to malware or viruses. At the time of being stored at the local machine, the protected data will be protected continuously.

Whenever it is transmitted, it is continuously encrypted. Programming languages are also secured against internal code errors. There is a range of established security components.

Various security APIs supporting authentication, secure messaging, and other cryptographic conventions add to the overall security of the developed application. Some components are secured at the library level, e.g., Strings.

Any vulnerabilities found by the Java community tend to be fixed very quickly. The open-source Java community plays an important role in uncovering potential vulnerabilities and enhancing the language.

Advantage	Disadvantage
Java is a very easy language to learn and understand in creating and developing projects.	Java has very few GUI builders – Swing, SWT, JSF and JavaFX among the more popular ones.
Java is the right choice for cross-platform applications.	Garbage collector uses CPU cycles and memory - (but hardly any, at least CPU time).
Android depends on Java - Android SDK includes many Java standard libraries.	
Java has a huge open source ecosystem, partly because Google has used the Java virtual machine (JVM) for Android.	
Java has the highest development speed - Java ensures the application building process.	
Flexibility - security - robustness is the trademark of this language.  Java is a really safe language.	

*Table 1: Advantage and Disadvantage of java front-end.*

### 1.1.2 Kotlin

#### Overview

Kotlin is a new programming language from JetBrains. It first appeared in 2011 when JetBrains announced a new project called "Kotlin". Like Swift, Kotlin is an open-source language.

Like Java, C, and C++, Kotlin is also a statically typed programming language. Static type languages are languages where variables need to be identified before they can be used. This means that the variable needs to be declared and initialized first.

### **Easy to develop**

Kotlin has smart extensions that help developers build clean APIs. Kotlin programmers can take advantage of the Ancho library and over 2000 Kotlin projects on GitHub. Kotlin is also a source language like Java, most of which is fully supported with extensive courses and documentation. free. In general, Kotlin is also an easy language to develop but in terms of documentation Kotlin cannot be as much as java as it is a post-development language.

### **Performance**

A Kotlin application that contains complex computations in the code can be slow on user devices with poor specification if built by inexperienced developers. Kotlin are slower than java.

According to tests, Java with the JVM compiler is about 17% faster than Kotlin with the JIT interpreter.

### **Security**

Security risk of null reference exceptions:

Empty reference exceptions, also known as null dereferences, are one of the main OWASP security holes to watch out for in an application. The problem is that null is it's a value not a value. In Java, it has no intrinsic data type and requires special handling.

For example, you are designing a method to find users in a database. Bad, but common practice is to return null when nothing is found. On the surface it makes sense - because null is supposed to represent a lack of something that already exists - however, it mutates the expected object return type, which can lead to potential problems in code.

Kotlin's security against NullPointerException is done through the null-safe methodology, while catch statements are required by the developer in Java. The security risk of NullPointerException is that it has the potential to crash a program and is generally considered a fatal bug. Security holes increase in Java where null is accepted where it shouldn't be. This is one of the biggest security

highlights that Kotlin has overcome from Java. However, in general, we can still evaluate in terms of security Kotlin and Java are both strong security languages.

Advantage	Disadvantage
Kotlin has smart extensions that help developers build clean APIs.	Kotlin is also an easy language to develop but in terms of documentation Kotlin can't be as much as java as it is a post-development language.
Kotlin developers can take advantage of the Ancho library and over 2000 Kotlin projects on GitHub.	A Kotlin application that contains complex computations in code can run slowly on users' devices with poor specifications if built by inexperienced developers. Kotlin is slower than java.
Kotlin has optimized their code lines and is much shorter than Java.	According to tests, Java with the JVM compiler is about 17% faster than Kotlin with the JIT interpreter.
	Security risks of null reference exceptions

*Table 2: Advantage and Disadvantage of kotlin front-end.*

## Select technology for front-end

for front-end I will use java instead of Kotlin to make android apps because java is a very easy language to learn and understand in creating and developing projects. Java has a huge open-source ecosystem that makes it easy to develop projects by referencing previous projects. A java

application that contains standard computations in code works fast on user's device with very good specifications, good performance makes java coding applications smoother. In addition, with its extremely good security, Java has completely convinced my project compared to Kotlin.

## 2.2 Back-end

### 2.2.1 Java

#### Overview

Spring Boot is a project developed by JAV (java language) in the Spring framework ecosystem. It helps us programmers simplify the process of programming an application with Spring, focusing only on developing business for the application.

Its active community offers a well-supported backend for different types of application needs. The highlights of the framework are that it fits every Java application very well and a wide range of extensions is available for designing the ultimate web applications at the top of the Java EE platform.

## **Performance**

Java compiles the source code into bytecode and runs it with the help of virtual machines. This makes the language cross-platform. Java recompiles before runtime. Java's virtual machine will perform "Just-in-time" compilation of all or part of the program into native code, which greatly improves the performance of Java programs.

## **Syntax**

Java, users need to follow strict syntax rules and need to explicitly define the data type at the time of declaration. It causes many difficulties and inconveniences for beginners when the program does not run because of minor errors such as the lack of a ";" at the end of the command line, etc. Some developers like to be organized, obviously, they feel really comfortable with this, but conversely, there are also many developers who don't, especially when they are at the end of the command line. in big projects.

## **Applications in the backend**

java is used a lot in Backend Development - the branch of development that deals with creating software to run on the Server. This is the most popular area according to a survey from Stack Overflow developers.

Writing a program is not only difficult, but it is also very difficult to meet all the design requirements from security to reliability and efficiency. This is why developers have created abstract frameworks in the software that allow them to be used without too much effort.

<b>Advantage</b>	<b>Disadvantage</b>
Java is a cross-platform language.	Java, users need to follow strict syntax rules and need to explicitly define the data type at the time of declaration. It causes many difficulties and inconveniences for beginners when the program does not run because of small errors such as missing ";"
Java recompiles before runtime.	Writing a program is not only difficult, but it is

	also very difficult to meet all the design requirements from security to reliability and efficiency.
The Java virtual machine performs "Just-in-time" compilation of all or part of the program into native code, which greatly improves the performance of Java programs.	
java is used a lot in Backend Development - the branch of development that deals with creating software to run on the Server.	
This is the most popular area according to a survey from Stack Overflow developers.	

*Table 3: Advantage and Disadvantage of java back-end.*

## 2.2.2 Python

### Overview

Python is a powerful, high-level, object-oriented programming language, created by Guido van Rossum. It's easy to learn and is emerging as one of the best introductory programming languages for first-timers. Python is completely dynamically typed and uses automatic memory allocation.

Python has powerful high-level data structures and a simple yet effective approach to object-oriented programming. Python's command syntax is a huge plus as its clarity, ease of understanding, and flexible typing makes it rapidly becoming an ideal language for scripting and application development in a wide variety of fields, in most areas. all platforms.

### Performance

Python compiles the source code into bytecode and runs it with the help of virtual machines. This makes the language cross-platform. But there is an important difference as mentioned above: Python usually compiles source code at runtime, while Java compiles before runtime. Java's virtual machine will perform "Just-in-time" compilation of all or part of the program into native code, which greatly improves the performance of Java programs. In contrast, in the most popular version of Python, CPython does not do this, affecting its performance.

### Syntax

Python is a dynamically typed language, as you can see when writing Python, you do not need to specify the data type of the variable at the time of declaration because the interpreter will infer these types and the checking will be performed at runtime. This makes Python's syntax easier and quite similar to English Language. Plus, Python doesn't use curly braces and doesn't follow indentation rules, which makes the code quite readable and more beginner-friendly.

### **Applications in the backend**

Python has two prominent frameworks, Django and Flask, that both provide the necessary basic functionality while being efficient and secure. The above frameworks make Python extremely powerful in web development for developers. However they are not so popular and much of the documentation is back-end with java.

Advantage	Disadvantage
Python is a cross-platform language.	Python usually compiles source code at runtime (slower than Java).
Python is a dynamically typed language.	Python is not a good choice for CPU intensive algorithms, as well as scalable infrastructure software like chat servers.
The python syntax is easy and quite similar to the English Language.	Not as scalable and manageable as Java when working with large projects.
Python doesn't use curly braces and doesn't follow indentation rules, which makes the code quite readable and more beginner-friendly.	
Django and Flask, both provide the necessary basic functionality while being efficient and secure.	
The above frameworks make Python extremely powerful in web development for developers. However, they are not so common and much of the documentation is back-end with java.	

*Table 4: Advantage and Disadvantage of python back-end.*

### **Select technology for back-end**

Regarding backend development I will choose python to develop my application because Python's syntax is easier and quite similar to English Language. Plus, Python doesn't use curly braces and doesn't follow indentation rules, which makes the code quite readable and user-friendly for me. Although python is a bit weaker in performance than java, I still choose python as the back-end and API for "My Doctor" project because python will help me shorten the time to output diagnostic results because I will also choose python as the language to develop computational parts for Machine learning - Deep learning.

## **2.3 Database**

### **2.3.1 SQL lite**

#### **Overview**

SQLite is a standalone open-source, file-based RDBMS (compared to MySQL is server- based, for client access) and is known for portability, reliability, and strong performance right out of the box. even in low memory environments. Its transactions follow ACID - a database standard.

The SQLite project's website describes it as a "serverless" database. With SQLite, any process accessing the database reads and writes directly to the database. This simplifies the installation process of SQLite. Likewise, no configuration is required for the programs that will use the SQLite database: all that is needed is access to the file.

SQLite is free and open-source software that does not require a special license to use. However, the project offers several extensions - one for each - that help with compression and encryption. In addition, the project also offers different commercial support packages, each with an annual fee.

#### **Popularity and ease of use**

In the 9th place SQLite is not a very popular database compared to MySQL in the 2nd place because SQLite has limited concurrency weaknesses: Although many programs can access and query the same SQLite database at the same time, but only one program can apply changes to the database at a time.

SQLite supports greater concurrency than most other embedded database management systems, but not as much as RDBMSs like MySQL or PostgreSQL. In addition, SQLite does not have user management.

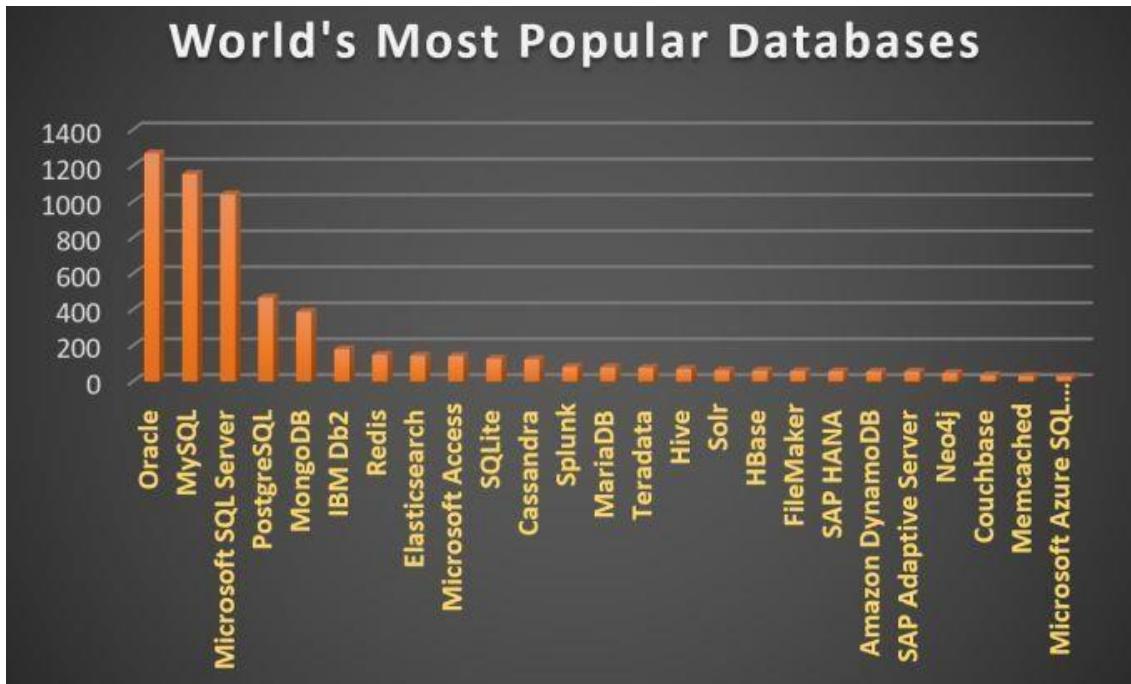


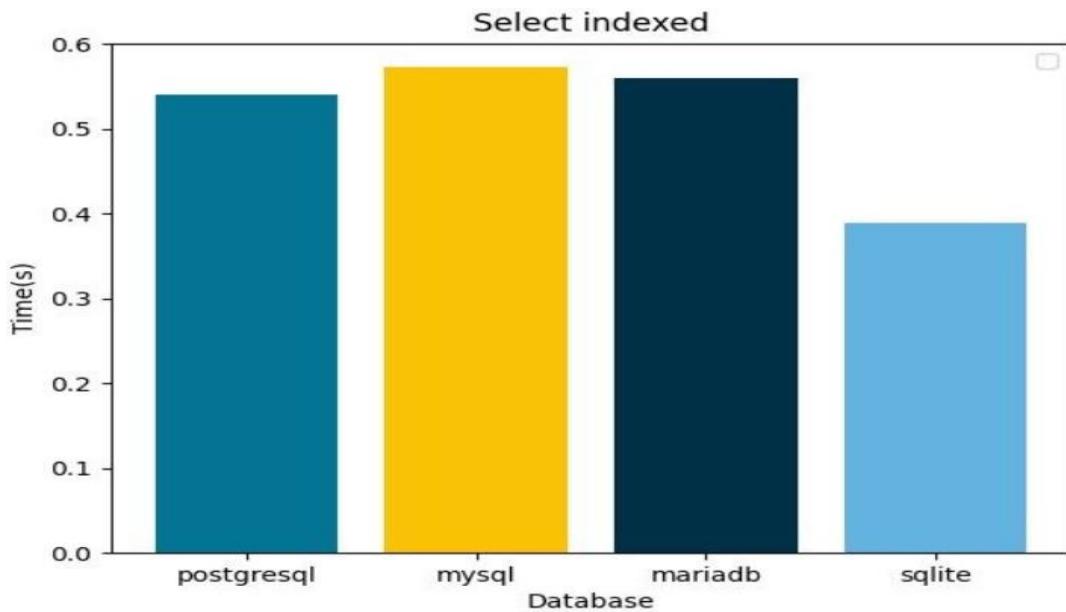
Figure 8: World's most popular Databases.

## Security

A server-based database engine can, in some cases, provide better protection against errors in the client application than a serverless and file-based database like SQLite. This leads to SQLite's security is quite weak.

## Performance

SQLite is one of the pretty fast databases along with MySQL and MariaDB but SQLite is still not as fast as MySQL. Below is a performance comparison table.



*Figure 9: Time run of Databases.*

Advantage	Disadvantage
In 9th place SQLite is not a very popular database compared to MySQL in 2nd place because SQLite has limited weakness in concurrency.	SQLite supports greater concurrency than most other embedded DBMSs, but not as much as RDBMSs like MySQL or PostgreSQL.
Although multiple programs can access and query an SQLite database at the same time, only one program can apply changes to the database at a time.	SQLite has no user management.
	SQLite's security is quite weak.
	SQLite is one of the pretty fast databases along with MySQL and MariaDB but SQLite is still not as fast as MySQL

*Table 5: Advantage and Disadvantage of SQLite.*

### 2.3.2 MySQL

#### Overview

According to DB-Engines Ranking, MySQL is the most popular open-source RDBMS since the site started tracking database popularity in 2012. It is a feature-rich product that powers many websites and applications. world's largest apps, including Twitter, Facebook, Netflix and Spotify. Getting started with MySQL is relatively simple, thanks in large part to its exhaustive documentation and large community of developers, as well as the abundance of MySQL-related online resources.

MySQL is fast and reliable, following standard SQL. MySQL developers are continuously working towards a stricter adherence to the SQL standard, although possibly slower than the new standard. Unlike applications that use SQLite, applications that use a MySQL database access it through a separate daemon process. Because the server process sits between the database and other applications, it allows greater control over who has access to the database.

MySQL leverages a multitude of built-in third-party applications, tools, and libraries that extend its functionality and make it easier to work with. Some of the more widely used third- party tools are phpMyAdmin, DBeaver, and HeidiSQL.

### **Popularity and ease of use**

As one of the most popular database systems in the world, there is no shortage of database administrators with experience working with MySQL. Similarly, there are many MySQL database documentation, as well as third-party tools - such as phpMyAdmin - to simplify database usage. MySQL is more popular than SQLite.

### **Security**

MySQL is installed with a script that helps you to improve the security of your database by setting the password security level of the installation, defining the password for the root user, deleting anonymous accounts and deleting the test database by default, is accessible to all users. Also, unlike SQLite, MySQL supports user management and allows you to grant access on a per-user basis. MySQL is more secure than SQLite

### **Performance**

By choosing not to implement certain features of SQL, MySQL developers were able to prioritize speed. While more recent benchmark tests show that other RDBMSs like PostgreSQL can match or at least come close to MySQL in speed, MySQL still holds the reputation of being an extremely fast database solution. MySQL is faster than SQLite.

Advantage	Disadvantage
-----------	--------------

<p>It is one of the most popular database systems in the world.</p> <p>Similarly, there is extensive documentation on MySQL databases, as well as third-party tools - such as phpMyAdmin - to simplify database usage. MySQL is more popular than SQLite.</p>	<p>MySQL is limited in capacity, specifically, when the number of user records grows larger, it will make it difficult to access data, causing users to need to apply many measures to speed up data sharing such as sharing Download the database to multiple servers</p>
<p>MySQL is installed with a script that helps you improve the security of your database by setting the password security level of your settings, defining a password for the root user, removing anonymous accounts, and deleting test database by default, accessible to all users.</p>	<p>The way specific functions are handled with MySQL (e.g. references, transactions, audits, etc.) makes it less reliable than some other relational DBMSs.</p>
<p>Also, unlike SQLite, MySQL supports user management and allows you to grant access on a per-user basis.</p> <p>MySQL is more secure than SQLite.</p>	
<p>By choosing not to implement certain SQL features, MySQL developers were able to prioritize speed.</p>	
<p>While more recent benchmark tests show that other RDBMSs like PostgreSQL can match or at least come close to MySQL in terms of speed, MySQL still holds the reputation of being an extremely fast database solution. MySQL is faster than SQLite.</p>	

*Table 6: Advantage and Disadvantage of MySQL*

### Select technology for Databases

As for SQL development I would choose MySQL to develop my application because of their popularity and ease of use, MySQL is one of the most popular database systems in the world. Similarly, there is extensive documentation on MySQL databases, as well as third-party tools such

as phpMyAdmin - to simplify database usage. What makes it easy for me to develop my ERD on MySQL. About security MySQL is installed with a script that helps you to improve the security of your database by setting the password security level of the installation, defining the password for the root user, removing hidden accounts list and delete the test database by default, is accessible to all users. Also, unlike SQLite, MySQL supports user management and allows you to grant access on a per-user basis. This is very good at protecting users' personal information and medical records. Also, with a great speed MySQL completely convinced me compared to SQLite.

## **2.4 Machine learning – Deep learning**

### **2.4.1 Convolutional neural network (CNN)**

#### **-ResNet-50**

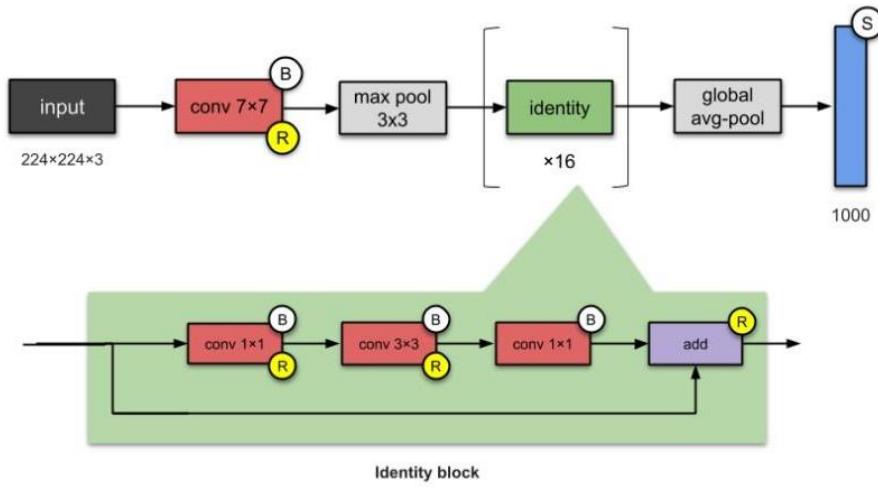
##### **Overview**

ResNet (short for residual network), is a deep learning network that received interest in 2012 after the LSVRC2012 competition and became popular in the field of machine vision.

ResNet makes it possible and efficient to train hundreds or even thousands of layers of neural networks. Why is it called a residual network? Is it "redundant" as its name suggests?

Thanks to ResNet's powerful representation capabilities, the performance of many machine vision applications, not just image classification applications, is enhanced. Some examples include object detection and facial recognition applications.

According to the universal approximation theorem, architecturally, a feedforward neural network is capable of approximating any function to the provided training data, as long as its capacity is not exceeded. However, a good approximation of the data is not the only goal, we need a model capable of generalizing the data. That's why deep architectures become the trend of the research community.



*Figure 11: Overview ResNet-50.*

## Popularity

ResNet is the most commonly used architecture at the moment. because ResNet is the earliest architecture to apply batch normalization and even though it is a very deep network when the number of layers is up to 152, thanks to the application of special techniques ResNet has brought the winner of the ImageNet contest 2015.

## Accuracy

Previous architectures often improve accuracy by increasing the depth of the CNN network. But experiments show that up to a certain depth threshold, the accuracy of the model will saturate and even backfire and make the model less accurate. When traversing too many layers of depth can cause original information to be lost, Microsoft researchers have solved this problem on ResNet by using a shortcut connection.

Skip connections help keep information from being lost by connecting from the earlier earlier layers to the later layers and bypassing some intermediate layers. In the CNN base network architectures of the YOLOv2, YOLOv3 and more recently YOLOv4 networks you will frequently see deadlocks applied.

## Speed

ResNet is also the earliest architecture to adopt batch normalization. Although it is a very deep network when the number of layers is up to 152, thanks to the application of special techniques that we will learn below, the size of ResNet50 is only about 26 million parameters.

Advantage	Disadvantage
ResNet is the most commonly used architecture at the moment. ResNet took home the winner of the 2015 ImageNet competition.	The calculation parameters are still very high compared to running in real time which is still a distant result.
Bypassing connections helps to keep information from being lost by connecting from earlier layers to later layers and bypassing some intermediate layers.	
ResNet is also the earliest architecture to adopt mass normalization. ResNet50 is only about 26 million parameters.	

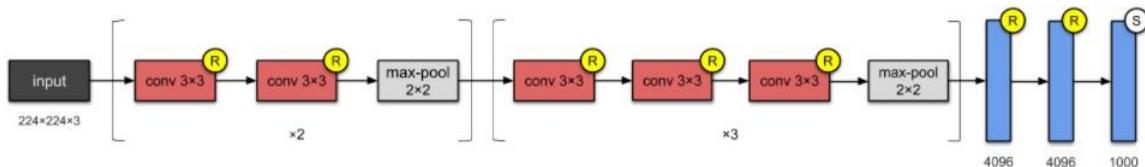
*Table 7: Advantage and Disadvantage of ResNet-50.*

## -VGG16

### Overview

VGG16 is a convolutional neural network proposed by K. Simonyan and A. Zisserman, University of Oxford. The model after training by the VGG16 network achieved 92.7% accuracy in the top-5 test in ImageNet data including 14 million images belonging to 1000 different classes.

With VGG-16, the concept of a deeper neural network will help improve the accuracy of the model better with this biased view vgg16 did not have as good accuracy as ResNet because of the data after going Through too many layers will be saturated.



*Figure 12: Overview VGG16.*

### Popularity

With VGG-16, the concept of a deeper neural network will help improve the accuracy of the model better, which makes vgg16 not widely used because of their weight. VGG16 is not as popular now

as ResNet.

### Accuracy

With VGG-16, the concept of a deeper neural network will help improve the accuracy of the model better with this biased view VGG16 did not have as good accuracy as ResNet because of the data after going Through too many layers will be saturated.

### Speed

The VGG-16 network has its parameter count up to 138 million parameters. This is one of the networks that has the largest number of parameters. There is also another version of VGG-16, VGG-19, which adds 3 layers of depth. This makes the speed of vgg16 very slow.

Advantage	Disadvantage
With VGG-16, a deeper neural network concept will help to improve the accuracy of the model better.	VGG16 are not widely used because of their weight. VGG16 is not as popular as ResNet right now.
	VGG16 did not have as good accuracy as ResNet because the data after going through too many layers would be saturated.
	The VGG-16 network has up to 138 million parameters. This is one of the networks with the largest number of parameters.
	There is also another version of the VGG-16, the VGG-19 that adds 3 more layers of depth. This makes the speed of vgg16 very slow.

*Table 8: Advantage and Disadvantage of VGG16.*

#### 2.4.2 Object detection

##### -Yolo

### Overview

YOLO - You Only Look Once is one of the best object detection models at the moment. Although

they are all called YOLO, the versions of this model have very significant improvements after each version. After 3 versions of main author Joseph Redmon, YOLOv1 to v3, up to now, there is one more paper YOLOv4 by Alexey Bochkovskiy which is linked directly from the original repository of Joseph Redmon and YOLOv5 is currently one of the models. Best for object detection. In the app 'my doctor' will use YOLOv5 for detecting skin lesions and classifying diseases from those injured areas. This also greatly aids segmentation of diseased images at a later stage.

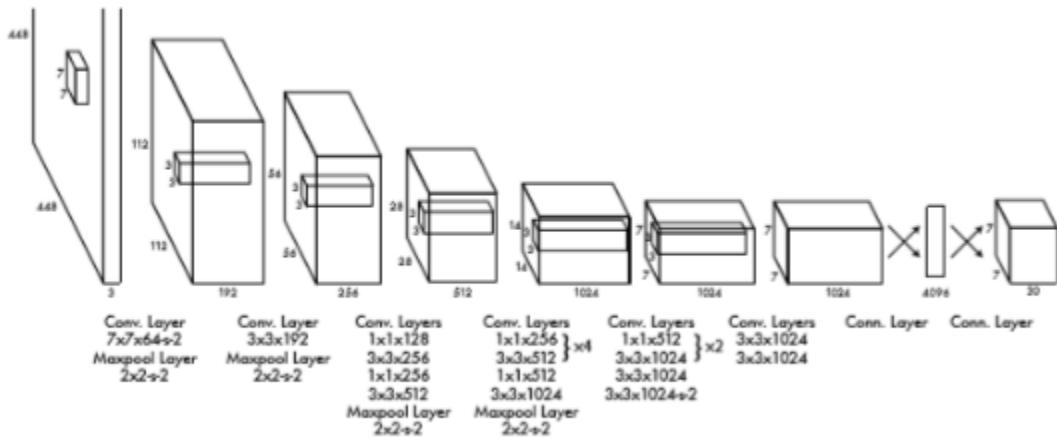


Figure 13: Overview YOLOV1.

## Popularity

Although these approaches have solved the challenges of data limitation and modeling in object detection, they are not able to detect objects in a single algorithm run. YOLO algorithm has gained popularity because of its superior performance over the aforementioned object detection techniques.

## Accuracy and Speed

yolov5 has a very good speed about 60% more than Fast R-CNN but in return its mAP is lower than Fast R-CNN.

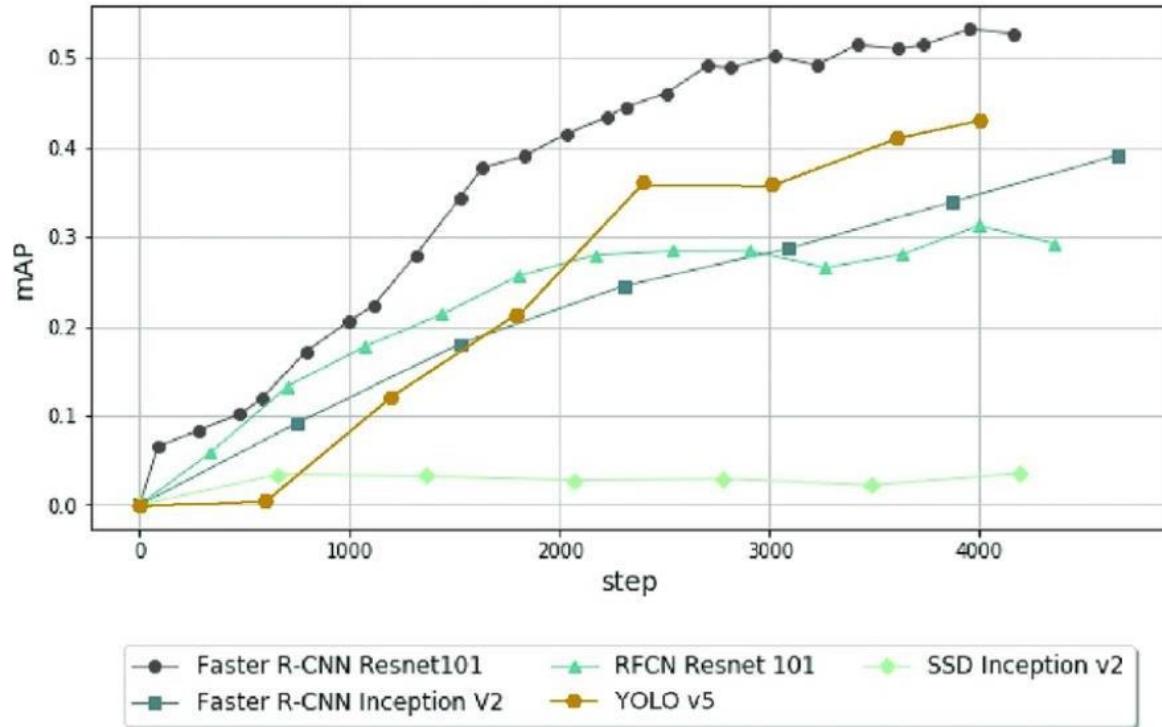


Figure 14: mAP of some model detect.

Advantage	Disadvantage
The YOLO algorithm has gained popularity because of its superior performance compared to the aforementioned object detection techniques.	yolov5 has a very better speed than Fast R-CNN by about 60% but in return its mAP is lower than Fast R-CNN.

Table 9: Advantage and Disadvantage of YOLO.

### -Faster R-CNN

#### Overview

R-CNN (regions with CNN features) is a class of feature-defining models based on CNN networks developed by Ross Girshick et al. This class of models includes 3 main models, R- CNN, Fast R-CNN and Faster-RCNN, designed for object positioning and object recognition tasks.

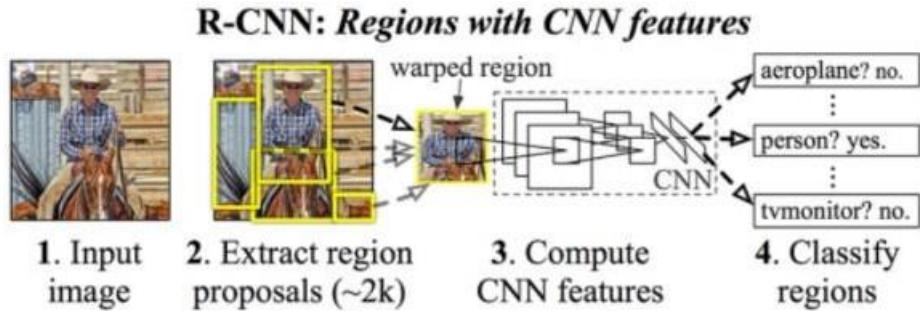


Figure 15: Overview R-CNN.

## Popularity

Fast R-CNN is also one of the popular models but they are not as popular as yolo because of their speed.

## Accuracy and Speed

Faster R-CNN does not use a selective search algorithm to retrieve region proposals, but it adds a new CNN network called Region Proposal Network (RPN) to find region proposals. This makes Faster R-CNN's mAp higher than Yolo's, but their speed is reduced.

Advantage	Disadvantage
For large data for models R-CNN by Selective Search algorithm proved to be more effective than YOLO.	Fast R-CNN is also one of the popular models but they are not as popular as yolo because of their speed.
	Faster R-CNN does not use a selective search algorithm to retrieve region proposals, but it adds a new CNN network called Region Proposal Network (RPN) to find region proposals. This makes Faster R-CNN's mAp higher than yolo's, but their speed is reduced.

Table 10: Advantage and Disadvantage of R-CNN.

### 2.4.3 Segmentation

## -U-net

### Overview

U-net (as the name suggests, is U-shaped), was originally designed to segment the actual image.

### Accuracy and Speed

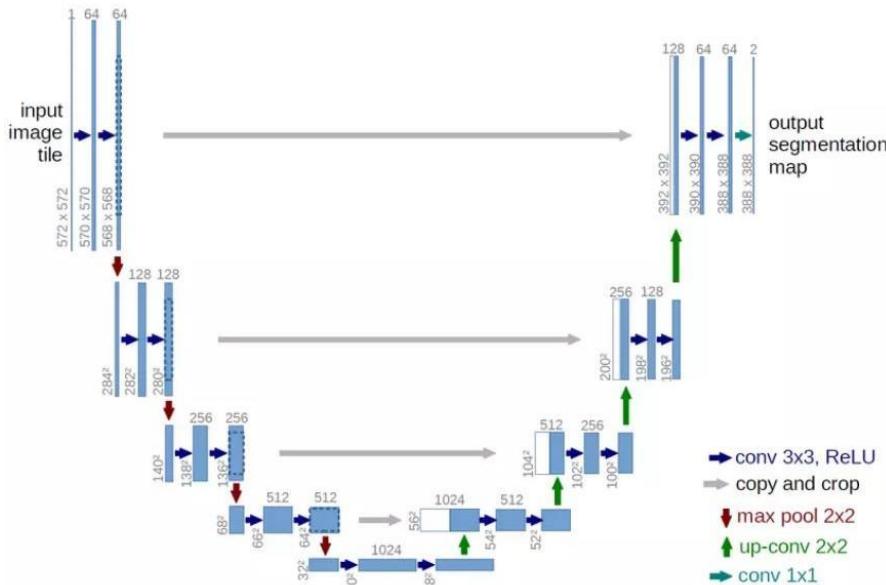


Figure 16: Overview Unet.

Unet has quite high accuracy but Unet has low speed. With Unet architecture for 572x572 input as the original article has a speed of 5 fps. Therefore, it is not suitable to apply to real-time demanding tasks such as self-driving cars. However, Unet is often used quite commonly in tasks that do not require real-time because its accuracy is not bad and the architecture is easy to implement.

Advantage	Disadvantage
Unet has quite high accuracy but Unet has low speed.	With Unet architecture for 572x572 input like the original post has a speed of 5 fps.
Unet is often used quite commonly in tasks that do not require real-time because its accuracy is not bad and the architecture is easy to implement.	Therefore, it is not suitable for applications that require real-time such as self-driving cars.

Table 11: Advantage and Disadvantage of Unet.

## -DeepLap-v3

### Overview

DeepLab-v3 is a state-of-art deep learning model for semantic image segmentation, where the goal is to assign semantic labels

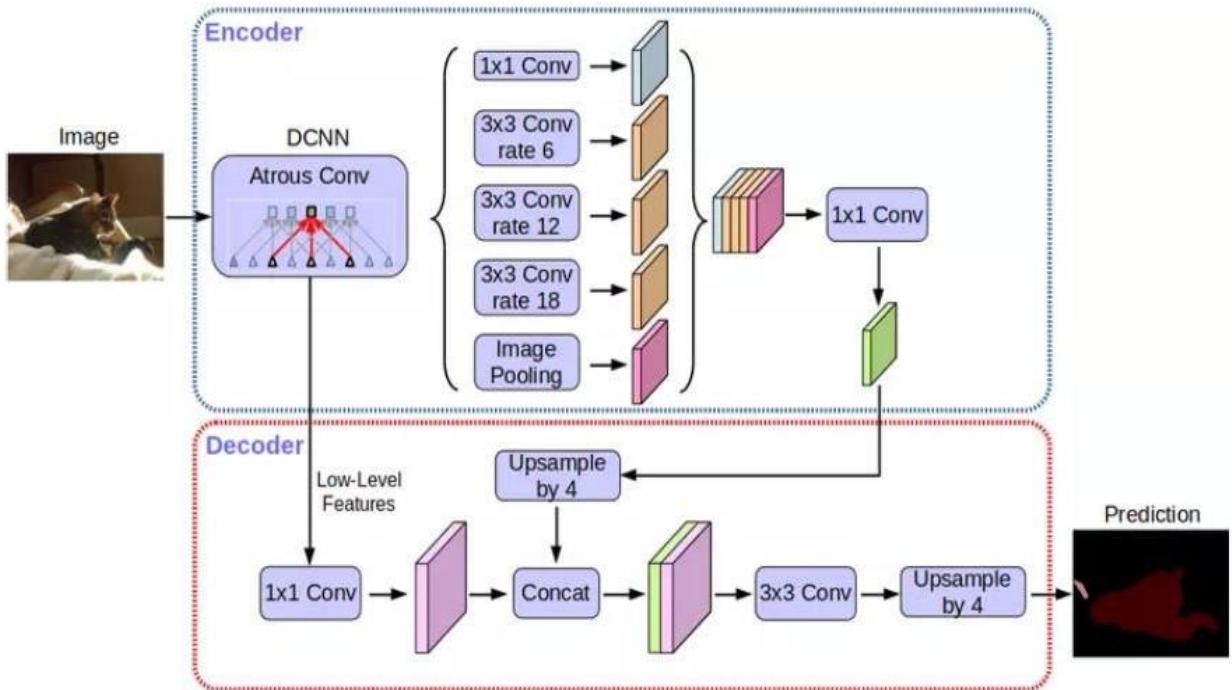


Figure 17: Overview DeepLab-v3.

## Accuracy and Speed

With modern architectures such as Atrous Convolution, Atrous Spatial Pyramid Pooling (ASPP) and CRF All-Connection Layer DeepLab-v3 has completely defeated Unet in both speed and time.

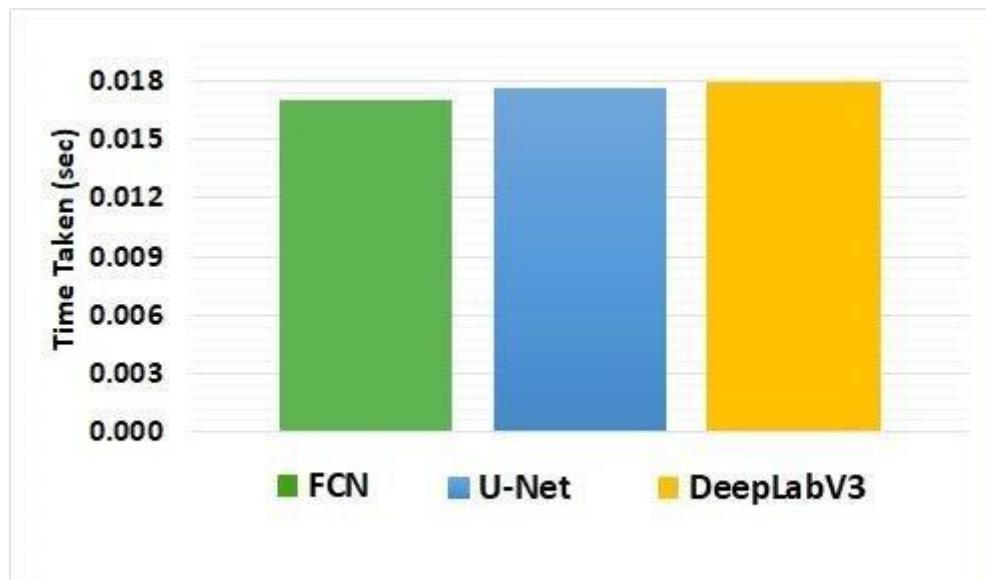


Figure 18: Time of some model segmentation.

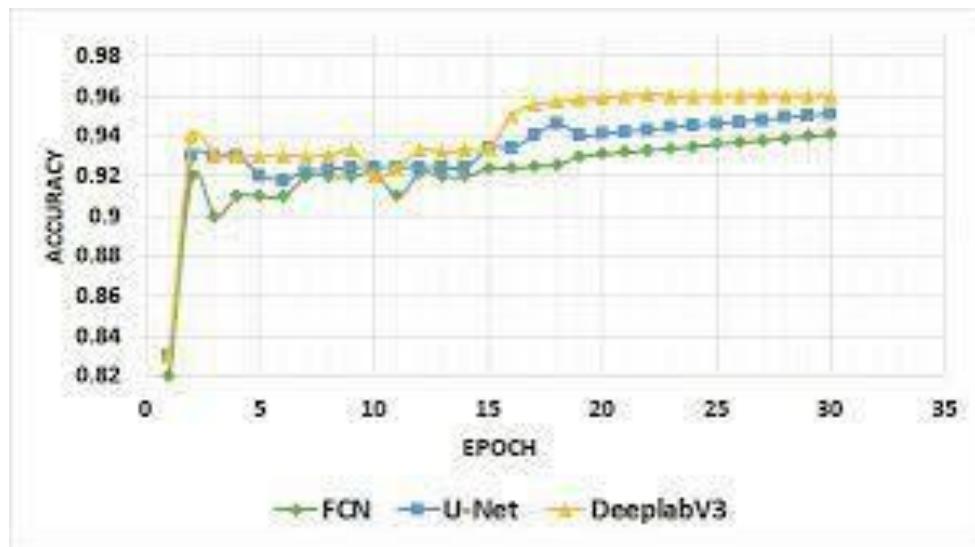


Figure 19: Accuracy of FCN, Unet and Deeplabv3.

Advantage	Disadvantage
DeepLab-v3 has the best popularity.	About segmentation unet is still a slow network and suitable only in learning test.
DeepLab-v3 has better runtime than Unet and FCN.	
DeepLab-v3 has better accuracy than Unet and FCN.	

Table 12: Advantage and Disadvantage of DeepLab-V3.

### Select technology for Machine-learning, Deep-learning

About developing Machine learning - Deep learning:

**For CNN** I will choose Resnet because its intelligent architecture that ignores the connection keeps information from being lost by connecting from the previous layers to the following layers and bypassing some intermediate layers. This improves the accuracy and speed of Resnet.

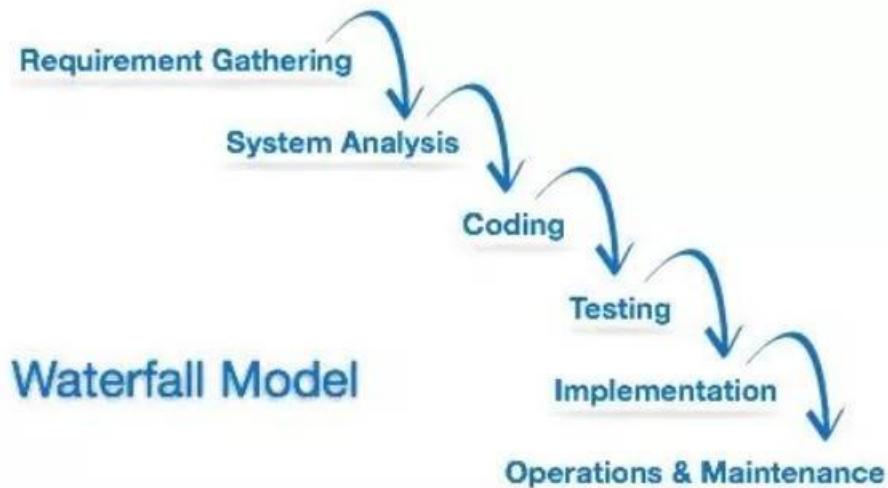
**For the Object detection** I will choose Yolov5 because Yolov5 is one of the new architectures that have just been released recently, they have many versions and the accuracy is also very high in terms of mAP, only slightly behind Faster-RCNN but in terms of speed they are fast. more than 60%.

**For Segmentation** part of course I will choose Deeplab-v3 because their modern architecture completely beats Unet in both accuracy and time.

### 3. Review of Methodologies

#### 3.1 Waterfall

This is considered as the first software development model to be used. This model applies sequentially the phases of software development. The output of the former stage is the input of the following phase. The next stage is executed only when the previous stage has ended. In particular, do not go back to the previous stage to process requests when you want to change.



*Figure 20: Overview Waterfall.*

#### Overview:

-Requirement gathering: Requirements gathering and analysis are recorded into the requirements specification document during this phase.

-System Analysis: Analyze and design software systems, determine the overall system architecture of the software.

-Coding: The system is developed by unit and integrated in the next phase. Each Unit developed and tested by the dev is called a Unit Test.

-Testing: Install and test the software. The main job of this phase is to check and correct all the errors found so that the software works correctly and according to the requirements specification document.

-Implementation: Deploy the system in a customer environment and bring it to market.

-Operations and Maintenance: Maintain the system when there are any changes from customers, users.

#### Popularity

The waterfall model was one of the first software models used. Because of its simplicity, this is also one of the most popular and easy to develop models today, second only to the Agile model as one of the most popular new methods today.

### **Flexibility in modification**

waterfall model is like a waterfall that only goes down, not up with this model we can realize its flexibility is very poor and not suitable for projects that change requirements because we cannot go back to the previous part while working on the later parts of the model.

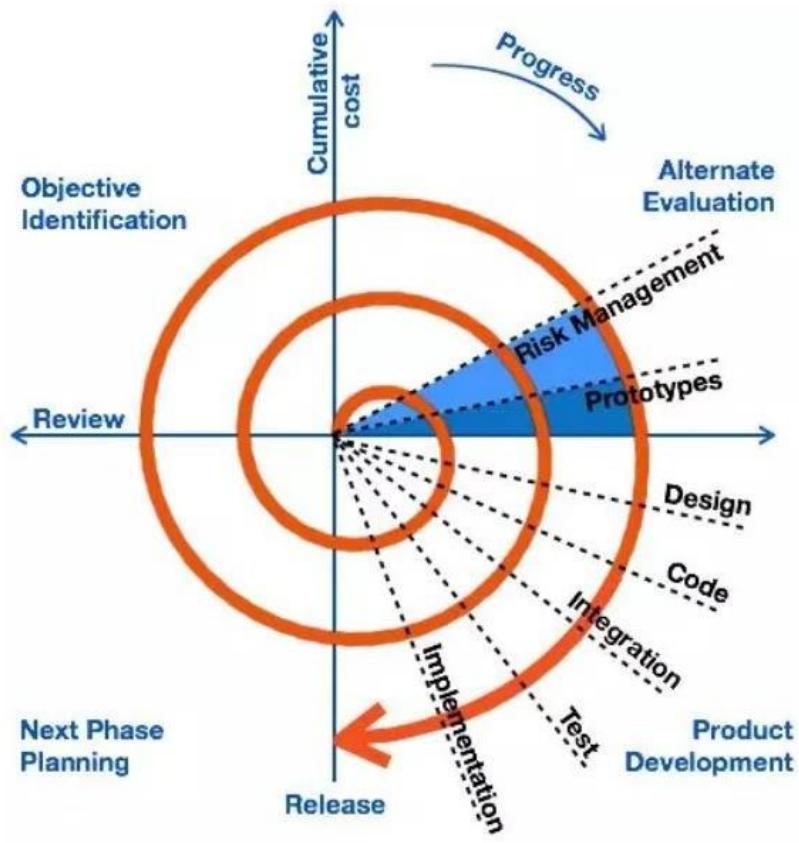
### **Save cost and time**

Waterfall model is one of the simple and cost-effective models but when any requirement needs to be changed during the model run, the whole model rework can happen and it will be a lot of money and time for this.

Advantage	Disadvantage
Waterfall is one of the most popular and easy to develop models today.	The waterfall model is like a waterfall that only goes down, not up with this model we can find its flexibility very poor and not suitable for projects that change requirements because we cannot return to the previous part while working on the later parts of the model.
The waterfall model is one of the simplest and cost-effective models	When there are any requirements that need to be changed during the run of the model, a full rework of the model can occur and will be a lot of money and time for this.

*Table 13: Advantage and Disadvantage of Waterfall.*

## **3.2 Spiral pattern**



*Figure 21: Overview Spiral.*

## Overview

A model that combines the features of prototyping model and waterfall model. The spiral model is preferred for large, expensive and complex projects. This model uses the same stages as the waterfall model, in terms of ordering, planning, risk assessment, etc.

## Popularity

Spiral model is one of the quite popular models for large and complex projects today. But their popularity still cannot be compared with waterfall models or Agile.

## Flexibility in modification

Spiral models are easy to modify because they have repeated steps like a spiral until the required project comes to an end. In general, this model is easy to modify because of its characteristics.

## Save cost and time

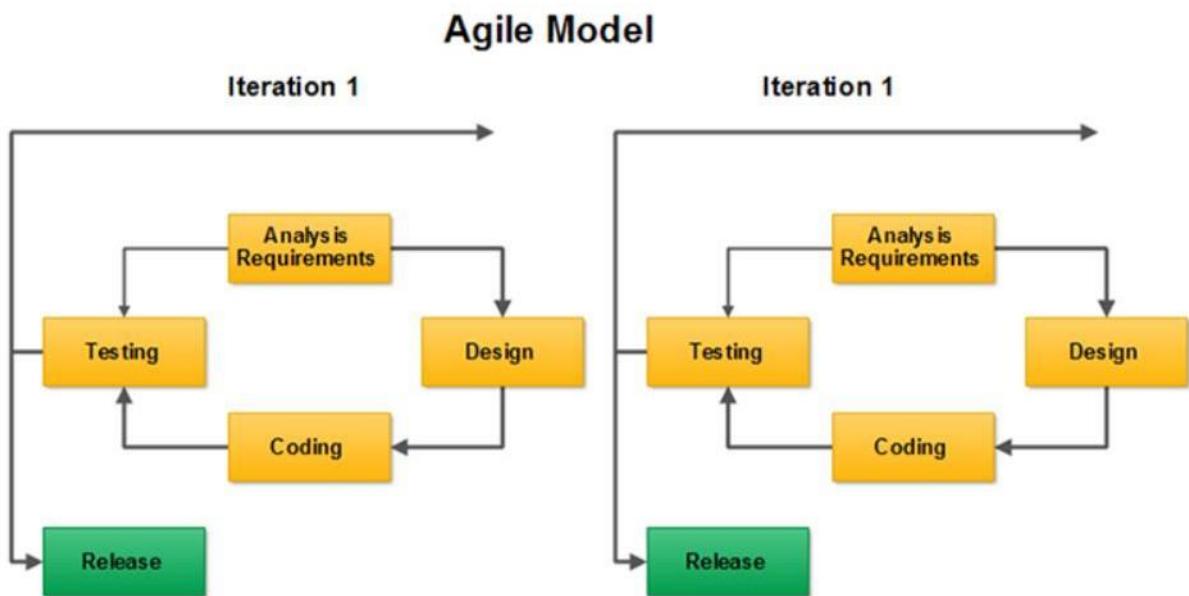
In contrast to the ease of modification, this model has a weakness that is very time and money consuming, they are not suitable for projects with tight budgets or projects that need to be completed soon. The spiral process can cost a lot of money and money and time can become infinite if the

project comes to a standstill.

Advantage	Disadvantage
Spiral model is one of the quite popular models for large and complex works today.	But their popularity still cannot be compared with waterfall or Agile models.
Spiral models are easy to modify as they have repeated steps like a spiral until the end of the required project.	In contrast to the ease of modification, this model has a weakness that it is very time and money consuming, they are not suitable for projects with tight budgets or projects that need to be completed soon.

*Table 14: Advantage and Disadvantage of Spiral.*

### 3.3 Agile Model



*Figure 23: Overview Agile.*

#### Overview

##### Step 1. Analysis and Requirements

This is the step of receiving the project's requirements and starting to analyze what software the project requires to implement...

##### Step 2: Design.

After reading and clearly analyzing the requirements of the project, step 2 is the software design

stage.

How is this software designed, what programming language, what algorithms, what tools, and what libraries to build the product.

Step 3: Coding.

Perform the coding process with the functions outlined in the design.

In fact, the coder both executes the code and tests the basic functions that the design has given.

After the coding is completed, the developer has to review his own code for algorithms, styles, etc.

Then reviewed again by the leader, or PM or a more experienced coder.

Until the code has reached the optimum, then proceed to put the product on the server and transfer it to the tester.

Step 4: Testing.

Performed by testers after the coders complete step 3. The bug fixing process starts here.

A circle of interaction between dev and QA will occur until the function is guaranteed to run well.

When testing is completed, the product is delivered to the customer.

The development team continues to return to the first stage with a new task next.

## **Popularity**

Agile model is the most popular and widely used modern model today.

## **Flexibility in modification**

Outstanding point is the ability to quickly adapt to changes from customers. Any change requests from customers are actively received and flexibly adjusted for the next feature releases. This model requires regular work and interaction between the project implementation team and the customer, avoiding the "trivial" information of the traditional model.

## **Save cost and time**

The biggest and most obvious benefit that the Agile model brings is shortening the product launch time, usually 1-2 weeks will release a basic feature, bringing value to customers. In addition, the model is also very economical in terms of budget.

Advantage	Disadvantage
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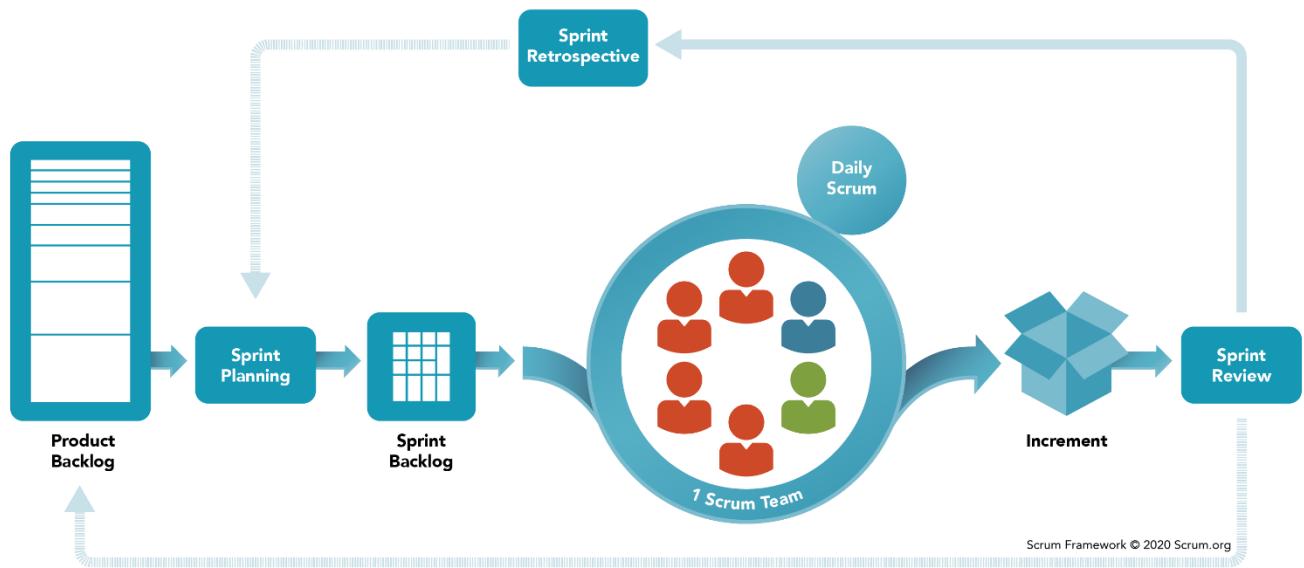
Agile has the ability to quickly adapt to changes from customers.	This model requires regular work and interaction between the project team and the customer, avoiding the "trivial" information of the traditional model.
Any change requests from customers are actively received by customers and flexibly adjusted for the next feature releases.	
The biggest and most obvious benefit that the Agile model brings is shortening the product launch time, usually 1-2 weeks will launch a basic feature, bringing value to customers.	
Agile is also very economical in terms of budget.	

*Table 16: Advantage and Disadvantage of Agile.*

### 3.4 Scrum

#### Overview

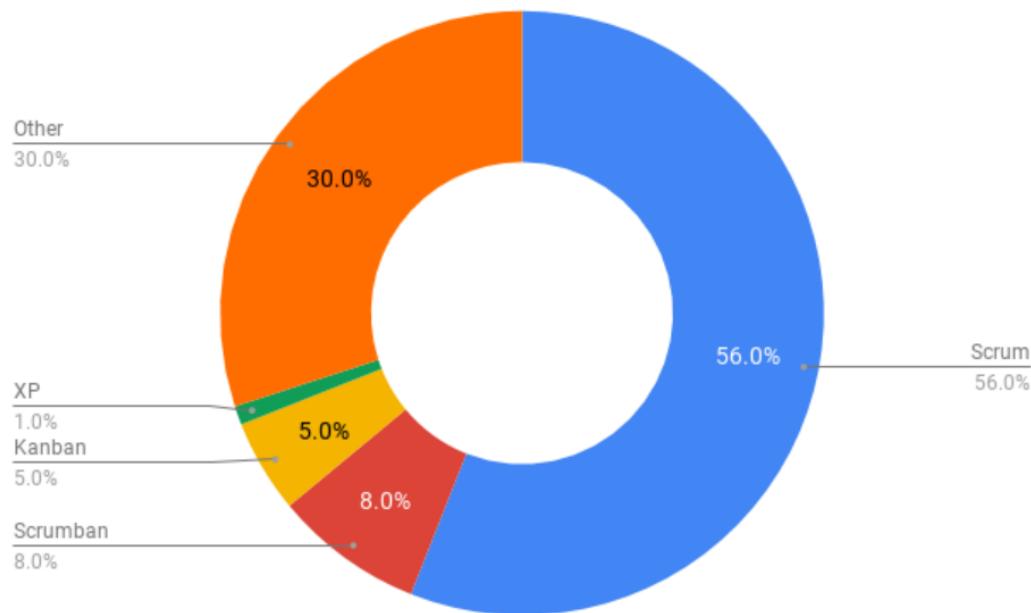
Scrum is an Agile methodology (agile software development) based on iterative and growth mechanics. Scrum is designed to support the development, delivery, and improvement of complex products. With Scrum, the product is built in a series of iterative processes, called a sprint. Thereby, you can continuously improve the product, technique, team and work environment. That way you can provide value to your customers throughout the development process.



*Figure 24: Overview Scrum.*

## Popularity

As we can see from the statistical data, Scrum is the most popular Agile framework today.



*Figure 25: Popularity of Scrum.*

## Flexibility in modification

Similar to Agile, Scrum also has the outstanding point of being able to quickly adapt to changes from

customers. Any change requests from customers are actively received by customers and flexibly adjusted for the next feature releases.

Agile and scrum, both aim to provide maximum value to business users. They strive to ensure the delivery of products or projects to business users in the minimum time possible. Both emphasize continuous improvement, collaboration, open communication.

Agile is a development methodology and is based on an incremental and iterative approach; while Scrum is one of many implementation frameworks or processes of agile methodology.

Scrum offers incremental modules to clients every week or two. This can also help Scrum make it easier to modify than Agile through increased interaction with customers.

### **Save cost and time**

Similar to Agile, Scrum brings shortened product launch time, usually 1-2 weeks will launch a basic feature, bringing value to customers and Scrum also saves cost and time.

Advantage	Disadvantage
Scrum also excels in the ability to quickly adapt to changes from customers.	Creep scope is an important issue in Scrum projects. Since the project depends on the close cooperation of the team, any member leaving the team can disrupt the whole project.
Any change requests of customers are actively received by customers and flexibly adjusted for the next feature launches.	
Agile and scrum, both aim to provide maximum value to business users. They strive to ensure the delivery of products or projects to business users in the minimum time possible. Both emphasize continuous improvement, cooperation, open communication.	
Scrum offers incremental modules to clients every week or two. This can also make Scrum easier to modify than Agile through increased customer engagement.	

Similar to Agile, Scrum shortens product launch time, usually 1-2 weeks.	
--	--

*Table 17: Advantage and Disadvantage of Scrum.*

### **Select technology for Methodologies**

I would choose Scrum over other models.

Because with a short time of 2 months to build the project, I could not extend the time for the project. Currently, the compensation requirements from the customer are still not specific and it is impossible to be sure that the requirements have not changed. With such problems if I choose the waterfall model for the project. The project will most likely fail because for the waterfall model the requirements are almost impossible to change and if changed, it will greatly affect the previous steps. For the spiral model, the changes coming from the customer side are not much of a problem for this model, but they do have a problem. The spiral model is suitable for large projects and of the research type where client requirements vary greatly determining budget and timing may not be possible. In addition, the Y.Doctor project has had quite a few developers before. Time and budget issues also occur naturally for some models such as the V-model. Scrum helps me to divide the project into Sprint, Each Sprint is divided into 2 weeks. In each Sprint there are backlogs. The backlogs will specify the mission of each Sprint. After 2 weeks a prototype will appear. From these archetypes the author will be able to get an intuitive look at the Y.Doctor project. From there, it is possible to make an appropriate assessment of the status of the project.

## **III. Requirement Analysis**

### **1. Similar application**

#### **1.1 eDoctor**

##### **Overview application**

eDoctor is a technology company with the desire to build a comprehensive healthcare system through a mobile application. Currently, eDoctor has built a large user community and has become a trusted partner by hundreds of businesses in Vietnam.

The eDoctor application on smartphones/tablets provides healthcare services. Based on information technology platform, eDoctor application helps to connect users and doctors easily anytime, anywhere. Users can use the application to get health advice, look up drugs & clinics, and other health services.

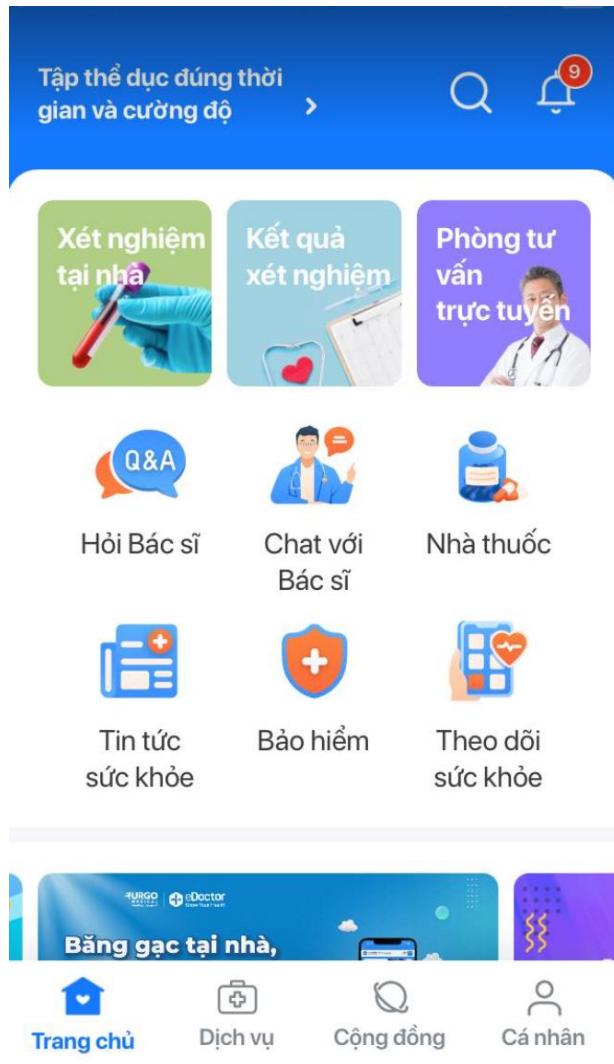


Figure 26: Home of eDoctor.

In the Home section of eDoctor we can see some main functions such as: Q&A with a doctor, this function helps patients ask questions about their medical condition and can the doctor read the questions and answer them. patient. The next function is chat with doctors where users can directly interact and chat with doctors about their health status as well as listen to useful advice from doctors. At the pharmacy function, users can also take a picture of their bill or code their bill, then the doctor will prescribe the medicine and send it to the patient. The health news function allows patients to read news about common diseases and ways to prevent them. The insurance function helps users to buy health insurance quickly. The health tracking function gives users a health care schedule for themselves. Patients can view their health monitoring and exercise schedules to take care of their own health

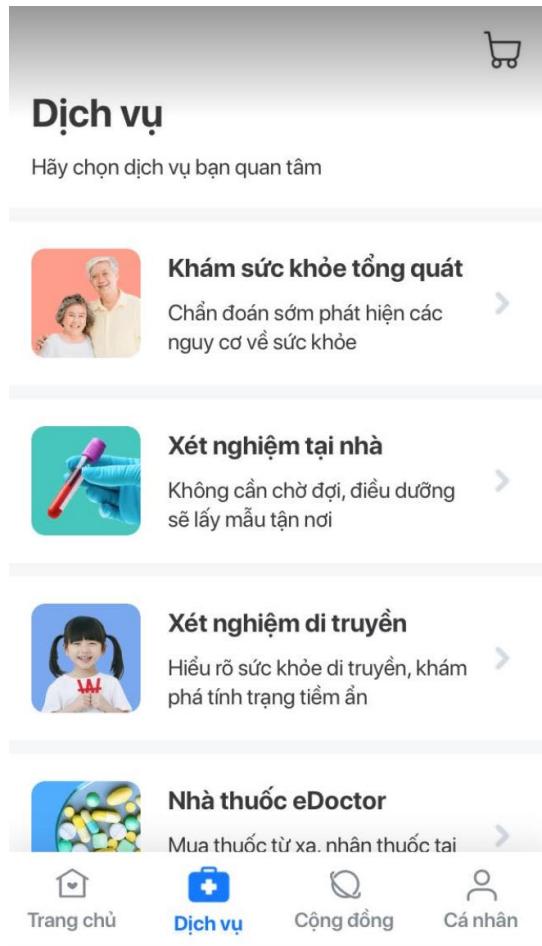
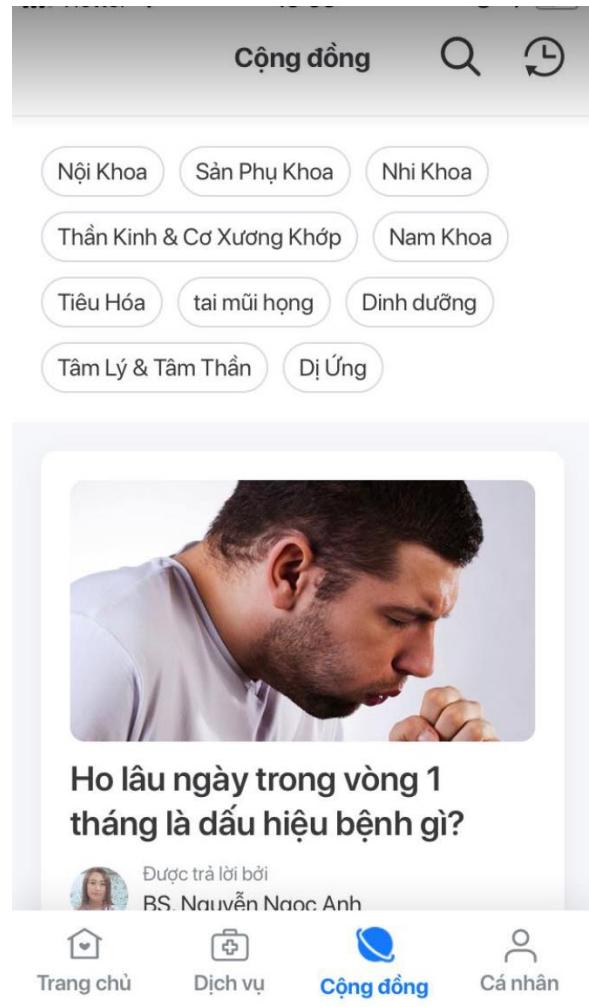


Figure 27: Service of eDoctor.

At the service section, patients can also order a lot of services from hospitals such as: General health check-up, home testing, genetic testing, pharmacy... These functions help patients can order their own health care and services.



*Figure 28: News of eDoctor.*

The next function is a community where users can post their personal questions or doctors can post experiences on life skills to prevent disease and take care of health. Here patients can search for posts by hot topics. Patients and doctors can also comment on posts. This function creates a public link between the patient and the doctor.

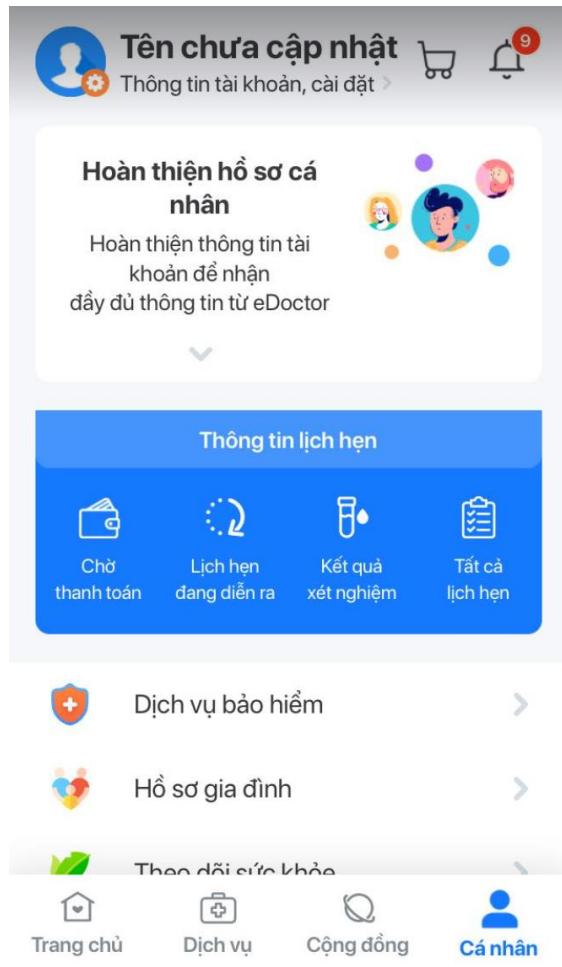


Figure 29: Profile of eDoctor.

The next function is the profile where you can see some main functions such as waiting for payment, the payment waiting function helps users see their pending transactions. Ongoing Appointments helps the user to see all their upcoming appointments for the doctor. The test results will be recorded in all their medical records during the medical examination and treatment. In addition, they can also see all appointments in the show all appointments feature.

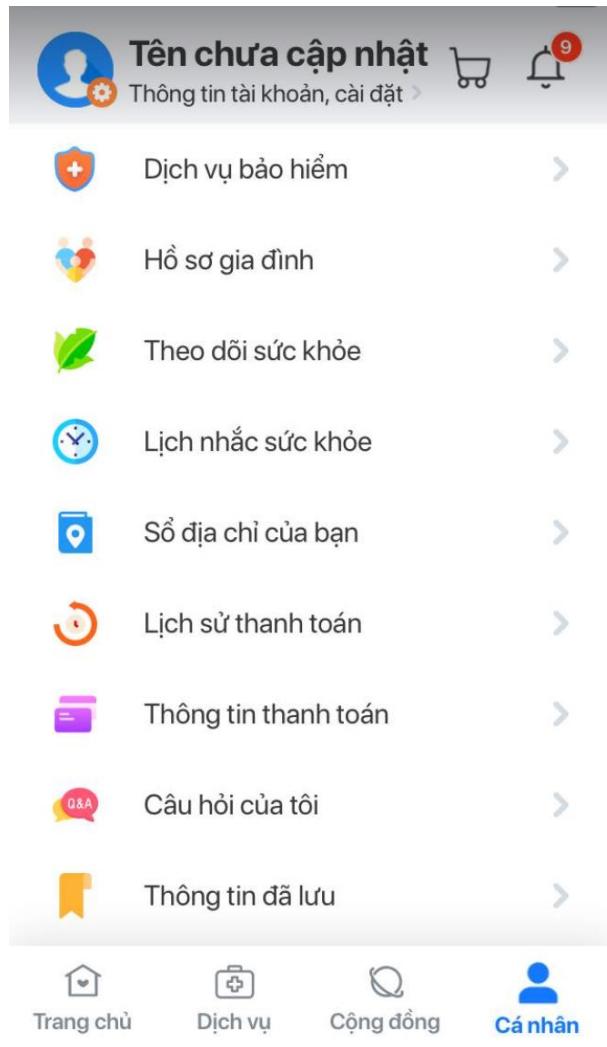


Figure 30: Profile of eDoctor.

In addition, the app also has a number of functions such as: Insurance service helps users to view the insurance services they own and at the same time introduce them to other insurance services. Family profile function helps users add profiles of family members to facilitate medical examination and treatment. Health tracking function will help users create a health care schedule. Health reminder calendar will help patients create reminders for example: take medicine at 6 o'clock. In addition, users can also update personal information such as home address to facilitate some functions such as test at home. In addition, the system also saves payment information and transaction history of the patient.



Figure 31: Profile of eDoctor.

In addition to the main functions, the app also has a number of secondary functions such as support center, user terms, calling hotline...

### Strengths and Weaknesses of eDoctor

#### Strengths

- In general, the app has health care features for patients, full medical services such as booking an appointment, buying medicine, making calls to interact directly with doctors. take care of their own health effectively.
- Users can post posts and ask questions to doctors, which is a very good function in helping patients interact directly with doctors without having to go to the hospital directly.

- Health tracking function allows patients to create a schedule of their own health care. From there, creating good habits is the patient's daily health care activities.

### **Weaknesses**

-The payment functions are still quite difficult when linking with some banks with strict regulations, you will have to go to the payment counter to link. In addition, the security registration process is also quite weak. The payment registration function is still not effective.

-Patients do not receive free care. This is one of the fatal weaknesses in the development of the app. Users will not be able to experience any medical examination and treatment services of doctors if they do not pay. Even if they don't know what the service is like. If you want a patient to have medical examination and treatment needs, you need to first give them a reason and suggestion to use that service. For example, after having a symptom of a patient's feet with acne, he took a picture and let the AI doctor diagnose that the disease was just blisters and he was suggested to the pharmacy functions and the inquiry function Call, chat with doctors.

## **2. Business requirement**

ID	Feature/Requirement	Actor	Descriptions	Priority
1	Register account	Client/Doctor/Admin	provide email, phone number, username, password to register. Email and phone number must be unique, password must be at least 6 digits.	Must have
2	Login account	Client/Doctor/Admin	provide email , password to login. The system will notify users when email, wrong password.	Must have
3	Home	Client	At Home will include services for users such as: booking an appointment, booking a test at home, an online pharmacy, Dr.Hera, calling to consult with a doctor, asking questions, and other health services.	Must have
4	Book an appointment	Client	Select the hospital -> select the examination record -> select the	Must have

			examination department -> select the examination schedule -> pay -> finish saving to the history and appointment schedule.	
5	Dr.Hera	Client/Doctor	Doctor Hera has learned from a medical resource before, users only need to provide a photo of the disease to the doctor, the doctor will diagnose the user's disease using AI technology.	Must have
6	Call/chat with doctor	Client	Select the profile to be consulted -> select a specialty -> select a doctor -> show doctor profile and call chat.	Must have
7	Q&A	Client	Select a specialty -> post a question and wait for the doctor to answer.	
8	Other health care services	Client	select service plan -> select profile, address -> select calendar -> payment and save to history.	Must have
9	Hospital	Client	will show users the most prestigious hospitals near them, when the user chooses the hospital the app will link with google map to show how they go there.	Must have
10	News	Client/Doctor	All users share about their medical problem, it's like a social network users can post and share on other users and doctors will be able to see comments.	Must have
11	Post	Client/Doctor	Users can post a problem to ask everyone	Must have
12	Like	Client/Doctor	Users can like the posts they like or unlike if they do by clicking a second time if they don't like it	Must have

13	Comment	Client/Doctor	Users can comment on a certain article	Must have
14	Register CarePay	Client/Doctor	check, update the profile and the user needs to provide the identity card number -> capture the face (AI check) -> take the front face ID card (AI check and take information) -> take the face ID card after ->( AI check and take information) -> check and modify information get from identity card -> successful Carepay registration.	Must have
15	Carepay	Client/Doctor	Users will be shown some functions of carepay: scanning payment code, transfer, deposit and withdraw, add card link, carepay information, screen lock settings.	Must have
16	Scanning payment code	Client/Doctor	user will access the camera and scan the payment code	
17	Transfer	Client/Doctor	select transfer item (carepay, bank) -> enter phone number/account number -> enter amount -> confirm invoice -> enter import face -> print invoice and save in history.	Must have
18	Recharge	Client/Doctor	choose the type of top-up card -> fill in the amount to top up -> top up	Must have
19	Withdraw money	Client/Doctor	Fill in the amount to withdraw->withdraw	Must have
20	Add card	Client/Doctor	Enter card number, card opening date, expiration date, cardholder's full name -> card link.	Must have

21	Carepay information	Client/Doctor	Carepay information -> show all information (name, account number, usage details)	Must have
22	Set screen lock	Client/Doctor	Screen lock settings require entering a lock with any payment service.	
23	Profile	Client/Doctor	Here at the top users can see their information including photo, name, phone number . Users can also update their profile here. In addition, users can see a number of other functions such as: top up the account, transfer money via points, add relatives to the account, enter gift codes, support children with serious illnesses, declare medical information about covid19, view my examination schedule, medical records, list of doctors, transaction history, invite friends to download the app, create reminders, set screen lock, set notifications, ask questions, change password, call for advice, access facebook of the app, terms of use, introduce the app and log out.	Must have
24	Update profile	Client/Doctor	Here users can see all their current information such as profile picture, name, date of birth, gender, city, county, district, commune, address and user can change any information. Any information after changing the user can press save to save the information, all information will be saved in the	Must have

			database and after successfully saved the user will return to the profile, the relevant information in the profile will be updated.	
25	Recharge	Client/Doctor	Here, there are 3 top-up features that will be shown: 1 is to top up with a phone card, 2 is to top up with a linked ATM card, 3 is to top up with a linked international card. When selecting a different deposit type, the app will show different input fields for the user to deposit. After selecting the recharge card here, if the user does not enter the amount but presses to recharge, the app will prompt the user to enter the amount. After entering the amount and clicking on top up, the app will check if the user has enough money in the recharge source, if not, the app will notify the user again if there is an app, it will add the amount on the app to the user and return. Re-profile here all relevant information will be updated.	Must have
26	Accumulated points	Client/Doctor	users can enter and exchange from the money in the account through accumulated points.	Must have
27	Relative profile	Client	relatives profile list -> add profile -> enter info -> save on database -> show user about adding profile.	Must have
28	Endow	Client/Doctor	Enter the code and receive the gift	Nice to have

29	Logout	Client/Doctor/Admin	Return to the login of the app	Must have
30	Medical examination for patients	Doctor	The doctor can see all the patients who have an appointment with them at what time and place -> the doctor can see the details of the appointment -> after the examination the doctor will give the patient a list of tests test for the patient to check	Must have
31	Prescriptions	Doctor	As the next function of medical examination and treatment, the pharmacy will record the results of the patient's treatment and prescribe medicine for them. All this data will be kept in the patient's medical record.	Must have
32	Online pharmacy	Doctor	Here the doctor can see all the patient's orders and call the person ordering the medicine.	Must have
33	Call status	Doctor	Here the doctor can turn the call function on and off so that the patient can call or can't call the doctor.	Must have
34	Answer questions	Doctor	Here the doctor can see the patient's questions and answer them.	Must have
35	Register a doctor	Doctor	Here, the doctor needs to provide information such as specialty, hospital, face, certificate for AI to check, after successful check, the doctor can use the doctor's functions otherwise they can only use it. limited functions.	Must have
36	Register doctor active	Doctor	After successful registration, the doctor will have a profile of their own	Must have

			including their name, hospital, specialty and certification.	
37	All hospital	Admin	Here the admin can add, edit and delete the currently empty hospitals.	
38	Test at home	Admin	Here, admin can view test schedules at home and assign a doctor to the right specialty who is free during the appointment time.	Must have
39	Client account	Admin	Here the doctor can see all the patient's information	Must have
40	Doctor account	Admin	Here the doctor can see all the doctor's information	Must have
41	See all contribute	Admin	admin can see all contributions from patients as well as doctors	Must have
42	Add gift code	Admin	admin can add gift code and bonus to code	Must have
43	Service	admin	admin can add service	Must have
44	Test at home	Client	Select test package -> select appointment schedule - appointment time -> select profile and address -> payment -> finish saving to history and appointment.	Nice to have
45	Online pharmacy	Client	Take a picture of the prescription and wait for a response from the doctor, the doctor will respond within 1 hour and deliver the medicine to your place.	Nice to have
46	Donations	Client/Doctor	select donation card type -> enter donation amount -> save to history.	Nice to have
47	Health declaration	Client/Doctor/Admin	enter declaration form -> answer questions -> medical declaration.	Nice to have

48	Appointment schedule	Client	View all appointments, doctor appointments	Nice to have
49	Transaction history	Client/Doctor	view all transaction history	Nice to have
50	Invite friends	Client/Doctor/Admin	Links to network apps that will meet to invite the user's friends	Nice to have
51	Remind	Client/Doctor/Admin	show all reminders -> from here users can add or delete reminders -> enter the reminder date, time, title, if you want to repeat daily -> show the user the reminder schedule.	Nice to have
52	Screen lock settings	Client/Doctor	turn screen lock on and off when paying for services	Nice to have
53	Notification toggle settings	Client/Doctor/Admin	settings to turn on and off the app's notifications	Nice to have
54	Change Password	Client/Doctor/Admin	enter old password, new password, re-enter invite password -> check for mistakes -> change password	Must have
55	Call customer care	Client/Doctor/Admin	call the app hotline	Nice to have
56	Facebook app	Client/Doctor/Admin	link to the app's Facebook	Nice to have
57	Terms of use	Client/Doctor/Admin	all requirements, commitments on the terms of use of the app	Nice to have
58	Introduce	Client/Doctor	all the company information and company contacts of the app	Nice to have

*Table 18: Business requirement.*

### 3. Solution requirements

#### 3.1 Technology

##### 3.1.1 Front-end - Java

For the front-end will be used by java with android because of their outstanding features in terms of security as well as popularity in documentation because Java is an older language than Kotlin.

### **3.1.2 Back-end - Python**

As for the back-end will be used by python because of their convenience compared to java when I combine with machine learning- deep learning. Python is a programming language that integrates many libraries such as TensorFlow, torch, keras...

### **3.1.3 Database - SQL Server**

For the database I will use MySQL because of its superior features compared to SQLite in terms of security as well as speed.

#### **3.1.4 Machine learning – Deep learning**

##### **-Convolutional neural network (CNN)**

###### **ResNet-50**

For classification tasks I will use ResNet-50 instead of VGG16 because of their outstanding speed and accuracy.

###### **-Object detection**

###### **Yolo**

For detection tasks I will use YOLOV5 instead of R-CNN because of their superior speed and accuracy.

###### **-Segmentation**

###### **DeepLap-v3**

For detection tasks I will use DeeplabV3 instead of U-net because of their outstanding speed and accuracy.

## **3.2 Architect**

For the active architecture for the project I will use MVVM :

Since Microsoft introduced two new application development platforms, WPF and Silverlight, there have been many changes in event handling and data binding, between application layers.

Thereby, most of the work of the layer is combined with the presentation layer. This raises the need for a new, more appropriate application development model. And thus, the Model - View - ViewModel (MVVM) pattern was born and is becoming more and more popular.

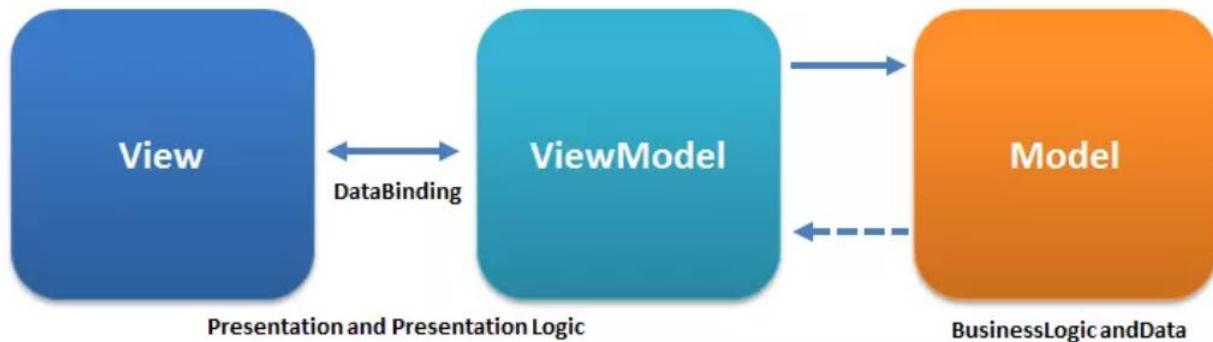


Figure 32: MVVM model.

## 4. Non functional requirement

### 4.1 Performance

**Load:** Features must load in 1-2s except for AI features that must load under 5s.

**CCP:** ensure the system can withstand 1000 users at a time without crashing or overloading the system.

### 4.2 Security

-Password not displayed when logging in

-Only show a single false message when logging in to the wrong account, wrong password and correct account, wrong password.

-Password must be encrypted.

-About the legality of the application. All personal information when users register to use the application, disease status, skin disease photos, medical records will be guaranteed not to be shared with anyone or any organization. All such information is only allowed to serve the needs of individual users. For information that may be in public form such as doctor's phone number, doctor's certificate, the doctor's information will only be used when the user registers and allows the

application to use that information . Information shared from users is only for the functionality of the application and not for commercial purposes.

### 4.3 User interface

-In an interface system there should be a consensus on similar components and states. For example, pop ups, window shapes, colors, user notifications, actions with similar functions.

-Allows to use keyboard shortcuts - Shorten familiar operations

- Actions that need to be provided with feedback.

-Action can be reversed

### 4.5 Device support

-The devices used in the project are Samsung j4 or later.

## 5. Project requirements

Name	Number of participants	Role/Responsibility/Tasks	number of working days
Business analyst	1	- Analyzing customer requirements -After synthetic analysis into user cases, flowchart.	8
Designer	1	-Application design.	7
Database designer	1	-ERD, database design	8
Planner	1	-Analyze and plan to build app	6
Data taker	1	- Collect skin disease photo data, photo ID card, photo with doctor's certificate. - Label photos	4
Project manager	1	Managing team member - Control scope and risk, quality - Reporting status of project to the project owner - Integrate parts of project	2
Tester	1	- Test the application and return it to the relevant party if the application has an error	6

Security person	1	Evaluate and implement system security(email, password)	7
Android developer	1	front-end app programming by designer	8
Python developer	1	Back-end programming and API documentation for front-end	9
Computer vision developer	1	- Design image classification model. -Designed object detection model. -Design image segmentation model.	12
Total	11		95

*Table 19: Project requirements.*

## 5. Transition requirement

Models that classify images as human faces or not, ID cards or not, doctor degrees or not, skin disease photo classification models, skin disease detection models, disease image segmentation models, and more are all included. perform training by transfer learning to achieve the best effect, they will be weighted from previous classification models, detect object, segmentation and freeze their weight. The training to better fit the model is only part of the fully connected part below. For models without pre-weighted models, it is still necessary to use weights of the first layers so that the training gives the best results to avoid overfit.

## 6. Stakeholder requirements

In the process of collecting confidential photos such as: ID photo, doctor's card photo, face photo, skin disease photo. It is necessary to assure the parties involved in the photography that their photos for ID photos, diplomas, will only be used for model training purposes and are fully responsible if it affects them personally. At the same time, they will give them a way to contact the company and a gift for participants who contribute ID photos, faces, and sick photos. For doctor's photos, they will get some free incentives when joining the DT.OH app. All images must be approved by the supplier.

## 7. The WBS

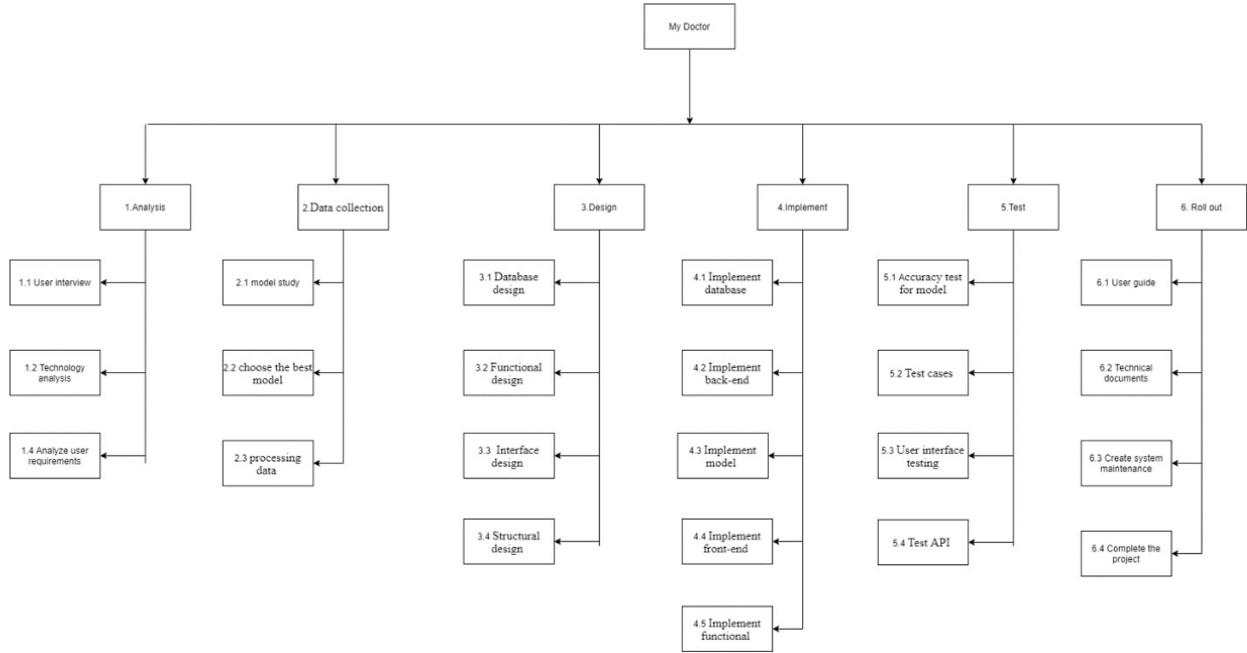


Figure 32: WBS.

### WBS dictionary.

No	Work package	Start date	End date	Person in charge	Number of working days
1	analysis	November 5, 2021	November 18, 2021		8
1.1	User interview	November 5, 2021	November 9, 2021	Business analyst	7
1.2	Technology analysis	November 9, 2021	November 13, 2021	Business analyst	8
1.3	Analyze user requirements	November 15, 2021	November 18, 2021	Business analyst	6
2	Data collection	November 19, 2021	December 9, 2021		4

2.1	Model study	November 19, 2021	November 24, 2021	Computer vision developer	2
2.2	Choose the best model	November 25, 2021	November 29, 2021	Computer vision developer	6
2.3	Processing data	November 30, 2021	December 9, 2021	Data taker	7
3	Design	December 9, 2021	January 10, 2022	Designer	8
3.1	Database design	December 10, 2021	December 15, 2021	Designer database	9
3.2	Functional design	December 16, 2021	December 24, 2021	Business analyst	12
3.3	Interface design	December 27, 2021	January 4, 2022	Designer	9
3.4	Structural design	January 5, 2022	January 10, 2022	Business analyst	8
4	Implement	January 11, 2022	March 15, 2022		7
4.1	Implement database	January 11, 2022	January 18, 2022	Database designer	8
4.2	Implement back-end	January 19, 2022	January 28, 2022	Python developer	6

4.3	Implement model	January 31, 2022	February 11, 2022	Computer vision developer	4
4.4	Implement front-end	February 14, 2022	March 1, 2022	Android developer	2
4.5	Implement functional	March 1, 2022	March 15, 2022	Android developer	6
5	Test	March 15, 2022	March 31, 2022		7
5.1	Accuracy test model	March 16, 2022	March 17, 2022	Computer vision developer	8
5.2	Test cases	March 18, 2022	March 23, 2022	Tester	9
5.3	User interface test	March 24, 2022	March 28, 2022	Tester	12
5.4	Test API	March 29, 2022	March 31, 2022	Tester	8
6	Roll out	April 1, 2022	April 20, 2022		8
6.1	User guide	April 1, 2022	April 4, 2022	Tester	7
6.2	Technical documents	April 5,	April 10,	All developer	8

		2022	2022		
6.3	Create system maintenance	April 10, 2022	April 15, 2022	Security person	6
6.4	Complete project	April 15, 2022	April 20, 2022	Project manager	4

Table 20: WBS dictionary.

## IV. Design

### 1. Architecture

#### 1.1 Back-end

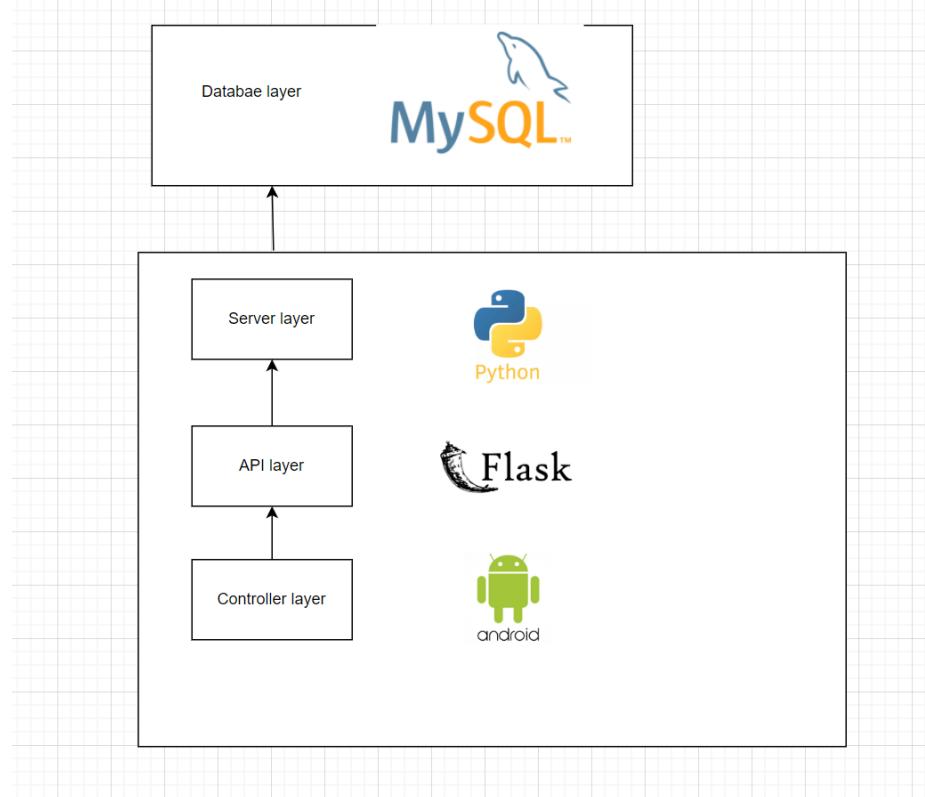


Figure 33: Architecture back -end.

Back-end includes 4 layers including: Database layer, Server layer, API layer, Controller layer.

First about the Database layer I chose MySQL to store all the data and be controlled from the Server.

Second about the Server layer I chose Python to control the access to MySQL.

Third about layer API I chose Flask one of the famous API today for python to communicate between front-end and back end.

Finally about Controller layer I choose android with java to control how layer.

When the user enters or presses a button the commands will be sent to the python back-end via the Flask API, after the bac-end receives the command from the front-end. The back-end will receive the command to access the database to return to the front-end.

## 1.2 Front-end

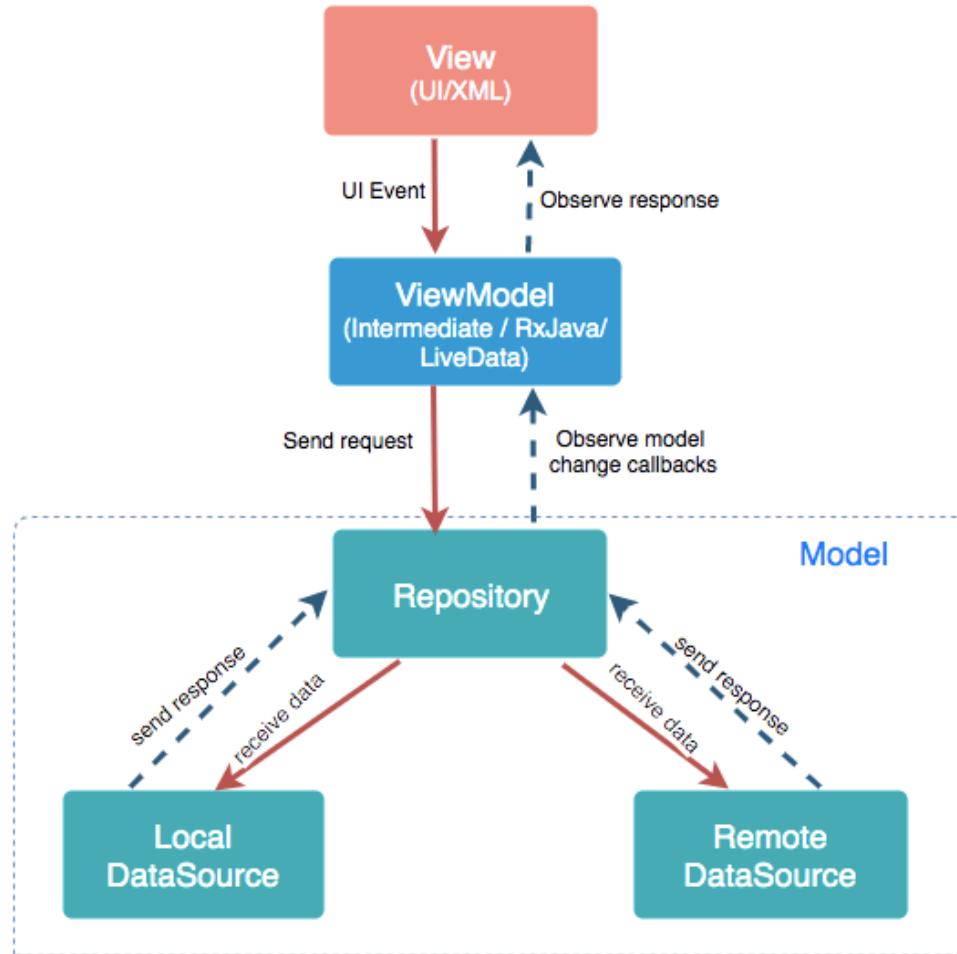


Figure 34: Architecture front -end.

- Views

Here contains the interface files and each interface file has a code-behind class included. Especially the code-behind file we will not use, everything we need to do will be moved down to the ViewModel class. Views are used to combine with MVVM patterns,... It is used to provide a neat conceptual separation between UI and presentation logic and data

#### - Models

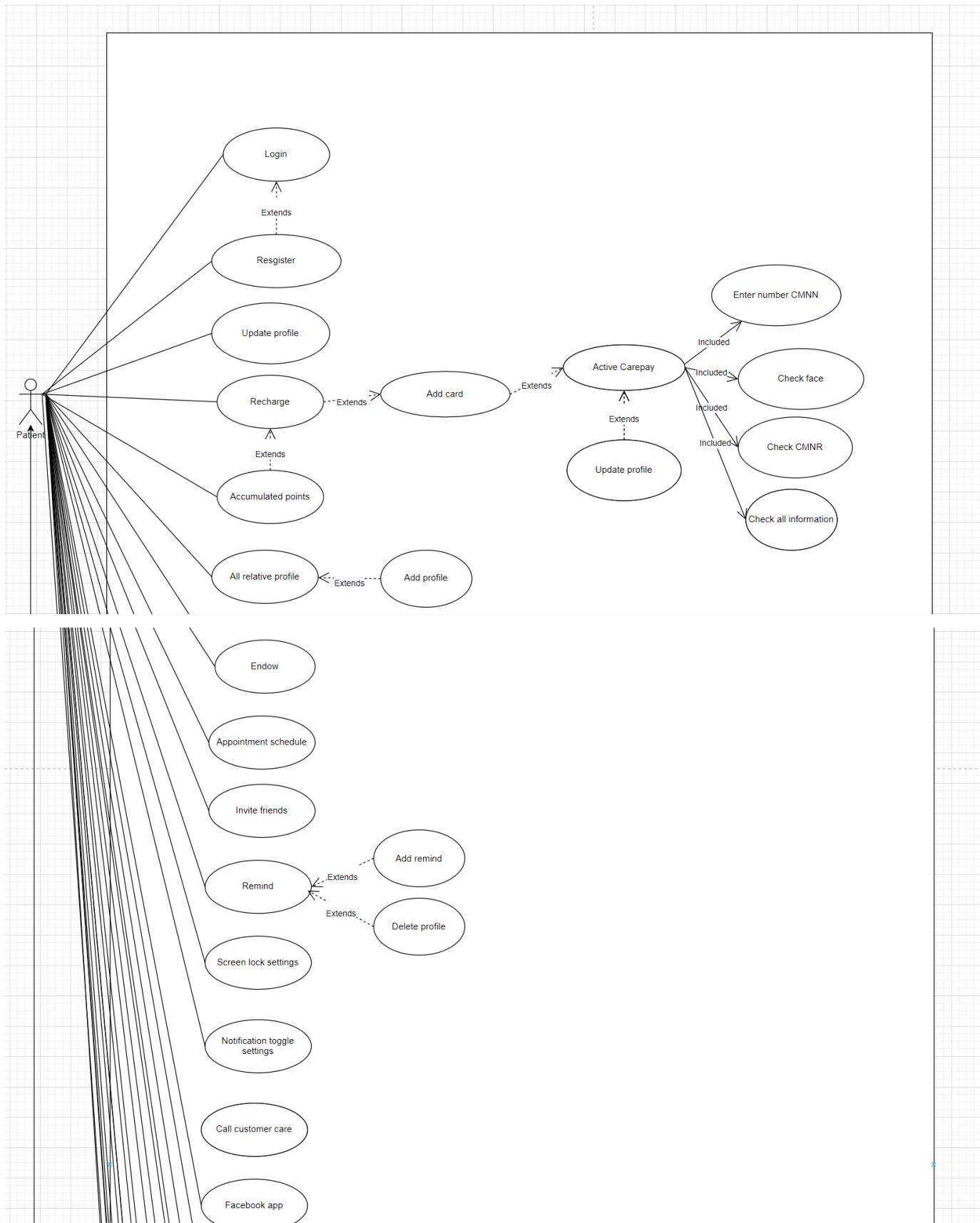
In the Models folder create the data tiers and any associated validation, business logic to ensure data integrity, can be separated as another Repositories, they are used as part of the MVVM model

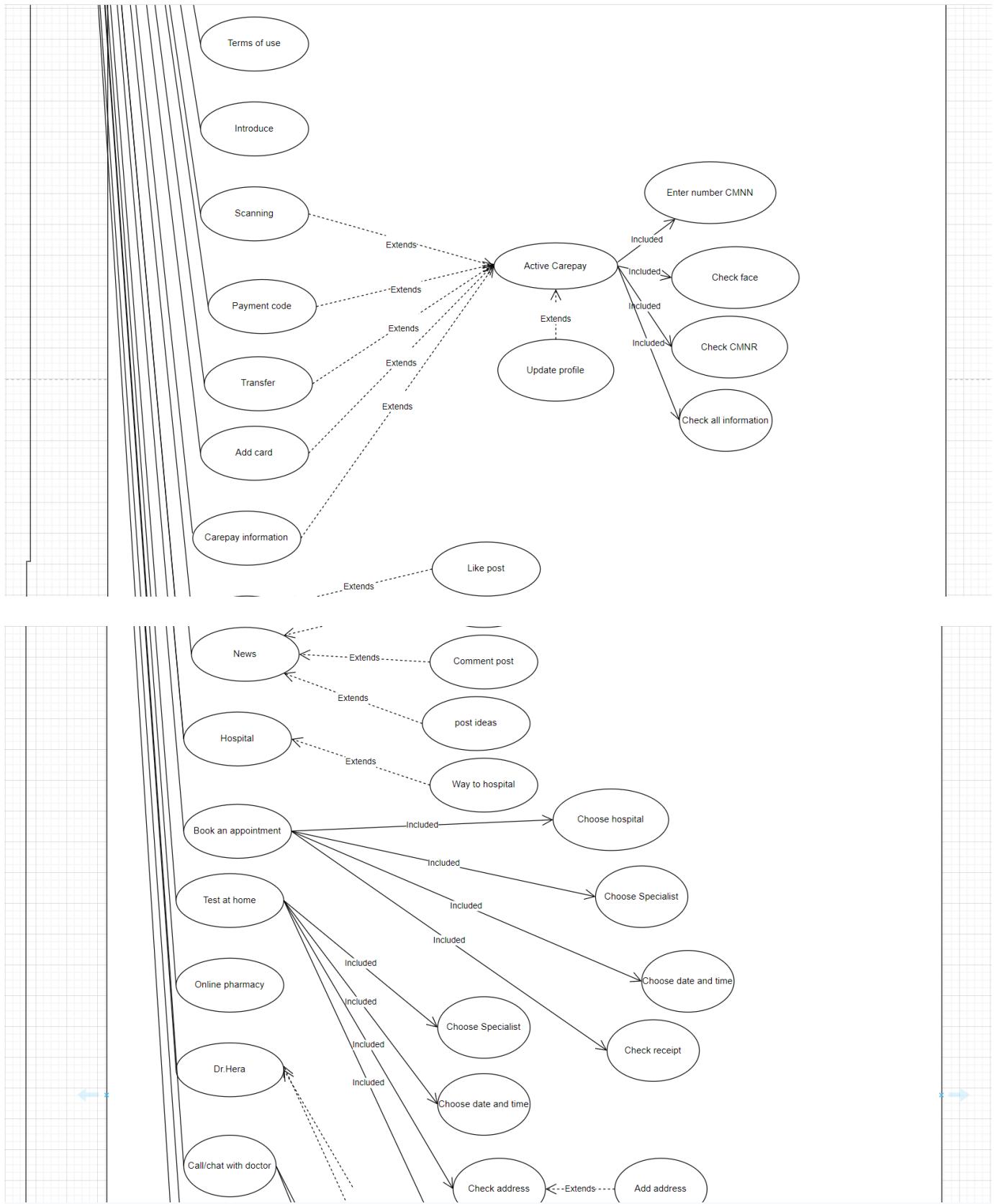
#### - ViewModels

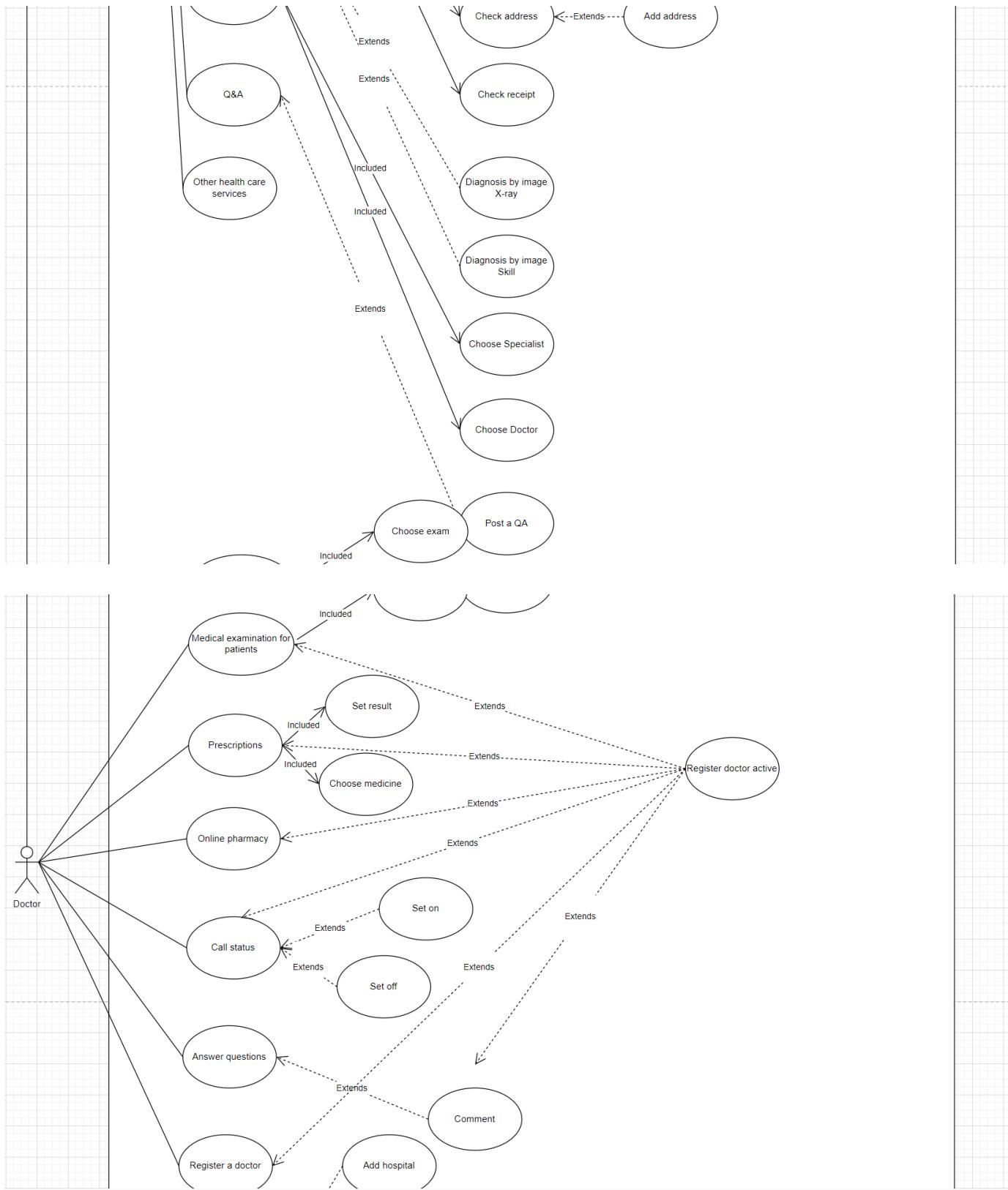
Usually in an interface file, we create a corresponding View Models class (sometimes we create many subclasses to help simplify the code file and call them in the main ViewModels class).

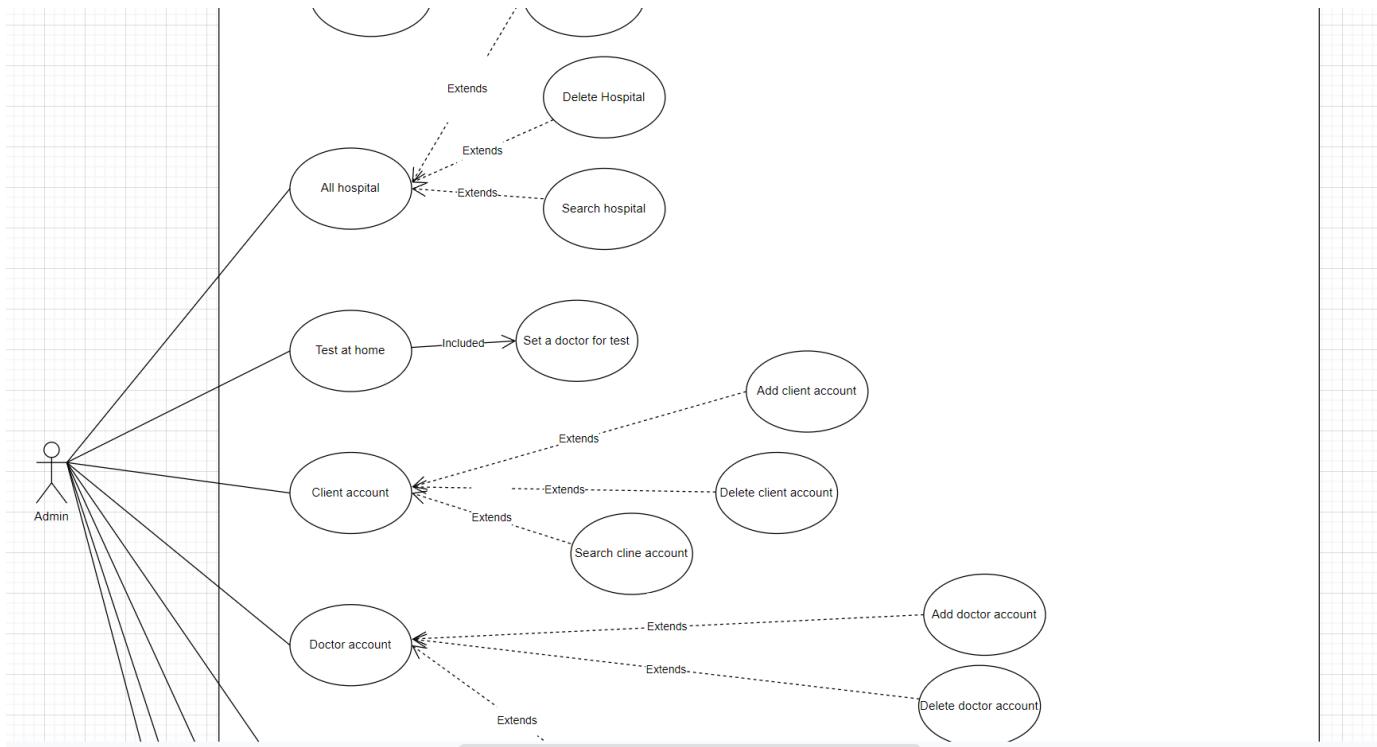
ViewModels will use models if need to define data. The connection between View-ViewModel helps them to send and receive data, to understand clearly we need to learn the concepts of Binding, DataContext, Behaviors SDK, so that we separate the code-behind of the View and bring down the View Model

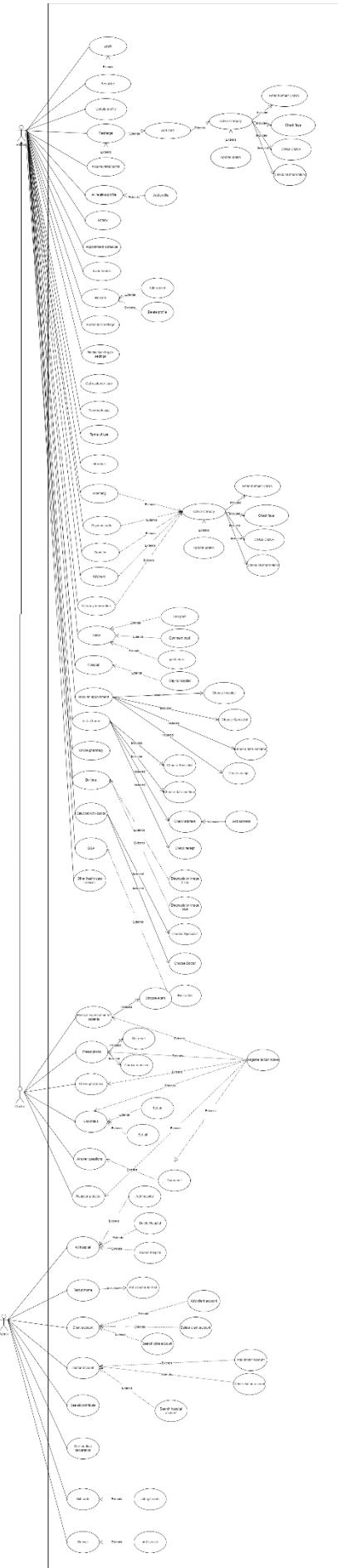
## **2. Use case diagram**











*Figure 35: Use case diagram.*

**Patient:**

With the patient they can login and if there is no account the patient can register an account. The functions in the profile allow the patient to Update profile, Recharge. Before Recharge users need to add their bank card and before adding the card they need to activate carepay if their account has not been active before. Active carepay needs to provide information such as identity card number, face photo, front photo of identity card, back photo of identity card. Accumulated points feature will help users convert from money to points with this point they can buy some services. If there are no more points, the user can go to top up. The All relative profile feature helps users add profiles of their loved ones. Endow feature helps users to enter a code and there will be a reward for each code separately. Appointment schedule feature helps users review the schedules they have scheduled and are scheduled. The Remind feature allows users to set alarm schedules as well as delete alarm schedules. To use the Scanning feature, Payment code, Transfer, Add card, Carepay information, users need Active Carepay. When active carepay, users can also update their profile to get the necessary information for the carepay confirmation system. The hospital feature helps users find the nearest hospital and access to google map only for users. In addition, users also have some features such as Invite friends, Screen lock settings, Notification toggle settings, Facebook app, Terms of use, Introduce to best support users.

**Doctor :**

Doctor inherits all features from Patient and has some unique features such as: Medical examination for patients , Prescriptions, Online pharmacy, Call status, Answer questions, Register a doctor. These features all need Register doctor active if the user has not been active before. The Medical examination for patients feature includes Choose exam. The Prescriptions feature needs Set result and Choose medicine. Call status feature can be set on and set off. The Answer questions feature may or may not answer the question.

**Admin :**

Admin has an All hospital feature where admin can add, delete, search for hospitals or do nothing. Test at home feature needs to Set a doctor. Client account feature here admin can see all information,

search Client accounts or do nothing. Doctor account feature here admin can see all information, search Doctor accounts or do nothing. The See all contribute feature helps admins see contributions. The See medical declaration feature helps admins see declarations from users. Gift code feature here admin can Add gift code or not. Service feature here admin can Add service or do nothing.

Above is the full explanation of the roles: Patient, Doctor, Admin.

### 3. Database ERD.

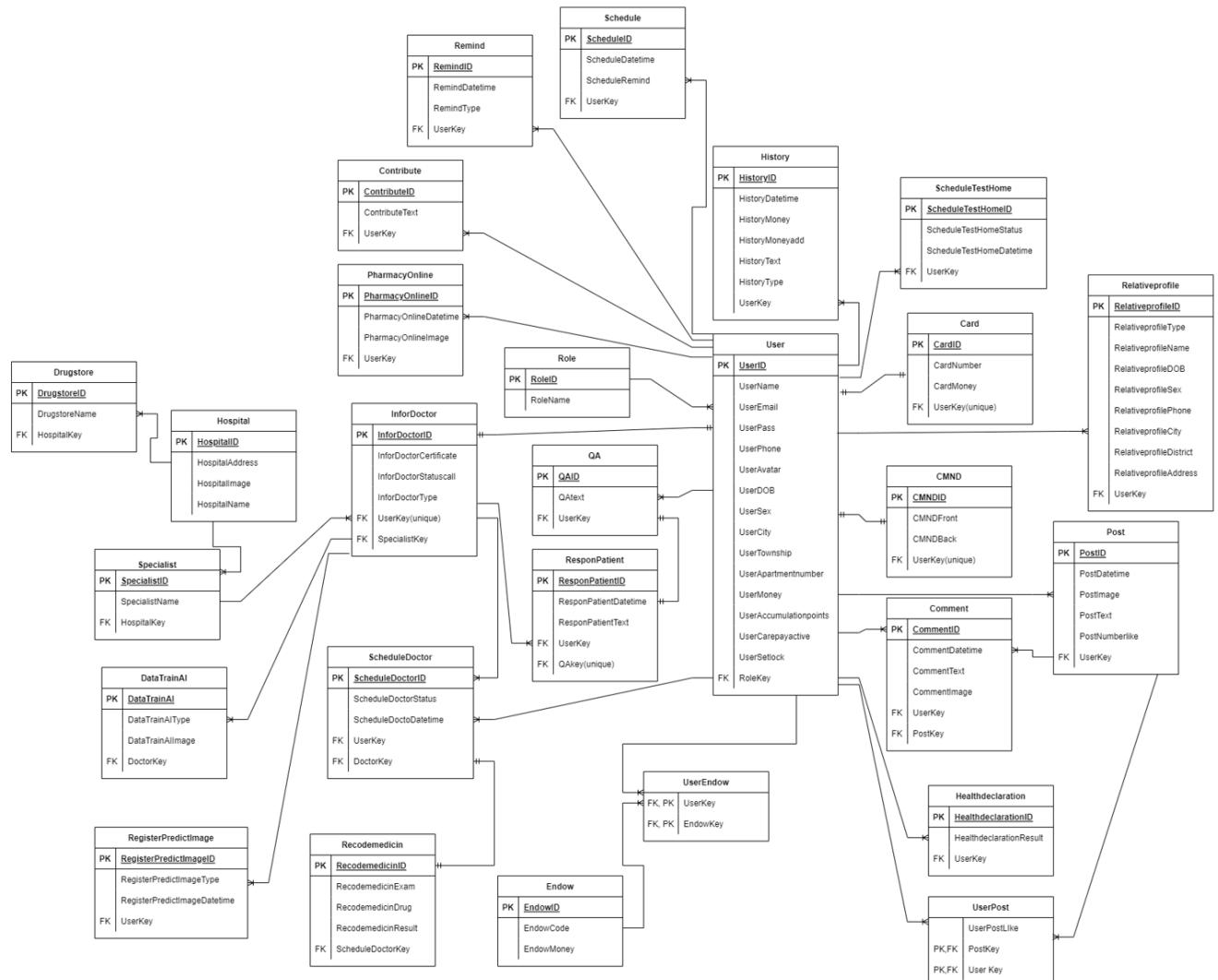


Figure 36: ERD.

#### Explain ER model.

ERD includes 27 tables: User, Role, Relativeprofile, Post, ScheduleTestHome, Card, CMND, Comment, Healthdeclaration, UserPost, History, UserEndow, RegisterPredictImage, Schedule, QA, ResponPatient, Endow, Remind, Contribute, PharmacyOnline, InforDoctor, ScheduleDoctor, Recodemycin, Hospital, Specialist, DataTrainAI, Drugstore.

<b>Table1</b>	<b>Relationship</b>	<b>Table2</b>	<b>Description</b>
User	1-n	History	The 1-n association of user and history shows that a user can have multiple transactions, transfer money, withdraw money to wallet, withdraw money from wallet...
	1-n	ScheduleTestHome	The 1-n association of the user and the scheduleTestHome indicates that a user can have multiple home appointments with the doctor.
	1-1	Card	The 1-to-1 association of the user and the card indicates that a user is only allowed to link with 1 bank card at a time for transactions.
	1-n	Relativeprofile	The 1-n association of the user and the relativeprofile represents that a user can create multiple medical records for a relative.
	1-1	CMND	The one-to-one link of the user and the ID indicates that a user

			can only activate carepay with their own identity card.
	1-n	Post	The 1-n link of the user and Post indicates that a user can post multiple posts to the social network to share their information.
	1-n	Comment	The 1-n link of the user and the Comment indicates that a user has commented on multiple posts.
	1-n	Healthdeclaration	The 1-n association of the user and healthdeclaration indicates that a user can make the same declaration as many times as they move somewhere else.
	1-n	UserPost	The 1-n link of the user and userPost indicates that a user can post multiple likes or comments on any post they see.
	1-n	UserEndow	The 1-n association of the user and userEndow indicates that a single user can enter more than one coupon code and they cannot overlap.
	1-n	ScheduleDoctor	The 1-n association of the user and scheduleDoctor represents that a user can have multiple clinic appointments.

	1-n	QA	The 1-n link of the user and QA indicates that a user can ask multiple questions to the doctor.
	1-1	InforDoctor	The 1-n association of the user and the infoDoctor indicates that a user can only register to be a single doctor.
	n-1	Role	The n-1 association of a user and a role indicates that a user can have only one position, admin or doctor or client.
	1-n	PharmacyOnline	The 1-n association of the user and pharmacyOnline represents that a single user can order multiple prescriptions.
	1-n	Remind	The 1-n link of user and reminder shows that a user can create multiple reminder alarms.
	1-n	Contribute	User and contribute 1-n links show that a user can submit their comments to the admin multiple times
	1-n	Schedule	The 1-n association of the user and the Schedule shows that a user has multiple doctor appointment histories
Role	1-n	Account	The 1-n association of the role and the user indicates that a role

			will have multiple accounts for that role site.
Relativeprofile	n-1	Account	The n-1 association of relativeprofile and user indicates that multiple relativeprofiles can belong to a given account
Post	n-1	User	The n-1 association of a post and a user represents that a post can only belong to a single poster.
	1-n	Comment	The 1-n association of posts and comments indicates that a post will have many comments coming from the user
	1-n	UserPost	The 1-n link of the post and the UserPost indicates that a post will get a lot of likes from the user
ScheduleTestHome	n-1	User	The n-1 association of scheduleTestHomen and user represents that a single scheduleTestHomen will be created by only one user.
Card	1-1	User	The n-1 association of card and user indicates that a card will be linked only from 1 user
CMND	1-1	User	The n-1 association of CMND and user indicates that a CMND will be linked only from 1 user

Comment	n-1	User	The n-1 association of comment and user indicates that a comment will belong to a single user
	n-1	Post	The n-1 association of comment and post represents that a comment will be of a single post.
Healthdeclaration	n-1	User	The n-1 association of healthdeclaration and post represents that a healthdeclaration will belong to a certain user
UserPost	n-1	Post	The n-1 association of userPost and post represents that a like will belong to a certain post.
	n-1	User	The n-1 association of userPost and user represents that a like will belong to someone.
History	n-1	User	The n-1 association of history and user represents that a history belongs to someone.
UserEndow	n-1	User	The n-1 association of userEndow and user represents that a userEndow will belong to someone.
	n-1	Endow	The n-1 association of userEndow and endow represents that a userEndow will belong to

			some endow.
RegisterPredictImage	n-1	Infordoctor	The n-1 association of registerPredictImage and InforDoctor represents that a registerPredictImage will belong to some doctor.
Schedule	n-1	User	The n-1 association of schedule and user represents that a schedule will belong to a certain user.
QA	n-1	User	The n-1 association of QA and user represents that a QA will belong to a certain user.
	1-1	ResponPatient	The n-1 association of QA and responPatient indicates that a QA can only be answered by one physician.
ResponPatient	n-1	Infordoctor	The n-1 association of Infodoc and responPatient represents that a responPatient belongs to only one physician.
	1-1	QA	The n-1 association of QA and responPatient indicates that a responPatient can only be answered by one QA.
Endow	1-n	UserEndow	The 1-n association of endow and userEnd represents that an endow can be entered by many

			different accounts.
Remind	n-1	User	The 1-n association of remind and user indicates that a reminder will belong to a single user.
PharmacyOnline	n-1	User	The 1-n association of pharmacyOnline and user indicates that a pharmacyOnline will belong to a single user.
InforDoctor	1-1	User	The 1-n association of inforDoctor and user indicates that a inforDoctor will belong to a single user.
	1-n	ResponPatient	The 1-n association of inforDoctor and responPatient indicates that an inforDoctor can answer multiple questions from a patient.
	1-n	ScheduleDoctor	The 1-n association of inforDoctor and ScheduleDoctor represents that an inforDoctor has multiple patient meetings.
	1-n	RegisterPredictImage	The 1-n association of inforDoctor and RegisterPredictImage indicates that an inforDoctor has sent multiple join requests to the admin.

	1-n	DataTrainAI	The 1-n link of inforDoctor and DataTrainAI shows that one inforDoctor can predict many images for AI.
	n-1	Specialist	The n-1 association of inforDoctor and Specialist represents that an inforDoctor can belong to a particular specialization.
ScheduleDoctor	1-1	Recodemicin	The 1-n association of ScheduleDoctor and Recodemicin indicates that a ScheduleDoctor will produce a single test history result for the patient.
	n-1	User	The 1-n association of ScheduleDoctor and user indicates that a ScheduleDoctor will belong to a single user
	n-1	InforDoctor	The 1-n association of ScheduleDoctor and inforDoctor indicates that a ScheduleDoctor will belong to a single doctor.
Recodemicin	1-1	ScheduleDoctor	The 1-n association of ScheduleDoctor and Recodemicin indicates that a ScheduleDoctor will produce a single test history result for the patient.

Hospital	1-n	Drugstore	The 1-n link of Hospital and Drugstore shows that a Hospital will have many drugs.
	1-n	Specialist	The 1-n link of Hospital and Specialist indicates that a Hospital will have many specialties
Specialist	1-n	InforDoctor	The 1-n association of inforDoctor and Specialist represents that a Specialist have many doctor.
	n-1	Hospital	The 1-n association of hospital and Specialist represents that a Specialist belongs to a single hospital.
DataTrainAI	n-1	InforDoctor	The 1-n association of InforDoctor and DataTrainAI represents that a DataTrainAI belongs to a single doctor.
Drugstore	n-1	Hospital	The 1-n association of drugstore and hospital indicates that a drugstore belongs to a single hospital.

*Table 21: Explain database relationship.*

### **Design physical Data types / Constraint of the Contribution System.**

#### **Table User**

Name of fields	Types	Allow Null	Constraints	Description

UserID	INT	Not null	no	primary key
UserName	VARCHAR(50)	Null	no	
UserEmail	VARCHAR(50)	Null	no	
UserPass	VARCHAR(50)	Null	no	
UserPhone	VARCHAR(50)	Null	no	
UserAvatar	VARCHAR(50)	Null	no	
UserDOB	Date	Null	no	
UserSex	VARCHAR(50)	Null	no	
UserCity	VARCHAR(50)	Null	no	
UserTownship	VARCHAR(50)	Null	no	
UserApartmentnumber	VARCHAR(50)	Null	no	
UserMoney	Double	Null	no	
UserAccumulationpoints	INT	Null	no	
UserCarepayactive	VARCHAR(50)	Null	no	
UserSetlock	VARCHAR(50)	Null	no	
RoleKey	INT	Null	no	foreign key

**Table Role**

Name of fields	Types	Allow Null	Constraints	Description
<b><u>RoleID</u></b>	INT	Not null	no	primary key
RoleName	VARCHAR(50)	Null	no	

**Table Relativeprofile**

Name of fields	Types	Allow Null	Constraints	Description
<b><u>RelativeprofileID</u></b>	INT	Not null	no	primary key
RelativeprofileType	INT	Null	no	
RelativeprofileName	VARCHAR(50)	Null	no	
RelativeprofileDOB	Date	Null	no	
RelativeprofileSex	VARCHAR(50)	Null	no	

RelativeprofilePhone	VARCHAR(50)	Null	no	
RelativeprofileCity	VARCHAR(50)	Null	no	
RelativeprofileDistrict	VARCHAR(50)	Null	no	
RelativeprofileAddress	VARCHAR(50)	Null	no	
UserKey	INT	Null	no	foreign key

**Table Post**

Name of fields	Types	Allow Null	Constraints	Description
<u>PostID</u>	INT	Not null	no	primary key
PostDatetime	DateTime	Null	no	
PostImage	VARCHAR(50)	Null	no	
PostText	VARCHAR(50)	Null	no	
PostNumberlike	INT	Null	no	
UserKey	INT	Null	no	foreign key

**Table ScheduleTestHome**

Name of fields	Types	Allow Null	Constraints	Description
<u>ScheduleTestHomeID</u>	INT	Not null	no	primary key
ScheduleTestHomeStatus	INT	Null	no	
ScheduleTestHomeDatetime	DateTime	Null	no	
UserKey	INT	Null	no	foreign key

**Table Card**

Name of fields	Types	Allow Null	Constraints	Description
<u>CardID</u>	INT	Not null	no	primary key
CardNumber	VARCHAR(50)	Null	no	
CardMoney	Double	Null	no	

UserKey(unique)	INT	Null	no	foreign key
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**Table CMND**

Name of fields	Types	Allow Null	Constraints	Description
<b><u>CMNDID</u></b>	INT	Not null	no	primary key
CMNDFront	VARCHAR(50)	Null	no	
CMDNDBack	VARCHAR(50)	Null	no	
UserKey(unique)	INT	Null	no	foreign key

**Table Comment**

Name of fields	Types	Allow Null	Constraints	Description
<b><u>CommentID</u></b>	INT	Not null	no	primary key
CommentDatetime	DateTime	Null	no	
CommentText	Text	Null	no	
CommentImage	VARCHAR(50)	Null	no	
UserKey	INT	Null	no	foreign key
PostKey	INT	Null	no	foreign key

**Table Healthdeclaration**

Name of fields	Types	Allow Null	Constraints	Description
<b><u>HealthdeclarationID</u></b>	INT	Not null	no	primary key
HealthdeclarationResult	VARCHAR(200)	Null	no	
UserKey	INT	Null	no	foreign key

**Table UserPost**

Name of fields	Types	Allow Null	Constraints	Description
UserPostLike	BOOL	Null	no	

PostKey	INT	Null	no	foreign key, primary key
UserKey	INT	Null	no	foreign key, primary key

### Table History

Name of fields	Types	Allow Null	Constraints	Description
<b><u>HistoryID</u></b>	INT	Not null	no	primary key
HistoryDatetime	DateTime	Null	no	
HistoryMoney	Double	Null	no	
HistoryMoneyadd	Double	Null	no	
HistoryText	Text	Null	no	
HistoryType	INT	Null	no	
UserKey	INT	Null	no	foreign key

### Table UserEndow

Name of fields	Types	Allow Null	Constraints	Description
<b>UserKey</b>	INT	Null	no	foreign key, primary key
<b>EndowKey</b>	INT	Null	no	foreign key, primary key

### Table RegisterPredictImage

Name of fields	Types	Allow Null	Constraints	Description
<b><u>RegisterPredictImageID</u></b>	INT	Not null	no	primary key
RegisterPredictImageType	INT	Null	no	
RegisterPredictImageDatetime	DateTime	Null	no	
UserKey	INT	Null	no	foreign key

### Table Schedule

Name of fields	Types	Allow Null	Constraints	Description
<b>ScheduleID</b>	INT	Not null	no	primary key
ScheduleDatetime	DateTime	Null	no	
UserKey	INT	Null	no	foreign key

### Table QA

Name of fields	Types	Allow Null	Constraints	Description
<b>QAIID</b>	INT	Not null	no	primary key
QAtext	Text	Null	no	
UserKey	INT	Null	no	foreign key

### Table ResponPatient

Name of fields	Types	Allow Null	Constraints	Description
<b>ResponPatientID</b>	INT	Not null	no	primary key
ResponPatientDatetime	DateTime	Null	no	
ResponPatientText	Text	Null	no	
UserKey	INT	Null	no	foreign key
QAkey(unique)	INT	Null	no	foreign key

### Table Endow

Name of fields	Types	Allow Null	Constraints	Description
<b>EndowID</b>	INT	Not null	no	primary key
EndowCode	VARCHAR(50)	Null	no	
EndowMoney	Double	Null	no	

### Table Remind

Name of fields	Types	Allow Null	Constraints	Description
<b>RemindID</b>	INT	Not null	no	primary key

RemindDatetime	DateTime	Null	no	
RemindType	INT	Null	no	
UserKey	INT	Null	no	foreign key

### Table Contribute

Name of fields	Types	Allow Null	Constraints	Description
<u>ContributeID</u>	INT	Not null	no	primary key
ContributeText	Text	Null	no	
UserKey	INT	Null	no	foreign key

### Table PharmacyOnline

Name of fields	Types	Allow Null	Constraints	Description
<u>PharmacyOnlineID</u>	INT	Not null	no	primary key
PharmacyOnlineDatetime	DateTime	Null	no	
PharmacyOnlineImage	VARCHAR(50)	Null	no	
UserKey	INT	Null	no	foreign key

### Table InforDoctor

Name of fields	Types	Allow Null	Constraints	Description
<u>InforDoctorID</u>	INT	Not null	no	primary key
InforDoctorCertificate	VARCHAR(50)	Null	no	
InforDoctorStatuscall	Bool	Null	no	
PostText	Text	Null	no	
InforDoctorType	INT	Null	no	
SpecialistKey	INT	Null	no	foreign key
UserKey(unique)	INT	Null	no	foreign key

### Table ScheduleDoctor

Name of fields	Types	Allow Null	Constraints	Description
<b>ScheduleDoctorID</b>	INT	Not null	no	primary key
ScheduleDoctorStatus	INT	Null	no	
ScheduleDoctorDatetime	DateTime	Null	no	
UserKey	INT	Null	no	foreign key
DoctorKey	INT	Null	no	foreign key

### Table Recodemycin

Name of fields	Types	Allow Null	Constraints	Description
<b>RecodemycinID</b>	INT	Not null	no	primary key
RecodemycinExam	VARCHAR(200)	Null	no	
RecodemycinDrug	VARCHAR(100)	Null	no	
RecodemycinResult	VARCHAR(200)	Null	no	
ScheduleDoctorKey	INT	Null	no	foreign key

### Table Hospital

Name of fields	Types	Allow Null	Constraints	Description
<b>HospitalID</b>	INT	Not null	no	primary key
HospitalAddress	VARCHAR(50)	Null	no	
HospitalImage	VARCHAR(50)	Null	no	
HospitalName	VARCHAR(50)	Null	no	

### Table Specialist

Name of fields	Types	Allow Null	Constraints	Description
<b>SpecialistID</b>	INT	Not null	no	primary key
SpecialistName	VARCHAR(50)	Null	no	
HospitalKey	INT	Null	no	foreign key

## Table DataTrainAI

Name of fields	Types	Allow Null	Constraints	Description
<b>DataTrainAI</b>	INT	Not null	no	primary key
DataTrainAIType	INT	Null	no	
DataTrainAIImage	VARCHAR(50)	Null	no	
DoctorKey	INT	Null	no	foreign key

## Table Drugstore

Name of fields	Types	Allow Null	Constraints	Description
<b>DrugstoreId</b>	INT	Not null	no	primary key
DrugstoreName	VARCHAR(50)	Null	no	
HospitalKey	INT	Null	no	foreign key

## 4. Activity diagram.

### 4.1 Patient.

#### Login diagram

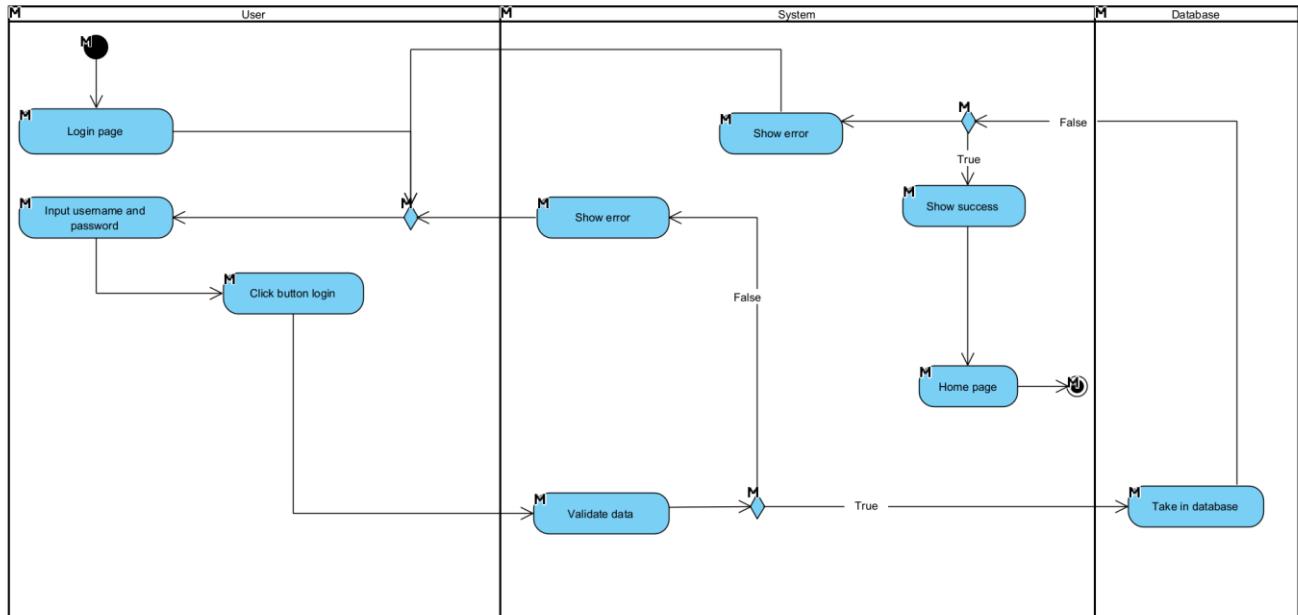
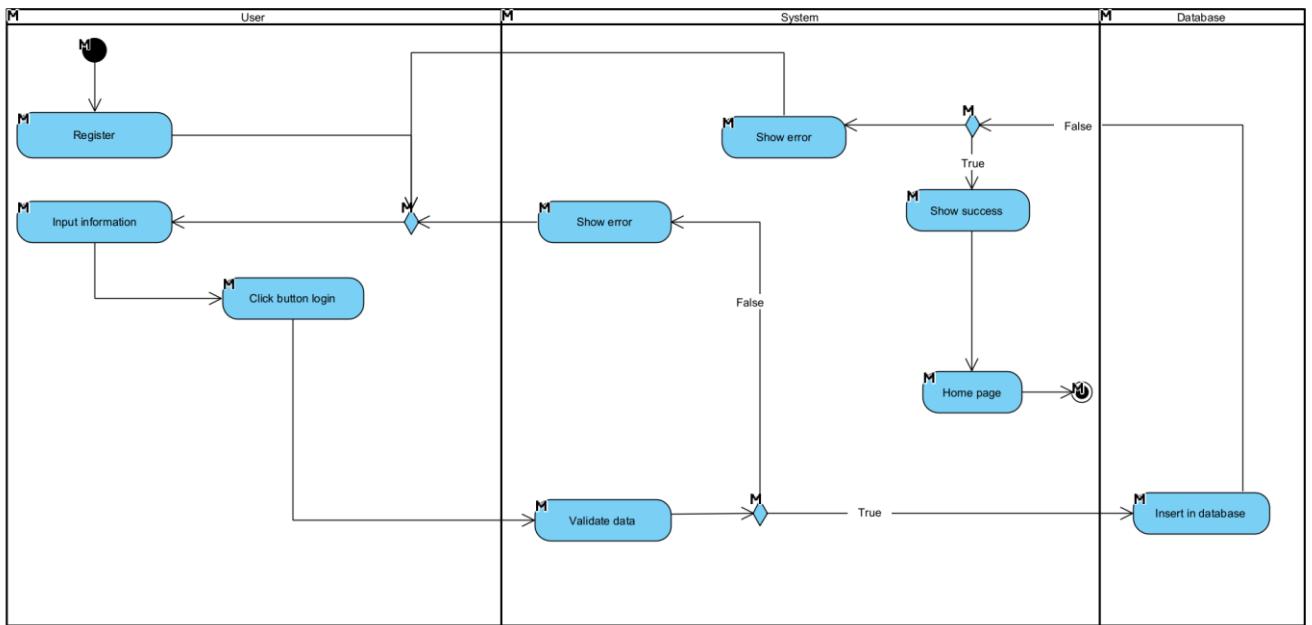


Figure 37: Login diagram of patient

The above is about the login activity diagram first, the user needs to login with their username and password to access the system .After logging in, the system will validate the data if it is wrong, it

will return a message if it is correct, the system will check the account from the database. If the system cannot select an account with the same username and password as the user entered, the system will return a message. If there is, the system will notify the user successfully and take them to the Home page.

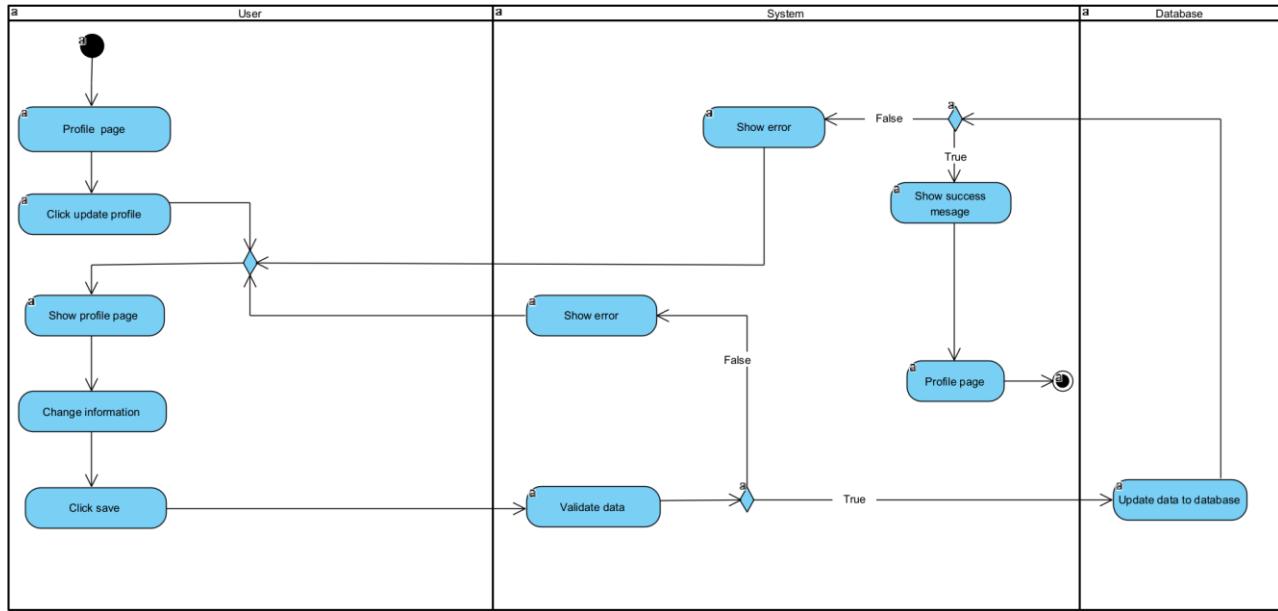
### Register diagram.



*Figure 38: Register diagram of patient*

The above is about the register activity diagram first, users need to input information to register an account, after clicking register, the system will validate the data if it is wrong, it will return a message if it is correct, the system will check the account from the database . If the system cannot select any account with email and phone as the user entered, the system will return a success message and redirect the user to the Login page.

### Update profile diagram



*Figure 39 Update profile diagram of patient.*

Above is the Update profile diagram, the first user needs to go to the profile, then click on update profile and enter the information to be modified. When the user clicks save, the system will show validate data, if it fails, the system will show the user an error. If there is, the system will update the user's information on the data base and return the user to the profile page.

## Recharge diagram.

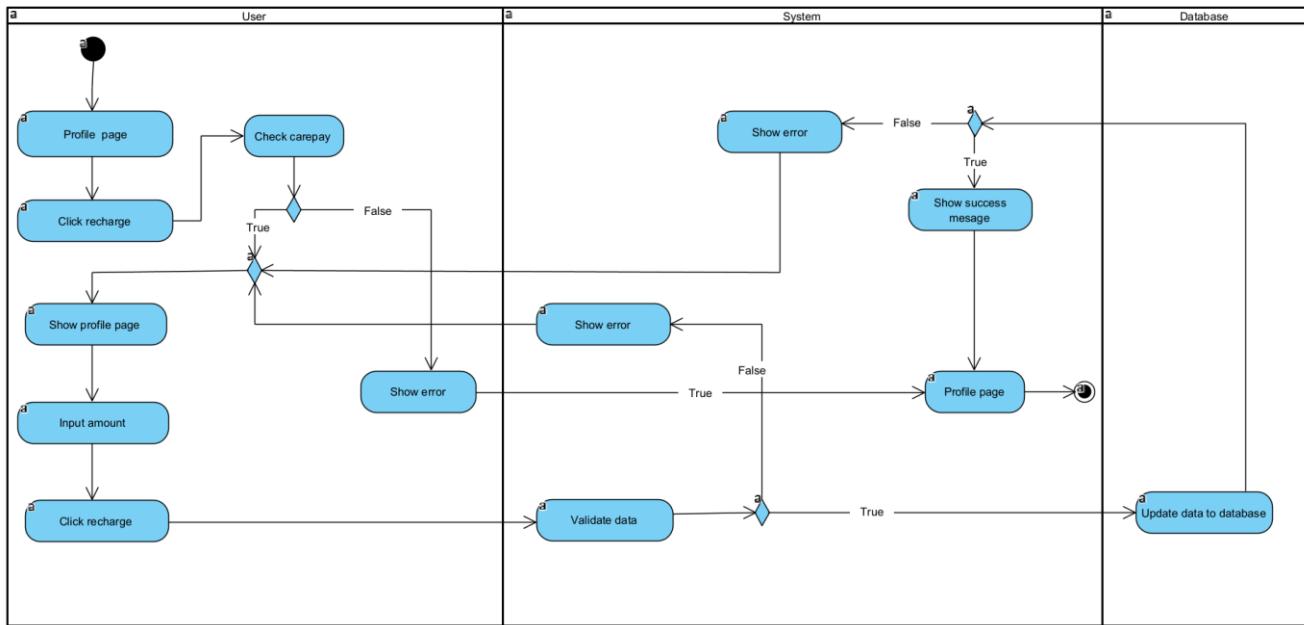
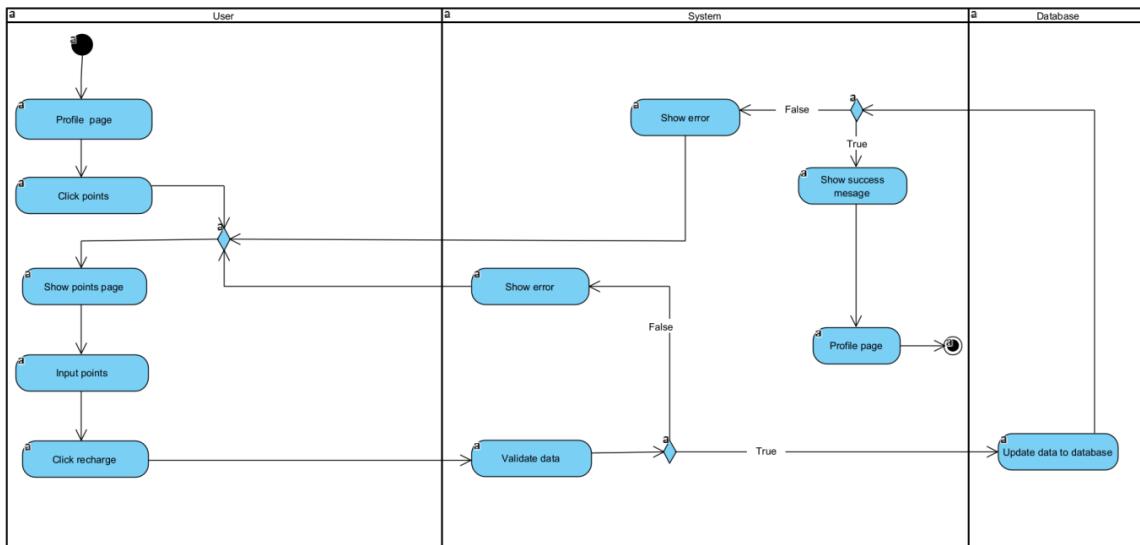


Figure 40 : Recharge diagram of patient

Above is the first deposit diagram, the user needs to go to the profile, then click on recharge and enter the amount to deposit. When the user clicks save, the system will show validate data, if it fails, the system will show the user an error. If there is, the system will update the user's information on the data base and return the user to the profile page.

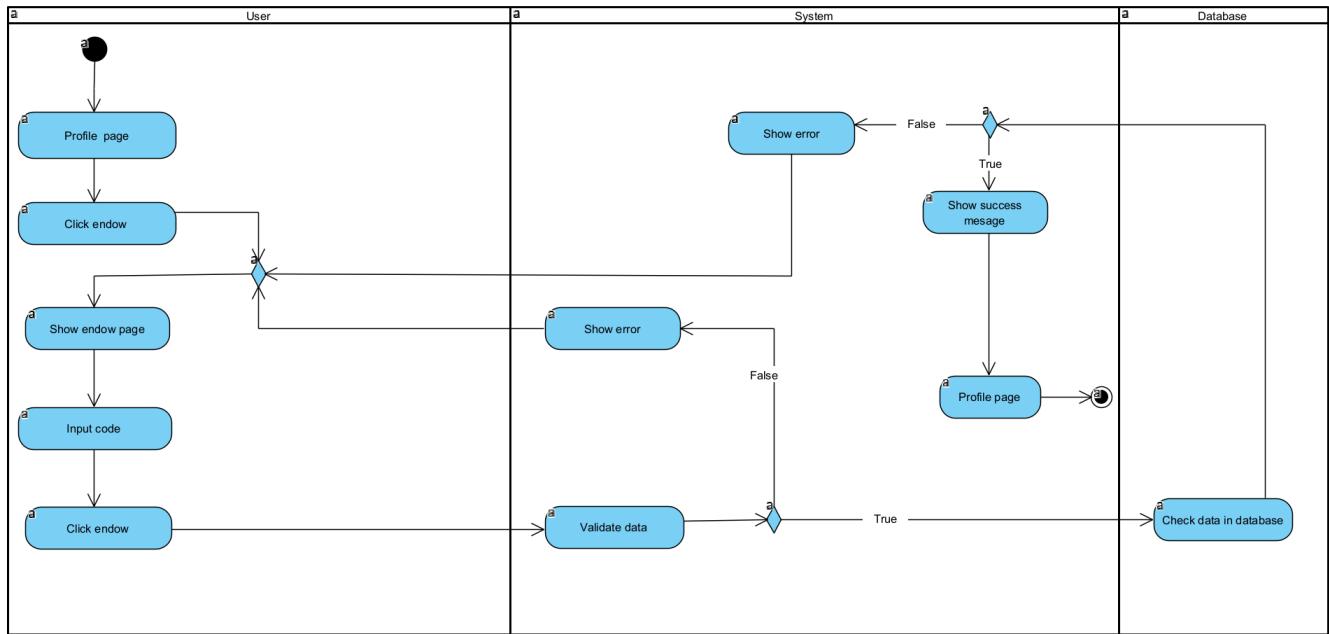
## Point diagram



*Figure 41: Point diagram of patient*

Above is the reward diagram first, the user needs to go to the profile, then click on redeem and enter the amount to change. When the user clicks to change, the system will show validate data, if it fails, the system will show the user an error. If there is, the system will update the user's information on the data base and return the user to the profile page.

### **Endow diagram**



*Figure 42: Endow diagram of patient*

Above is the Endow diagram, the first user needs to go to the profile, then click on Endow and enter the code. When the user clicks to change, the system will show validate data, if it fails, the system will show the user an error. If there is, the system will update the user's information on the data base and return the user to the profile page.

### **Donation diagram**

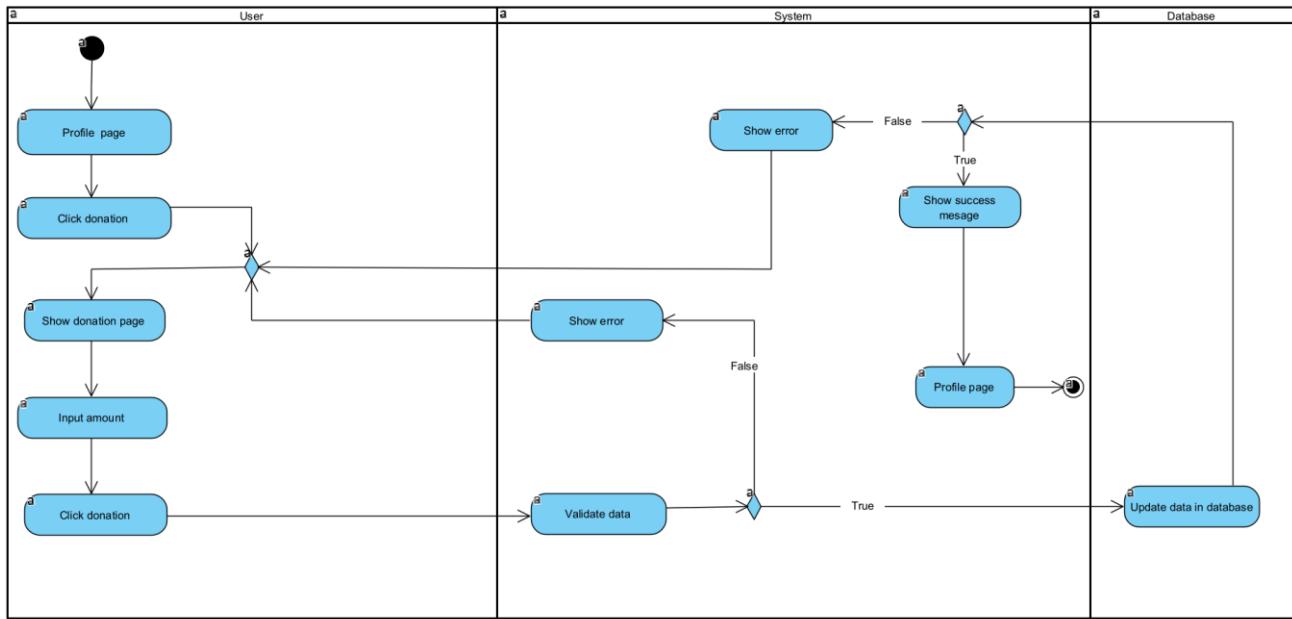
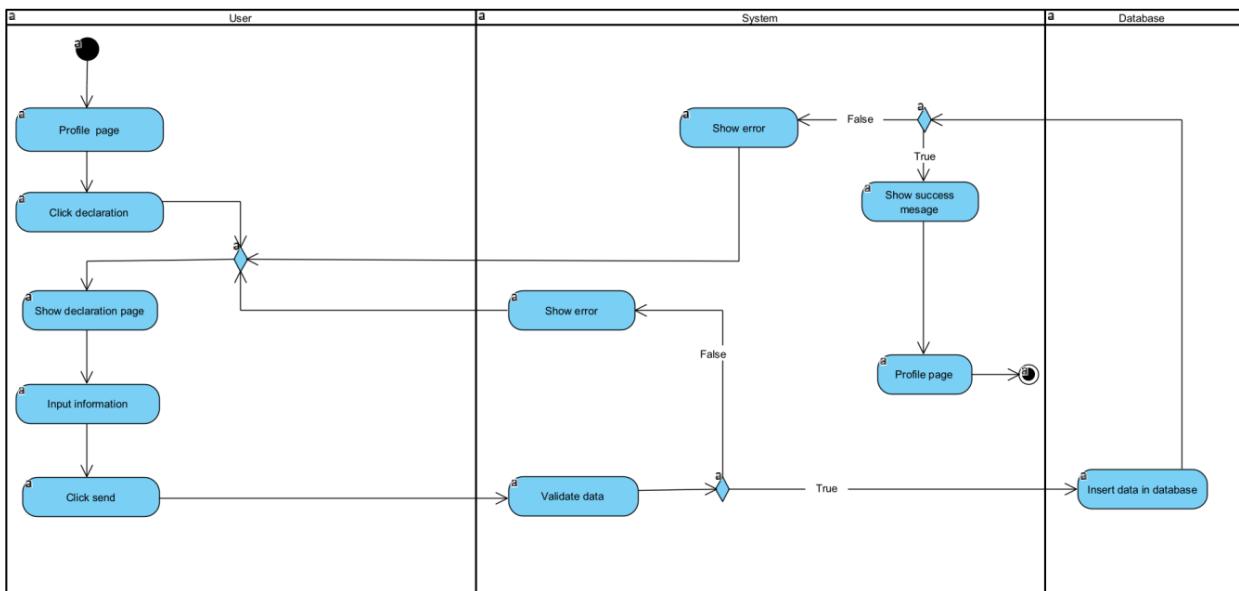


Figure 43: Donation diagram of patient

Above is the Donation diagram, the first user needs to go to the profile, then click on Donation and enter the amount to support to buy medicine for poor children. When the user clicks to change, the system will show validate data, if it fails, the system will show the user an error. If there is, the system will update the user's information on the data base and return the user to the profile page.

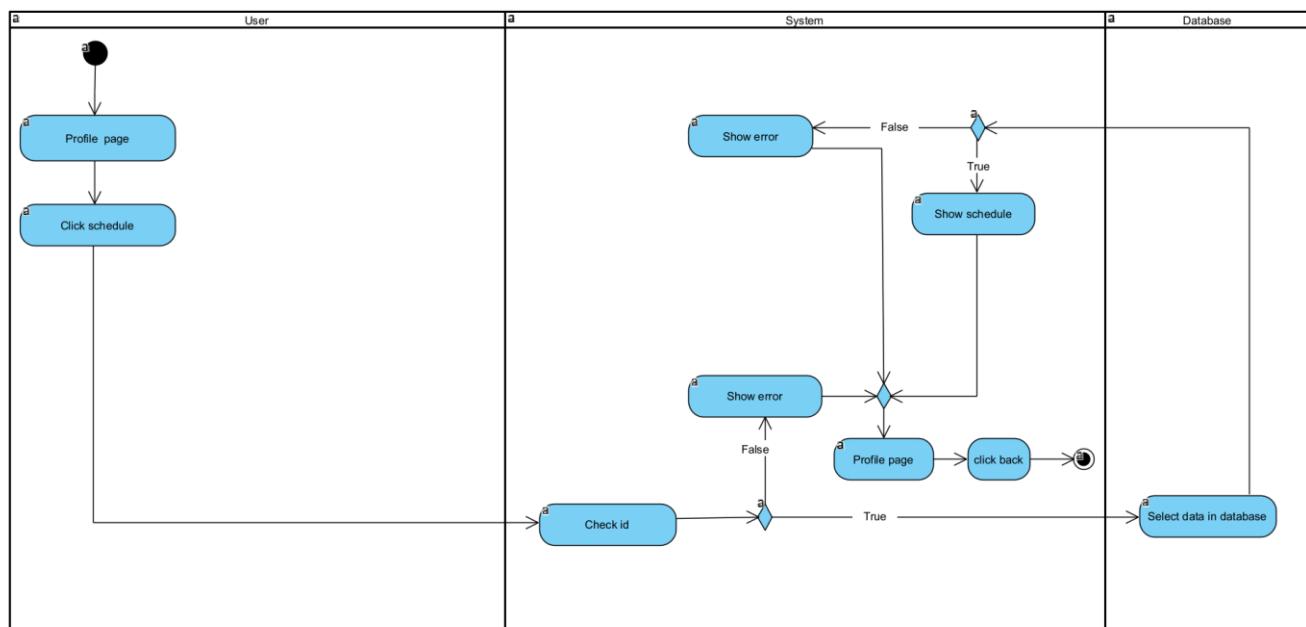
### health declaration diagram



Above is the medical declaration diagram, first the user needs to go to the profile, then click on the medical declaration and answer the declaration questions. When the user clicks send, the system will receive the information and insert it into the database. If successful, it will show a success message, if it fails, it will show a failure message to the user.

*Figure 44 : health declaration diagram of patient.*

### Schedule diagram



*Figure 45: Schedule diagram of patient.*

Above is the schedule diagram that the user needs to first go to the profile and then click on the schedule. After the user clicks, the system will check the user id, if it fails, the system will show the user an error. If there is a system, it will select the user's information on the data base and show the user the schedules they have made with the doctor.

### History diagram.

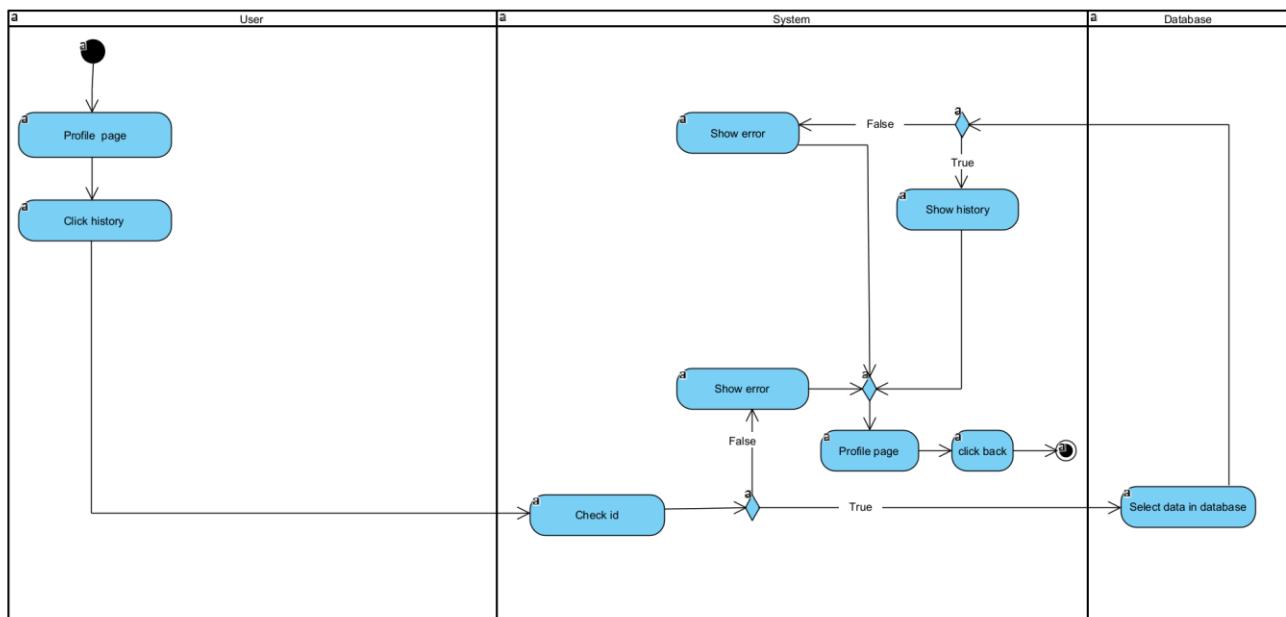


Figure 46 History diagram of patient.

## Remind diagram

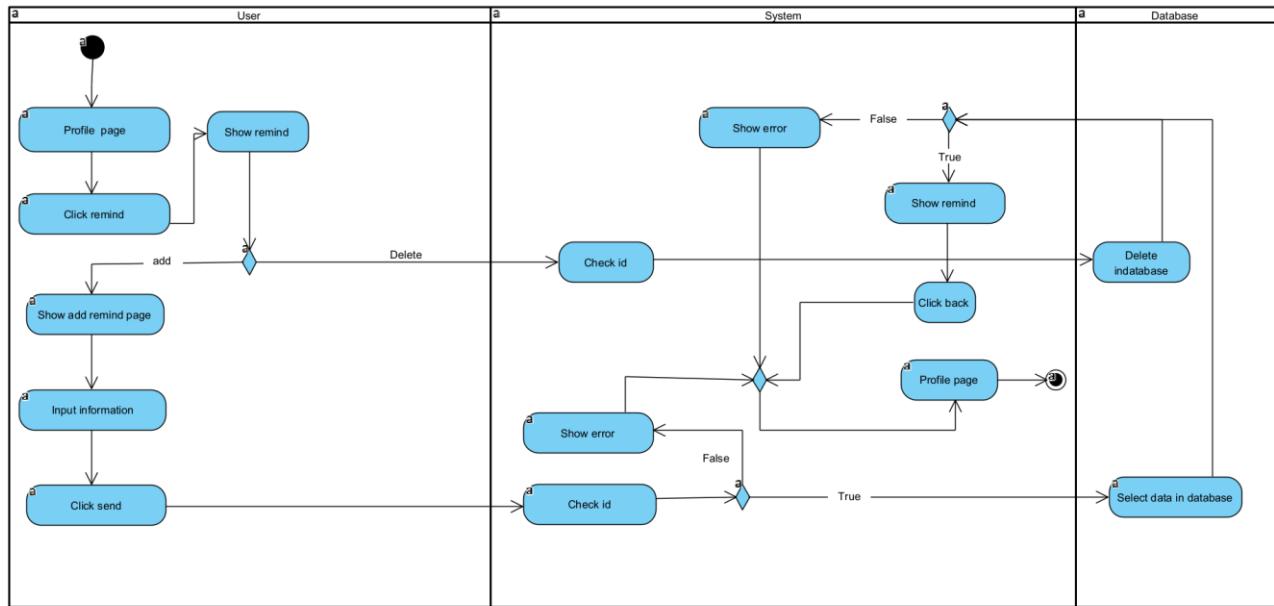


Figure 47: Remind diagram of patient.

Above is the first reminder diagram that the user needs to go to the profile and then click on remind . Here the user has 2 options to click on delete, the system will check the id and delete on the data base, if unsuccessful, it will notify the user if successful, it will report a success message to the user and show remind page. If the user selects add it will go to an add reminder page. Here the user needs to input information and the system will check the id and insert the information into the database. If successful, it will notify the user of a successful message, if it fails, it will notify the user of a failed massage and both will give they come to remind page.

### Contribute diagram

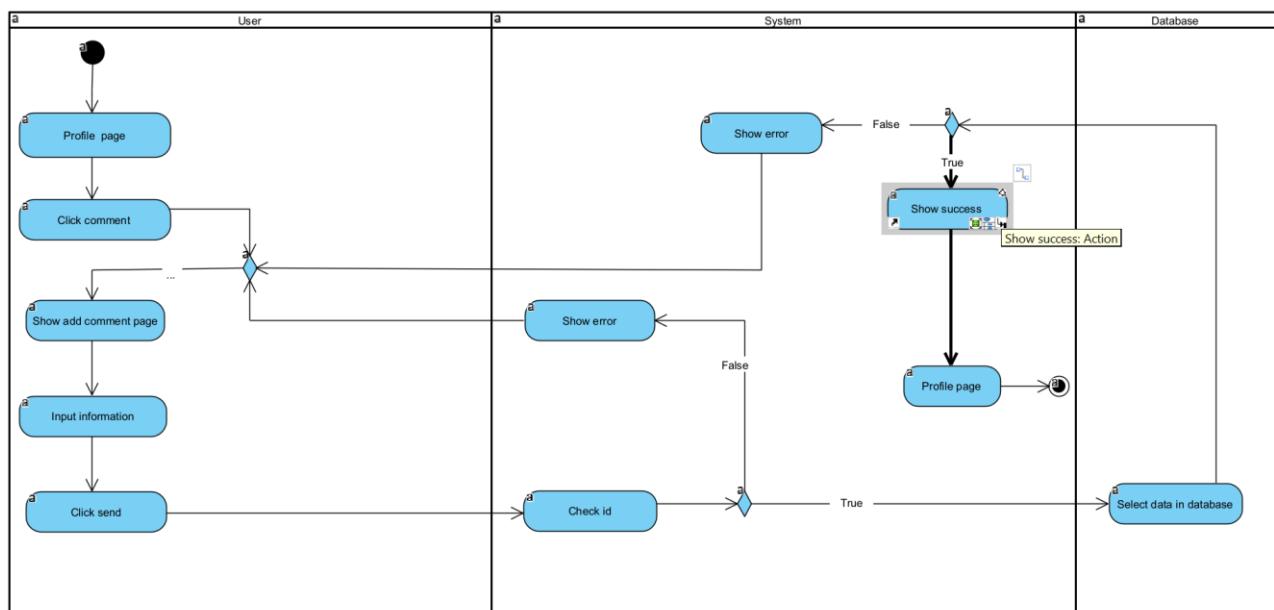
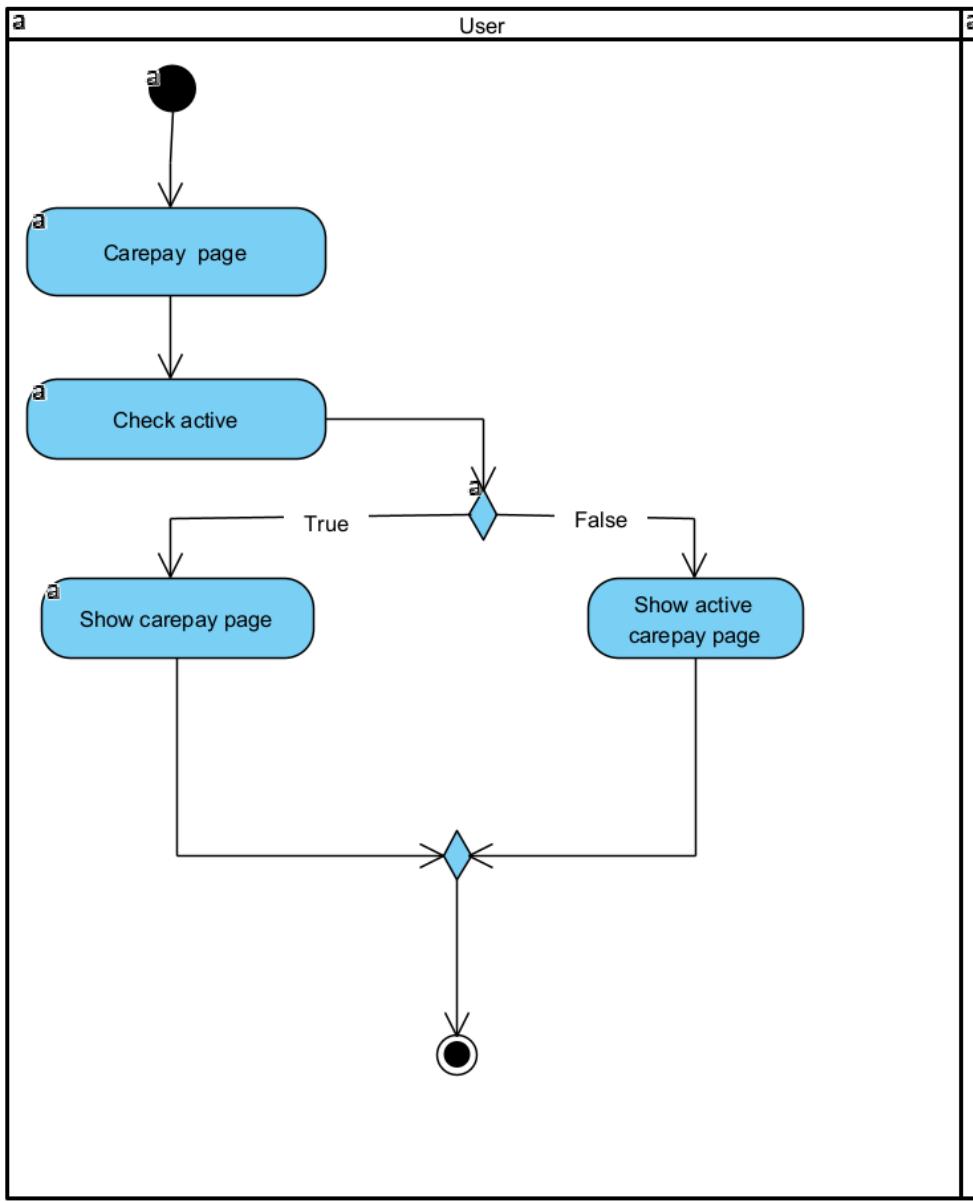


Figure 48 Contribute diagram of patient.

Above is the Contribute diagram first users need to go to carepay then click Contribute . Here you can input data and then press send. The system will check the user id and then store it on the data base, if successful, it will return a success message. If archiving fails, a failure message is returned. Finally take the user to the profile page.

### Carepay diagram



*Figure 49: Carepay diagram of patient.*

Above is the Carepay diagram. Here the system will check the user id if they have active carepay the user will be shown the carepay page otherwise the user will be shown the non-active carepay page.

### Scan to pay diagram

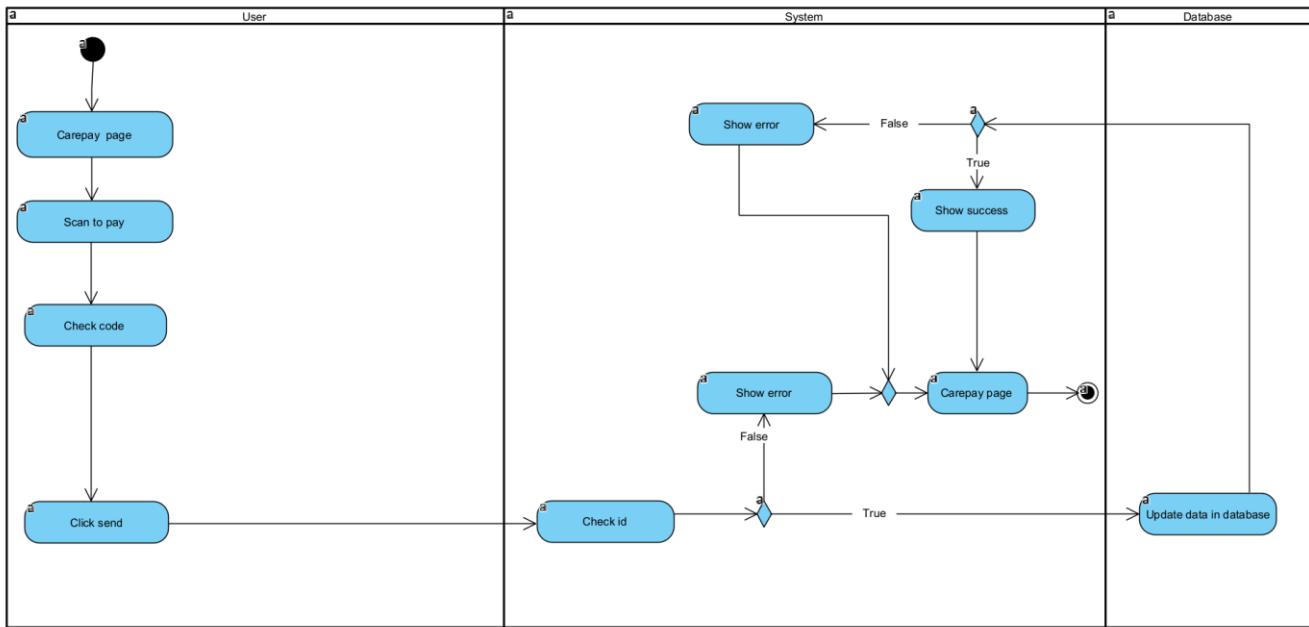
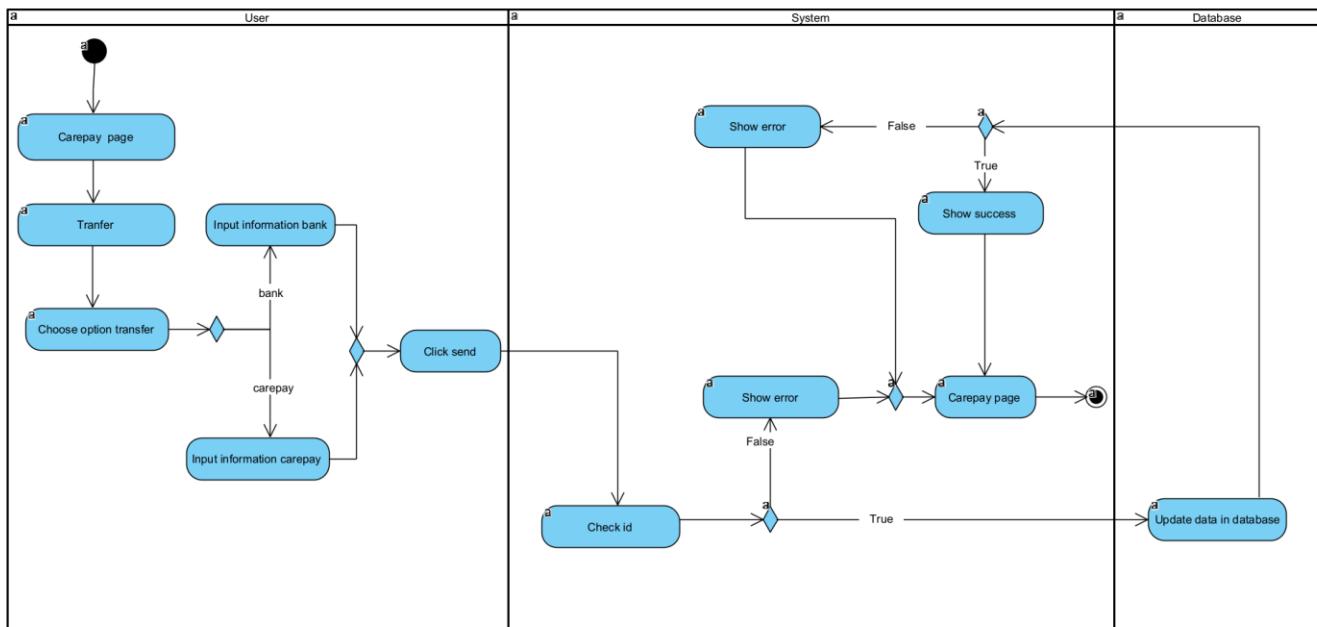


Figure 50: Scan to pay diagram of patient.

Above is the Scan to pay diagram. First, the user needs to scan the code, after reading the code the system will update the money in the user's account. If successful, the system will send the user a successful message, if it fails, the system will notify the user of failure. Finally, the system will take the user to the carepay page.

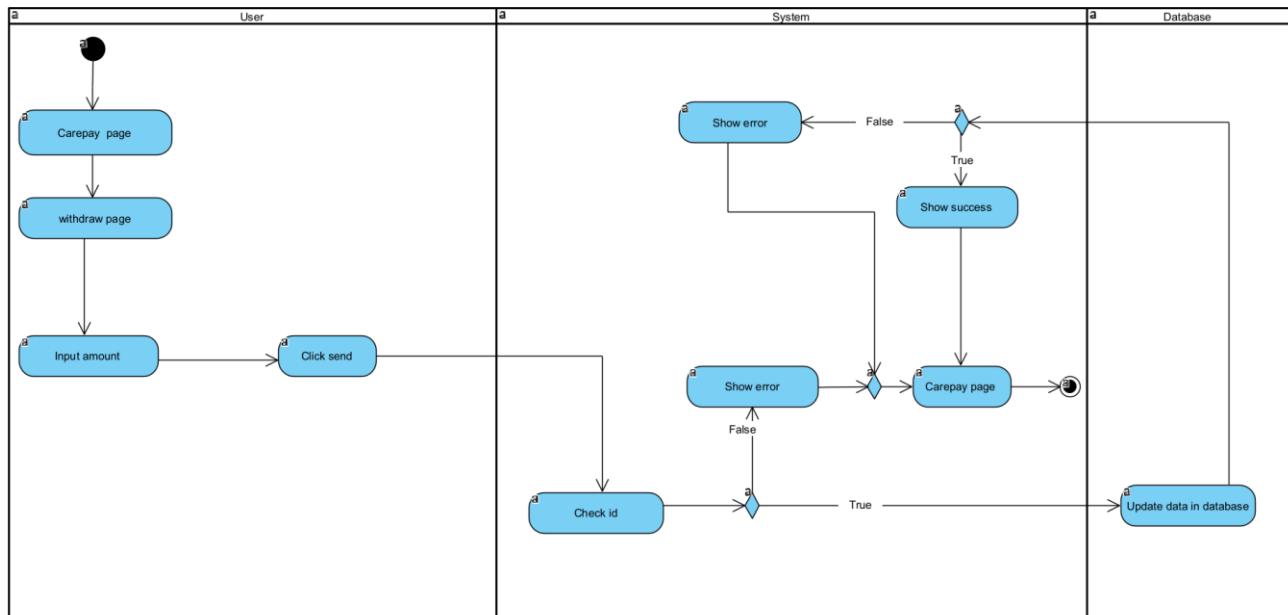
## Transfer diagram



*Figure 51 : Transfer diagram of patient.*

Above is the Transfer diagram, the first user needs to go to carepay and then click on Transfer. Here the user has 2 options. Click on the bank then input the necessary data and click send the system will update the data base if it fails, it will notify the user if successful, it will report a success message to the user and show invoice . Click on carepay then input the necessary data and click send, the system will update the data base if it fails, it will notify the user, if successful, it will report a success message to the user and show the invoice. Finally, users can return to the home page or transfer page if they want to continue transferring money.

### **Withdraw diagram**



*Figure 52: Withdraw diagram of patient.*

Above is the Withdraw diagram, users need to go to the carepay section, then click Withdraw and enter the amount to withdraw. When the user clicks save, the system will display the authentication data, if it fails, the system will show an error to the user. If so, the system will update the user's information on the database and return the user to the carepay page.

### **News post diagram.**

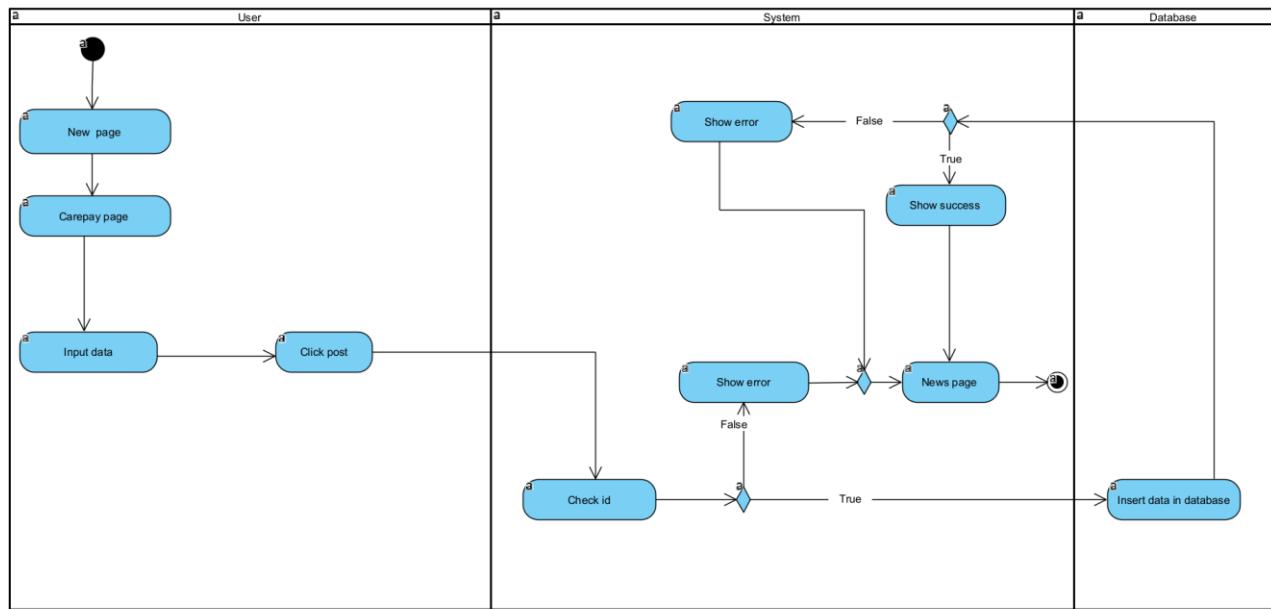
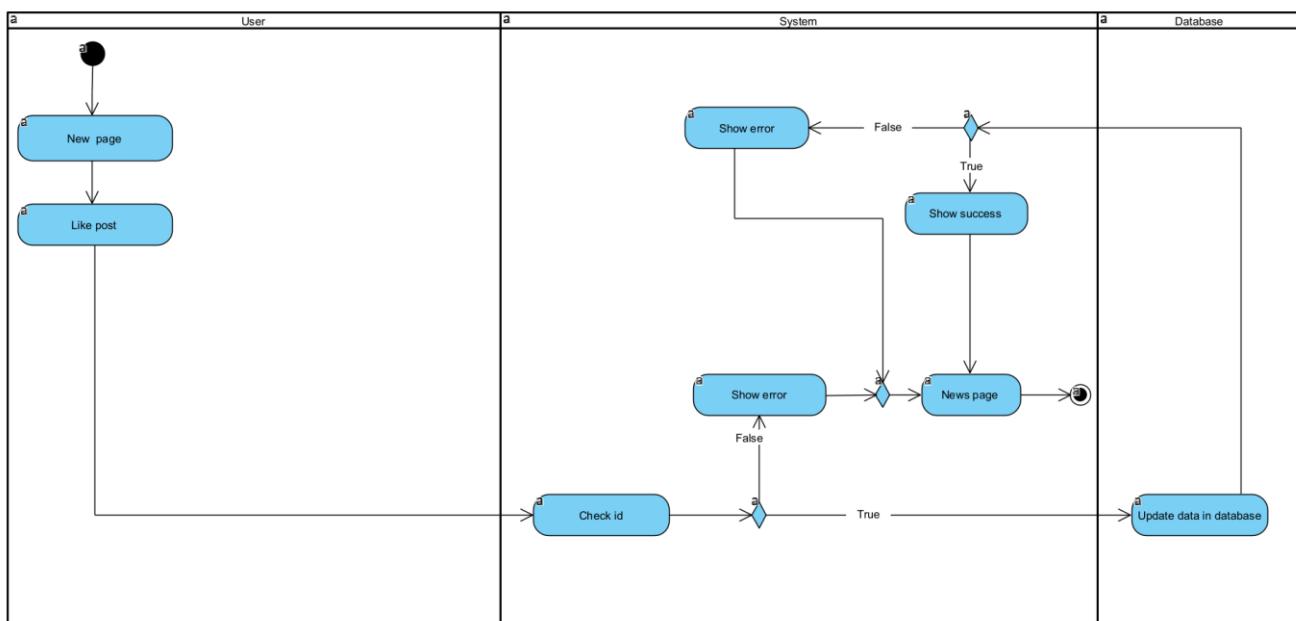


Figure 53: News post diagram of patient.

Above is the News post diagram, users need to go to the News section, then click on the post and input data. When the user clicks post , the system will display the authentication data, if it fails, the system will show an error to the user. If so, the system will update the user's information on the database and return the user to the News page.

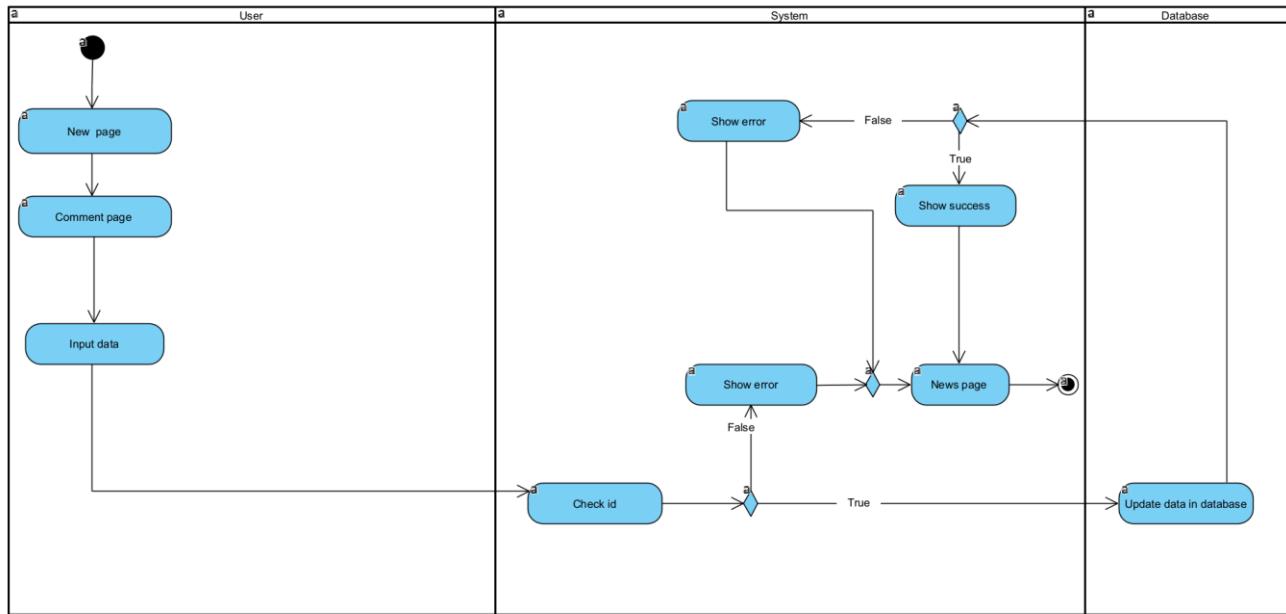
### Like post diagram



*Figure 54: Like post diagram of patient.*

Above is the News post diagram, users need to go to the News section, then click like on an article. When the user clicks like, the system will check the user id of the link and post, if it fails, the system will show an error to the user. If so, the system will update the user's information on the database and return the user to the News page.

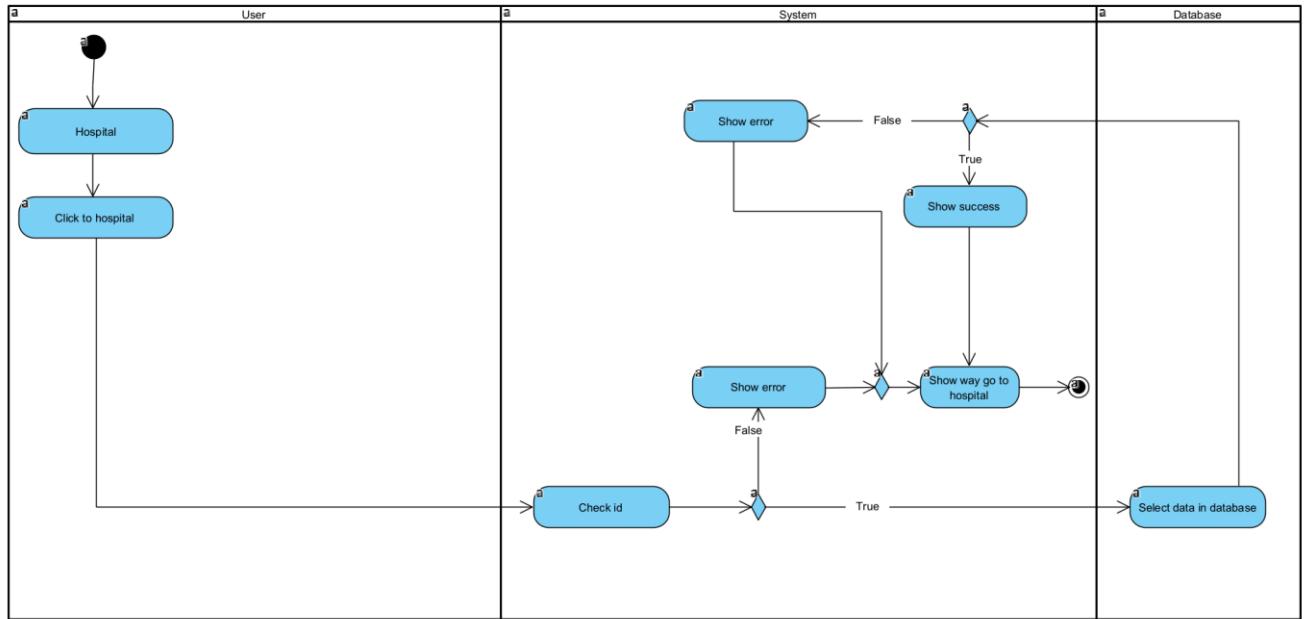
### **Comment post diagram.**



*Figure 55: Comment post diagram of patient.*

Above is the News post diagram, users need to go to the News section, then click comment and enter a comment. When the user clicks post, the system will check the user id and post, if it fails, the system will show an error to the user. If so, the system will update the user's information on the database and return the user to the News page.

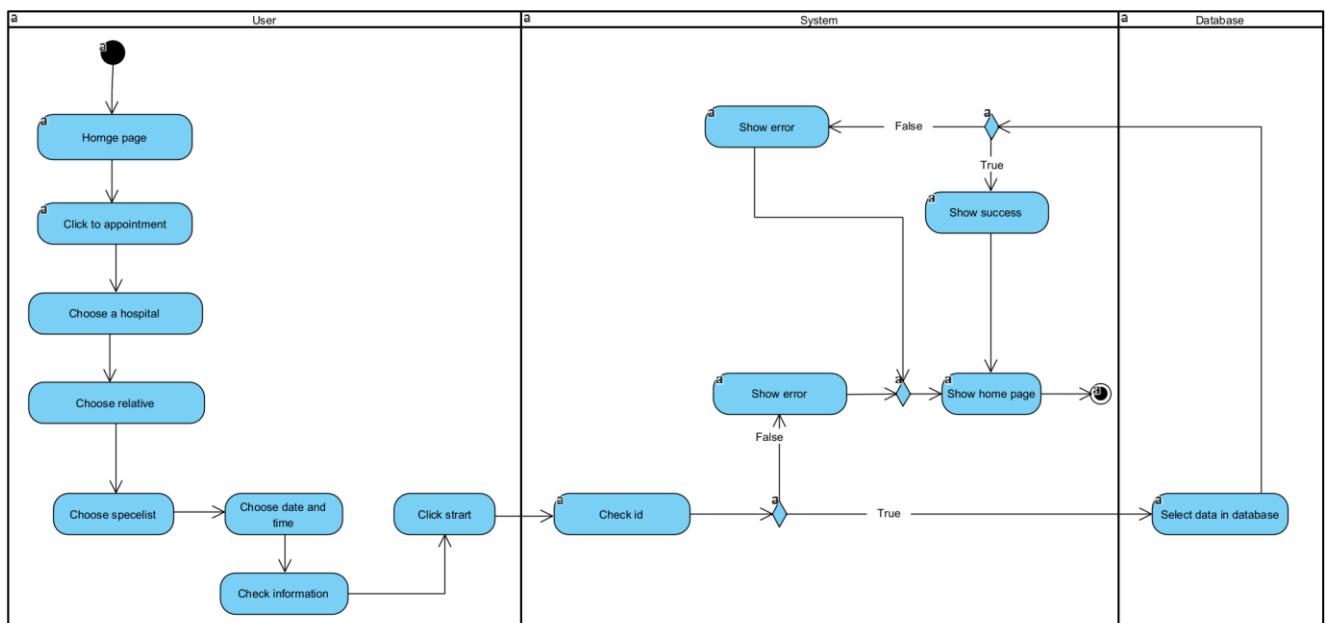
### **Way to Hospital.**



*Figure 56 Way to Hospital of patient.*

Above is the Way to Hospital diagram to get to the Way to Hospital, users need to go to the hospital section and then choose a hospital. When the server receives the command and checks the select to the database to get the address of the hospital, then accesses google map to show the user the way to the hospital.

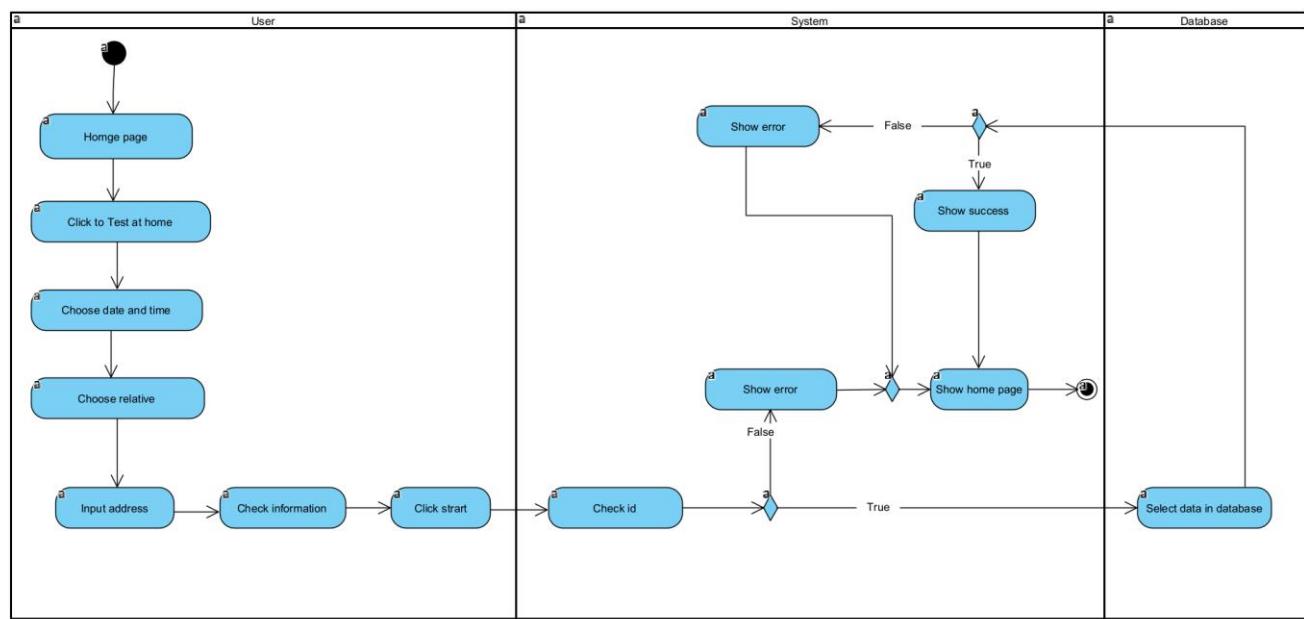
### Book an appointment diagram.



*Figure 57 : Book an appointment diagram of patient.*

Above is the Book an appointment diagram to get to the Book an appointment, the user needs to go to the home page and then to the Book an appointment diagram. After entering the user needs to select a hospital after selecting the hospital the user needs to select the profile, after selecting the profile the user needs to select the type of medical examination and treatment and check the medical examination information. When you click start the server will receive the command and check your account id and save the appointment in the database.

### **Test at home diagram**



*Figure 58 : Test at home diagram of patient.*

Above is the Test at home diagram to access Test at home, users need to go to the home page and then go to Test at home. After entering the user needs to choose an appointment time, then the user needs to select the examination record, then the user needs to confirm the address of the examination record, finally the user will be reviewed and confirmed the bill. When you click start the server will receive the command and check your account id and save the appointment in the database.

### **Online pharmacy diagram**

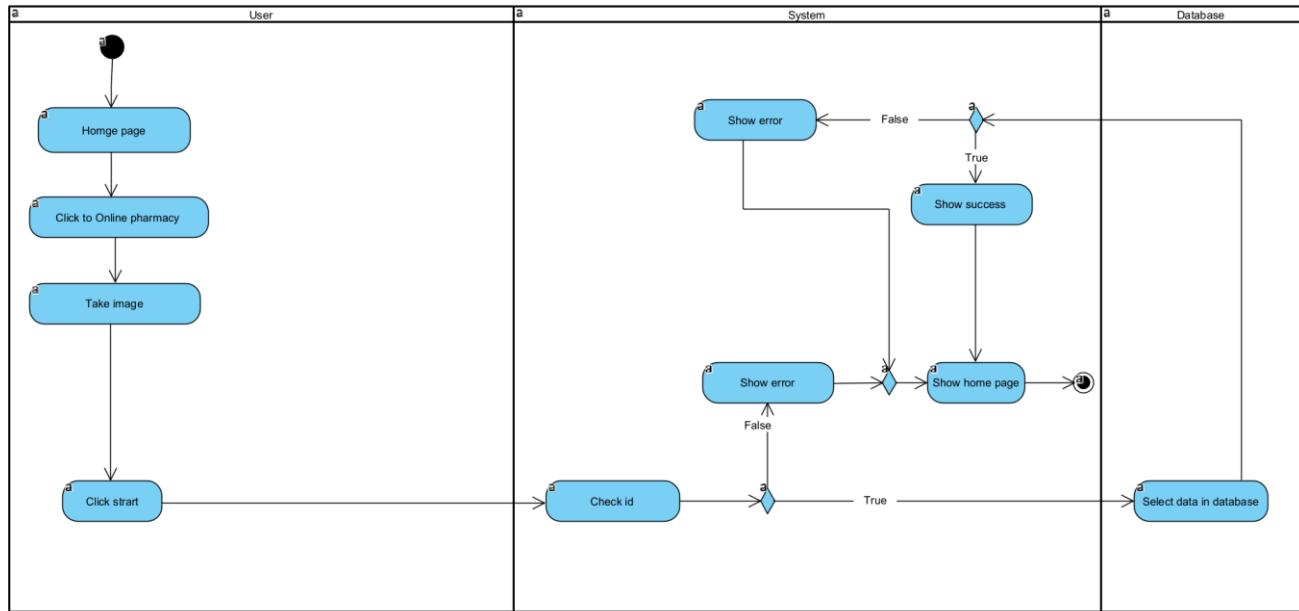
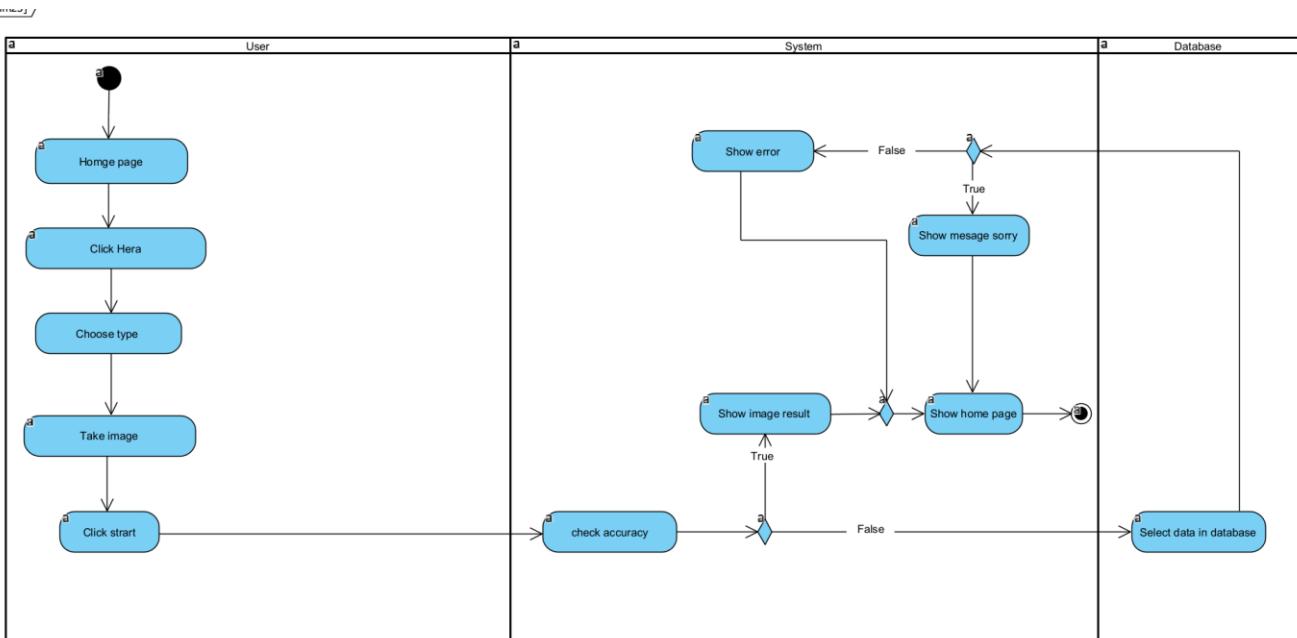


Figure 59: Online pharmacy diagram of patient.

Above is the Online pharmacy diagram to access the Online pharmacy, users need to go to the home page and then go to the Online pharmacy . After entering the user needs to capture their prescription record. When you click start the server will receive the command and check your account id and save the prescription in the database.

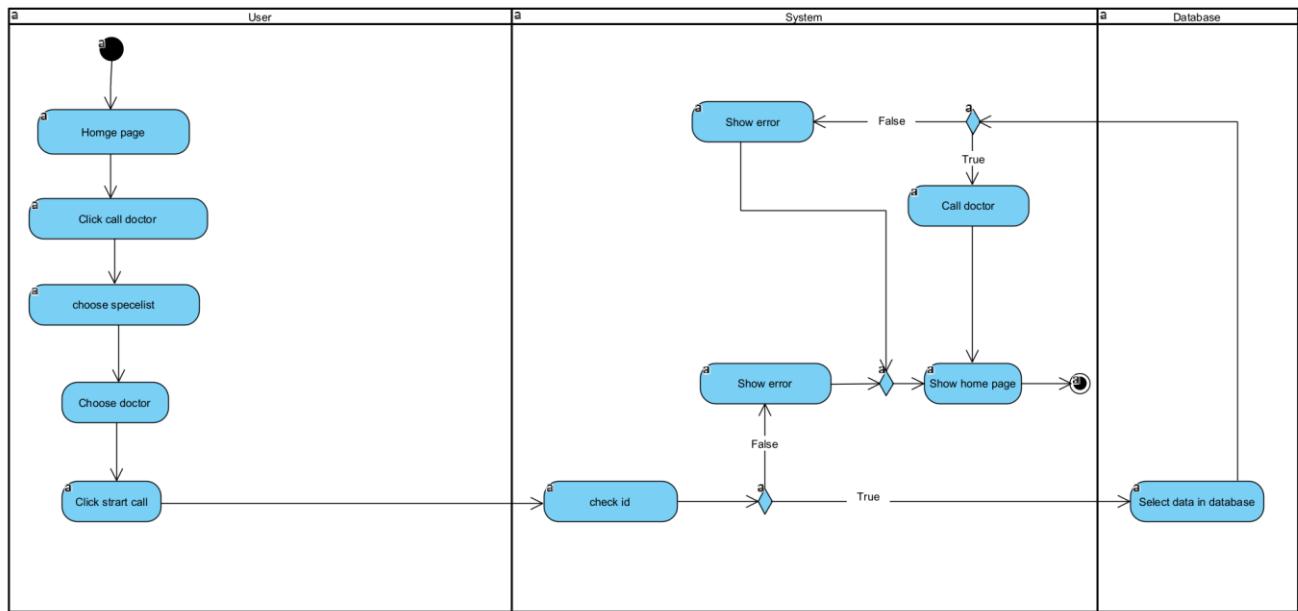
### Dr.Hera diagram



*Figure 60: Dr.Hera diagram of patient.*

Above is the Dr.Hera diagram to access Dr.Hera, users need to go to the homepage then go to Dr.Hera. After entering, the user needs to select the disease to predict and provide a picture of the disease. When you press start the server will receive the command and check the images you send, then the AI will predict if the accuracy is higher than 50%, the machine will return the results for you. But if there is an AI predict the disease If it is lower than 50%, it will be saved in the database. Those documents will be labeled for later machine learning.

### Call/chat with doctor diagram



*Figure 61: Call/chat with doctor diagram of patient.*

Above is the Call/chat with doctor diagram to access Call/chat with doctor, users need to go to the home page and then go to Call/chat with doctor. Here the user needs to select the medical record and select the date, then there will be a list of doctors for the user to choose whether the user can call or view the doctor's information. If you view the doctor information, the server will check the id and return you information about that doctor including hospital , specialty, certificate and phone number.

### Post Q&A diagram

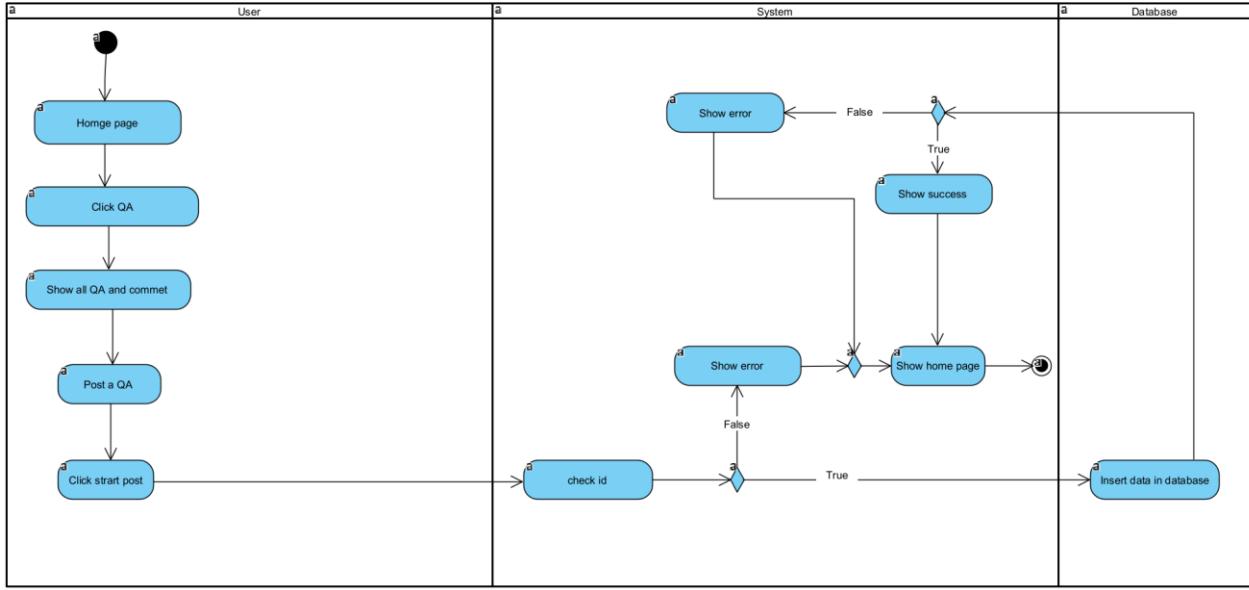
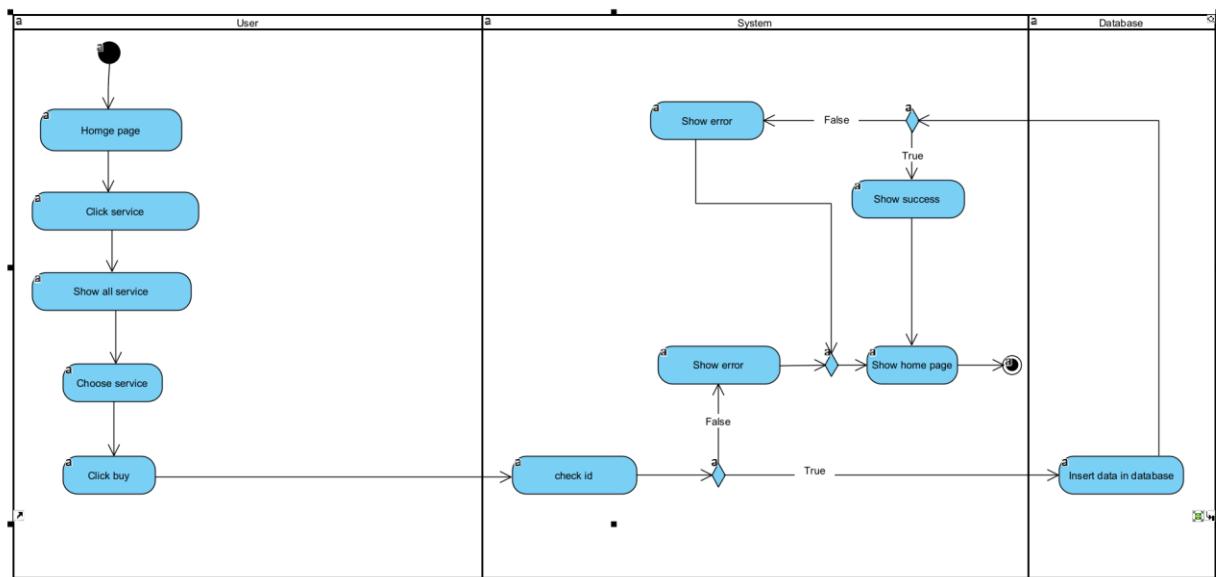


Figure 62: Post Q&A diagram of patient.

Above is the Post Q&A diagram to access the Post Q&A, users need to go to the home page and then go to the Post Q&A. Here users need to ask their own questions. After clicking post the server will receive the command and check the questioner id and then save it on the database. In case of success the server will return a success message to the user in case of an error the server will also return a message to the user.

### Other health care services diagram

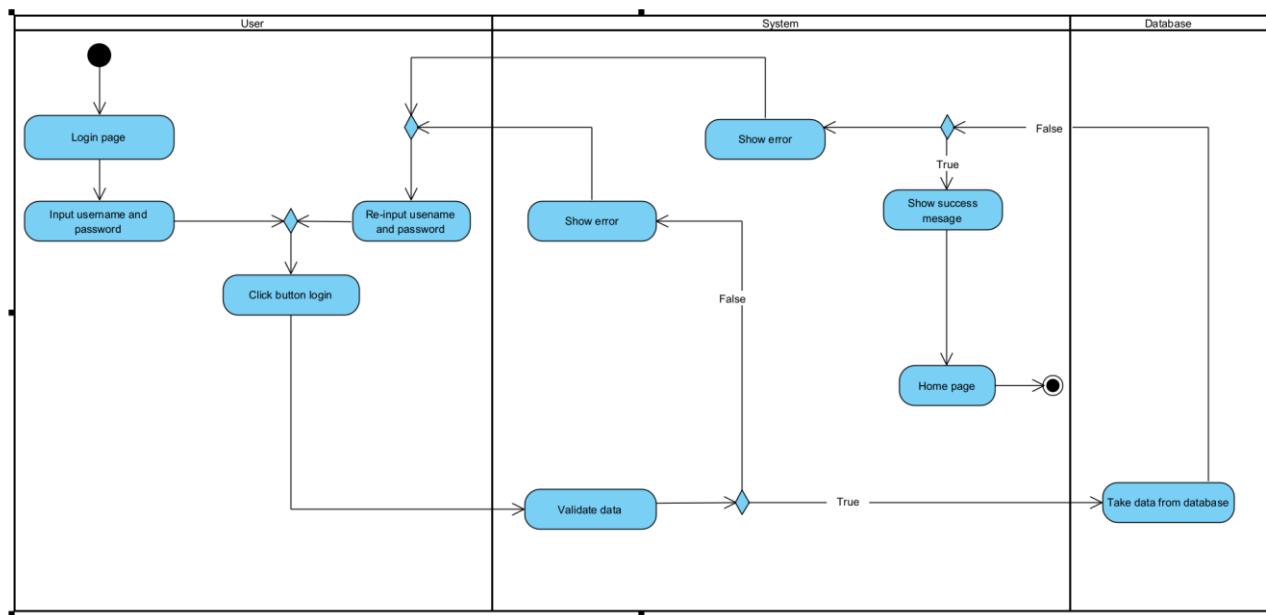


*Figure 63 Other health care services diagram of patient*

Above is the Other health care services diagram to access Other health care services, users need to go to the home page then go to Other health care services. Here the user needs to select the service and then pay their bill. After clicking add the server will receive the order and check the buyer id and then save it on the database. In case of success the server will return a success message to the user in case of an error the server will also return a message to the user.

## 4.2 Doctor

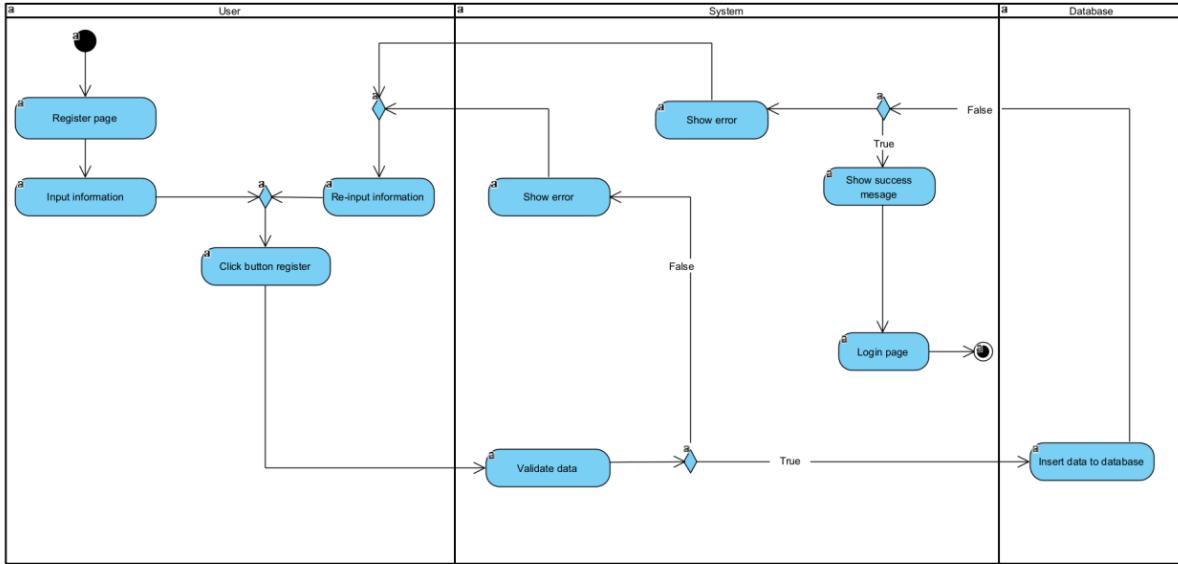
### Login diagram



*Figure 64: Login diagram of doctor*

The above is about the login activity diagram first, the user needs to login with their username and password to access the system after logging in, the system will validate the data if it is wrong, it will return a message if it is correct, the system will check the account from the data base. If the system cannot select an account with the same username and password as the user entered, the system will return a message. If there is, the system will notify the user successfully and take them to the Home page.

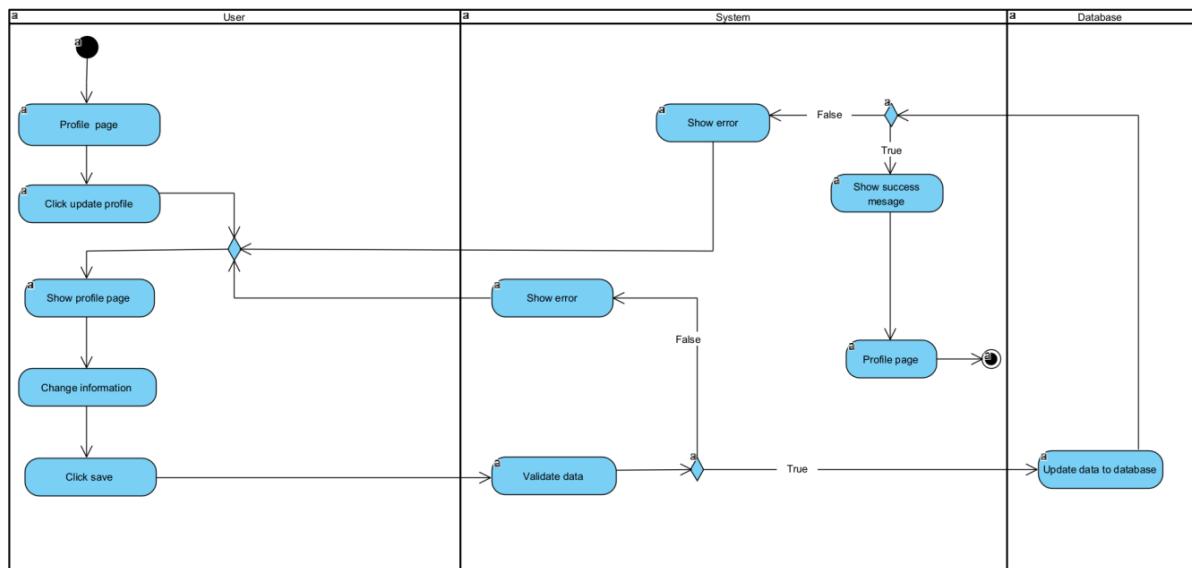
### Register diagram.



*Figure 65: Register diagram of doctor*

The above is about the register activity diagram first, users need to log in information to register an account, after clicking register, the system will validate the data if it is wrong, it will return a message if it is correct, the system will check the account from the data base . If the system cannot select any account with Email and phone as the user entered, the system will return a success message and redirect the user to the Login page.

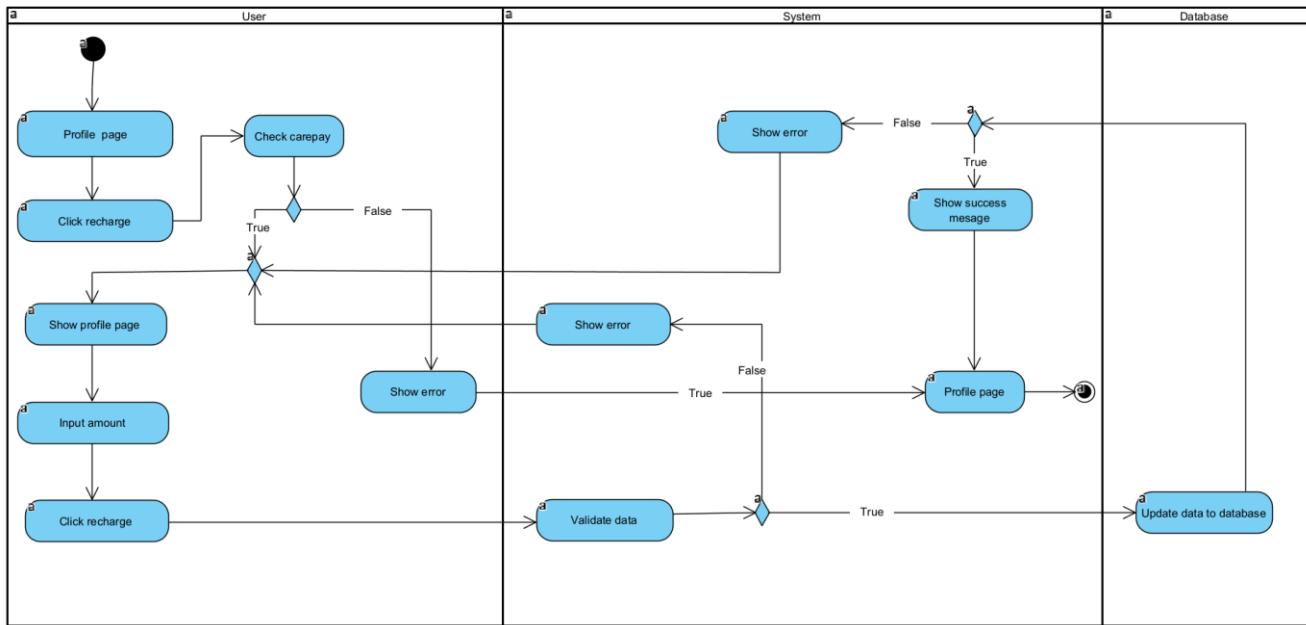
### Update profile diagram



*Figure 66 Update profile diagram of doctor.*

Above is the Update profile diagram, the first user needs to go to the profile, then click on update profile and enter the information to be modified. When the user clicks save, the system will show validate data, if it fails, the system will show the user an error. If there is, the system will update the user's information on the data base and return the user to the profile page.

### **Recharge diagram.**



*Figure 67: Recharge diagram of doctor*

Above is the first deposit diagram, the user needs to go to the profile, then click on recharge and enter the amount to deposit. When the user clicks save, the system will show validate data, if it fails, the system will show the user an error. If there is, the system will update the user's information on the data base and return the user to the profile page.

### **Point diagram**

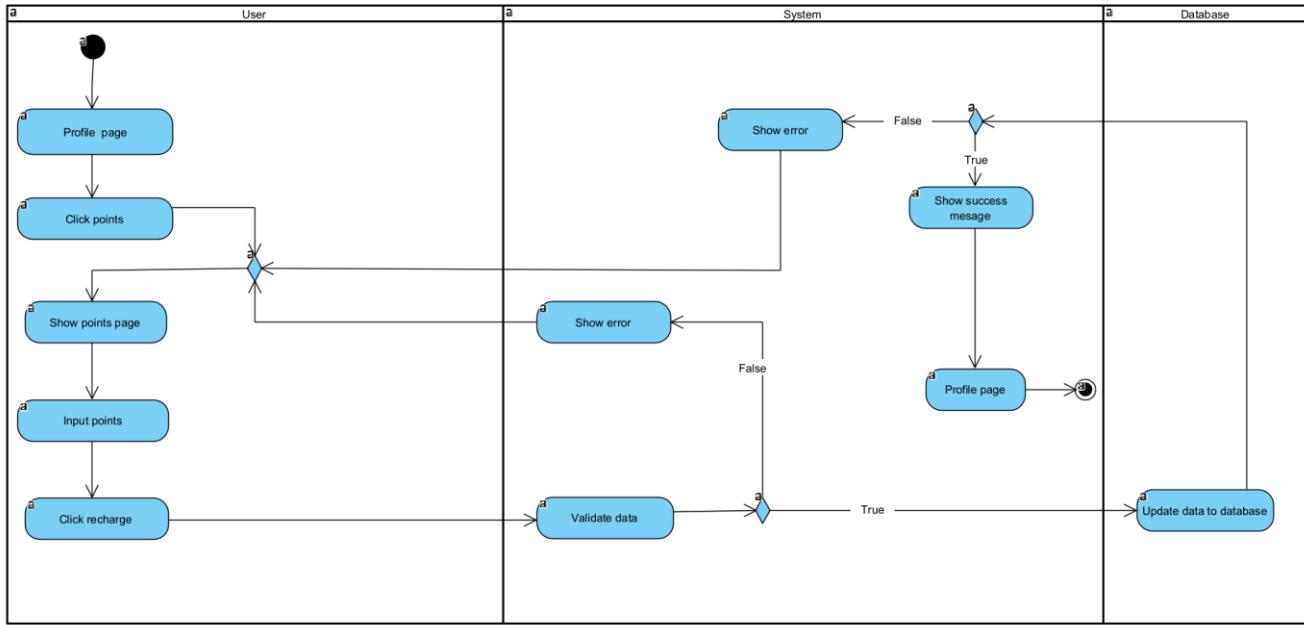
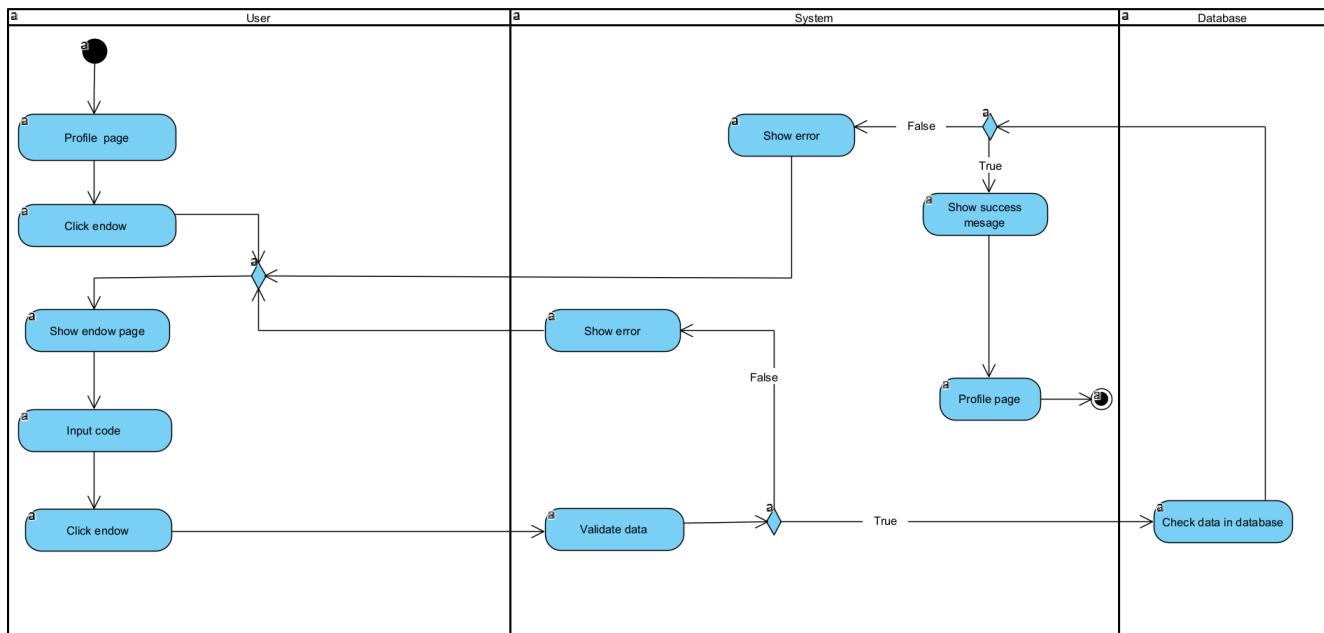


Figure 68: Point diagram of doctor.

Above is the reward diagram first, the user needs to go to the profile, then click on redeem and enter the amount to change. When the user clicks to change, the system will validate data, if it fails, the system will show the user an error. If there is, the system will update the user's information on the data base and return the user to the profile page.

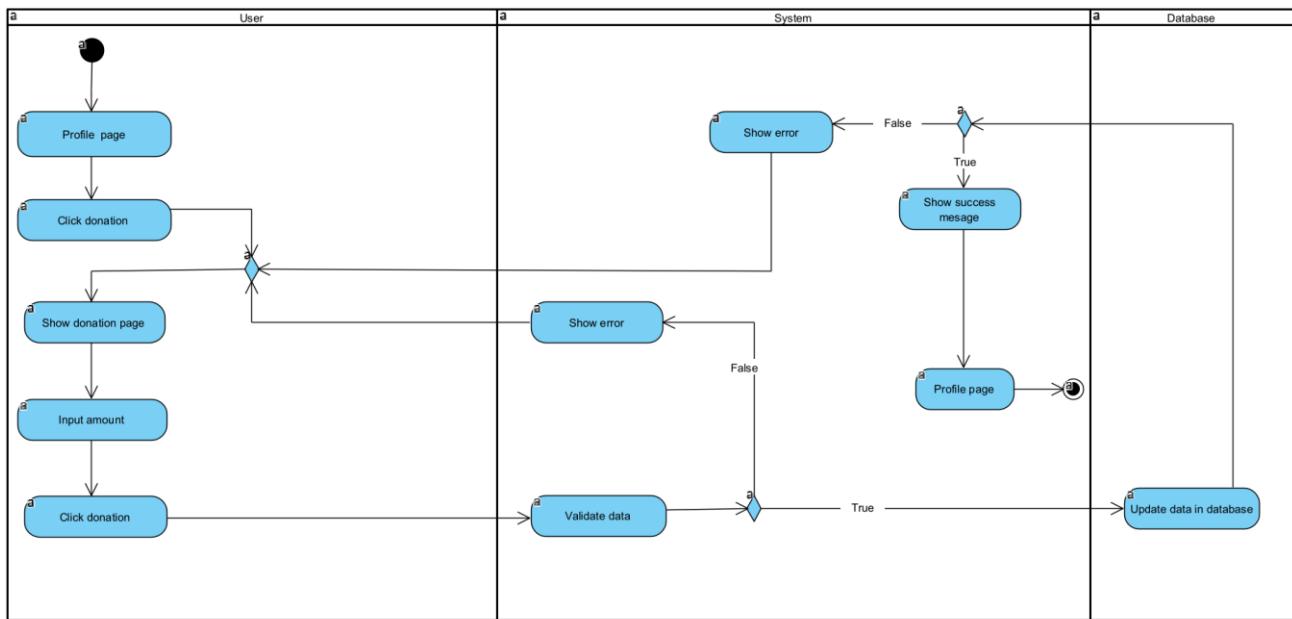
## Endow diagram



*Figure 69: Endow diagram of doctor.*

Above is the Endow diagram, the first user needs to go to the profile, then click on Endow and enter the code. When the user clicks to change, the system will show validate data, if it fails, the system will show the user an error. If there is, the system will update the user's information on the data base and return the user to the profile page.

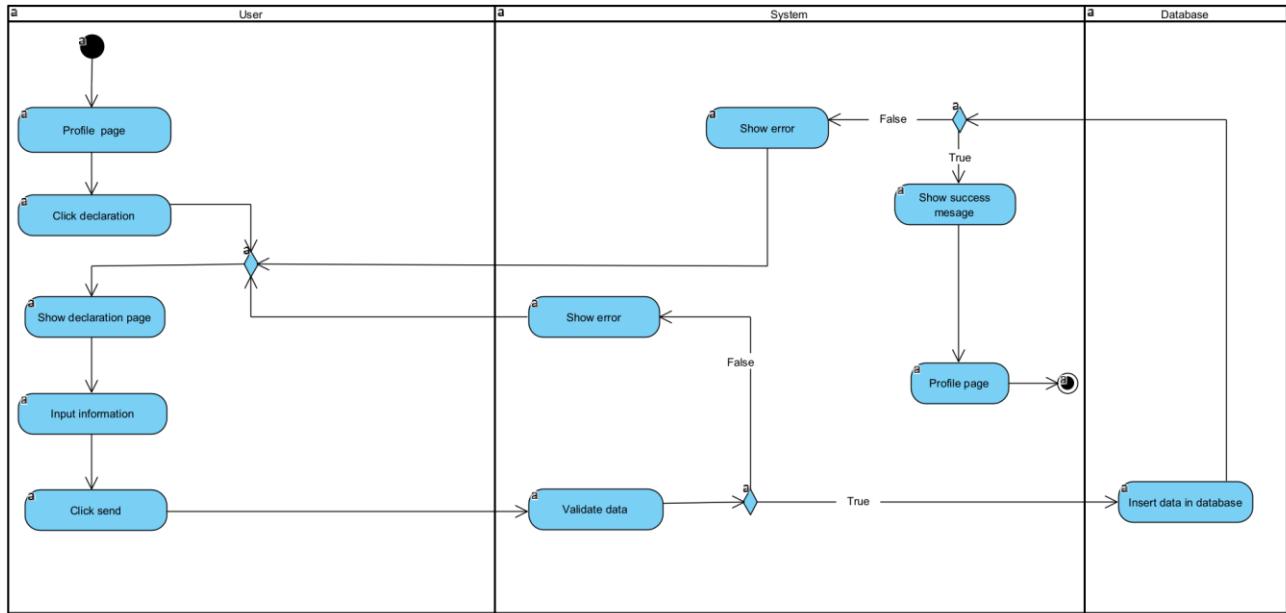
### Donation diagram



*Figure 70: Donation diagram of doctor.*

Above is the Donation diagram, the first user needs to go to the profile, then click on Donation and enter the amount to support to buy medicine for poor children. When the user clicks to change, the system will show validate data, if it fails, the system will show the user an error. If there is, the system will update the user's information on the data base and return the user to the profile page.

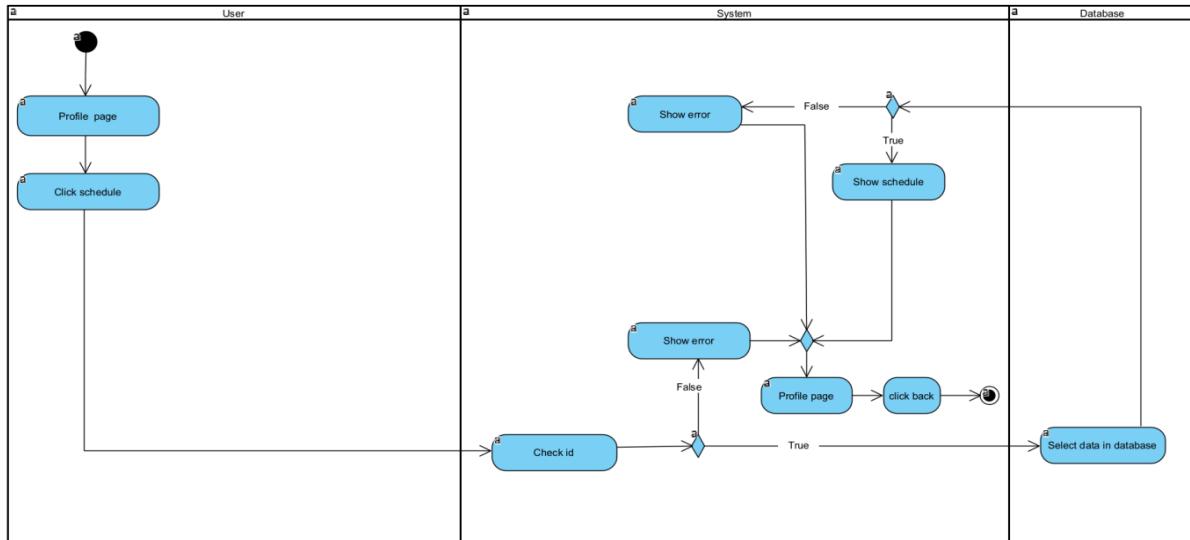
## health declaration diagram



Above is the medical declaration diagram, first the user needs to go to the profile, then click on the medical declaration and answer the declaration questions. When the user clicks send, the system will receive the information and insert it into the database. If successful, it will show a success message, if it fails, it will show a failure message to the user.

*Figure 71: health declaration diagram of doctor.*

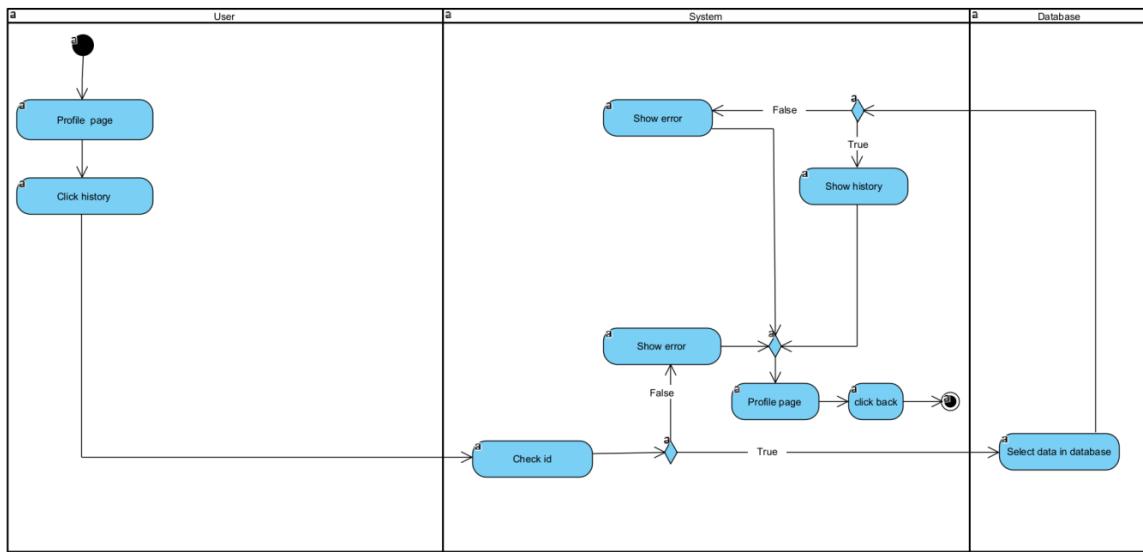
## Schedule diagram



*Figure 72: Schedule diagram of doctor.*

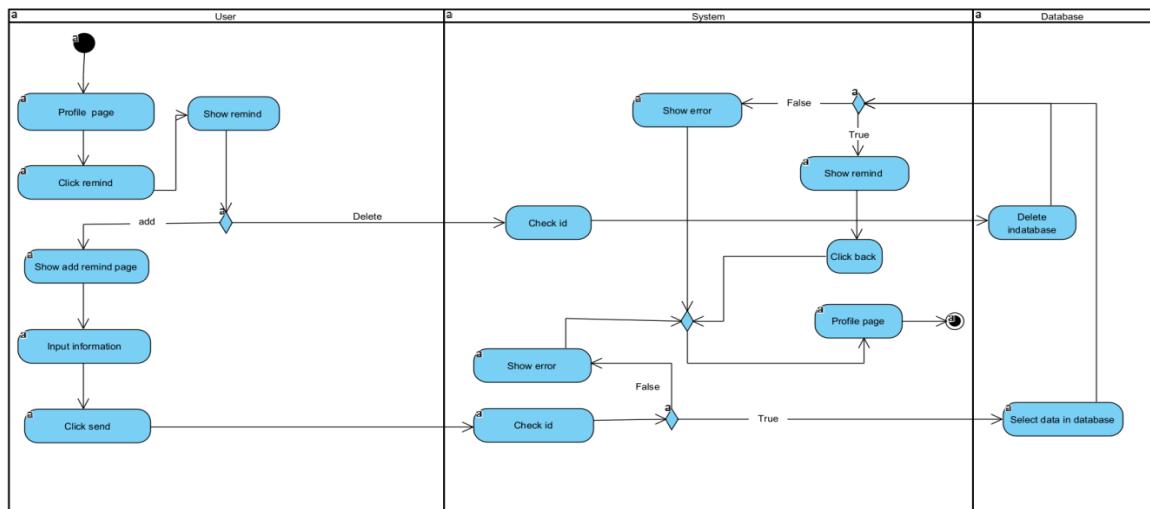
Above is the schedule diagram that the user needs to first go to the profile and then click on the schedule. After the user clicks, the system will check the user id, if it fails, the system will show the user an error. If there is a system, it will select the user's information on the data base and show the user the schedules they have made with the doctor.

### History diagram.



*Figure 73 History diagram of doctor.*

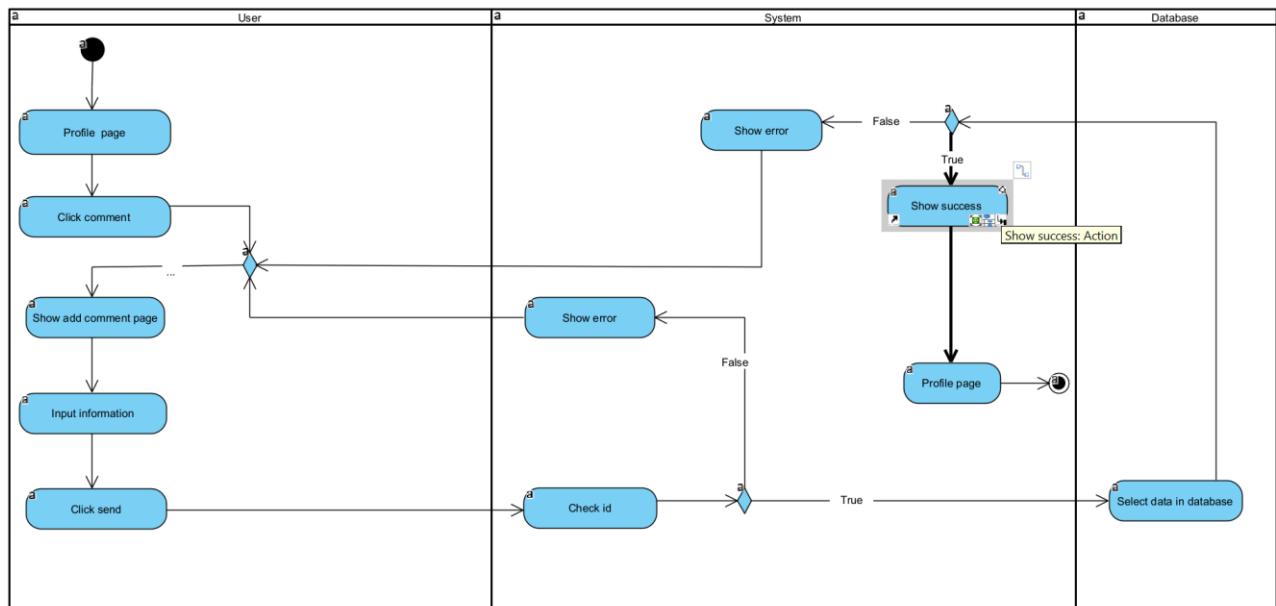
### Remind diagram



*Figure 74: Remind diagram of doctor.*

Above is the first reminder diagram that the user needs to go to the profile and then click on remind . Here the user has 2 options to click on delete, the system will check the id and delete on the data base, if unsuccessful, it will notify the user if successful, it will report a success message to the user and show remind page. If the user selects add it will go to an add reminder page. Here the user needs to input information and the system will check the id and insert the information into the database. If successful, it will notify the user of a successful message, if it fails, it will notify the user of a failed message and both will give they come to remind page.

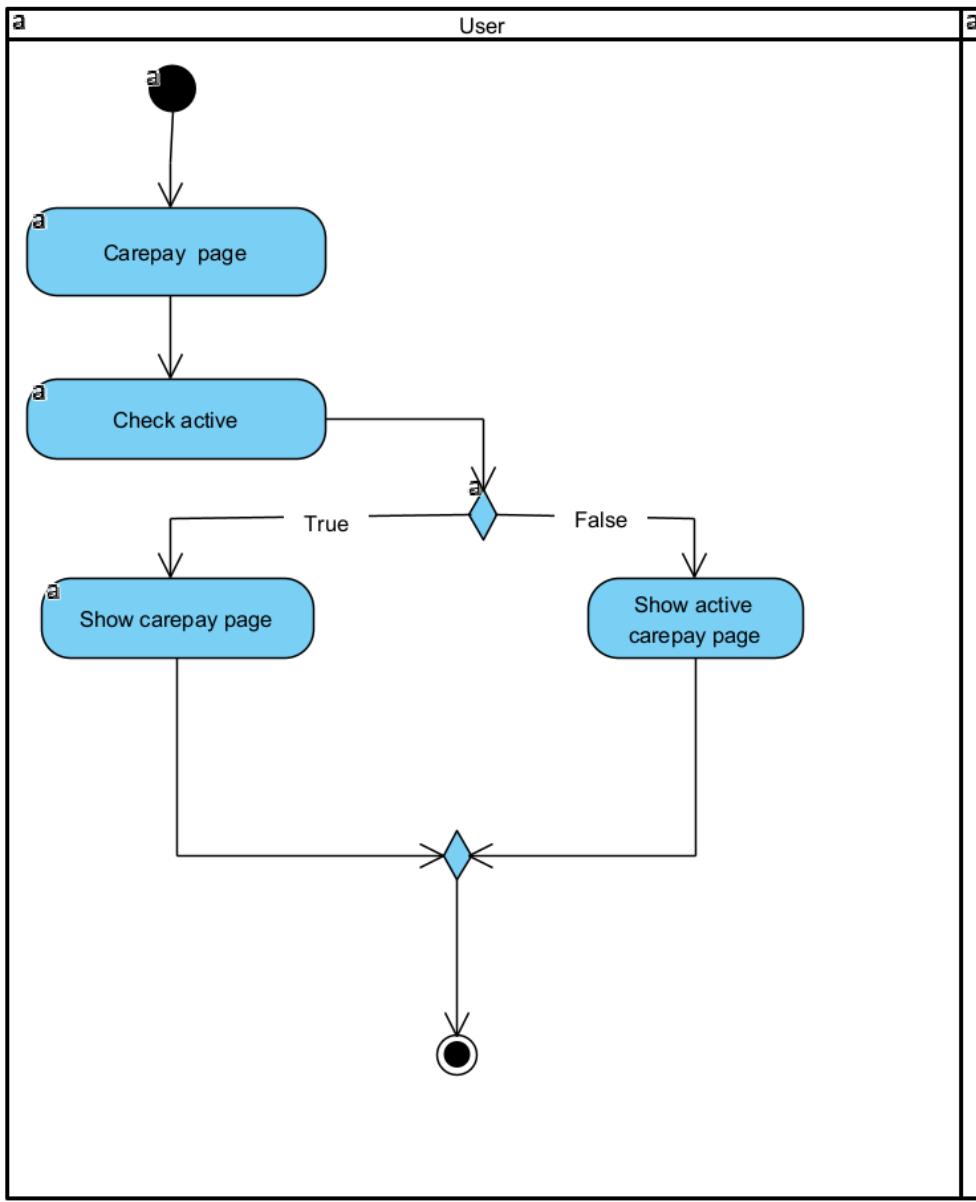
### Contribute diagram



*Figure 75: Contribute diagram of doctor.*

Above is the Contribute diagram first users need to go to carepay then click Contribute . Here you can input data and then press send. The system will check the user id and then store it on the data base, if successful, it will return a success message. If archiving fails, a failure message is returned. Finally take the user to the profile page.

### Carepay diagram



*Figure 76: Carepay diagram of doctor.*

Above is the Carepay diagram. Here the system will check the user id if they have active carepay the user will be shown the carepay page otherwise the user will be shown the non-active carepay page.

### Scan to pay diagram

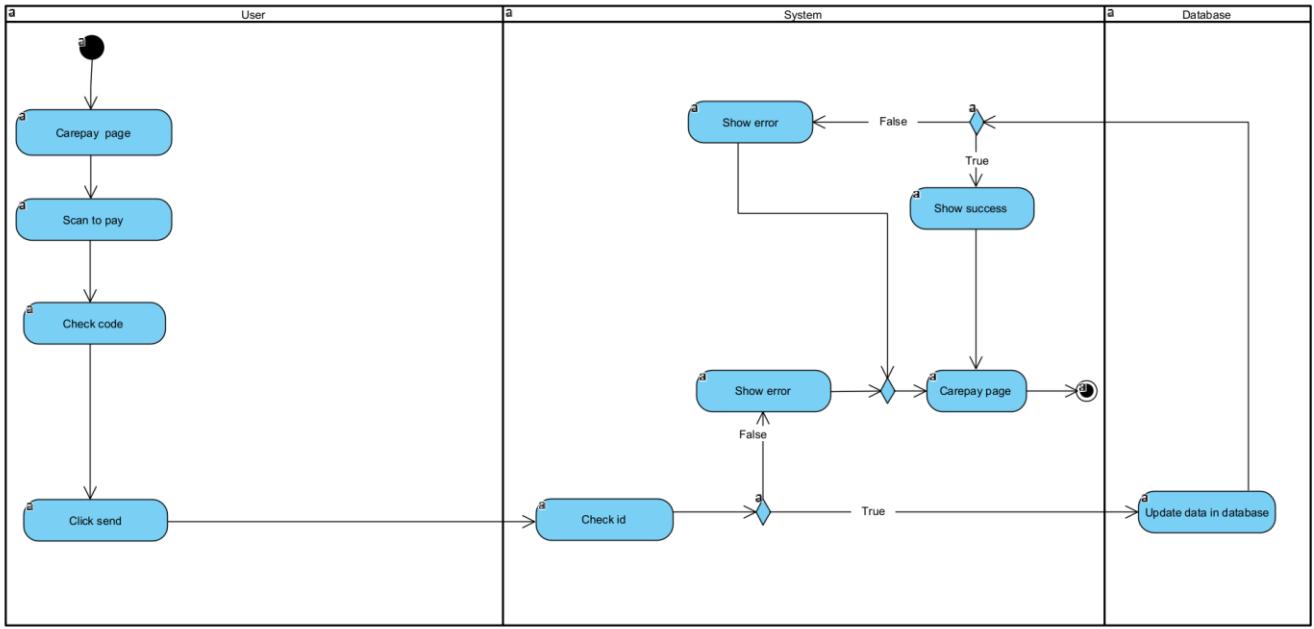
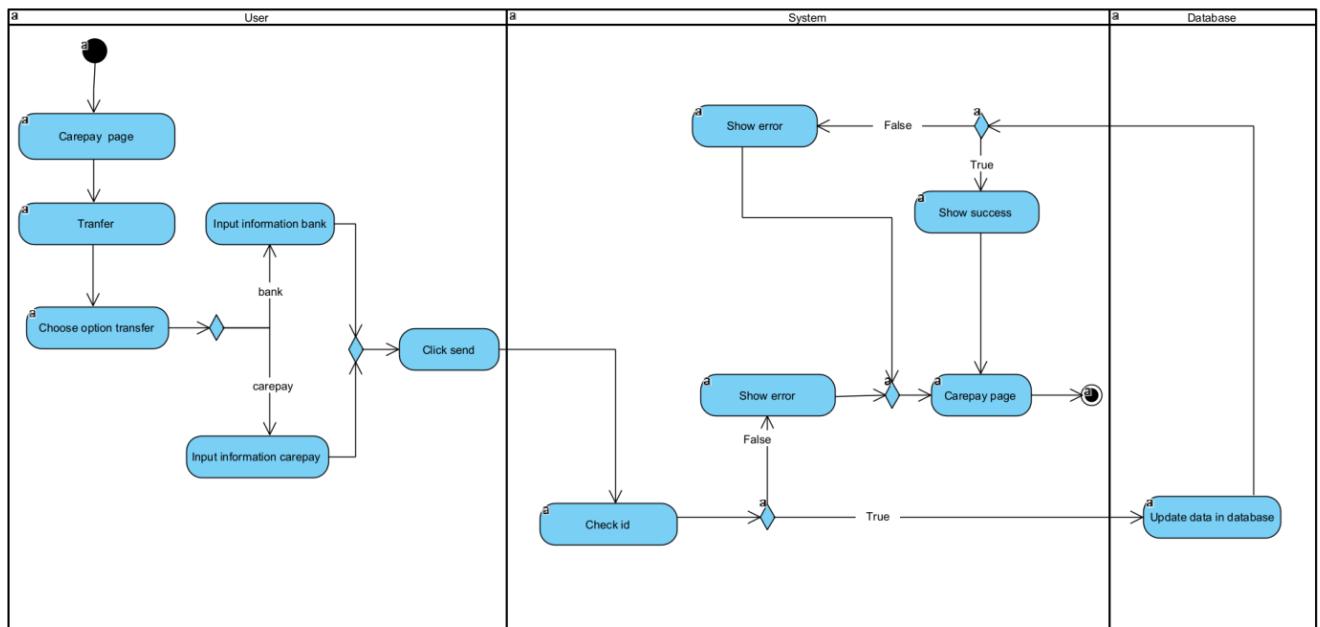


Figure 77: Scan to pay diagram of doctor.

Above is the Scan to pay diagram. First, the user needs to scan the code, after reading the code the system will update the money in the user's account. If successful, the system will send the user a successful message, if it fails, the system will notify the user of failure. Finally, the system will take the user to the carepay page.

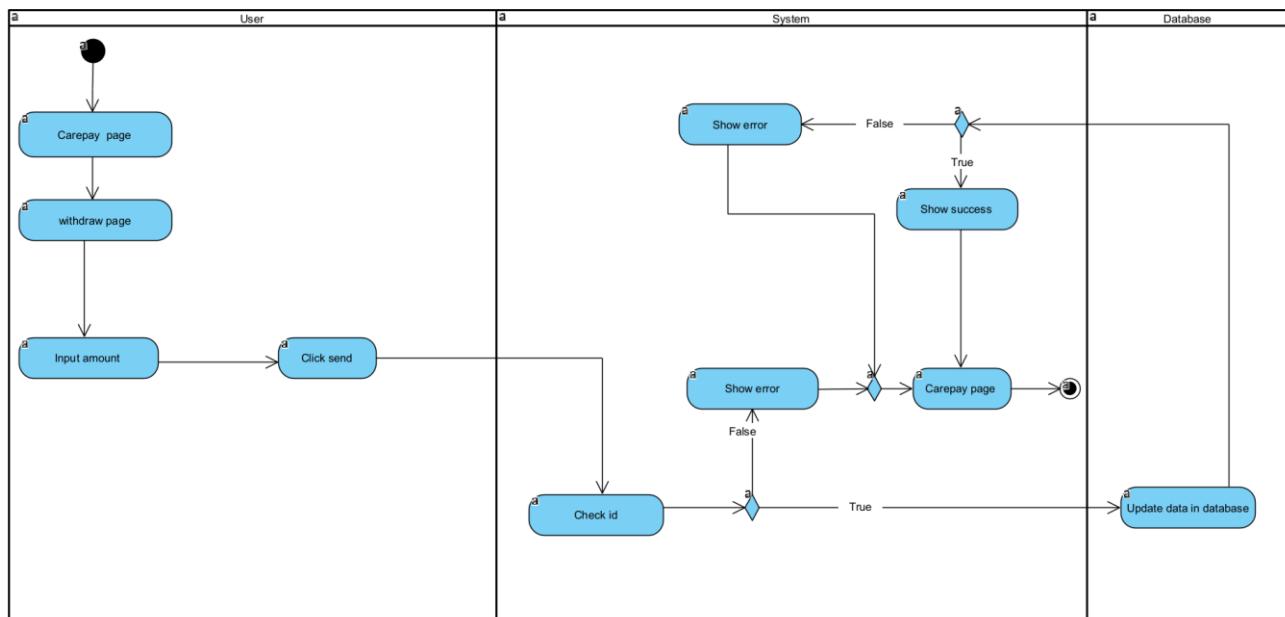
## Transfer diagram



*Figure 78 : Transfer diagram of doctor.*

Above is the Transfer diagram, the first user needs to go to carepay and then click on Transfer. Here the user has 2 options. Click on the bank then input the necessary data and click send the system will update the data base if it fails, it will notify the user if successful, it will report a success message to the user and show invoice . Click on carepay then input the necessary data and click send, the system will update the data base if it fails, it will notify the user, if successful, it will report a success message to the user and show the invoice. Finally, users can return to the home page or transfer page if they want to continue transferring money.

### **Withdraw diagram**



*Figure 79: Withdraw diagram of doctor.*

Above is the Withdraw diagram, users need to go to the carepay section, then click Withdraw and enter the amount to withdraw. When the user clicks save, the system will display the authentication data, if it fails, the system will show an error to the user. If so, the system will update the user's information on the database and return the user to the carepay page.

### **News post diagram.**

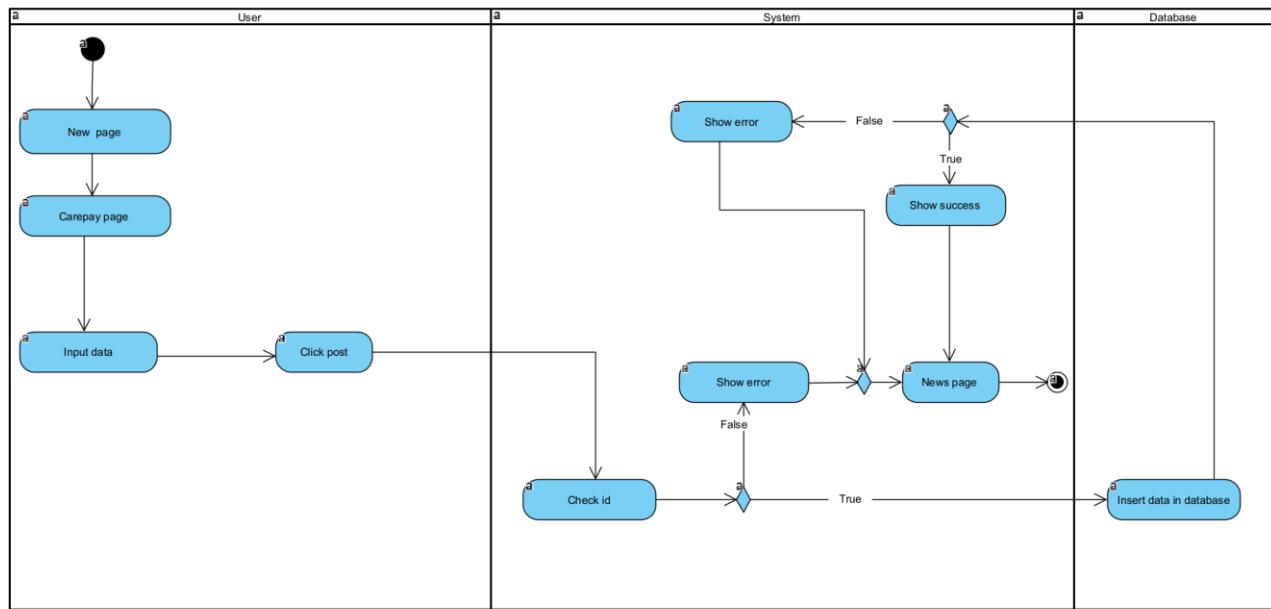
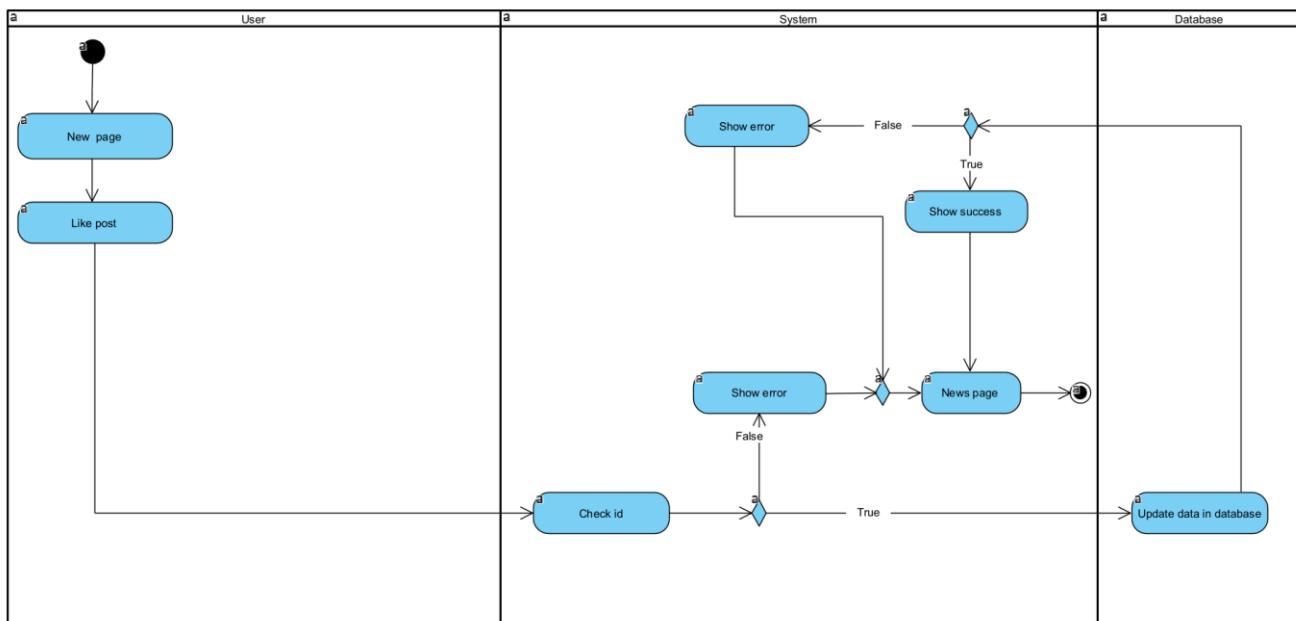


Figure 80: News post diagram of doctor.

Above is the News post diagram, users need to go to the News section, then click on the post and input data. When the user clicks post , the system will display the authentication data, if it fails, the system will show an error to the user. If so, the system will update the user's information on the database and return the user to the News page.

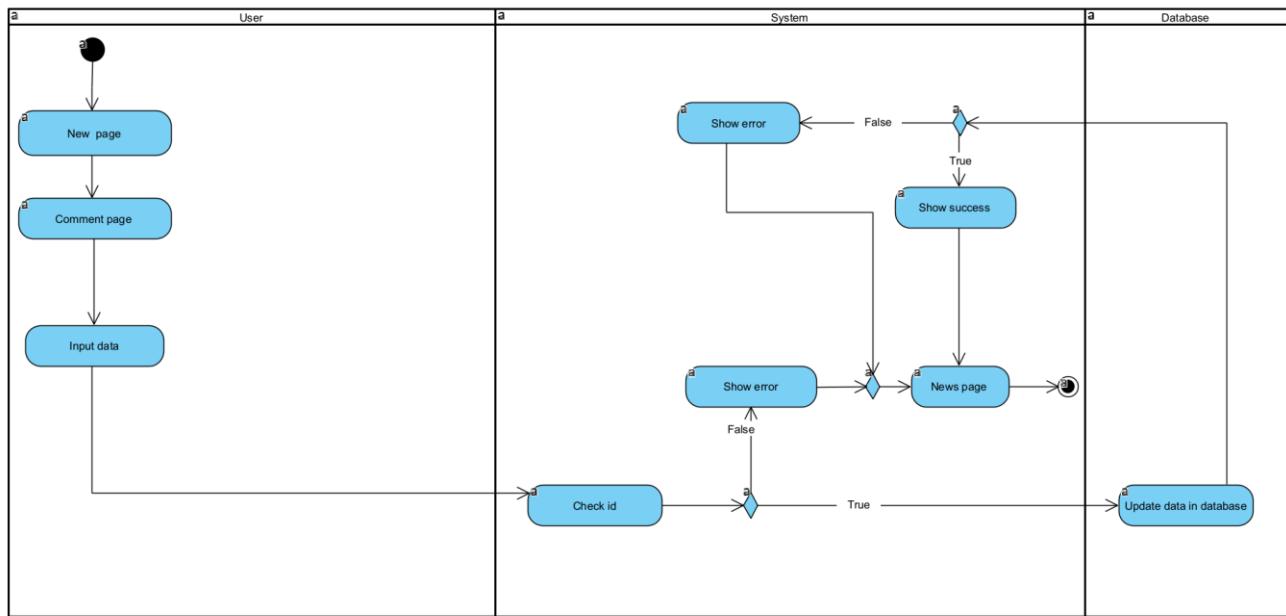
### Like post diagram



*Figure 81: Like post diagram of doctor.*

Above is the News post diagram, users need to go to the News section, then click like on an article. When the user clicks like, the system will check the user id of the link and post, if it fails, the system will show an error to the user. If so, the system will update the user's information on the database and return the user to the News page.

### **Comment post diagram.**



*Figure 82: Comment post diagram of doctor.*

Above is the News post diagram, users need to go to the News section, then click comment and enter a comment. When the user clicks post, the system will check the user id and post, if it fails, the system will show an error to the user. If so, the system will update the user's information on the database and return the user to the News page.

### **Medical examination for patients diagram**

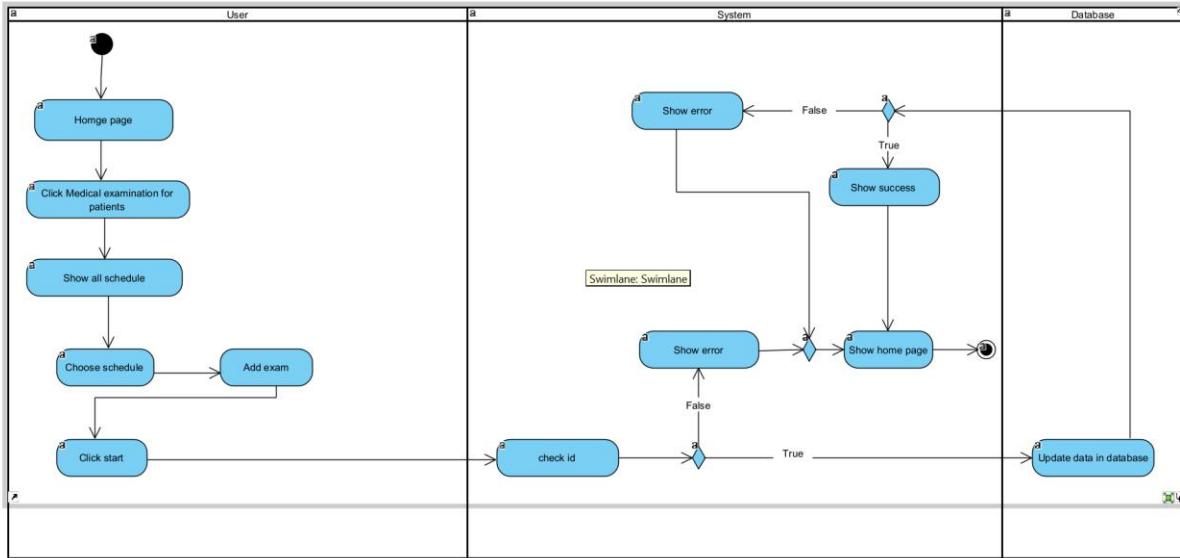
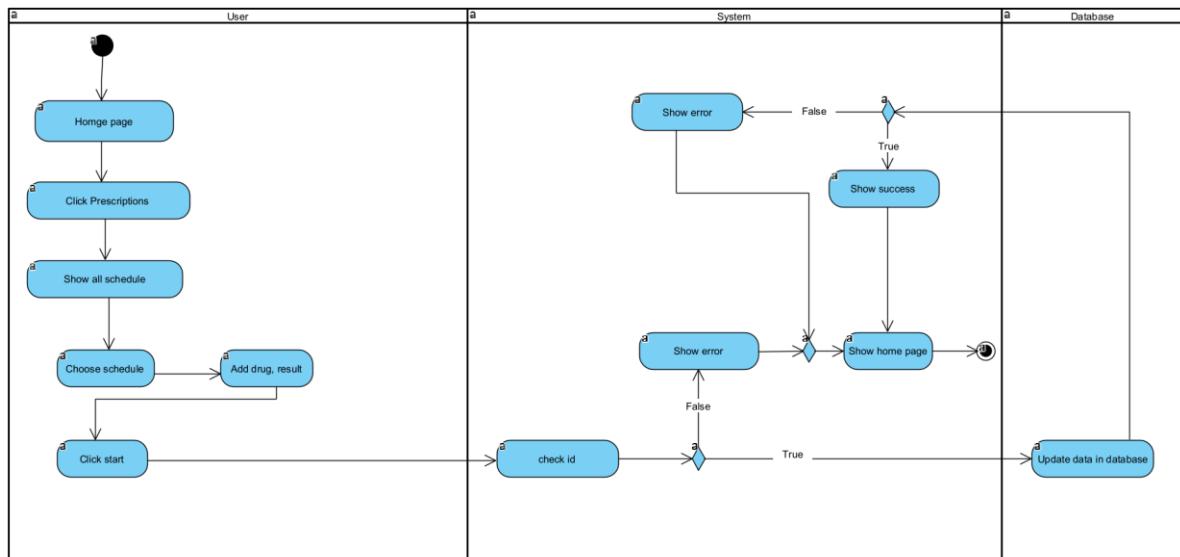


Figure 83: Medical examination for patients diagram of doctor.

Above is the Medical examination for patients diagram to access the Medical examination for patients, users need to go to the home page and then go to the Medical examination for patients . Here the user needs to choose the exam schedule and set exam for the patient. After clicking add server will receive the command and check the examiner id and then save it on the database. In case of success the server will return a success message to the user in case of an error the server will also return a message to the user.

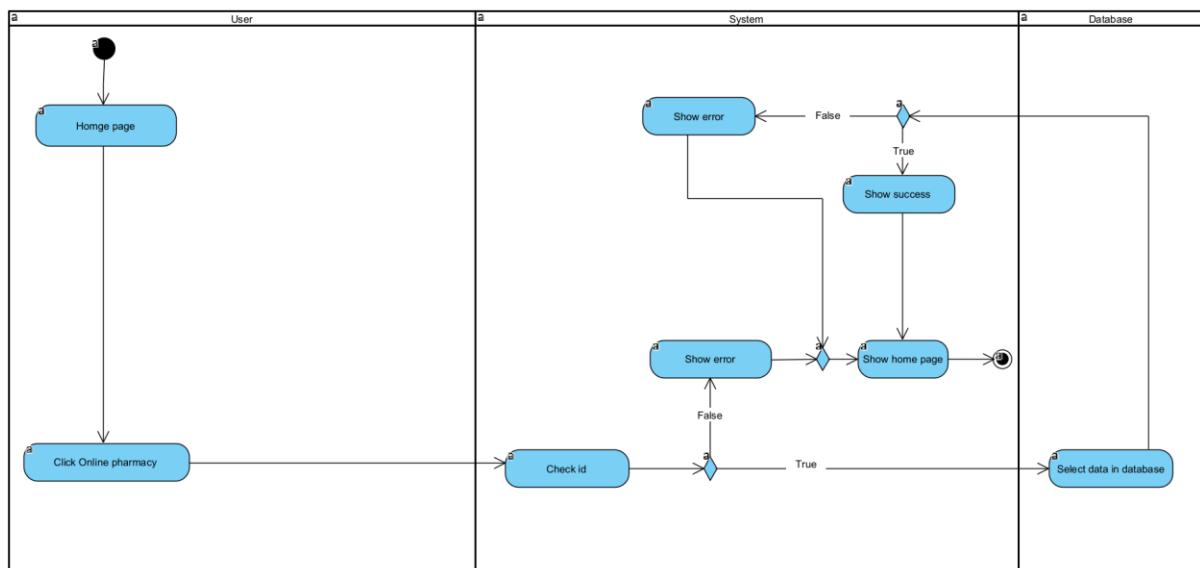
## Prescriptions diagram



*Figure 84: Prescriptions diagram of doctor.*

Above is the Prescriptions diagram to access Prescriptions users need to go to the home page then go to Prescriptions . Here the user records the examination and prescribes medicine for the patient. After clicking add server will receive the command and check the examiner id and then save it on the database. In case of success the server will return a success message to the user in case of an error the server will also return a message to the user.

### Online pharmacy diagram



*Figure 85: Online pharmacy diagram of doctor.*

Above is the Online pharmacy diagram to access the Online pharmacy, users need to go to the home page and then go to the Online pharmacy . Here the user can see all the prescriptions ordered from the patient. After clicking add server will receive the command and check the examiner id and then save it on the database. In case of success the server will return a success message to the user in case of an error the server will also return a message to the user.

### Answer questions diagram

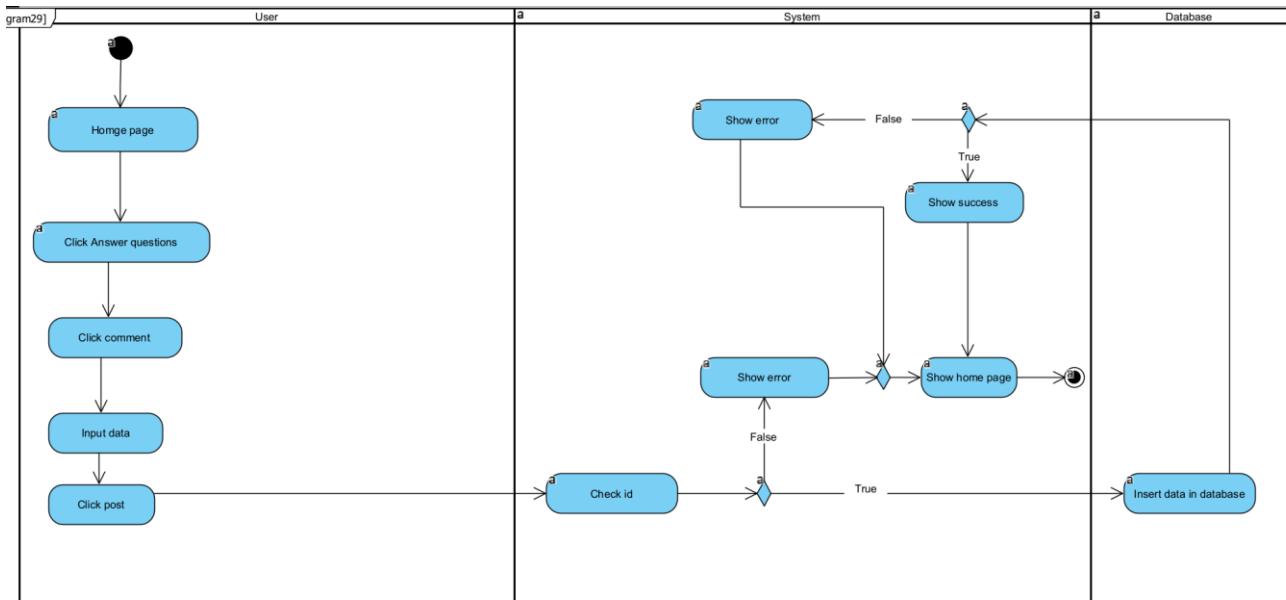
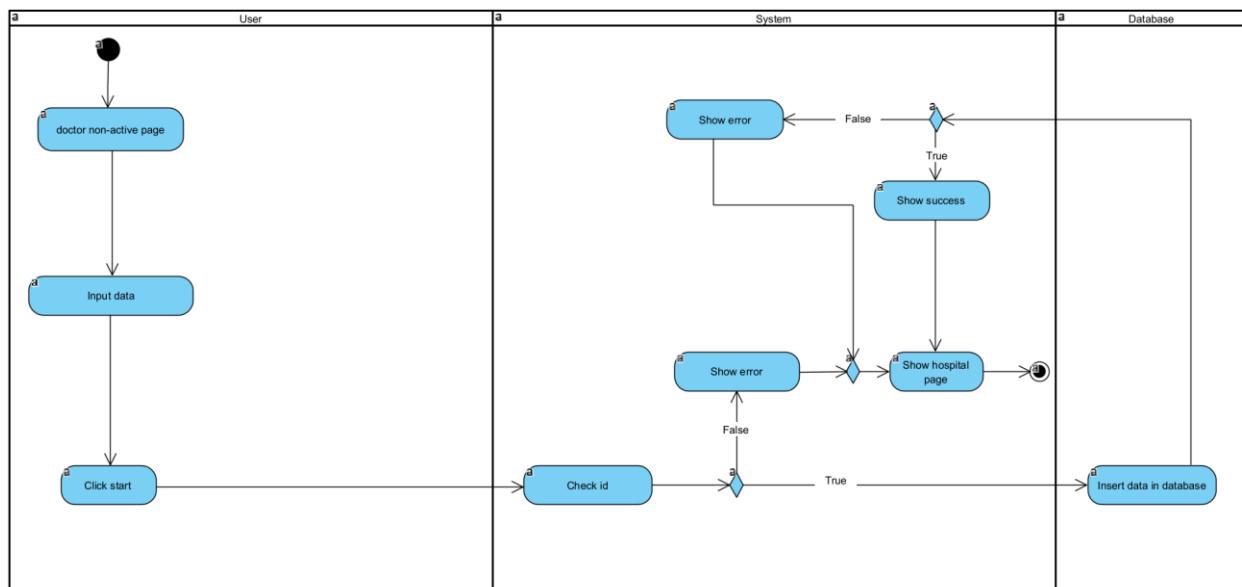


Figure 86: Answer questions diagram of doctor.

Above is the Answer questions diagram to access Answer questions, users need to go to the home page and then to Answer questions . Here the user sees all questions coming from the patient, the user needs to enter the answer. After clicking post, the server will receive the command and check the examiner id and then save it on the database. In case of success the server will return a success message to the user in case of an error the server will also return a message to the user.

### Register a doctor diagram

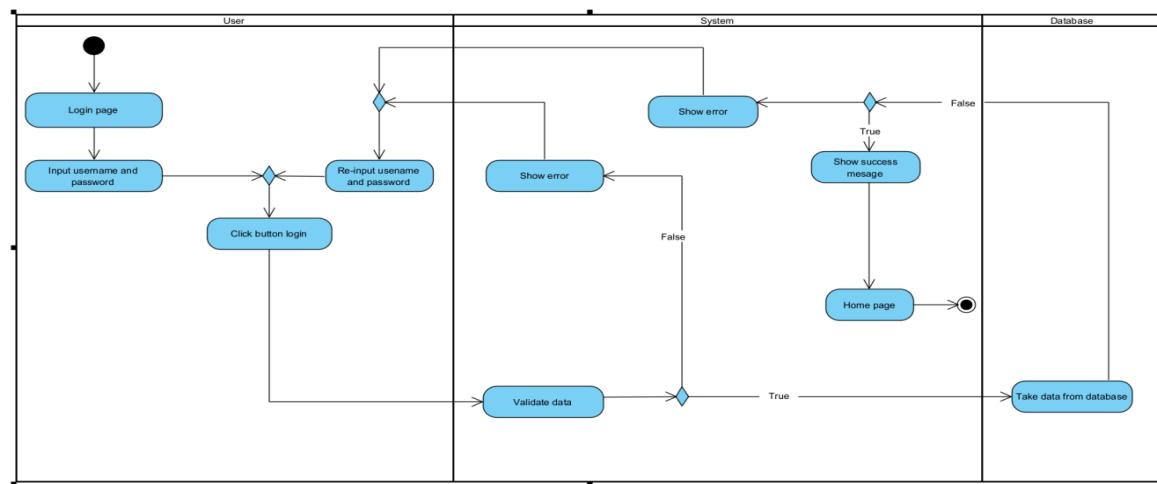


*Figure 87: Register a doctor diagram of doctor.*

Above is the Register a doctor diagram to access Register a doctor, users need to go to the doctor page and then go to Register a doctor . Here users will have to provide some information to prove they are a doctor, all this information will be checked by the AI system. After clicking post, the server will receive the command and check the examiner id and then save it on the database. In case of success the server will return a success message to the user in case of an error the server will also return a message to the user.

#### 4.3 Admin.

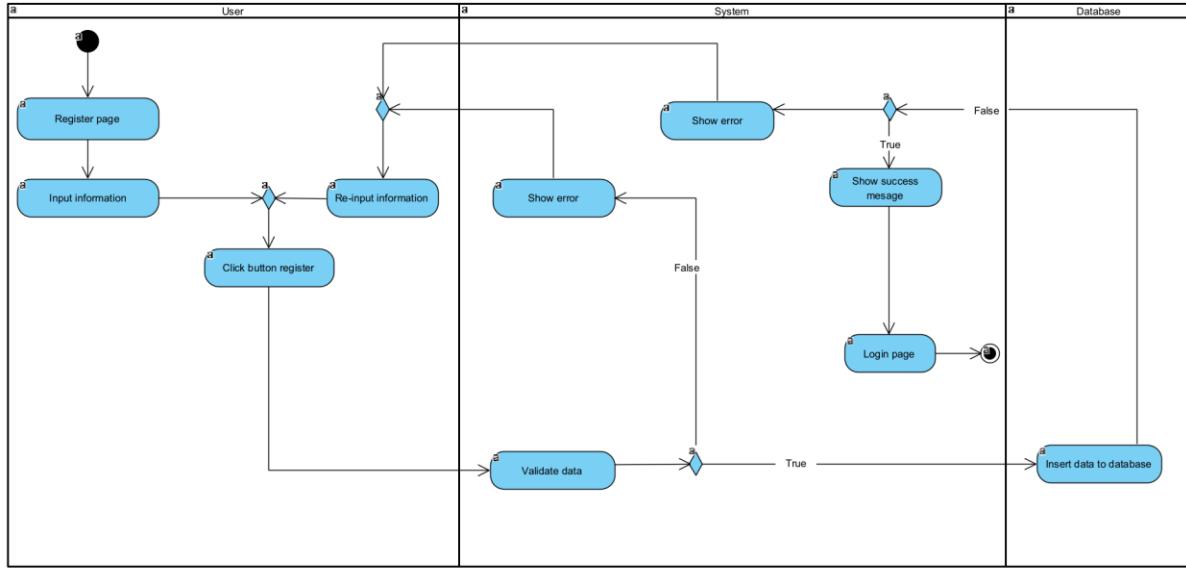
##### Login diagram



*Figure 88: Login diagram of admin.*

The above is about the login activity diagram first, the user needs to login with their username and password to access the system after logging in, the system will validate the data if it is wrong, it will return a message if it is correct, the system will check the account from the data. base. If the system cannot select an account with the same username and password as the user entered, the system will return a message. If there is, the system will notify the user successfully and take them to the Home page.

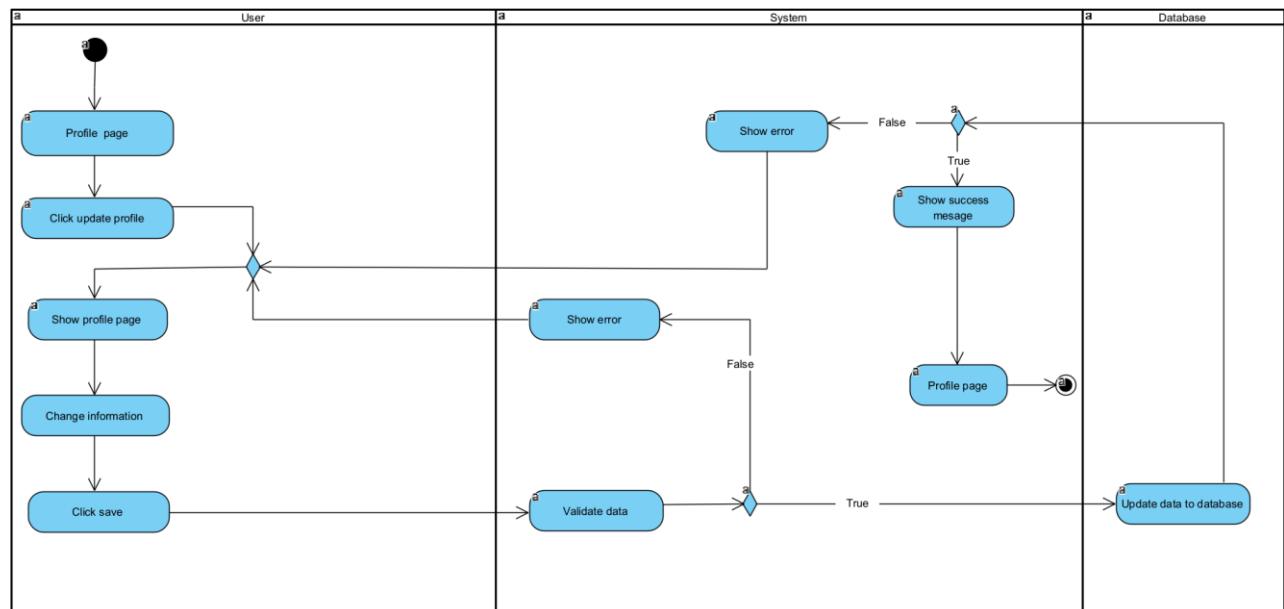
##### Register diagram.



*Figure 89: Register diagram of admin.*

The above is about the register activity diagram first, users need to log in information to register an account, after clicking register, the system will validate the data if it is wrong, it will return a message if it is correct, the system will check the account from the data base . If the system cannot select any account with Email and phone as the user entered, the system will return a success message and redirect the user to the Login page.

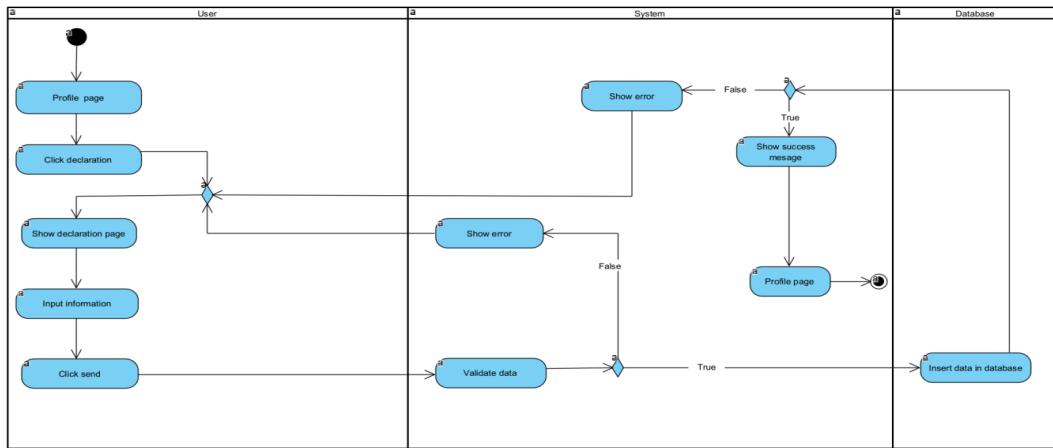
### Update profile diagram



*Figure 90: Update profile diagram of admin.*

Above is the Update profile diagram, the first user needs to go to the profile, then click on update profile and enter the information to be modified. When the user clicks save, the system will show validate data, if it fails, the system will show the user an error. If there is, the system will update the user's information on the data base and return the user to the profile page.

### **health declaration diagram**



*Figure 91: health declaration diagram of admin.*

Above is the medical declaration diagram, first the user needs to go to the profile, then click on the medical declaration and answer the declaration questions. When the user clicks send, the system will receive the information and insert it into the database. If successful, it will show a success message, if it fails, it will show a failure message to the user.

### **Remind diagram**

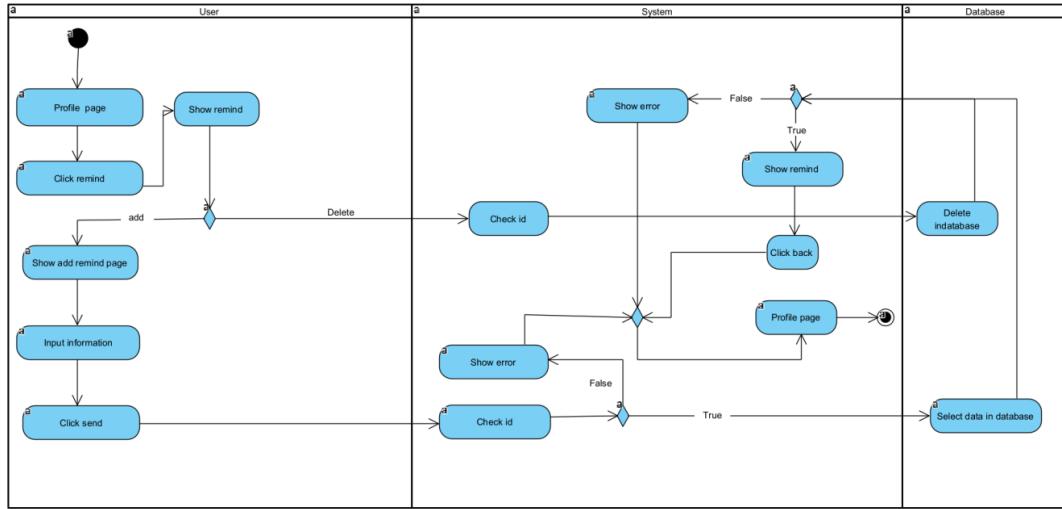
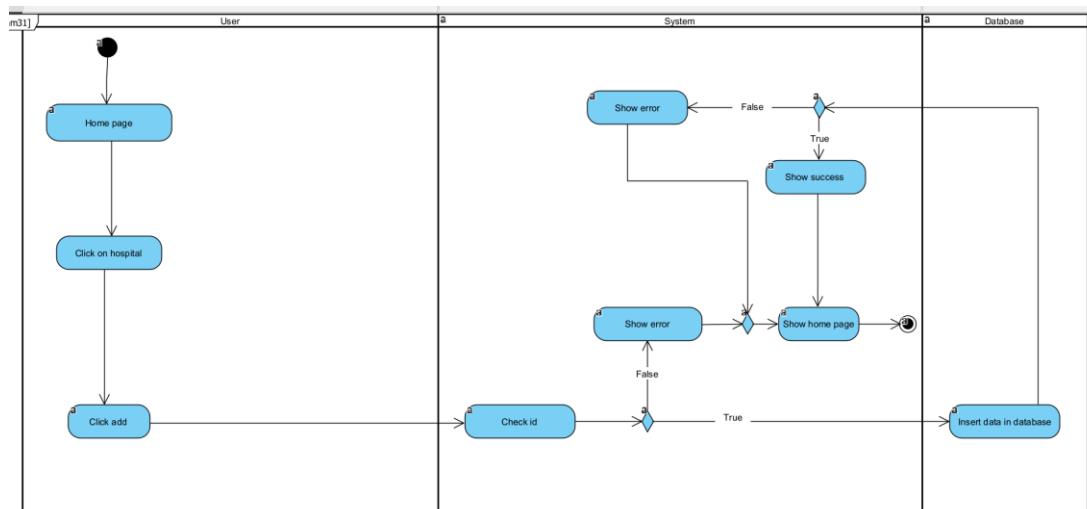


Figure 92: Remind diagram of admin.

Above is the first reminder diagram that the user needs to go to the profile and then click on remind . Here the user has 2 options to click on delete, the system will check the id and delete on the data base, if unsuccessful, it will notify the user if successful, it will report a success message to the user and show remind page. If the user selects add it will go to an add reminder page. Here the user needs to input information and the system will check the id and insert the information into the database. If successful, it will notify the user of a successful message, if it fails, it will notify the user of a failed massage and both will give they come to remind page.

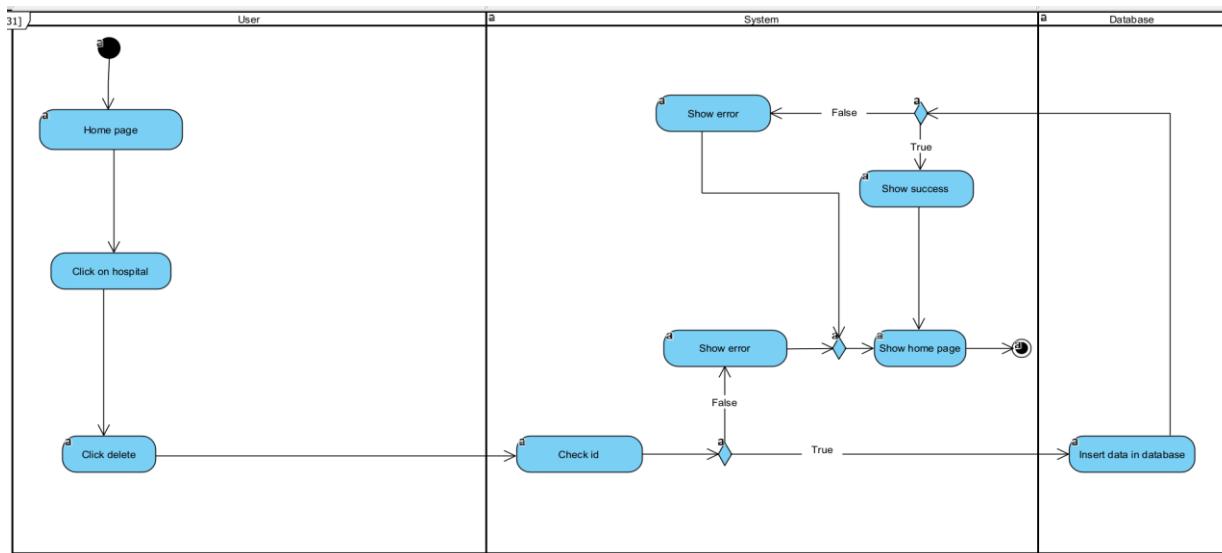
### Add hospital diagram.



*Figure 93: Add hospital diagram of admin.*

Above is the Add hospital diagram to access Add hospital, users need to go to the home page and then go to Add hospital. Here users will be able to add more hospitals. After clicking add the server will receive the command and check the user id and then save it on the database. In case of success the server will return a success message to the user in case of an error the server will also return a message to the user.

### Delete hospital diagram



*Figure 94: Delete hospital diagram of admin.*

Above is the Add hospital diagram to access Add hospital, users need to go to the home page and then go to Add hospital. Here users will be able to delete hospitals. After clicking add the server will receive the command and check the user id and then save it on the database. In case of success the server will return a success message to the user in case of an error the server will also return a message to the user.

### Test at home diagram

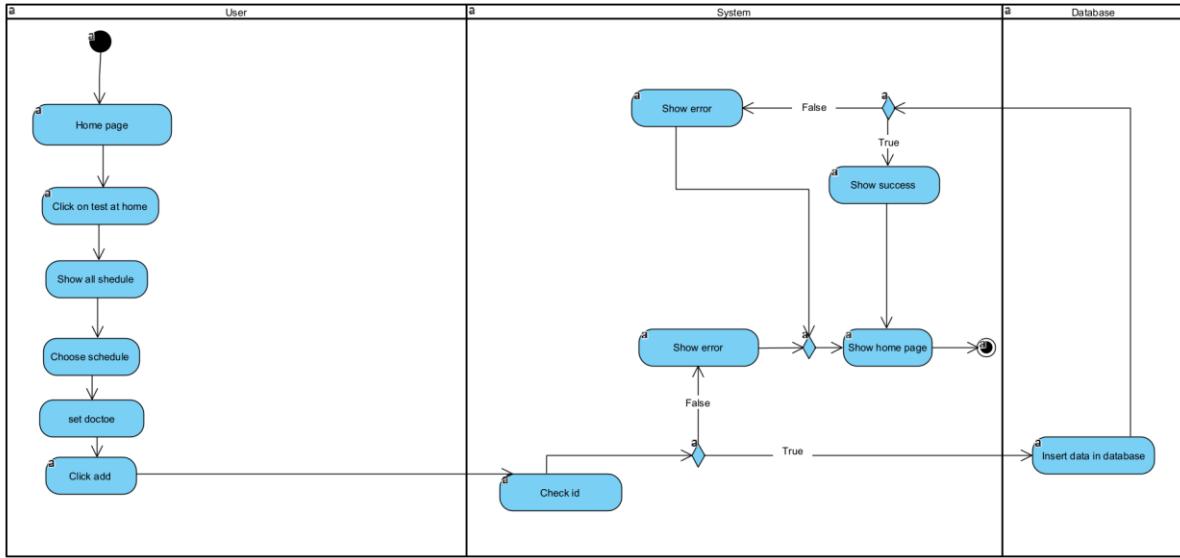


Figure 95: Test at home diagram of admin.

Above is the Test at home diagram to access Test at home, users need to go to the home page and then go to Test at home. Here the user will see all the people who booked the test at home, the user's task is to set a doctor for them. After clicking add the server will receive the command and add data to the database and return a message to the user. In case of success the server will return a success message to the user in case of an error the server will also return a message to the user.

### Client account diagram

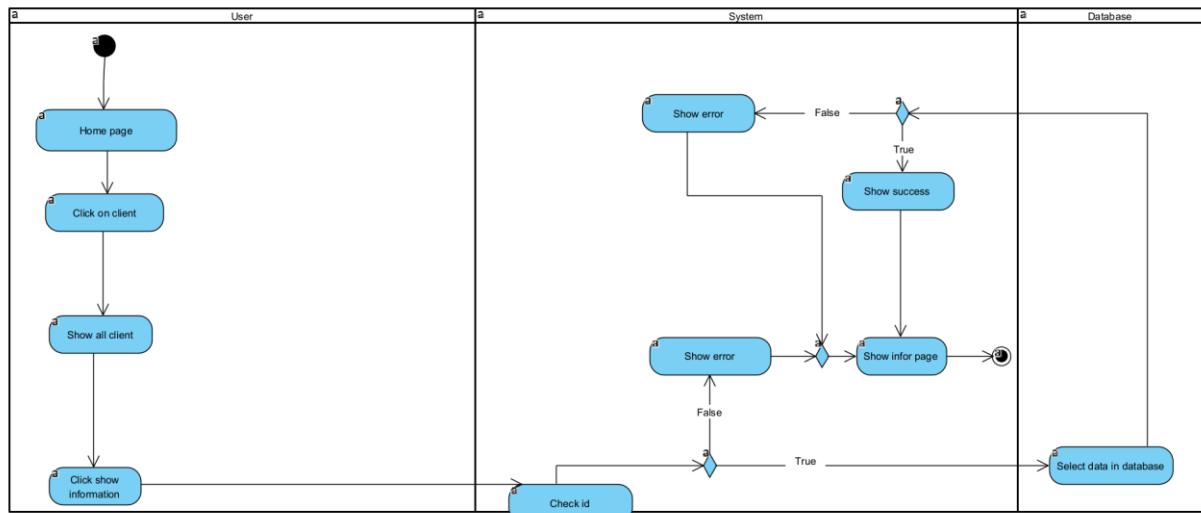


Figure 96: Client account diagram of admin.

Above is the Client account diagram to access Client account, users need to go to the home page and then go to Client account. Here users will see all their client. After clicking see the server will receive the command and select data from the database and return it to the user. In case of success the server will return a success message to the user in case of an error the server will also return a message to the user.

### Doctor account diagram

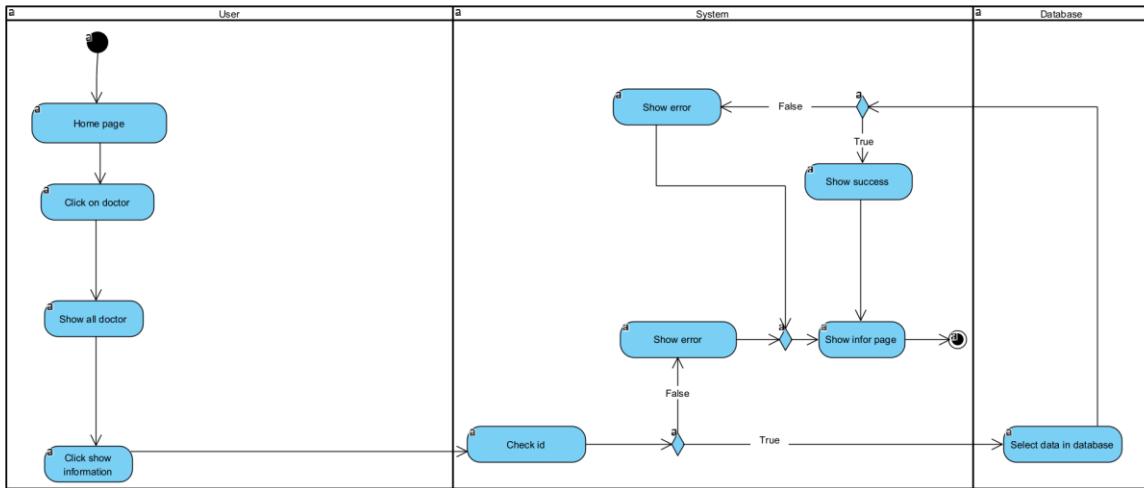


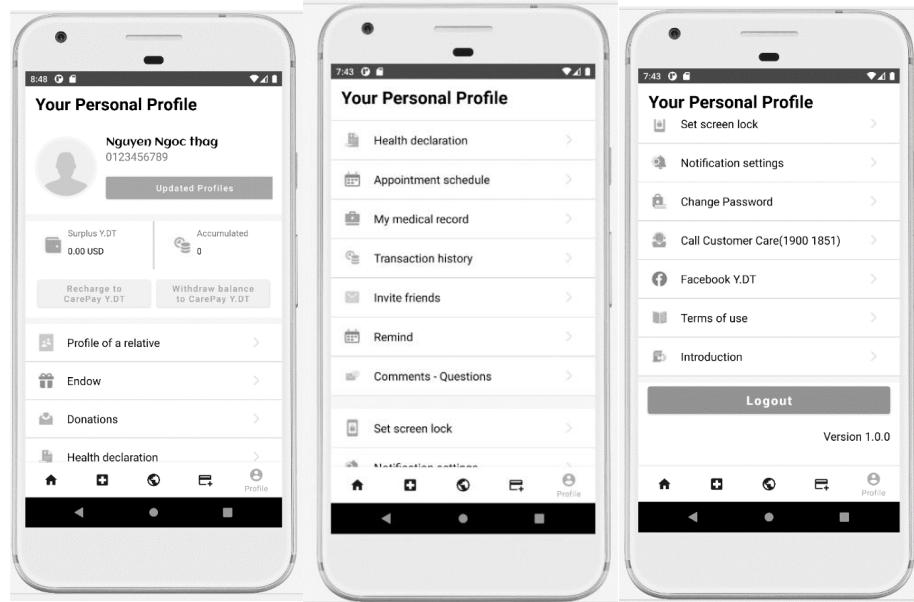
Figure 97: Doctor account diagram of admin.

Above is the Doctor account diagram to access Doctor account, users need to go to the home page and then go to Doctor account. Here users will see all their doctor. After clicking see the server will receive the command and select data from the database and return it to the user. In case of success the server will return a success message to the user in case of an error the server will also return a message to the user.

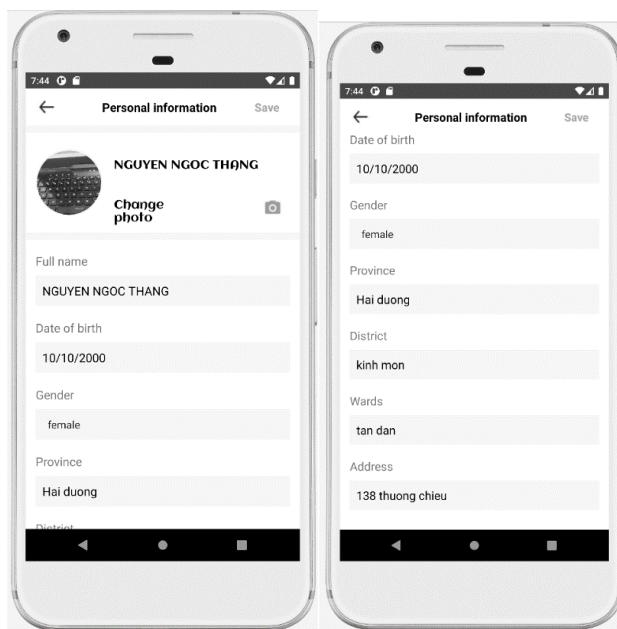
## 5. Wireframe

### 5.1 Patient

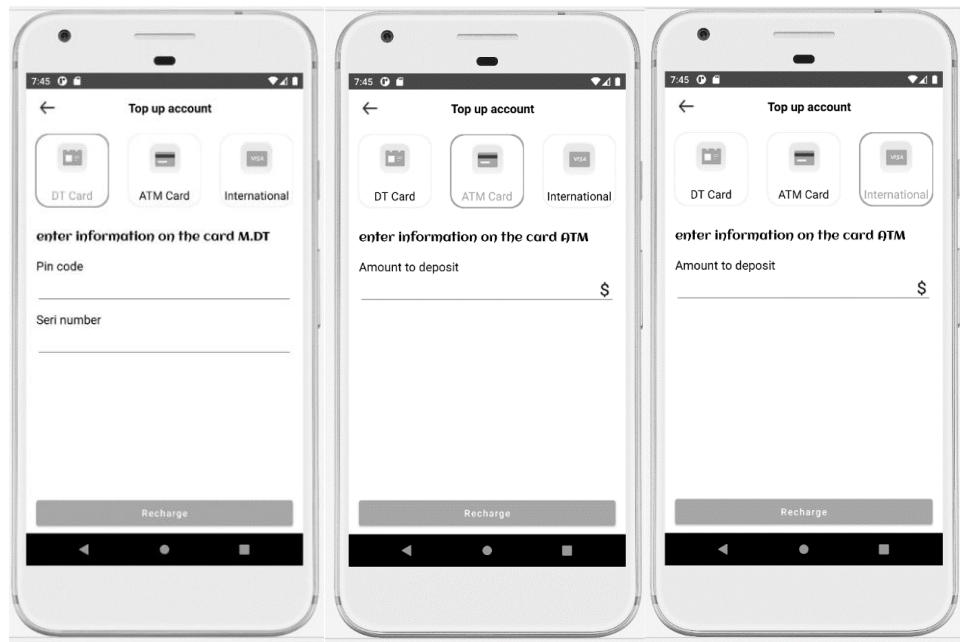
#### 5.1.1 Profile page



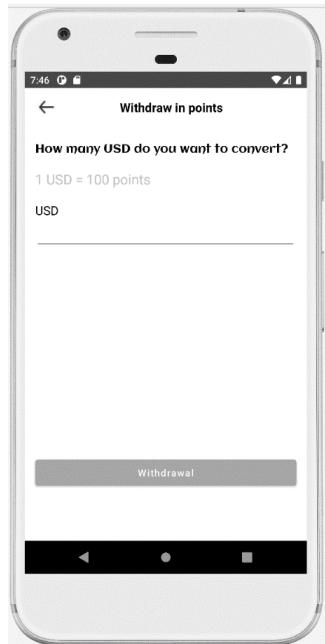
**When user click on update**



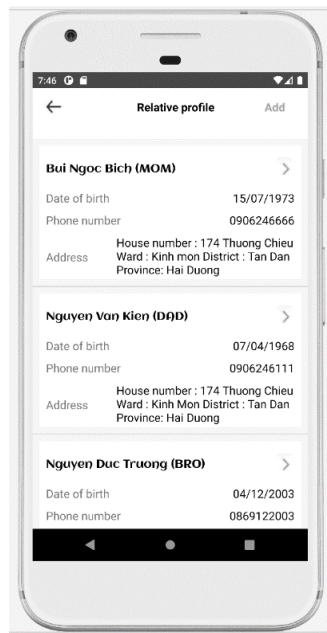
**When user click recharge**



**When user click to points**



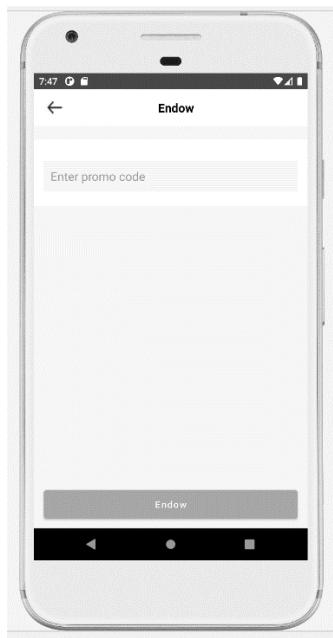
**When you user click relative**



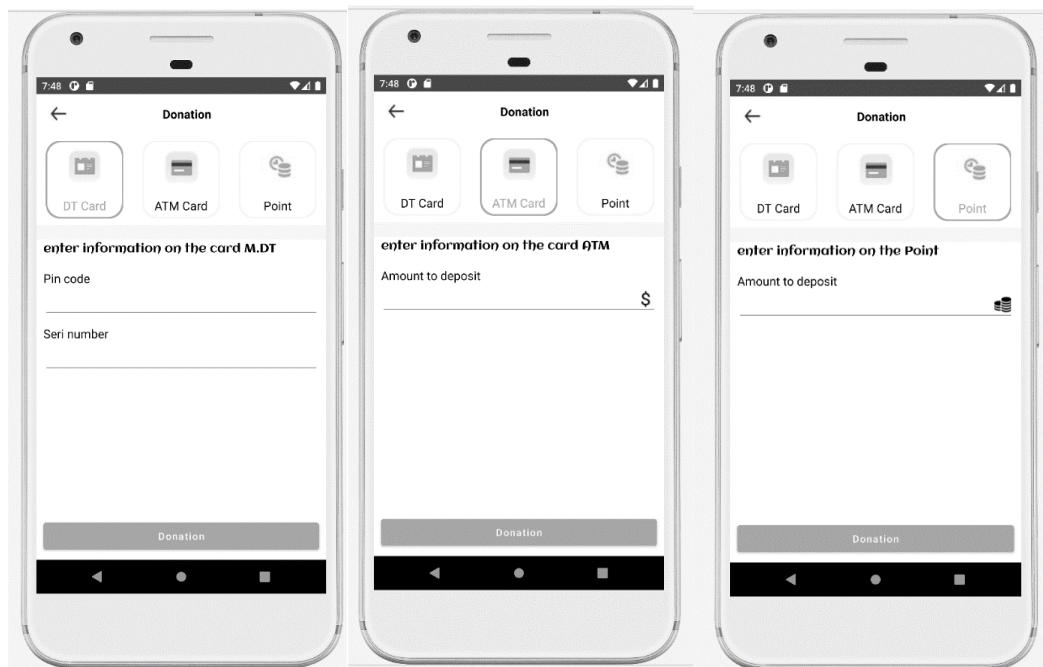
### When user click add in relative



### When use click endow



### When user click to donation



### When the user clicks on the medical declaration

**Health declaration**

Full name: NGUYEN NGOC THANG

Phone: 0938218666

Date of birth: 10/10/2000

Gender: female

Province: Hai duong

District: kinh mon

**Health declaration**

District: kinh mon

Wards: tan dan

Address: 138 thuong chieu

Have you had any of the following symptoms in the past 14 days?

signal	yes	no
Fever	<input type="radio"/>	<input checked="" type="radio"/>
Cough	<input type="radio"/>	<input checked="" type="radio"/>
Sore throat	<input type="radio"/>	<input checked="" type="radio"/>

**Health declaration**

signal	yes	no
Fever	<input type="radio"/>	<input checked="" type="radio"/>
Cough	<input type="radio"/>	<input checked="" type="radio"/>
Sore throat	<input type="radio"/>	<input checked="" type="radio"/>

**During the past**

**Epidemiological factors**

Epidemiological factors	yes	no
1. Are you suffering from COVID-19?	<input type="radio"/>	<input checked="" type="radio"/>

**Health declaration**

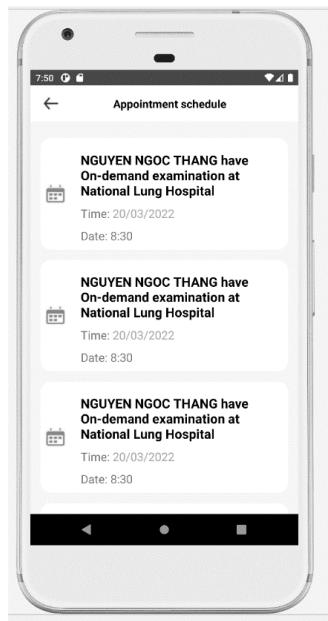
Epidemiological factors	yes	no
1. Are you suffering from COVID-19?	<input type="radio"/>	<input checked="" type="radio"/>
2. Close contact with an infected or suspected COVID-19 case within the past 14 days.	<input type="radio"/>	<input checked="" type="radio"/>
3. Traveled from another country or territory within the last 14 days.	<input type="radio"/>	<input checked="" type="radio"/>
4. Have you finished the group quarantine within the past 14 days?	<input type="radio"/>	<input checked="" type="radio"/>
5. In the past 14 days, has anyone in your family/work had a fever or cough?	<input type="radio"/>	<input checked="" type="radio"/>
6. Have you been discharged from hospital due to treatment for COVID-19 within the past 14 days?	<input type="radio"/>	<input checked="" type="radio"/>

**Health declaration**

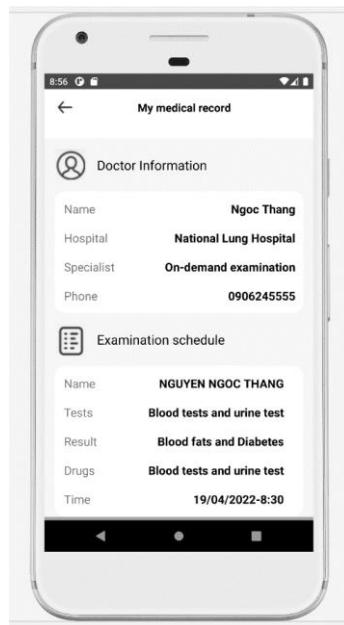
Epidemiological factors	yes	no
2. Close contact with an infected or suspected COVID-19 case within the past 14 days.	<input type="radio"/>	<input checked="" type="radio"/>
3. Traveled from another country or territory within the last 14 days.	<input type="radio"/>	<input checked="" type="radio"/>
4. Have you finished the group quarantine within the past 14 days?	<input type="radio"/>	<input checked="" type="radio"/>
5. In the past 14 days, has anyone in your family/work had a fever or cough?	<input type="radio"/>	<input checked="" type="radio"/>
6. Have you been discharged from hospital due to treatment for COVID-19 within the past 14 days?	<input type="radio"/>	<input checked="" type="radio"/>

Send

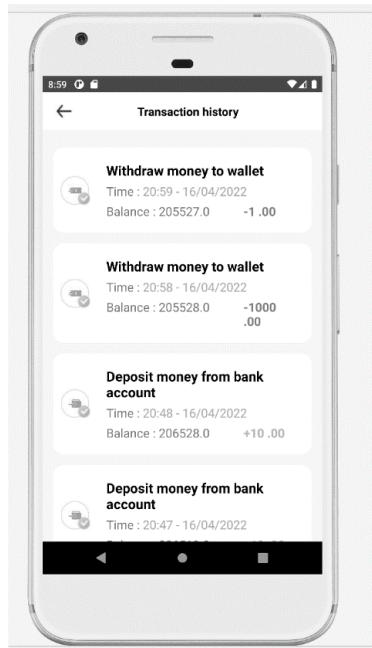
**When the user clicks to see the appointment**



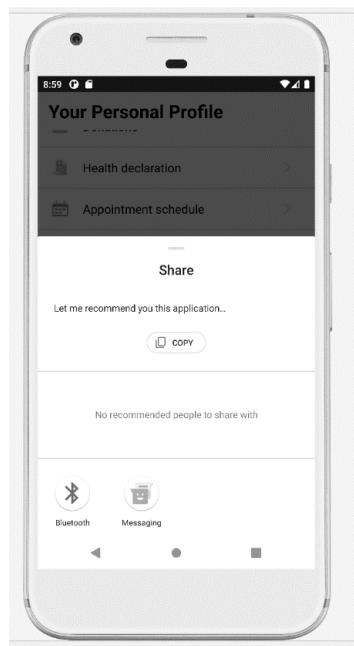
### When the user clicks to see my medical record



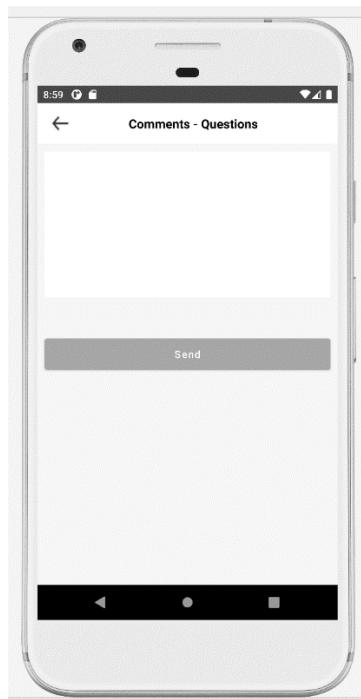
### When the user clicks to see the history



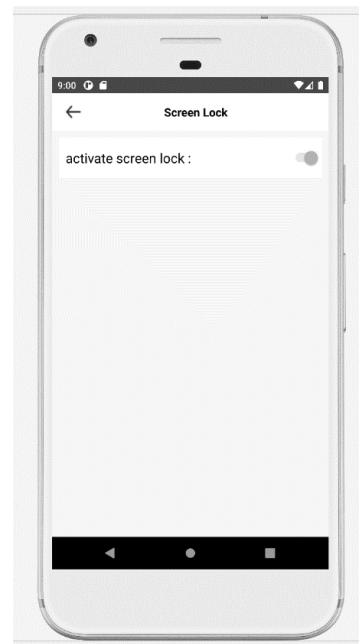
### When the user clicks invite friends



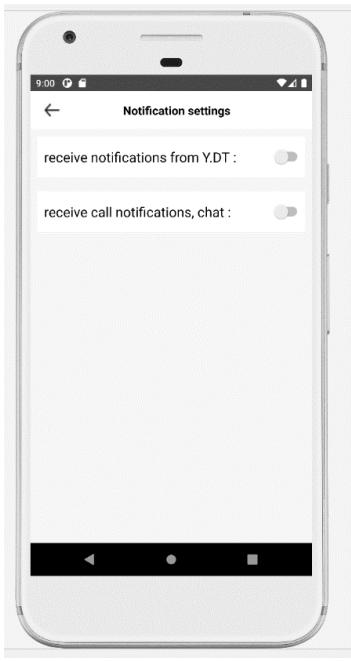
### When the user clicks contribute



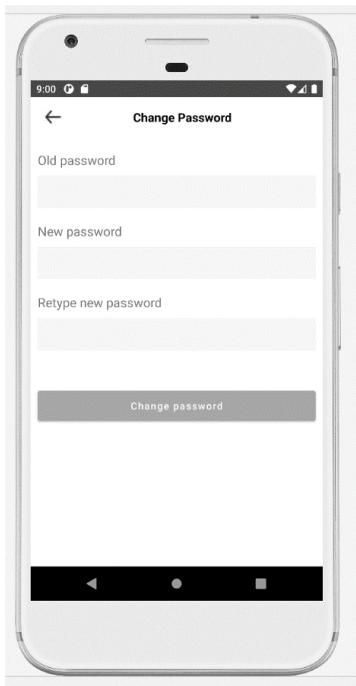
**When the user clicks set lock**



**When the user clicks set notification**



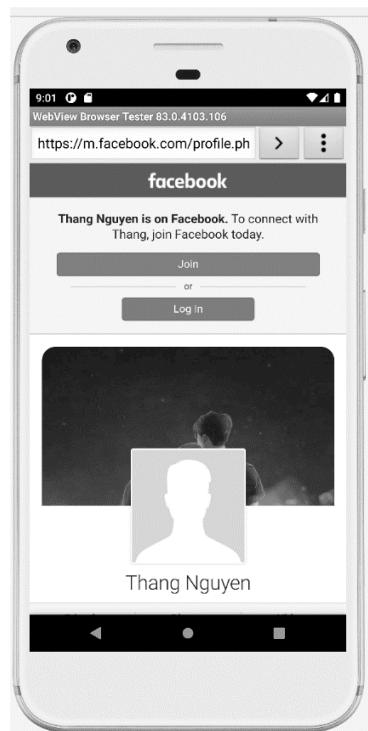
**When the user clicks change password**



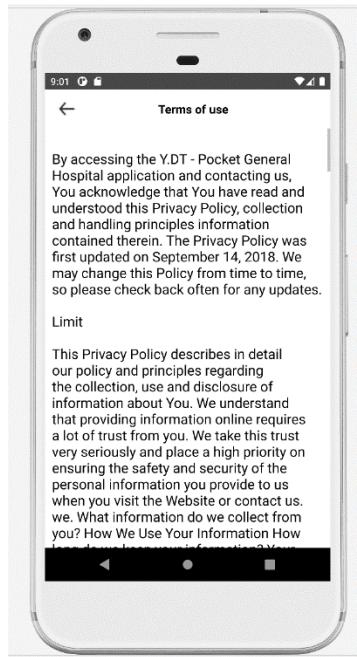
## When the user clicks to call the hotline



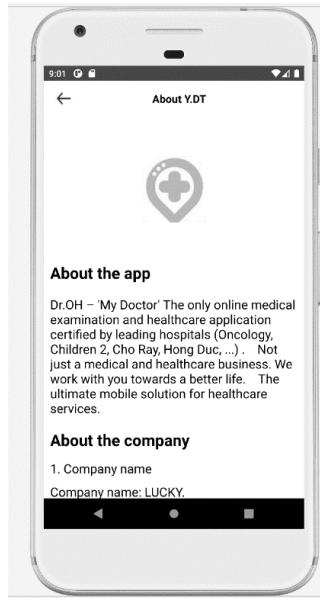
## When the user clicks to Facebook



## **When the user clicks to Terms of user**

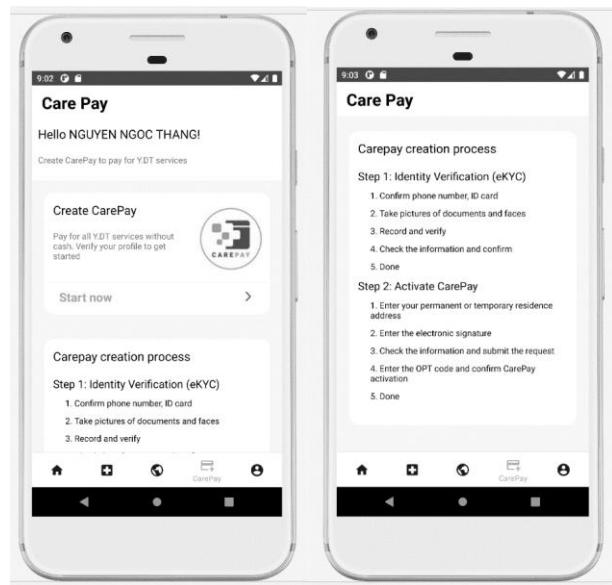


## **When the user clicks to Introduction**

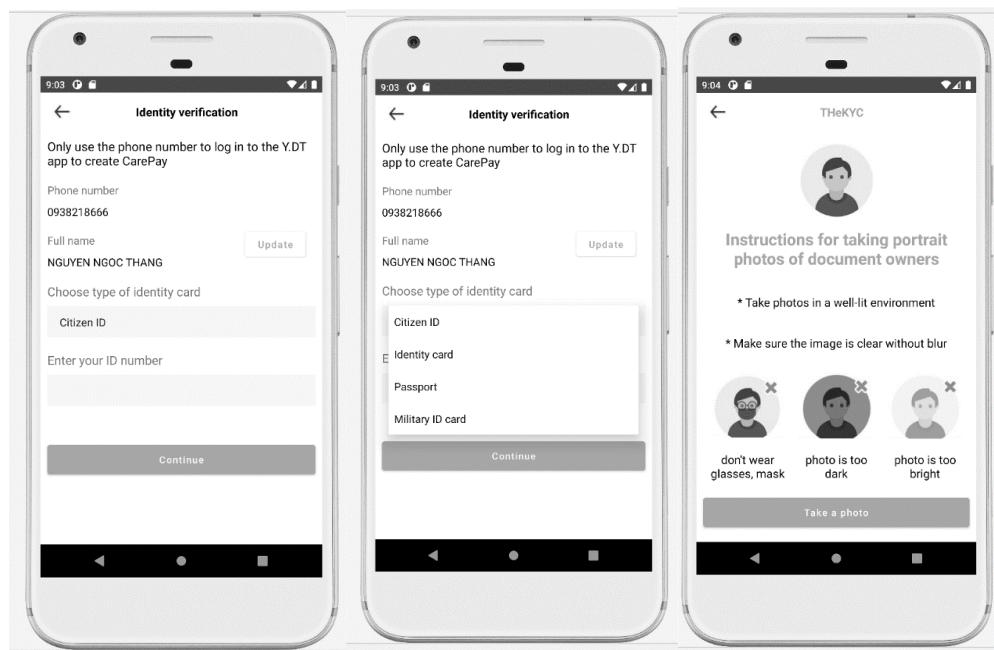


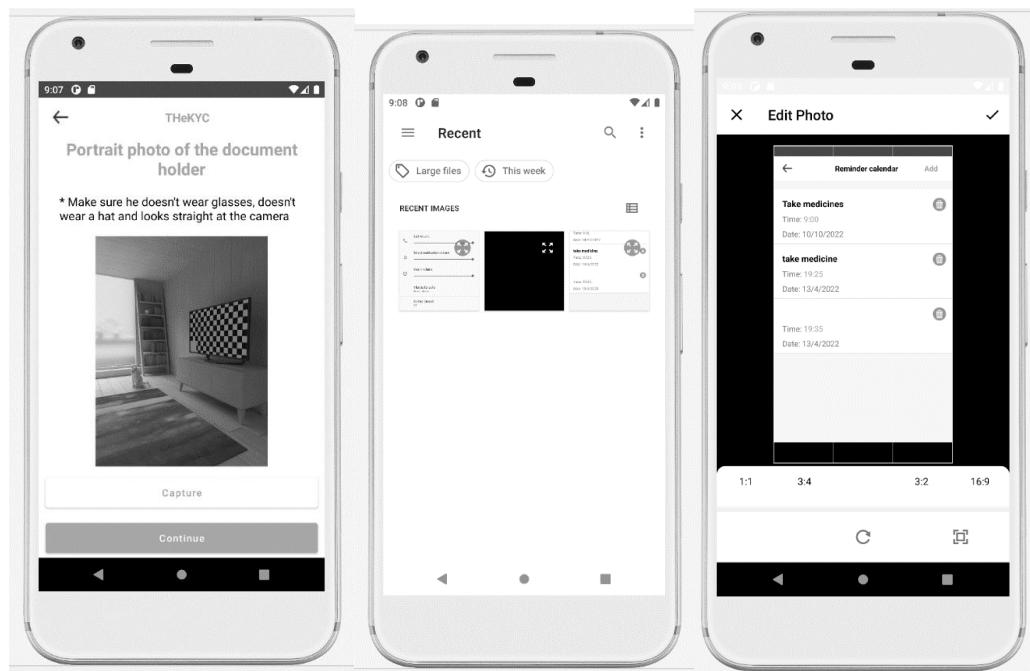
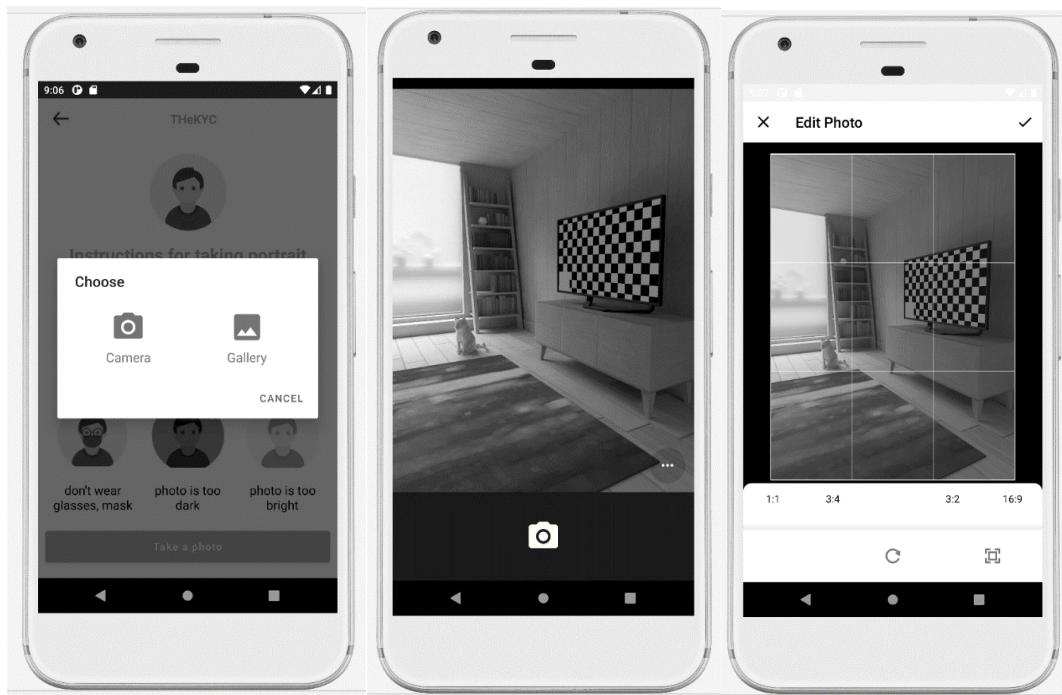
### **5.1.2 Carepay page**

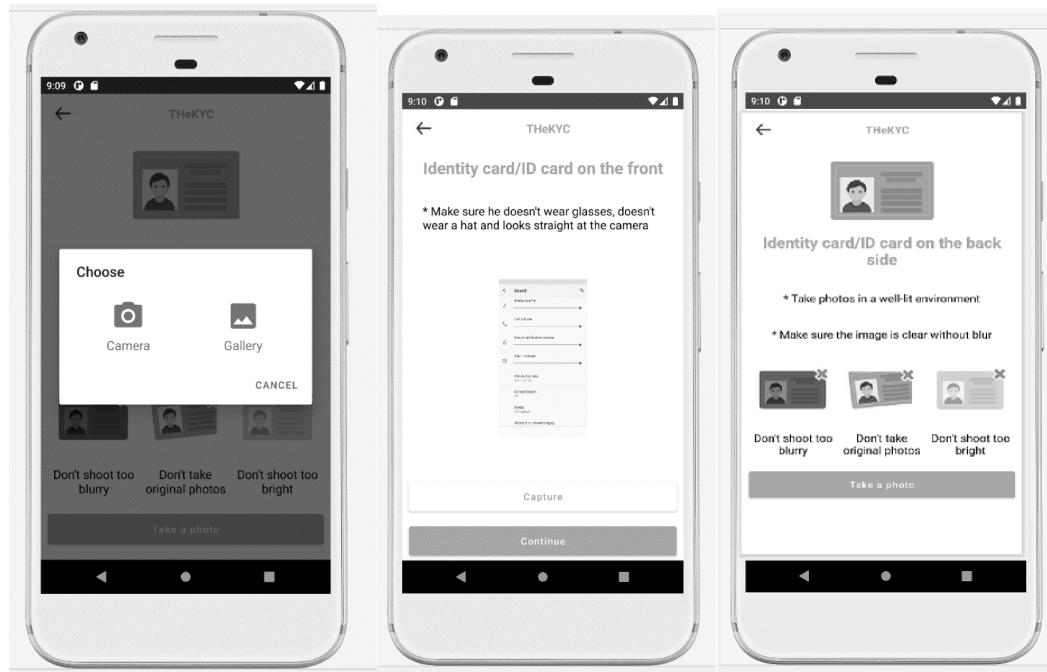
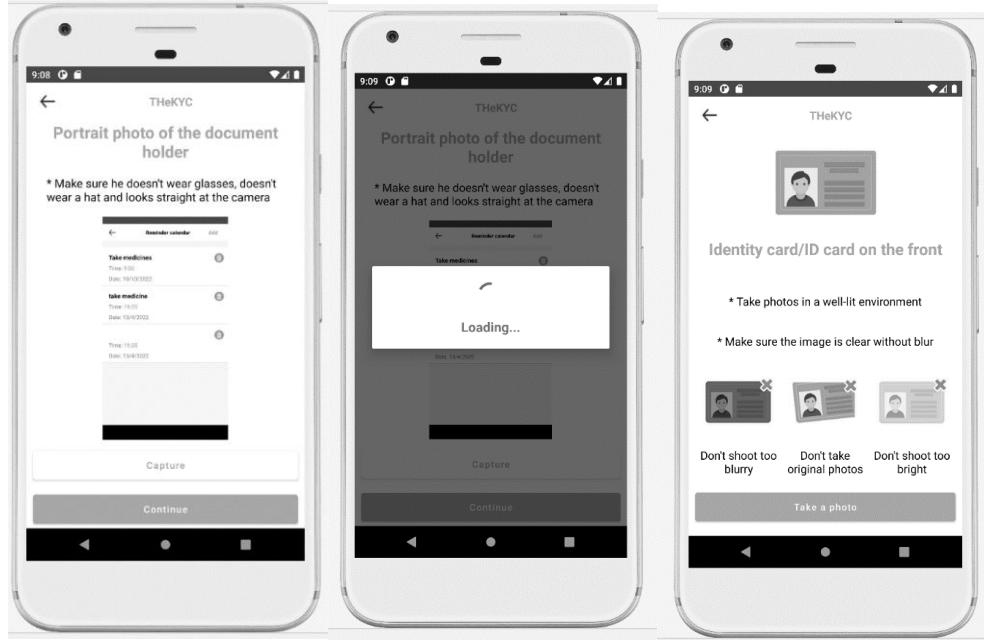
#### **When the user clicks Carpay if non activ**

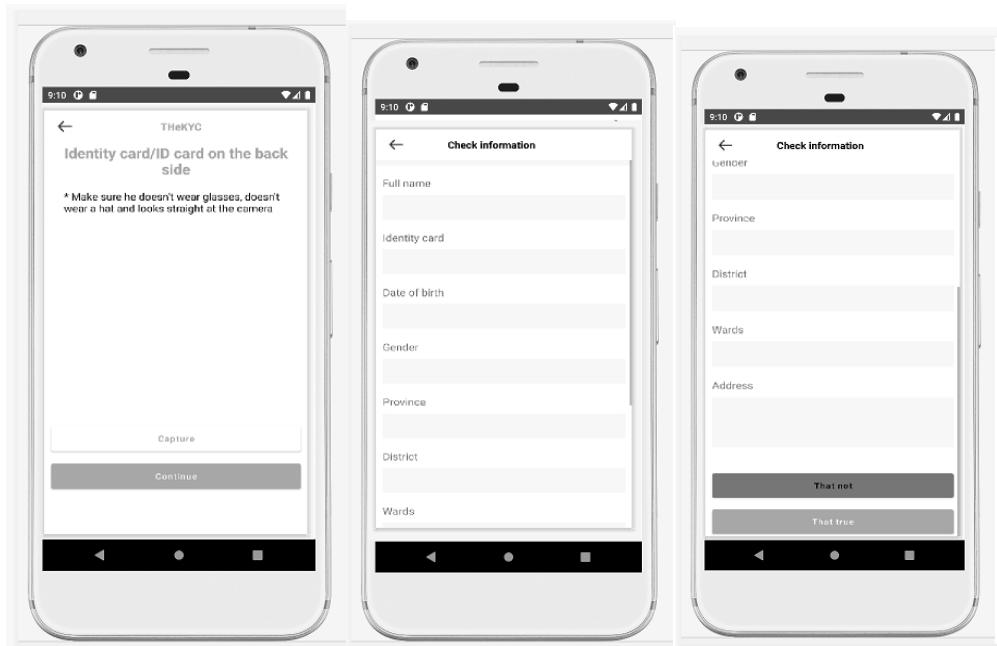


## When the user clicks to Start

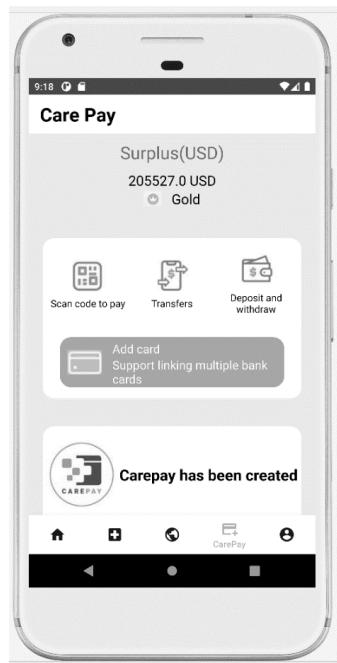








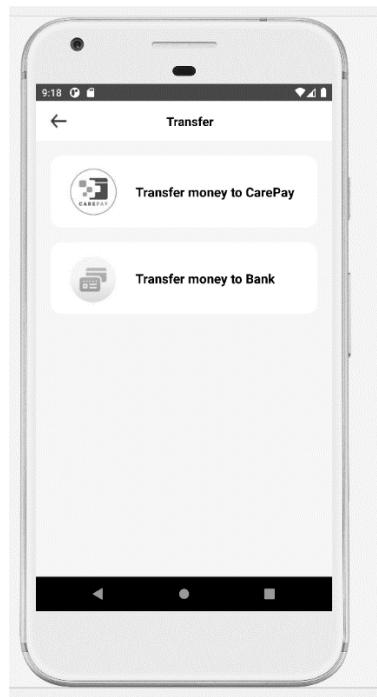
**When the user clicks to carepay if active**



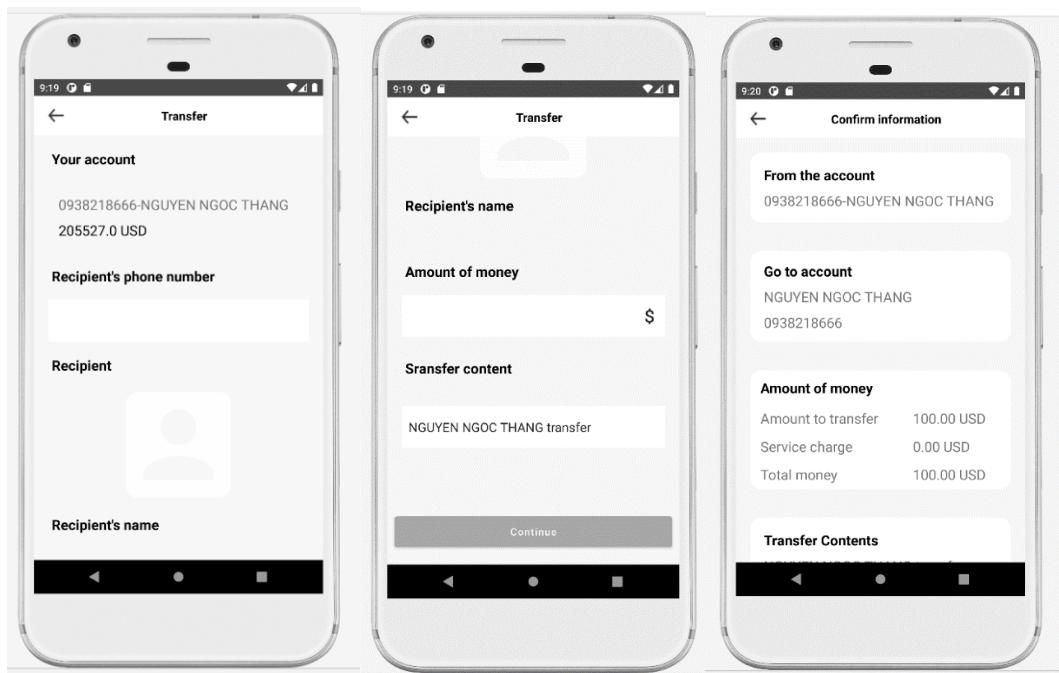
**When the user clicks to Scan**

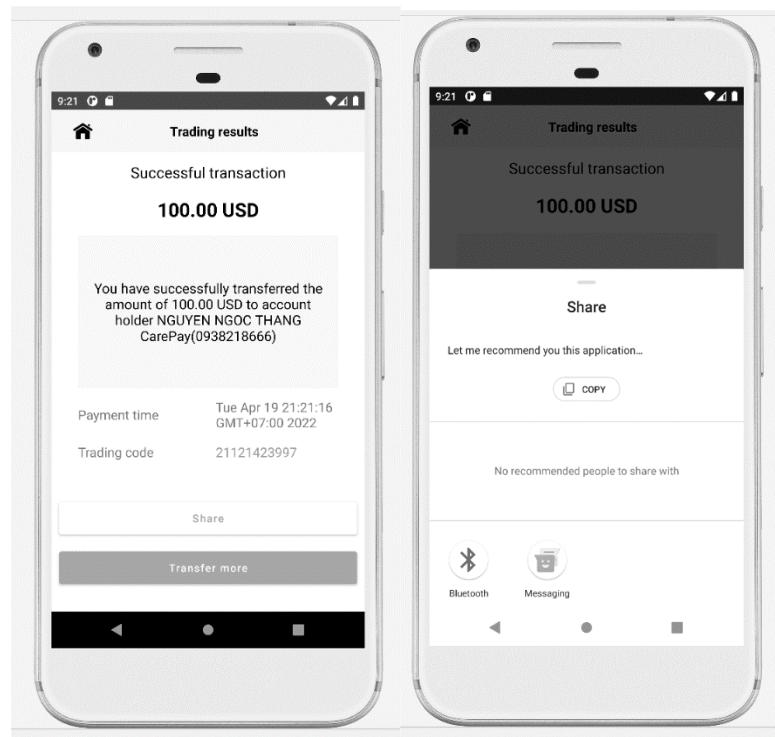
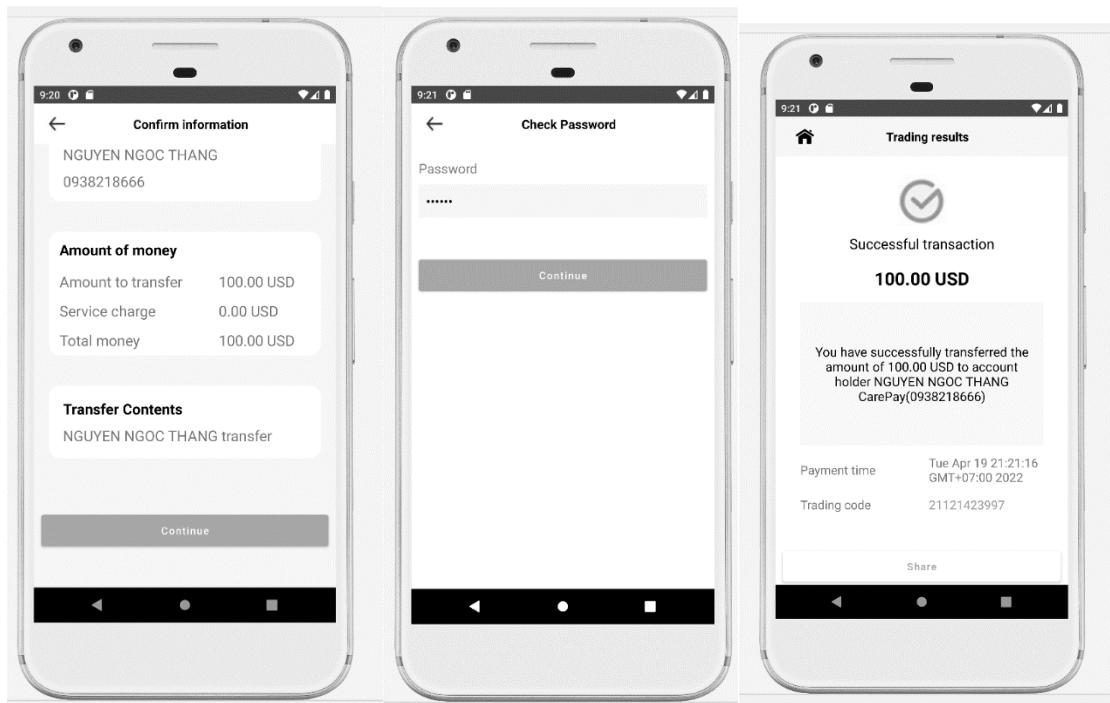


**When the user clicks to Transfer**

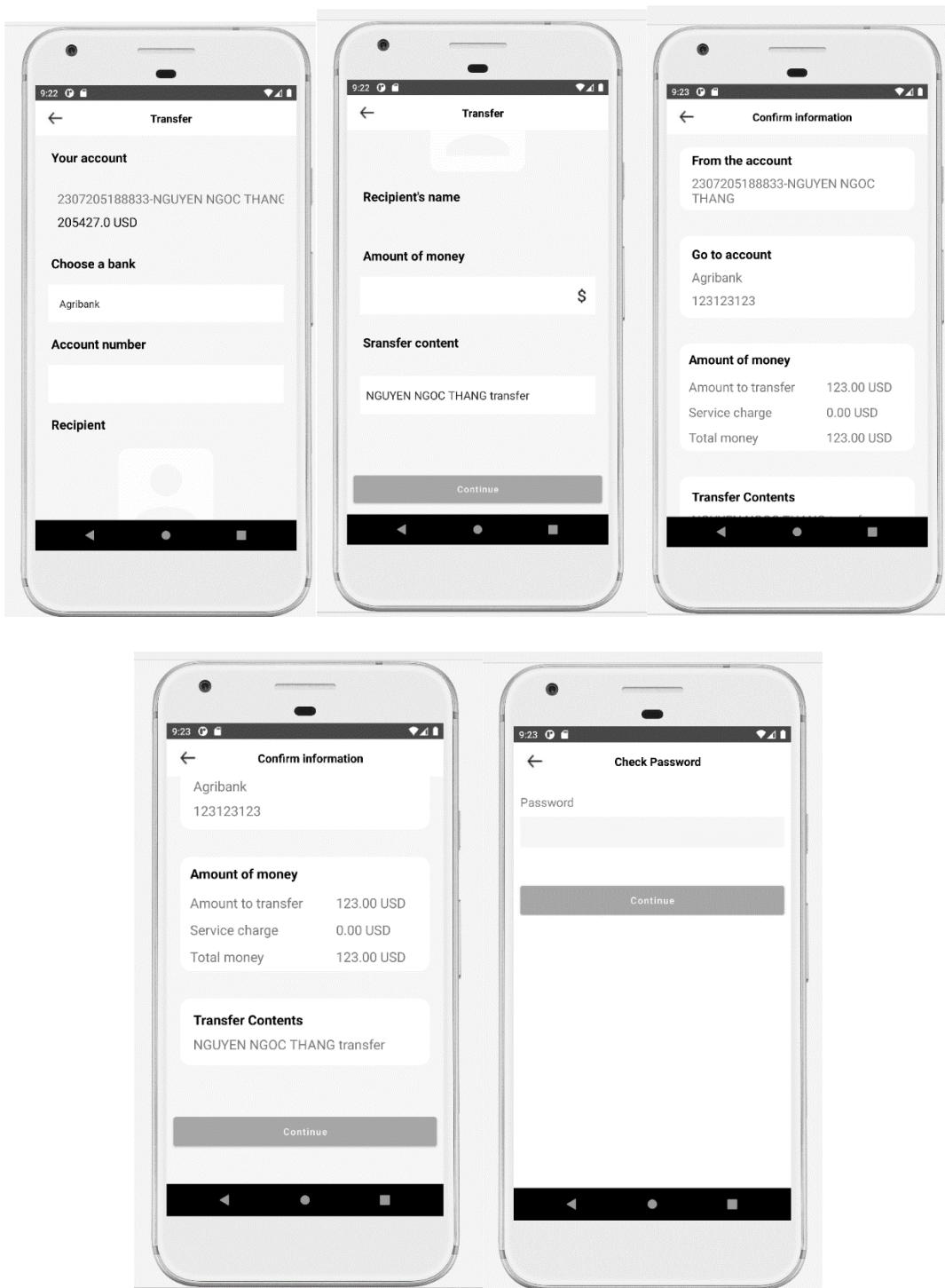


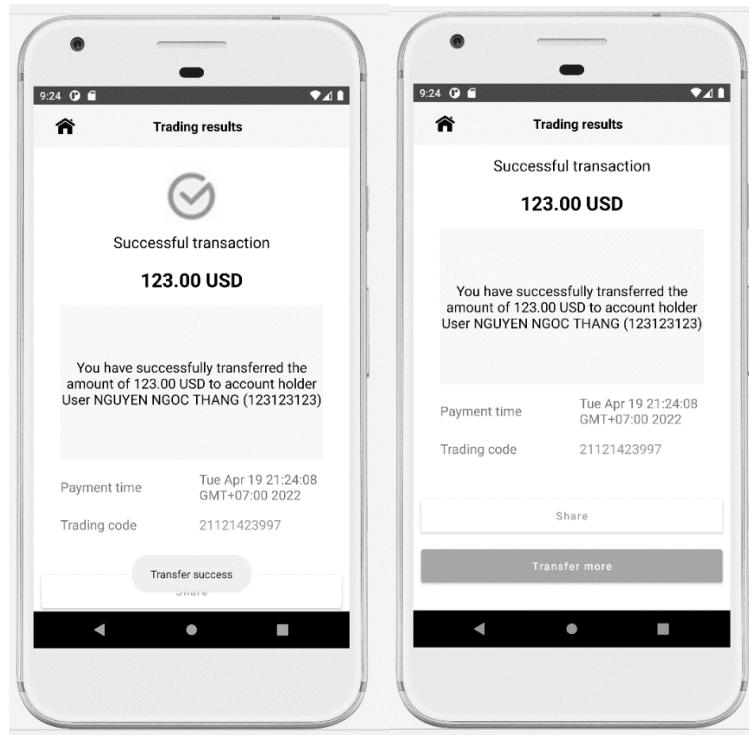
When the user clicks to Trasfer carepay



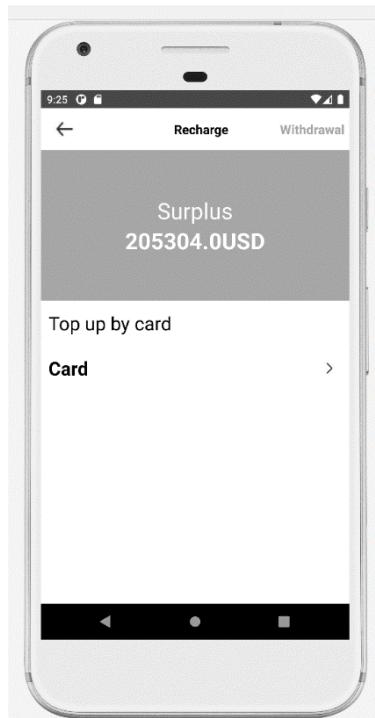


## When the user clicks to Transfer bank

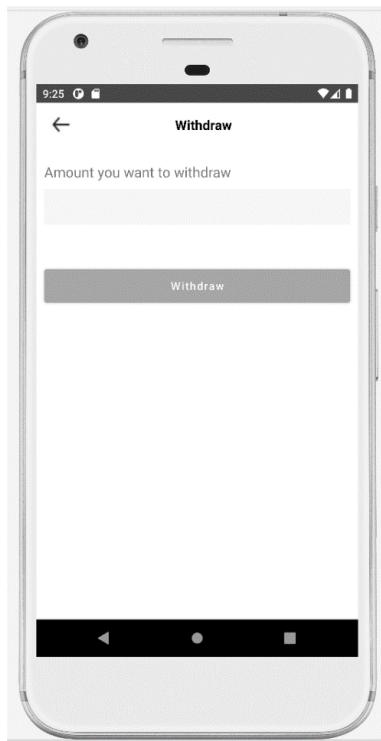




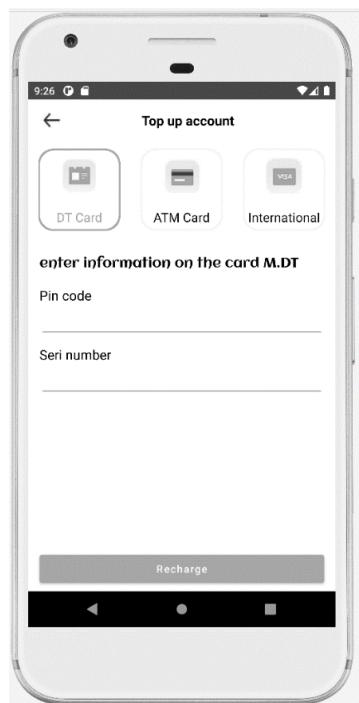
### When the user clicks to Recharge



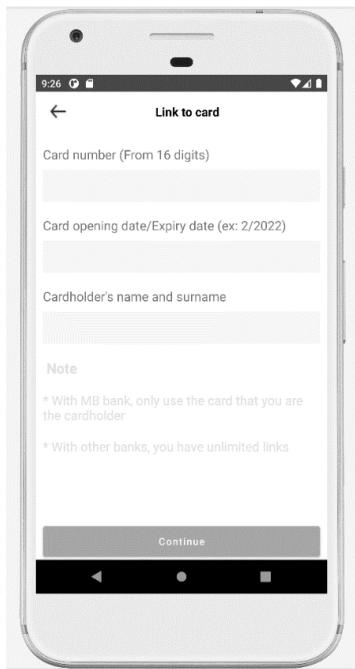
**When the user clicks to Withdraw**



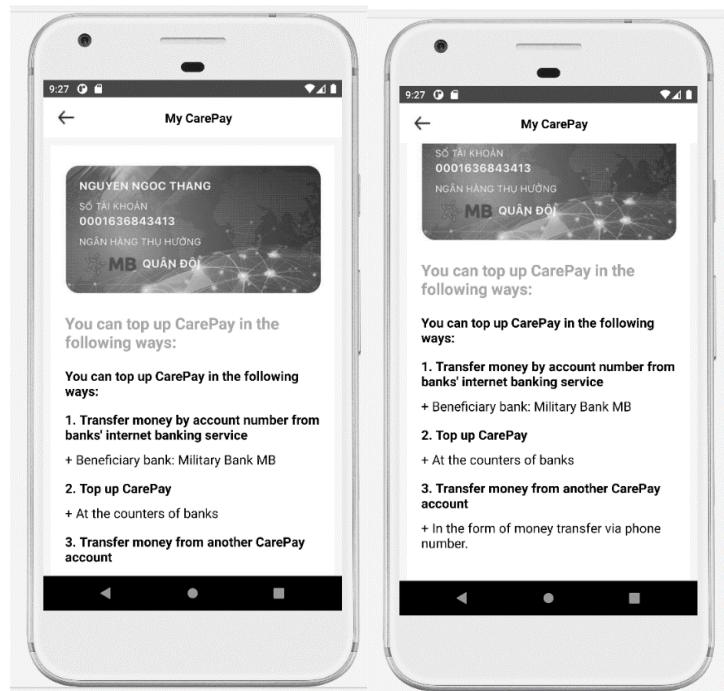
**When the user clicks to Top up go to Recharge**



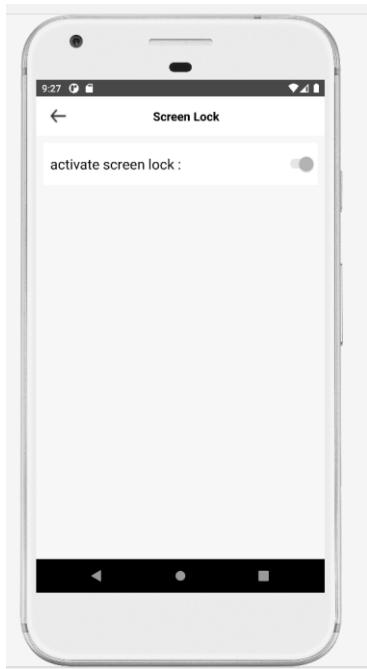
**When the user clicks to Add card**



## When the user clicks to Information card

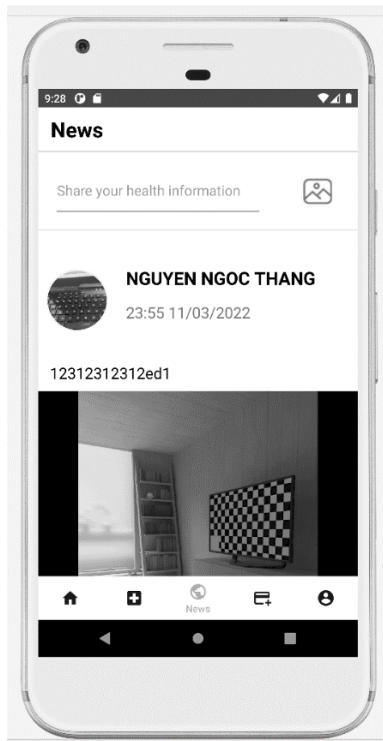


**When the user clicks to set lock**

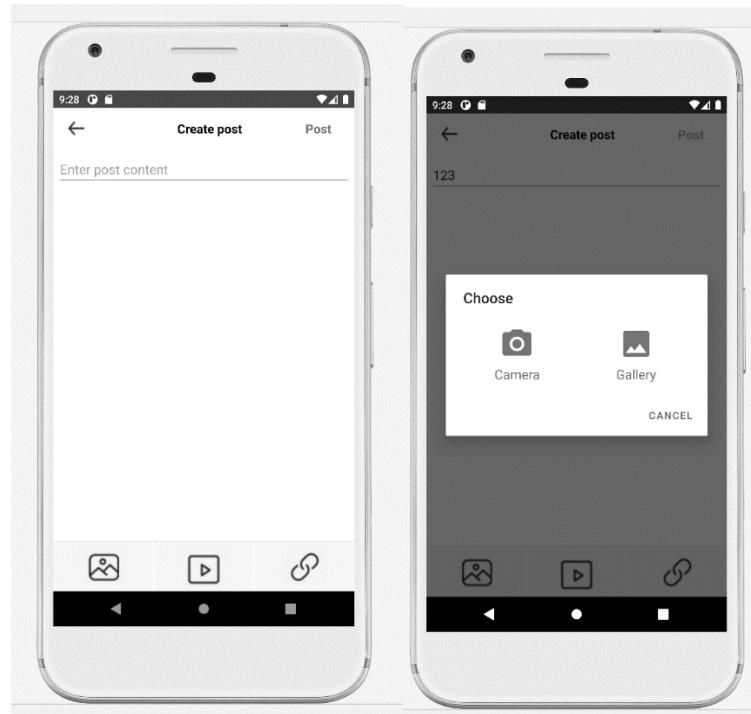


### 5.1.3 News page.

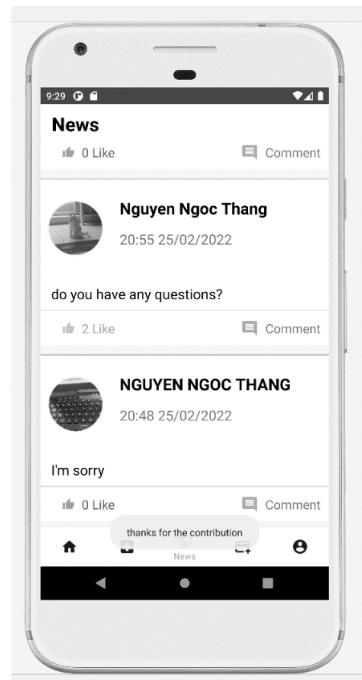
**When the user clicks to News**



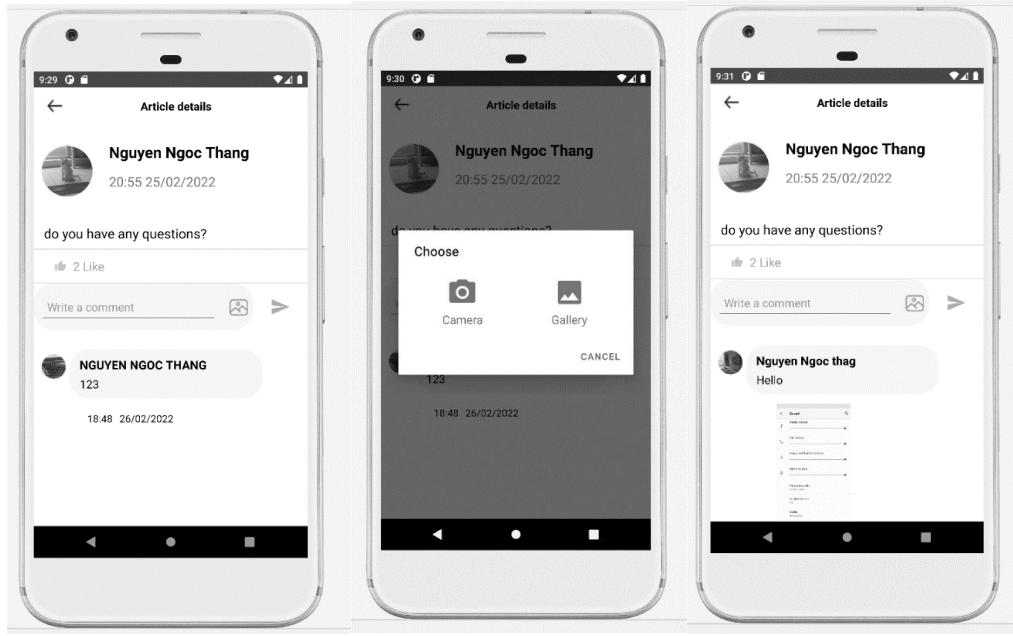
**When the user clicks to Post a new**



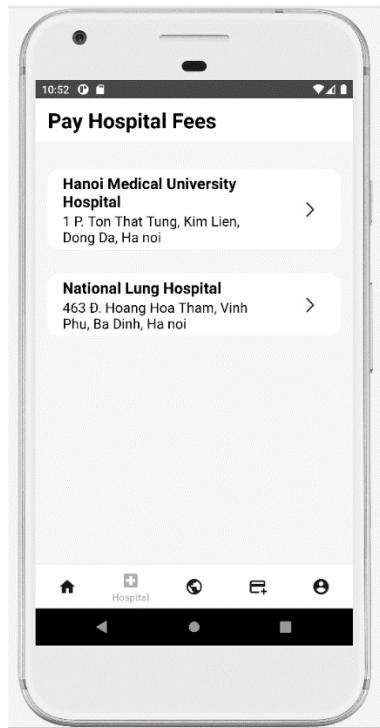
### When the user clicks to Like

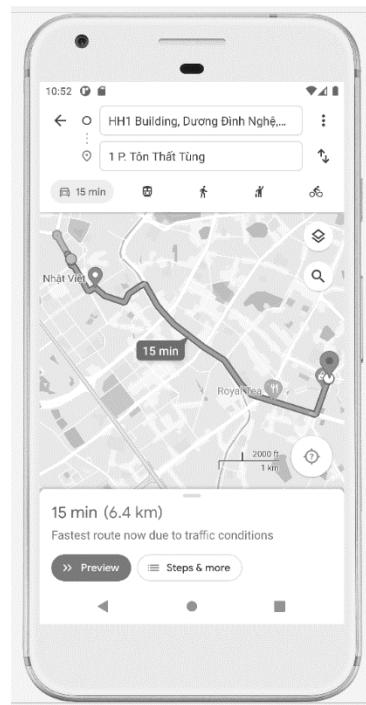


### When the user clicks to Comment

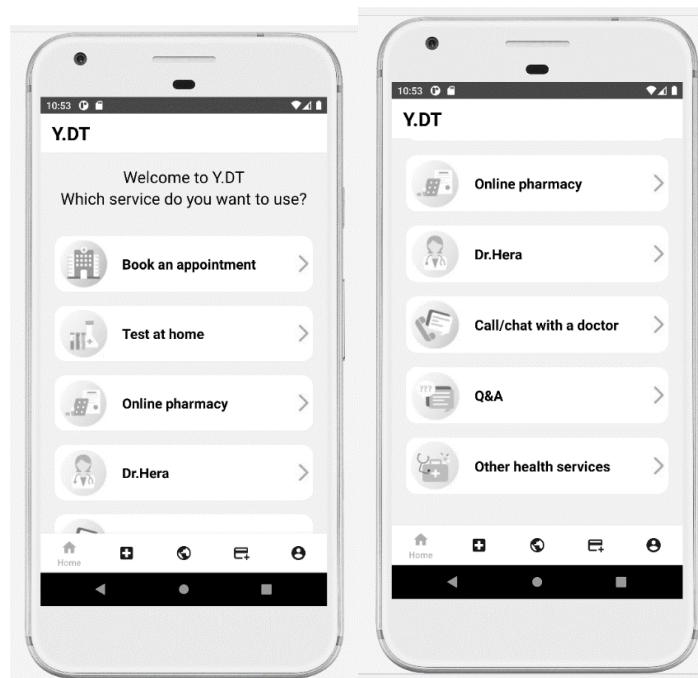


#### 5.1.4 Hospital page

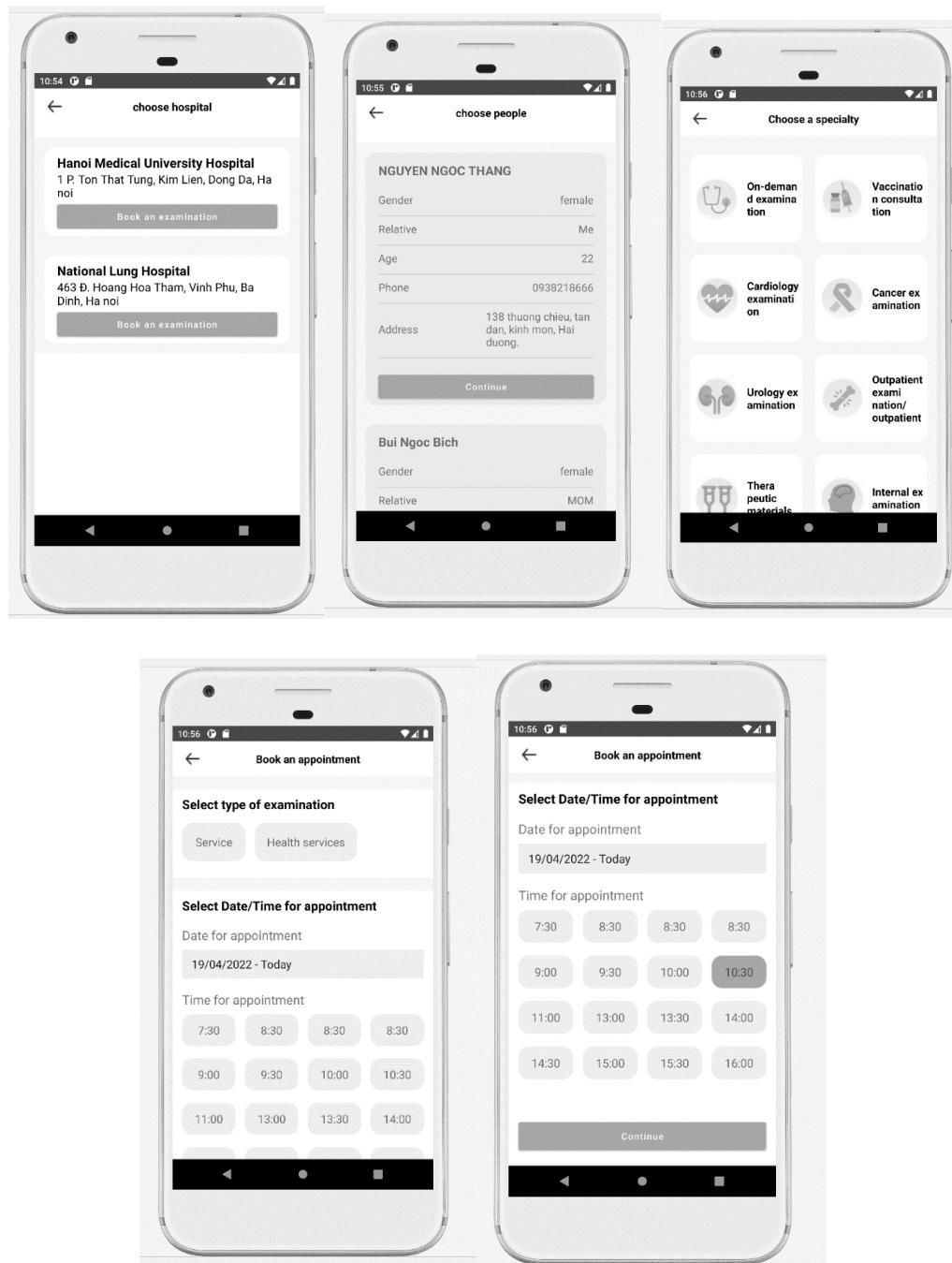


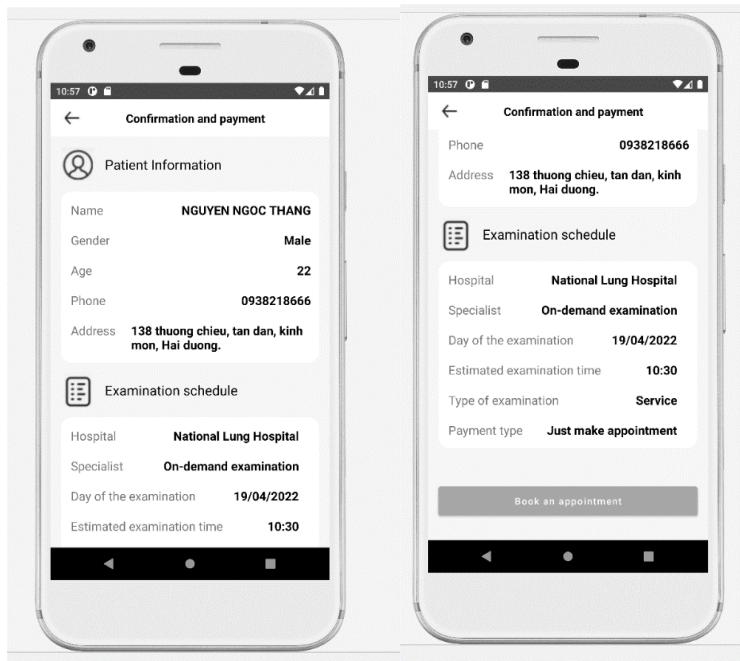


### 5.1.5 Home page

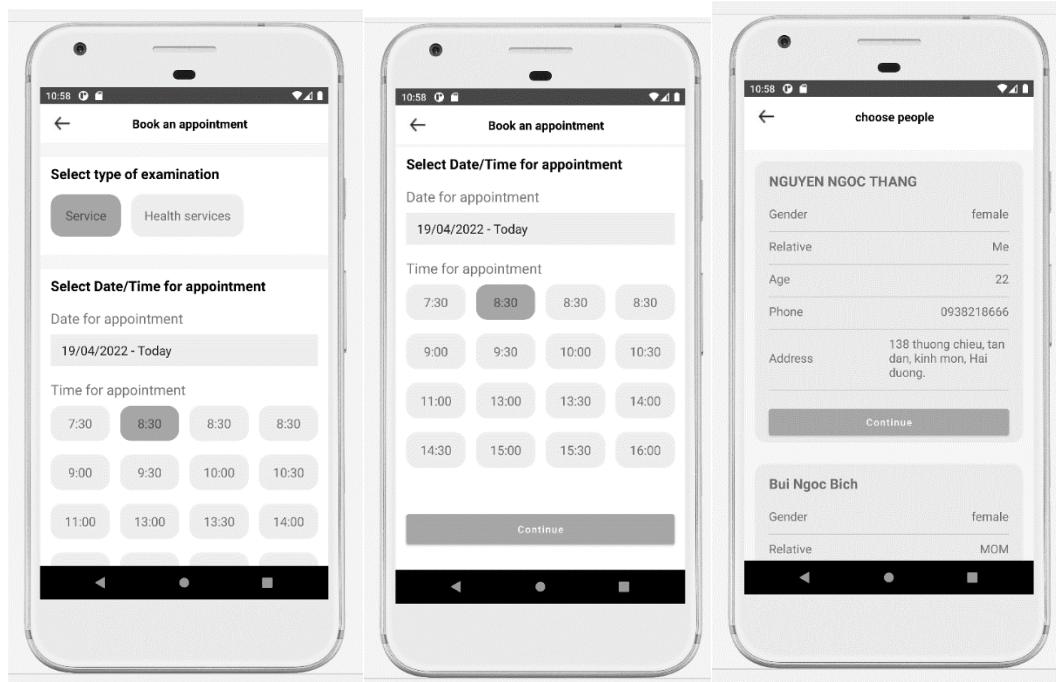


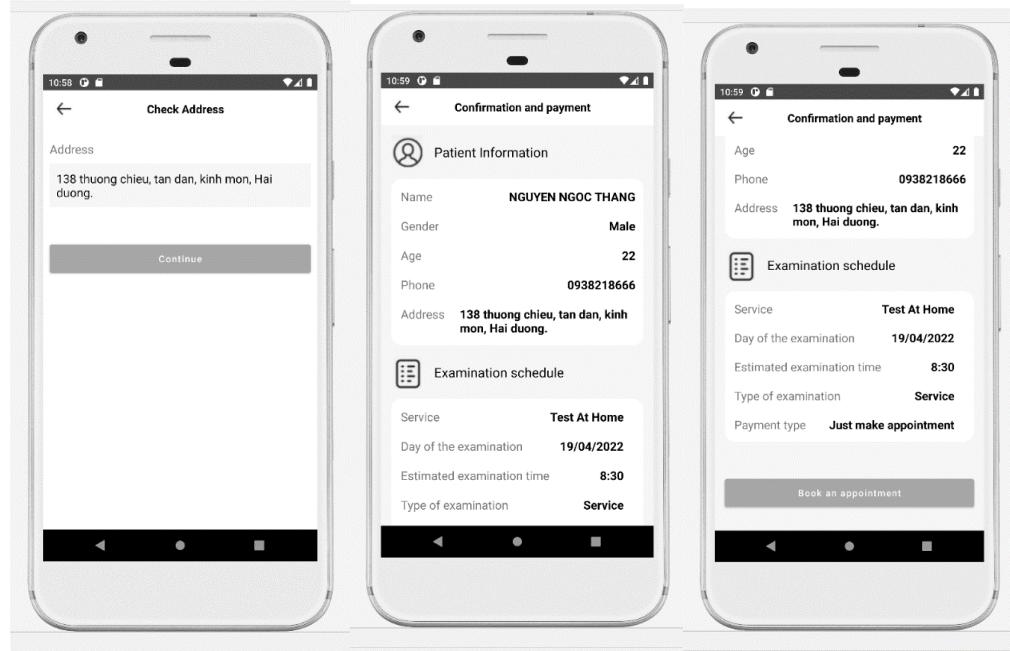
## When the user clicks to make an appointment



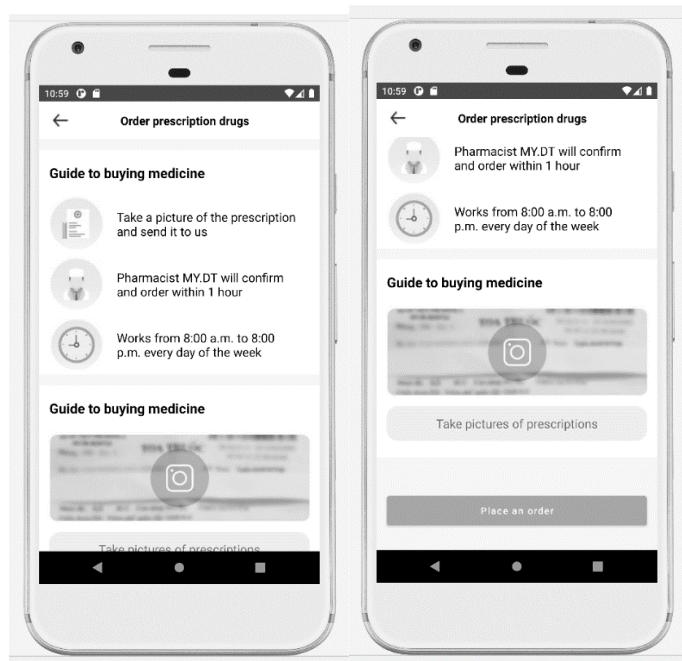


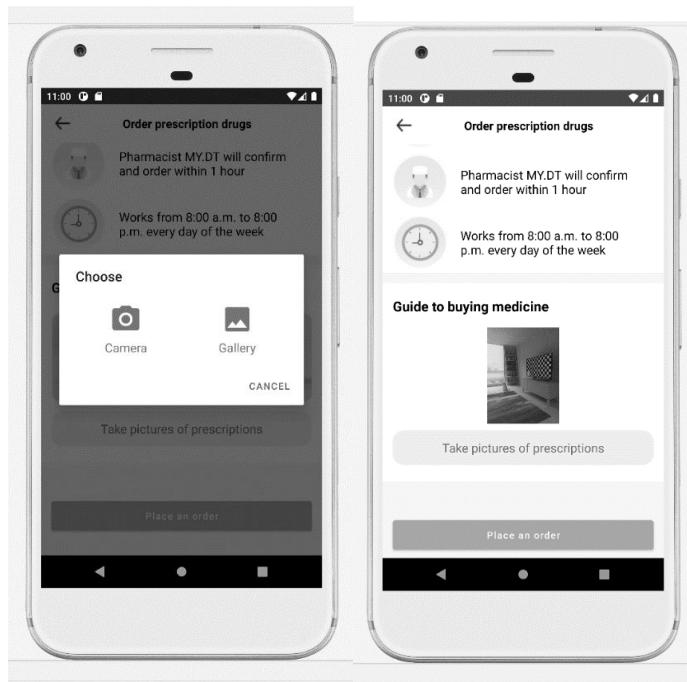
## When the user clicks to Test at home



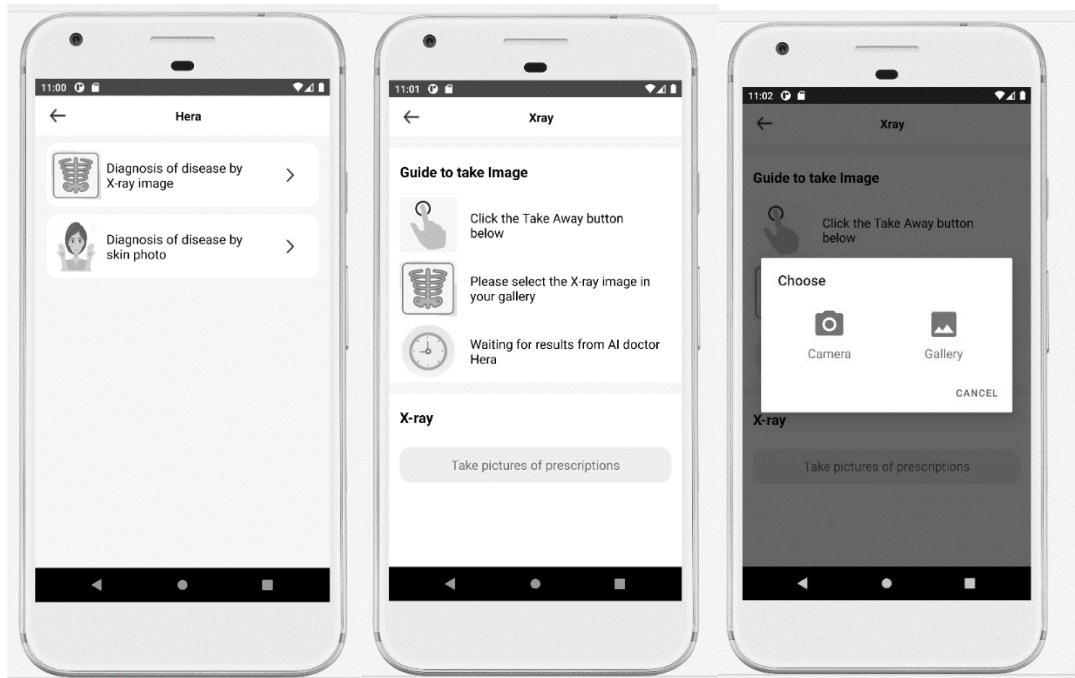


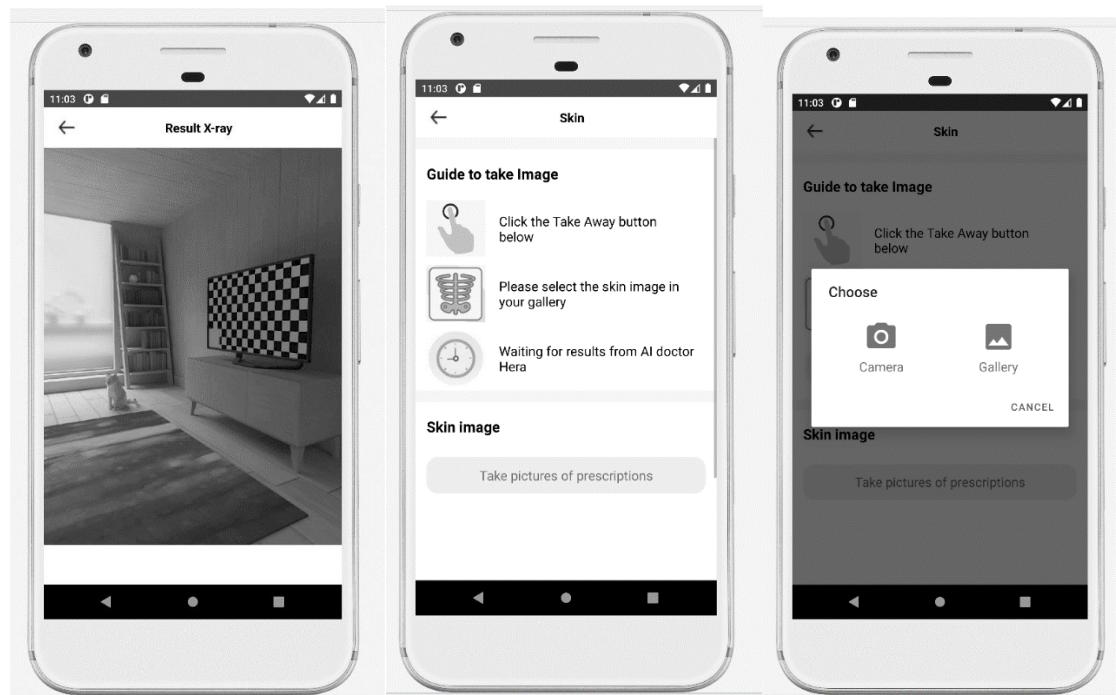
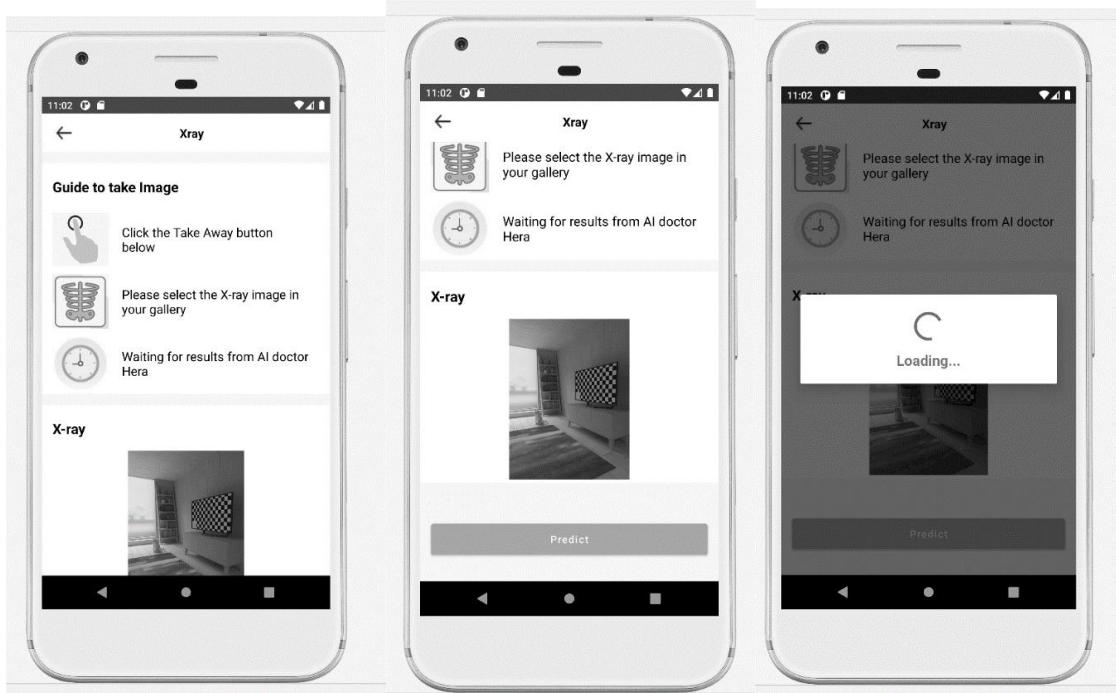
## When the user clicks to Online pharmacy

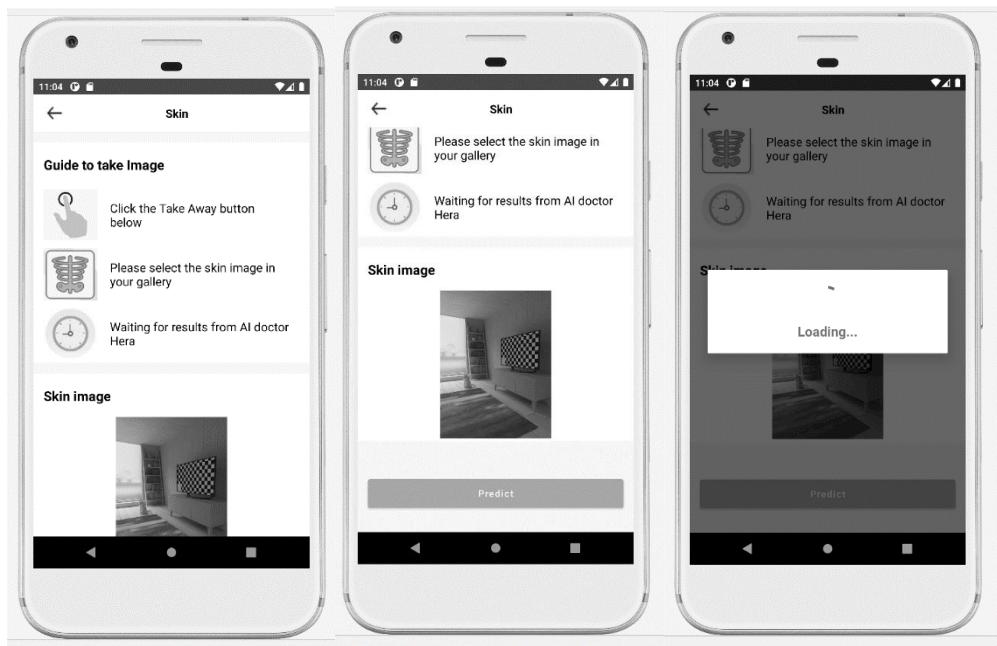




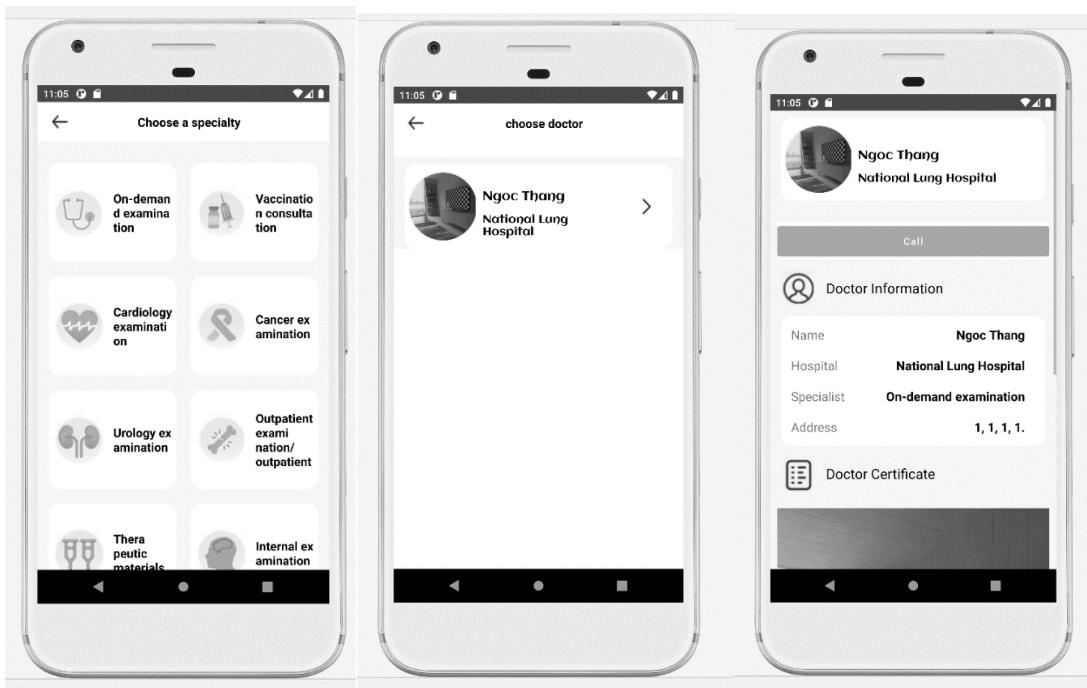
## When the user clicks to Doctor Hera

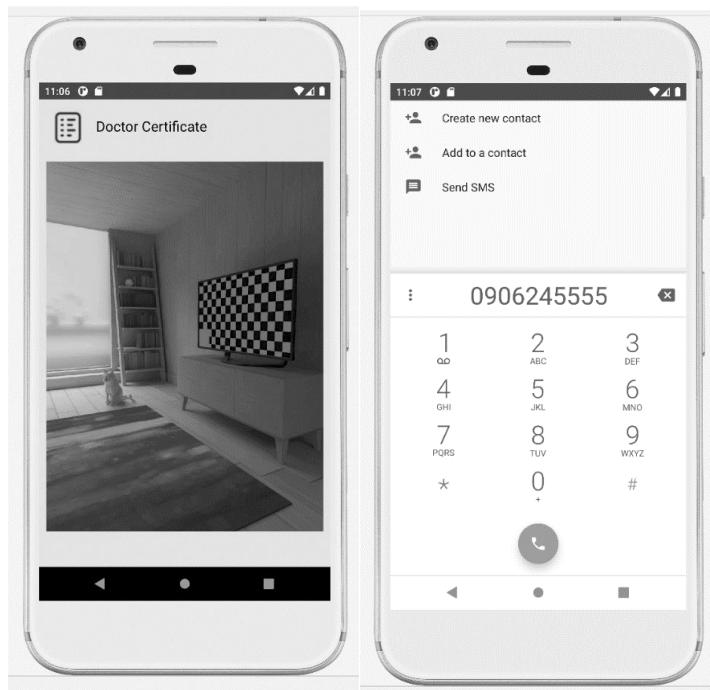




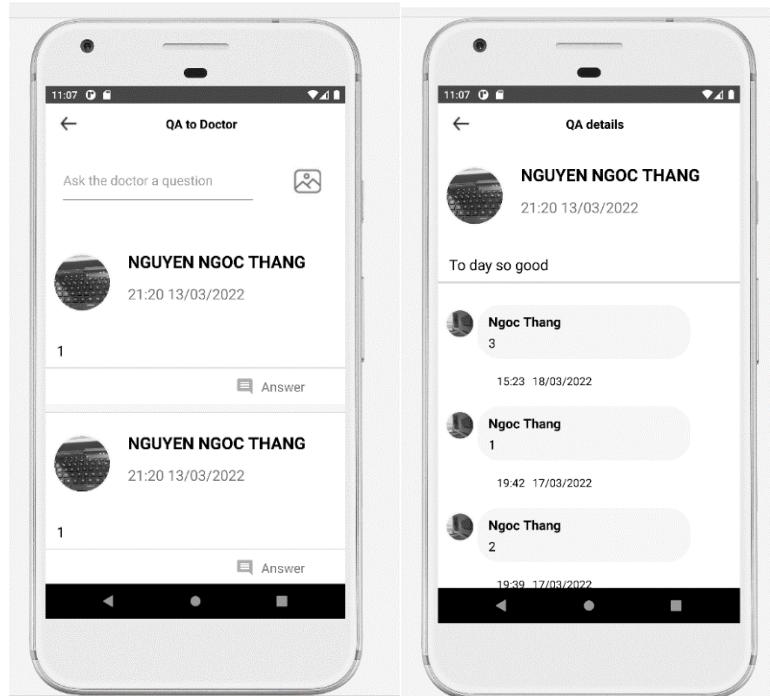


### When the user clicks to Call with doctor

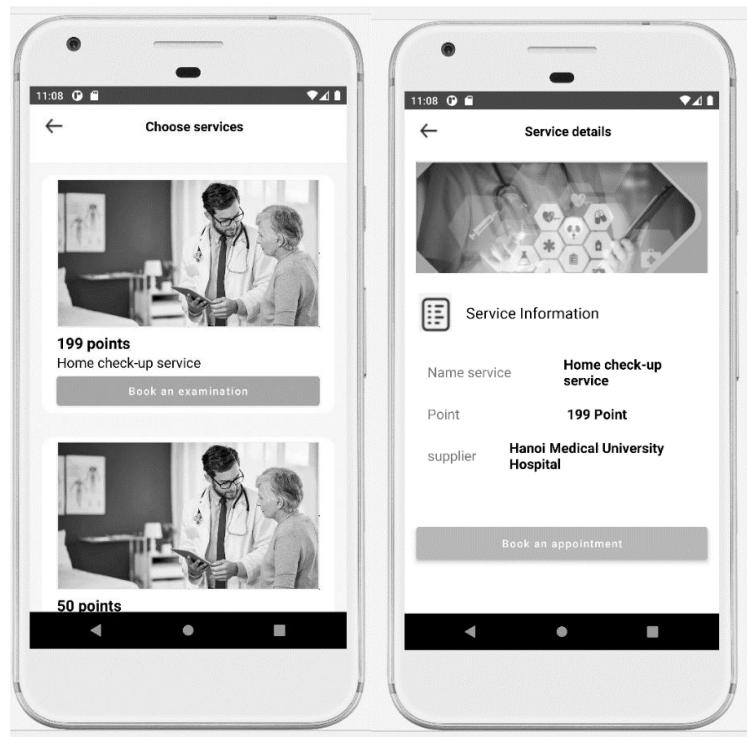




### When the user clicks to QA

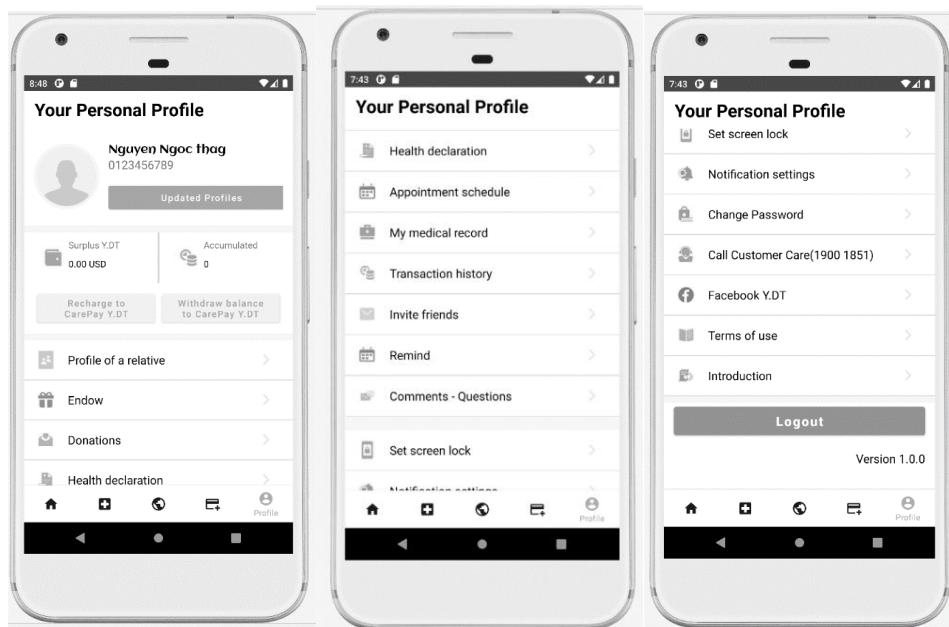


### When the user clicks to Service other

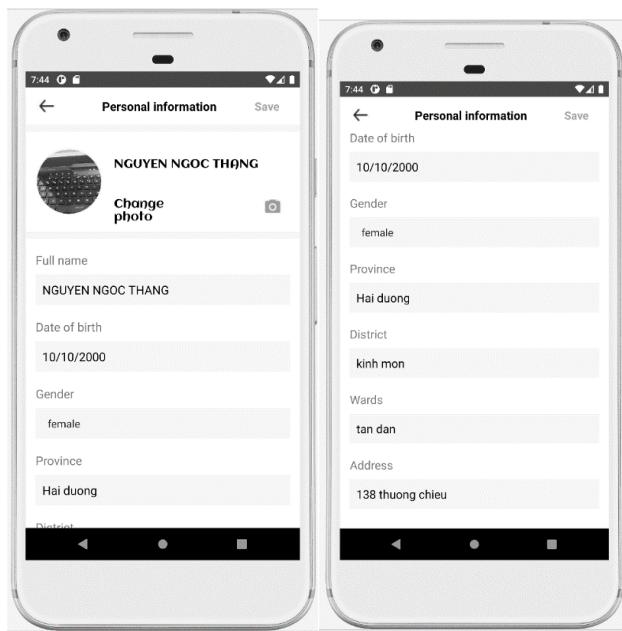


## 5.2 Doctor

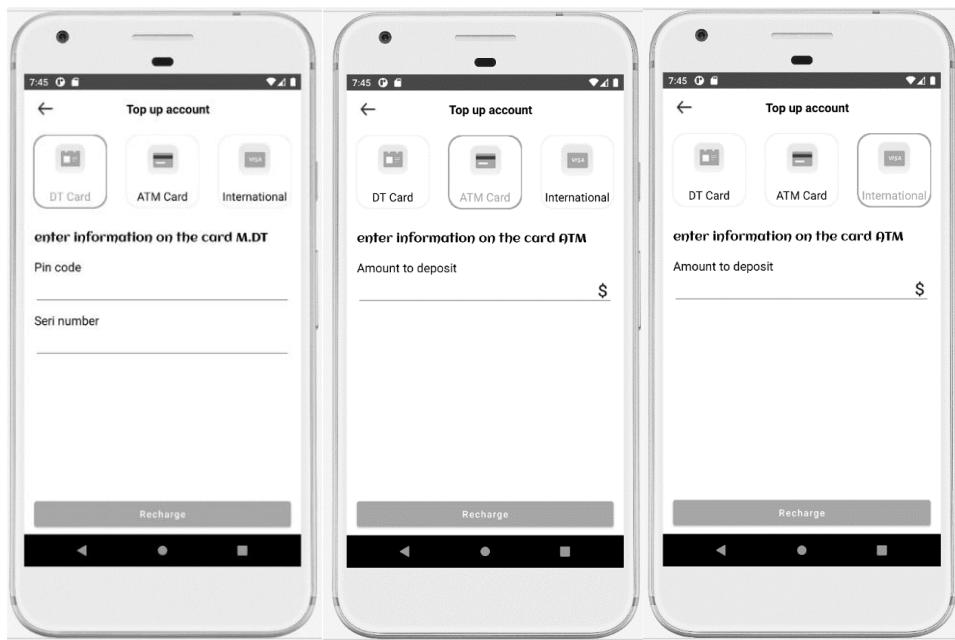
### 5.2.1 Profile page



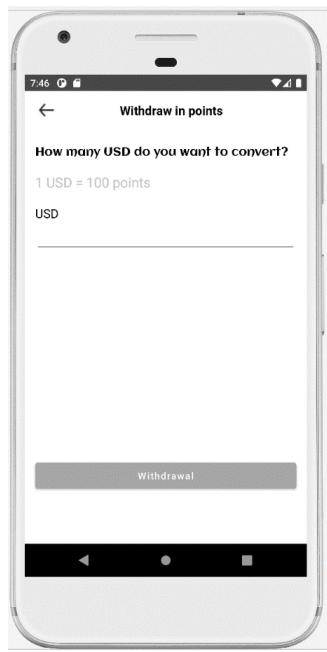
When user click on update



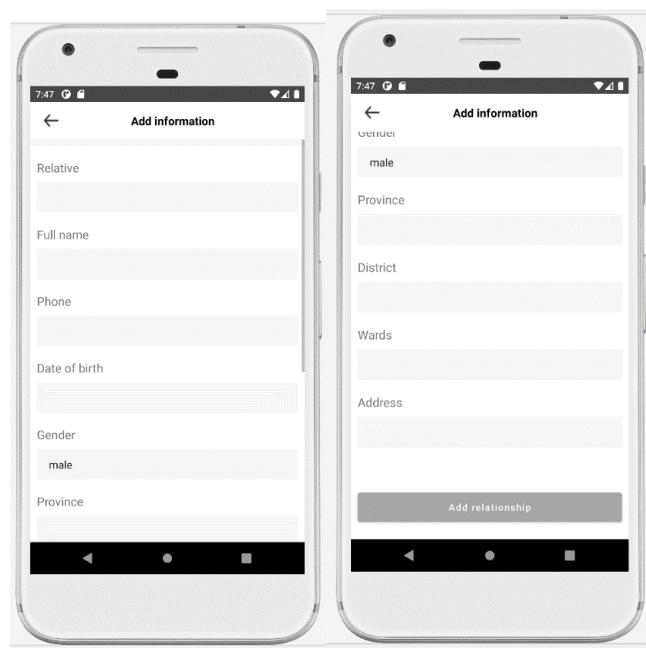
### When user click recharge



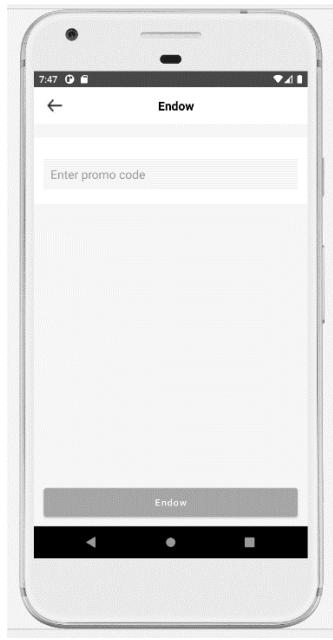
### When user click to points



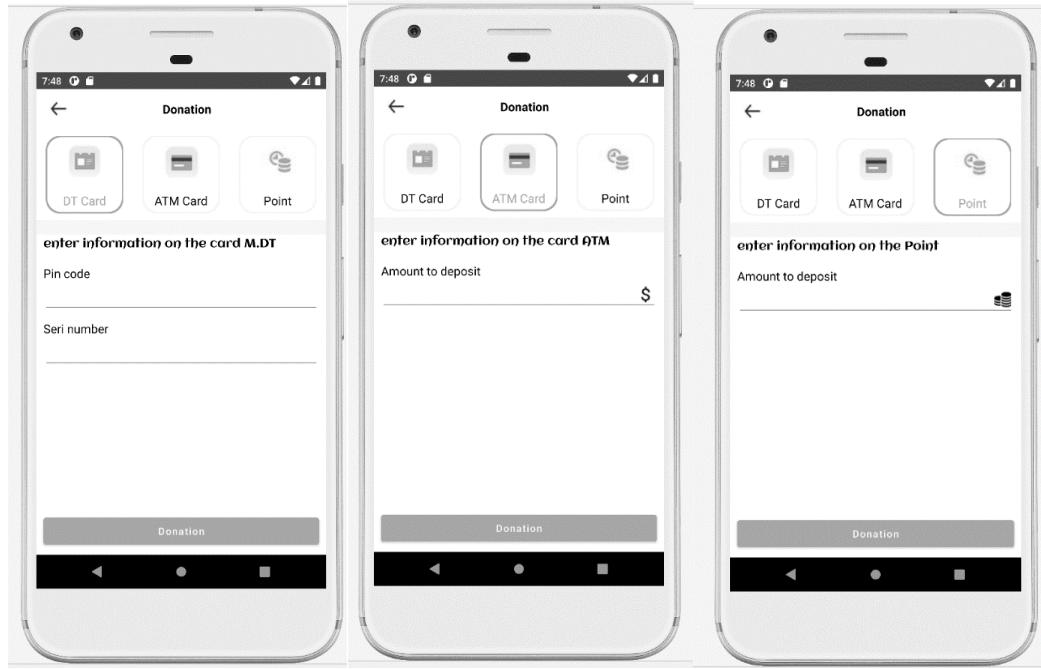
### When user click add in relative



### When use click endow



### When user click to donation



### When the user clicks on the medical declaration

**Health declaration**

Full name: NGUYEN NGOC THANG

Phone: 0938218666

Date of birth: 10/10/2000

Gender: female

Province: Hai duong

District: kinh mon

**Health declaration**

District: kinh mon

Wards: tan dan

Address: 138 thuong chieu

Have you had any of the following symptoms in the past 14 days?

signal	yes	no
Fever	<input type="radio"/>	<input checked="" type="radio"/>
Cough	<input type="radio"/>	<input checked="" type="radio"/>
Sore throat	<input type="radio"/>	<input checked="" type="radio"/>

**Health declaration**

signal	yes	no
Fever	<input type="radio"/>	<input checked="" type="radio"/>
Cough	<input type="radio"/>	<input checked="" type="radio"/>
Sore throat	<input type="radio"/>	<input checked="" type="radio"/>

**Epidemiological factors**

1. Are you suffering from COVID-19?	yes	no
<input type="radio"/>	<input checked="" type="radio"/>	

**Health declaration**

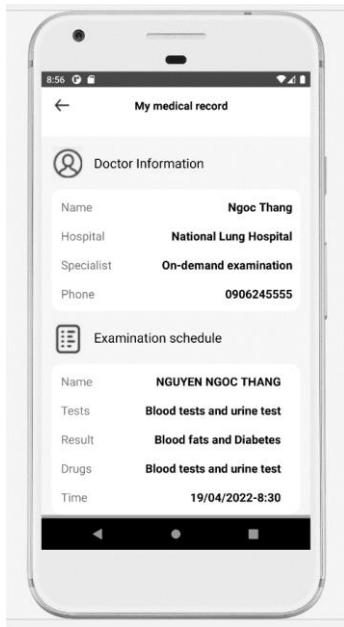
Epidemiological factors	yes	no
1. Are you suffering from COVID-19?	<input type="radio"/>	<input checked="" type="radio"/>
2. Close contact with an infected or suspected COVID-19 case within the past 14 days.	<input type="radio"/>	<input checked="" type="radio"/>
3. Traveled from another country or territory within the last 14 days.	<input type="radio"/>	<input checked="" type="radio"/>
4. Have you finished the group quarantine within the past 14 days?	<input type="radio"/>	<input checked="" type="radio"/>
5. In the past 14 days, has anyone in your family/work had a fever or cough?	<input type="radio"/>	<input checked="" type="radio"/>
6. Have you been discharged from hospital due to treatment for COVID-19 within the past 14 days?	<input type="radio"/>	<input checked="" type="radio"/>

**Health declaration**

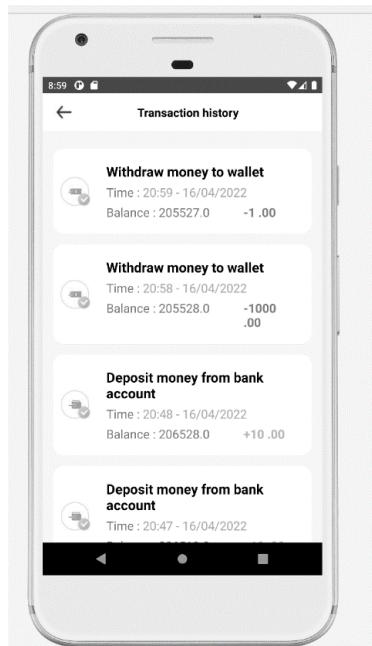
2. Close contact with an infected or suspected COVID-19 case within the past 14 days.	<input type="radio"/>	<input checked="" type="radio"/>
3. Traveled from another country or territory within the last 14 days.	<input type="radio"/>	<input checked="" type="radio"/>
4. Have you finished the group quarantine within the past 14 days?	<input type="radio"/>	<input checked="" type="radio"/>
5. In the past 14 days, has anyone in your family/work had a fever or cough?	<input type="radio"/>	<input checked="" type="radio"/>
6. Have you been discharged from hospital due to treatment for COVID-19 within the past 14 days?	<input type="radio"/>	<input checked="" type="radio"/>

**Send**

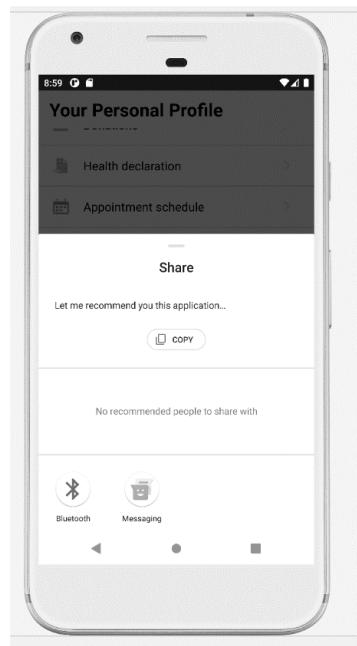
**When the user clicks to see my medical record**



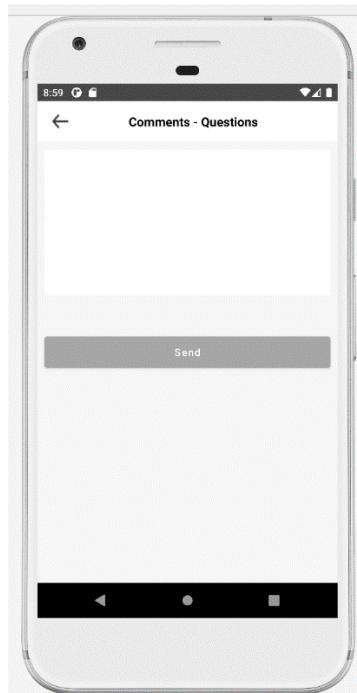
### When the user clicks to see the history



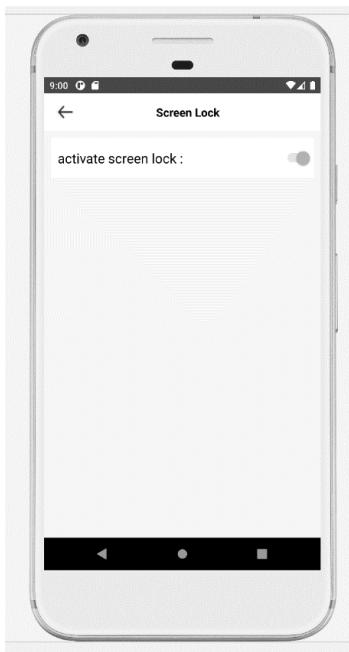
### When the user clicks invite friends



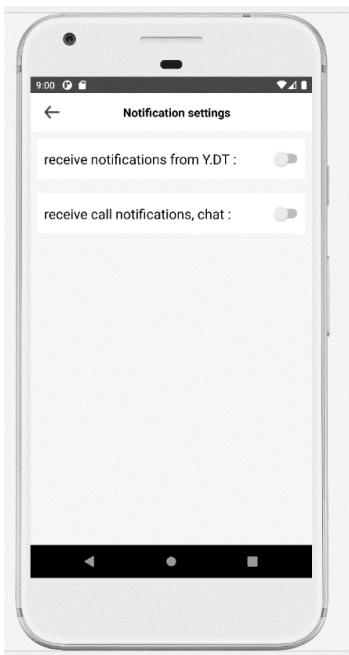
### When the user clicks contribute



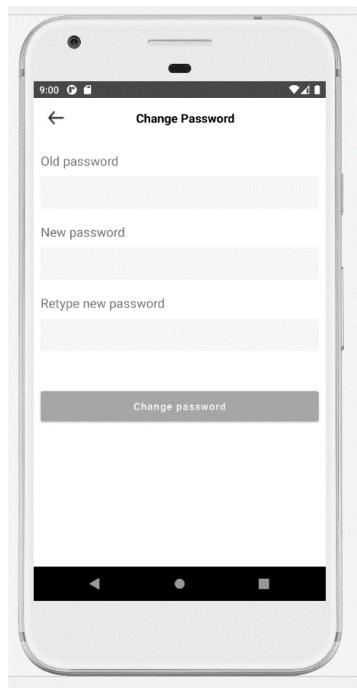
### When the user clicks set lock



**When the user clicks set notification**



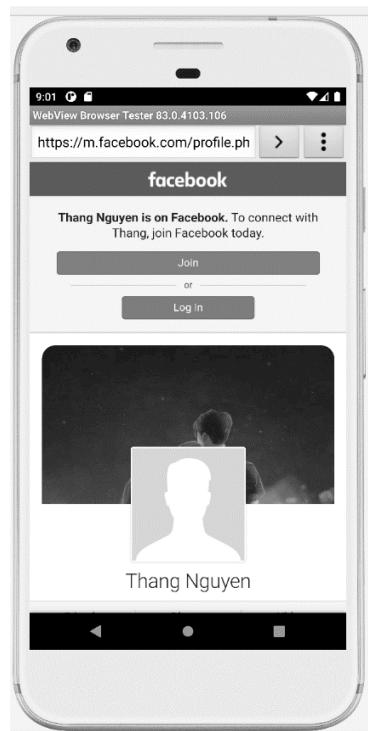
**When the user clicks change password**



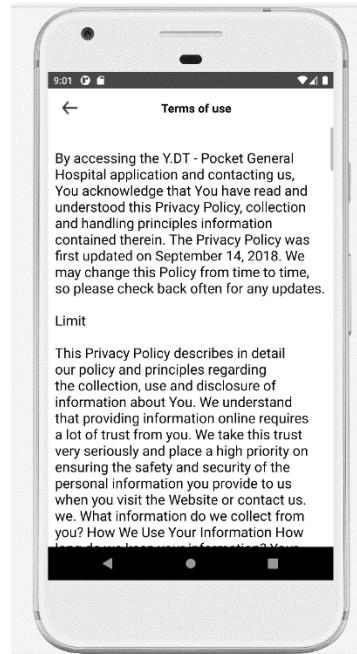
**When the user clicks to call the hotline**



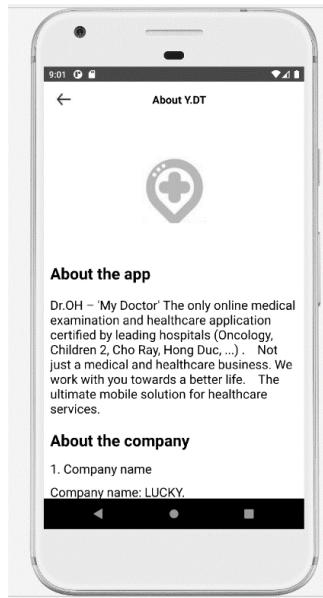
**When the user clicks to Facebook**



### When the user clicks to Terms of user

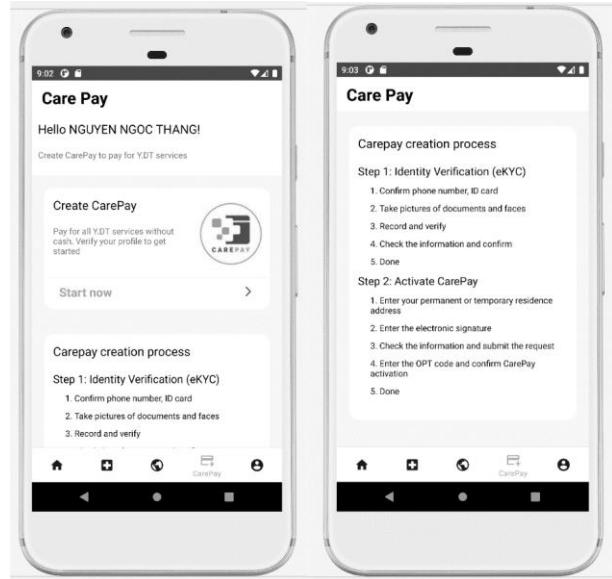


### When the user clicks to Introduction

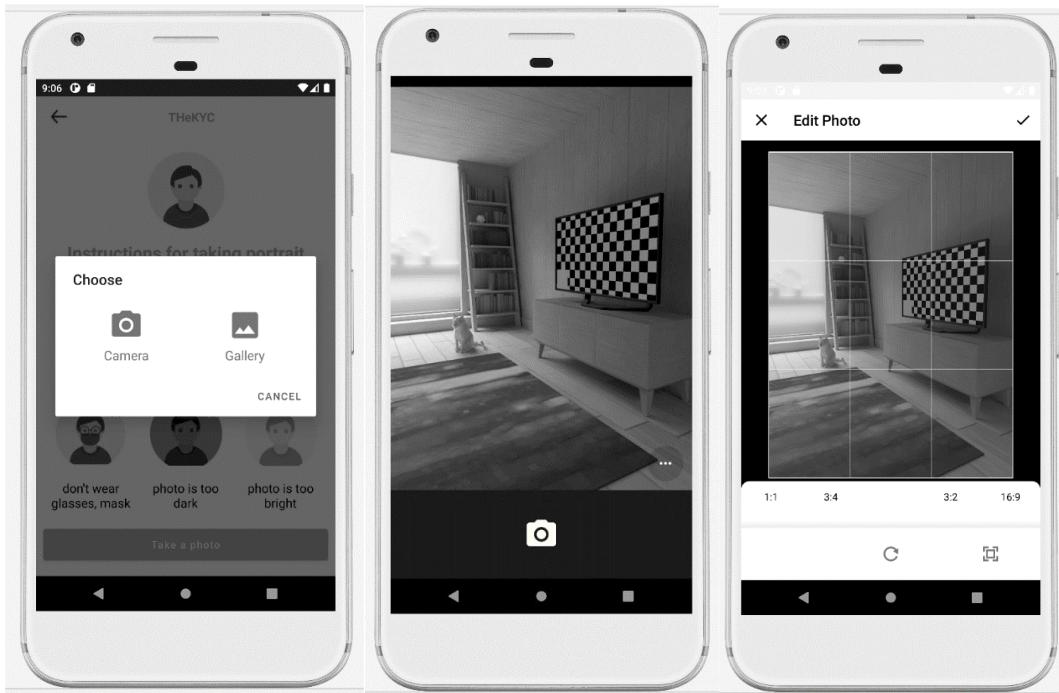
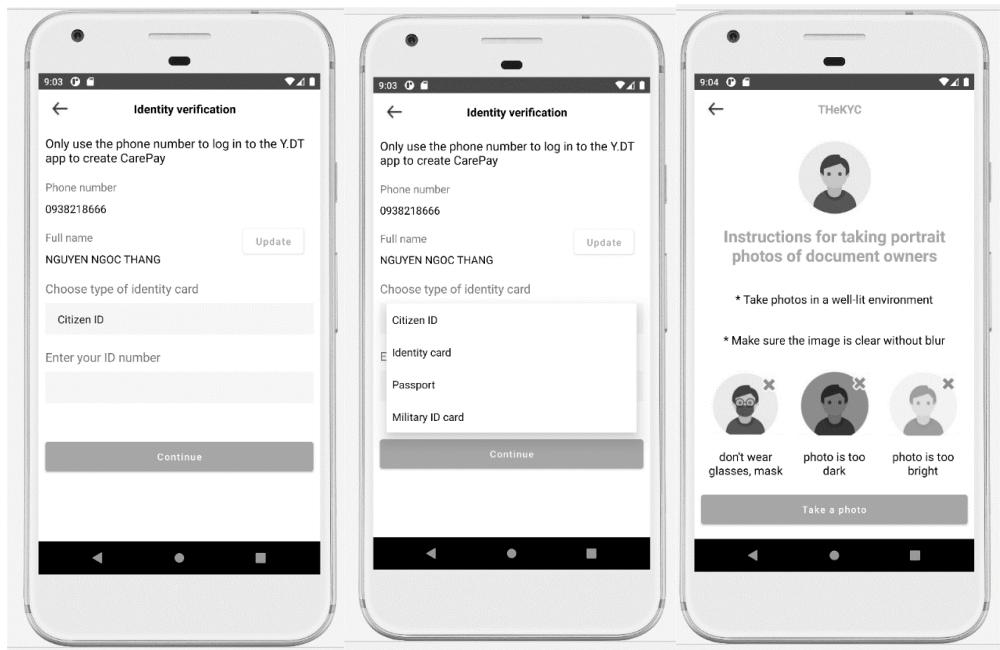


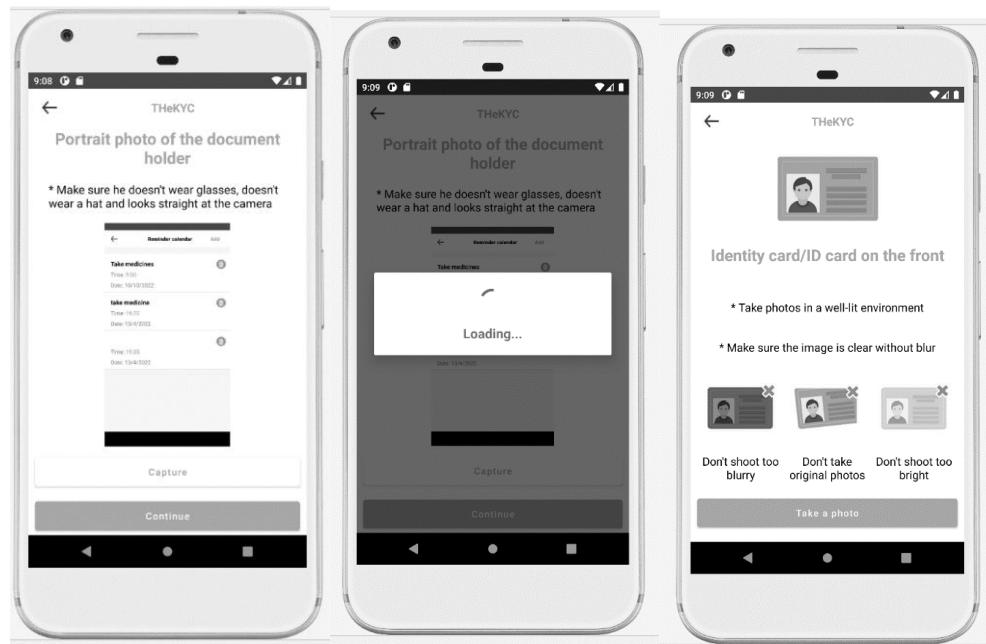
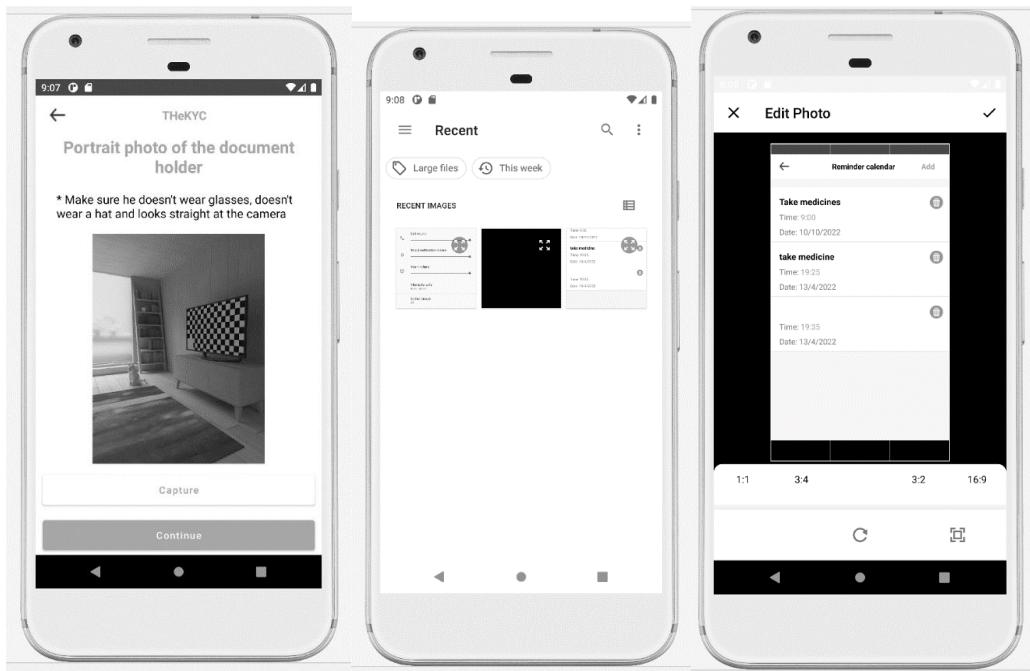
## 5.2.2 Carepay page.

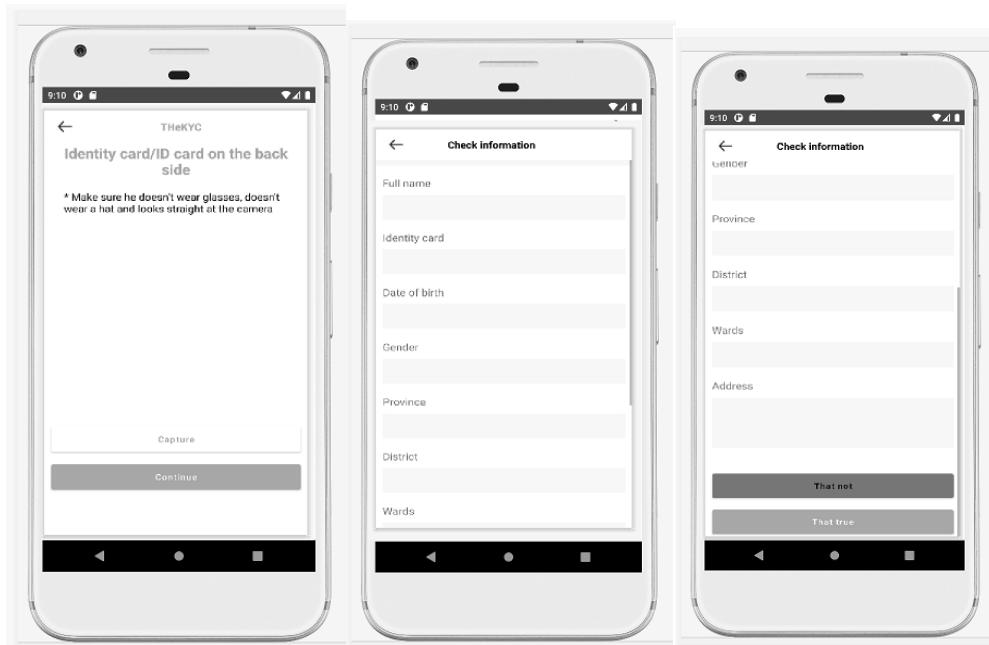
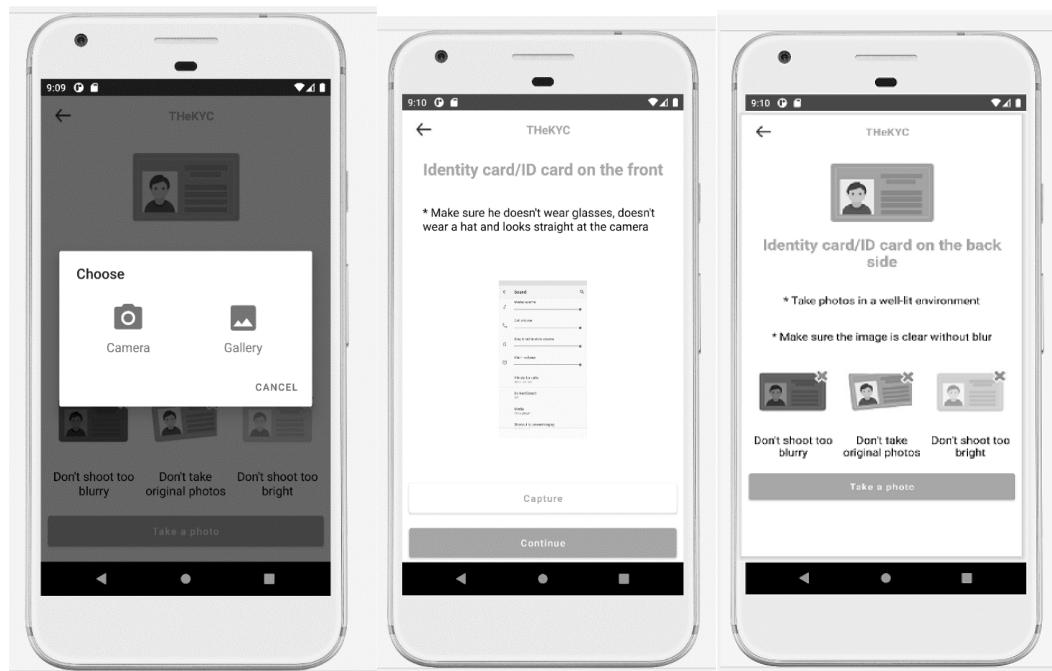
When the user clicks Carpay if non active



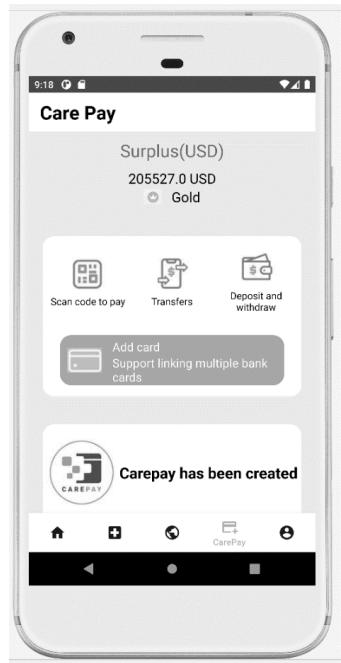
When the user clicks to Start







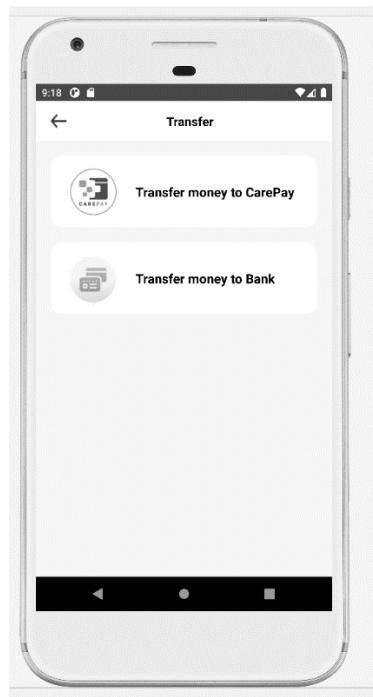
**When the user clicks to carepay if active**



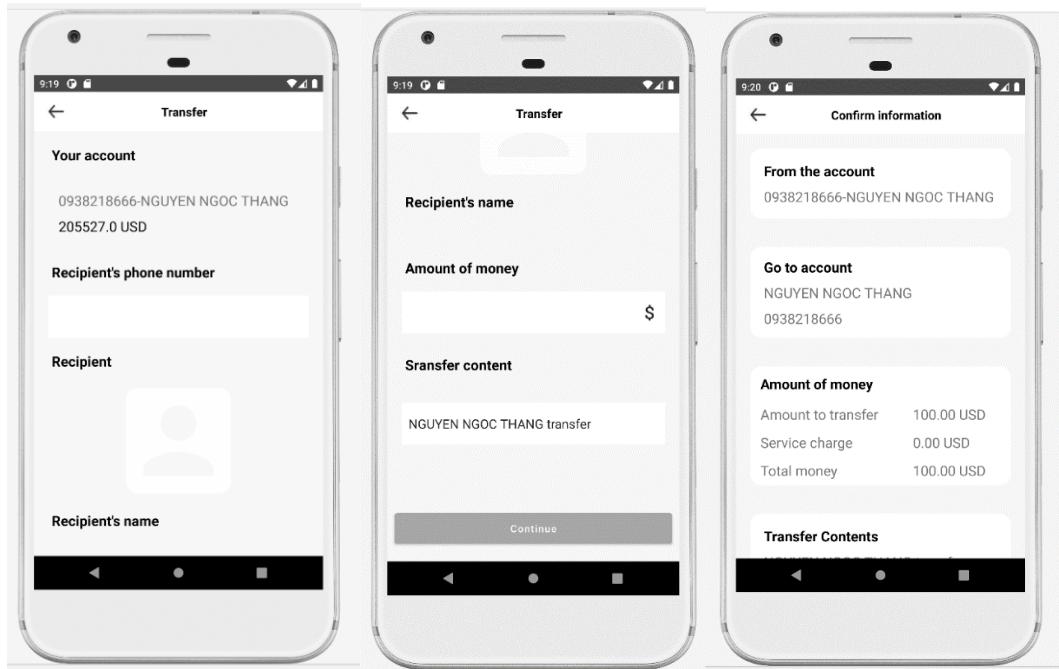
**When the user clicks to Scan**

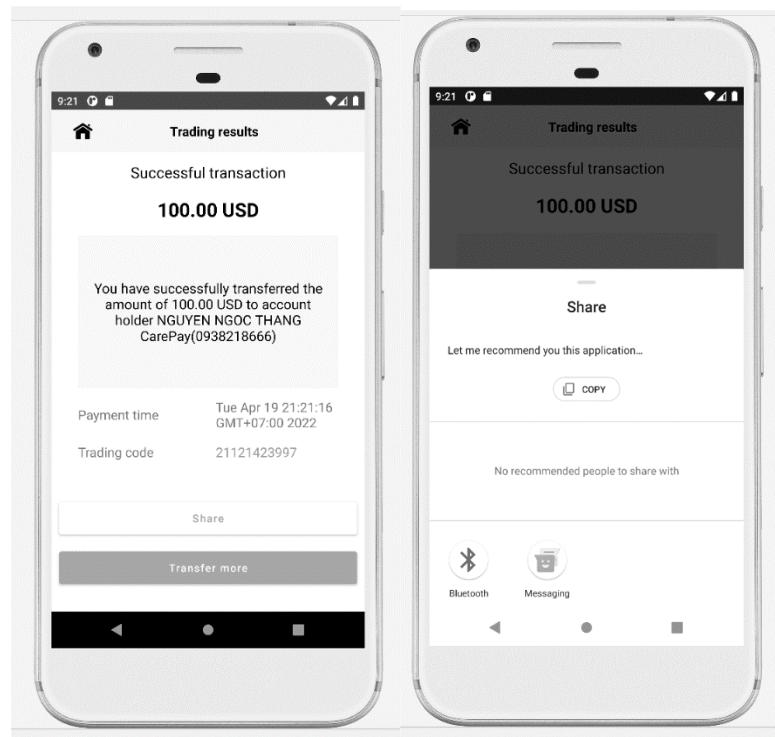
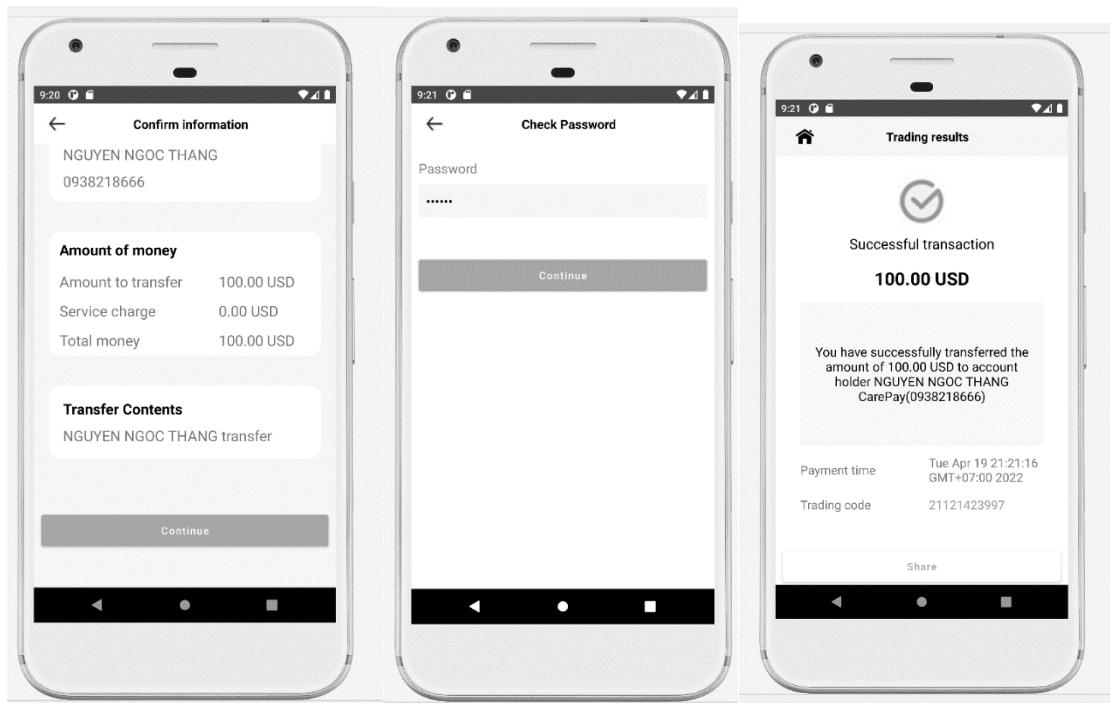


**When the user clicks to Transfer**

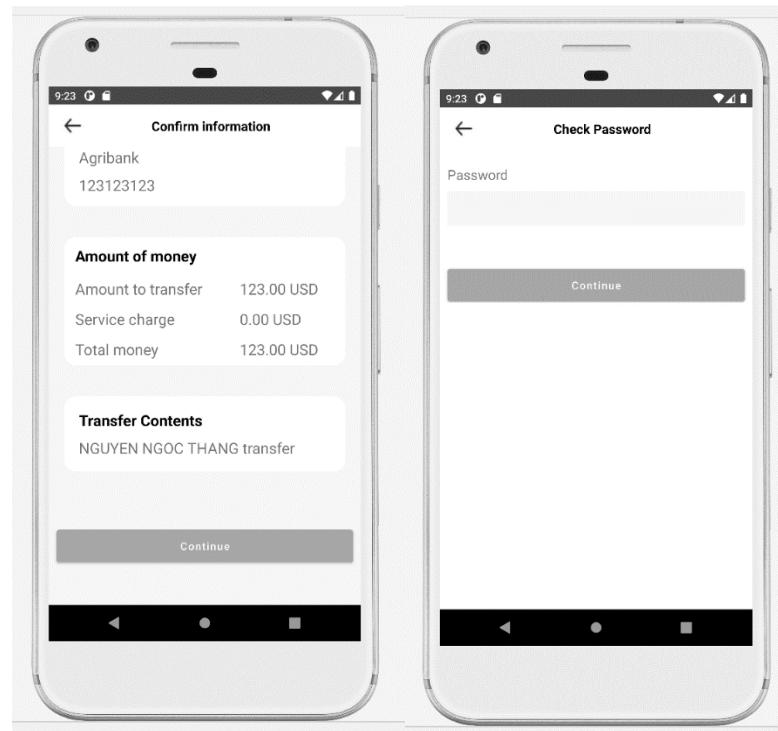
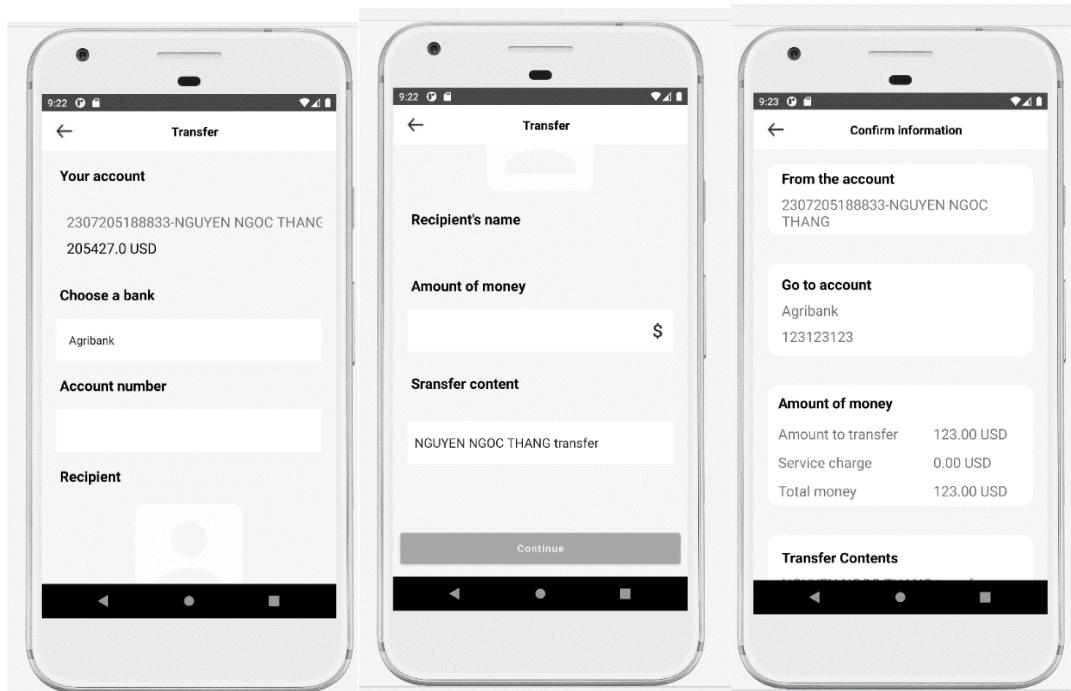


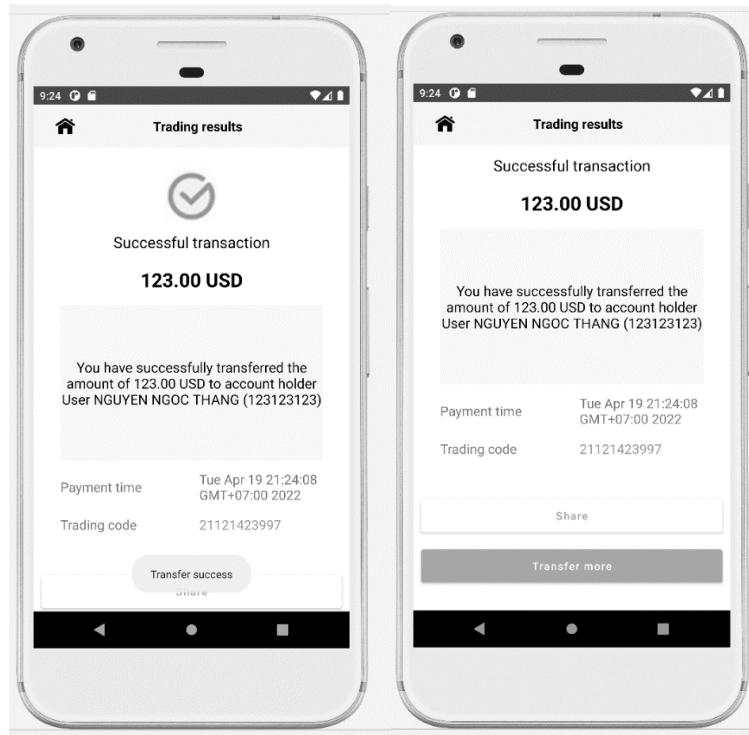
### When the user clicks to Transfer carepay



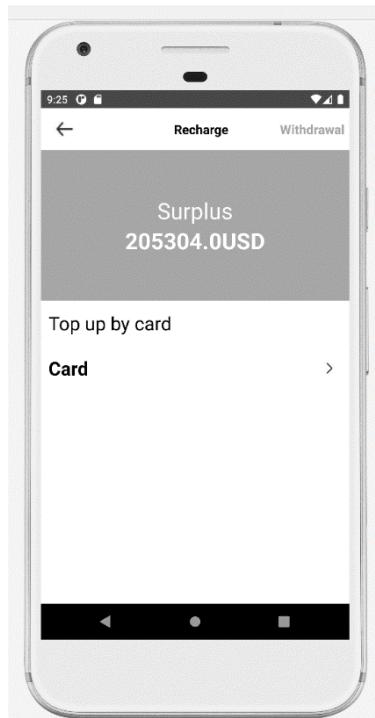


**When the user clicks to Transfer bank**

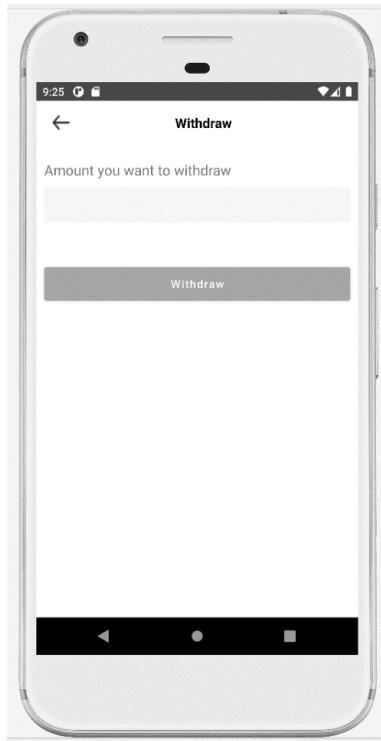




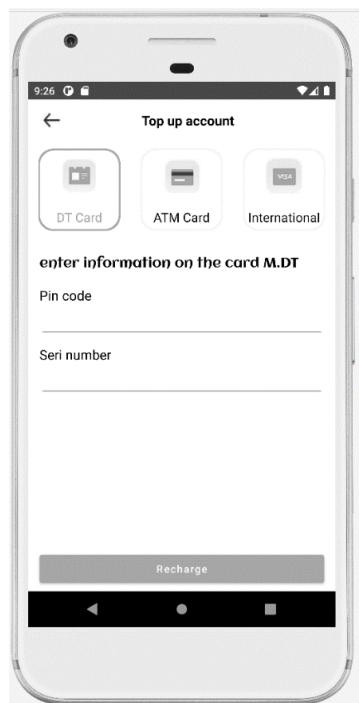
### When the user clicks to Recharge



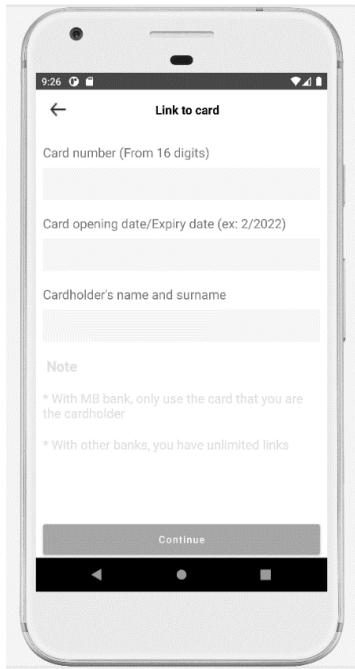
### **When the user clicks to Withdraw**



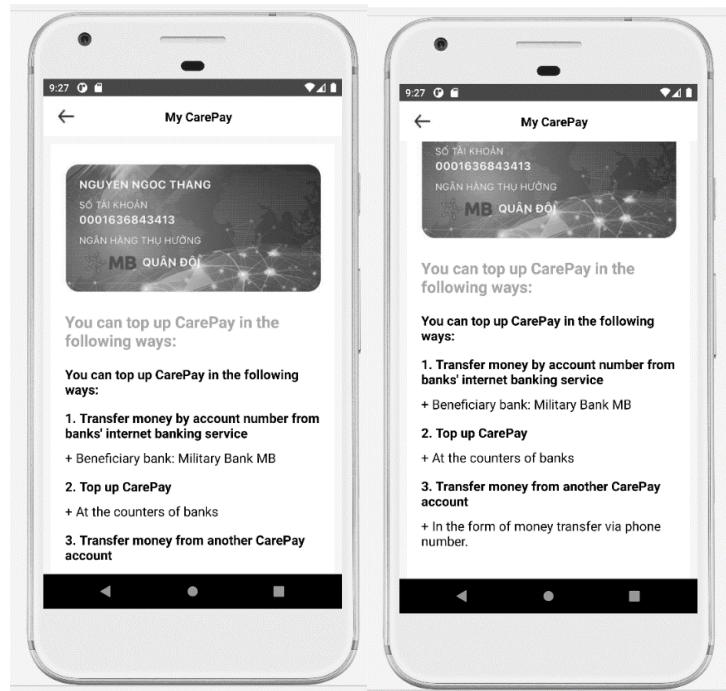
### **When the user clicks to Top up go to Recharge**



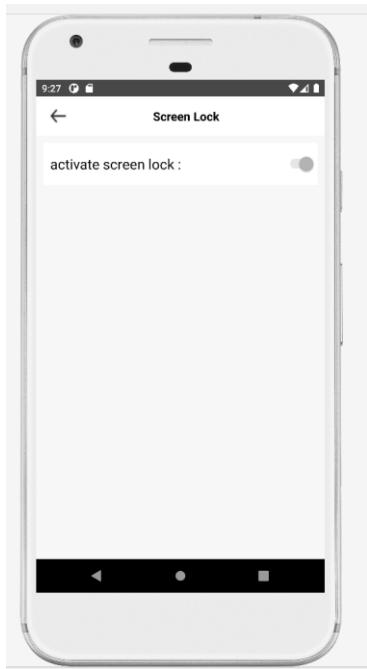
## When the user clicks to Add card



## When the user clicks to Information card

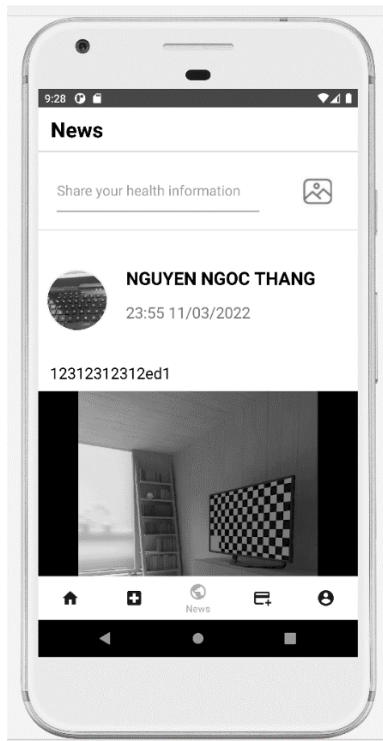


**When the user clicks to set lock**

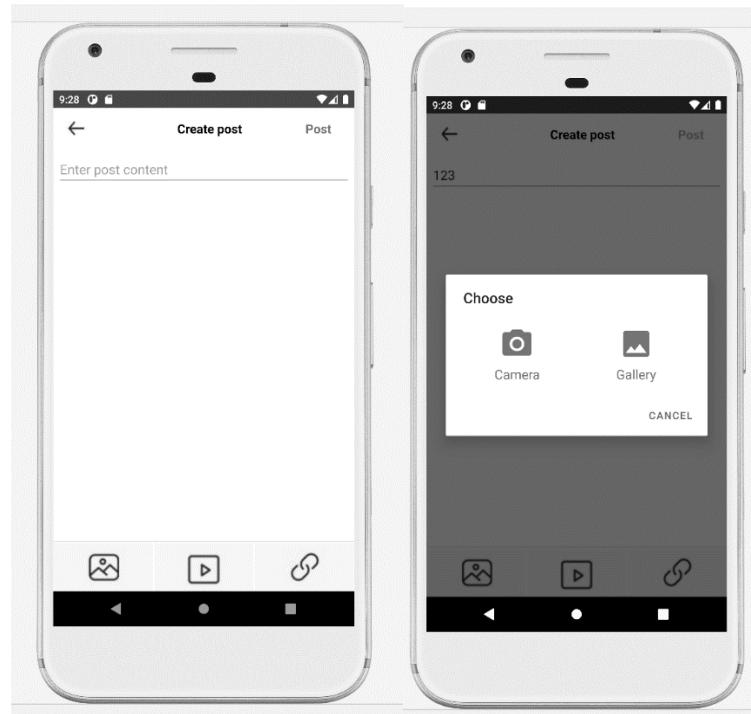


### 5.2.3 News page.

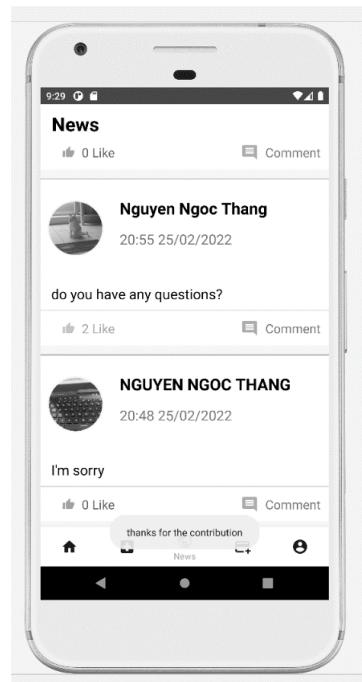
**When the user clicks to News**



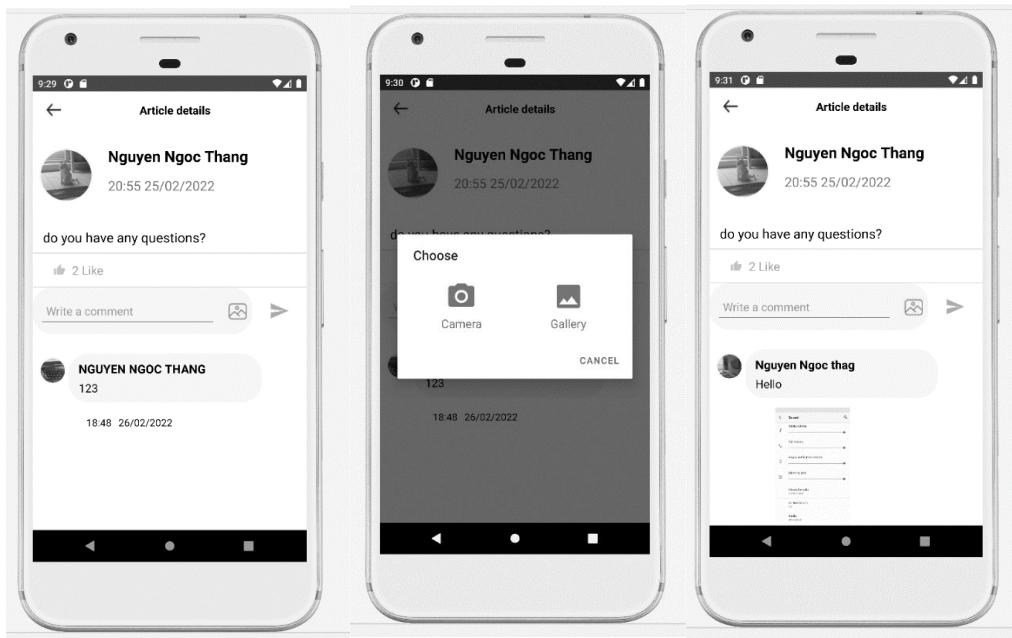
**When the user clicks to Post a new**



### When the user clicks to Like

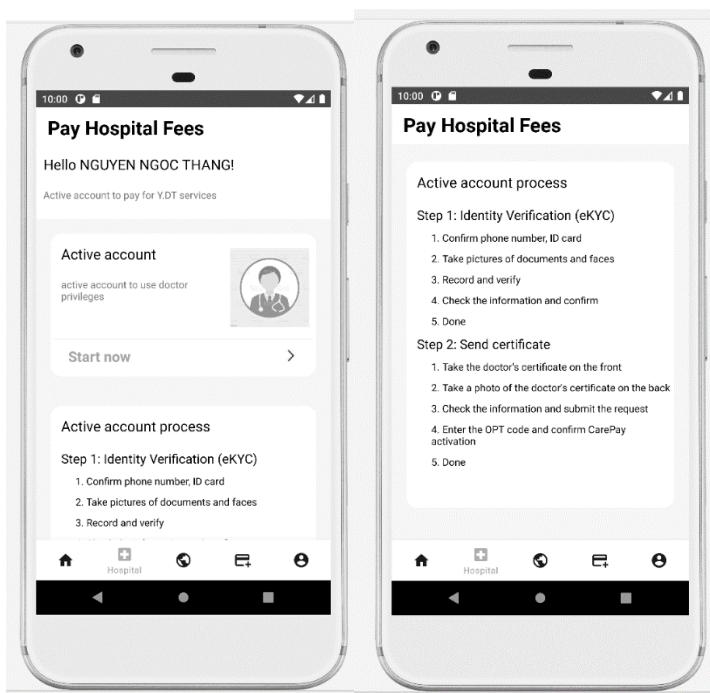


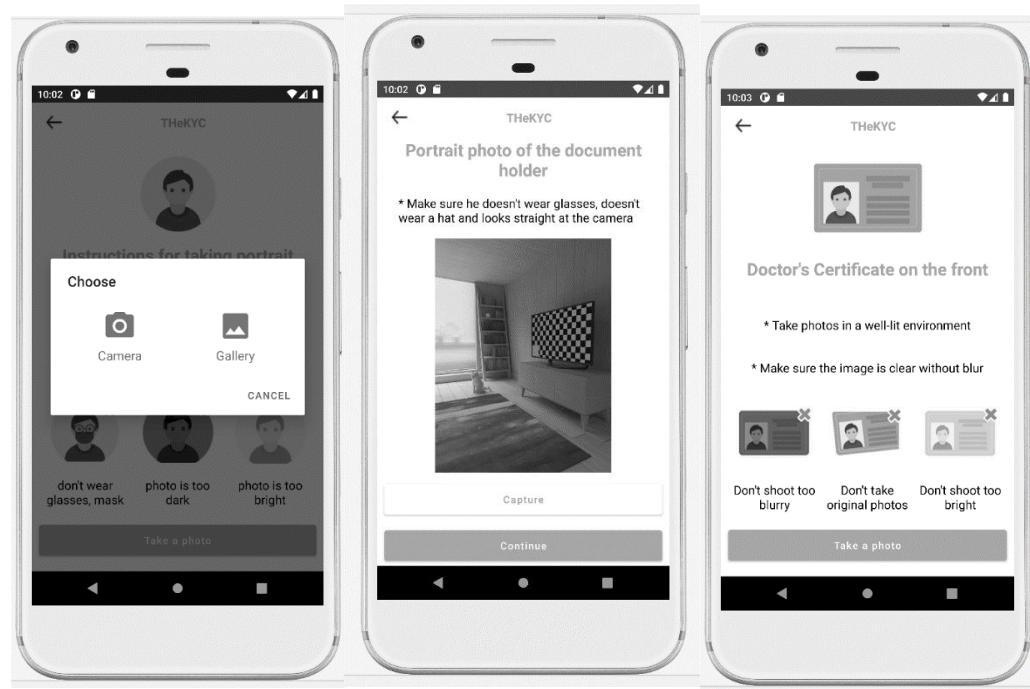
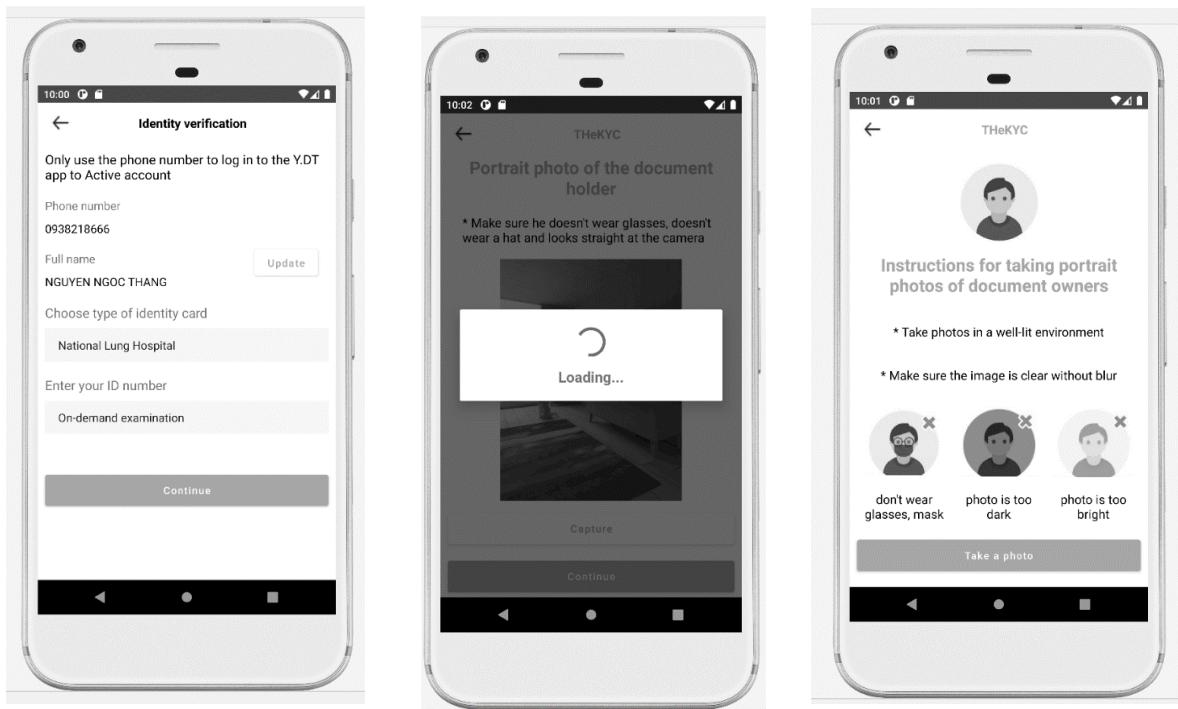
### When the user clicks to Comment

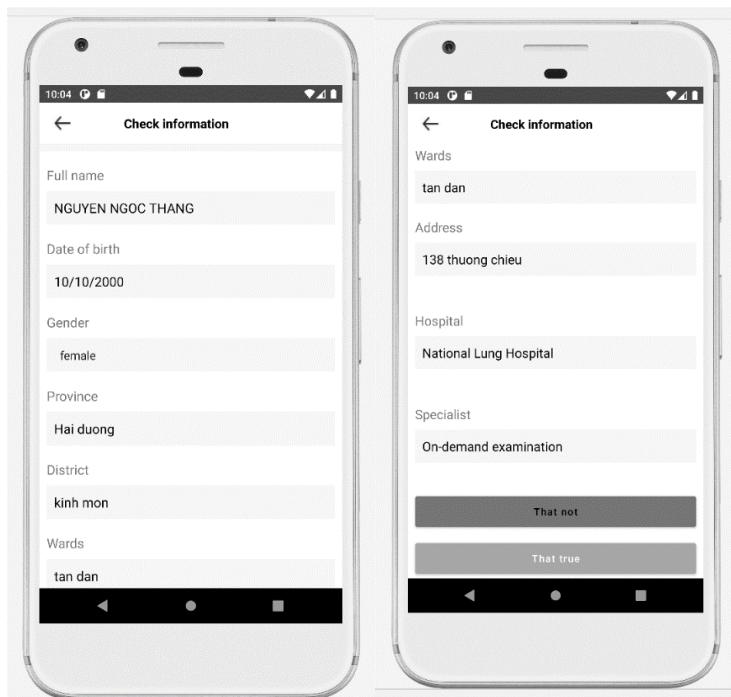
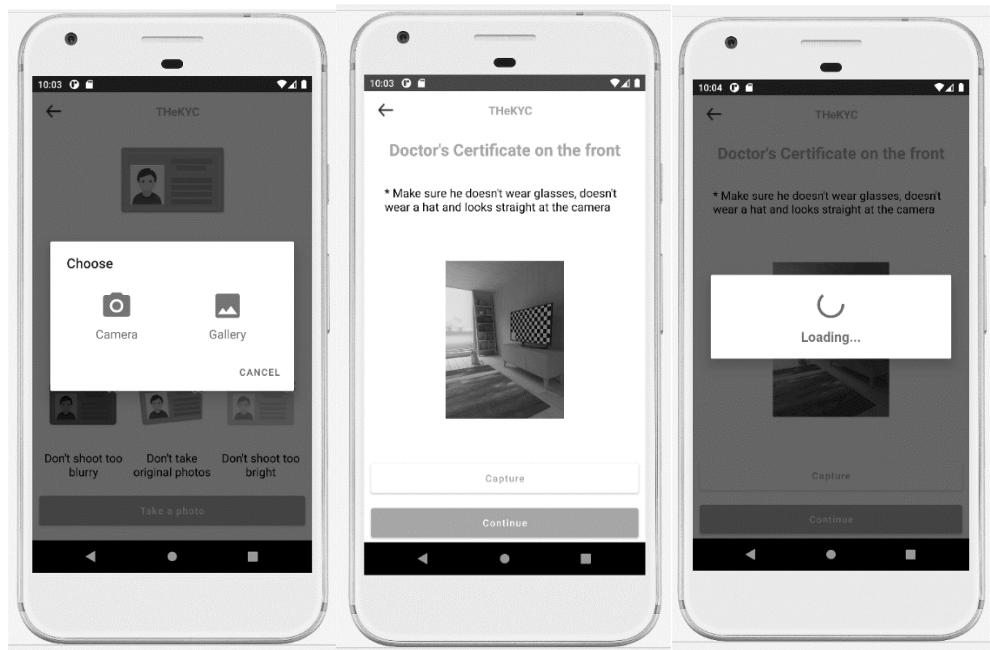


#### 5.2.4 Doctor page

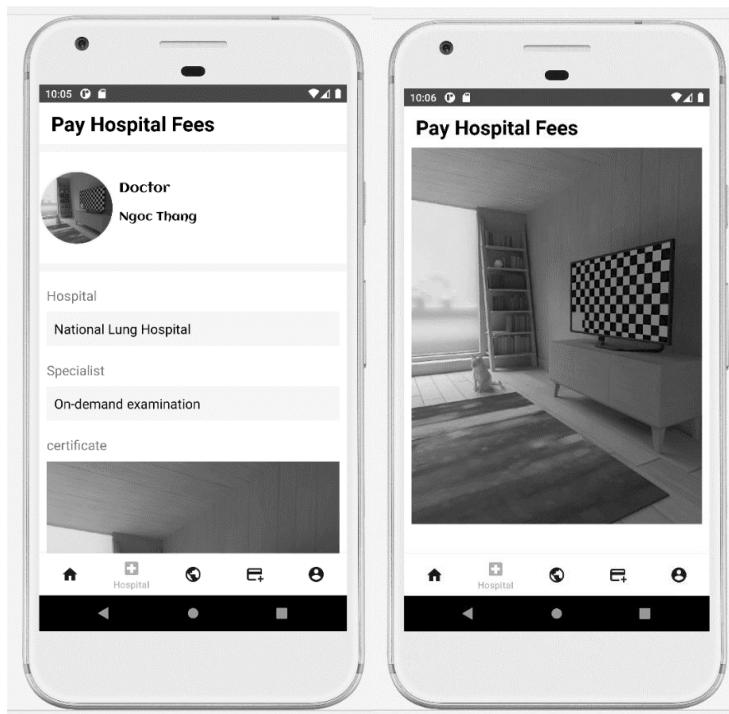
**When doctor non-active**



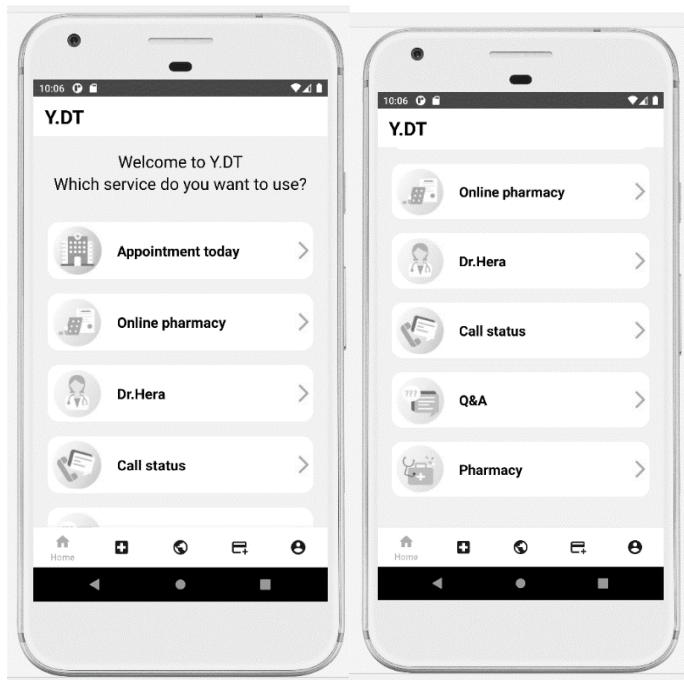




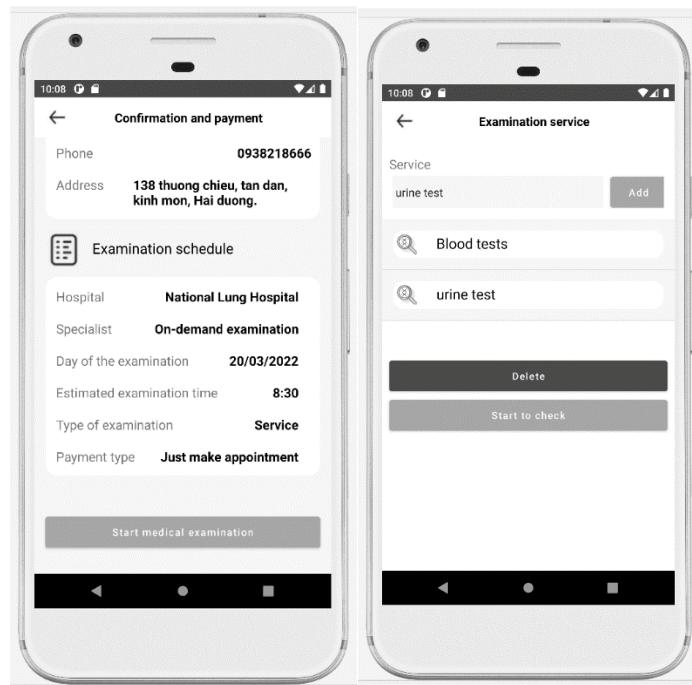
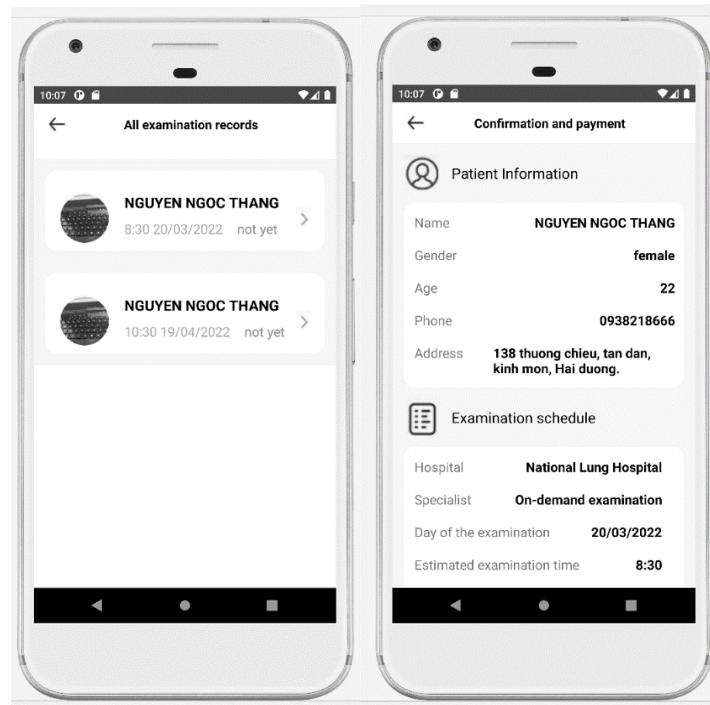
## When doctor active



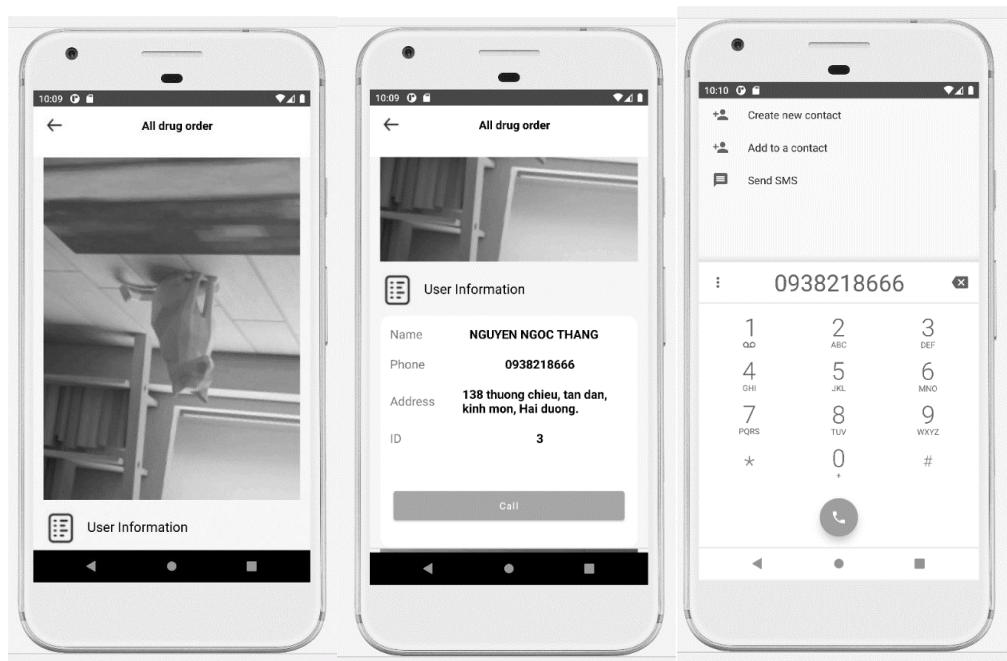
### 5.3.5 Home page.



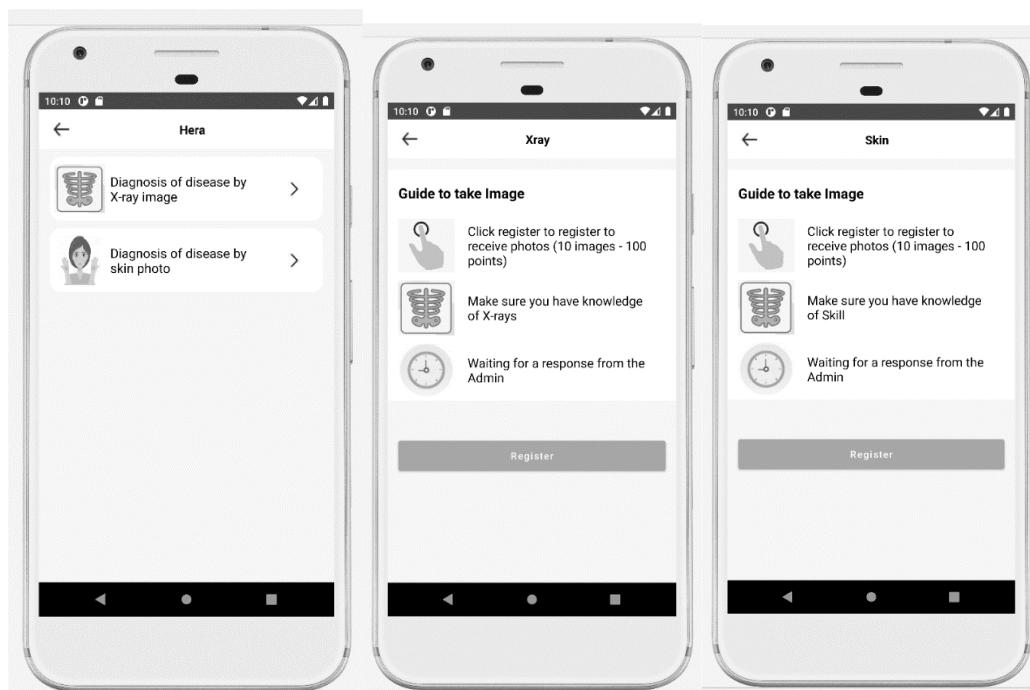
## When the user clicks to today's appointment



**When the user clicks online pharmacy**



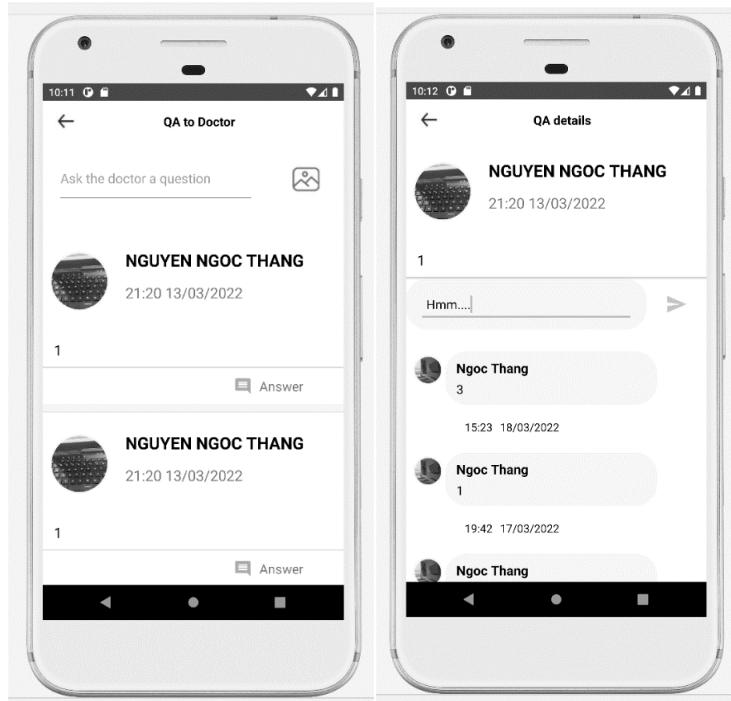
### When the user clicks Doctor Hera



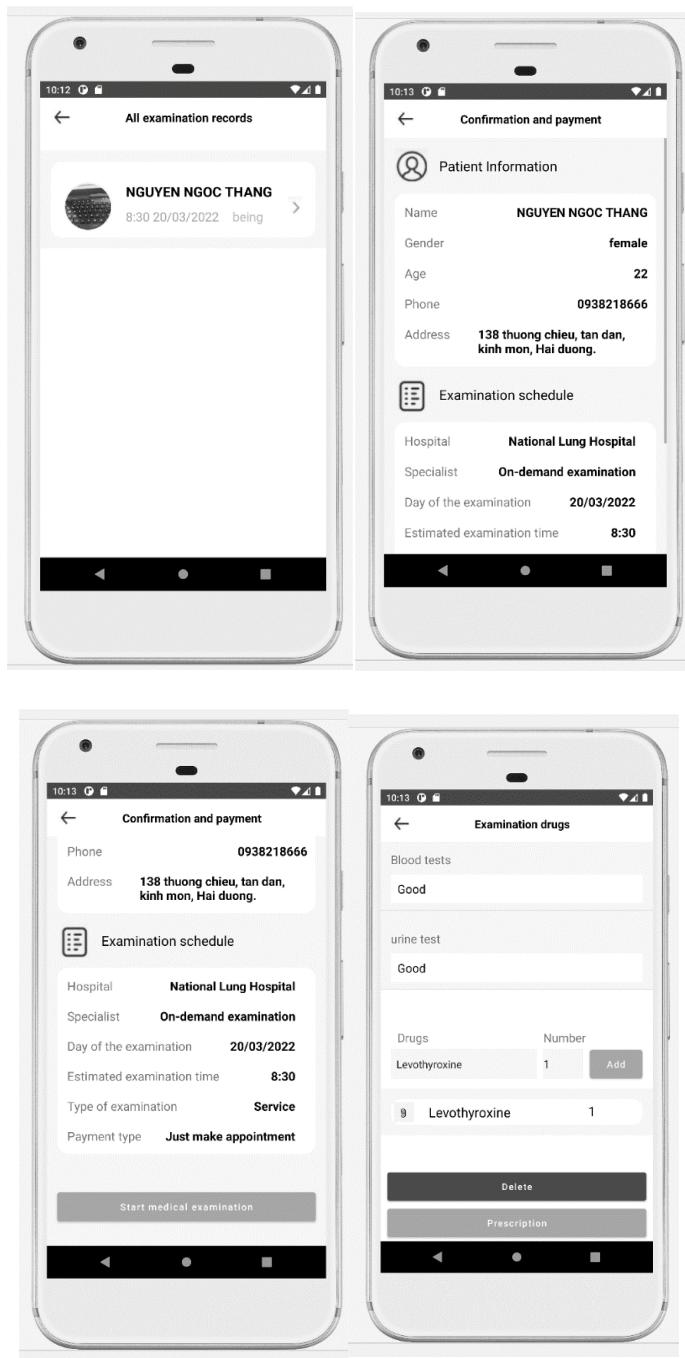
### When the user clicks Status call doctor



**When the user clicks to QA**

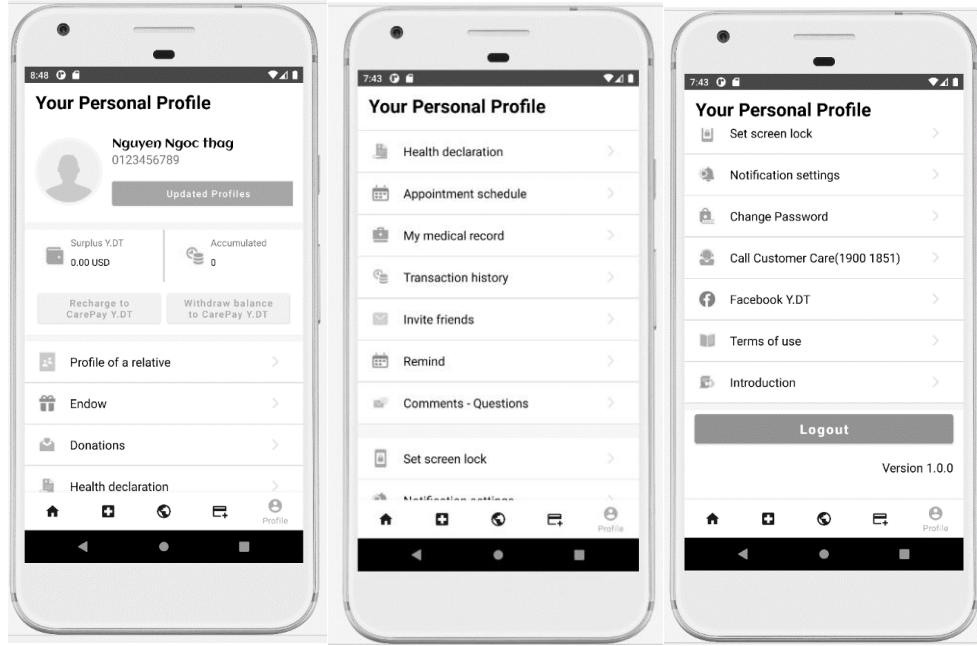


**When the user clicks Pharmacy.**

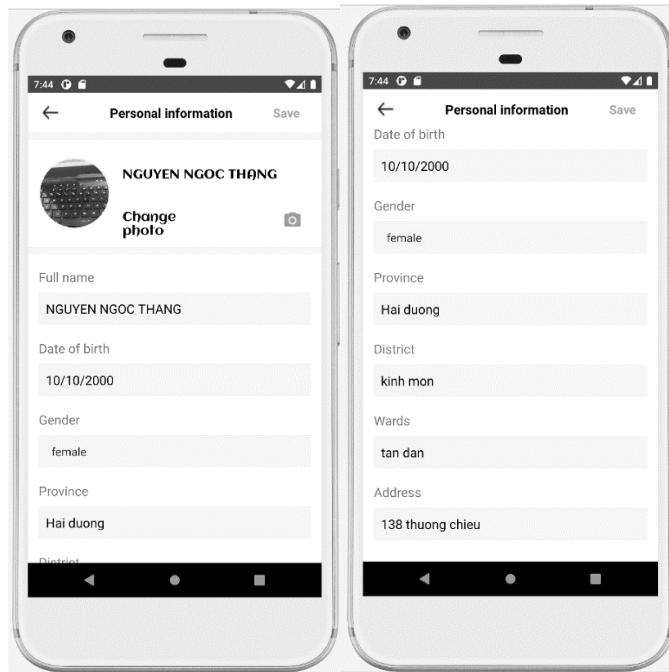


## 5.3 Admin.

### 5.3.1 Profile page.



**When user click on update**



**When the user clicks on the medical declaration**

**Health declaration**

Full name: NGUYEN NGOC THANG

Phone: 0938218666

Date of birth: 10/10/2000

Gender: female

Province: Hai duong

District: kinh mon

Wards: tan dan

Address: 138 thuong chieu

Have you had any of the following symptoms in the past 14 days?

signal	yes	no
Fever	<input type="radio"/>	<input checked="" type="radio"/>
Cough	<input type="radio"/>	<input checked="" type="radio"/>
Sore throat	<input type="radio"/>	<input checked="" type="radio"/>

During the past

Epidemiological factors

	yes	no
1. Are you suffering from COVID-19?	<input type="radio"/>	<input checked="" type="radio"/>

**Health declaration**

1. Are you suffering from COVID-19?

2. Close contact with an infected or suspected COVID-19 case within the past 14 days.

3. Traveled from another country or territory within the last 14 days.

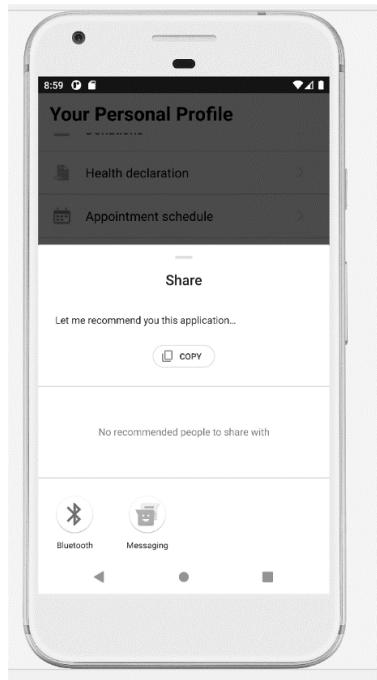
4. Have you finished the group quarantine within the past 14 days?

5. In the past 14 days, has anyone in your family/work had a fever or cough?

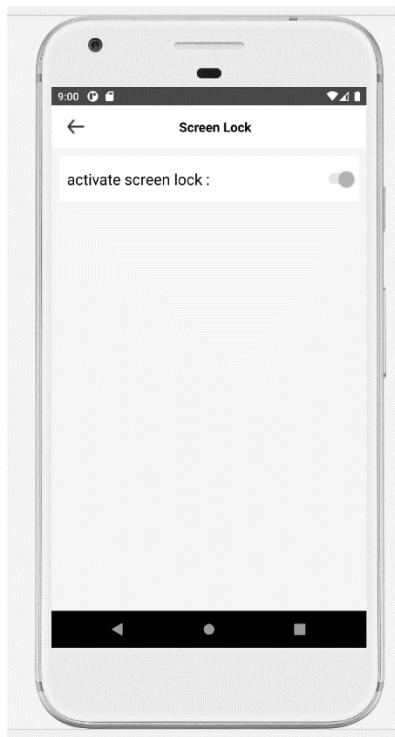
6. Have you been discharged from hospital due to treatment for COVID-19 within the past 14 days?

Send

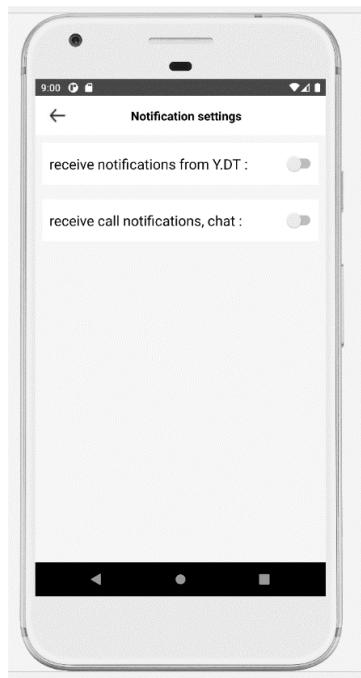
**When the user clicks on the Invite friend.**



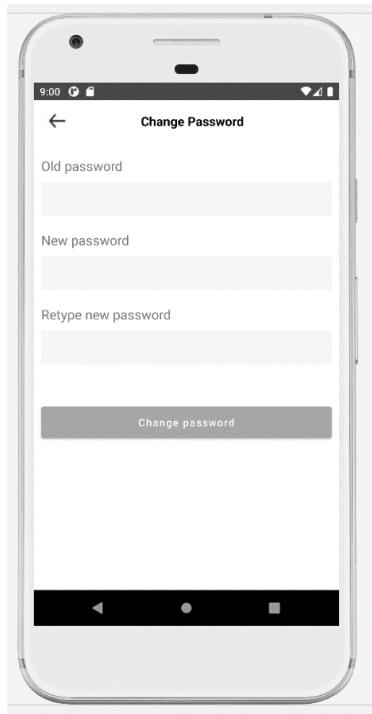
**When the user clicks set lock**



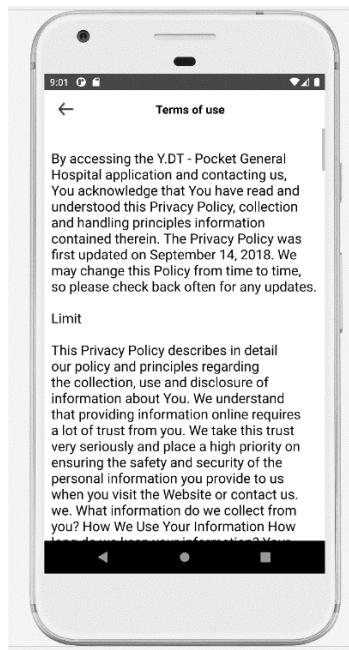
**When the user clicks set notification**



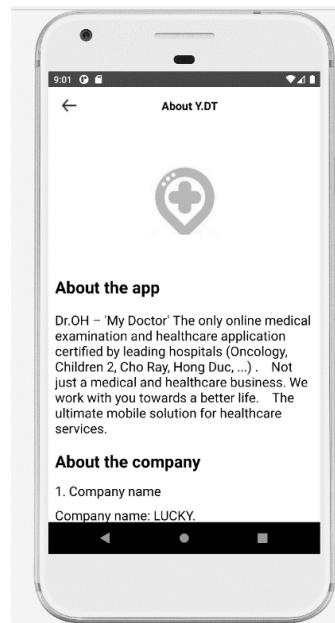
**When the user clicks change password**



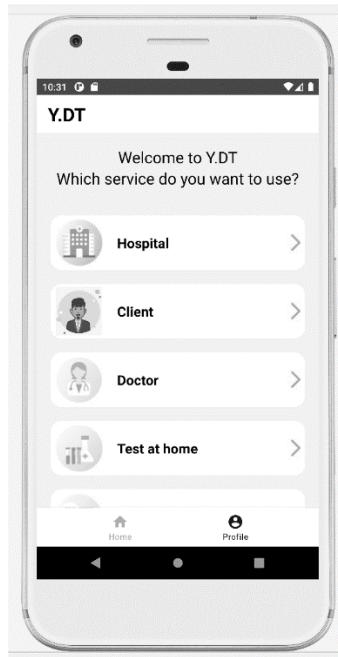
**When the user clicks to Terms of user**



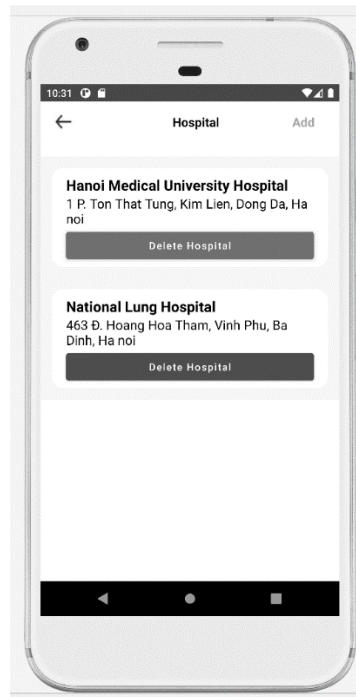
## When the user clicks to Introduction



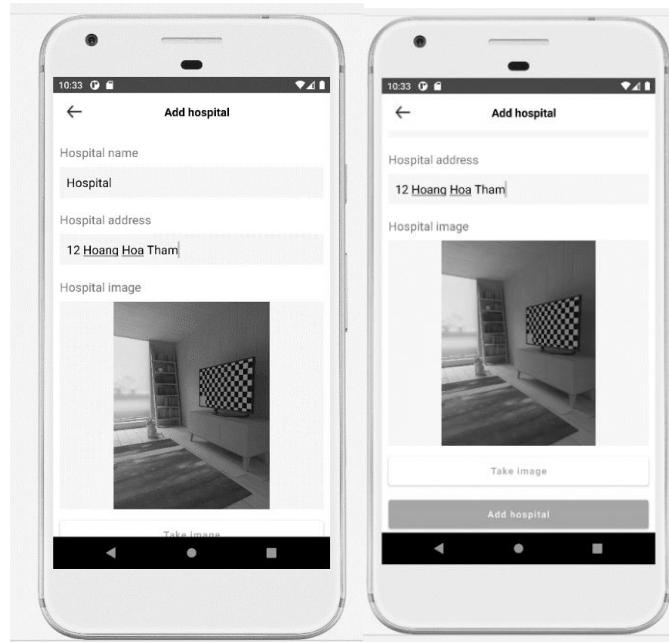
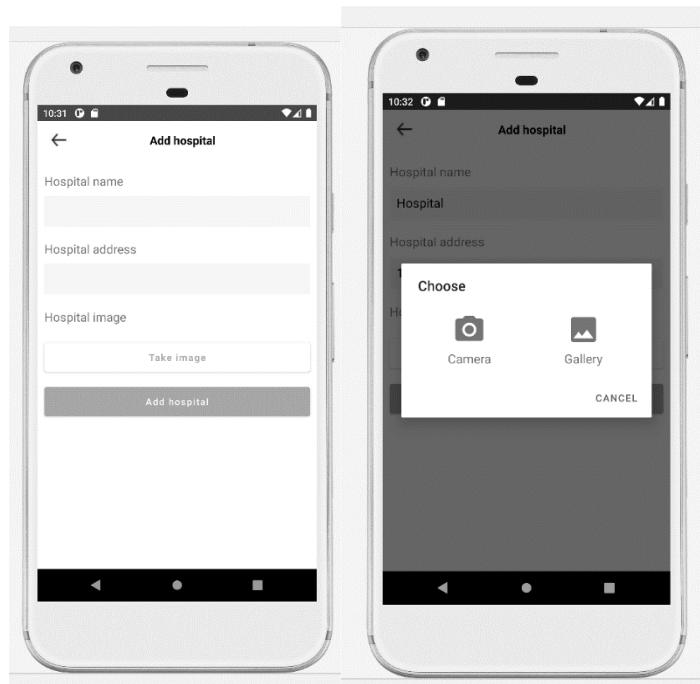
### 5.3.2 Home page.



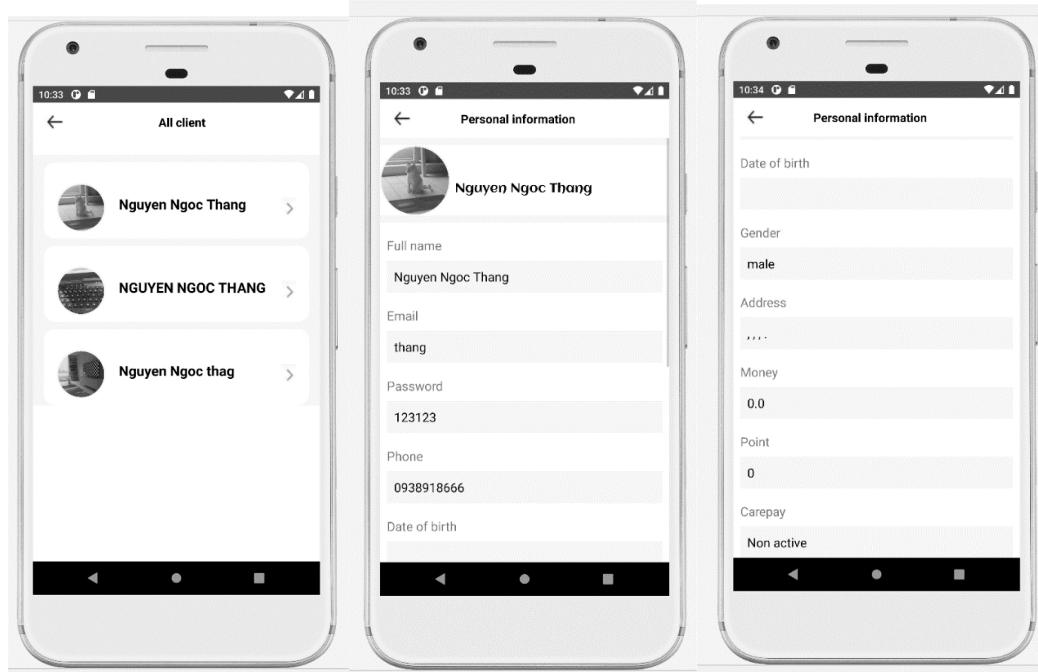
**When the user clicks Hospital**



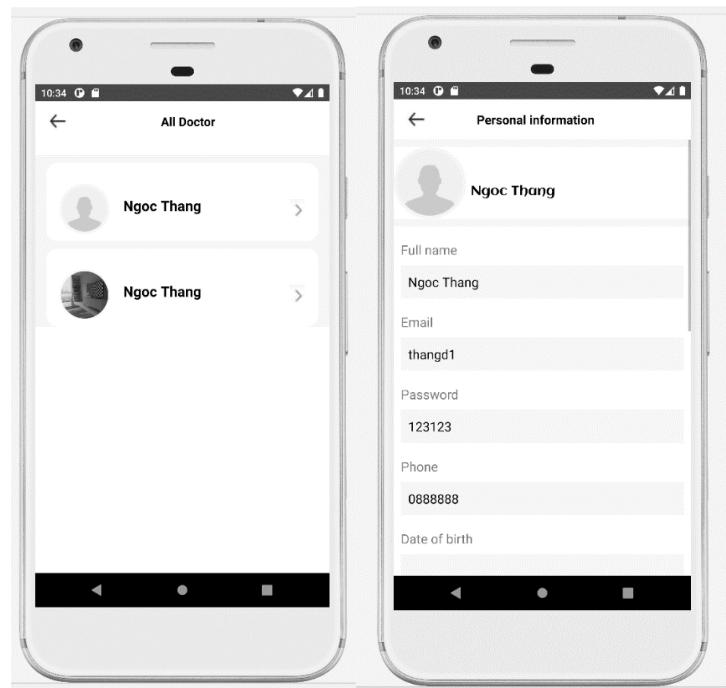
**When the user clicks to Add**

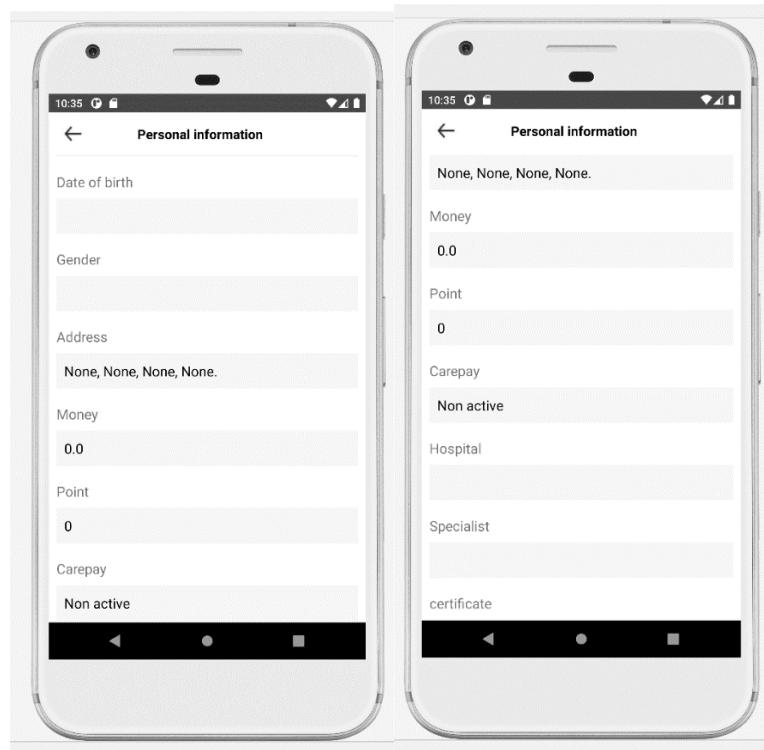


**When the user clicks Client**

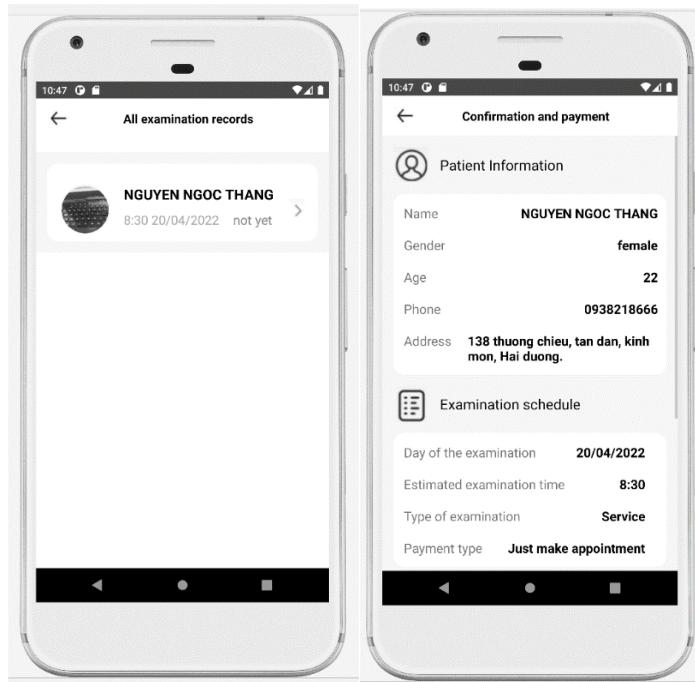


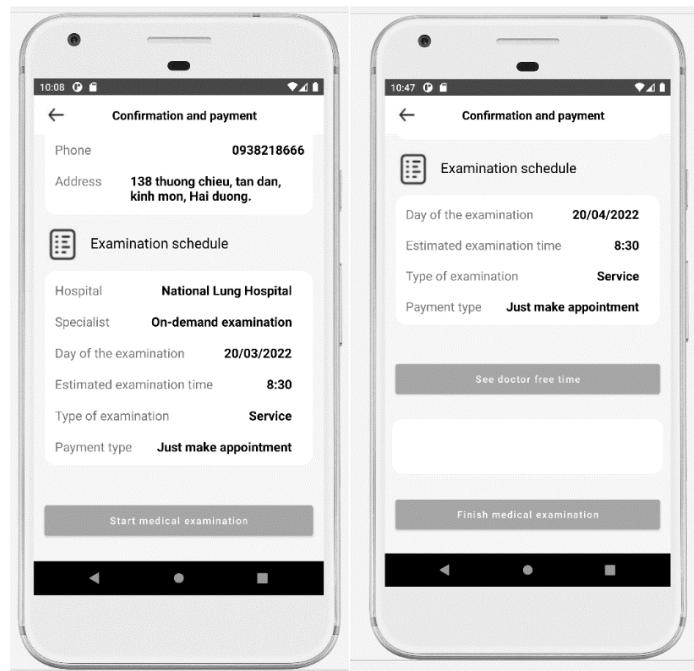
When the user clicks Doctor



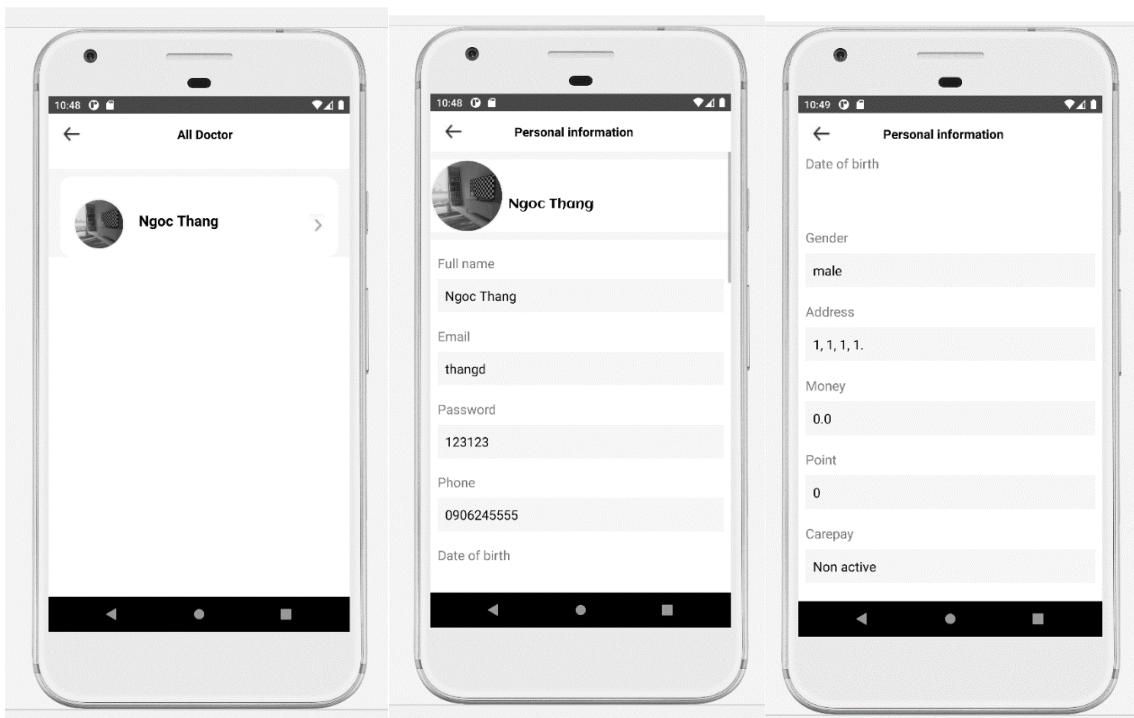


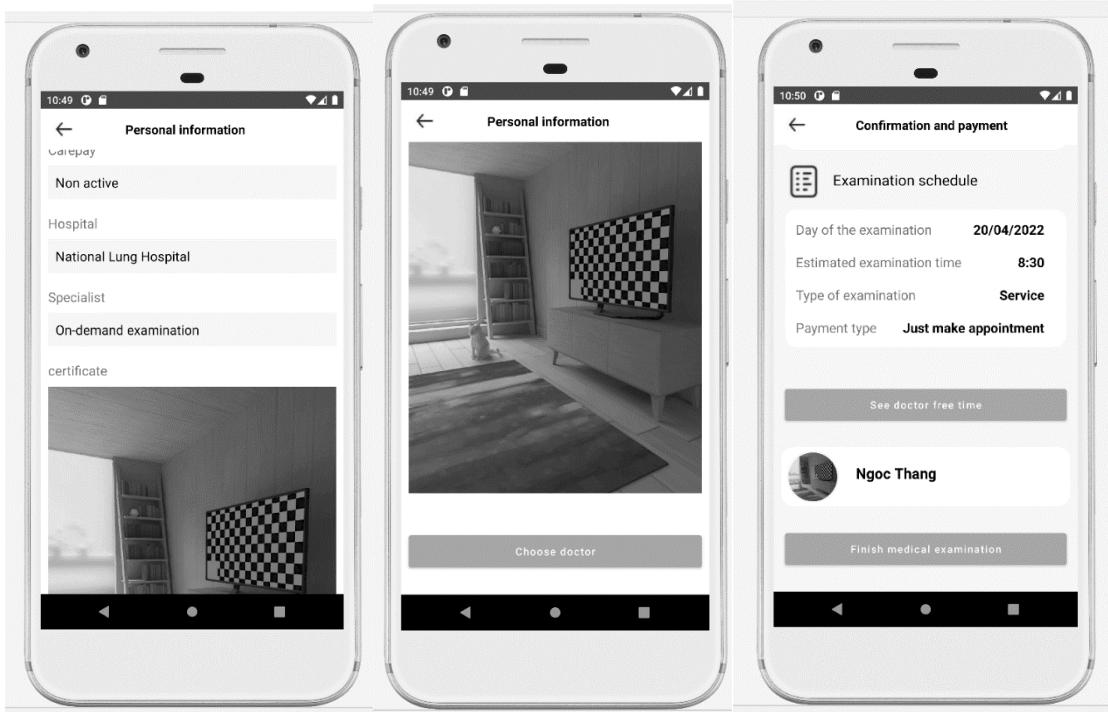
### When the user clicks Test at home





### When the user clicks set a doctor





## V. Implementation

### 1. Tools

#### 1.1 Development tool

##### 1.1.1 Android Studio

Android Studio is the official IDE used in Android application development based on IntelliJ IDEA. The main function of Android Studio is to provide interfaces that allow users to create applications and handle complex file tools behind the scenes. The programming language used in Android Studio is Java and it comes pre-installed on your device. When using Android Studio, just write, edit and store them on your projects and the files in that project. Also, Android Studio provides access to the Android SDK.

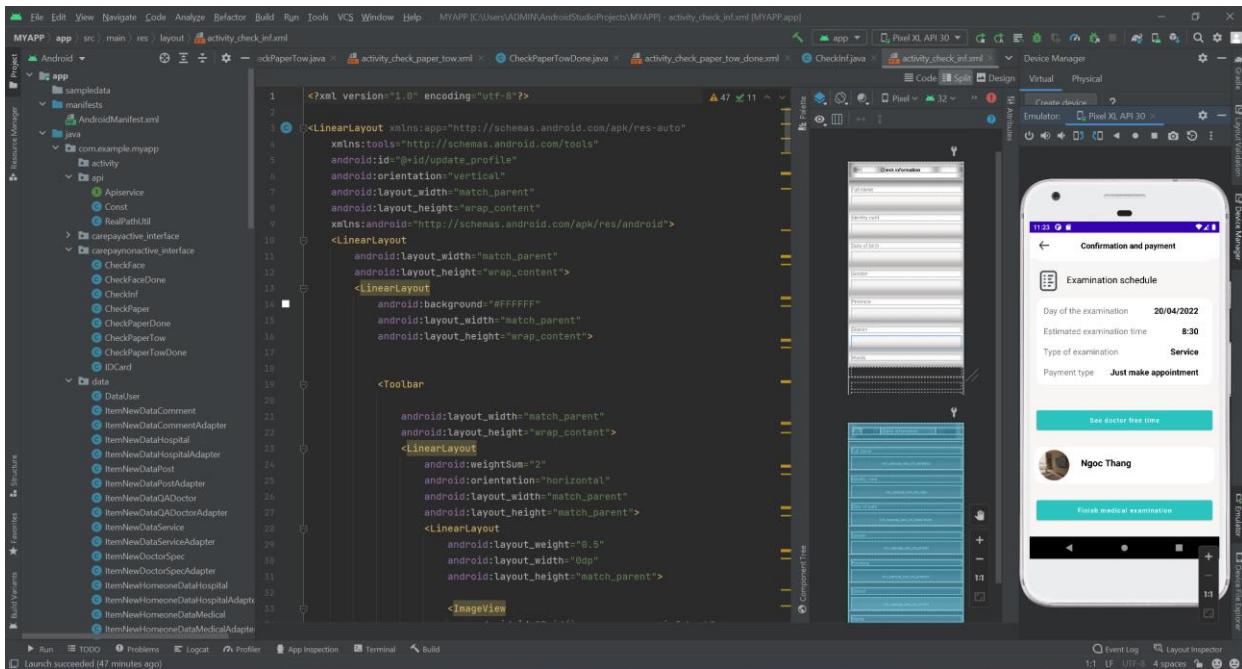


Figure 98: Android studio.

### Advantages of android studio

- Developed by Google, also the owner of the Android operating system
  - The latest and complete support and updated tools
- The features are easy to get used to and the interface is friendly, which is a big plus.
- There are complete and clear references and tutorials as well as forums for Android developers.

### Disadvantages of Android studio

- As an all-inclusive support tool, the data must be developed optimally. Large amounts of data take up a lot of your computer's memory space.
- Can check the app's working cash through the Android studio emulator, so it freezes, lags, heats up your computer and consumes a lot of laptop battery.
- Android is a powerful support programming tool with support and updates to the latest features, continuously from google. Google has fixed the problems of optimizing computer resources to reduce Android Studio being too heavy on old computers.

### 1.1.2 PyCharm.

PyCharm is a hybrid platform developed by JetBrains as an IDE for Python. It is commonly used for Python application development. Some unicorn organizations like Twitter, Facebook, Amazon and Pinterest also use PyCharm as their Python IDE. We can run PyCharm on Windows, Linux or Mac OS. In addition, it contains modules and packages that help programmers who develop software in Python save time and effort. Moreover, it can also be customized according to the requirements of the developers.

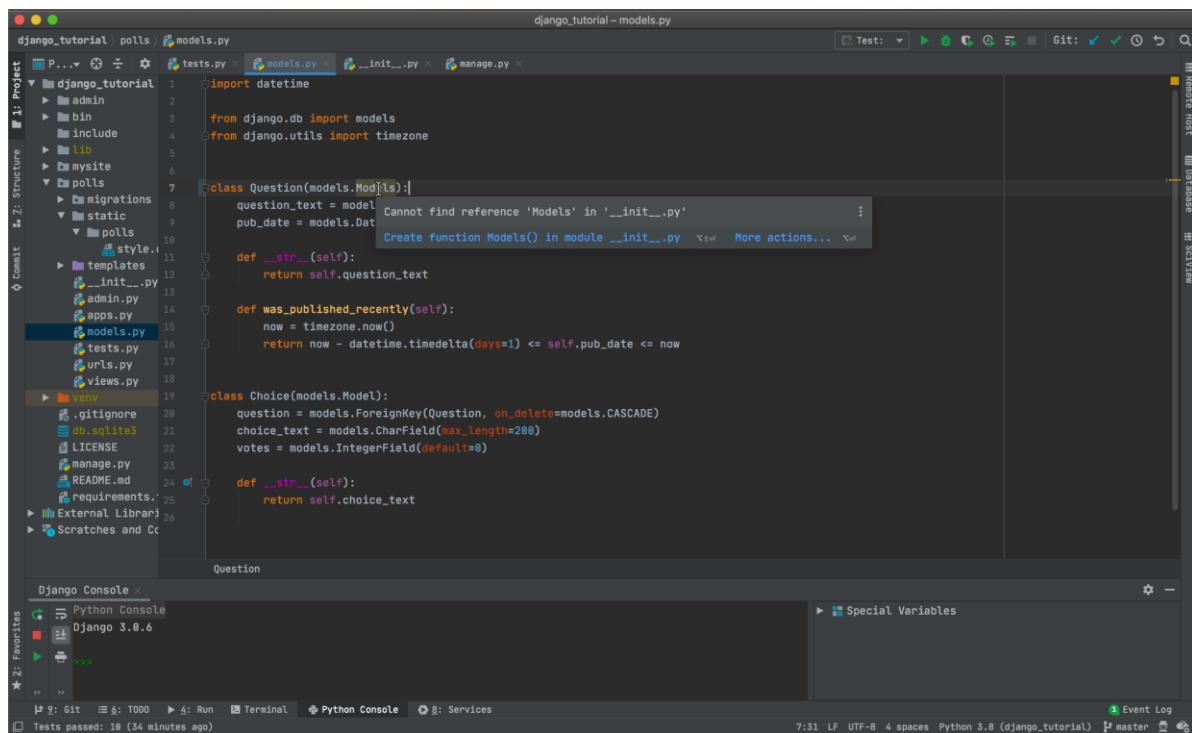


Figure 99: Pycharm.

#### Advantage

-Installing PyCharm is very easy.

-PyCharm is an easy to use IDE.

-There are many useful plugins and useful shortcuts in PyCharm.

-PyCharm integrates library and IDE features like autocomplete and coloring.

-It allows to view the source code in one click.

-Save software development time

-The feature of marking errors in the code further enhances the development process.

-The community of Python developers is huge and we can solve our questions/doubts easily.

## Defect

-PyCharm is not free and its Professional version is quite expensive.

Auto-complete feature is not good for newbie programmers

-It may cause problems while repairing tools like venv.

## 1.2 Design tool.

### 1.2.1 Visual paradigm.

Visual Paradigm Online Diagrams is a software solution Visual Paradigm Online Diagrams Reviews with functions and costs suitable for small and medium enterprises (SMEs) to large enterprises. Visual Paradigm Online Diagrams software is highly appreciated by both users and experts in the field of Customer Journey Mapping Software.

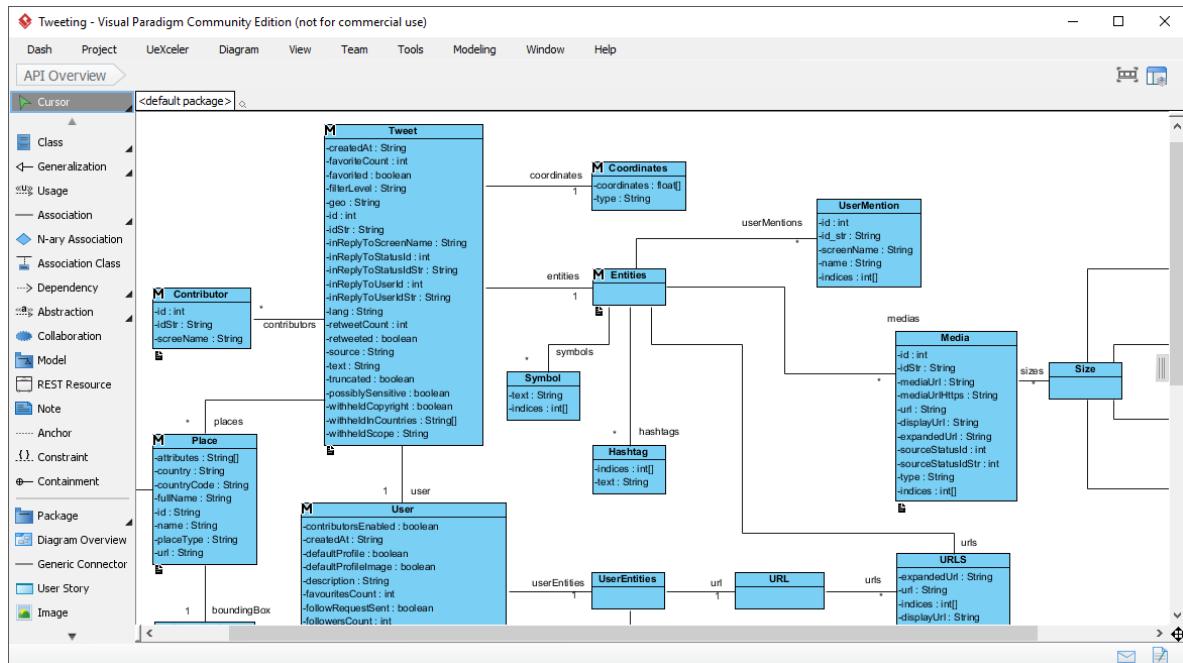


Figure 100: Visual paradigm.

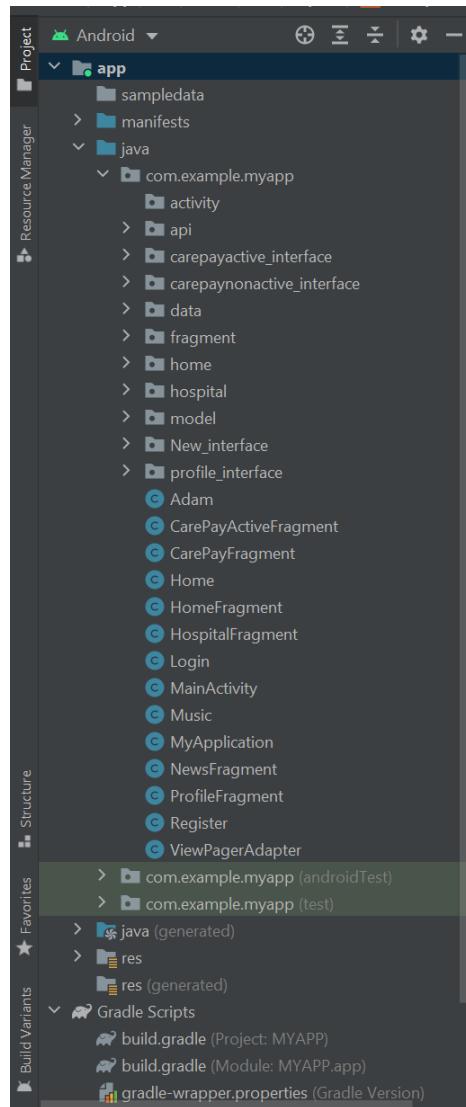
However, in terms of images, Visual Paradigm is still relatively limited (not diverse and vivid), so in many cases it cannot meet the requirements of users.

Another drawback is that Visual Paradigm is quite heavy and the free version is limited in some functions.

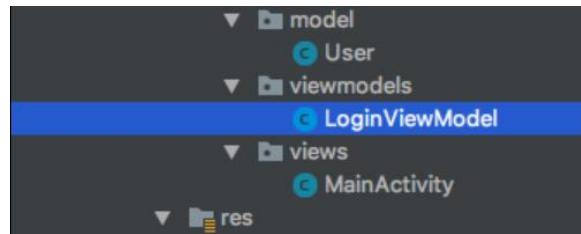
## 2. Code structure, class structure.

### 2.1 Front-end.

First, I divided my front-end code by main functions like Home, Hospital, Carepay, Carpay active, profile.

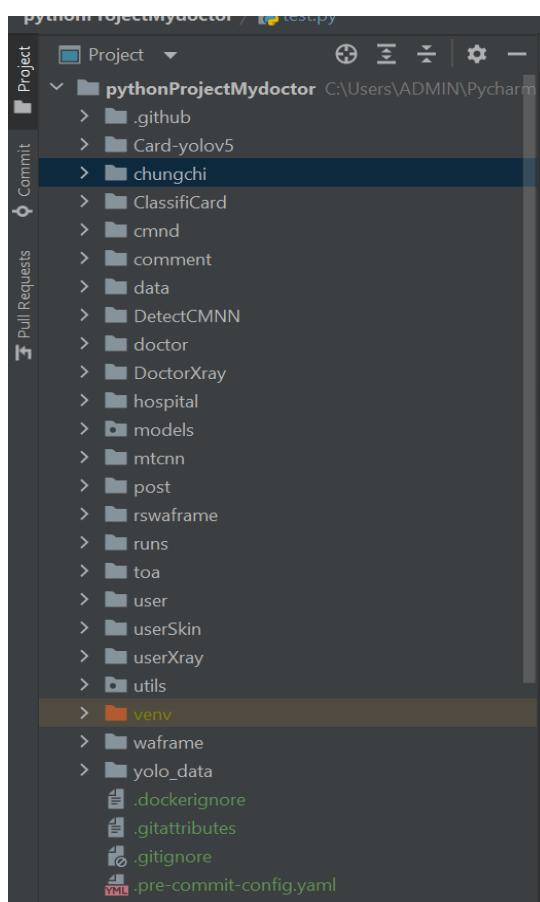


Then I execute the code according to MVVM for each small function.



## 2.1 Back-end.

For the back-end, I also divide it into handling main tasks such as face recognition, disease detection, and information retrieval from identity cards. App will be run at main and APIs will be written in unis.



## 3. Important classes / algorithms.

```

1  from __future__ import print_function, division
2  import torch
3  import torch.nn as nn
4  import torch.optim as optim
5  from torch.optim import lr_scheduler
6  import torch.backends.cudnn as cudnn
7  import numpy as np
8  import torchvision
9  from torchvision import datasets, models, transforms
10 import matplotlib.pyplot as plt
11 import time
12 import os
13 import copy
14 cudnn.benchmark = True
15 plt.ioff() # interactive mode
16 if __name__ == '__main__':
17     data_transforms = {
18         'train': transforms.Compose([
19             transforms.ToTensor(),
20             transforms.Normalize([0.485, 0.456, 0.406], [0.229, 0.224, 0.225])
21         ]),
22         'val': transforms.Compose([
23             transforms.ToTensor(),
24             transforms.Normalize([0.485, 0.456, 0.406], [0.229, 0.224, 0.225])
25         ]),
26     }
27     data_dir = 'datacard-non'
28     image_datasets = {x: datasets.ImageFolder(os.path.join(data_dir, x),
29                                              data_transforms[x])
30                       for x in ['train', 'val']}
31     dataloaders = {x: torch.utils.data.DataLoader(image_datasets[x], batch_size=4,
32                                                   shuffle=True, num_workers=4)
33                   for x in ['train', 'val']}
34     dataset_sizes = {x: len(image_datasets[x]) for x in ['train', 'val']}
35
36     dataset_sizes = {x: len(image_datasets[x]) for x in ['train', 'val']}
37     class_names = image_datasets['train'].classes
38
39     device = torch.device("cuda:0" if torch.cuda.is_available() else "cpu")
40     print(device)
41     def imshow(inp, title=None):
42         inp = inp.numpy().transpose((1, 2, 0))
43         mean = np.array([0.485, 0.456, 0.406])
44         std = np.array([0.229, 0.224, 0.225])
45         inp = std * inp + mean
46         inp = np.clip(inp, 0, 1)
47         plt.imshow(inp)
48         if title is not None:
49             plt.title(title)
50         plt.pause(0.001)
51     inputs, classes = next(iter(dataloaders['train']))
52     out = torchvision.utils.make_grid(inputs)
53     imshow(out, title=[class_names[x] for x in classes])
54     def train_model(model, criterion, optimizer, scheduler, num_epochs=25):
55         since = time.time()
56         best_model_wts = copy.deepcopy(model.state_dict())
57         best_acc = 0.0
58         for epoch in range(num_epochs):
59             print('Epoch {}/{}'.format(epoch, num_epochs - 1))
60             print('-' * 10)
61             # Each epoch has a training and validation phase
62             for phase in ['train', 'val']:
63                 if phase == 'train':
64                     model.train() # Set model to training mode
65                 else:
66                     model.eval() # Set model to evaluate mode

```

```

64         model.eval()    # Set model to evaluate mode
65         running_loss = 0.0
66         running_corrects = 0
67         for inputs, labels in dataloaders[phase]:
68             inputs = inputs.to(device)
69             labels = labels.to(device)
70             optimizer.zero_grad()
71             with torch.set_grad_enabled(phase == 'train'):
72                 outputs = model(inputs)
73                 _, preds = torch.max(outputs, 1)
74                 loss = criterion(outputs, labels)
75                 if phase == 'train':
76                     loss.backward()
77                     optimizer.step()
78                     running_loss += loss.item() * inputs.size(0)
79                     running_corrects += torch.sum(preds == labels.data)
80                 if phase == 'train':
81                     scheduler.step()
82                 epoch_loss = running_loss / dataset_sizes[phase]
83                 epoch_acc = running_corrects.double() / dataset_sizes[phase]
84                 print('{0} Loss: {:.4f} Acc: {:.4f}'.format(
85                     phase, epoch_loss, epoch_acc))
86                 if phase == 'val' and epoch_acc > best_acc:
87                     best_acc = epoch_acc
88                     best_model_wts = copy.deepcopy(model.state_dict())
89             time_elapsed = time.time() - since
90             print('Training complete in {:.0f}m {:.0f}s'.format(
91                 time_elapsed // 60, time_elapsed % 60))
92             print('Best val Acc: {:.4f}'.format(best_acc))
93
94         # load best model weights
95
96         # load best model weights
97         model.load_state_dict(best_model_wts)
98         return model, best_model_wts
99
100 def visualize_model(model, num_images=6):
101     was_training = model.training
102     model.eval()
103     images_so_far = 0
104     fig = plt.figure()
105
106     with torch.no_grad():
107         for i, (inputs, labels) in enumerate(dataloaders['val']):
108             inputs = inputs.to(device)
109             labels = labels.to(device)
110
111             outputs = model(inputs)
112             _, preds = torch.max(outputs, 1)
113             for j in range(inputs.size()[0]):
114                 images_so_far += 1
115                 ax = plt.subplot(num_images//2, 2, images_so_far)
116                 ax.axis('off')
117                 ax.set_title('predicted: {}'.format(class_names[preds[j]]))
118                 imshow(inputs.cpu().data[j])
119
120             if images_so_far == num_images:
121                 model.train(mode=was_training)
122                 return
123
124     model_ft = models.resnet18(pretrained=True)
125     num_ftrs = model_ft.fc.in_features
126     model_ft.fc = nn.Linear(num_ftrs, 2)
127
128     model_ft = model_ft.to(device)
129     criterion = nn.CrossEntropyLoss()
130     optimizer_ft = optim.SGD(model_ft.parameters(), lr=0.001, momentum=0.9)
131     exp_lr_scheduler = lr_scheduler.StepLR(optimizer_ft, step_size=7, gamma=0.1)
132     model_ft, save = train_model(model_ft, criterion, optimizer_ft, exp_lr_scheduler,
133                                 num_epochs=25)
134     torch.save(save, 'datacard-best.pth')
135

```

Above are some of my important algorithms to help AI learn to distinguish whether an Image is an ID card or not.

```

data_transforms = {
    'train': transforms.Compose([
        transforms.ToTensor(),
        transforms.Normalize([0.485, 0.456, 0.406], [0.229, 0.224, 0.225])
    ]),
    'val': transforms.Compose([
        transforms.ToTensor(),
        transforms.Normalize([0.485, 0.456, 0.406], [0.229, 0.224, 0.225])
    ]),
}
data_dir = 'datacard-non'
image_datasets = {x: datasets.ImageFolder(os.path.join(data_dir, x),
                                          data_transforms[x])
                  for x in ['train', 'val']}
dataloaders = {x: torch.utils.data.DataLoader(image_datasets[x], batch_size=4,
                                              shuffle=True, num_workers=4)
               for x in ['train', 'val']}
dataset_sizes = {x: len(image_datasets[x]) for x in ['train', 'val']}
class_names = image_datasets['train'].classes

```

First enhanced the data by taking the images to transform into another image by flipping the image, rotating the image... Then the Normalize image. The Normalize helps the image to learn more quickly. After Normalize the values on the image (0-255) will be from 0 - 1 or -1 - 1 that makes the layers calculate faster and the machine learn better.

```
device = torch.device("cuda:0" if torch.cuda.is_available() else "cpu")
```

Using CPU will help the computer to calculate faster.

```

model_ft = models.resnet50(pretrained=True)
num_ftrs = model_ft.fc.in_features
model_ft.fc = nn.Linear(num_ftrs, 2)
model_ft = model_ft.to(device)
criterion = nn.CrossEntropyLoss()
optimizer_ft = optim.SGD(model_ft.parameters(), lr=0.001, momentum=0.9)

exp_lr_scheduler = lr_scheduler.StepLR(optimizer_ft, step_size=7, gamma=0.1)

```

I used model Resnet50 to train model. Besides, the transfer learning method helps my model learn the available weights and at the same time learn more of my images to increase accuracy.

I have used the loss function function, CrossEntropyLoss, this function helps us define the loss between y and ypre, thereby helping the model learn more effectively at the next learning times. The main aim of all machine learning and deep learning problems is to optimize the loss function. lr=0.001, momentum=0.9 represent their learning rate and momentum each time they encounter an obstacle in the learning process.

```
for epoch in range(num_epochs):
    print('Epoch {} / {}'.format(epoch, num_epochs - 1))
    print('-' * 10)
    # Each epoch has a training and validation phase
    for phase in ['train', 'val']:
        if phase == 'train':
            model.train() # Set model to training mode
        else:
            model.eval() # Set model to evaluate mode
        running_loss = 0.0
        running_corrects = 0
        for inputs, labels in dataloaders[phase]:
            inputs = inputs.to(device)
            labels = labels.to(device)
            optimizer.zero_grad()
            with torch.set_grad_enabled(phase == 'train'):
                outputs = model(inputs)
                _, preds = torch.max(outputs, 1)
                loss = criterion(outputs, labels)
                if phase == 'train':
                    loss.backward()
                    optimizer.step()
                running_loss += loss.item() * inputs.size(0)
                running_corrects += torch.sum(preds == labels.data)
        if phase == 'train':
            scheduler.step()
        epoch_loss = running_loss / dataset_sizes[phase]
        epoch_acc = running_corrects.double() / dataset_sizes[phase]
```

```

    if phase == 'train':
        scheduler.step()
        epoch_loss = running_loss / dataset_sizes[phase]
        epoch_acc = running_corrects.double() / dataset_sizes[phase]
        print('{} Loss: {:.4f} Acc: {:.4f}'.format(
            phase, epoch_loss, epoch_acc))
        if phase == 'val' and epoch_acc > best_acc:
            best_acc = epoch_acc
            best_model_wts = copy.deepcopy(model.state_dict())
    time_elapsed = time.time() - since
    print('Training complete in {:.0f}m {:.0f}s'.format(
        time_elapsed // 60, time_elapsed % 60))
    print('Best val Acc: {:.4f}'.format(best_acc))

    # load best model weights
    model.load_state_dict(best_model_wts)
    return model, best_model_wts
def visualize_model(model, num_images=6):

```

When training model with epoch one at a time all my images will go through adding batch to train model . The model will rely on the loss function and the inverse derivative, forward with the kernels to find the best weight after each iteration.

## 4. Important API / Libraries.

### 4.1 Important API.

```
@app.route('/FaceImage', methods=['GET', 'POST'])
def handle_request():
    if flask.request.method == 'POST':
        imagefile = flask.request.files['image']
        filename = werkzeug.utils.secure_filename(imagefile.filename)
        imagefile.save(filename)
        data_uri = base64.b64encode(open(filename, 'rb').read()).decode('utf-8')
        im = Image.open(BytesIO(base64.b64decode(data_uri)))
        im.save('FACE.png', 'PNG')
        link = 'FACE.png'
        out = detectFace(link=link)
        print(out)

        if len(out) != 0:
            return "success"
        else:
            return 'success' # fail
    return "fail"
```

Above is the system's API to identify whether it's a human face or not

```
@app.route('/DoctorFrontImage', methods=['GET', 'POST'])
def handle_request11():
    if flask.request.method == 'POST':
        imagefile = flask.request.files['image']
        filename = werkzeug.utils.secure_filename(imagefile.filename)
        imagefile.save(filename)
        data_uri = base64.b64encode(open(filename, 'rb').read()).decode('utf-8')
        im = Image.open(BytesIO(base64.b64decode(data_uri)))
        im.save('DOCTORFRONT.png', 'PNG')
        link = 'DOCTORFRONT.png'
        out1, out2 = predictcardfront(link=link)

        if out1 >= -10:#1.8
            return "success"
        else:
            return 'success' # fail
    return "fail"
```

Above is the system's API to identify whether it has a doctor's certificate or not

## 4.2 Important libraries.

### TensorFlow :

A few years ago, when dealing with huge amounts of data, deep learning began to outperform

all other machine learning algorithms. Google soon realized this potential and thought they should use deep neural networks to improve their services, including:

- Gmail.
- Picture
- Google search engine

So they built a framework called TensorFlow so that researchers and developers can work together on the A.I model. Once fully developed and scaled, many people were able to use it.

First released in late 2015, the stable version of TensorFlow finally arrived in 2017. As open source under the license of Apache Open Source, you can now use, adapt, and re-contribute that modified version, in exchange for not having to pay a dime to Google.

## **PyTorch**

Pytorch is a framework developed by Facebook. This is a technology giant that invests a lot of resources in the development of Artificial Intelligence. Pytorch is developed with an open source license so it makes for a very large community. A large community means a lot of resources to learn and your problems may have already been solved by someone else. share with the community. Pytorch along with Tensorflow and Keras is one of the popular frameworks used in Deep Learning problems today. In particular, in research fields, almost all authors use pytorch to develop their problems. Pytorch shows its advantage in the research field because it is very easy for you to debug and visualize, in addition it follows the Dynamic Graphs mechanism that allows to reduce the time to train the model.

## **5. The Development Environment.**

Operating System (Operating System) Everyone is an Android application that can be programmed on all 3 of the most popular operating system platforms today: Microsoft Windows, Linux and Mac.

Java Development Kit, sure, because Android apps are written in Java, so this JDK is needed so other tools can use it to compile Java source code. Even if you use Kotlin as I mentioned above to replace Java in applications, you still need this

JDK, because Kotlin still makes use of the JVM virtual machine inside the JDK.

### Android Software Development Kit (SDK)

Similar to JDK, Android SDK is Android Development Kit. This SDK will provide me with a set of necessary libraries and tools so that I can build, test and debug the Android applications that I am about to develop.

### Android Studio

Finally Wire is a tool with which we will interact directly and permanently.

Android Studio provides me with an intuitive interface so that I can code, edit, compile, debug, manage memory, etc. everything needed for us to build software on it.

## 6. Technical problem & solutions.

```
* Running on http://192.168.1.149:5000/ (Press CTRL+C to quit)
192.168.1.149 - - [20/Apr/2022 12:41:06] "POST /login HTTP/1.1" 500 -
Traceback (most recent call last):
File "C:\Users\ADMIN\anaconda3\envs\pythonProjectMydoctor\lib\site-packages\flask\app.py", line 2091, in __call__
    return self.wsgi_app(environ, start_response)
File "C:\Users\ADMIN\anaconda3\envs\pythonProjectMydoctor\lib\site-packages\flask\app.py", line 2076, in wsgi_app
    response = self.handle_exception(e)
File "C:\Users\ADMIN\anaconda3\envs\pythonProjectMydoctor\lib\site-packages\flask\app.py", line 2073, in wsgi_app
    response = self.full_dispatch_request()
File "C:\Users\ADMIN\anaconda3\envs\pythonProjectMydoctor\lib\site-packages\flask\app.py", line 1519, in full_dispatch_request
    return self.finalize_request(rv)
File "C:\Users\ADMIN\anaconda3\envs\pythonProjectMydoctor\lib\site-packages\flask\app.py", line 1538, in finalize_request
    response = self.make_response(rv)
File "C:\Users\ADMIN\anaconda3\envs\pythonProjectMydoctor\lib\site-packages\flask\app.py", line 1702, in make_response
    f"The view function for {request.endpoint!r} did not"
TypeError: The view function for 'login_account' did not return a valid response. The function either returned None or ended without a return statement.
```

```
2022-04-20 10:59:12.123 502-502/? E/wifi_forwarder: qemu_pipe_open_ns:62: Could not connect to the 'pipe:qemud:wififoward' service: Invalid argument
2022-04-20 11:36:05.123 521-654/system_process E/ClipboardService: Denying clipboard access to org.chromium.webview_shell, application is not in focus nor is it a system service for user 0
```

Above is the error when at API post I forgot to return something to the front-end. I fixed it by writing returns to the front-end.

During the process, I also encountered many errors such as the accuracy of image classification is not high. To overcome them, I used transfer learning and data augmentation methods to retrain the model.

## 7. Build notes / Deployment notes.

### Step 1 :

push server and database to git

...or create a new repository on the command line

```
echo "# adapter" >> README.md
git init
git add README.md
git commit -m "first commit"
git branch -M main
git remote add origin https://github.com/thang20/adapter.git
git push -u origin main
```

...or push an existing repository from the command line

```
git remote add origin https://github.com/thang20/adapter.git
git branch -M main
git push -u origin main
```

...or import code from another repository

You can initialize this repository with code from a Subversion, Mercurial, or TFS project.

[Import code](#)

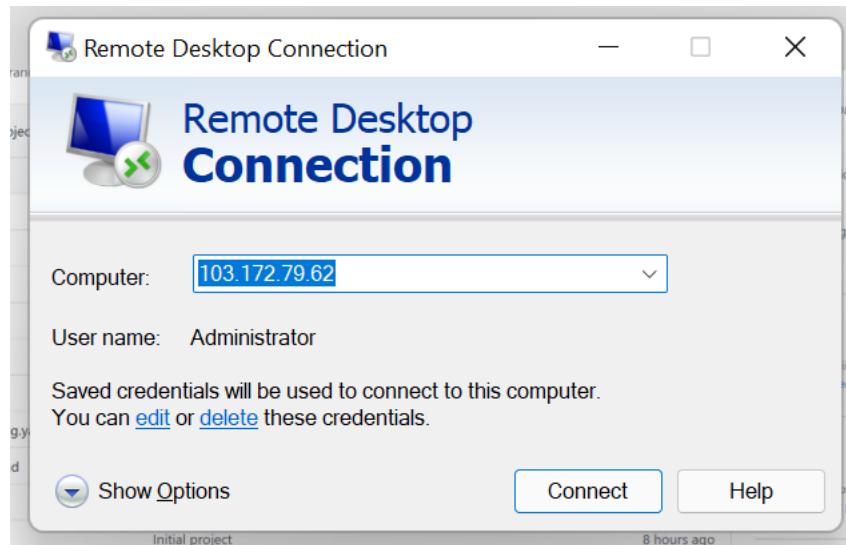
## Push success

The screenshot shows a GitHub repository page for 'thang20 / ProjectDoctor'. The repository is public and contains one branch ('main') and one commit ('7b39a8e' pushed 8 hours ago). The commit message is 'Initial project'. The repository has 0 stars, 1 watching, and 0 forks. There are sections for 'About', 'Releases', 'Packages', and 'Languages'.

File	Description	Last Commit
ClassifiCard	Initial project	8 hours ago
models	Initial project	8 hours ago
mtcnn	Initial project	8 hours ago
utils	Initial project	8 hours ago
.dockernignore	Initial project	8 hours ago
.gitattributes	Initial project	8 hours ago
.gitignore	Initial project	8 hours ago
pre-commit-config.yaml	Initial project	8 hours ago
CONTRIBUTING.md	Initial project	8 hours ago
Dockerfile	Initial project	8 hours ago
LICENSE	Initial project	8 hours ago
README.md	Initial project	8 hours ago

## Step 2 :

Connect to VPS



then setup environment for VPS including: xampp, pycharm, python, pip, library for server.

The screenshot displays a desktop interface with several open windows:

- XAMPP Control Panel v3.3.0**: Shows services like Apache, MySQL, FileZilla, Mercury, and Tomcat. Apache is running (PID 8496). MySQL is also listed.
- PyCharm IDE**: An open project named "ProjectDoctor" containing files main.py, detectt.py, and unit.py. The code uses Flask routes for hospital, dataonehospital, and datanerelative endpoints.
- Terminal Window**: Shows Python 3.9 running on port 5000. It displays logs indicating successful startup on both local host (127.0.0.1) and the VPS IP (103.172.79.62).

```

WARNING. THIS IS A DEVELOPMENT SERVER. DO NOT USE IT IN A PROD
* Running on http://127.0.0.1:5000
* Running on http://103.172.79.62:5000 (Press CTRL+C to quit)
* Restarting with stat
2022-04-26 17:33:25.402985: W tensorflow/stream_executor/platform/default/dso_loader.cc:64] Could not load dynamic library 'cudart64_110.dll'; dlopen error: cudart64_110.dll: cannot open shared object file: No such file or directory
2022-04-26 17:33:25.403164: I tensorflow/stream_executor/cuda/cudart_stub.cc:29] Ignore above cudart dlopen error if you do not have a GPU set up on your machine.
* Debugger is active!
* Debugger PIN: 565-308-766
  
```

## 8. List of the tasks or items of sprints

The Product Backlog is a curated and prioritized list of desired features for a product. Items with higher priority are at the top of the list and will be selected by the Developers for early production, lower priority items will be at the bottom of the list and developed later. This is the sole source of work undertaken by the Scrum Team.

**Here is my product backlog**

	I want to be able to	Priority	Sprint	Status
Client/Doctor/Admin	All users can create an account	Must	1	Done
Client/Doctor/Admin	All users can login	Must	1	Done
Client	Client can see the complete interface of home	Must	1	Done
Client/Doctor/Admin	Users can set alarms	Should	1	Done
Client/Doctor	Users can send contribute	Should	1	Done
Client/Doctor/Admin	Users can set the notification toggle	Should	1	Done
Client/Doctor/Admin	Users can change the password	Should	1	Done
Client/Doctor/Admin	Users can call the hotline	Must	1	Not done
Client/Doctor/Admin	Users can view the app's Facebook page	Must	1	Done
Client/Doctor/Admin	Users can view the terms of the app	Must	1	Done

Client/Doctor/Admin	Users can see the app's introduction	Must	1	Done
Doctor	Users can logout	Must	1	Done
Client/Doctor	Users can set lock for their account.	Should	1	Done
Client/Doctor	Users can see profile interface	Must	1	Done
Client/Doctor	User can update profile	Must	1	Done
Client/Doctor	User can exchange money from <u>carepay</u> to reward points	Must	1	Done

Client	Client can add their family profile	Must	1	Done
Client/Doctor	User can enter and receive increased gift code.	Must	1	Done
Client/Doctor/Admin	User can declare health	Must	1	Done
Client	Client can view all appointments they have booked	Must	1	Not done
Client/Doctor	Users can view their transaction history	Must	1	Done
Doctor	Doctor can register as a doctor	Must	2	Done
Doctor	Doctor can see the doctor profile	Must		Not done
Admin	Admin can see all hospitals and delete empty hospital information	Must	2	Done

Admin	Admin can view a set of doctors for doctor's test at home appointments	Must	2	Done
Admin	Admin can see all clients and their information	Must	2	Done
Admin	Admin can see all doctor and their information	Must	2	Done
Admin	Admin can see all contributions from users	Must	2	Done
Admin	Admin can see all medical	Must	2	Done

	declarations			
Admin	Admin can see all gift codes and add or remove them	Must	2	Done
Admin	Admin can see all services and add or remove them	Must	2	Done
Client/Doctor	Users can transfer money to account or card.	Must	2	Done
Client/Doctor	Users can see directions to the hospital	Must	2	Not done
Client/Doctor	Users can see everyone's posts	Must	2	Done
Client/Doctor	Users can like and comment on everyone's posts	Must	2	Done
Client/Doctor	Users can donate to children with serious illnesses	Must	2	Done
Client/Doctor/Admin	Users can view invite friends to download the app	Should	2	Done
Doctor	Doctor can enable/disable call status	Must	2	Done

Client/Doctor	Users can register to create a <u>carepay</u> account	Must	3	Done
Client/Doctor	Users can Scanning payment code	Must	3	Done
Client/Doctor	Users can deposit money from the card into <u>carepay</u>	Must	3	Done
Client/Doctor	Users can withdraw money	Must	3	Done

	from <u>carepay</u> to the card			
Client/Doctor	User has a <u>carepay</u> link to a bank account	Must	3	Done
Client/Doctor	User can view their <u>carepay</u> information.	Must	3	Not done
Doctor	Doctors can view their appointments with patients	Must	3	Done
Doctor	Doctor can prescribe medicine	Must	3	Done
Doctor	Doctor can view all prescriptions online	Must	3	Done
Doctor	Doctor can answer questions from patients	Must	3	Done
Doctor	Doctor can register as a doctor to diagnose diseases through photos	Must	3	Done
Client	Client can ask the doctor questions	Must	3	Done
Client	Client can buy some medical services they want	Must	3	Not done
Client	Client can view all hospitals	Must	3	Done

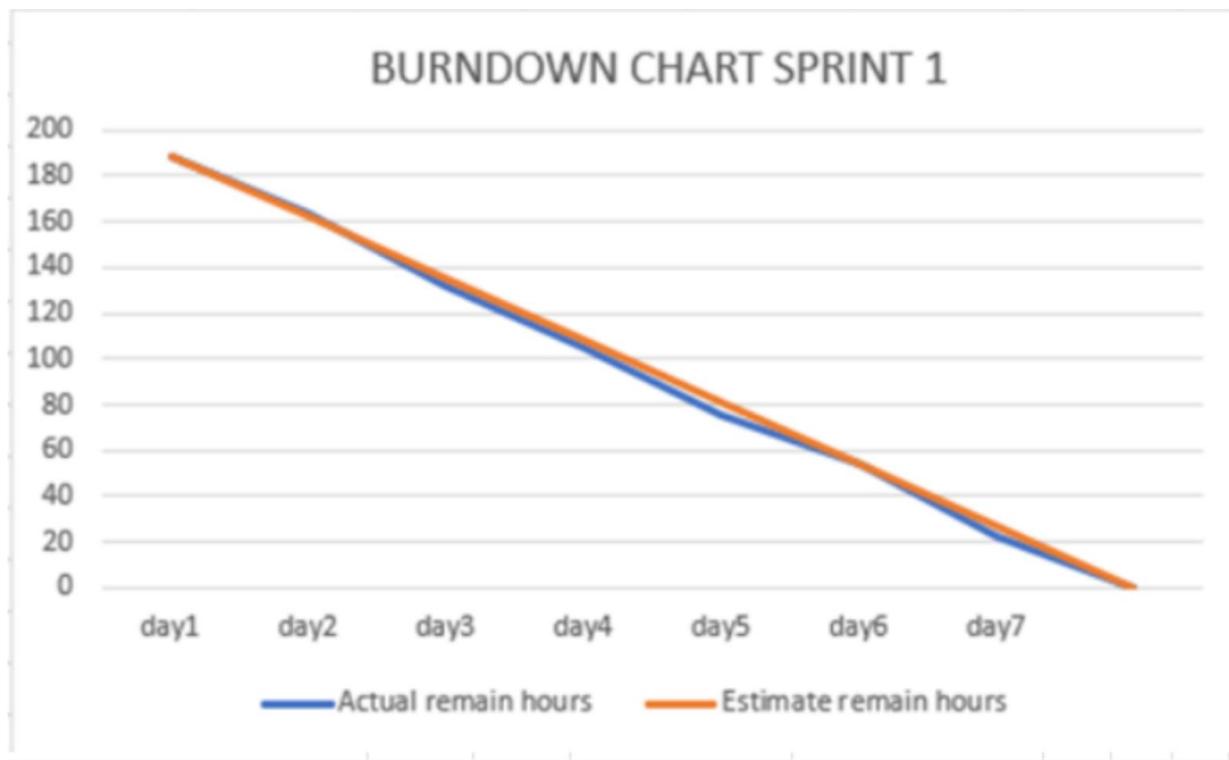
## Sprint 1

User story	Priority	Status	Member	Estimate hours	D1	D2	D3	D4	D5	D6	D7
All users can create an account	Must	Done	Nguyễn Ngọc Thắng	6	1	2	0	0	4	4	0
All users can login	Must	Done	Nguyễn Ngọc Thắng	7	1	0	1	2	1	0	2
Client can see the complete interface of home	Must	Done	Nguyễn Ngọc Thắng	8	0	0	0	2	2	1	2
Users can set lock for their account.	Must	Done	Nguyễn Ngọc Thắng	8	0	0	1	2	1	0	2
Users can see profile interface	Must	Done	Nguyễn Ngọc Thắng	9	0	0	0	2	0	2	0
User can update profile	Must	Done	Nguyễn Ngọc Thắng	5	0	0	1	2	1	0	0
User can exchange money from <u>carepay</u> to reward points	Must	Done	Nguyễn Ngọc Thắng	4	0	0	1	0	1	0	0
Client can add their family profile	Must	Done	Nguyễn Ngọc Thắng	6	0	0	0	3	0	3	0

User can enter and receive increased gift code.	Must	Done	Nguyễn Ngọc Thắng	5	0	0	1	3	0	0	1
User can declare health	Must	Done	Nguyễn Ngọc Thắng	5	0	0	1	0	1	3	0
Client can view all appointments they have booked	Must	Done	Nguyễn Ngọc Thắng	4	1	1	1	3	2	3	2
Users can view invite friends to download the app	Must	Done	Nguyễn Ngọc Thắng	5	0	3	3	0	3	2	0
Users can set alarms	Must	Done	Nguyễn Ngọc Thắng	6	0	3	1	0	0	2	0
Users can send contribute	Must	Done	Nguyễn Ngọc Thắng	5	0	4	4	0	4	1	0
Users can set the notification toggle	Should	Done	Nguyễn Ngọc Thắng	4	0	4	1	0	0	1	0
Users can change the password	Should	Done	Nguyễn Ngọc Thắng	7	0	0	1	0	4	4	1
Users can call the hotline	Should	Done	Nguyễn Ngọc Thắng	1	0	0	1	0	0	0	0

						0	4	4	4	4	0	0
	Should	Done	Nguyễn Ngọc Thắng	1		0	0	1		1	0	0
	Should	Done	Nguyễn Ngọc Thắng	1		0	2	1	2	3	1	3
	Should	Done	Nguyễn Ngọc Thắng	1		0	0	1	2	1	0	2

## Burn down Chart

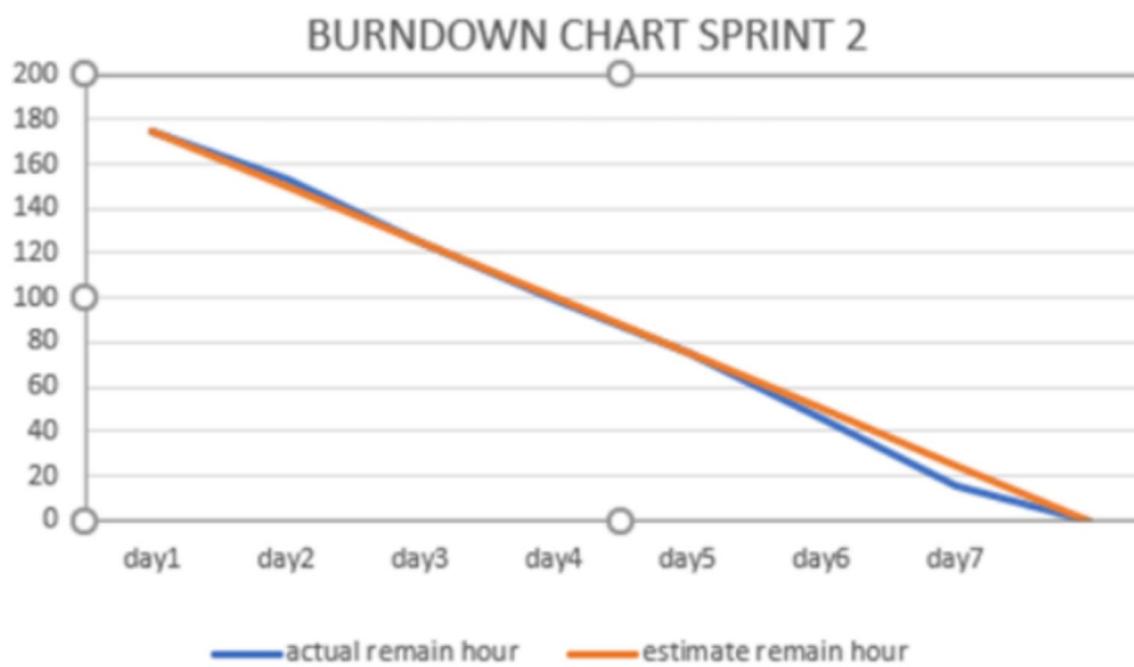


## Sprint 2

User story	Priority	Status	Member	Estimate hours	D1	D2	D3	D4	D5	D6	D7
Client can book an appointment	Must	Done	Nguyễn Ngọc Thắng	6	1	2	0	0	4	4	0
Client can book an appointment at home	Must	Done	Nguyễn Ngọc Thắng	7	1	0	1	2	1	0	2
Client can order a prescription online	Must	Done	Nguyễn Ngọc Thắng	8	0	0	0	2	2	1	2
Client can view all hospitals	Must	Done	Nguyễn Ngọc Thắng	8	0	0	1	2	1	0	2
Users can see directions to the hospital	Must	Done	Nguyễn Ngọc Thắng	9	0	0	0	2	0	2	0
Users can see everyone's posts	Must	Done	Nguyễn Ngọc Thắng	5	0	0	1	2	1	0	0
Users can like and comment on everyone's posts	Must	Done	Nguyễn Ngọc Thắng	4	0	0	1	0	1	0	0
Users can transfer money to account or card.	Must	Done	Nguyễn Ngọc Thắng	6	0	0	0	3	0	3	0
Tổng											
Users can donate to children with serious illnesses	Must	Done	Nguyễn Ngọc Thắng	5	0	0	1	3	0	0	1
Users can view invite friends to download the app	Must	Done	Nguyễn Ngọc Thắng	5	0	0	1	0	1	3	0
Doctor can register as a doctor	Must	Done	Nguyễn Ngọc Thắng	4	1	1	1	3	2	3	2
Doctor can see the doctor profile	Must	Done	Nguyễn Ngọc Thắng	5	0	3	3	0	3	2	0
Admin can see all hospitals and delete empty hospital information	Must	Done	Nguyễn Ngọc Thắng	6	0	3	1	0	0	2	0
Admin can view a set of doctors for doctor's test at home appointments	Must	Done	Nguyễn Ngọc Thắng	5	0	4	4	0	4	1	0
Admin can see all clients and their information	Should	Done	Nguyễn Ngọc Thắng	4	0	4	1	0	0	1	0

Admin can see all doctor and their information	Should	Done	Nguyễn Ngọc Thắng	7	0	0	1	0	4	4	1
Admin can see all contributions from users	Should	Done	Nguyễn Ngọc Thắng	1	0	0	1	0	0	0	0
Admin can see all medical declarations	Should	Done	Nguyễn Ngọc Thắng	1	0	4	4	4	4	0	0
Admin can see all gift codes and add or remove them	Should	Done	Nguyễn Ngọc Thắng	1	0	0	1		1	0	0
Admin can see all services and add or remove them	Should	Done	Nguyễn Ngọc Thắng	1	0	2	1	2	3	1	3

## Burn down Chart



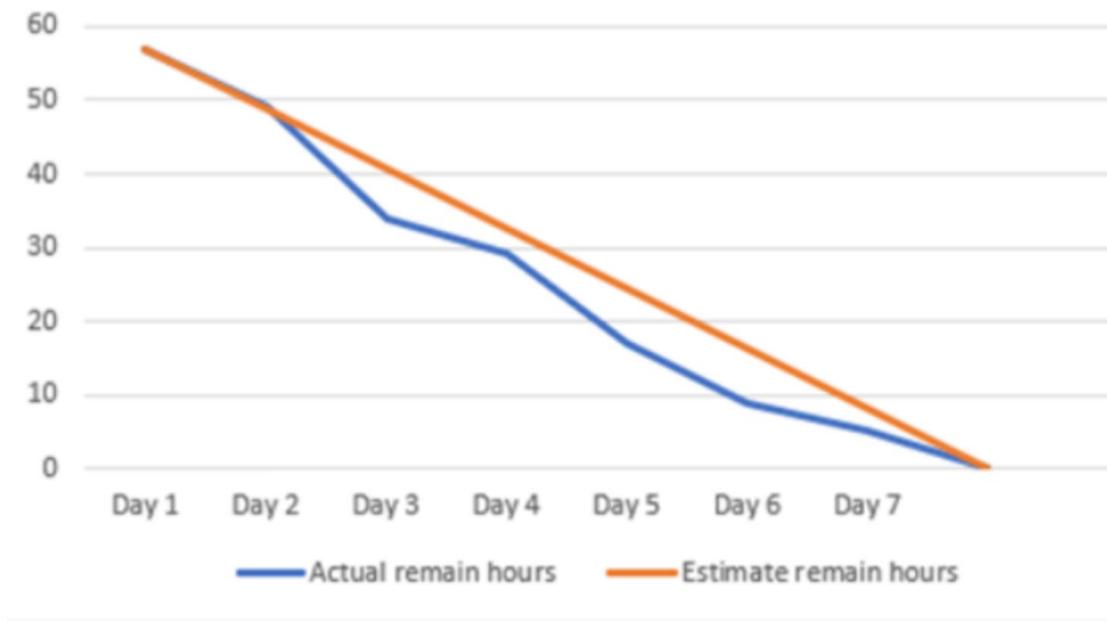
## Sprint 3

User story	Priority	Status	Member	Estimate hours	D1	D2	D3	D4	D5	D6	D7
Client can predict disease by x-ray image and skin disease photo	Must	Done	Nguyễn Ngọc Thắng	6	1	2	0	0	4	4	0
Client can call/chat with doctor	Must	Done	Nguyễn Ngọc Thắng	7	1	0	1	2	1	0	2
Client can ask the doctor questions	Must	Done	Nguyễn Ngọc Thắng	8	0	0	0	2	2	1	2
Client can buy some medical services they want	Must	Done	Nguyễn Ngọc Thắng	8	0	0	1	2	1	0	2
Client can view all hospitals	Must	Done	Nguyễn Ngọc Thắng	9	0	0	0	2	0	2	0
Users can like, comment can post articles	Must	Done	Nguyễn Ngọc Thắng	5	0	0	1	2	1	0	0
Users can register to create a carepay account	Must	Done	Nguyễn Ngọc Thắng	4	0	0	1	0	1	0	0

Users can Scanning payment code	Must	Done	Nguyễn Ngọc Thắng	6	0	0	0	3	0	3	0
Users can deposit money from the card into carepay	Must	Done	Nguyễn Ngọc Thắng	5	0	0	1	3	0	0	1

## Burn down Chart

## BURNDOWN CHART SPRINT 3



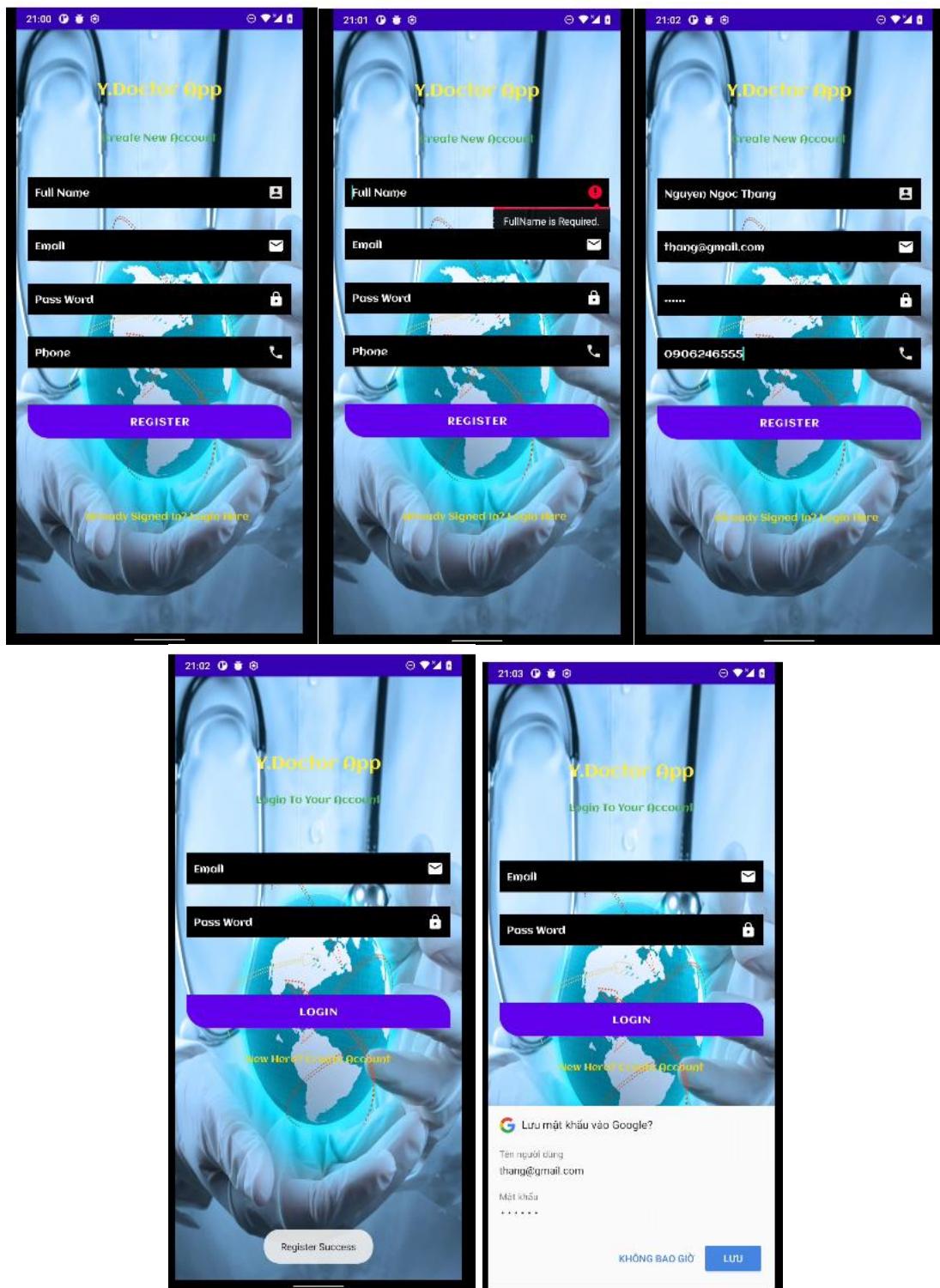
## VI. Evaluation

### 1. Results

#### Patient

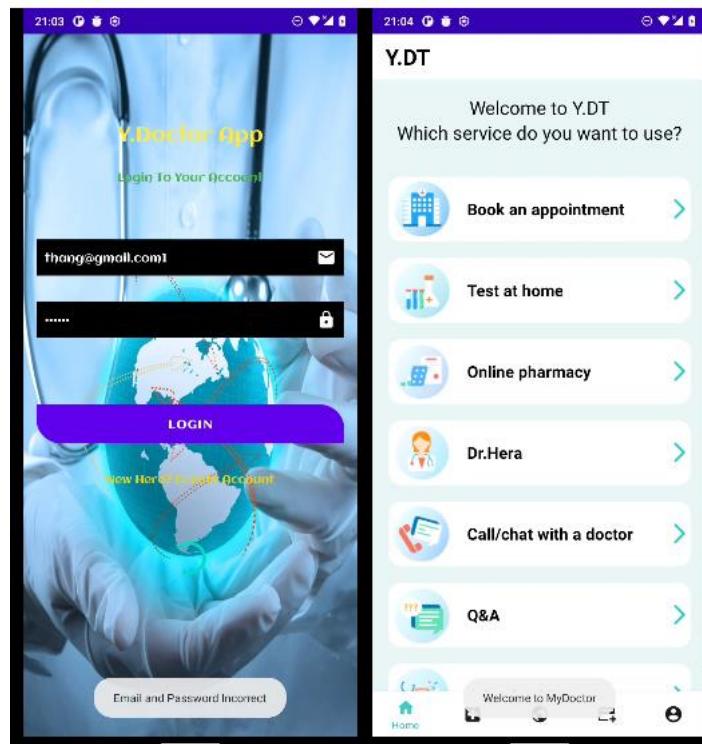
#### Register account

When users register, they need to provide full information such as Email, Full name, Password, Phone.



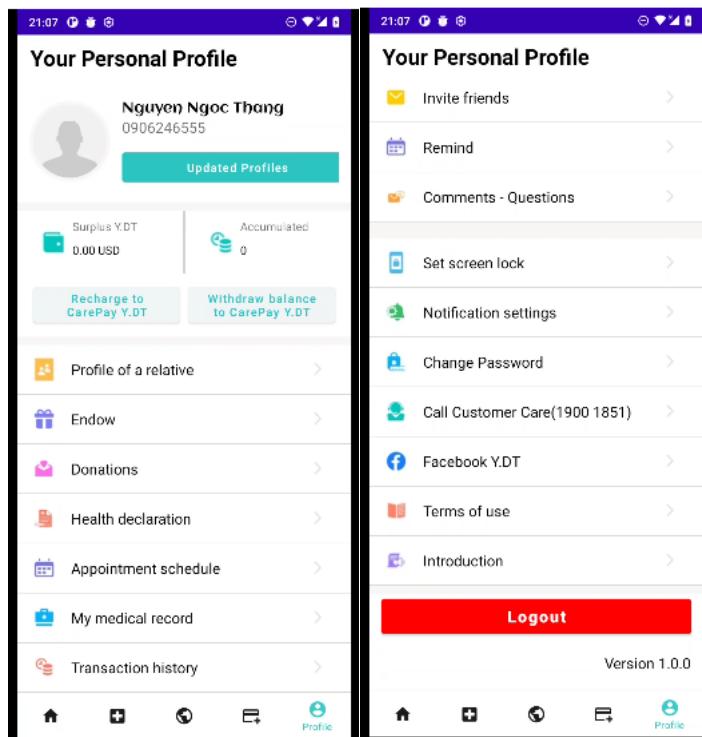
## Login account

When users log in, they need to provide Email and Password



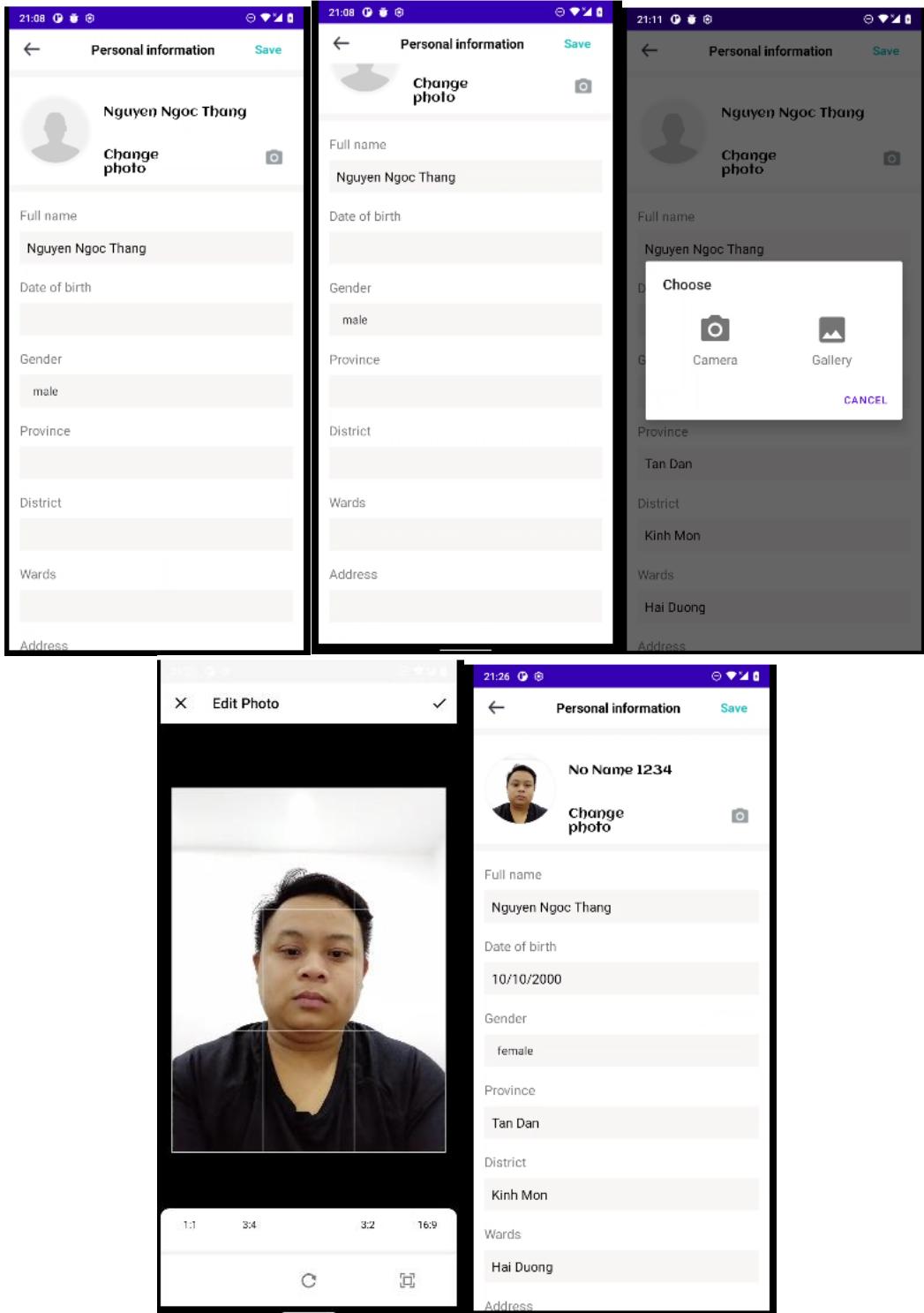
## Profile.

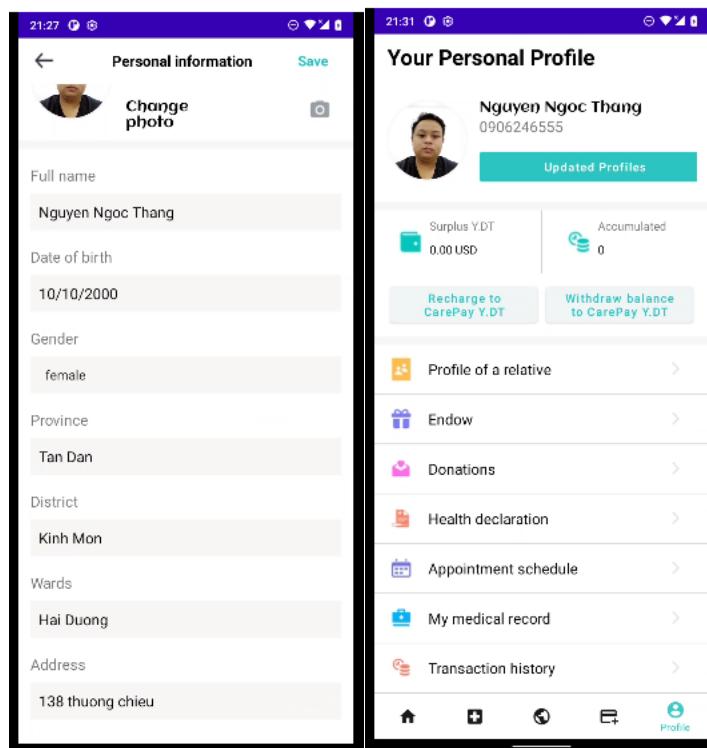
At the profile includes functions related to individual users.



## Update profile

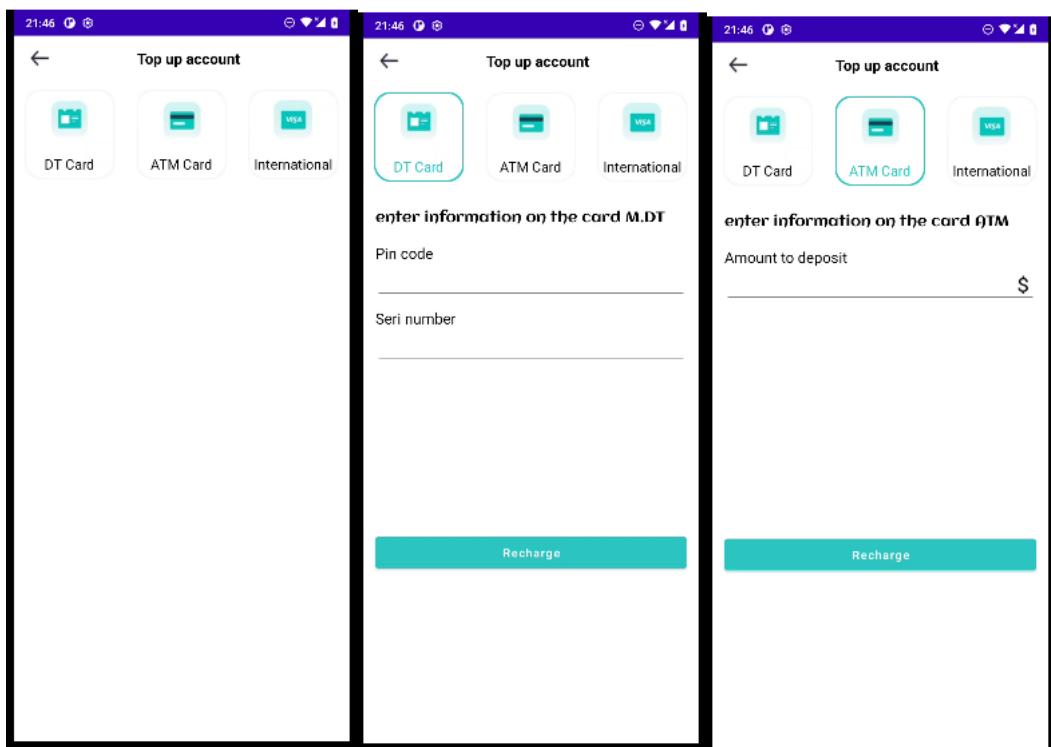
At update profile helps users update personal information about themselves.

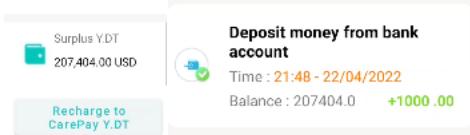
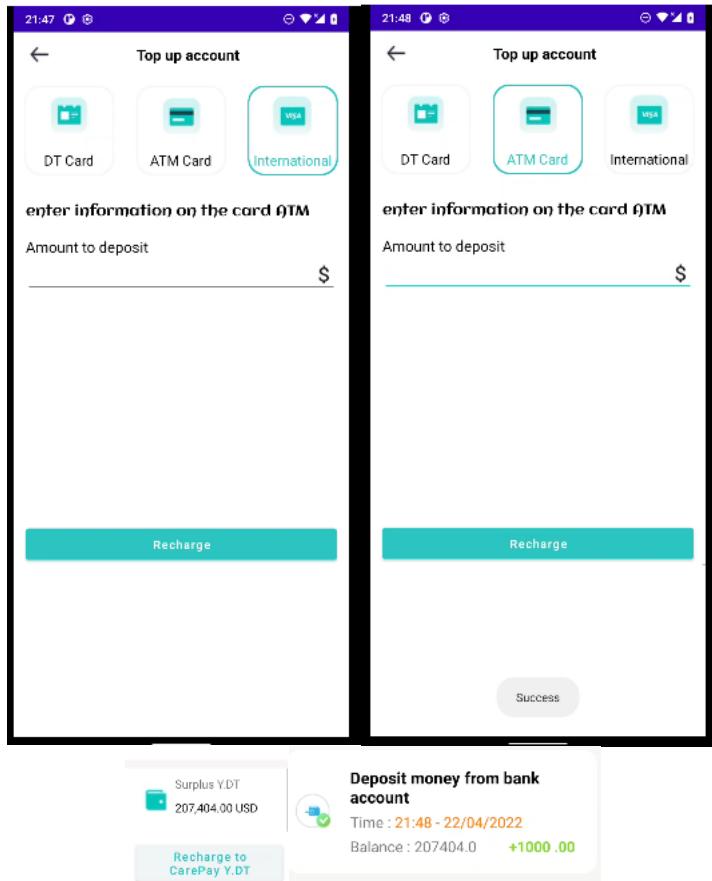




## Recharge.

Here users can top up money from bank cards to carepay.





## Accumulated points

Here users can use money in carepay to exchange for points

**1 USD = 100 points**

**USD**  
1000

**Withdrawal**

**Your Personal Profile**

**NGUYEN NGOC THANG**  
0972809182

**Updated Profiles**

**Surplus Y.DT**  
206,404.00 USD

**Accumulated**  
317,349

**Profile of a relative**

**Endow**

**Donations**

**Health declaration**

**Appointment schedule**

**My medical record**

**Transaction history**

**Redeem 10000 bonus points**

Time : 21:49 - 22/04/2022

Balance : 206404.0 -1000 .00

## Relative profile

Here the user can add or edit relative

**Bui Ngoc Bich (MOM)**

- Date of birth: 15/07/1973
- Phone number: 0906246666
- Address: House number: 174 Thuong Chieu  
Ward: Kinh mon District: Tan Dan  
Province: Hai Duong

**Nguyen Van Kien (DAD)**

- Date of birth: 07/04/1968
- Phone number: 0906246111
- Address: House number: 174 Thuong Chieu  
Ward: Kinh Mon District: Tan Dan  
Province: Hai Duong

**Nguyen Duc Truong (BRO)**

- Date of birth: 04/12/2003
- Phone number: 0869122003
- Address: House number: 174 Thuong Chieu  
Ward: Kinh Mon District: Tan Dan  
Province: Hai Duong

**Tran Duc Khlem (Friend)**

- Date of birth: 10/10/2000
- Phone number: 0979040836

**Add information**

Relative: Dad

Full name: Nguyen Van Kien

Phone: 0938218666

Date of birth: 22/04/1967

Gender: male

Province: Tan Dan

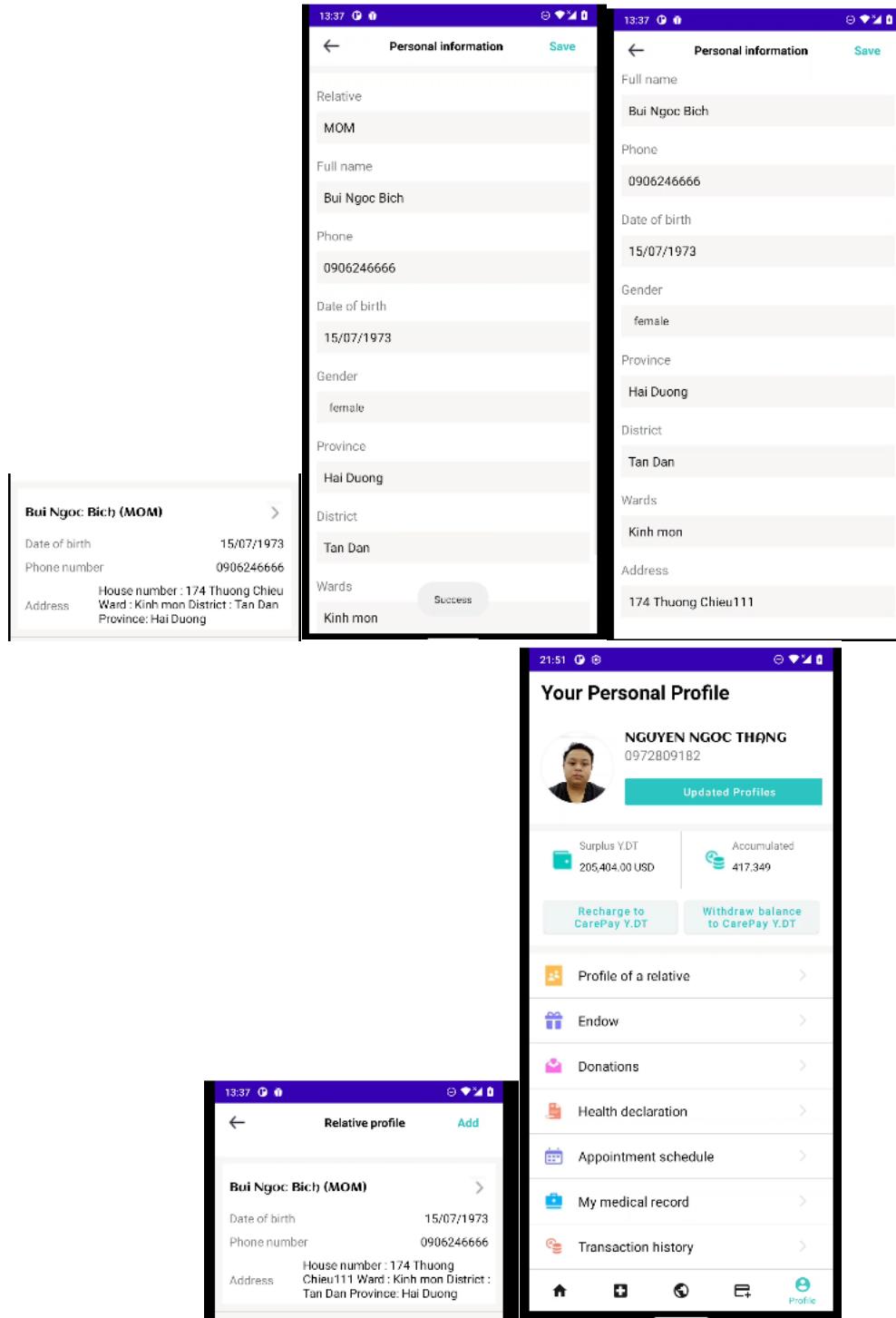
District: Kinh Mon

Wards: Hai Duong

Address: 136 Thuong Chieu

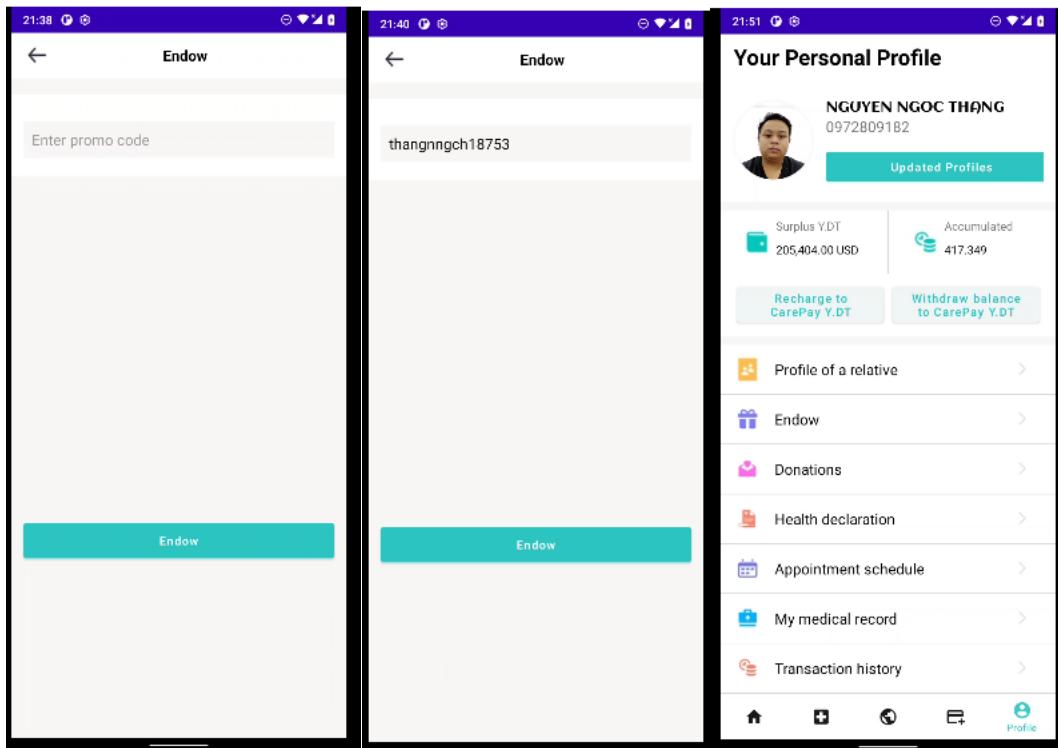
**Nguyen Van Kien (Dad)**

- Date of birth: 22/04/1967
- Phone number: 0938218666
- Address: House number: 136 Thuong Chieu  
Ward: Hai Duong District: Kinh Mon  
Province: Tan Dan



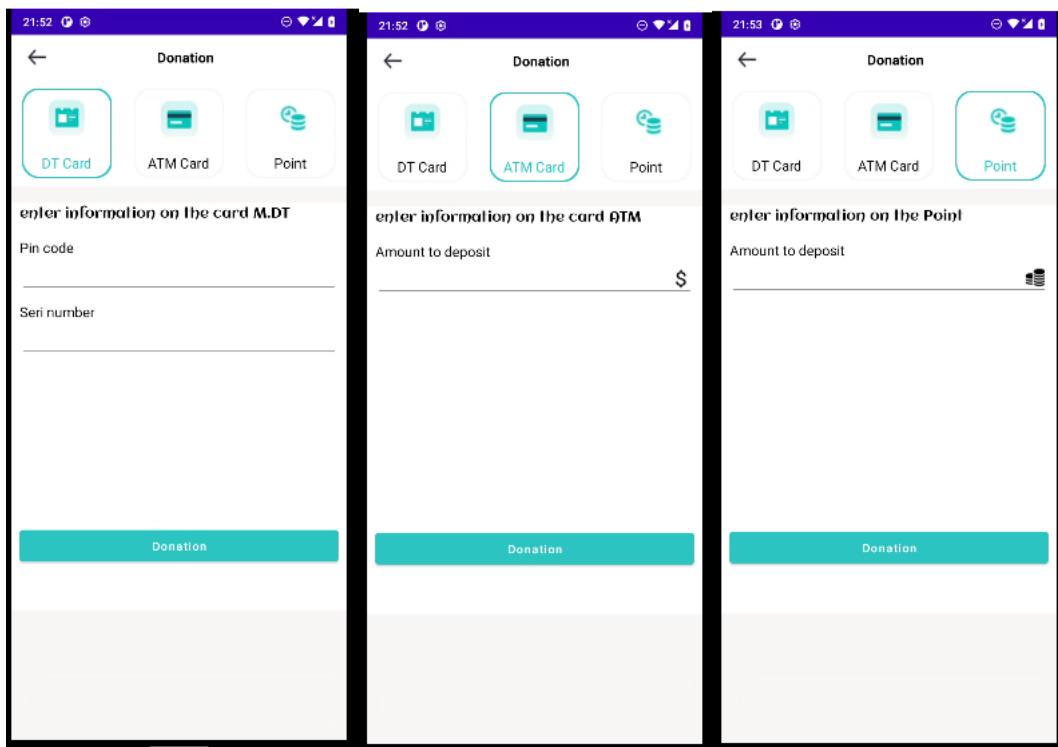
## Endow.

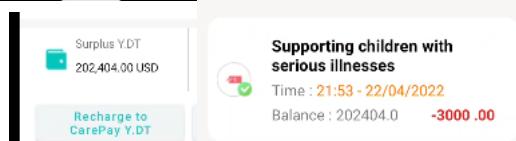
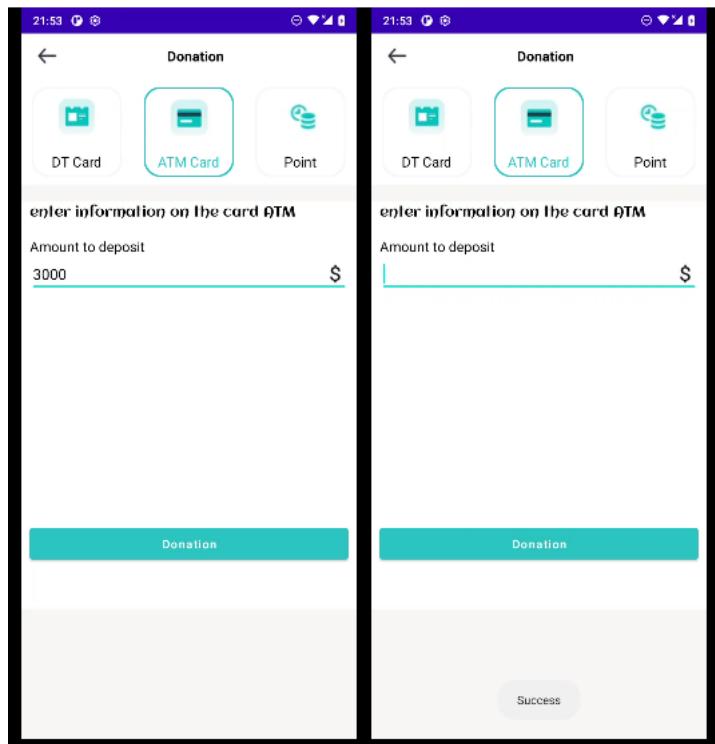
Here users can enter gift codes and each code can only be entered once



## Donations.

Here users can donate to children suffering from serious diseases with carepay money

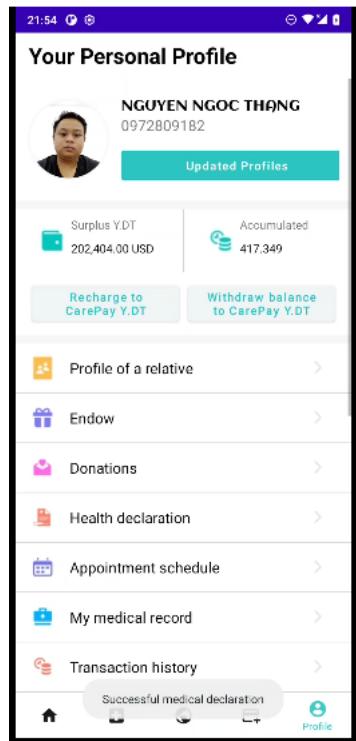




## Health declaration

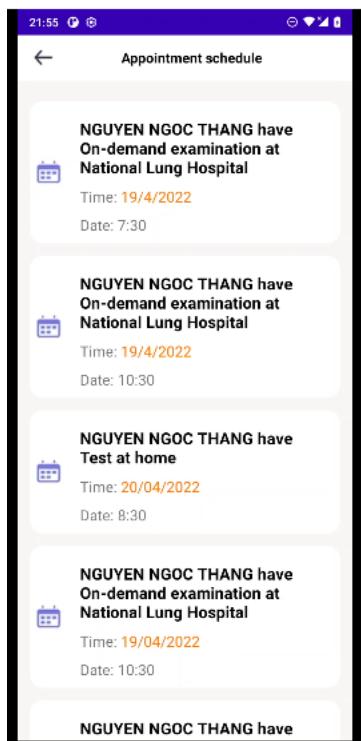
Here users can declare health

Question	yes	no
1. Are you suffering from COVID-19?	<input type="radio"/>	<input checked="" type="radio"/>
2. Close contact with an infected or suspected COVID-19 case within the past 14 days.	<input type="radio"/>	<input checked="" type="radio"/>
3. Traveled from another country or territory within the last 14 days.	<input type="radio"/>	<input checked="" type="radio"/>
4. Have you finished the group quarantine within the past 14 days?	<input type="radio"/>	<input checked="" type="radio"/>
5. In the past 14 days, has anyone in your family/work had a fever or cough?	<input type="radio"/>	<input checked="" type="radio"/>
6. Have you been discharged from hospital due to treatment for COVID-19 within the past 14 days?	<input type="radio"/>	<input checked="" type="radio"/>



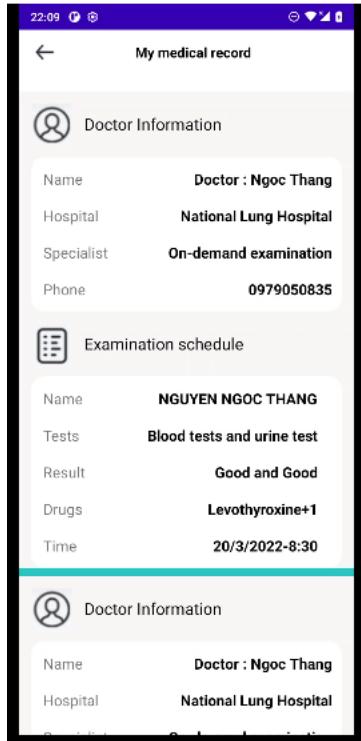
## Appointment schedule

Here user can see all appointments with doctor



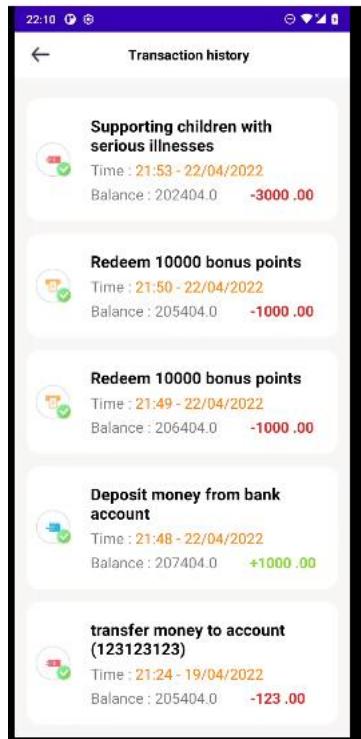
## My medical record

Here users can view all their medical history.



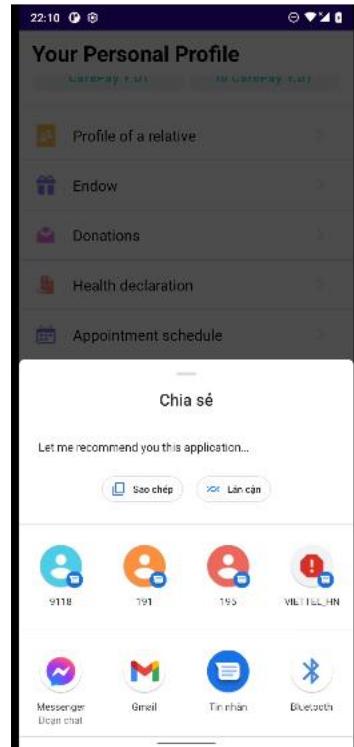
## Transaction history

Here users can see all their transaction history.



## Invite friends

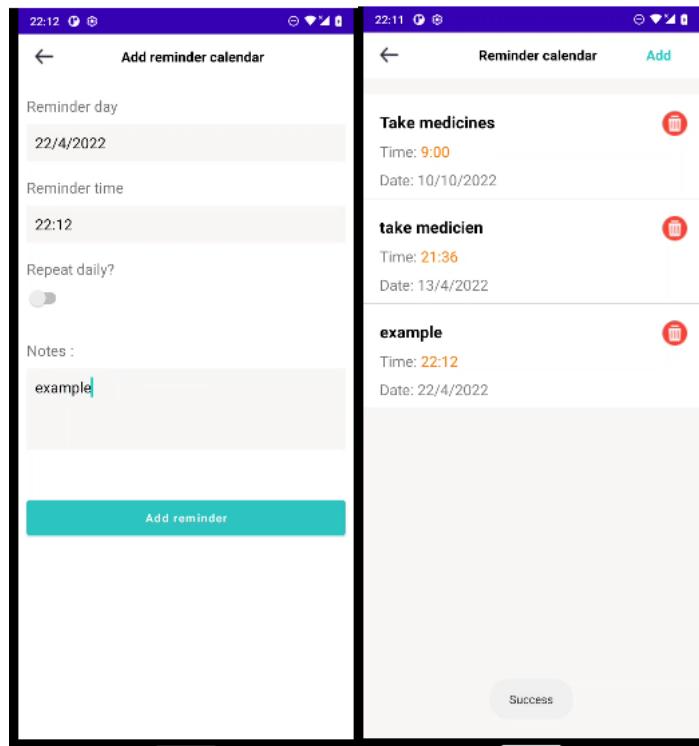
Here users can invite friends to download the app



## Remind

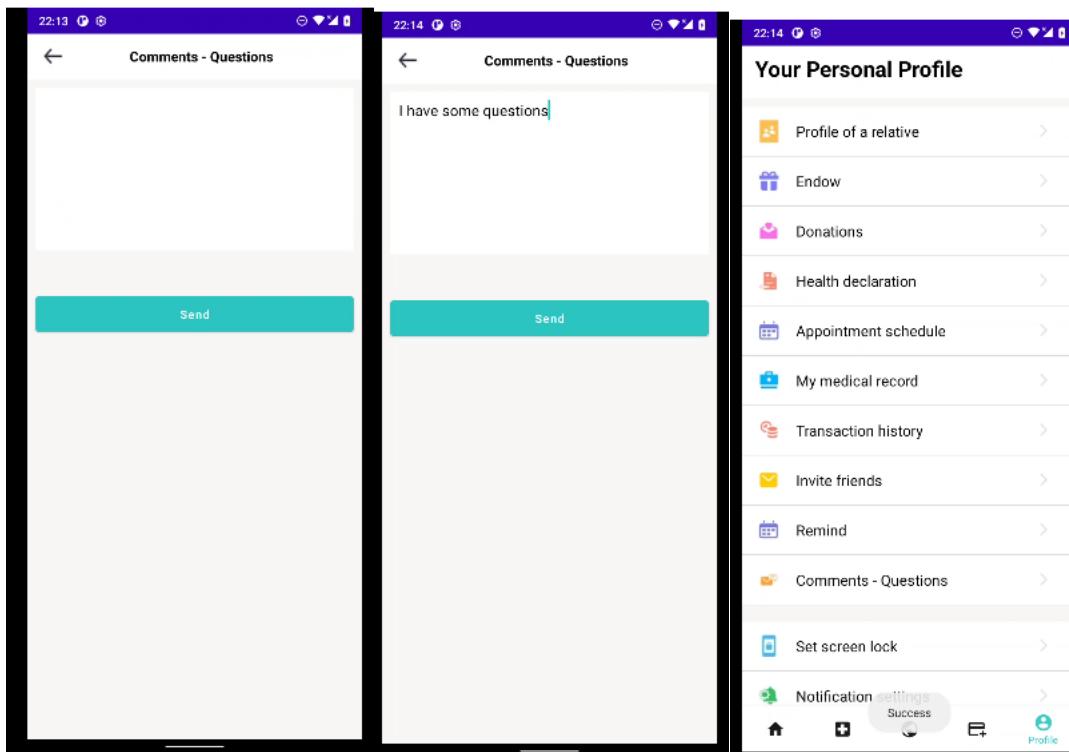
Here users can see all their reminder calendars and can add or remove reminders.

Three screenshots of a reminder calendar feature. The first screenshot shows a list of three existing reminders: "Take medicines" at 9:00 on 10/10/2022, "take medicien" at 21:36 on 13/4/2022, and another "take medicien" at 14:35 on 14/4/2022. The second screenshot shows the same list with a "Success" message at the bottom. The third screenshot is a "Add reminder calendar" form with fields for "Reminder day" (date input), "Reminder time" (time input), "Repeat daily?" (switch), "Notes:" (text input with placeholder "Ex : take medicine"), and a large green "Add reminder" button.



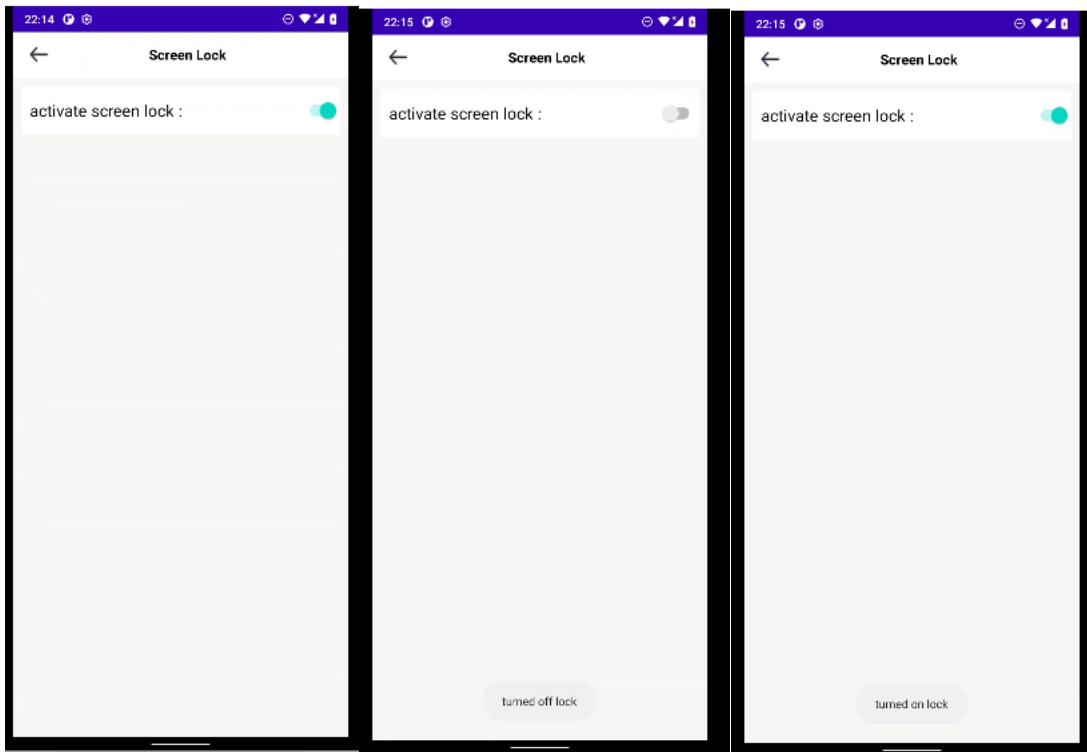
### Comment-Questions

Here users can send their contributions about the app to admin.



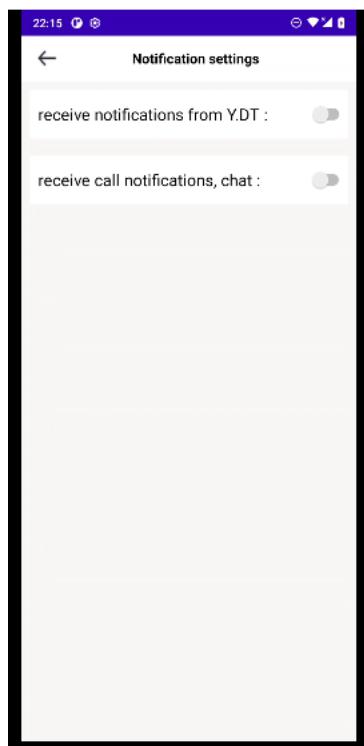
### Screen lock settings.

Here users can set lock when lock locks users will need to enter a password when transacting and vice versa.



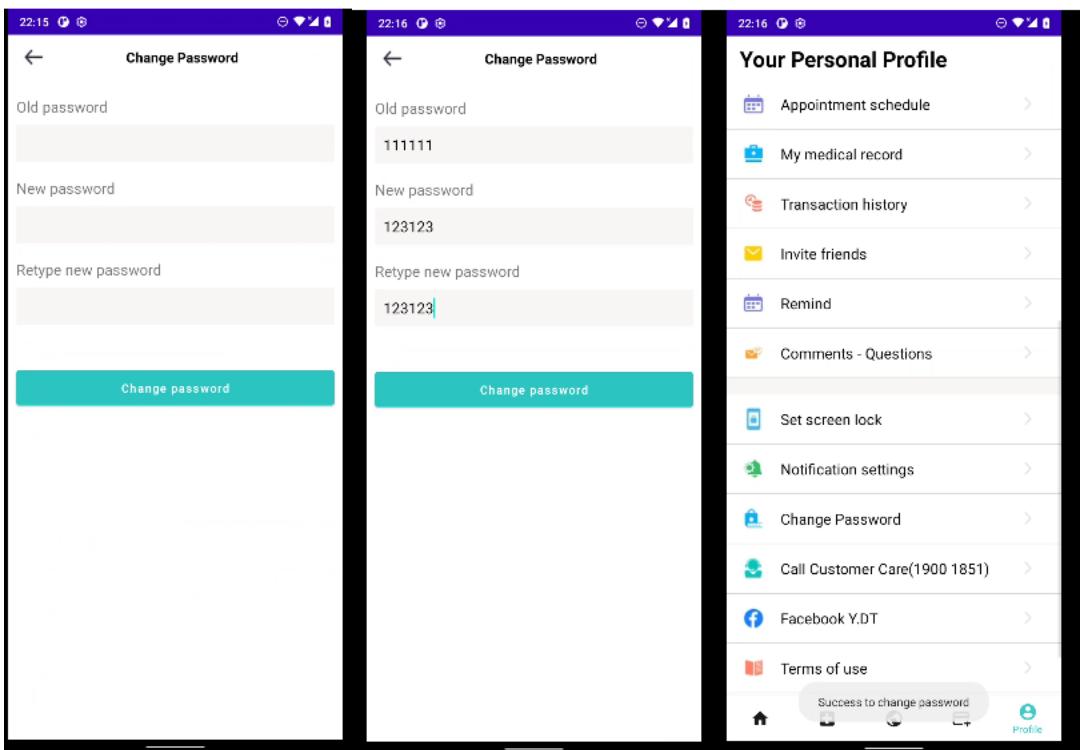
### Notification toggle settings

Here users can set notifications



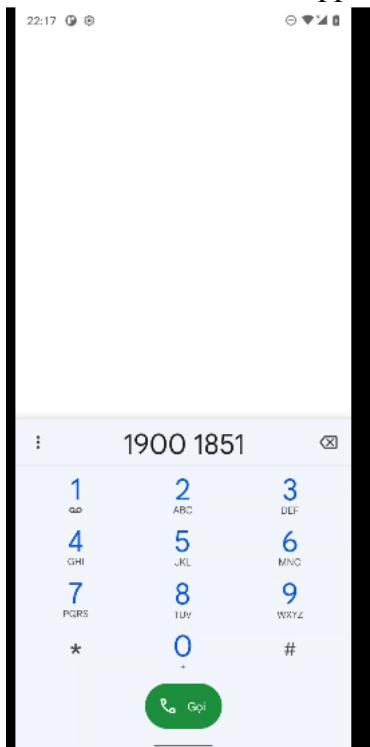
### Change Password

Here user can change password



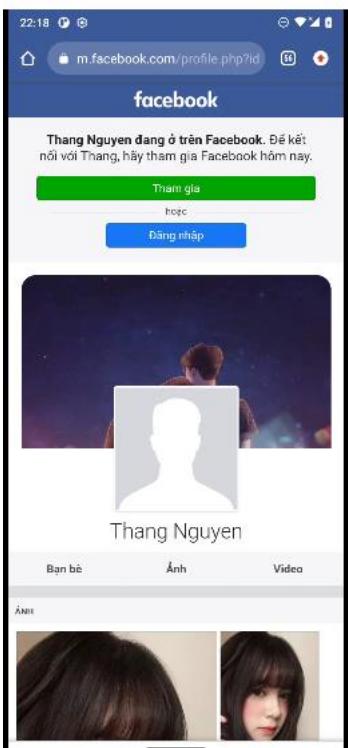
### Call customer care

Here users can call the app's hotline



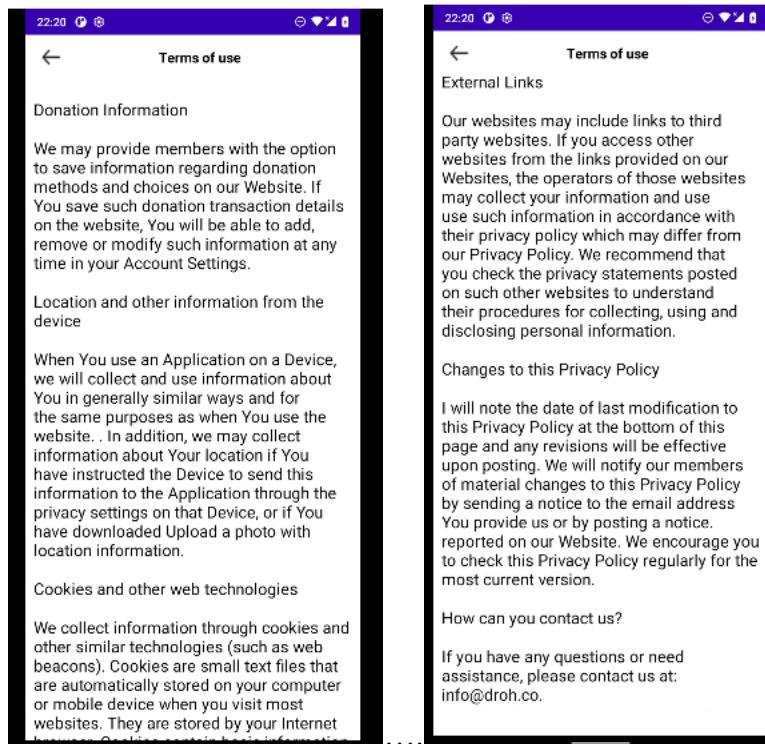
### Facebook app

Here users can access the app's facebook

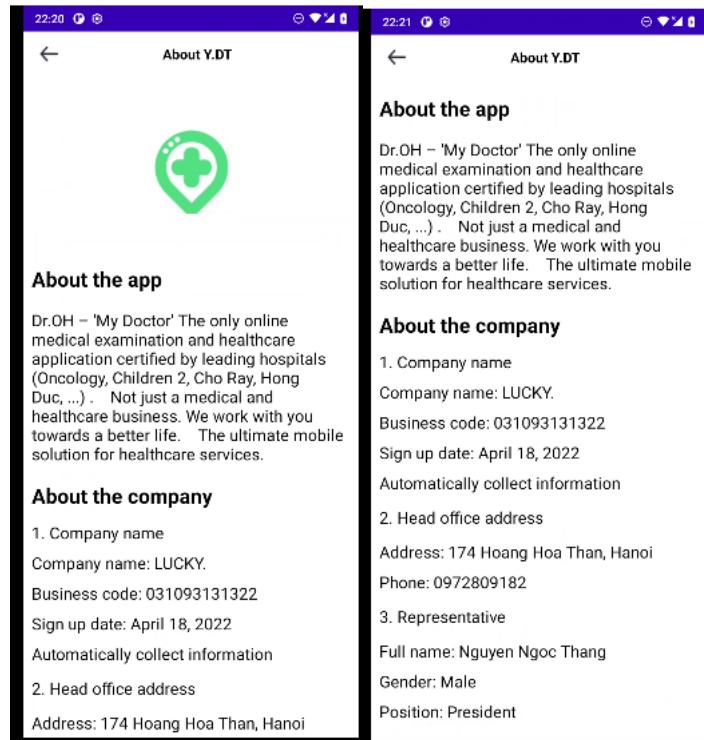


## Terms of use

<p><b>← Terms of use</b></p> <p>By accessing the Y.DT - Pocket General Hospital application and contacting us, You acknowledge that You have read and understood this Privacy Policy, collection and handling principles information contained therein. The Privacy Policy was first updated on September 14, 2018. We may change this Policy from time to time, so please check back often for any updates.</p> <p><b>Limit</b></p> <p>This Privacy Policy describes in detail our policy and principles regarding the collection, use and disclosure of information about You. We understand that providing information online requires a lot of trust from you. We take this trust very seriously and place a high priority on ensuring the safety and security of the personal information you provide to us when you visit the Website or contact us. What information do we collect from you? How We Use Your Information How long do we keep your information? Your rights and choices regarding the collection and use of your information Children's privacy External Links Changes to this Privacy Policy How can you contact us?</p> <p><b>General information</b></p>	<p><b>← Terms of use</b></p> <p><b>General information</b></p> <p>We receive and store any information that you enter into our Website or otherwise provide to us. This information includes information that can be used to identify You as an individual or to contact You directly ("personal information"). Personal Information includes information that you provide to us such as your first and last name, phone number, mailing and email address, username and password, and payment information (such as your credit card number, cardholder name and card expiration date). You can choose not to provide us with personal information, but usually, some information about you is required for you to gain trust from both parties as well as partners. by DR.OH - Pocket General Hospital. In addition, certain information is required so that you can ask us questions or initiate other transactions on our website. We may also collect other information such as your IP address, information that identifies your device and website browsing history to the extent that information refers to you.</p> <p><b>Security for WEBSITE</b></p> <p>You will have the opportunity to provide contact information and information regarding DR.OH - Pocket General Hospital to others through our Website. When providing contact information, it is important that you provide accurate and up-to-date information. We will use this information to communicate with you and to provide you with the services you request. We will not share your contact information with third parties without your consent, except as required by law or as necessary to protect our interests or those of our users.</p>	<p><b>← Terms of use</b></p> <p><b>Accessing our Website</b></p> <p>You will have the opportunity to provide contact information and information regarding DR.OH - Pocket General Hospital to others through our Website. When providing contact information, it is important that you provide accurate and up-to-date information. We will use this information to communicate with you and to provide you with the services you request. We will not share your contact information with third parties without your consent, except as required by law or as necessary to protect our interests or those of our users.</p> <p><b>Automatically collect information</b></p> <p>We automatically collect certain information from your computer or Device when you visit. For example, we will collect session data, including Your IP address, web browser software, and the web page you refer to. We may also collect information about your online activity, such as content viewed, pages visited and searches.</p> <p><b>Donation Information</b></p> <p>We may provide members with the option to save information regarding donation methods and choices on our Website. If You save such donation transaction details on the website, You will be able to add, remove or modify such information at any time.</p>
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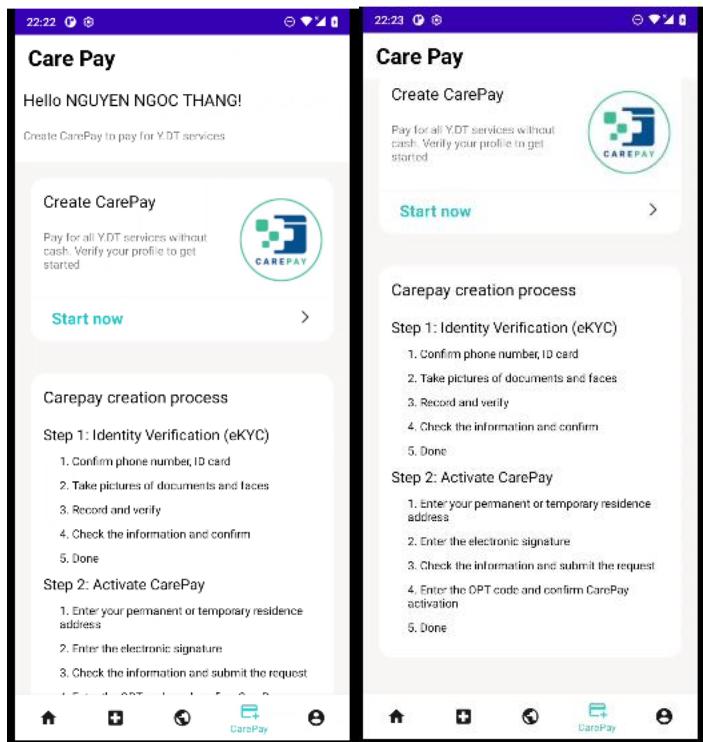
## Introduce



## Logout

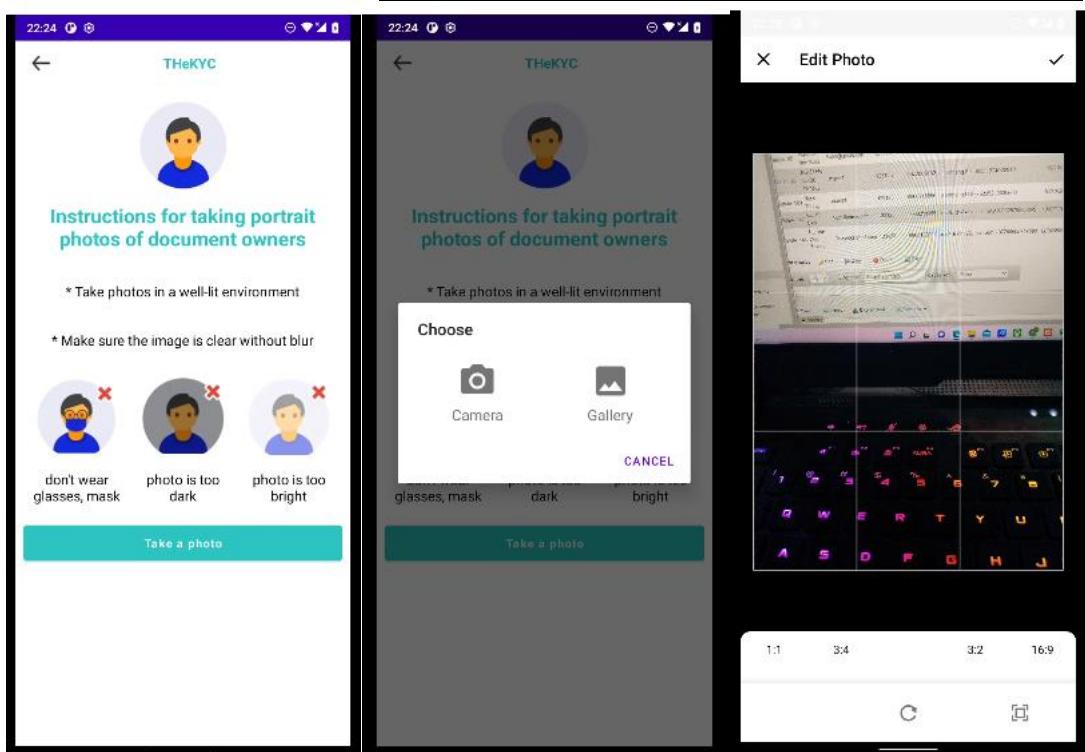
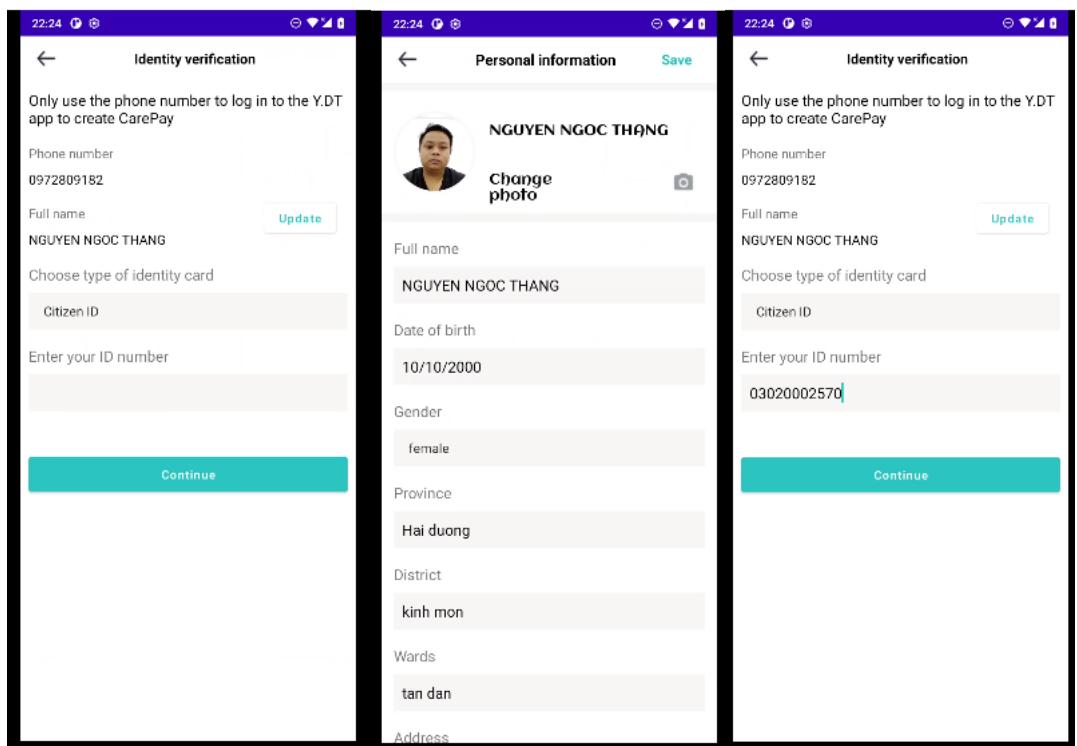


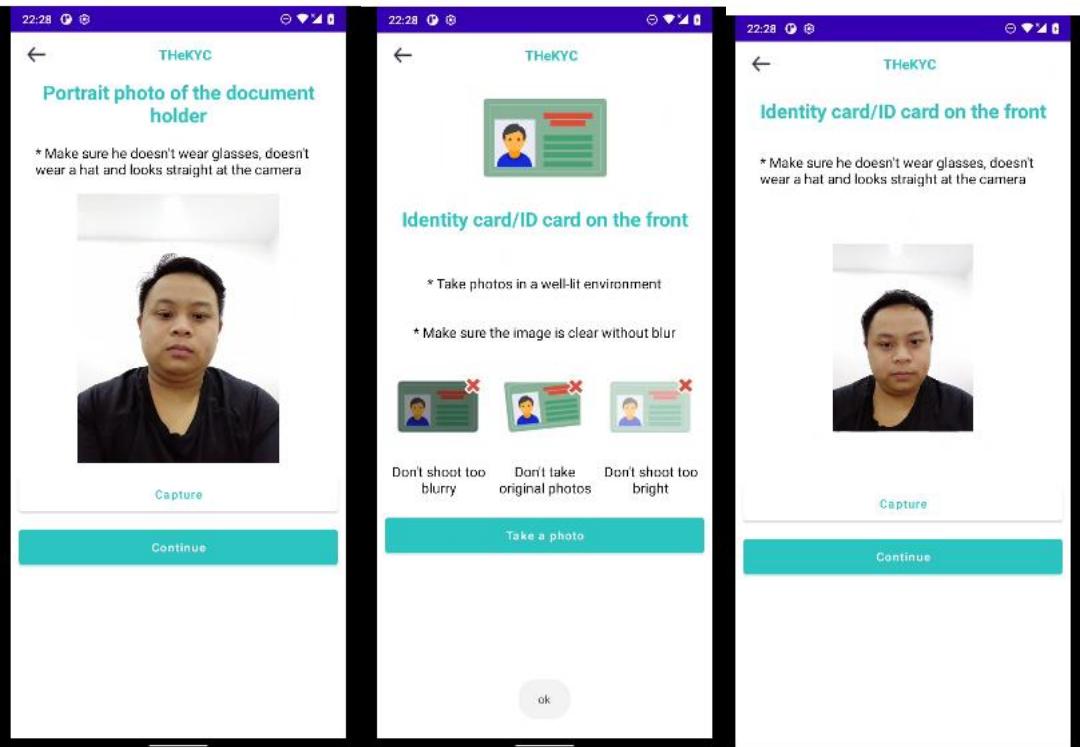
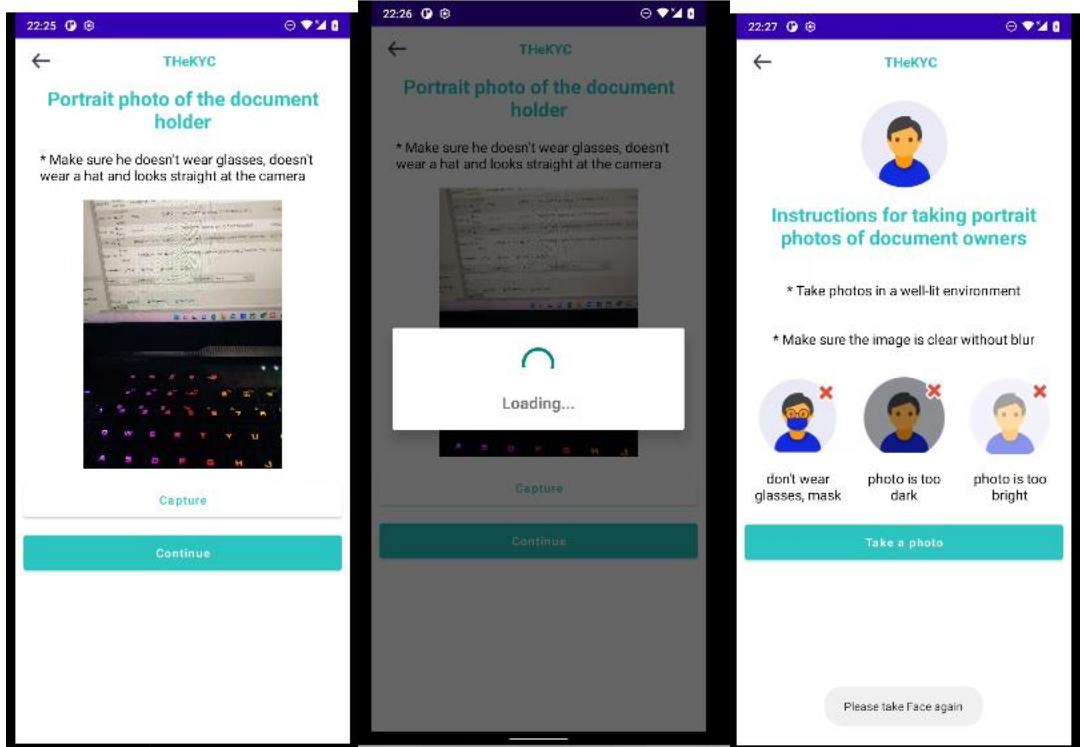
**Carepay non active**

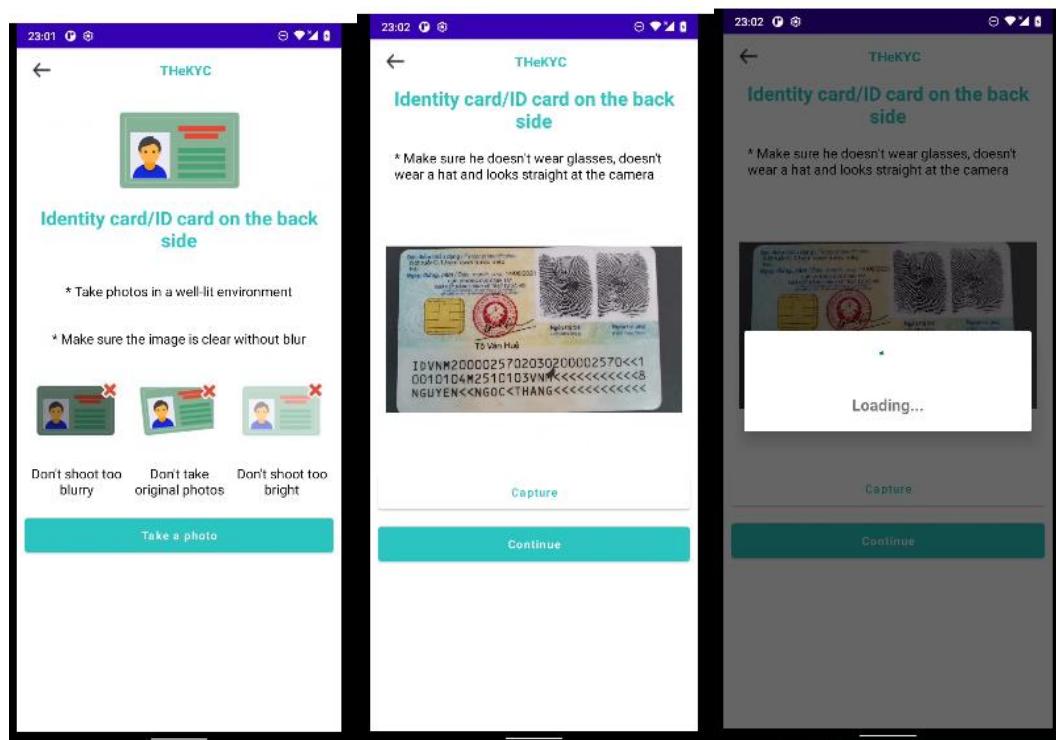
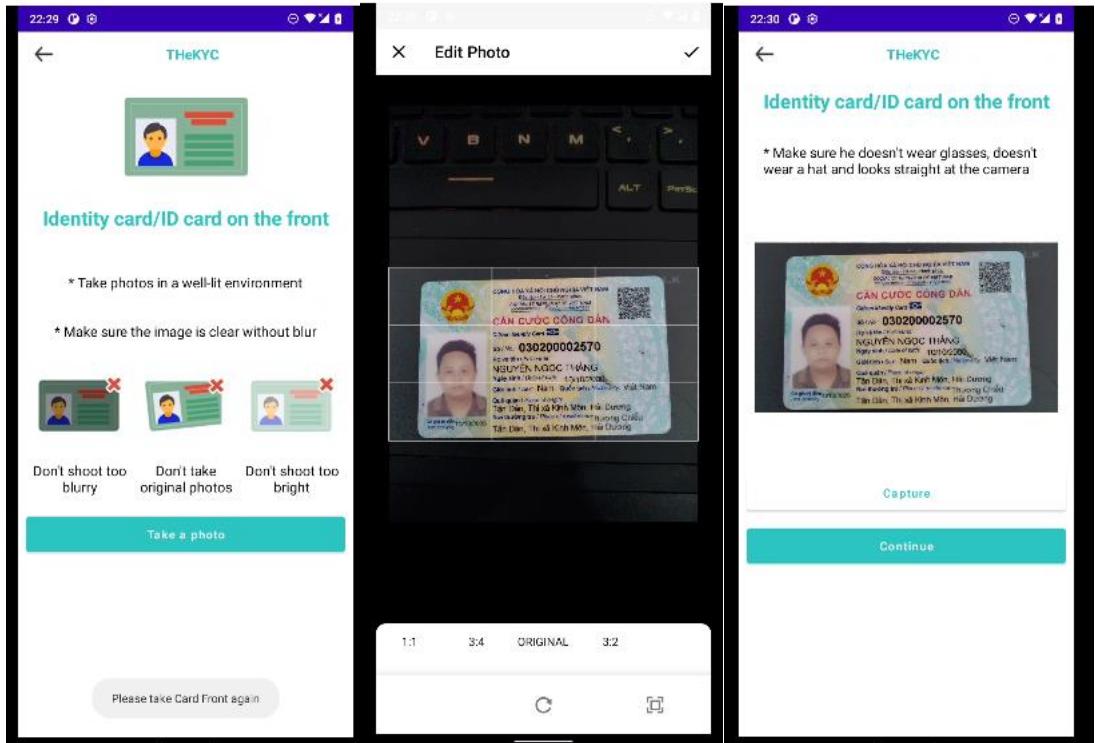


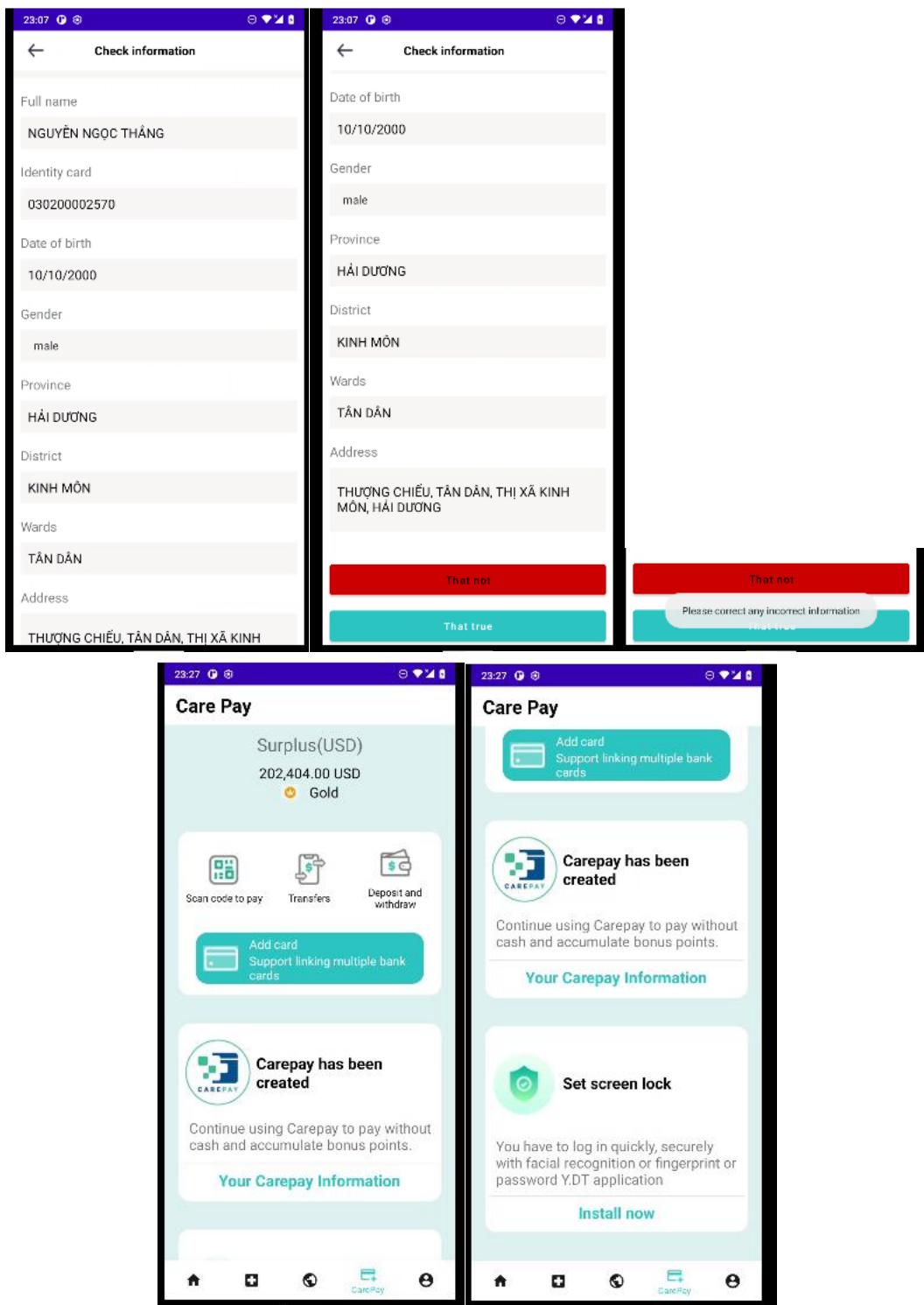
### **Register CarePay**

To use the app's transaction services, users need to register for carepay



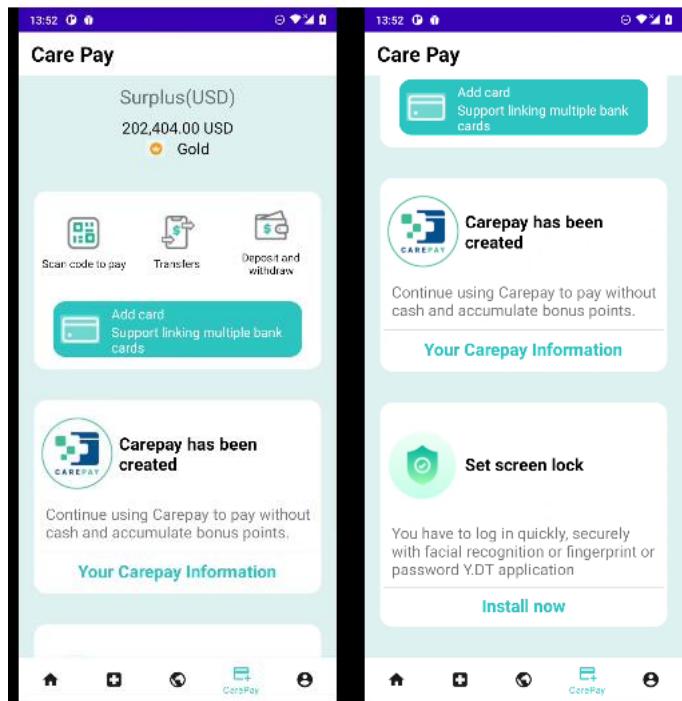






## Carepay

After successful registration, active carepay will appear.

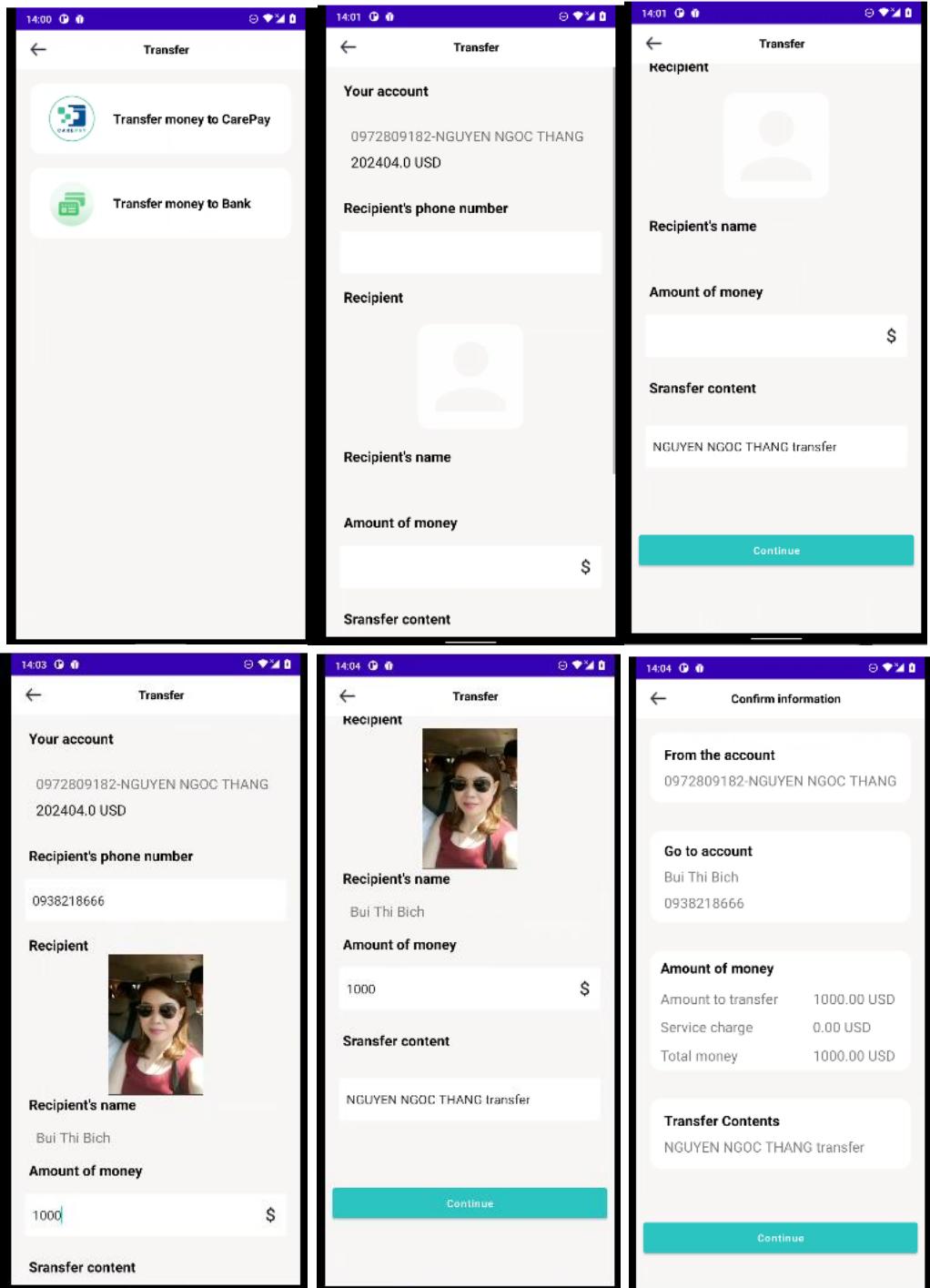


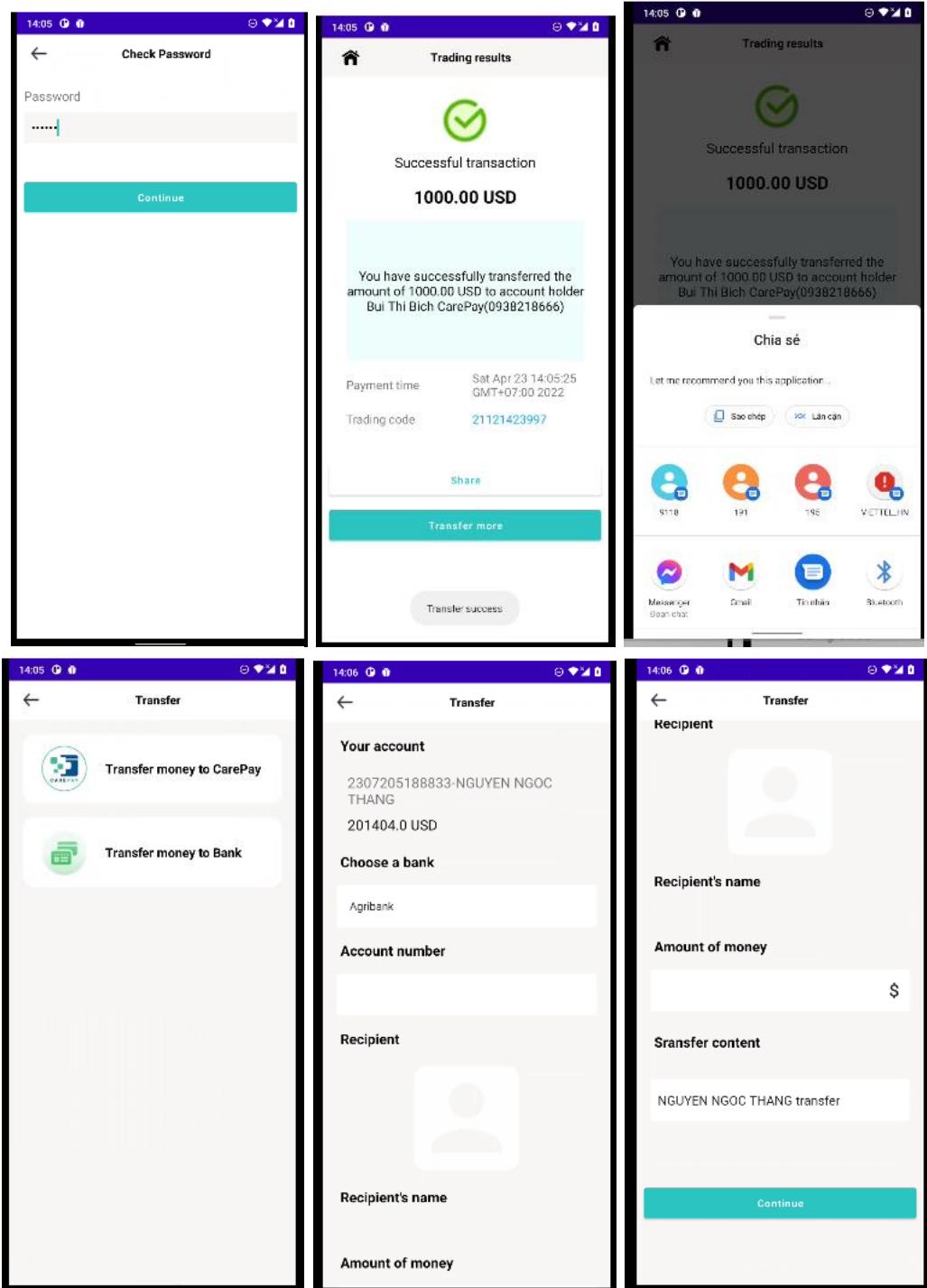
### Scanning to pay

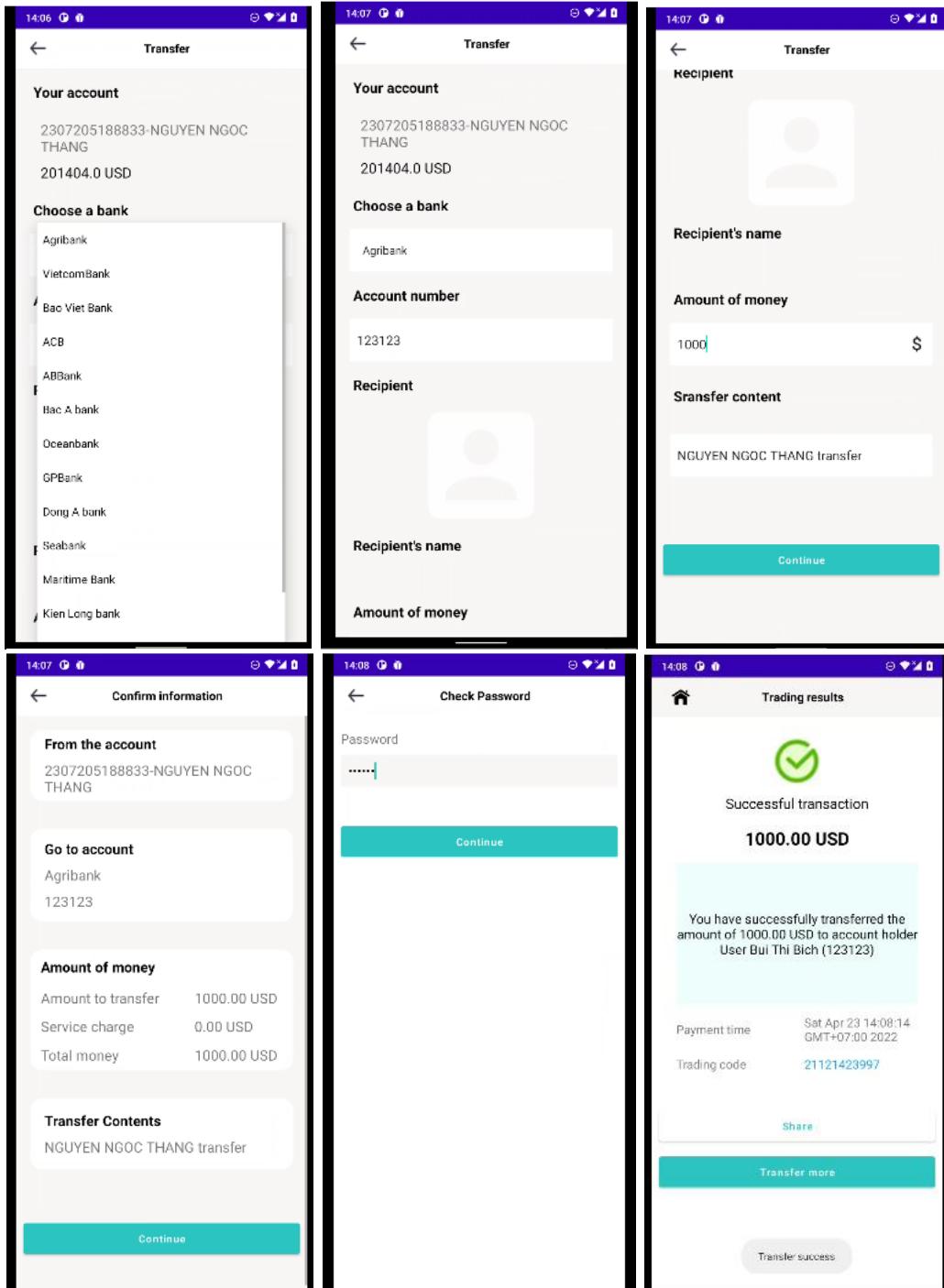


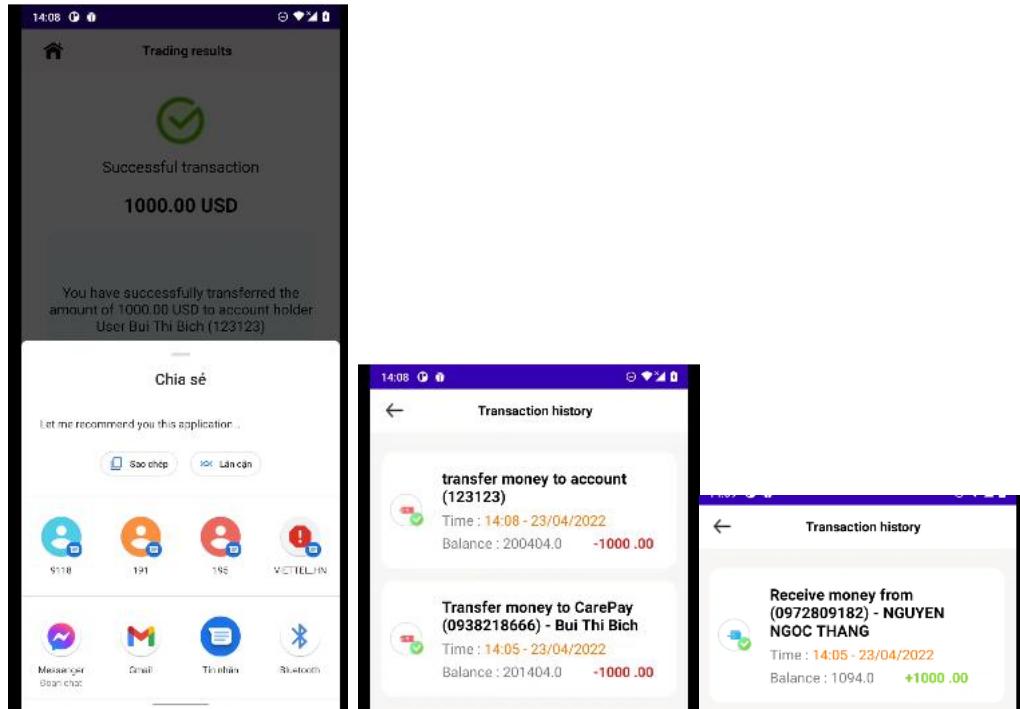
### Transfer

Users have 2 methods of money transfer: bank and carepay



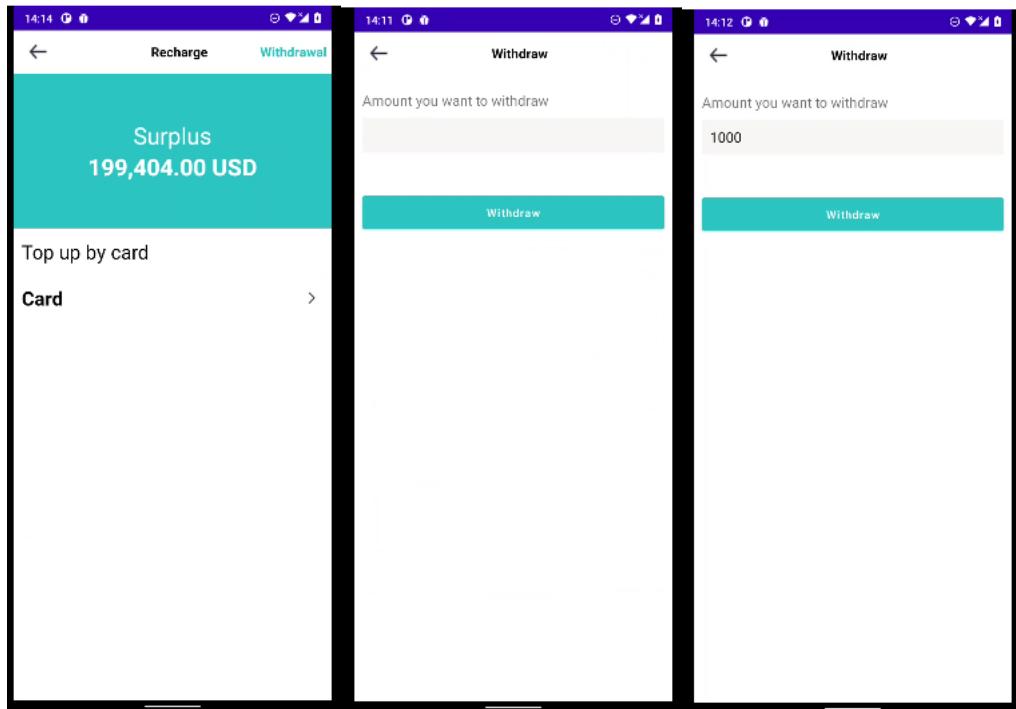


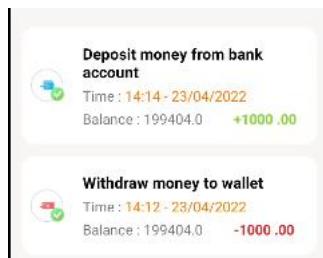
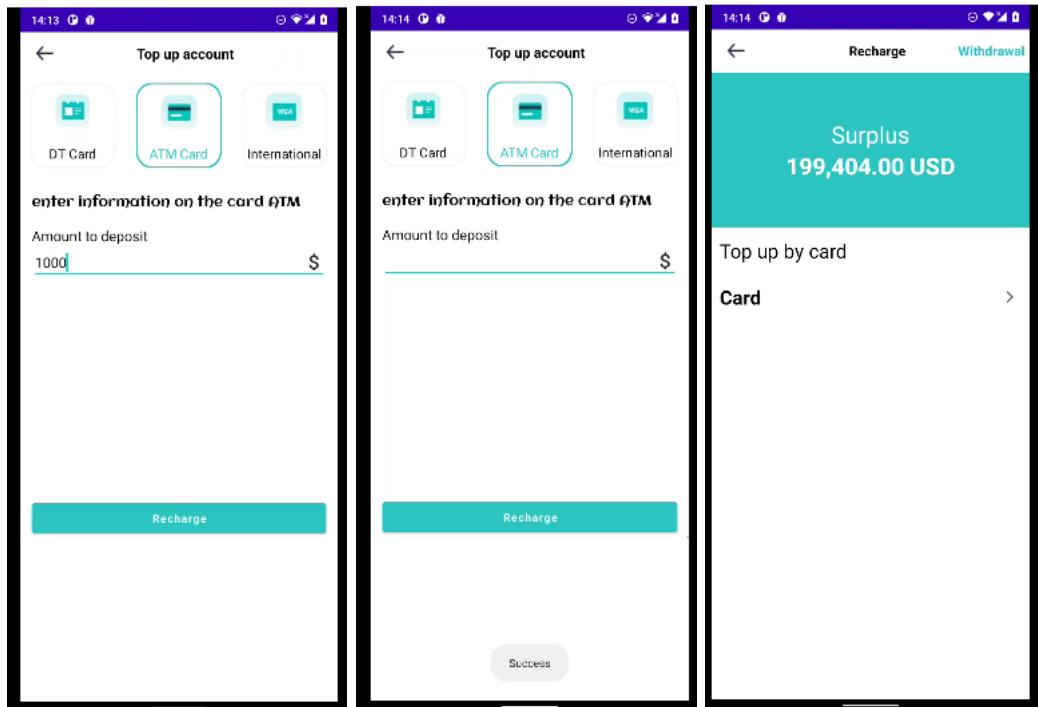
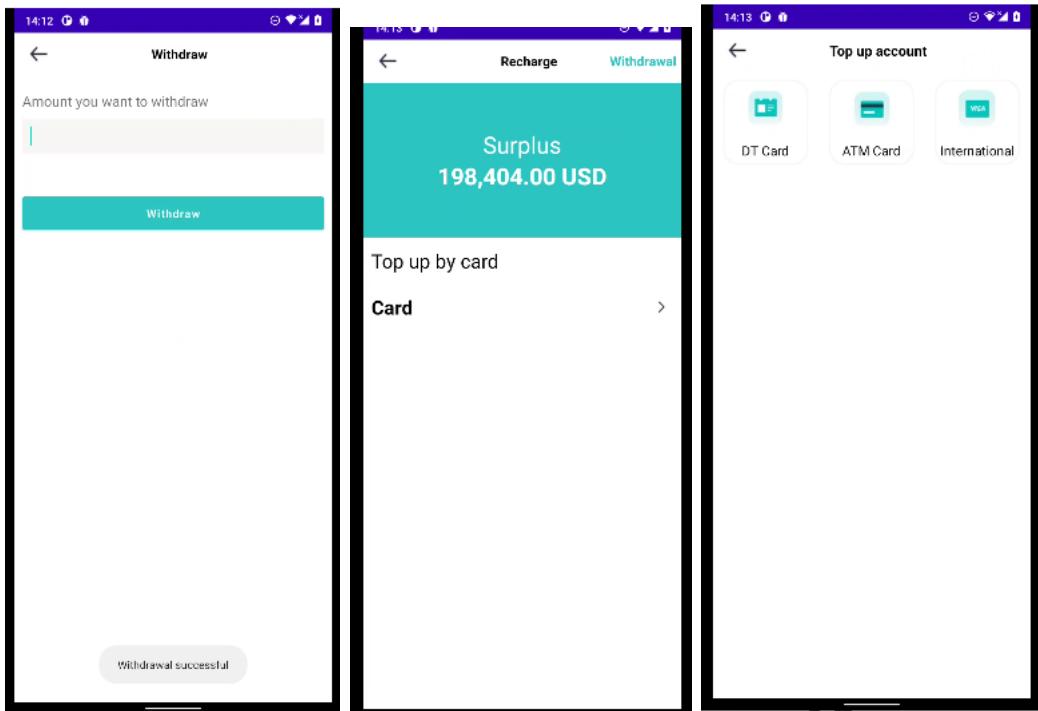




## Recharge and Withdraw money

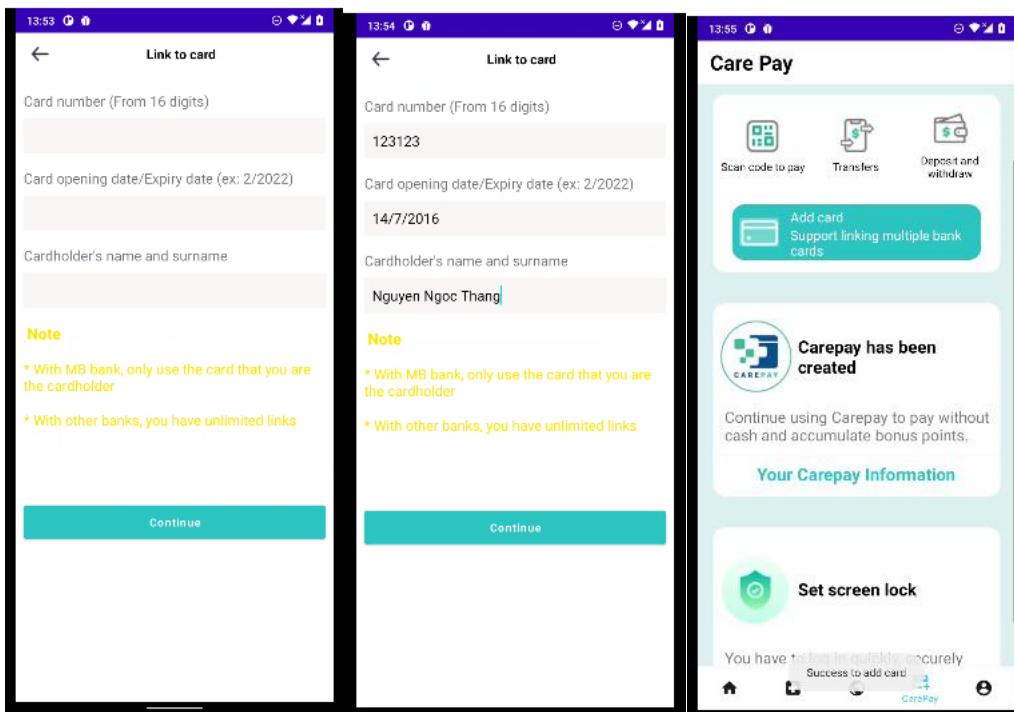
User can withdraw money from carepay to linked bank account as well as vice versa.



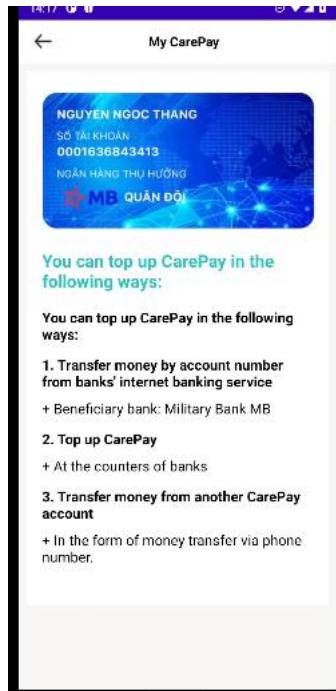


## Add card.

User can add link with bank account

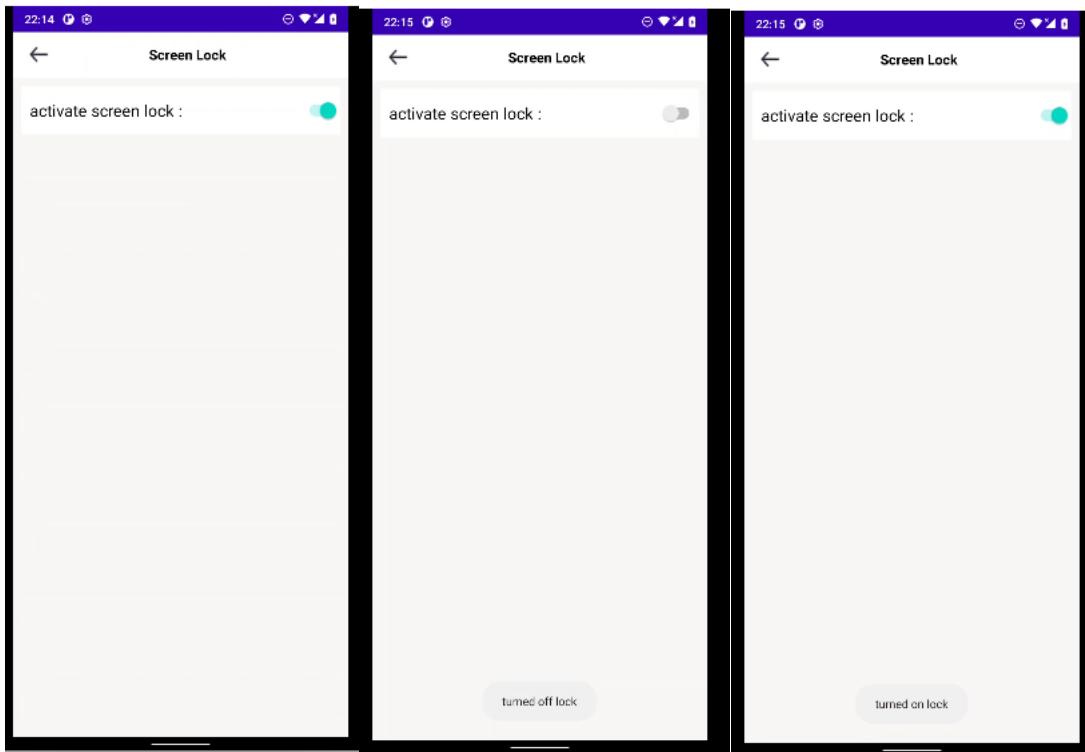


## Carepay information



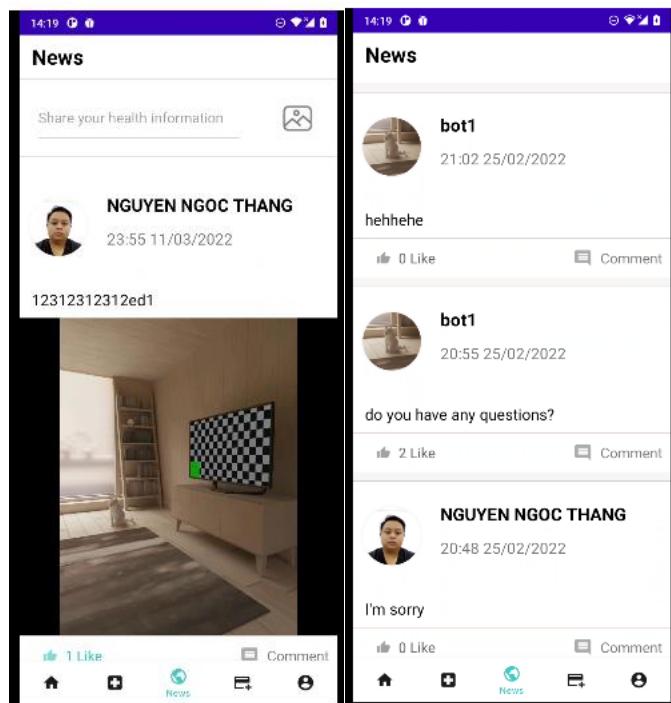
## Set screen lock

Here users can set lock when lock locks users will need to enter a password when transacting and vice versa.



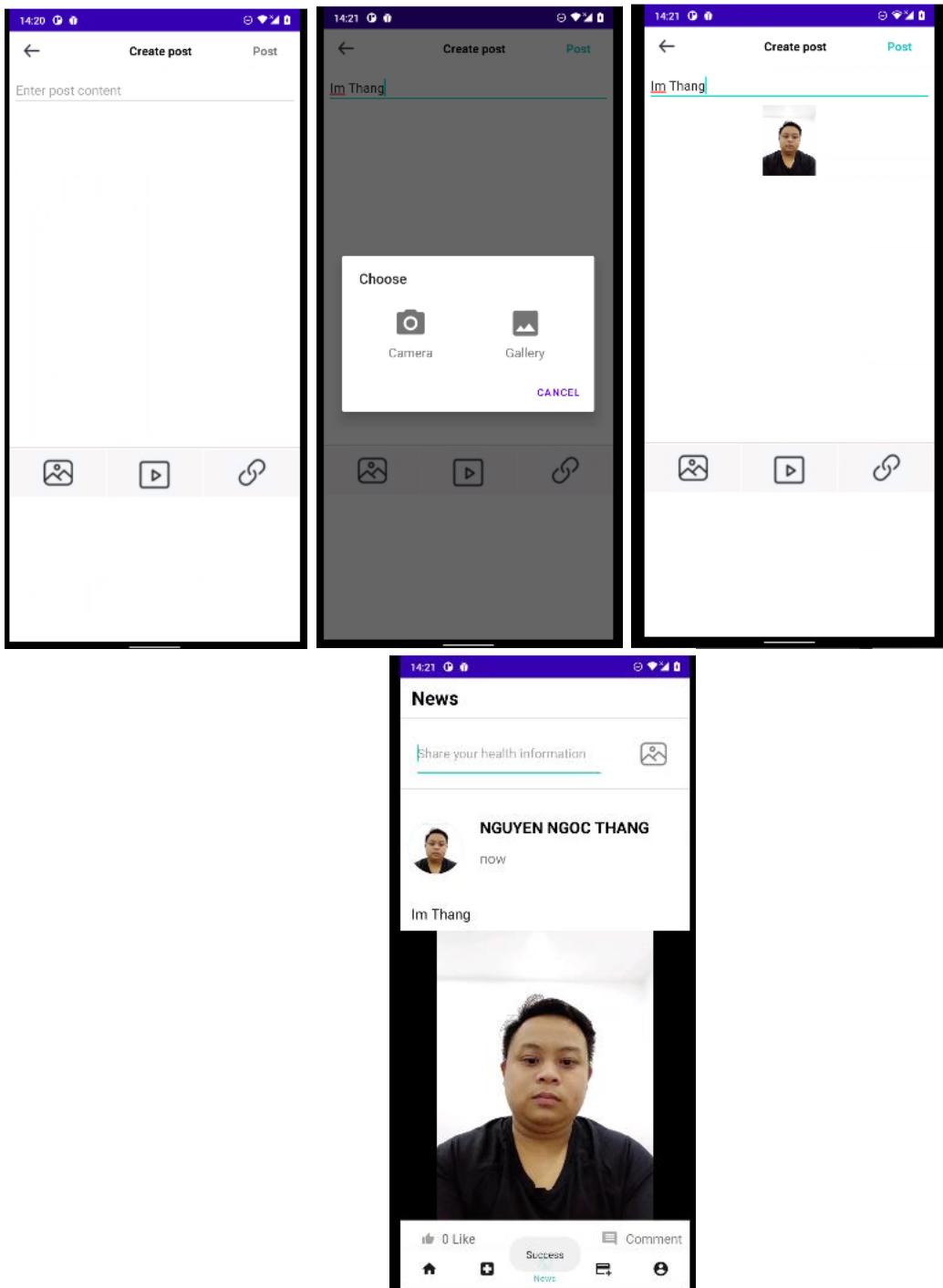
## News

This is a social network where patients and doctors share.



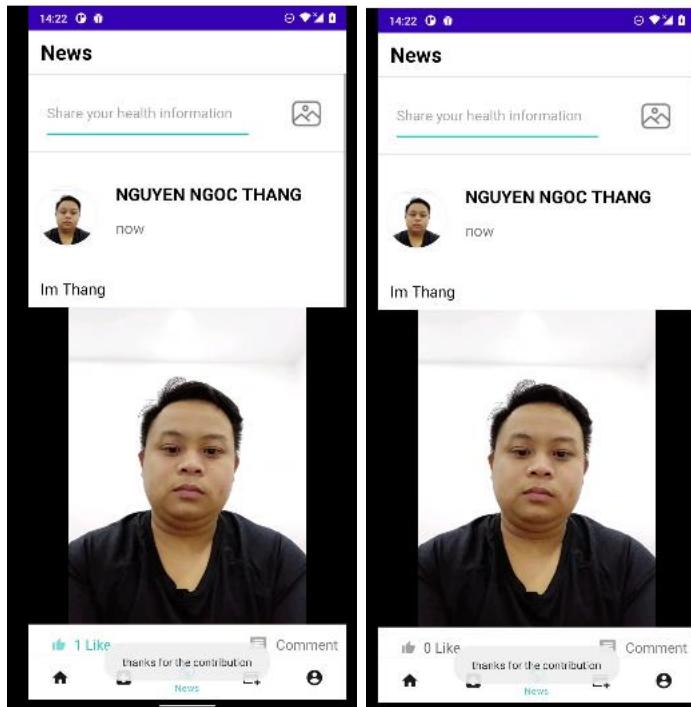
## Post

This is where users can post articles



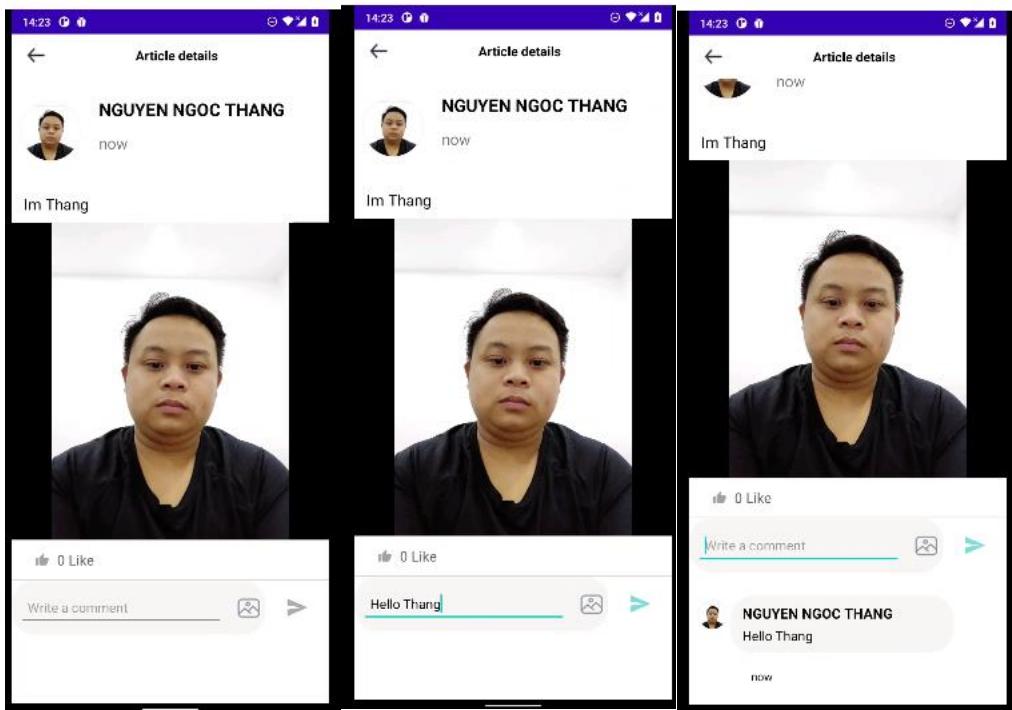
## Like

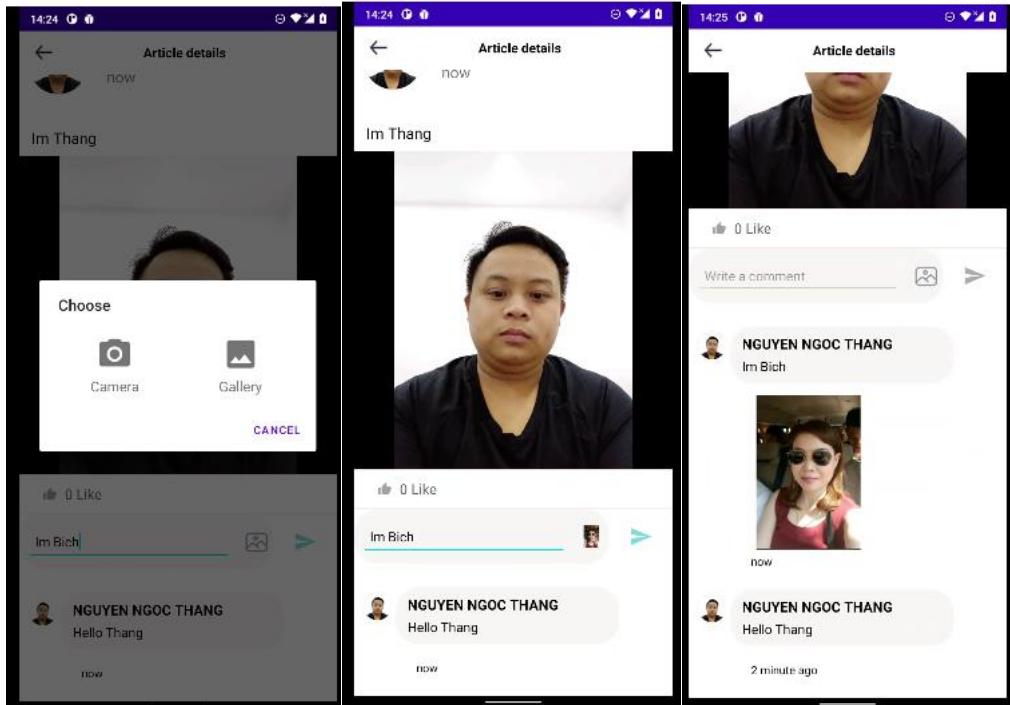
This is where users can like articles



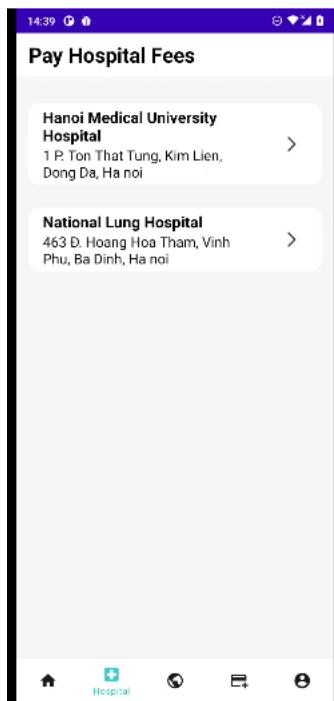
## Comment

This is where users can comment articles





Hospital

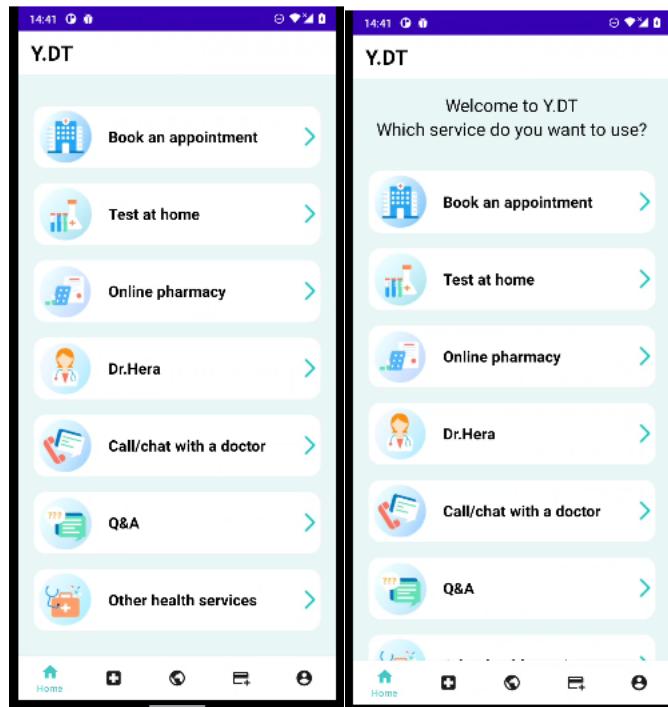


### Way to hospital

When the user clicks on a hospital, the app will direct you to that hospital.

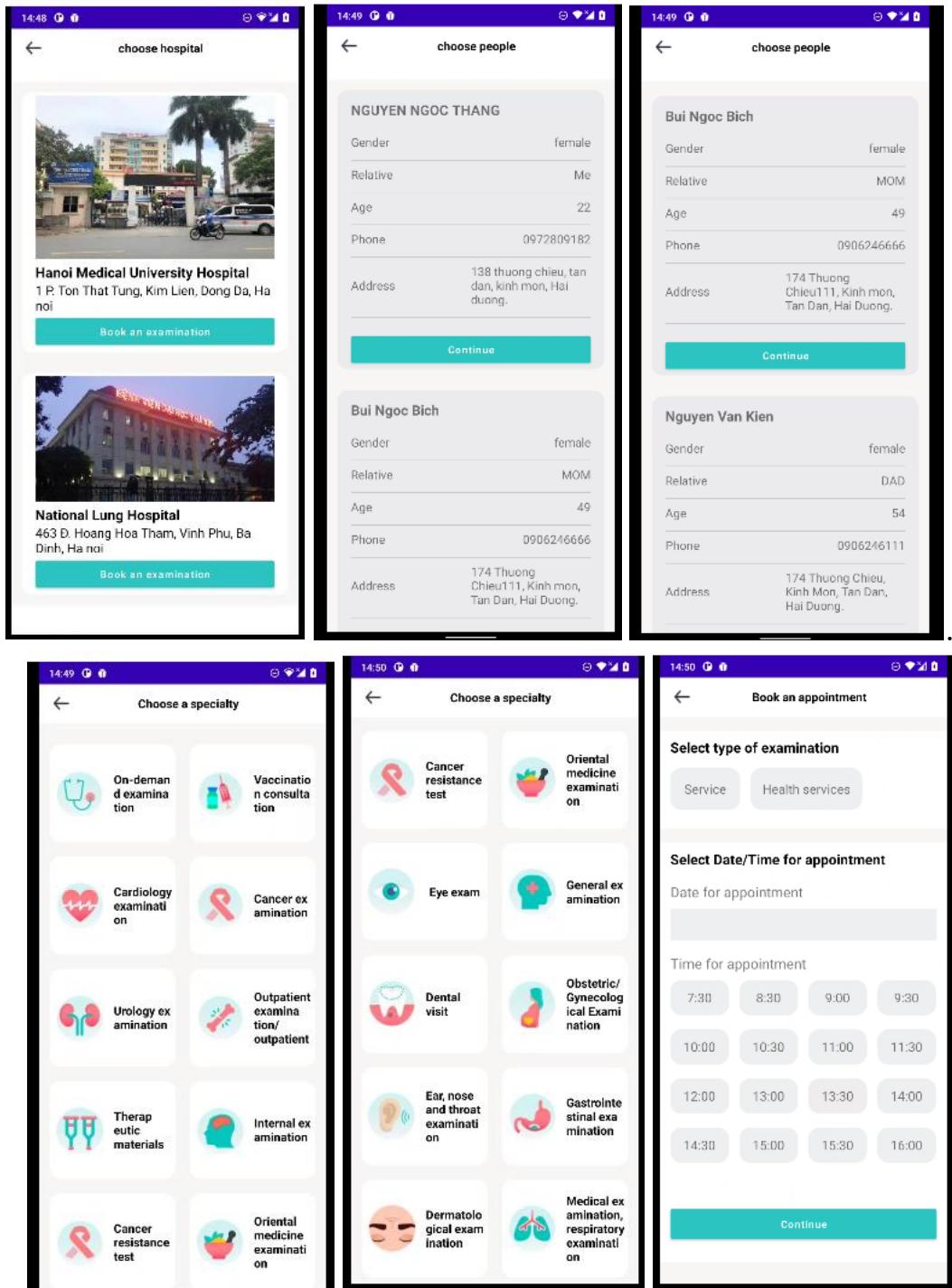


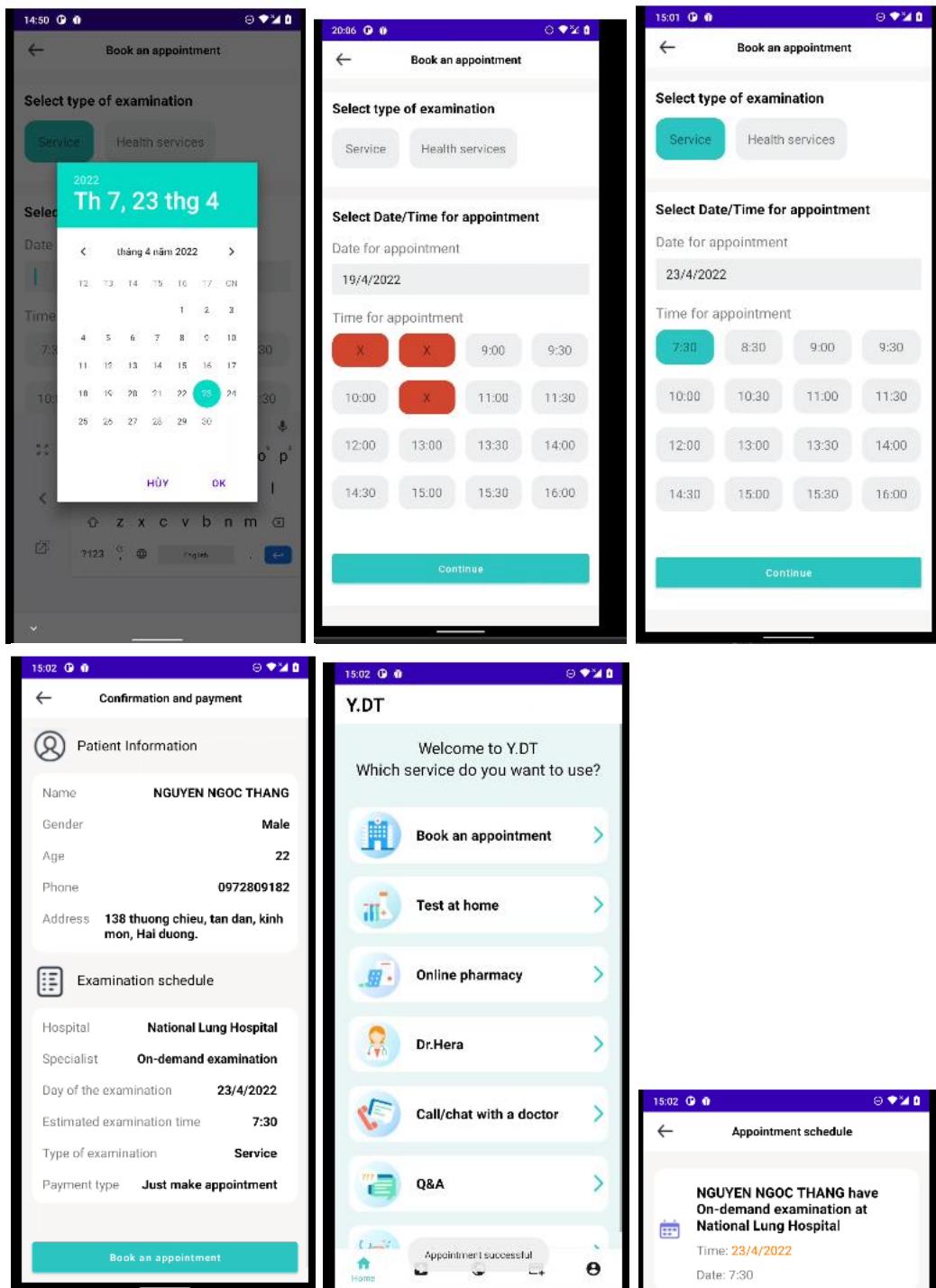
## Home



### Book an appointment.

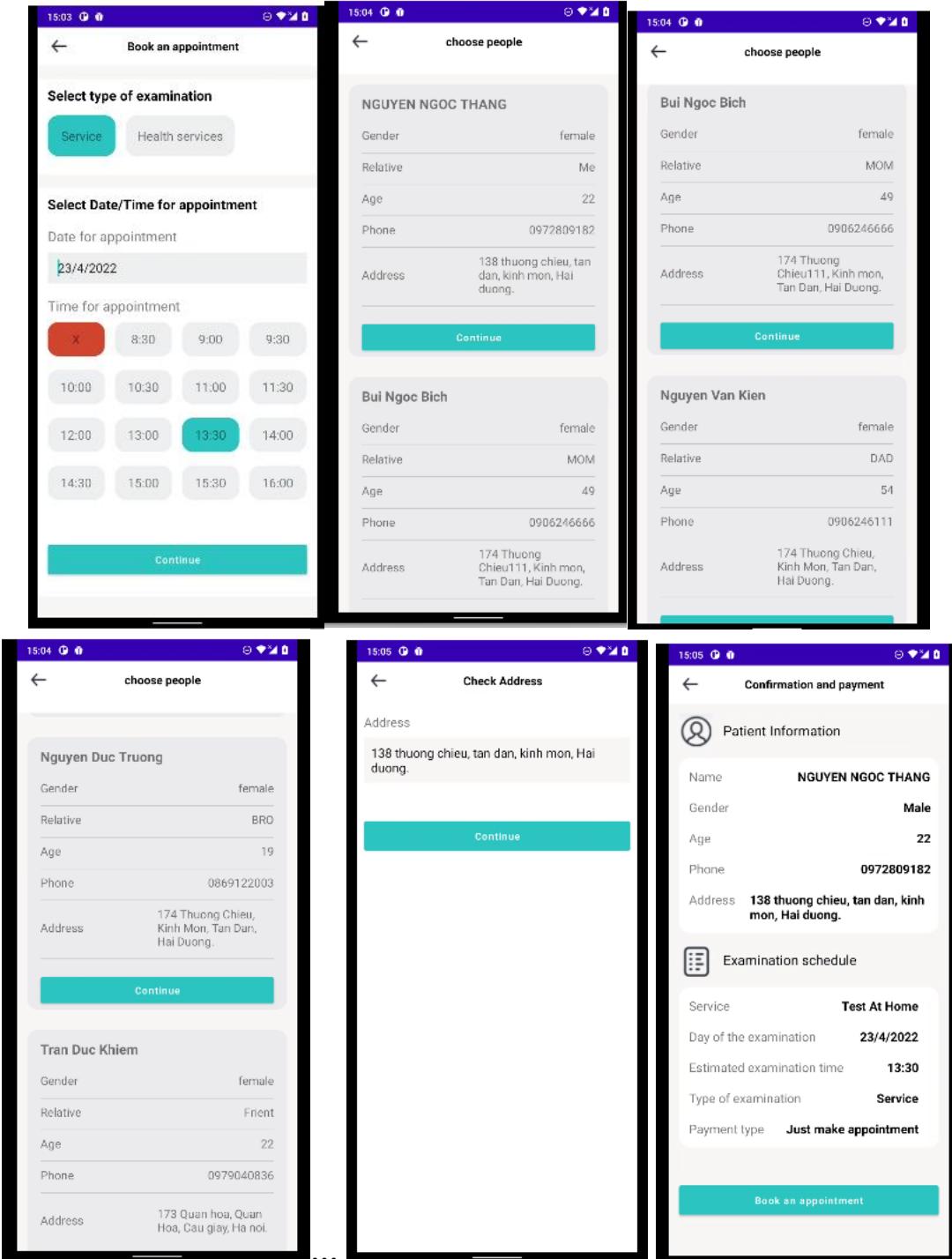
Here, the user can create an appointment with a doctor by selecting hospital , relative, choosing a type of examination, and choosing a schedule.

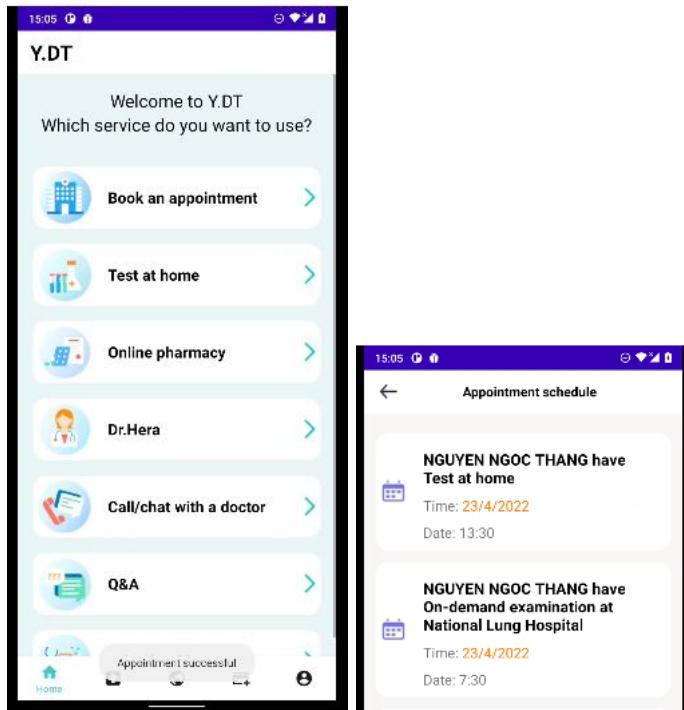




## Test at home

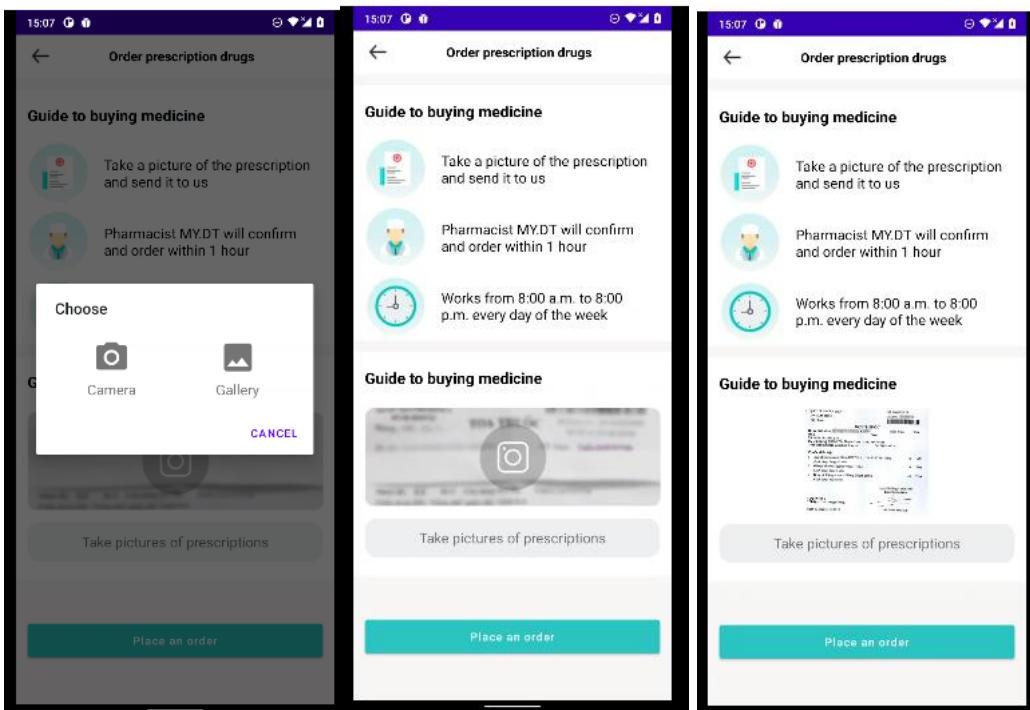
Here the user can create a home appointment by selecting the schedule, relative, confirming the location and then confirming the bill.

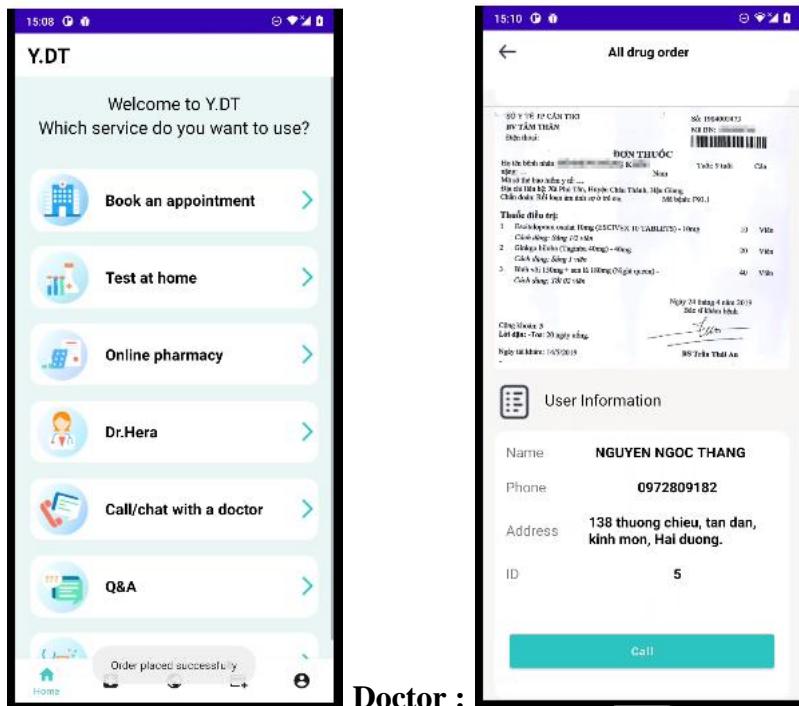




## Online pharmacy

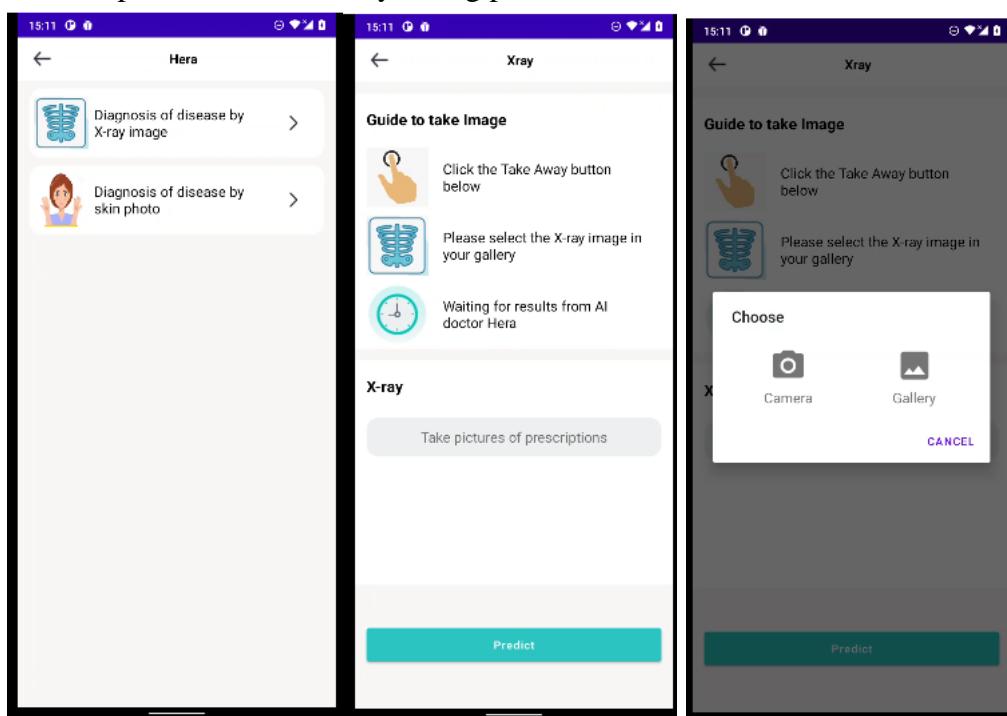
Here users can take pictures and send prescriptions to doctors

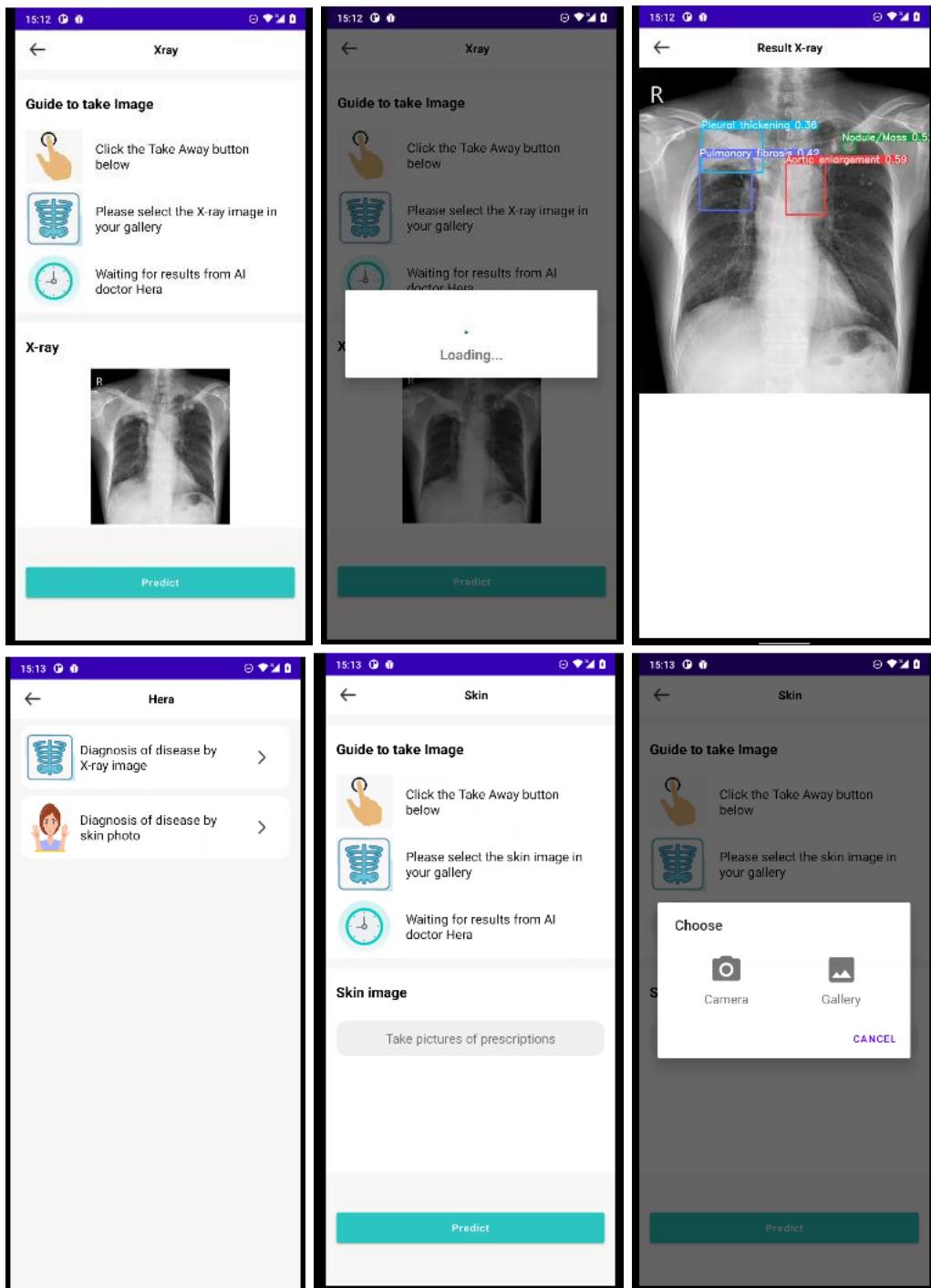


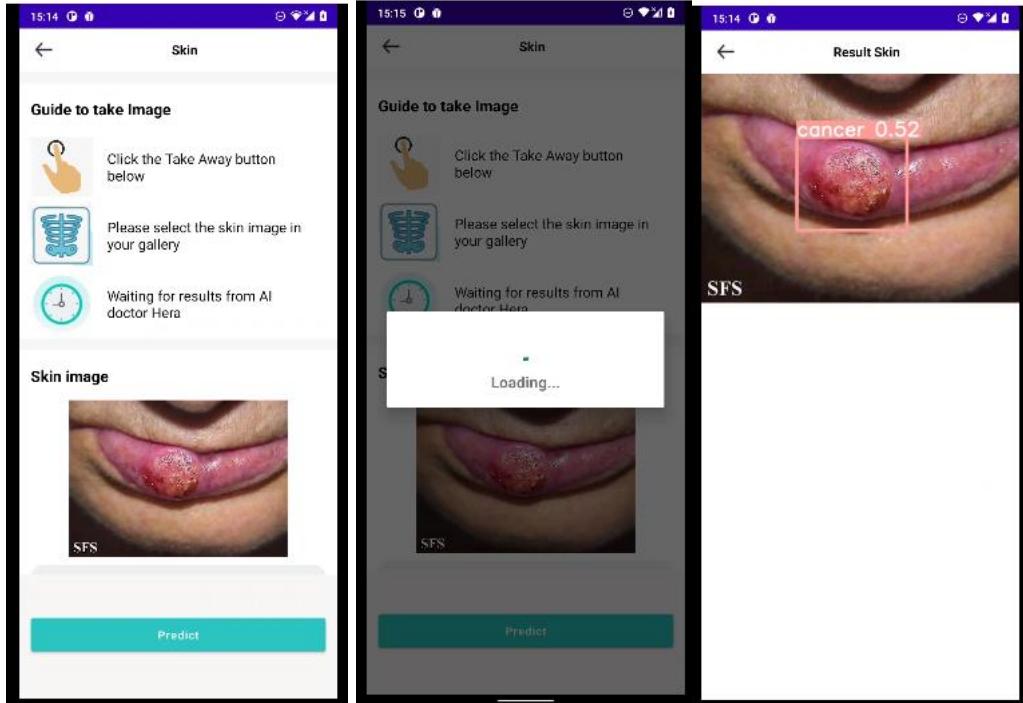


### Dr.Hera

Here users can predict the disease by taking photos in addition.

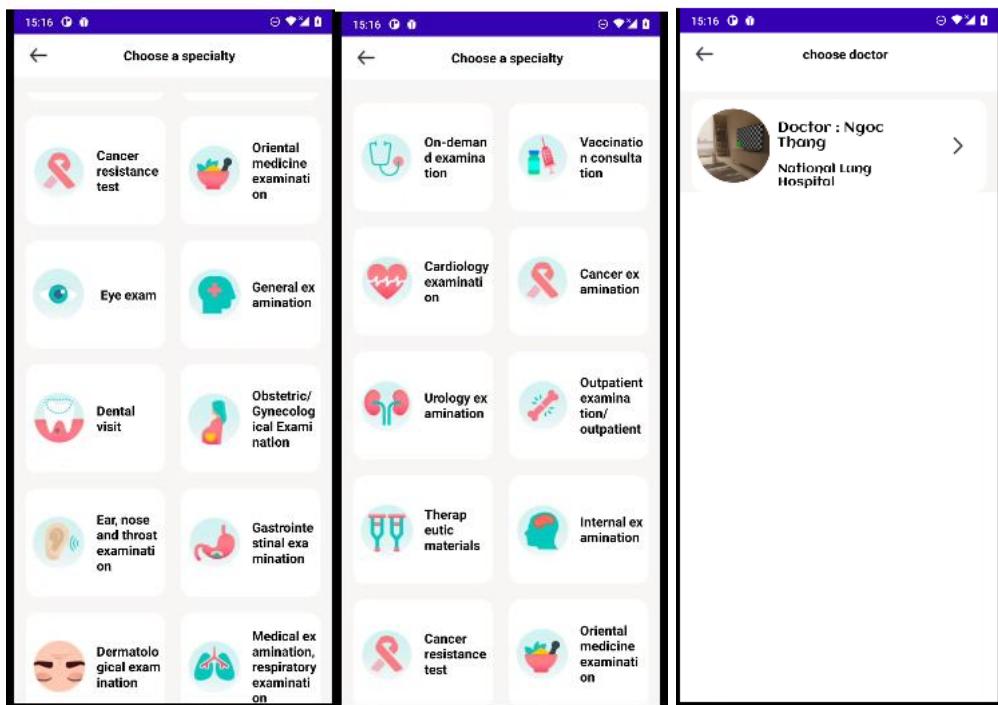


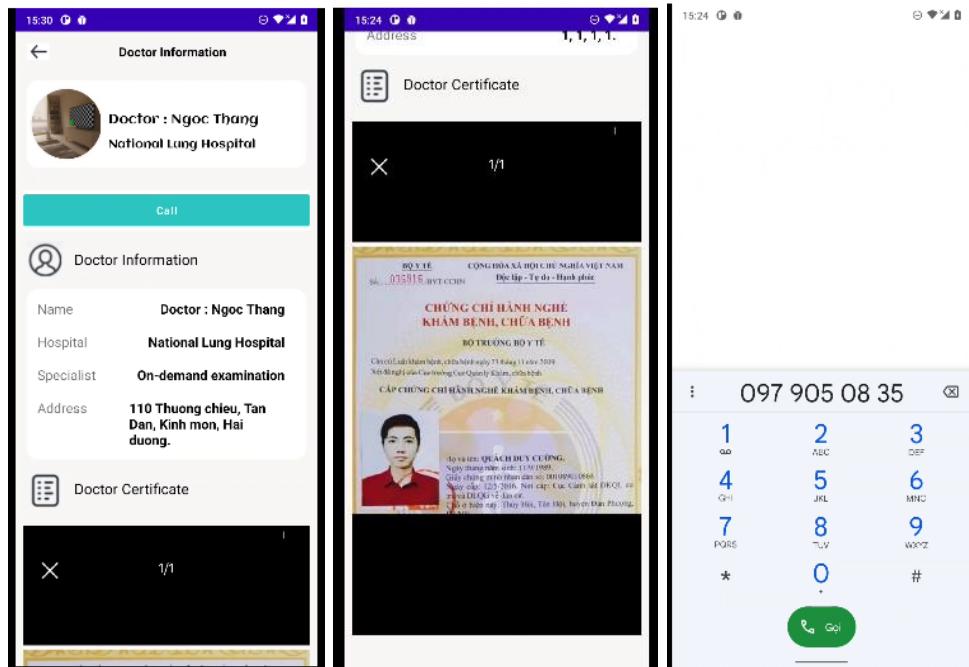




### Call/chat with doctor.

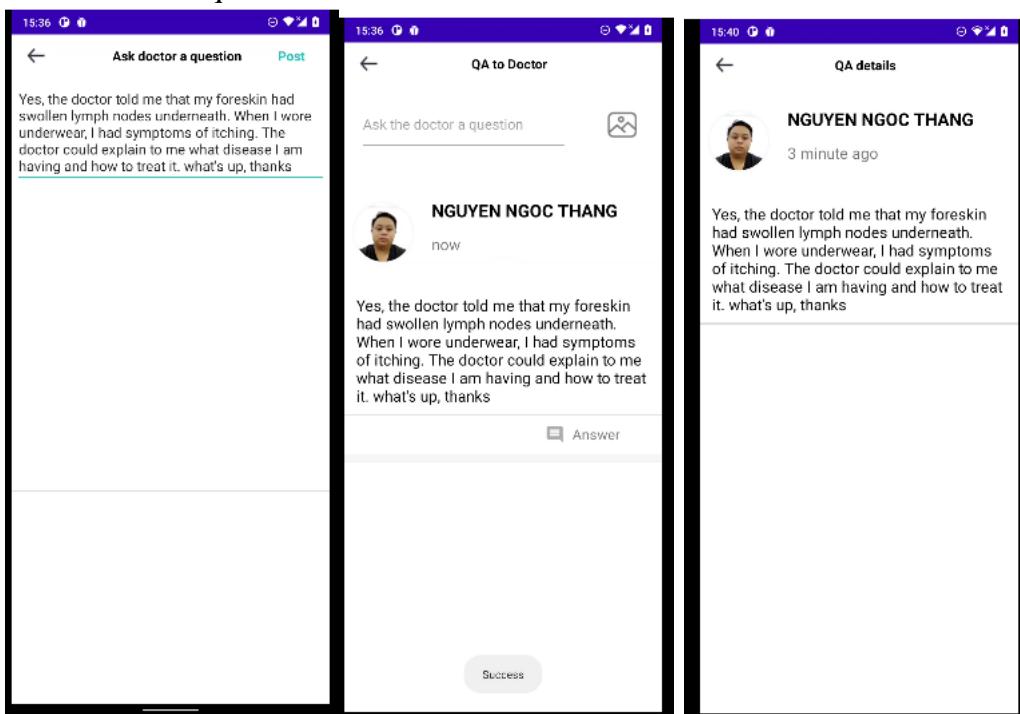
Here users can call a doctor by choosing a type of examination, choosing a doctor and calling a doctor





## Q&A

Here the user can ask questions and the doctor will answer the user

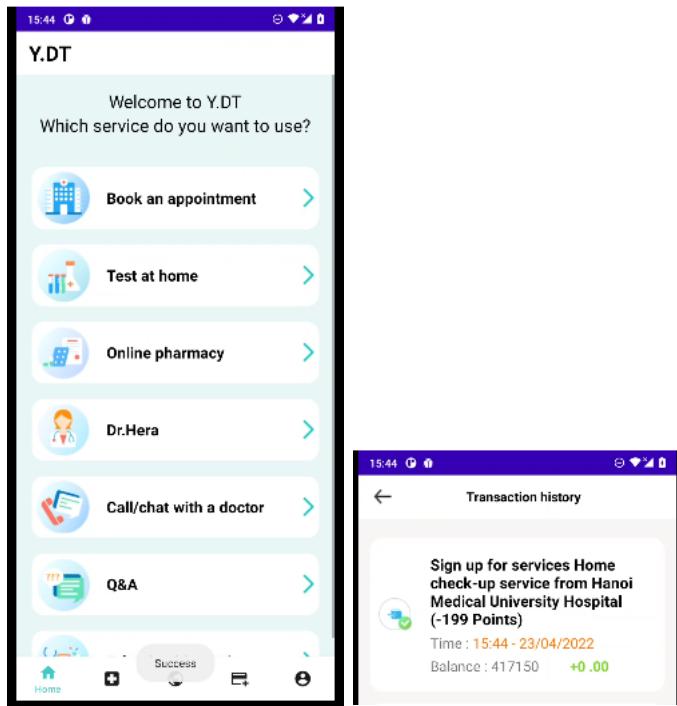




## Other health care services

Here users can purchase some of the available care with points

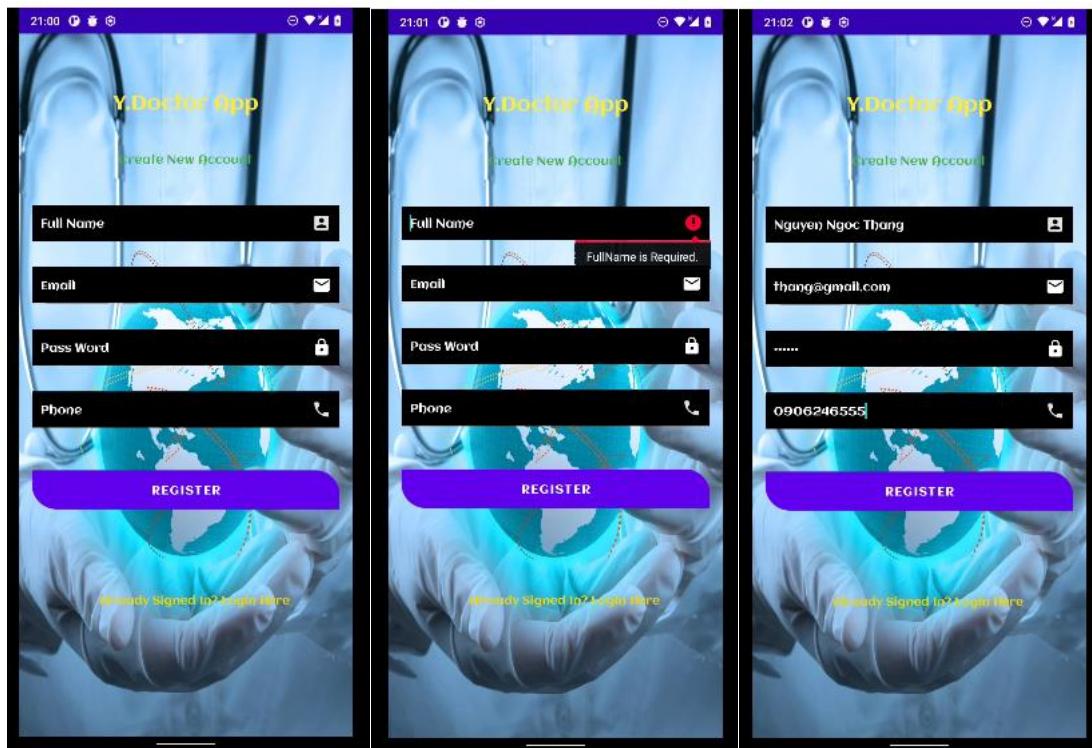
The image displays two mobile application screens. The left screen, titled "Choose services", lists two service options: "Home check-up service" (199 points) and "Test Covid19 at home" (50 points). Each option includes a small thumbnail image of a doctor interacting with a patient and a "Book an examination" button. The right screen, titled "Service details", provides more information about the "Home check-up service". It shows the service name, point requirement (199 Point), supplier (Hanoi Medical University Hospital), and a "Book an appointment" button.

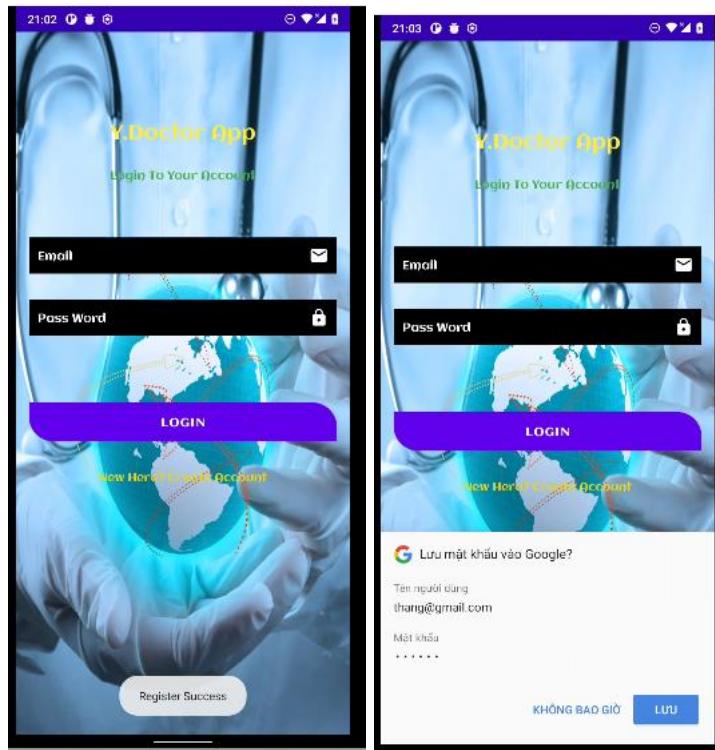


## Doctor

### Register account

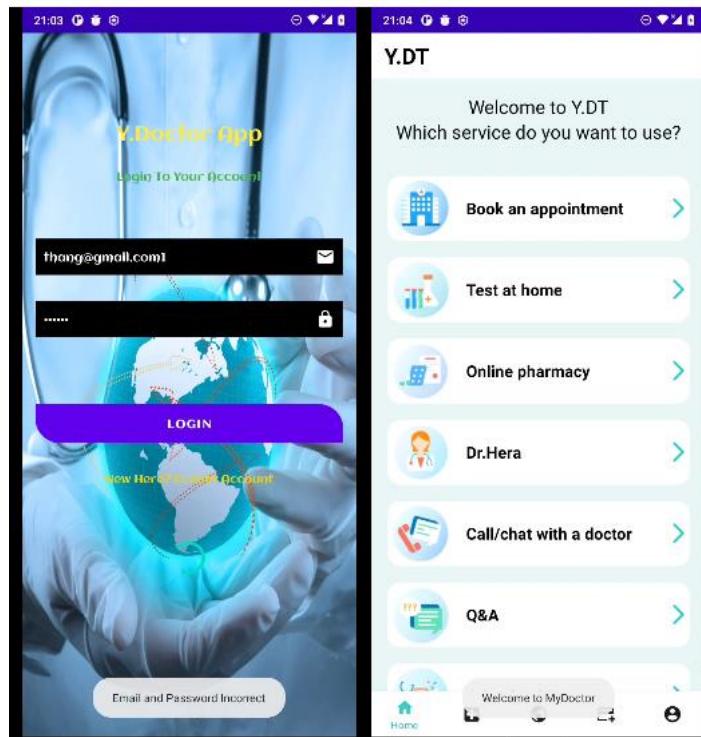
When users register, they need to provide full information such as Email, Full name, Password, Phone.





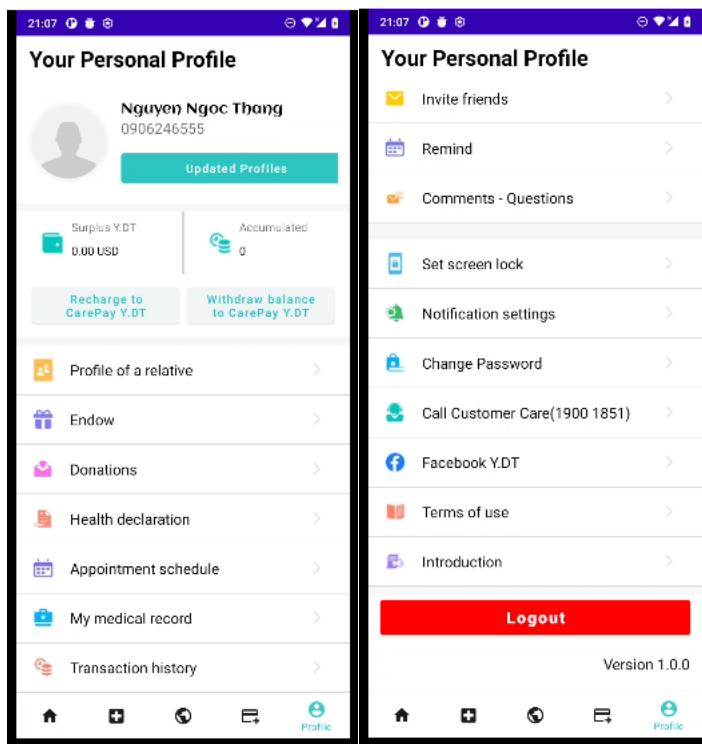
## Login account

When users log in, they need to provide Email and Password



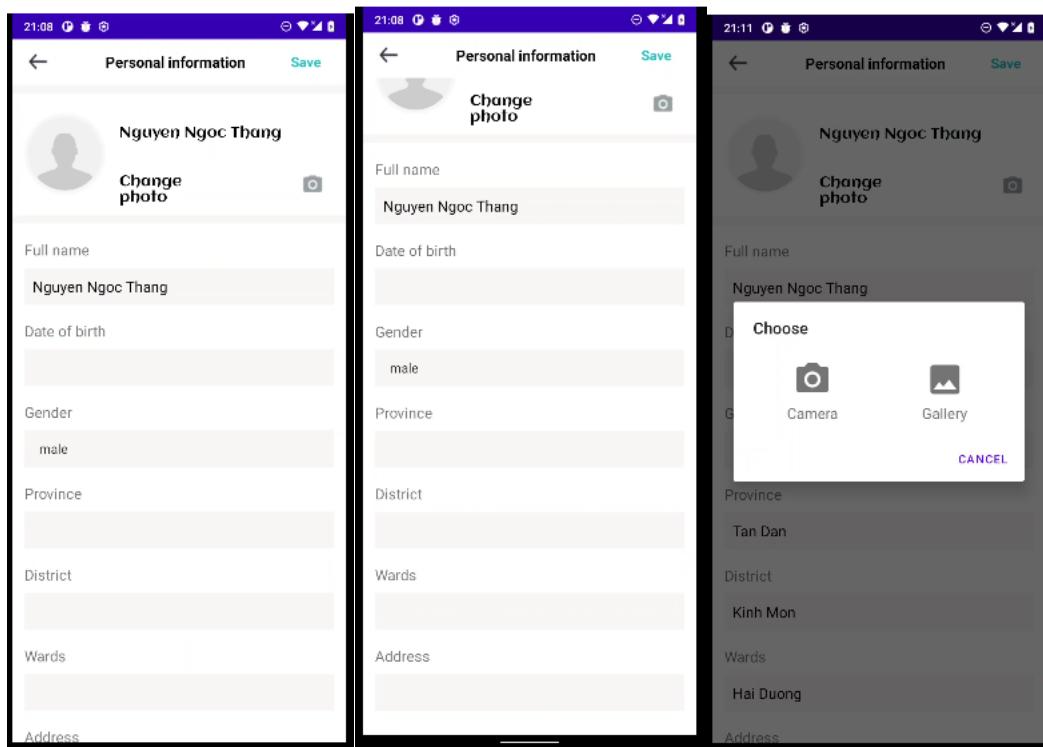
## Profile.

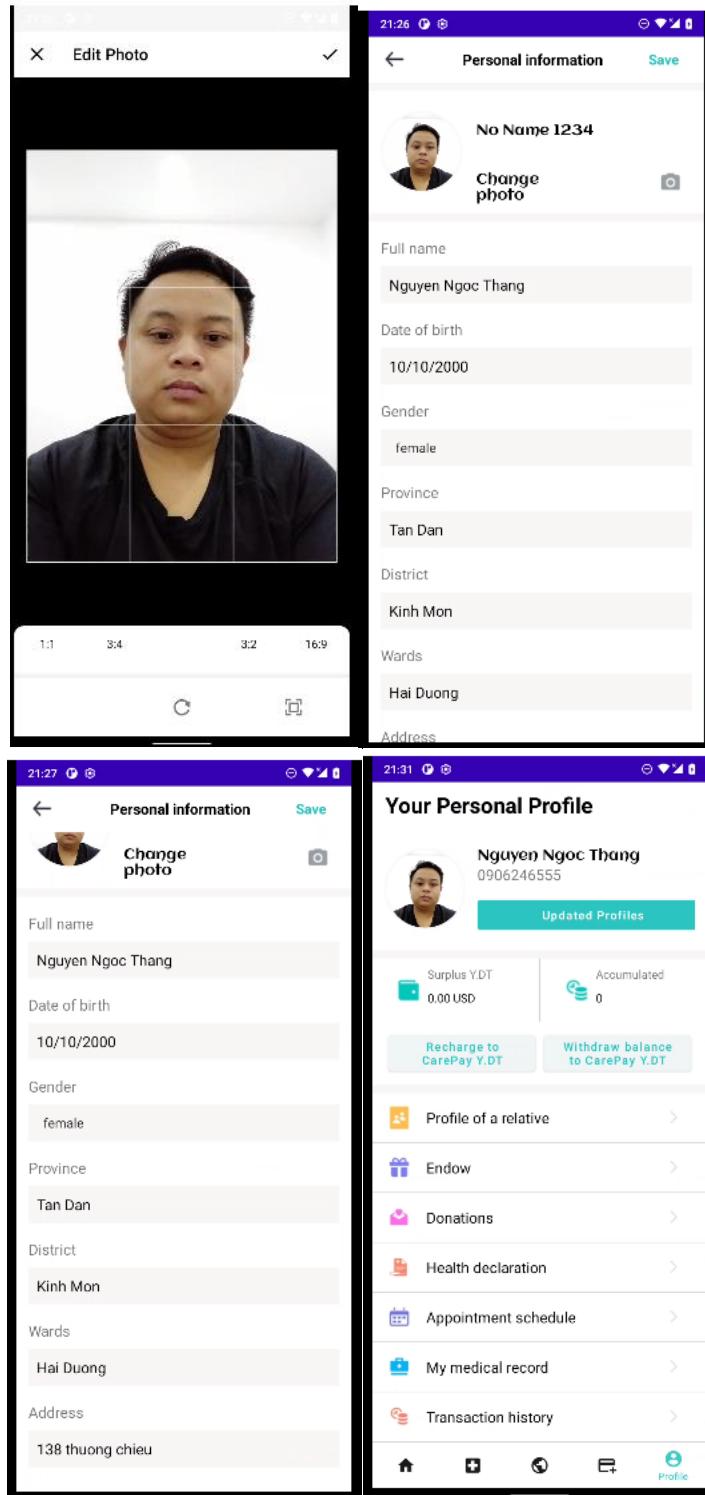
At the profile includes functions related to individual users.



## Update profile

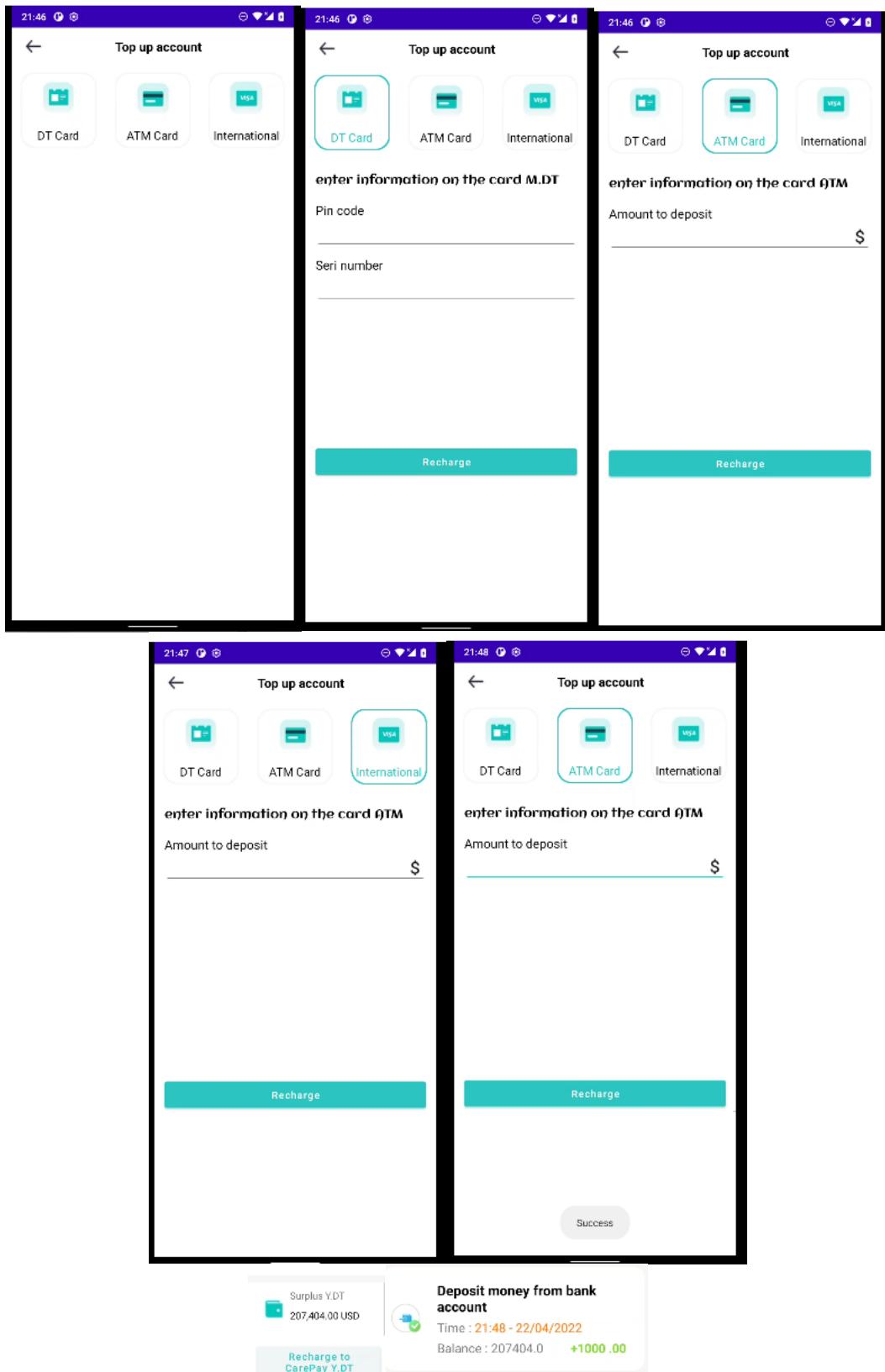
At update profile helps users update personal information about themselves.





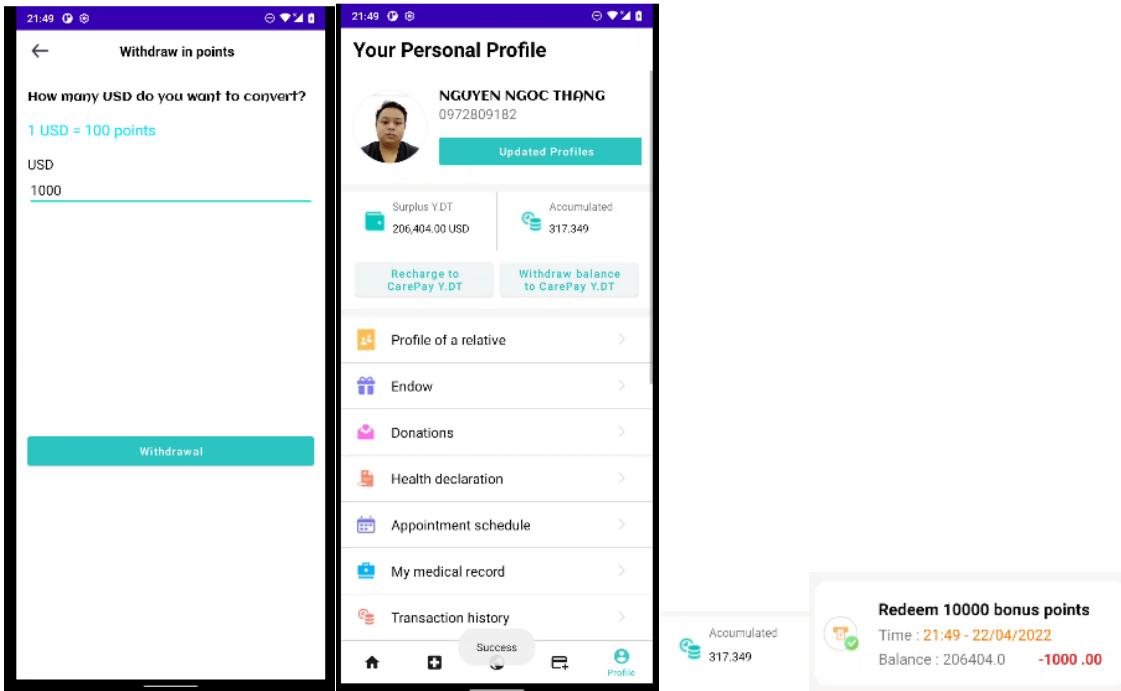
### Recharge.

Here users can top up money from bank cards to carepay.



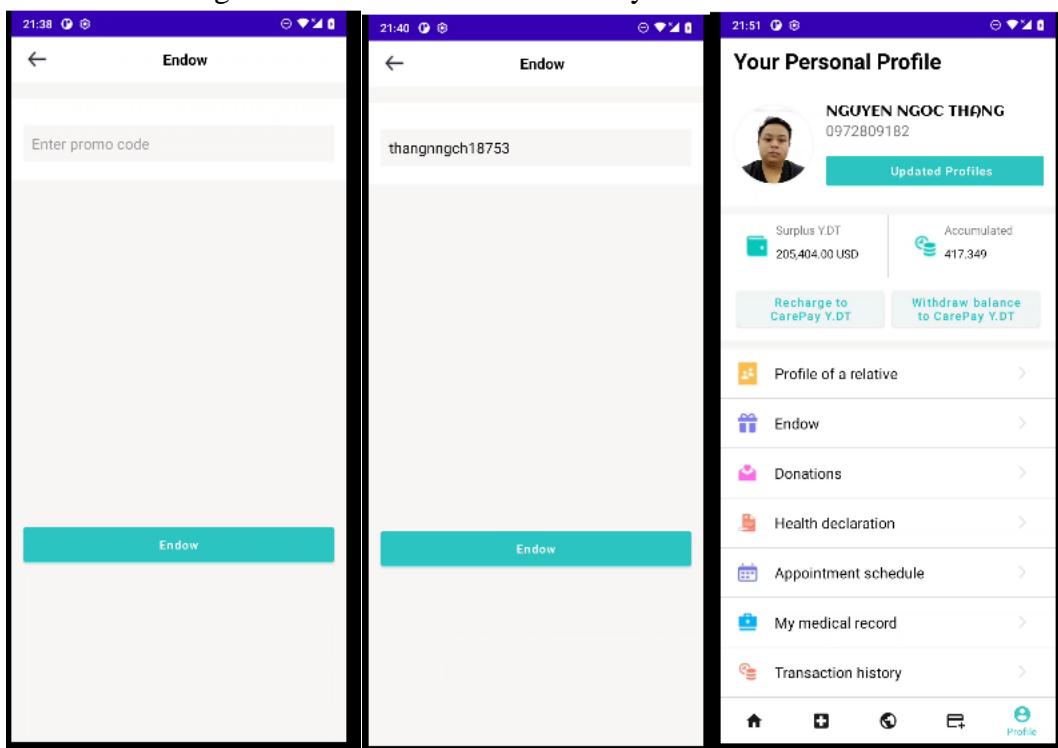
### Accumulated points

Here users can use money in carepay to exchange for points



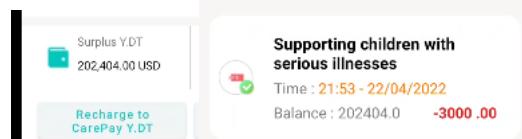
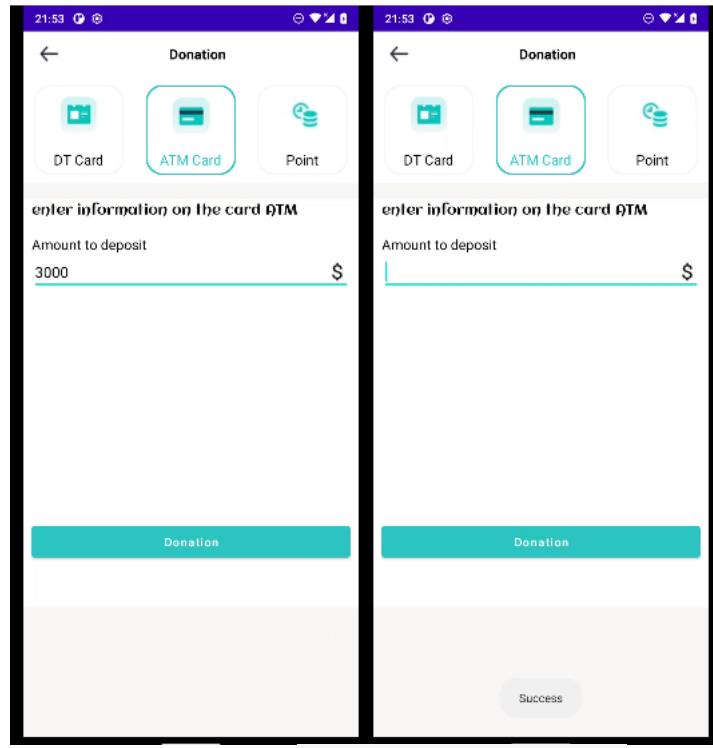
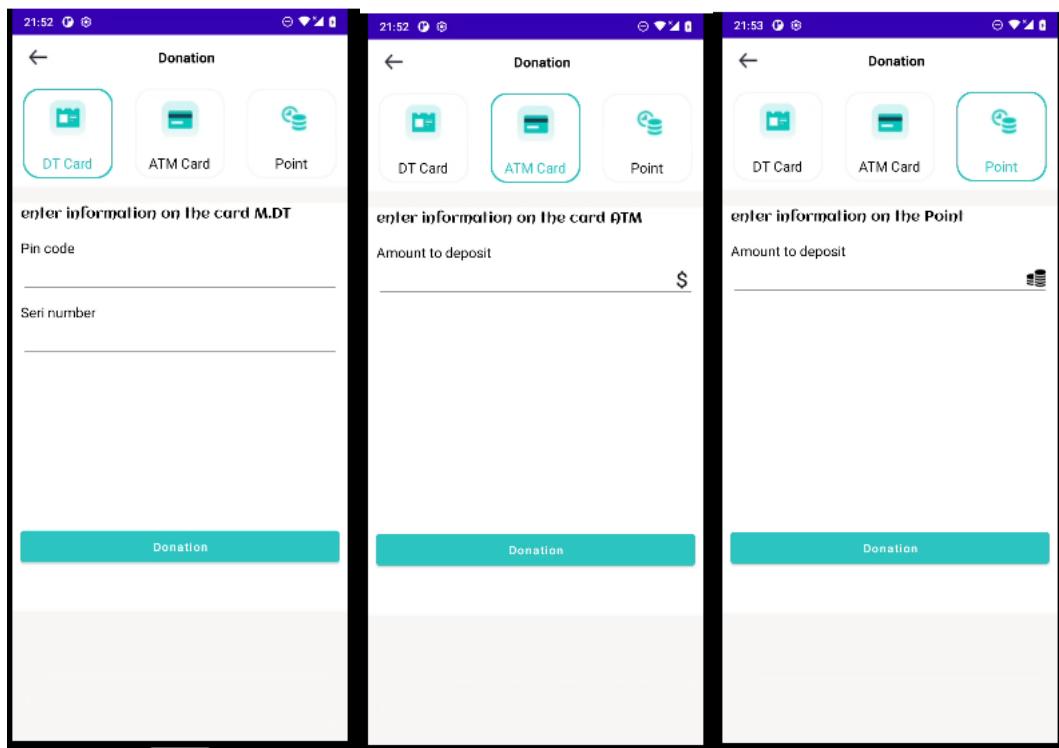
## Endow.

Here users can enter gift codes and each code can only be entered once



## Donations.

Here users can donate to children suffering from serious diseases with carepay money



## Health declaration

Here users can declare health

The screenshots show a mobile application for health declaration. The first screen displays user profile information: Full name (NGUYEN NGOC THANG), Phone (0972809182), Date of birth (10/10/2000), Gender (female), Province (Hai duong), District (kinh mon), Wards (tan dan), and Address (138 thuong chieu). The second screen shows a list of symptoms with checkboxes for 'yes' or 'no'. The third screen lists epidemiological factors with checkboxes for 'yes' or 'no'. The fourth screen is a summary of the declaration with a 'Send' button.

Health declaration

Full name: NGUYEN NGOC THANG

Phone: 0972809182

Date of birth: 10/10/2000

Gender: female

Province: Hai duong

District: kinh mon

Wards: tan dan

Address: 138 thuong chieu

Health declaration

138 thuong chieu

Have you had any of the following symptoms in the past 14 days?

signal	yes	no
Fever	<input type="radio"/>	<input checked="" type="radio"/>
Cough	<input type="radio"/>	<input checked="" type="radio"/>
Sore throat	<input type="radio"/>	<input checked="" type="radio"/>
Loss of taste/Loss of smell	<input type="radio"/>	<input checked="" type="radio"/>
Feeling tired	<input type="radio"/>	<input checked="" type="radio"/>
Shortness of breath	<input type="radio"/>	<input checked="" type="radio"/>
Other Symptoms/Signs	<input type="radio"/>	<input checked="" type="radio"/>

During the past

Epidemiological factors

	yes	no
1. Are you suffering from COVID-19?	<input type="radio"/>	<input checked="" type="radio"/>
2. Close contact with an infected or suspected COVID-19 case within the past 14 days.	<input type="radio"/>	<input checked="" type="radio"/>
3. Traveled from another country or territory within the last 14 days.	<input type="radio"/>	<input checked="" type="radio"/>
4. Have you finished the group quarantine within the past 14 days?	<input type="radio"/>	<input checked="" type="radio"/>
5. In the past 14 days, has anyone in your family/work had a fever or cough?	<input type="radio"/>	<input checked="" type="radio"/>
6. Have you been discharged from hospital due to treatment for COVID-19 within the past 14 days?	<input type="radio"/>	<input checked="" type="radio"/>

Send

Your Personal Profile

NGUYEN NGOC THANG  
0972809182

Updated Profiles

Surplus YDT: 202,404.00 USD | Accumulated: 417,349

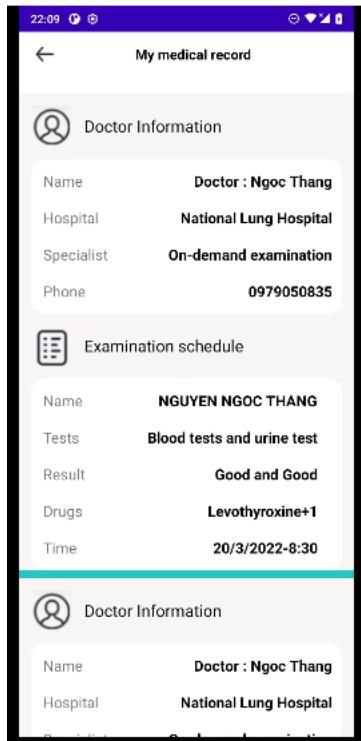
Recharge to CarePay Y.DT | Withdraw balance to CarePay Y.DT

Profile of a relative | Endow | Donations | Health declaration | Appointment schedule | My medical record | Transaction history

Successful medical declaration

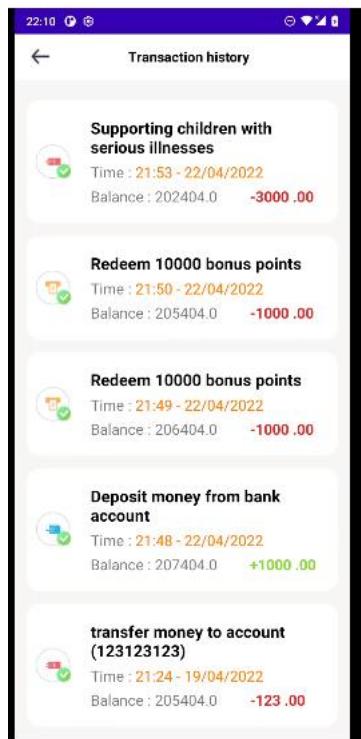
## My medical record

Here users can view all their medical history.



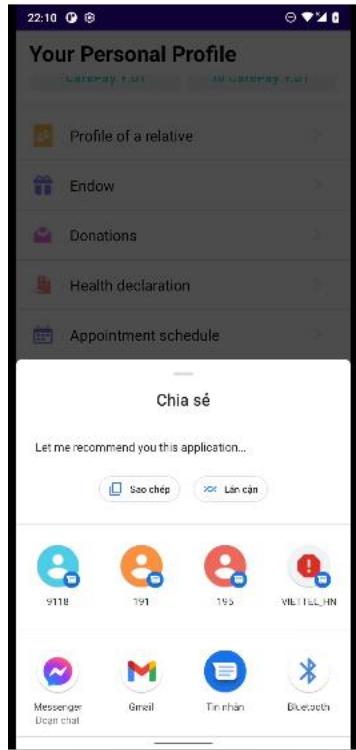
## Transaction history

Here users can see all their transaction history.



## Invite friends

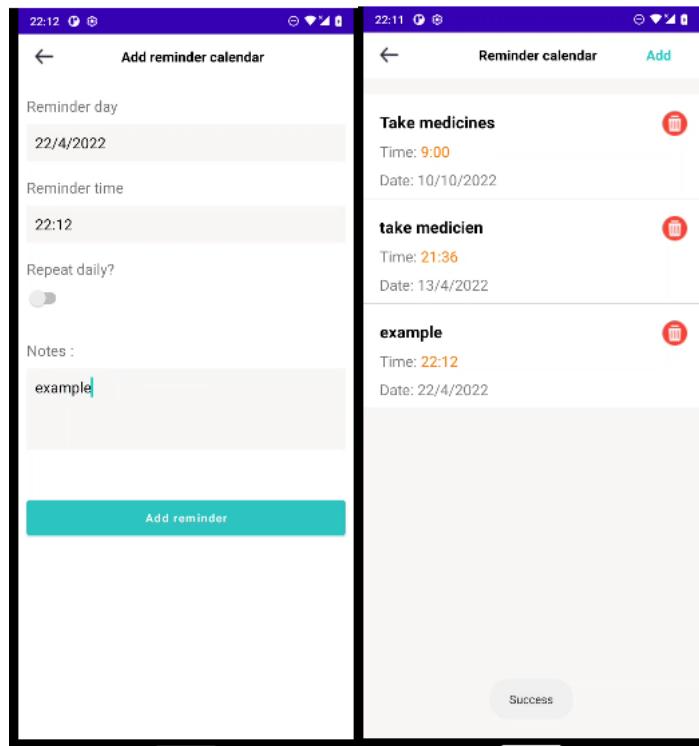
Here users can invite friends to download the app



## Remind

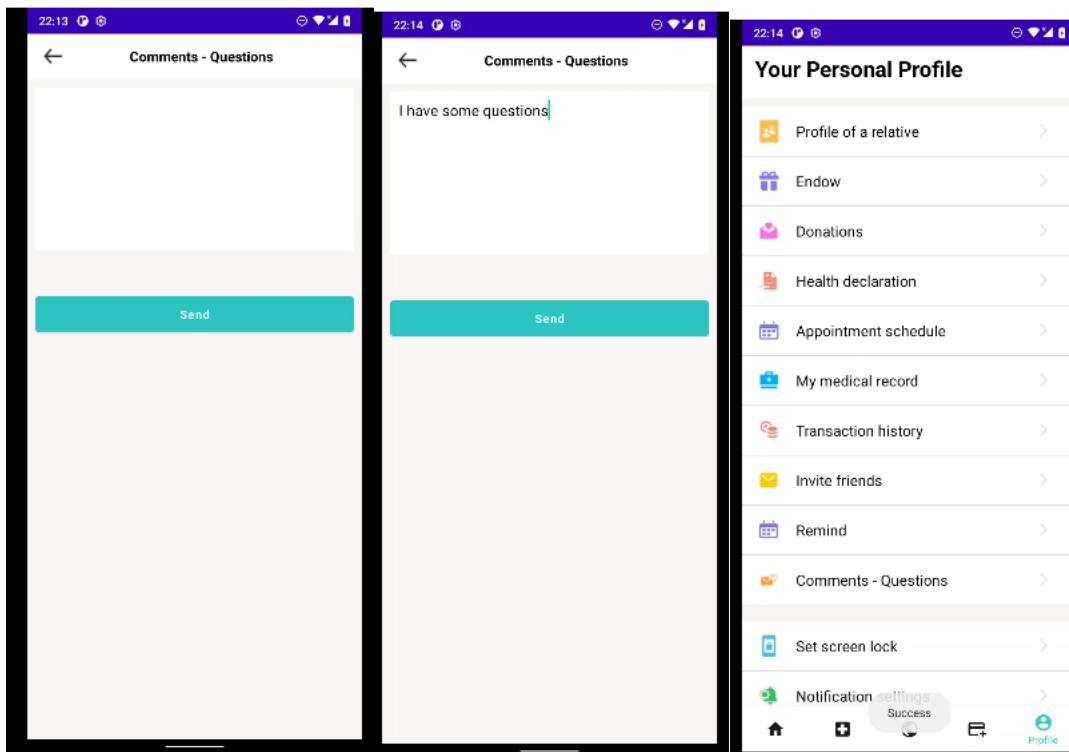
Here users can see all their reminder calendars and can add or remove reminders.

Three screenshots of a mobile application's reminder management feature. The first screenshot shows a list of three existing reminders: "Take medicines" (Time: 9:00, Date: 10/10/2022), "take medicien" (Time: 21:36, Date: 13/4/2022), and another "take medicien" (Time: 14:35, Date: 14/4/2022). Each reminder has a red trash icon to its right. The second screenshot shows the same list with a "Success" message at the bottom. The third screenshot is a modal dialog titled "Add reminder calendar" with fields for "Reminder day" (a date picker), "Reminder time" (a time picker), "Repeat daily?" (a toggle switch), and a notes field containing "Ex : take medicine". A large green "Add reminder" button is at the bottom of the modal.



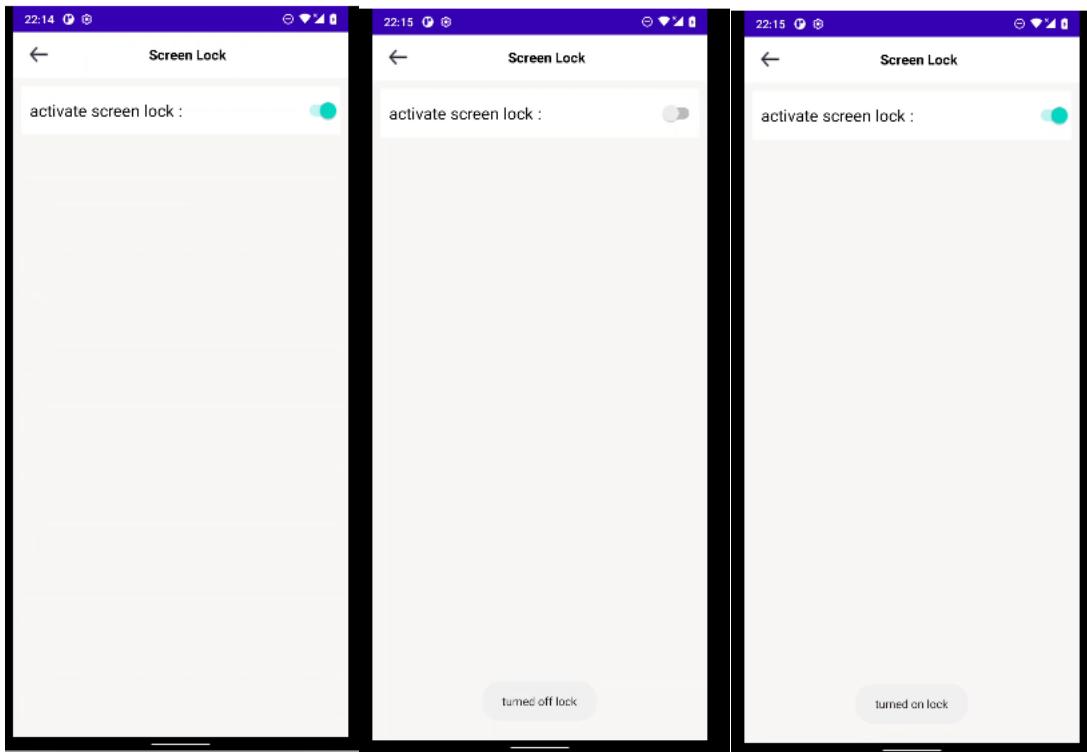
### Comment-Questions

Here users can send their contributions about the app to admin.



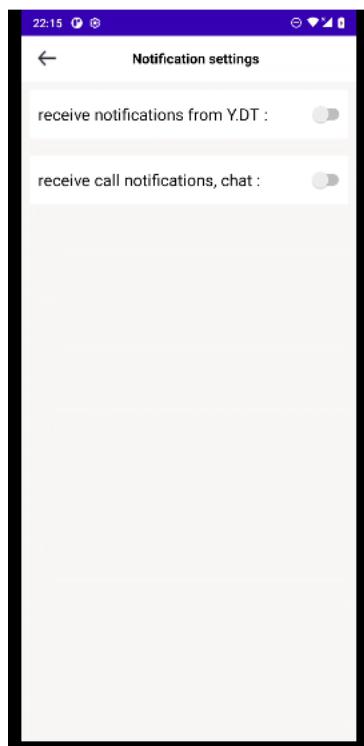
### Screen lock settings.

Here users can set lock when lock locks users will need to enter a password when transacting and vice versa.



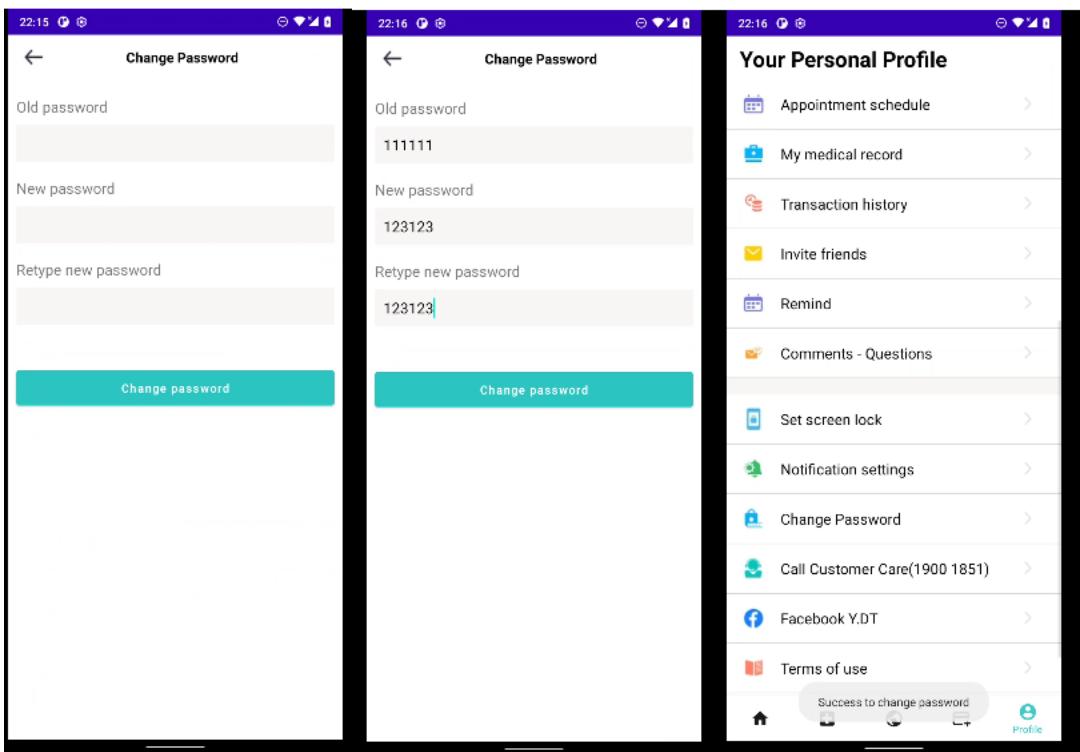
### Notification toggle settings

Here users can set notifications



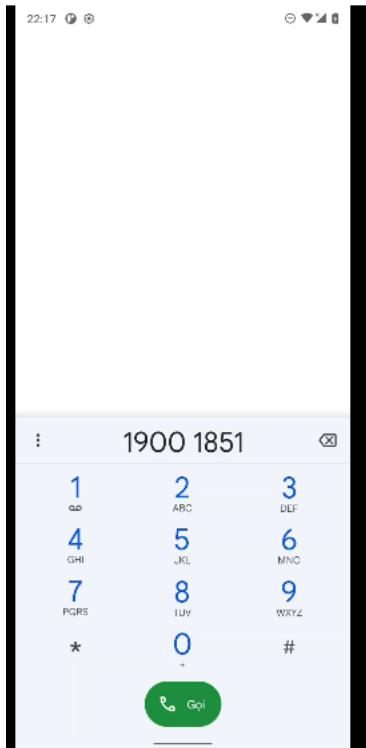
### Change Password

Here user can change password



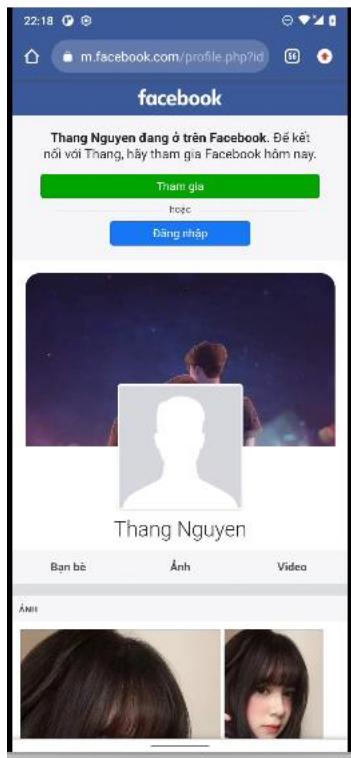
## Call customer care

Here users can call the app's hotline



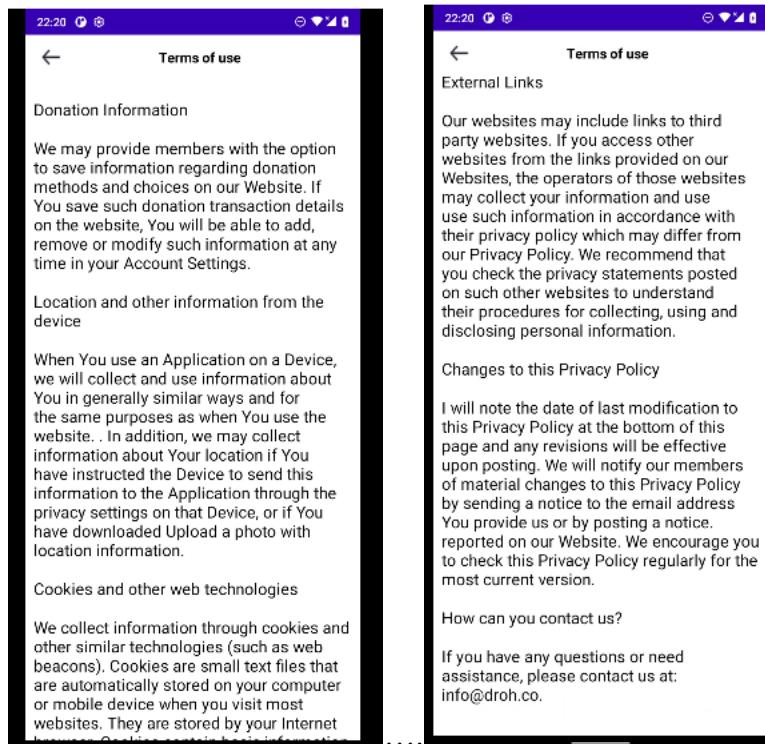
## Facebook app

Here users can access the app's facebook

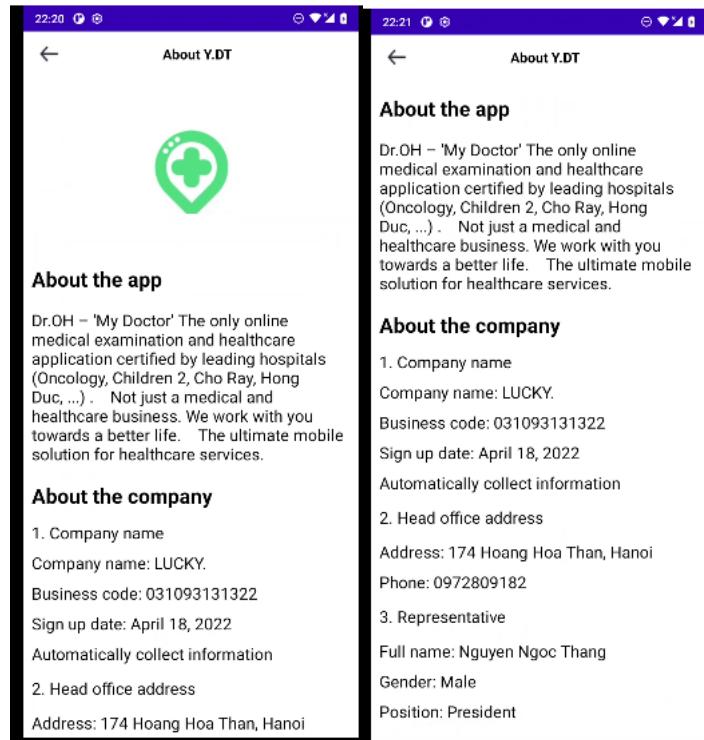


## Terms of use

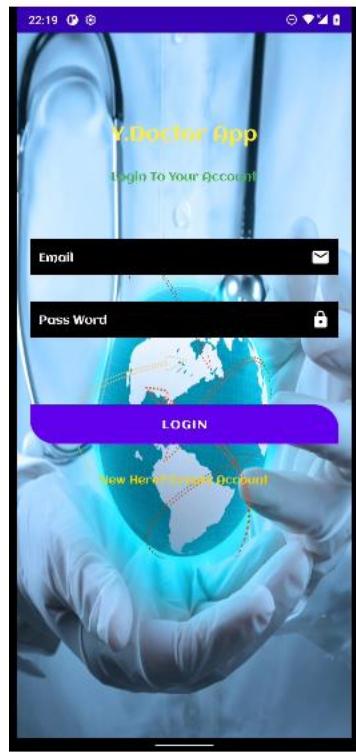
<p><b>Terms of use</b></p> <p>By accessing the Y.DT - Pocket General Hospital application and contacting us, You acknowledge that You have read and understood this Privacy Policy, collection and handling principles information contained therein. The Privacy Policy was first updated on September 14, 2018. We may change this Policy from time to time, so please check back often for any updates.</p> <p><b>Limit</b></p> <p>This Privacy Policy describes in detail our policy and principles regarding the collection, use and disclosure of information about You. We understand that providing information online requires a lot of trust from you. We take this trust very seriously and place a high priority on ensuring the safety and security of the personal information you provide to us when you visit the Website or contact us. What information do we collect from you? How We Use Your Information How long do we keep your information? Your rights and choices regarding the collection and use of your information Children's privacy External Links Changes to this Privacy Policy How can you contact us?</p> <p><b>General information</b></p>	<p><b>Terms of use</b></p> <p><b>General information</b></p> <p>We receive and store any information that you enter into our Website or otherwise provide to us. This information includes information that can be used to identify You as an individual or to contact You directly ("personal information"). Personal Information includes information that you provide to us such as your first and last name, phone number, mailing and email address, username and password, and payment information (such as your credit card number, cardholder name and card expiration date). You can choose not to provide us with personal information, but usually, some information about you is required for you to gain trust from both parties as well as partners. by DR.OH - Pocket General Hospital. In addition, certain information is required so that you can ask us questions or initiate other transactions on our website. We may also collect other information such as your IP address, information that identifies your device and website browsing history to the extent that information refers to you.</p> <p><b>Security for WEBSITE</b></p> <p>You will have the opportunity to provide contact information and information regarding DR.OH - Pocket General Hospital to others through our Website. When</p>	<p><b>Terms of use</b></p> <p><b>Security for WEBSITE</b></p> <p>You will have the opportunity to provide contact information and information regarding DR.OH - Pocket General Hospital to others through our Website. When</p> <p><b>Automatically collect information</b></p> <p>We automatically collect certain information from your computer or Device when you visit. For example, we will collect session data, including Your IP address, web browser software, and the web page you refer to. We may also collect information about your online activity, such as content viewed, pages visited and searches.</p> <p><b>Donation Information</b></p> <p>We may provide members with the option to save information regarding donation methods and choices on our Website. If You save such donation transaction details on the website, You will be able to add, remove or modify such information at any</p>
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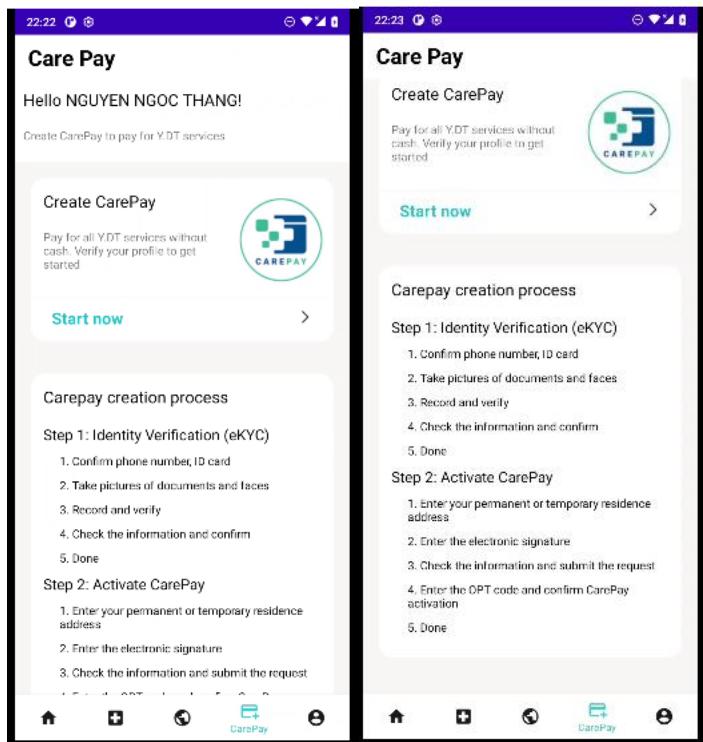
## Introduce



## Logout

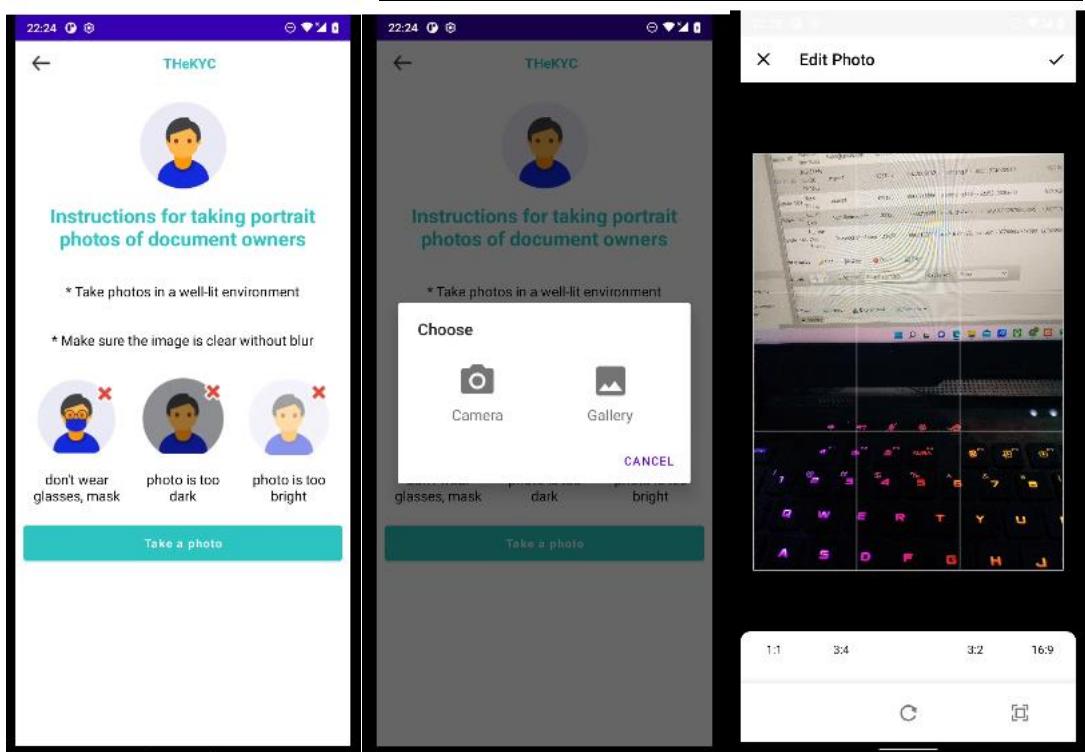
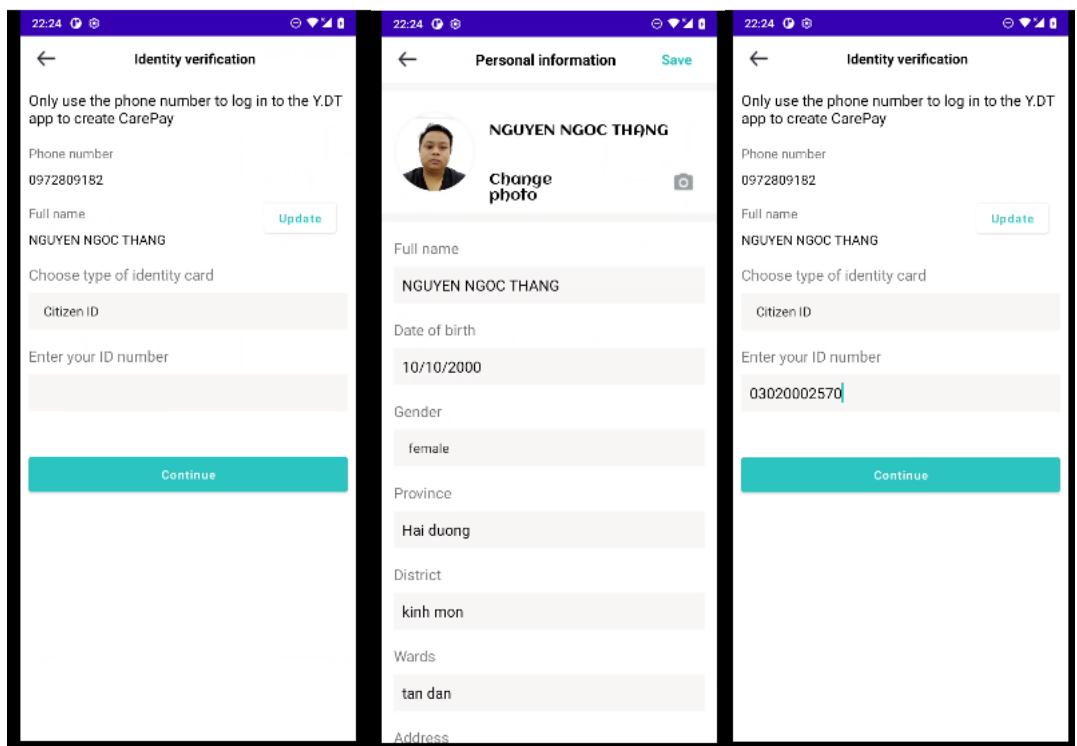


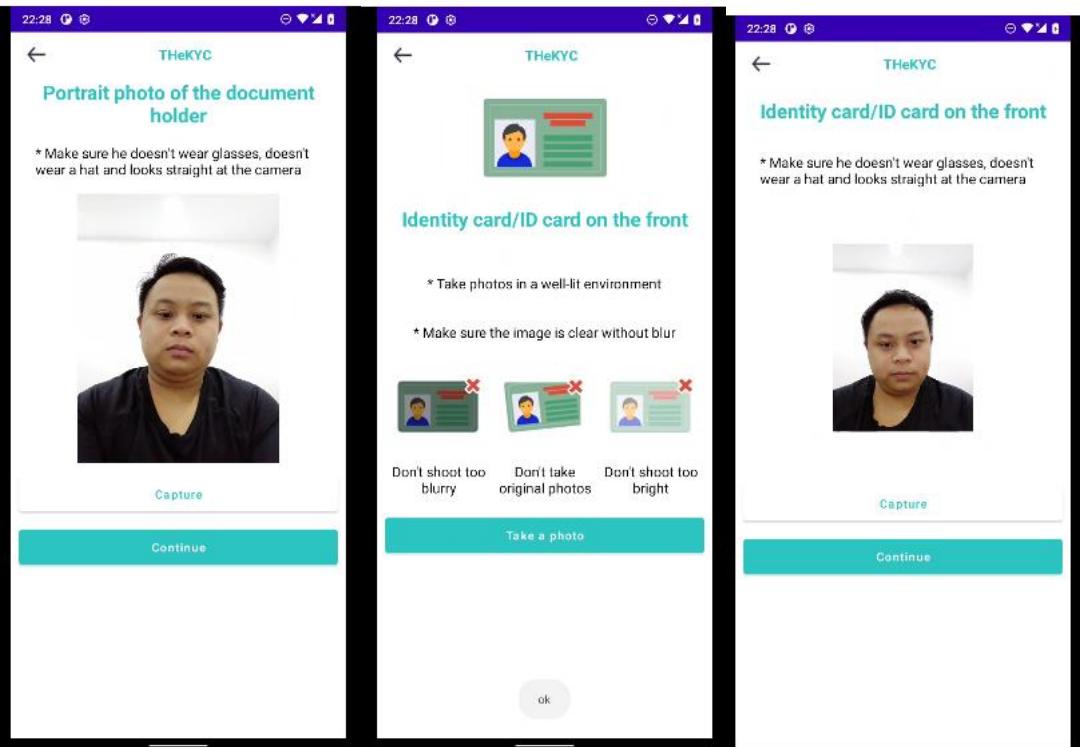
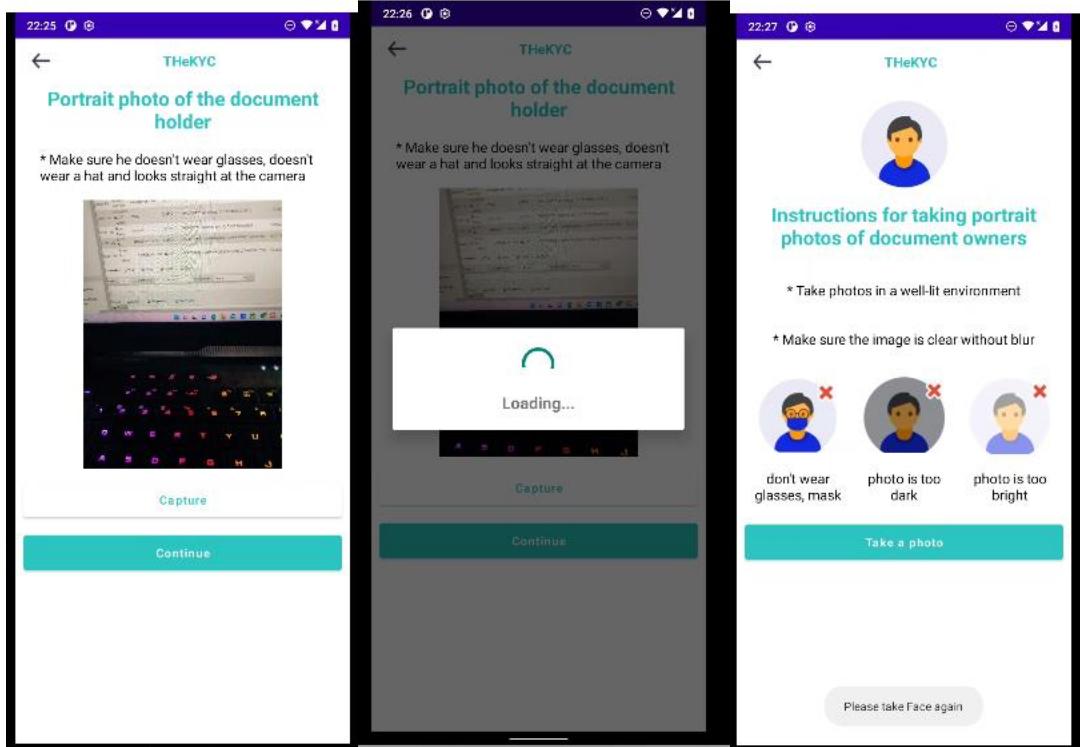
**Carepay non active**

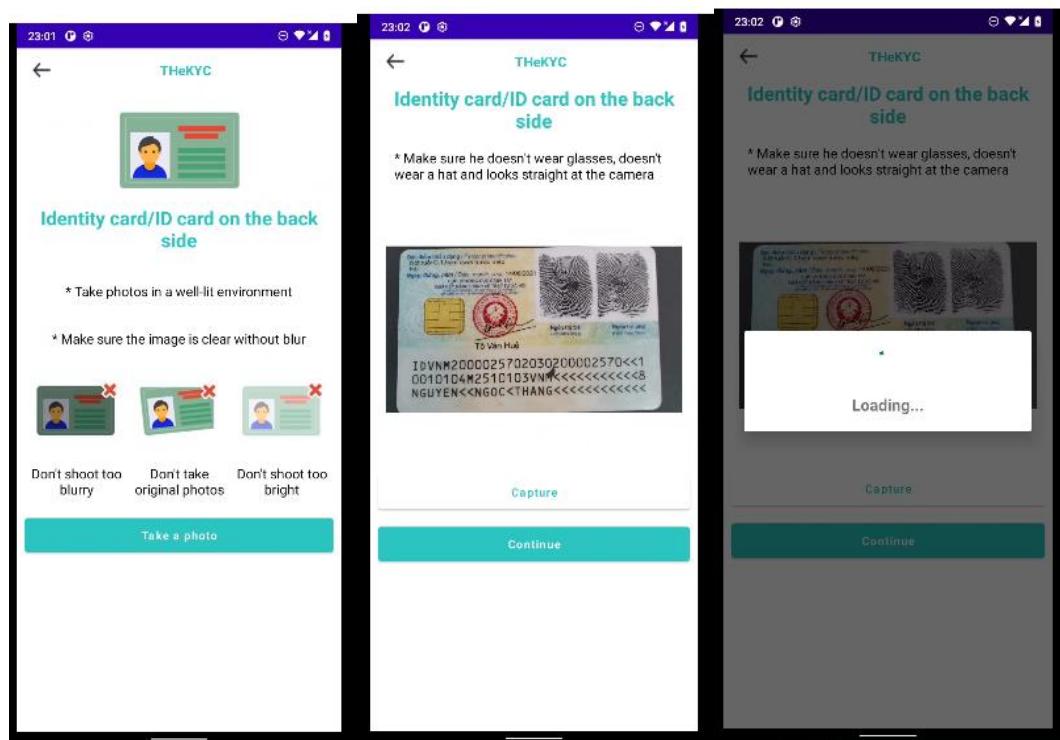
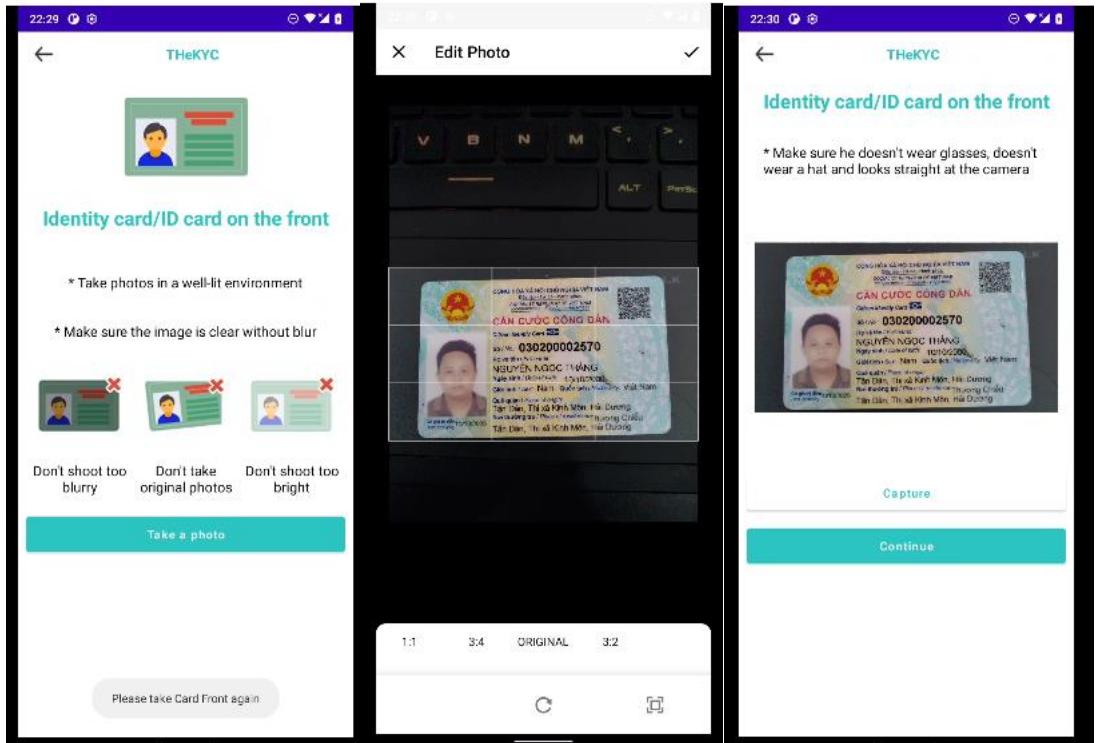


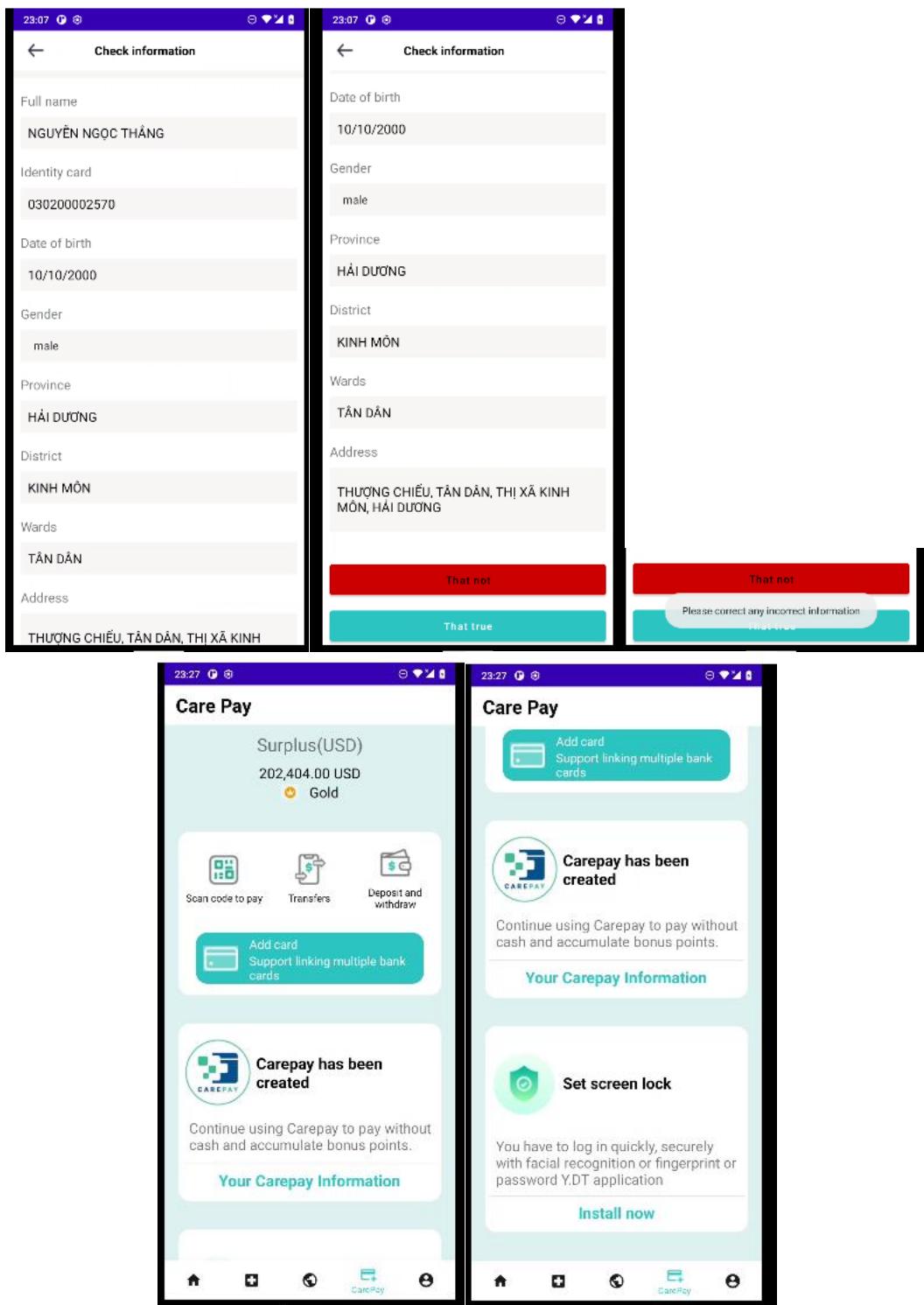
### **Register CarePay**

To use the app's transaction services, users need to register for carepay



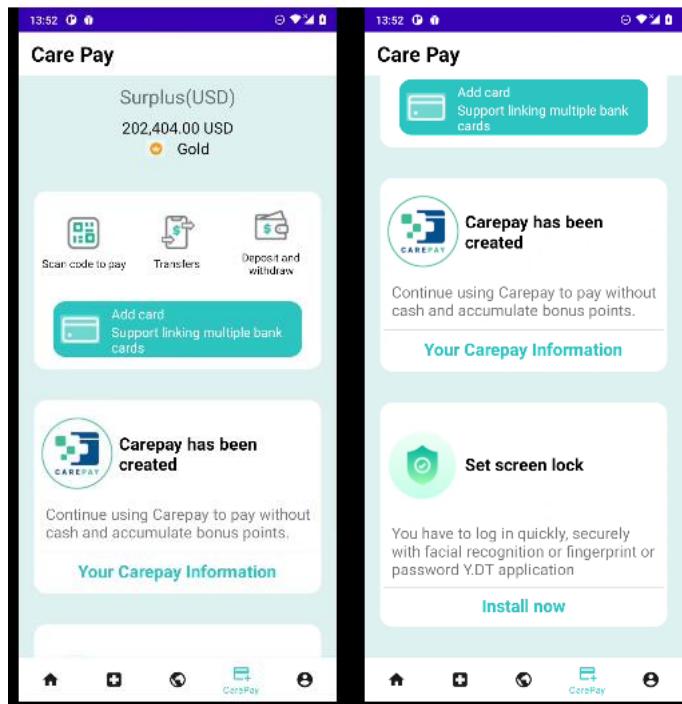




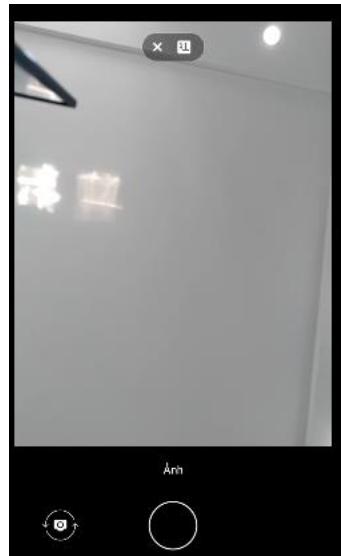


## Carepay

After successful registration, active carepay will appear.

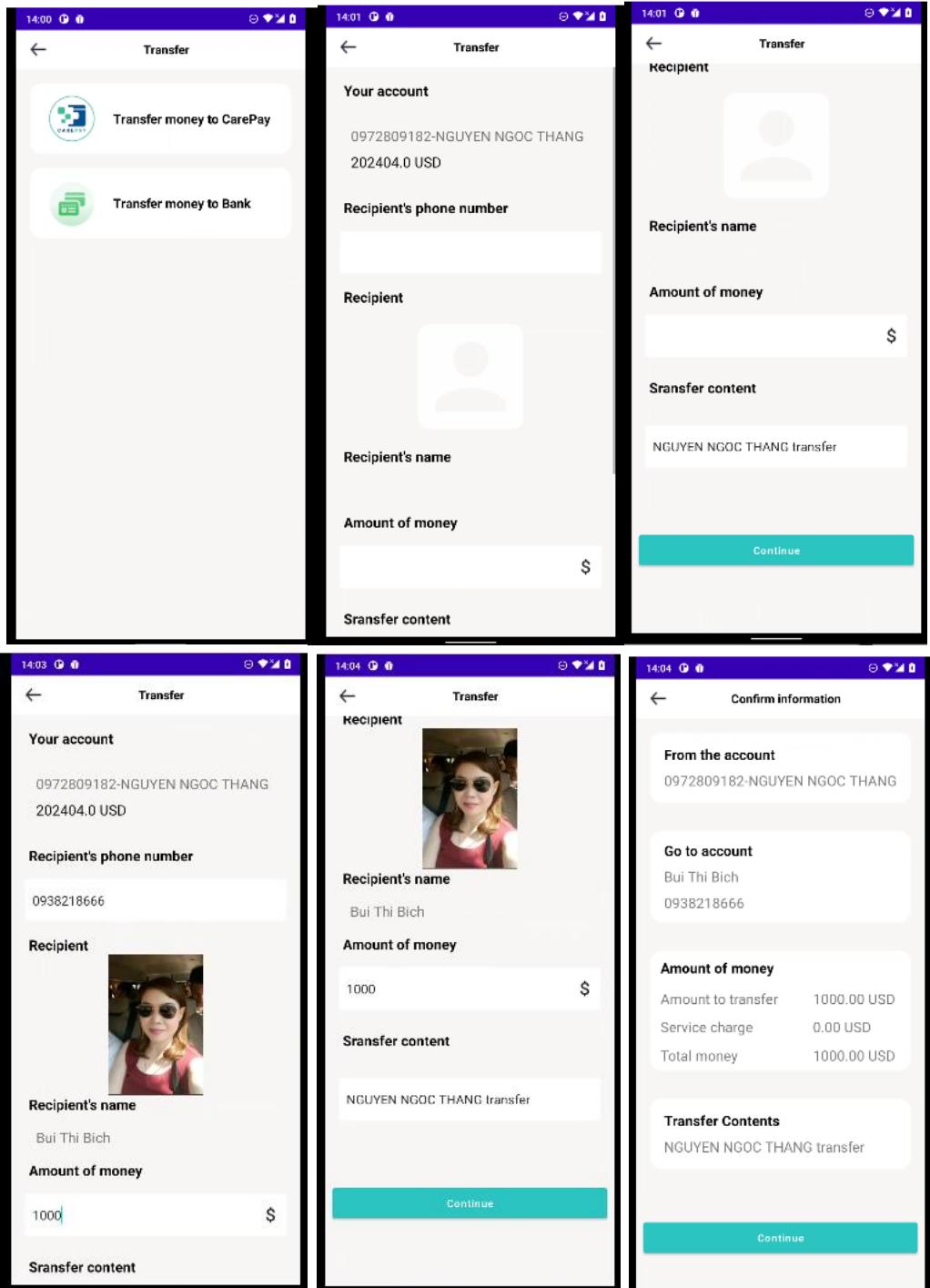


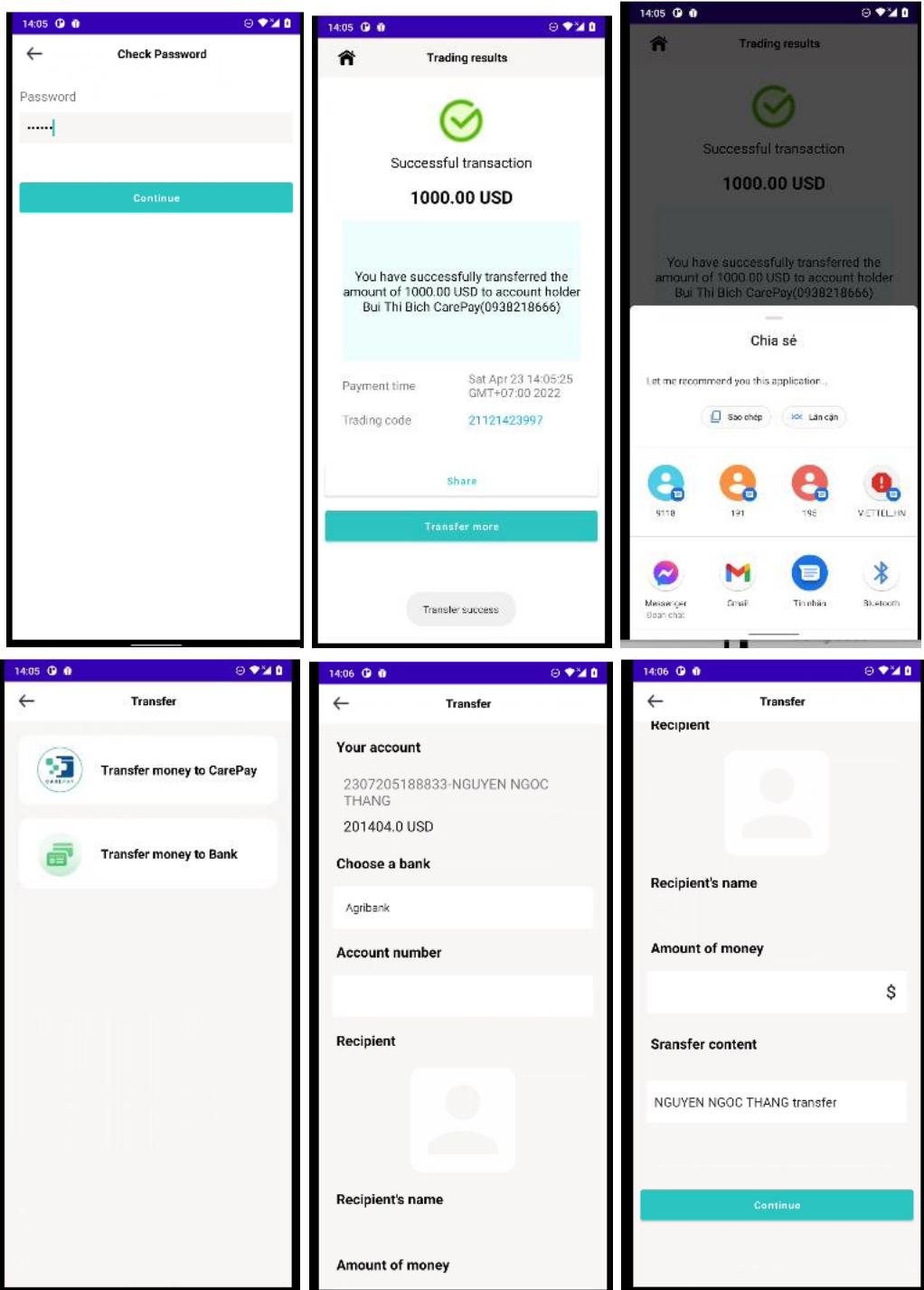
**Scanning to pay**

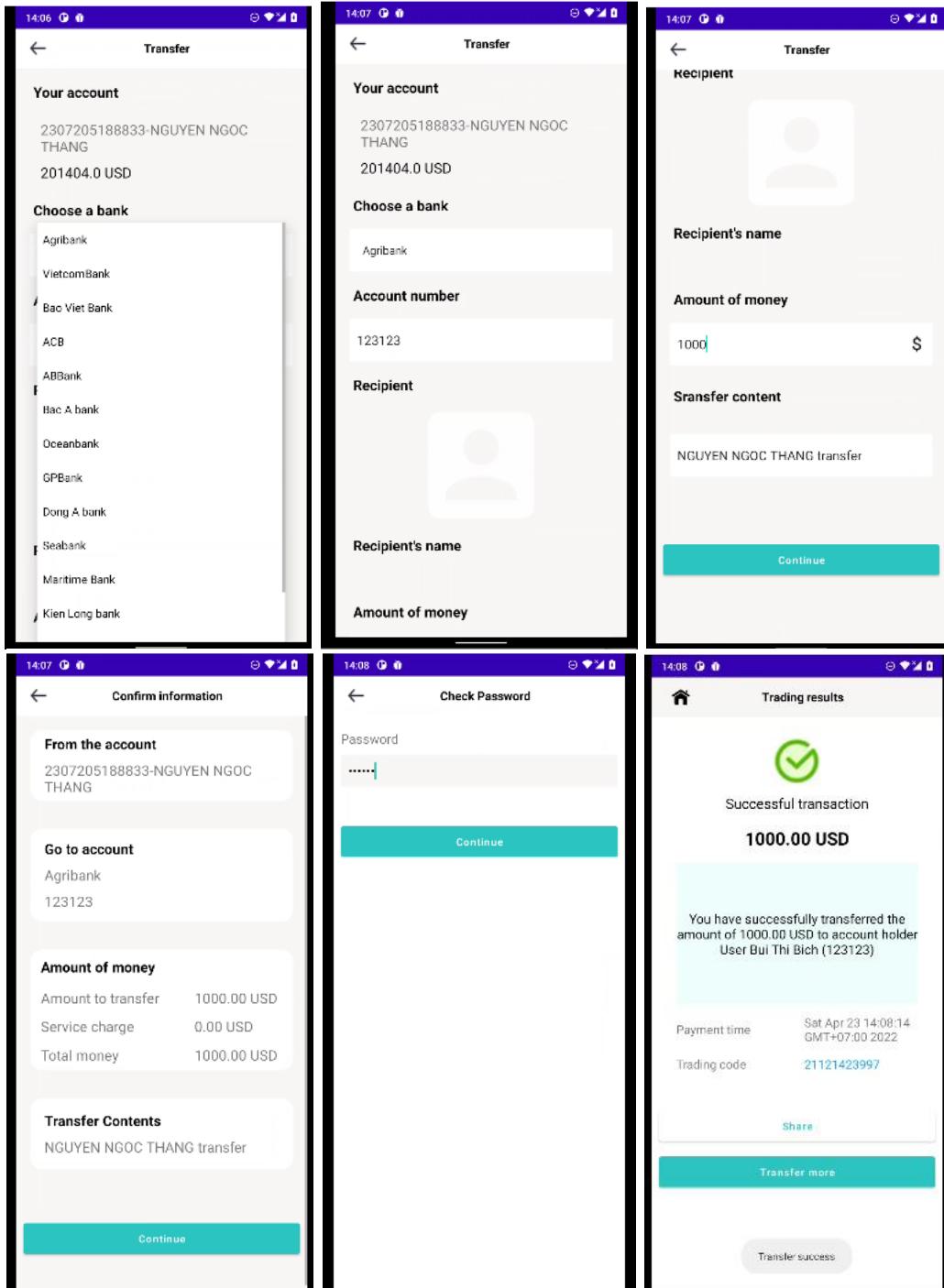


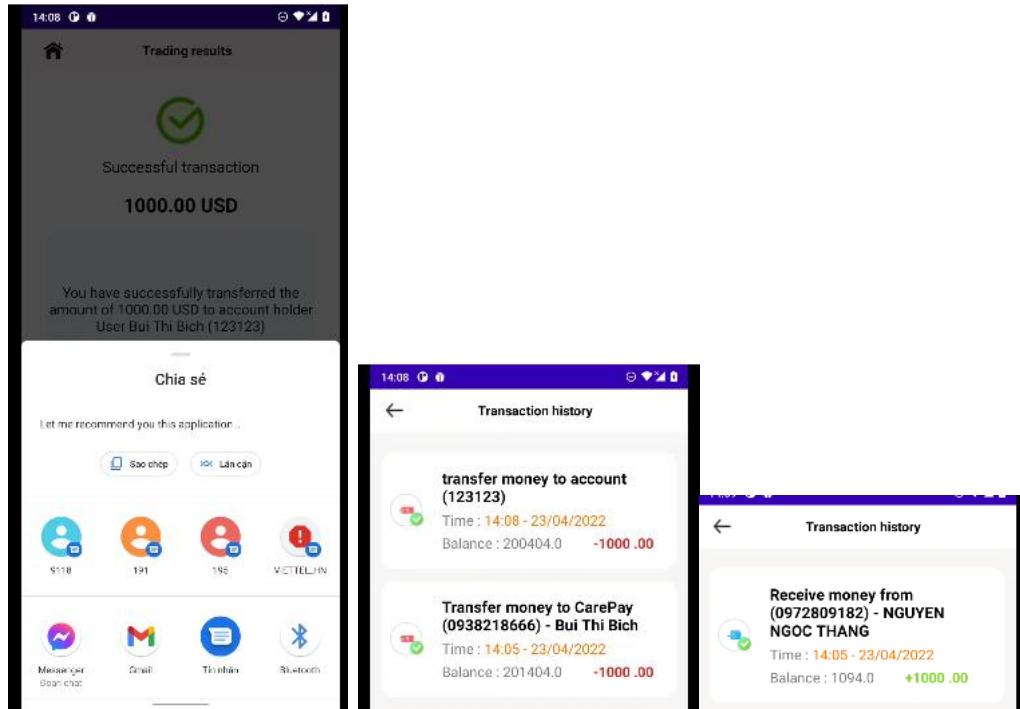
### **Transfer**

Users have 2 methods of money transfer: bank and carepay



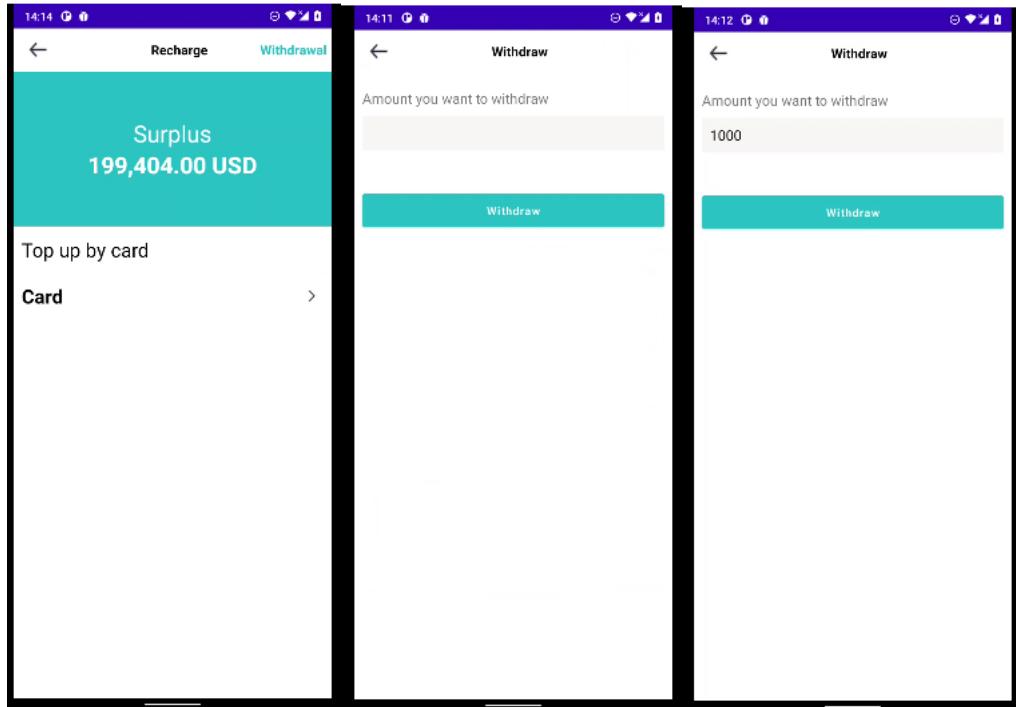


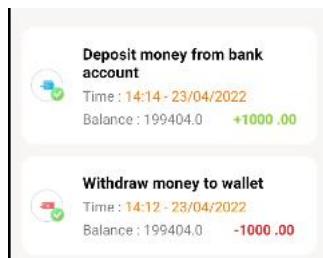
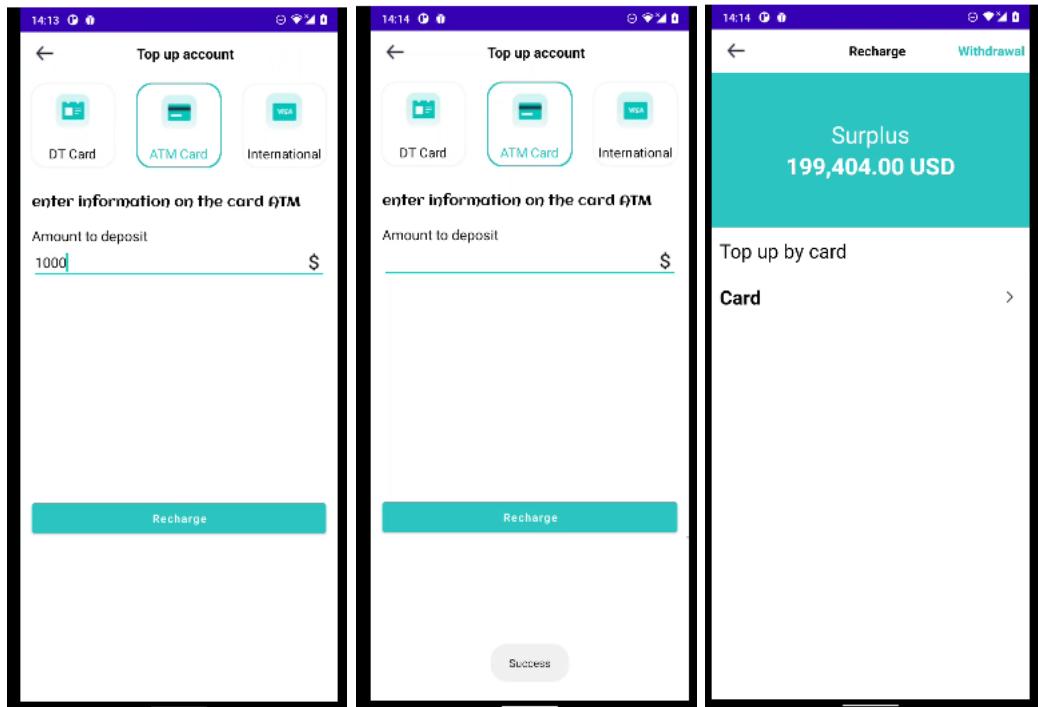
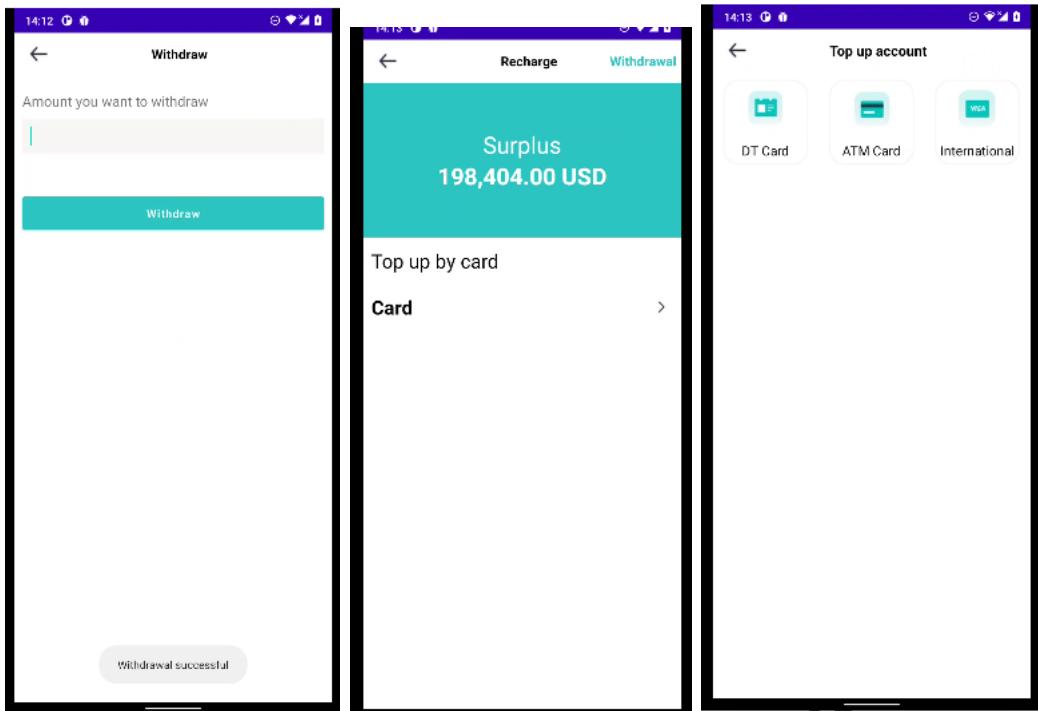




## Recharge and Withdraw money

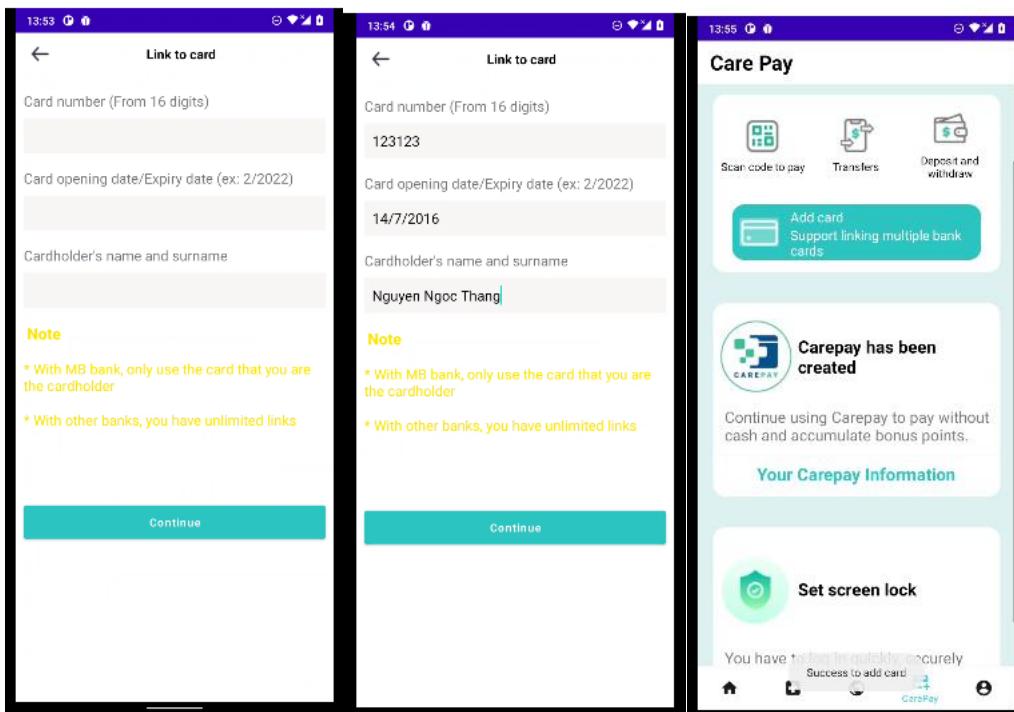
User can withdraw money from carepay to linked bank account as well as vice versa.



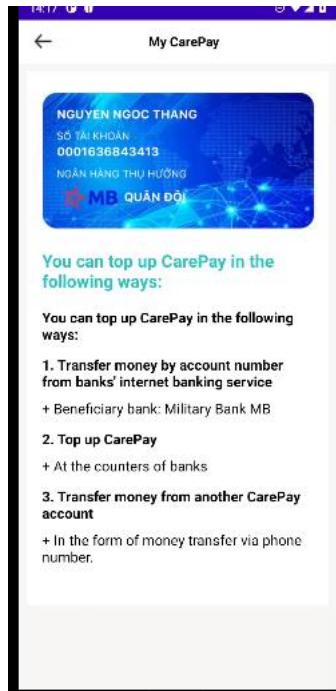


## Add card.

User can add link with bank account

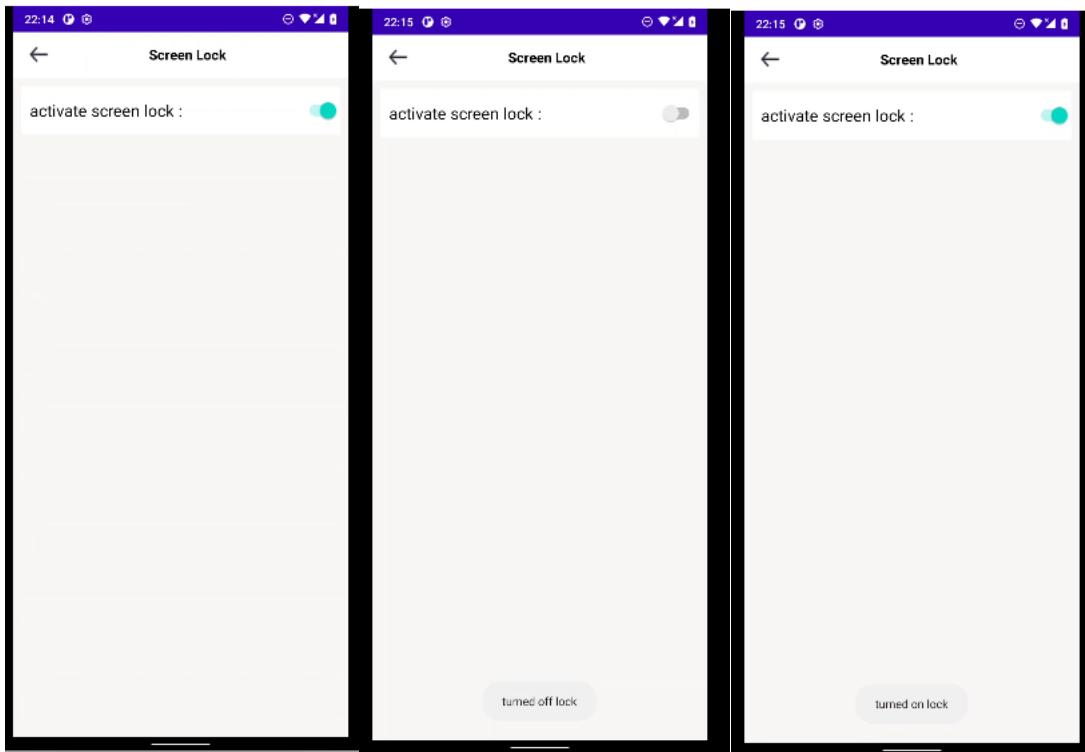


## Carepay information



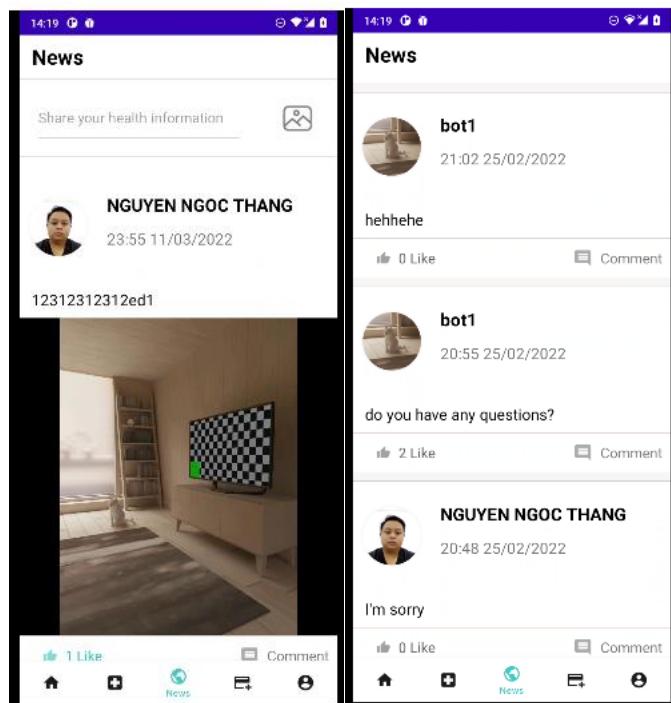
## Set screen lock

Here users can set lock when lock locks users will need to enter a password when transacting and vice versa.



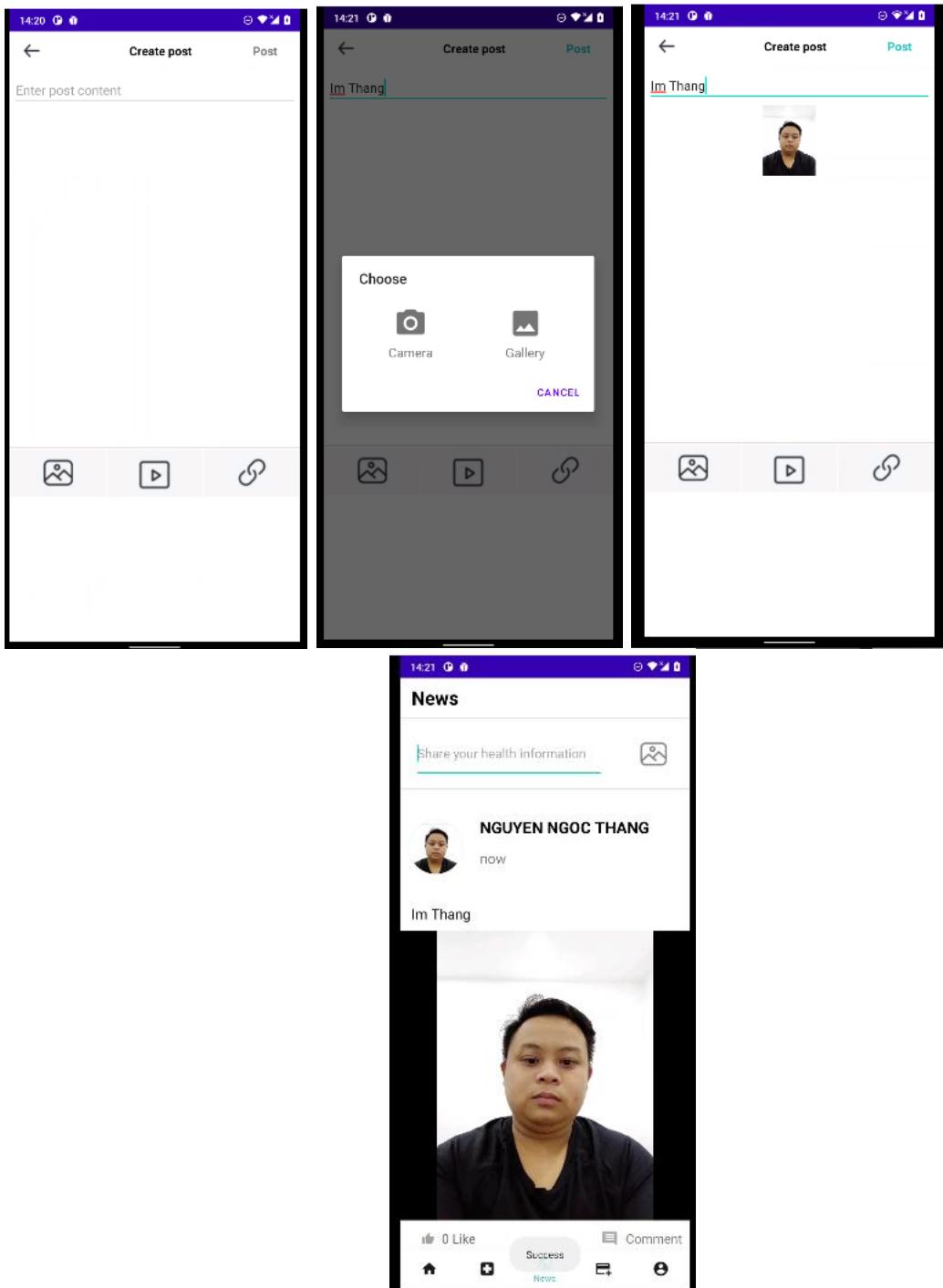
## News

This is a social network where patients and doctors share.



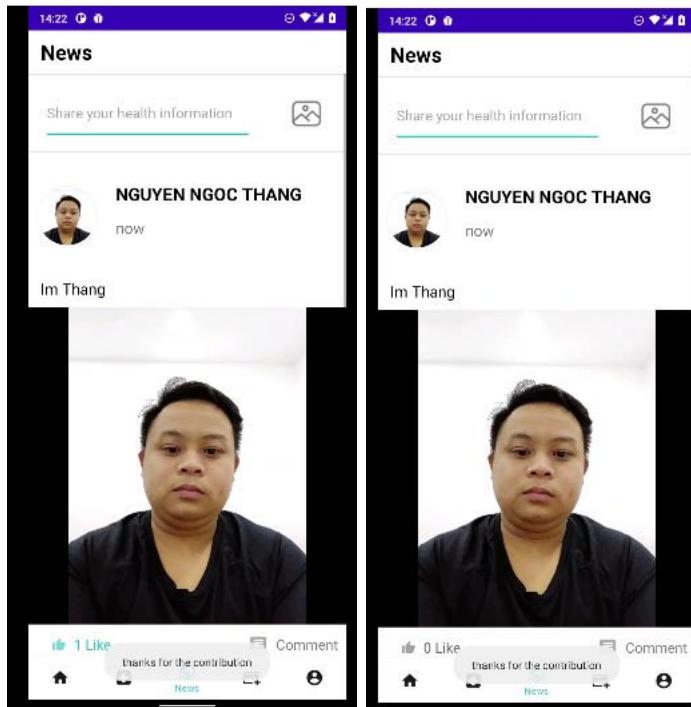
## Post

This is where users can post articles



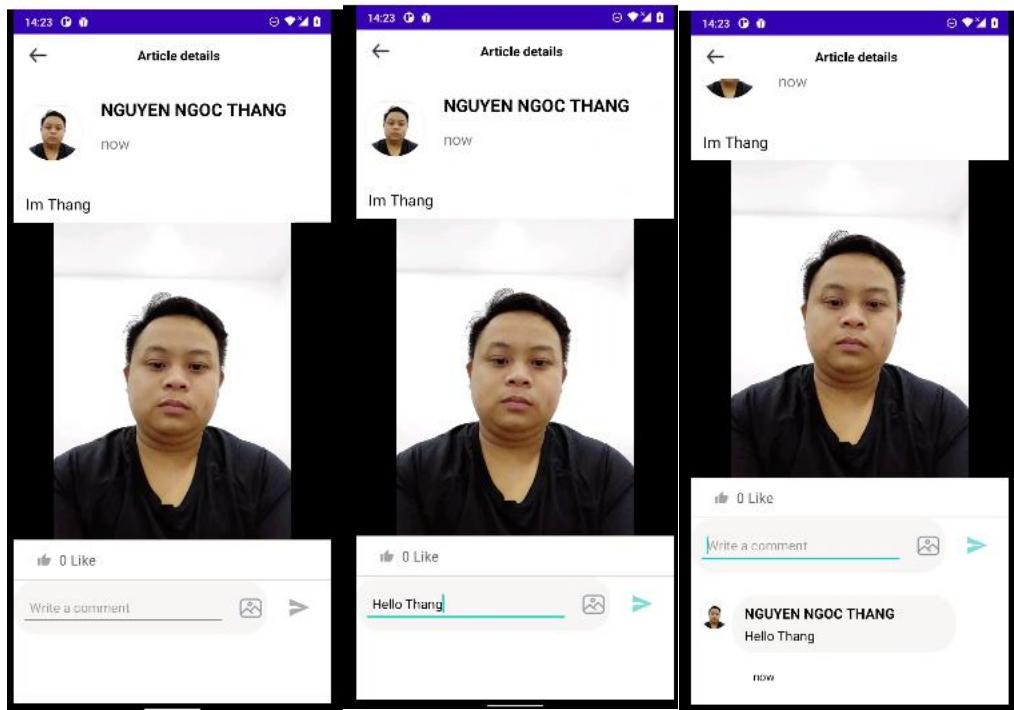
## Like

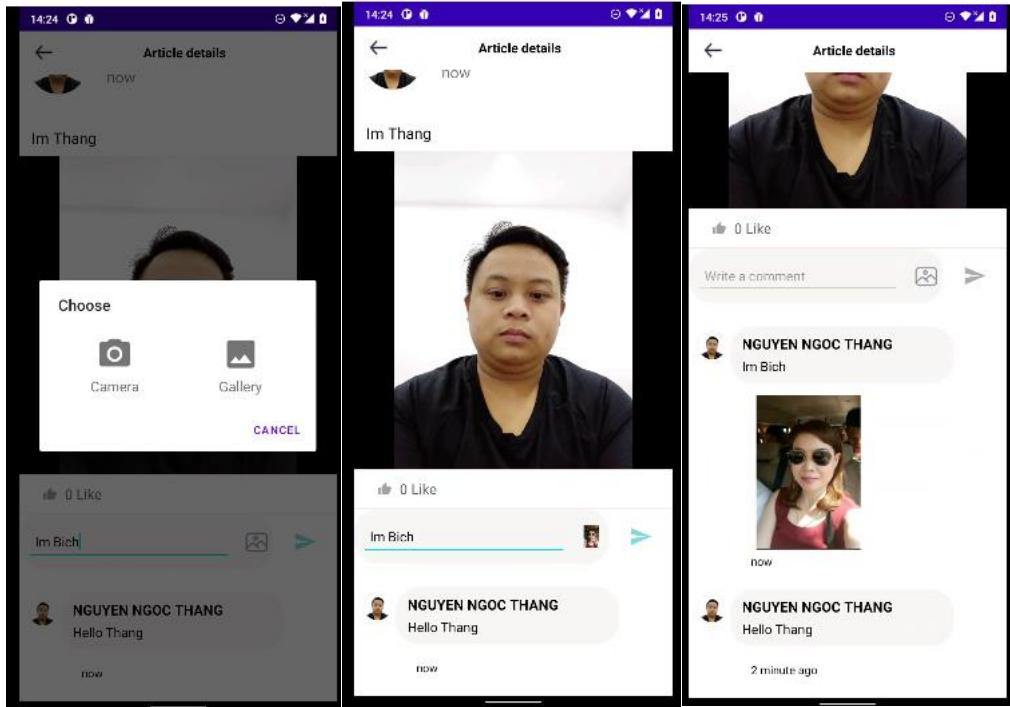
This is where users can like articles



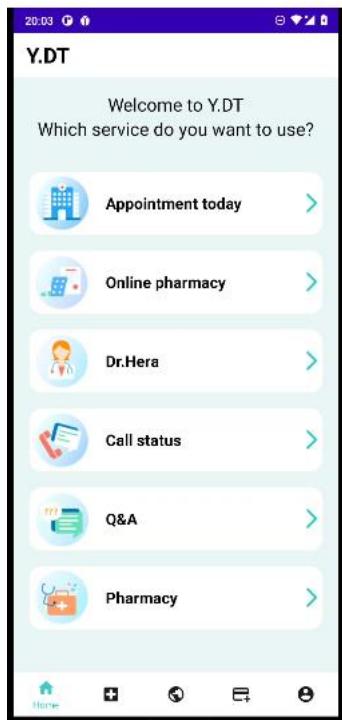
## Comment

This is where users can comment articles



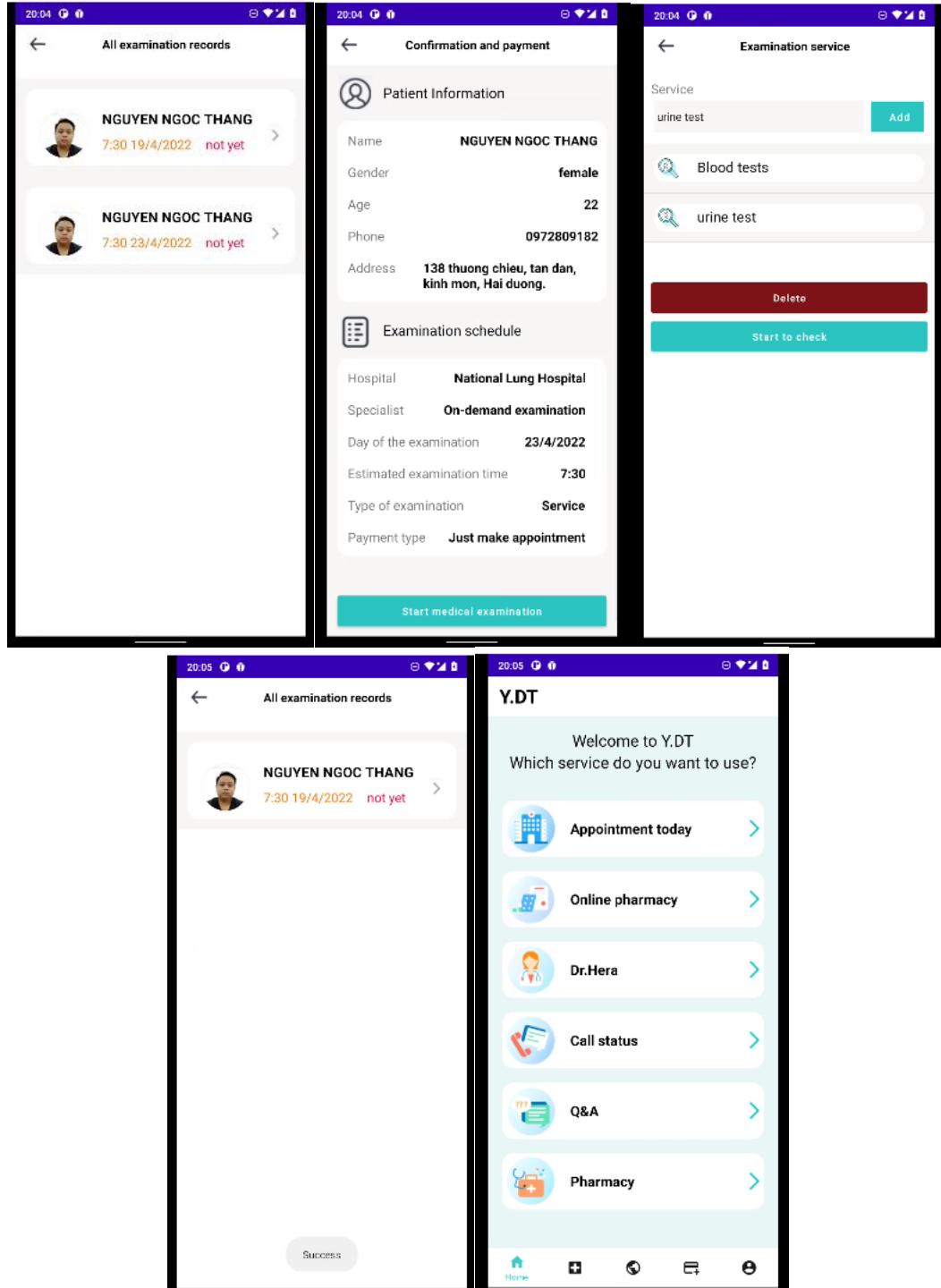


Hospital



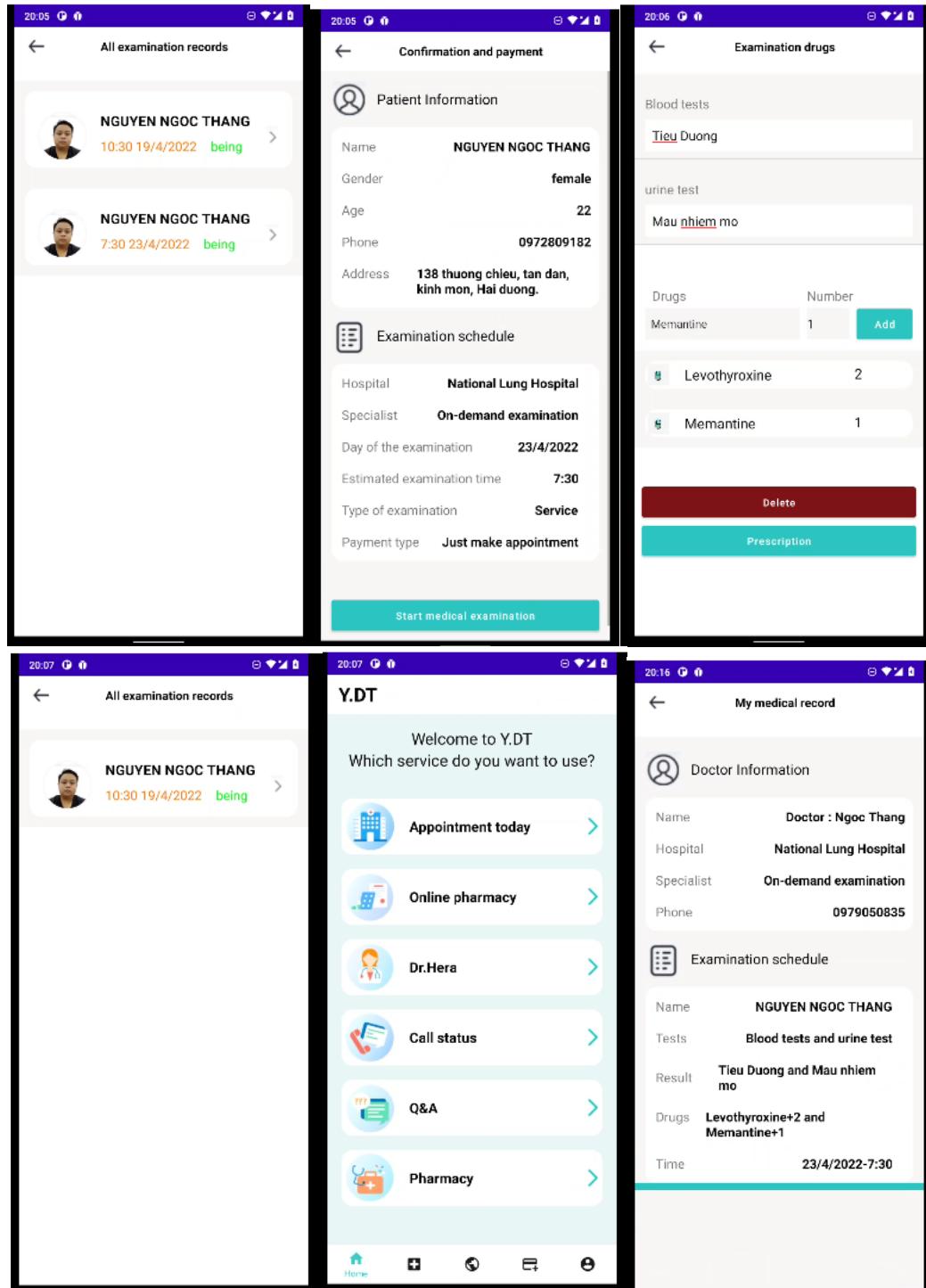
### Medical examination for patients

Here the doctor can see all the appointments coming from the patient.



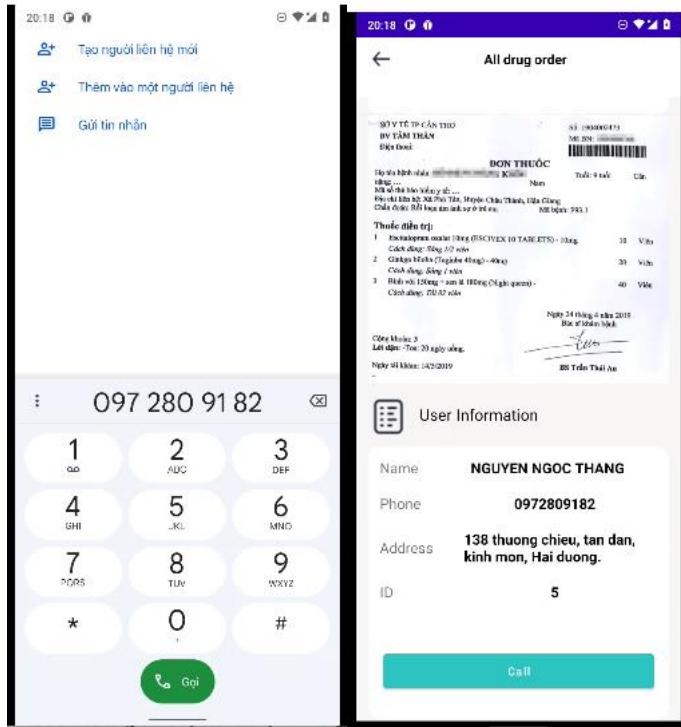
## Prescriptions

Here the doctor can record the results and prescribe medicine for the patient



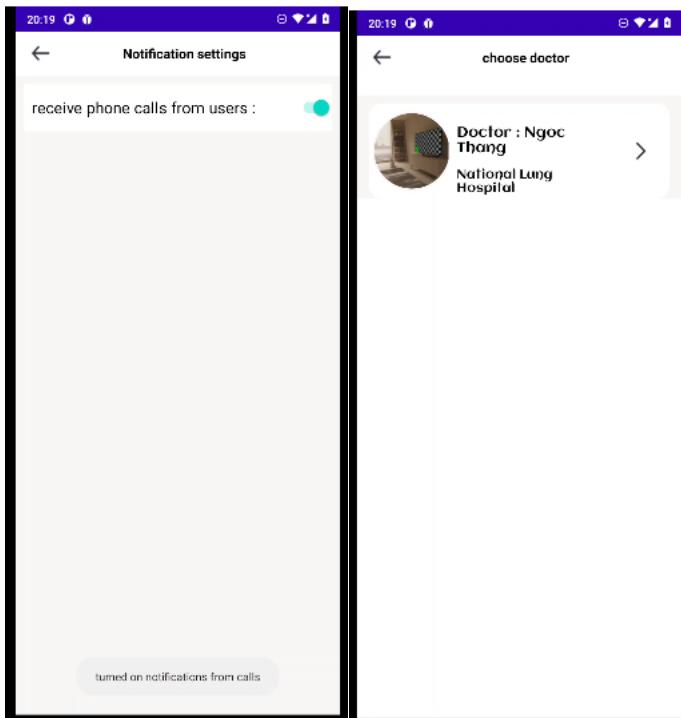
## Online pharmacy

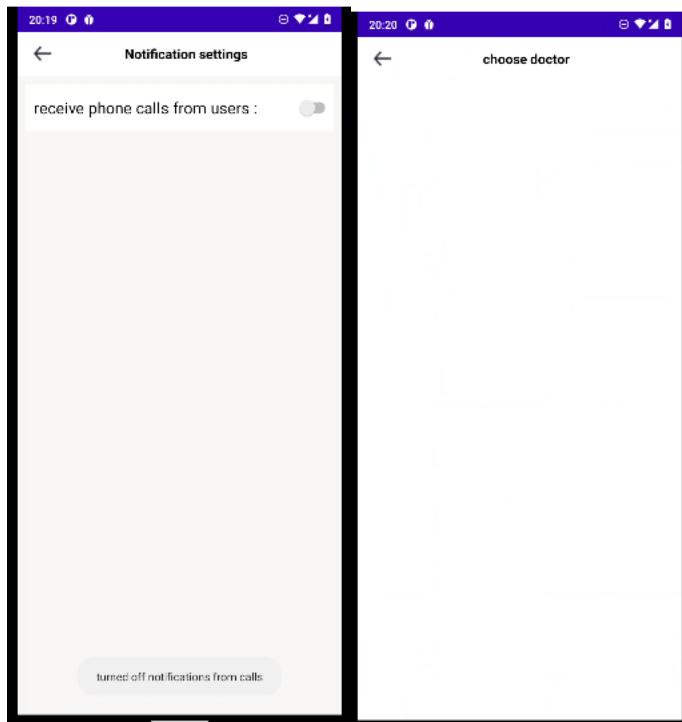
Here the doctor can see all the online prescriptions of the user and prescribe them



## Call status

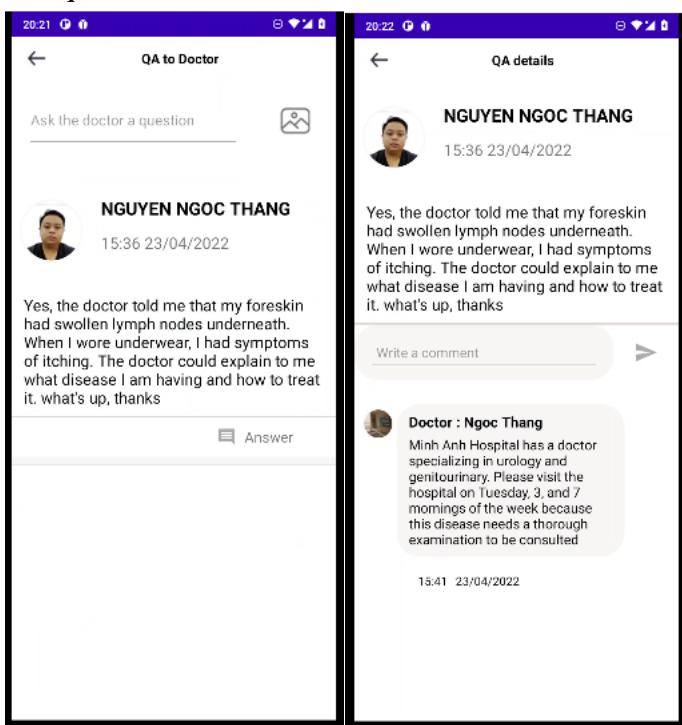
Here the doctor can turn on and off the call mode so that the user can call them or not.





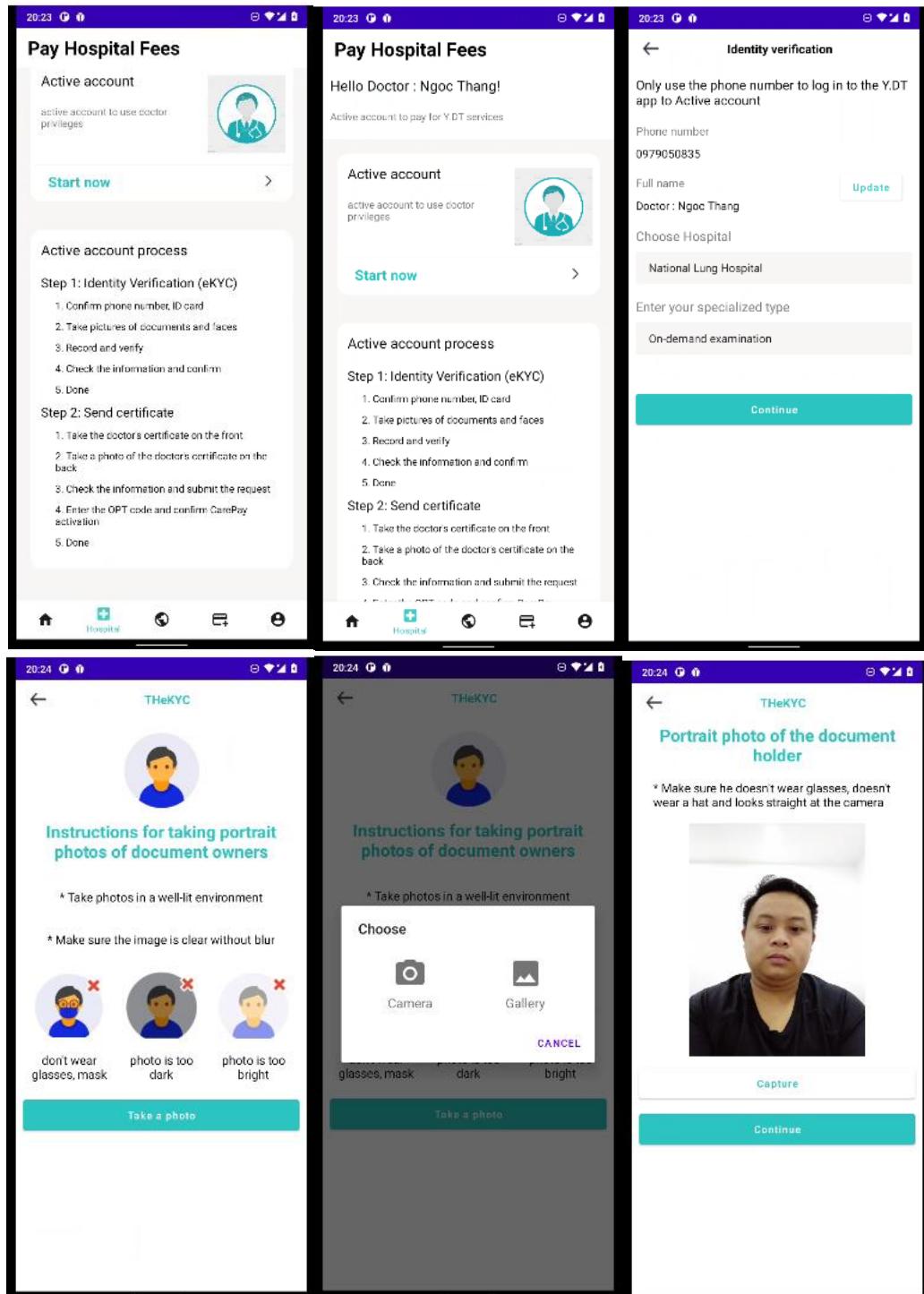
## Answer questions

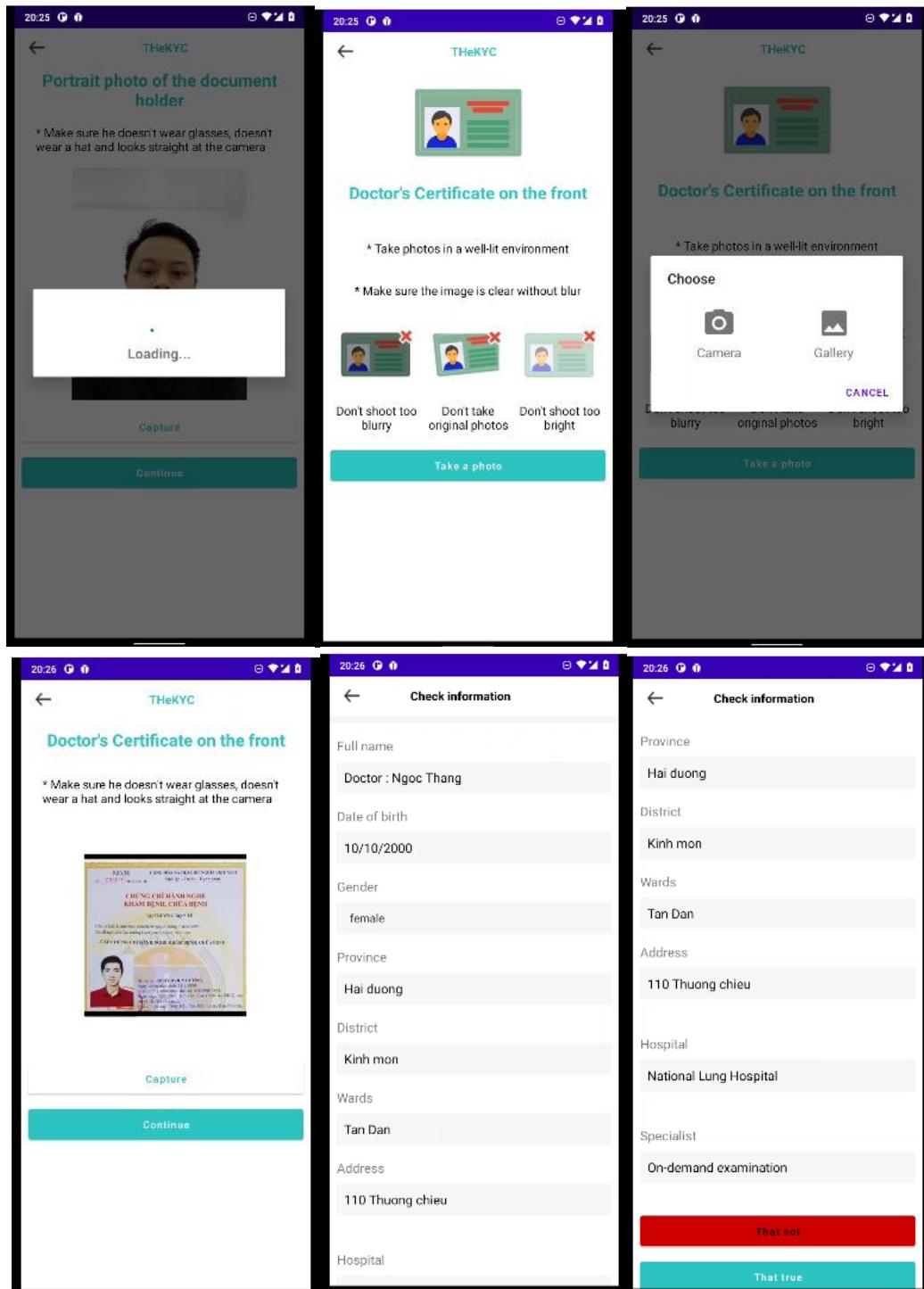
Here doctors can answer questions from users

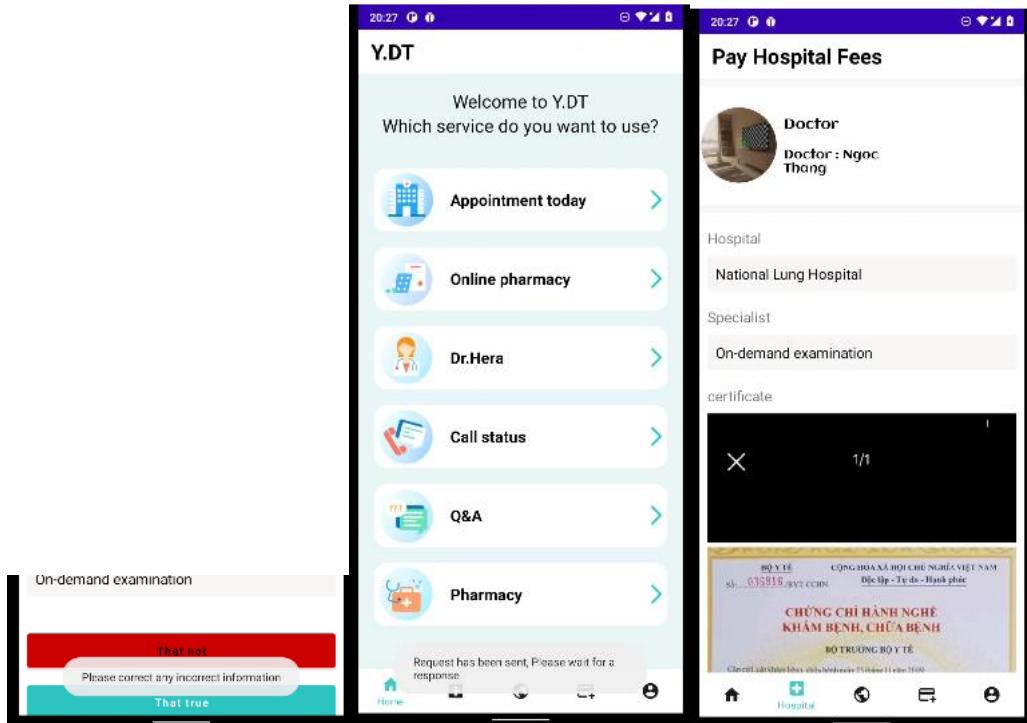


## Register a doctor

Here doctors can register to use doctor-specific functions

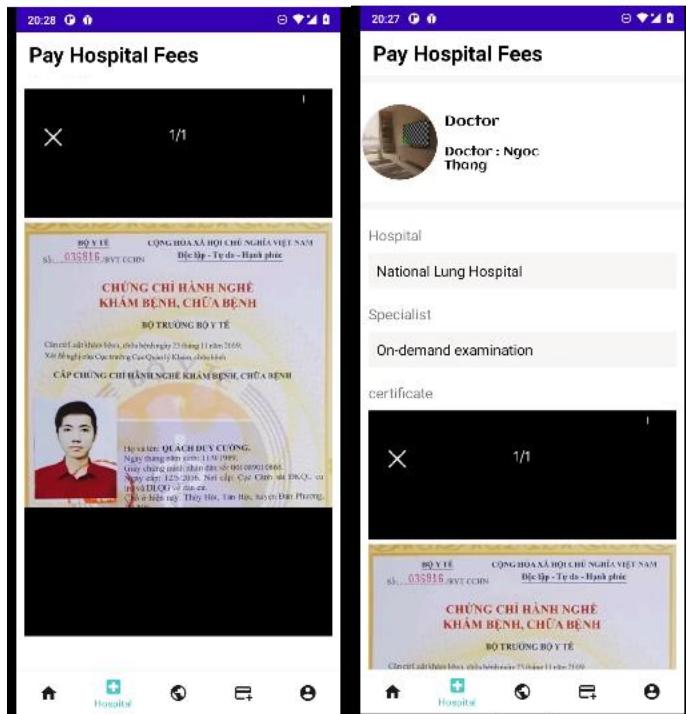






## Register doctor active

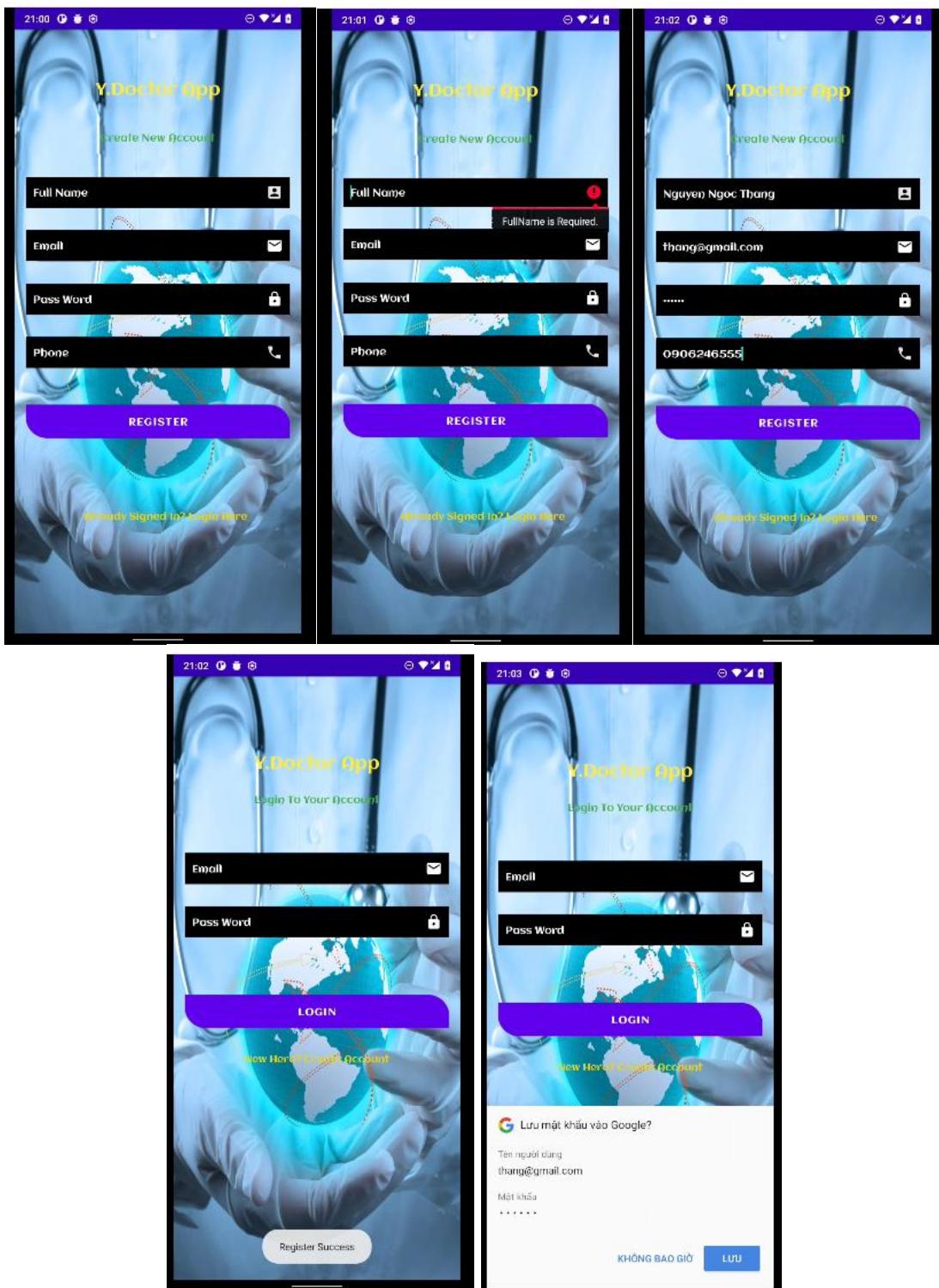
When successfully registering a doctor at the doctor page, the following screen will appear



## Admin

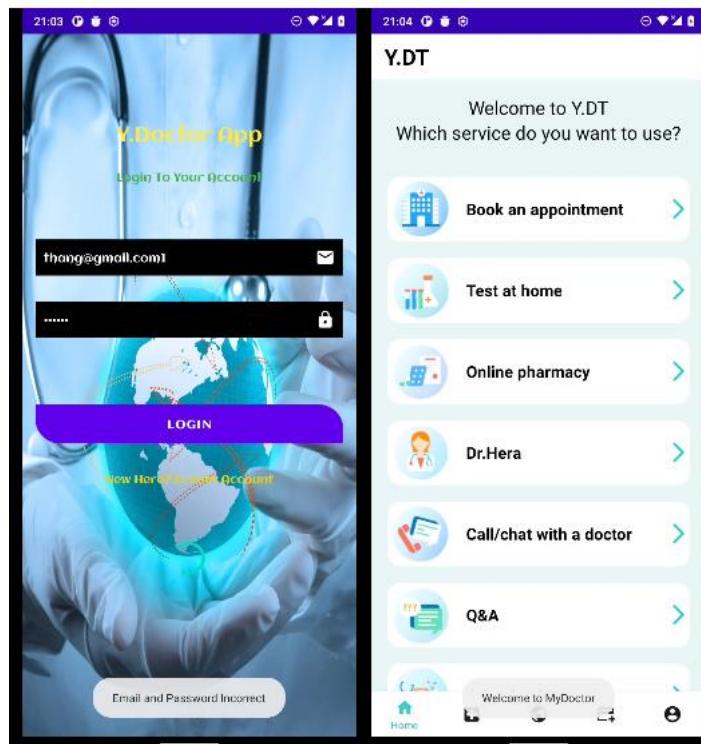
### Register account

When users register, they need to provide full information such as Email, Full name, Password, Phone.



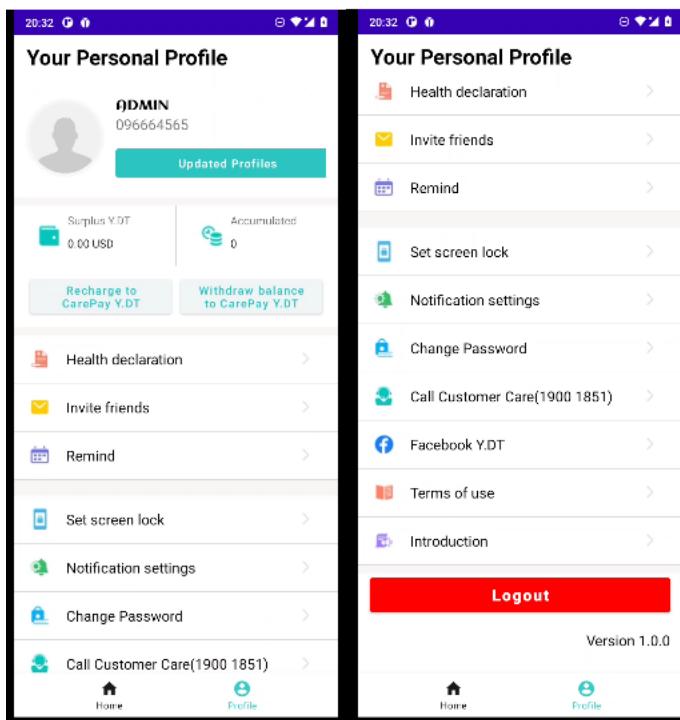
## Login account

When users log in, they need to provide Email and Password



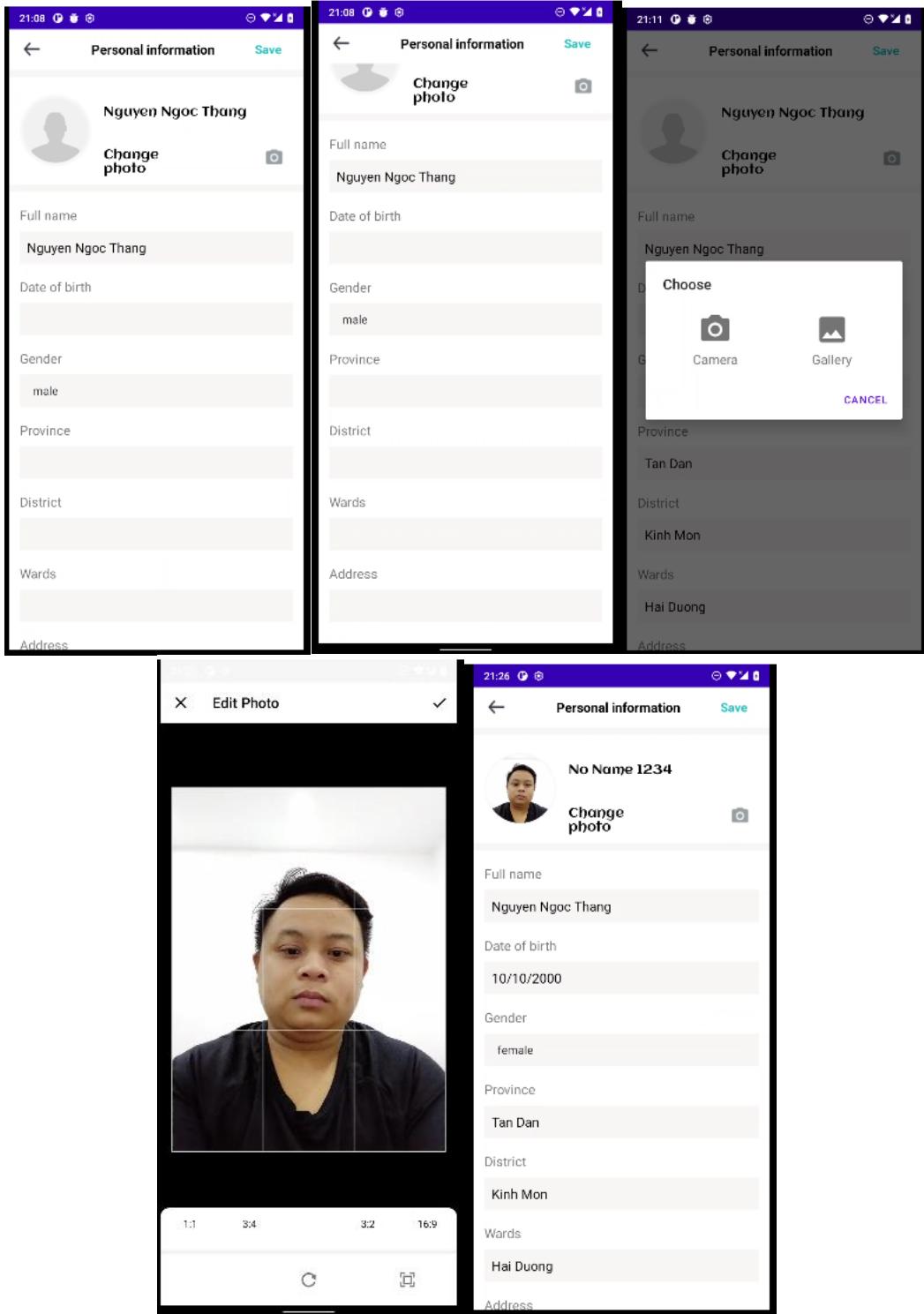
## Profile.

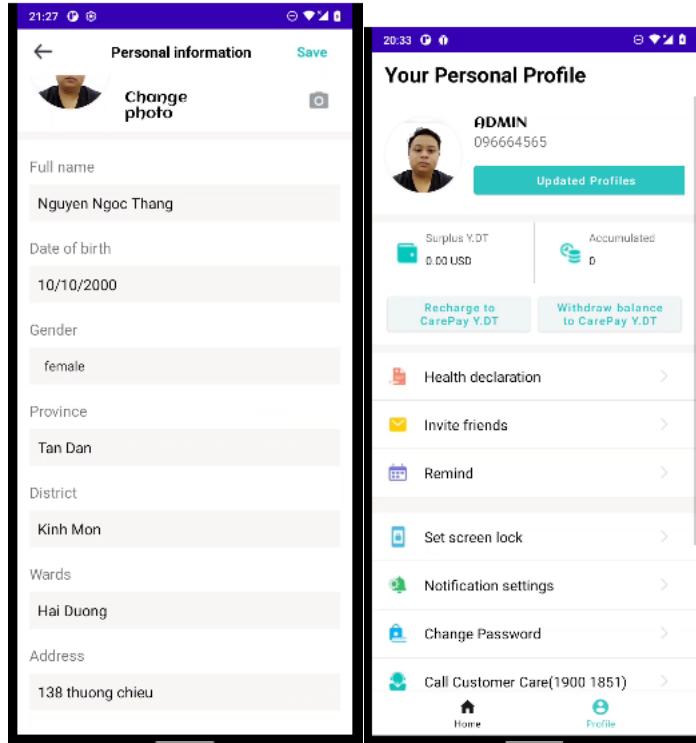
At the profile includes functions related to individual users.



## Update profile

At update profile helps users update personal information about themselves.

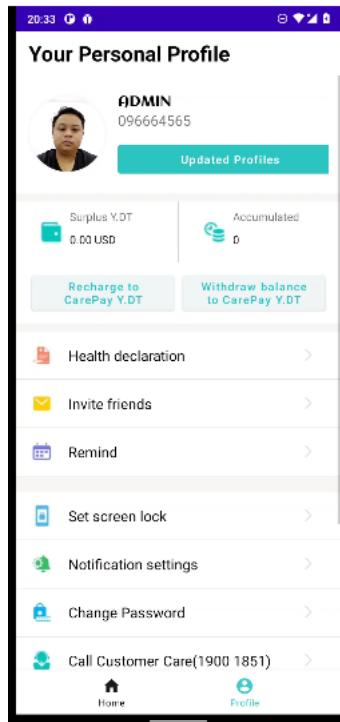




## Health declaration

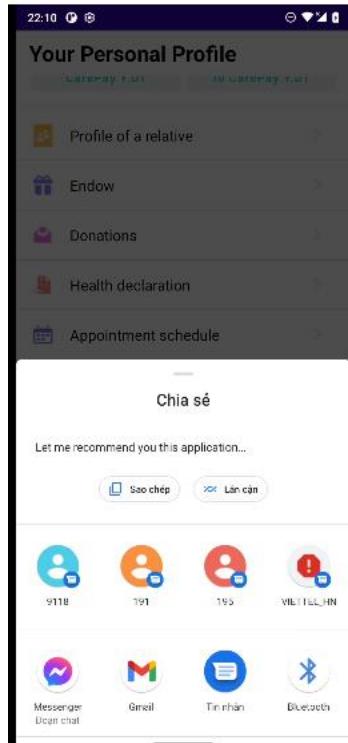
Here users can declare health

Epidemiological factors	yes	no
1. Are you suffering from COVID-19?	<input type="radio"/>	<input checked="" type="radio"/>
2. Close contact with an infected or suspected COVID-19 case within the past 14 days.	<input type="radio"/>	<input checked="" type="radio"/>
3. Traveled from another country or territory within the last 14 days.	<input type="radio"/>	<input checked="" type="radio"/>
4. Have you finished the group quarantine within the past 14 days?	<input type="radio"/>	<input checked="" type="radio"/>
5. In the past 14 days, has anyone in your family/work had a fever or cough?	<input type="radio"/>	<input checked="" type="radio"/>
6. Have you been discharged from hospital due to treatment for COVID-19 within the past 14 days?	<input type="radio"/>	<input checked="" type="radio"/>



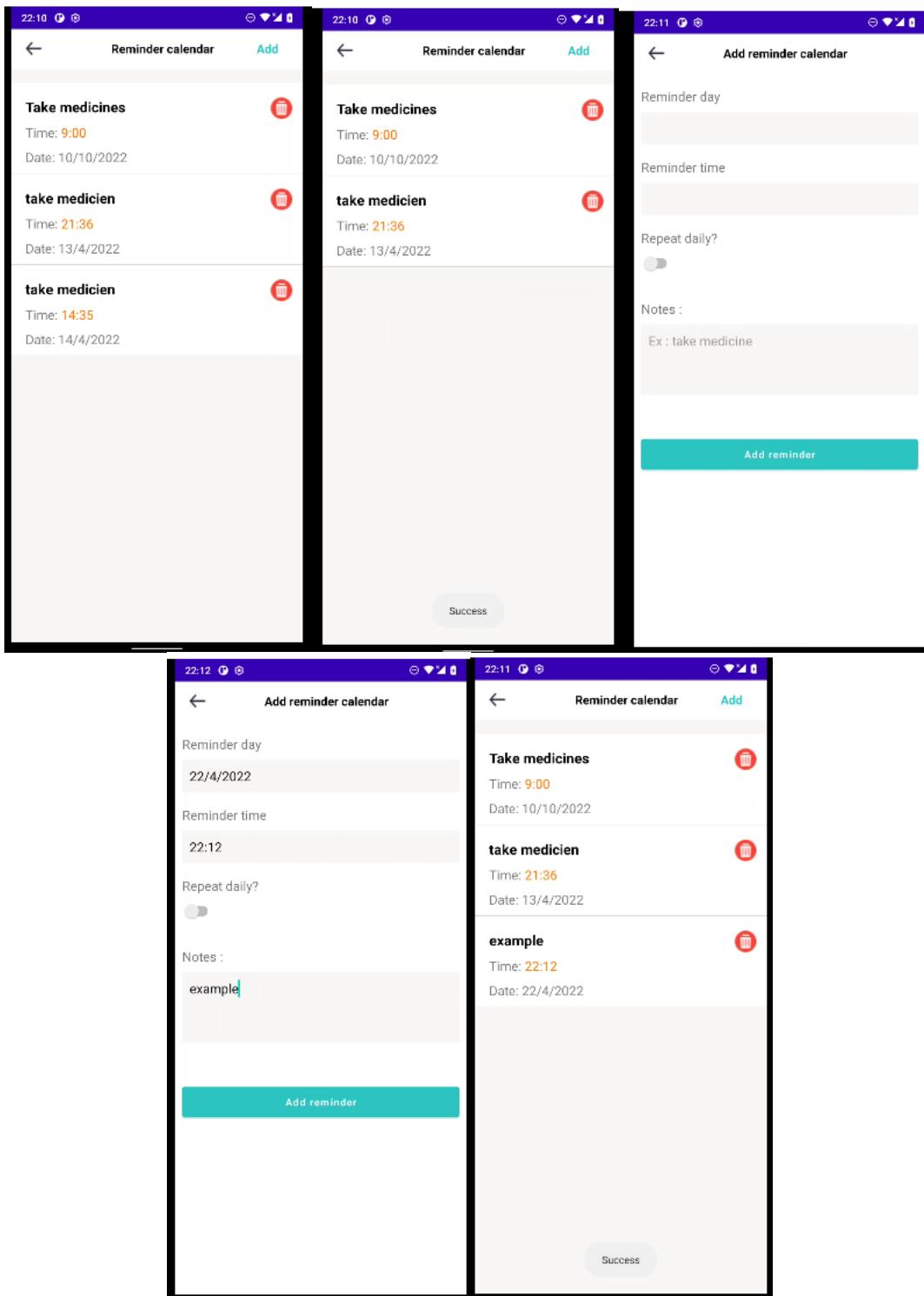
## Invite friends

Here users can invite friends to download the app



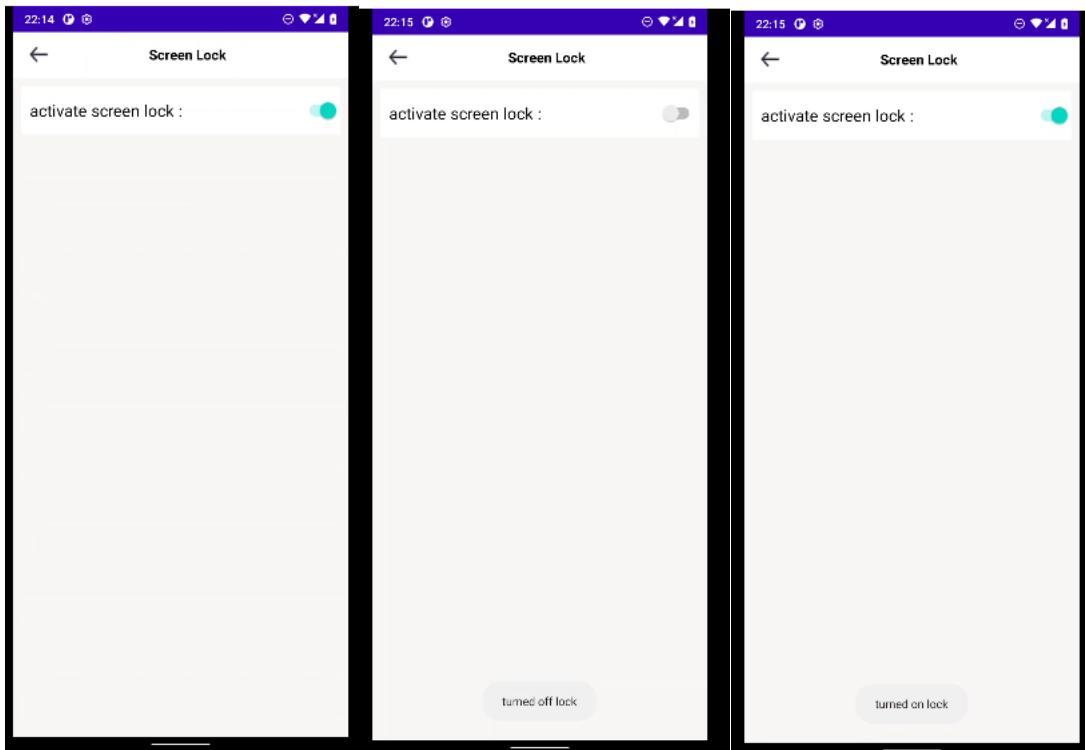
## Remind

Here users can see all their reminder calendars and can add or remove reminders.



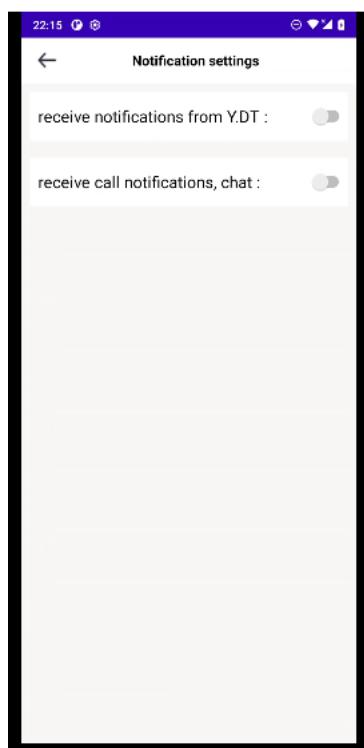
### Screen lock settings.

Here users can set lock when lock locks users will need to enter a password when transacting and vice versa.



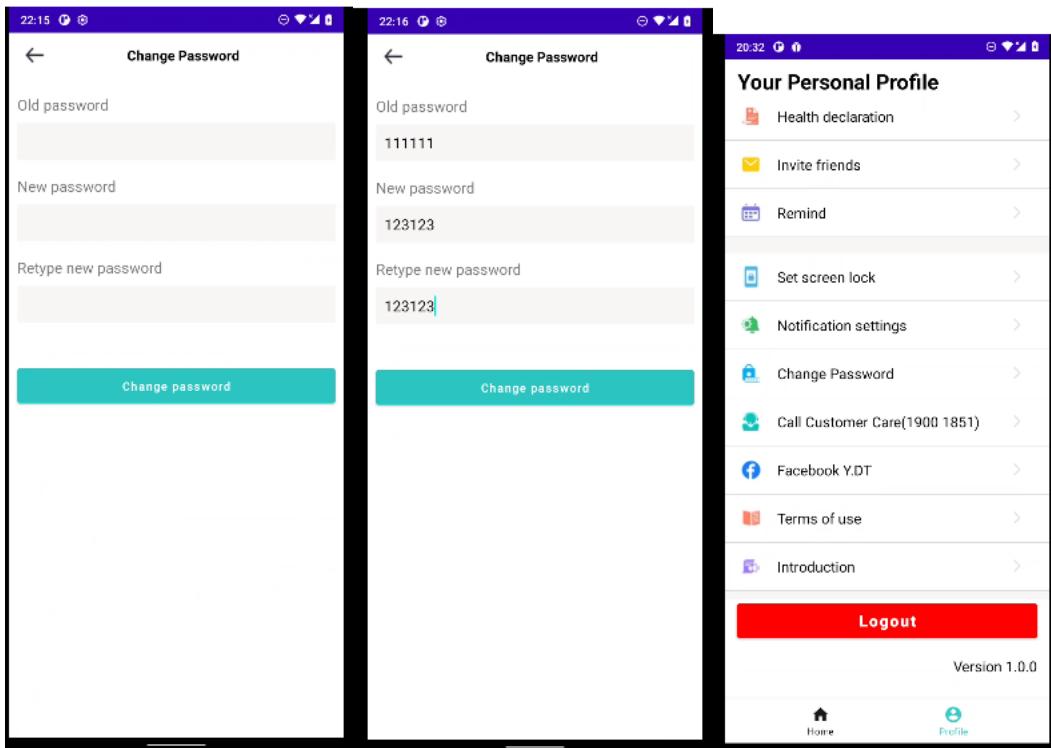
## Notification toggle settings

Here users can set notifications



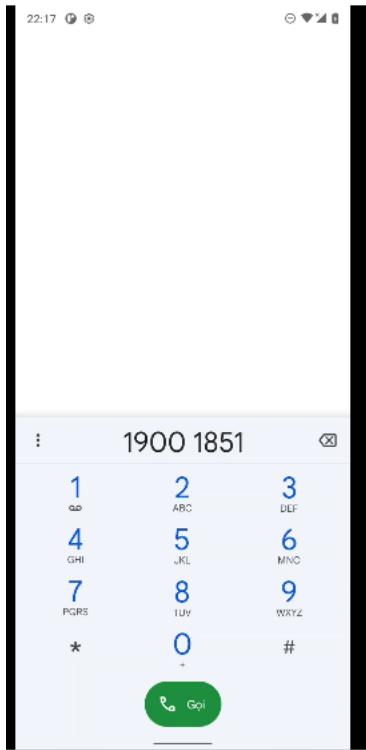
## Change Password

Here user can change password



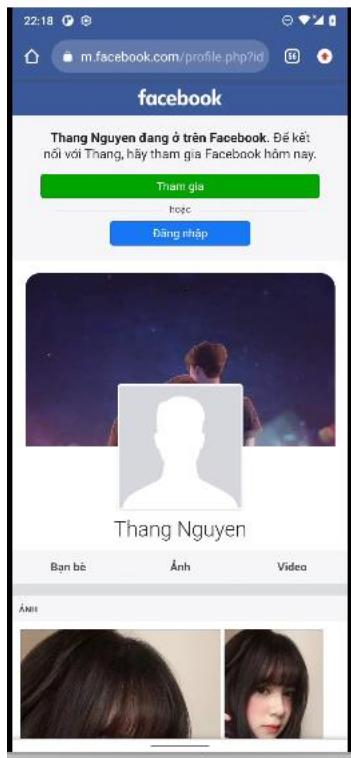
### Call customer care

Here users can call the app's hotline



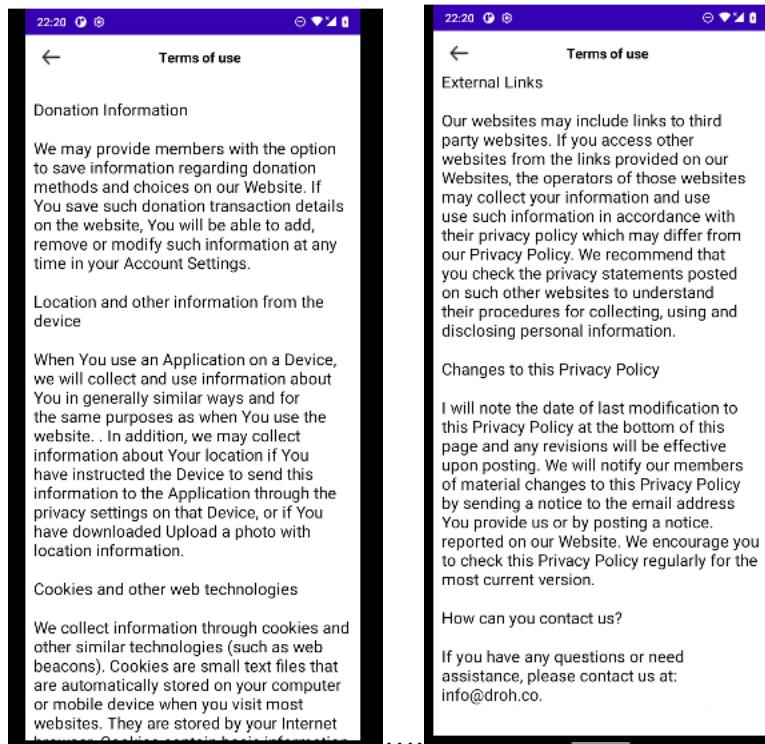
### Facebook app

Here users can access the app's facebook

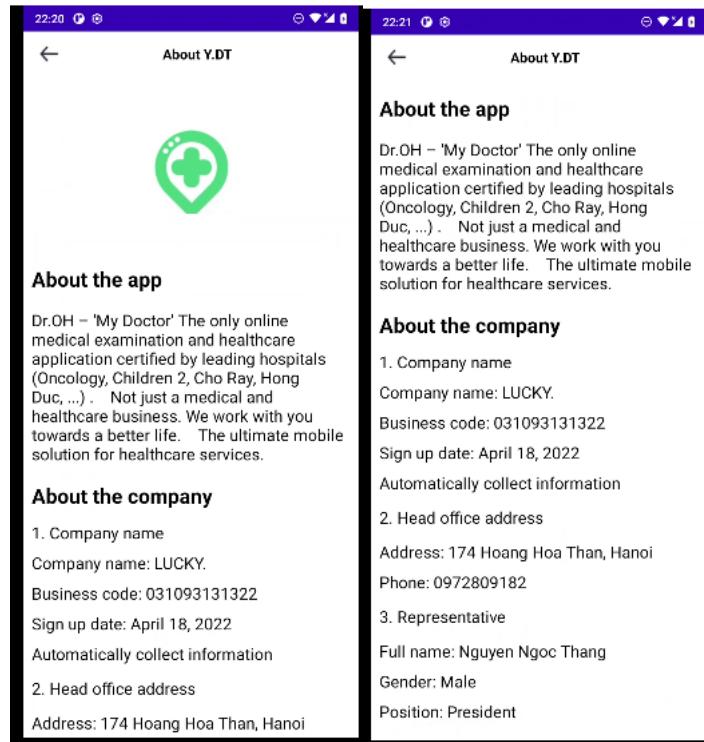


## Terms of use

<p><b>Terms of use</b></p> <p>By accessing the Y.DT - Pocket General Hospital application and contacting us, You acknowledge that You have read and understood this Privacy Policy, collection and handling principles information contained therein. The Privacy Policy was first updated on September 14, 2018. We may change this Policy from time to time, so please check back often for any updates.</p> <p><b>Limit</b></p> <p>This Privacy Policy describes in detail our policy and principles regarding the collection, use and disclosure of information about You. We understand that providing information online requires a lot of trust from you. We take this trust very seriously and place a high priority on ensuring the safety and security of the personal information you provide to us when you visit the Website or contact us. What information do we collect from you? How We Use Your Information How long do we keep your information? Your rights and choices regarding the collection and use of your information Children's privacy External Links Changes to this Privacy Policy How can you contact us?</p> <p><b>General information</b></p>	<p><b>Terms of use</b></p> <p><b>General information</b></p> <p>We receive and store any information that you enter into our Website or otherwise provide to us. This information includes information that can be used to identify You as an individual or to contact You directly ("personal information"). Personal Information includes information that you provide to us such as your first and last name, phone number, mailing and email address, username and password, and payment information (such as your credit card number, cardholder name and card expiration date). You can choose not to provide us with personal information, but usually, some information about you is required for you to gain trust from both parties as well as partners. by DR.OH - Pocket General Hospital. In addition, certain information is required so that you can ask us questions or initiate other transactions on our website. We may also collect other information such as your IP address, information that identifies your device and website browsing history to the extent that information refers to you.</p> <p><b>Security for WEBSITE</b></p> <p>You will have the opportunity to provide contact information and information regarding DR.OH - Pocket General Hospital to others through our Website. When</p>	<p><b>Terms of use</b></p> <p><b>Security for WEBSITE</b></p> <p>You will have the opportunity to provide contact information and information regarding DR.OH - Pocket General Hospital to others through our Website. When</p> <p><b>Automatically collect information</b></p> <p>We automatically collect certain information from your computer or Device when you visit. For example, we will collect session data, including Your IP address, web browser software, and the web page you refer to. We may also collect information about your online activity, such as content viewed, pages visited and searches.</p> <p><b>Donation Information</b></p> <p>We may provide members with the option to save information regarding donation methods and choices on our Website. If You save such donation transaction details on the website, You will be able to add, remove or modify such information at any</p>
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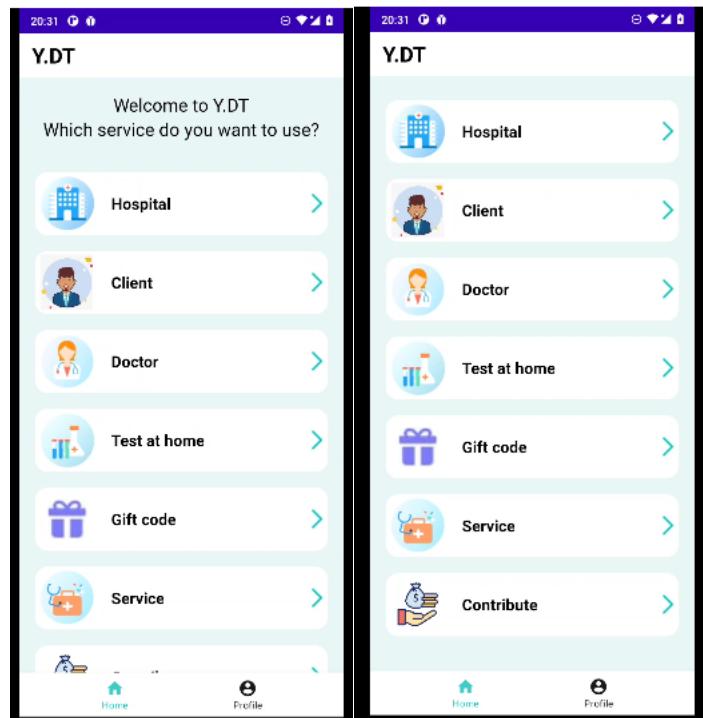
## Introduce



## Logout

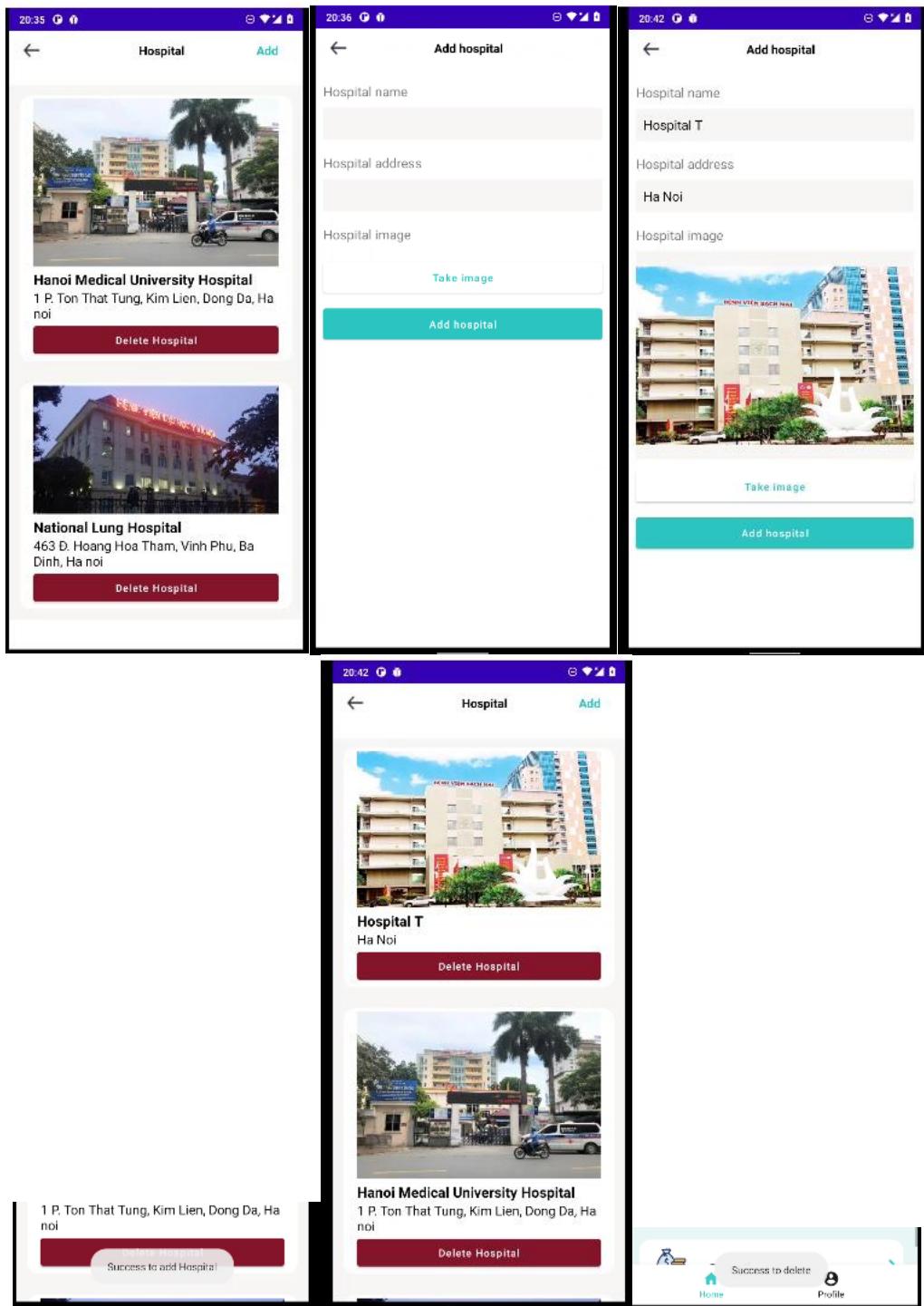


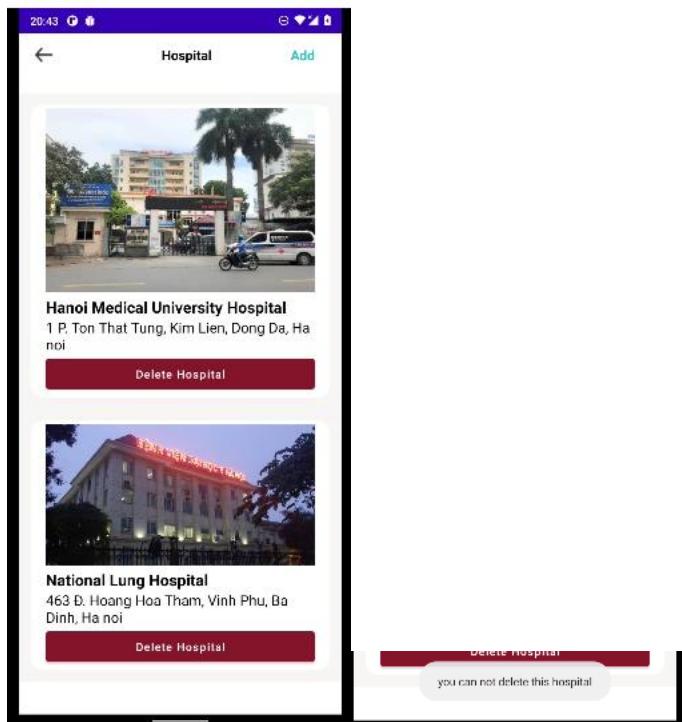
## Home



## All hospital

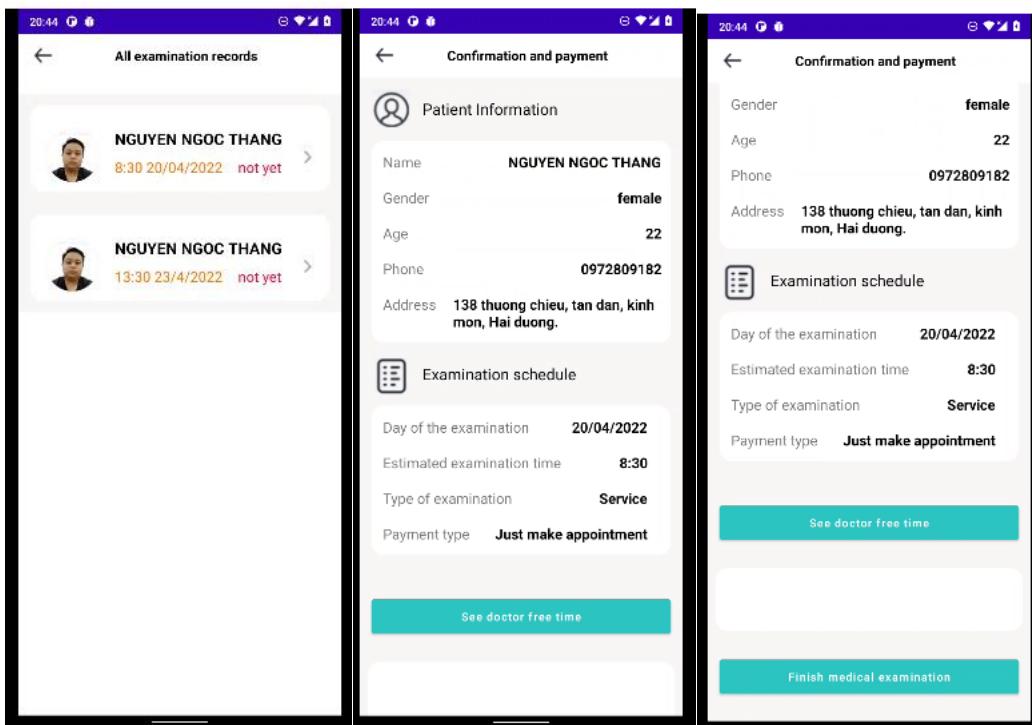
Here admin can add or remove hospital haven't information





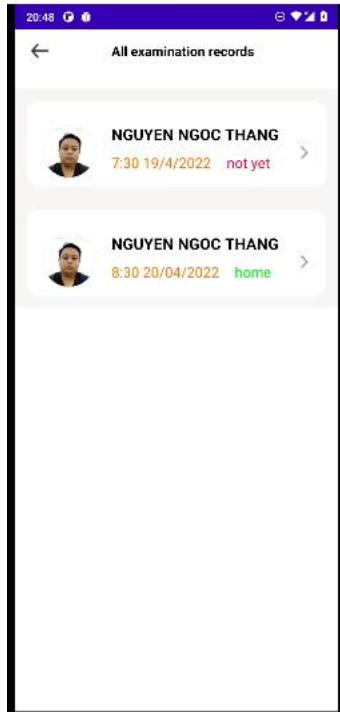
## Test at home

Here admin can consider a doctor to schedule test at home for users



The screenshots illustrate a mobile application interface for managing medical records and examinations:

- Screenshot 1: All Doctor**  
Shows a list of doctors. One entry is selected: "Doctor : Ngoc Thang".
- Screenshot 2: Personal information (Doctor : Ngoc Thang)**  
Shows detailed personal information for Doctor Ngoc Thang, including:
  - Full name: Doctor : Ngoc Thang
  - Email: thangd
  - Password: 123123
  - Phone: 0979050835
  - Date of birth: (not visible)
  - Gender: male
  - Address: 110 Thuong chieu, Tan Dan, Kinh mon, Hai duong.
- Screenshot 3: Personal information (Doctor : Ngoc Thang)**  
Shows additional personal information for Doctor Ngoc Thang, including:
  - Gender: male
  - Address: 110 Thuong chieu, Tan Dan, Kinh mon, Hai duong
  - Money: 0.0
  - Point: 0
  - Carepay: Non active
  - Hospital: National Lung Hospital
  - Specialist: On-demand examination
  - Certificate: (image of a medical certificate)
- Screenshot 4: Personal information (Non active)**  
Shows personal information for a non-active user, including:
  - Hospital: National Lung Hospital
  - Specialist: On-demand examination
  - Certificate: (image of a medical certificate)
- Screenshot 5: Confirmation and payment**  
Shows examination details for a female patient, aged 22, with phone number 0972809182, address 138 thuong chieu, tan dan, kinh mon, Hai duong. It includes an examination schedule for April 20, 2022, at 8:30 AM, and payment type "Just make appointment".
- Screenshot 6: Home screen**  
Shows a summary of the examination, the doctor's name (Doctor : Ngoc Thang), and a button to "Finish medical examination". A notification bar at the bottom indicates "turned on notifications from calls".



## Client account

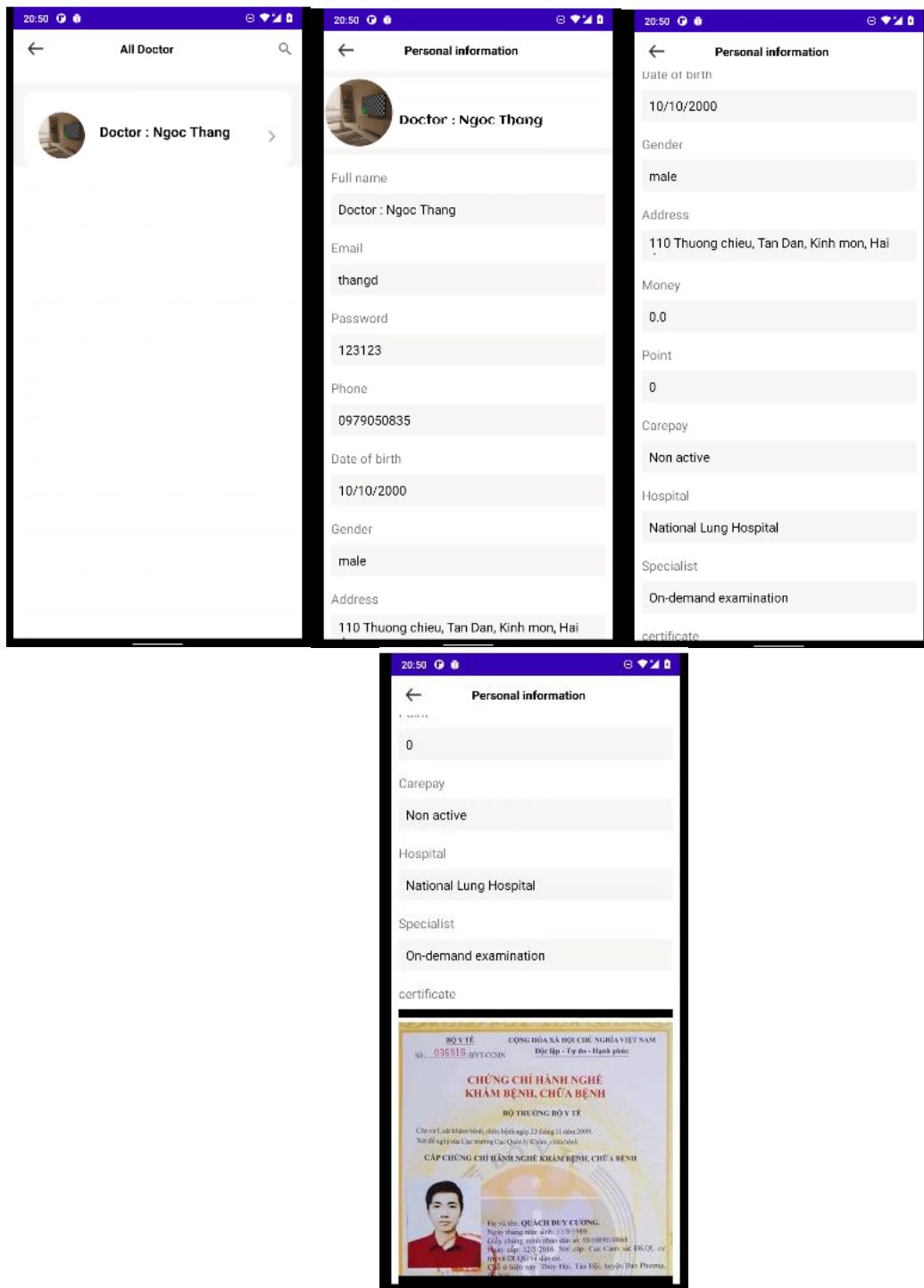
Here admin can see all patient information

Three side-by-side screenshots of a mobile application's "Personal information" screen.

- Screenshot 1 (Left):** Shows the personal information for "NGUYEN NGOC THANG". Fields include: Full name (NGUYEN NGOC THANG), Email (thang1), Password (123123), Phone (0972809182), Date of birth (10/10/2000), Gender (female), and Address (138 thuong chieu, tan dan, kinh mon, Hai).
- Screenshot 2 (Middle):** Shows a list of users with their names and profile pictures:
  - bot1
  - NGUYEN NGOC THANG
  - bot2
  - Bui Thi Bich
  - Nguyen Ngoc Thang
- Screenshot 3 (Right):** Shows the personal information for "NGUYEN NGOC THANG" with different field labels:
  - Password (123123)
  - Phone (0972809182)
  - Date of birth (10/10/2000)
  - Gender (female)
  - Address (138 thuong chieu, tan dan, kinh mon, Hai)
  - Money (199404.0)
  - Point (417150)
  - Carepay
  - Active

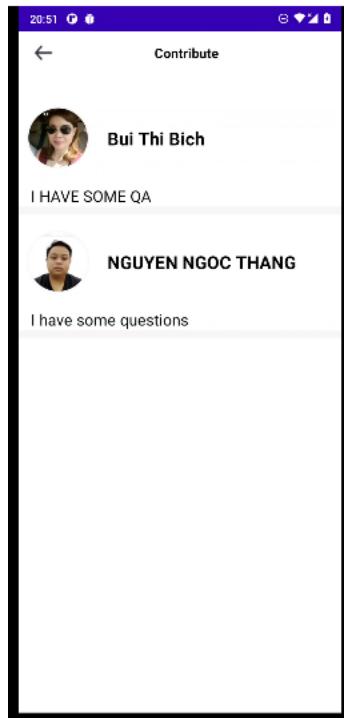
## Doctor account

Here admin can see all doctor information



### See all contribute

Here admin can see all contribute information



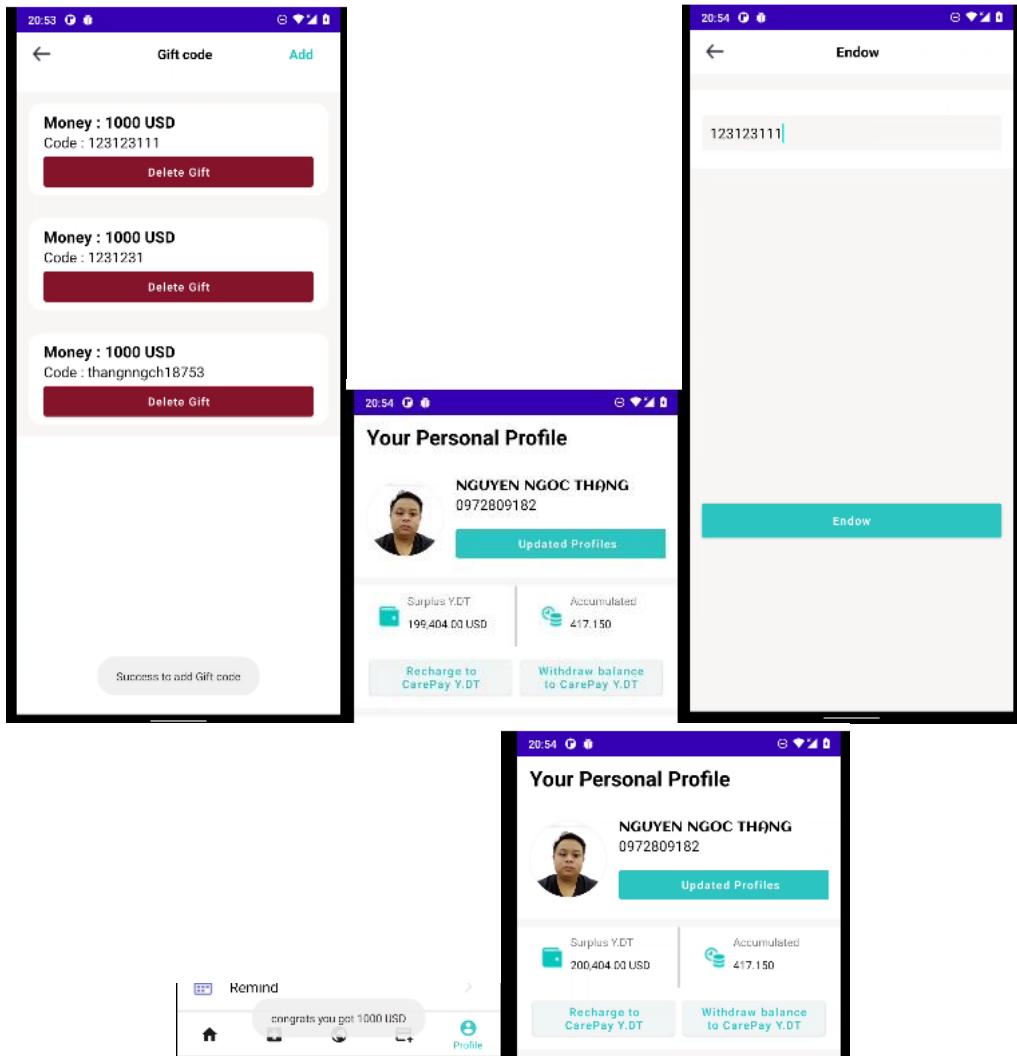
### Add gift code

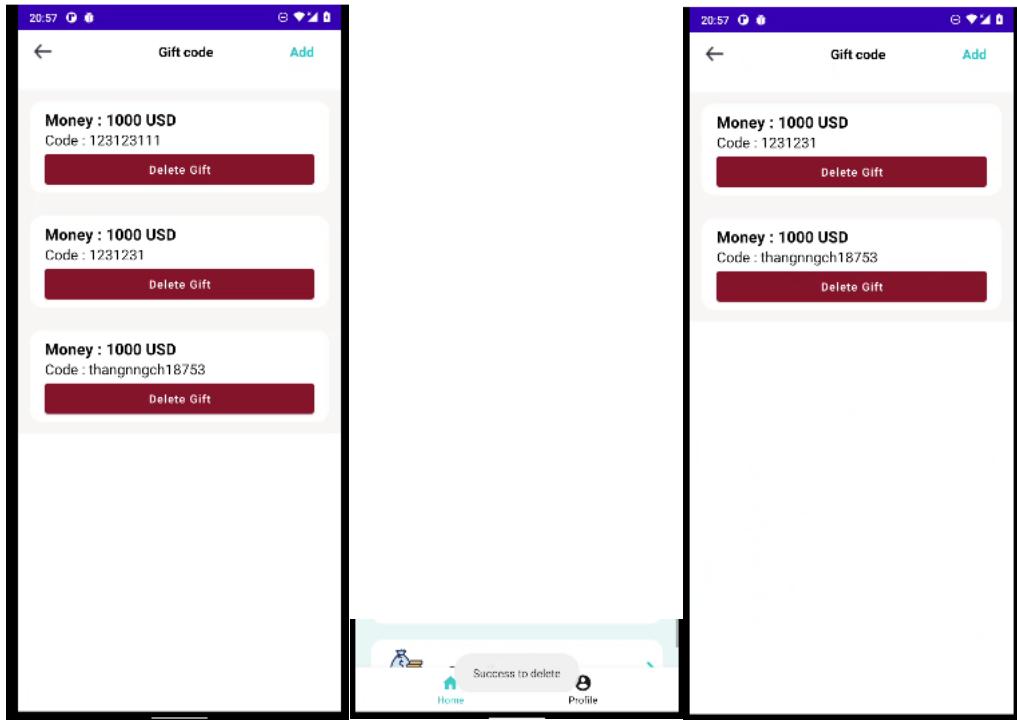
Here admin can add and remove gift

The first screenshot shows a list of existing gift codes: "Money : 1000 USD" (Code: 1231231) and "Money : 1000 USD" (Code: thangnngch18753), each with a "Delete Gift" button.

The second screenshot shows the "Add gift code" screen with fields for "Gift code" (containing "1231231") and "Money" (containing "100"). A large teal "Add gift" button is at the bottom. A small message at the bottom says "Fail to add Gift code".

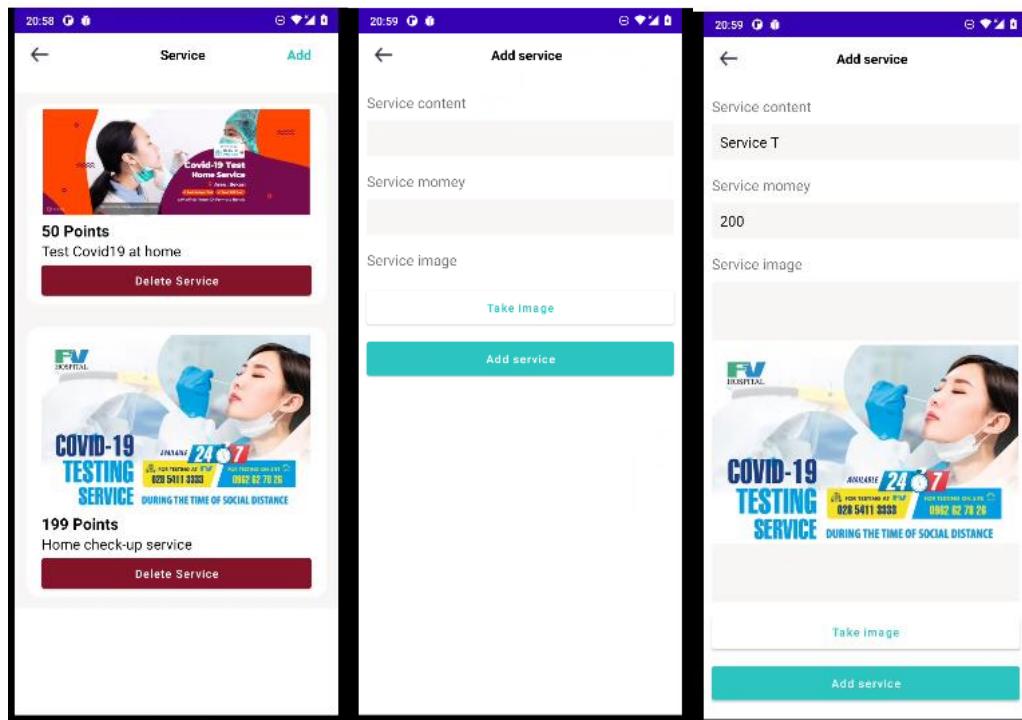
The third screenshot shows the same "Add gift code" screen after an attempt to add a new gift code. It shows the "Gift code" field containing "123123111" and the "Money" field containing "1000". A large teal "Add gift" button is at the bottom.

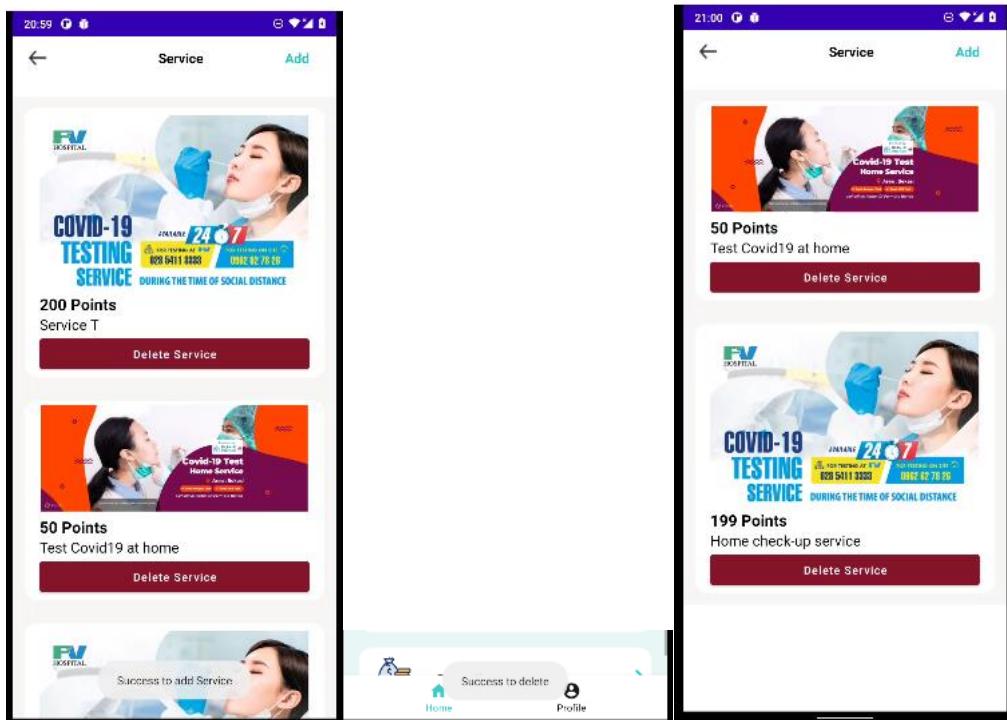




## Service

Here admin can add and remove service





## 2. Test

### 2.1 Test plan

#### Purpose

Always identify errors as soon as possible.

Prevent errors in a project and product.

Check if customer requirement criteria are met.

And finally the main goal of testing to measure the quality of the product and the project.

#### Project requirement

Sprint 1:

- Test user interface and functionality

- Customer, Doctor, Admin create an account

- Login Customers, Doctors, Administrators

- Customers see the complete interface of the homepage

- Customers, Doctors lock their accounts.

- Customers, Doctors, Admins view the profile interface
- Updated Profiles of Customers, Doctors, Admins
- Customers, Doctors change money from carepay to reward points
- Customers add their family profile
- Customers, Doctors enter and receive incremental gift codes.
- Customers, Doctors, Health Claims Administrator
- Customers see all the appointments they have booked
- Customer, Doctor, Admin views invite friends to download the app
- Customers, Doctors, Administrators set alarms
- Customers, Doctors send donations
- Customer, Doctor set up notification conversion
- Customer, Doctor, Administrator change password
- Customers, Doctors, Administrators call the hotline
- Customers, Doctors, Admins view the app's Facebook page
- Customers, Doctors, Admins view the terms of the application
- Customers, Doctors, Admins see the introduction of the application
- Customers, Doctors, Administrators log out

#### Sprint 2:

- Test user interface and functionality
- Customers make an appointment
- Customers make an appointment at home
- Customers order medicine online
- Customers view all hospitals

- Customers see directions to the hospital
- Customers see everyone's posts
- Customers, Doctors like and comment on everyone's posts
- Customer, Doctor transfer money to account or card.
- Customers, Doctors donate to children with serious diseases
- Customer, Doctor, Admin views invite friends to download the app
- Doctor registered as a doctor
- Doctor see doctor's record
- Admin view all hospitals and delete empty hospital information
- Admin see the doctor's appointment schedule at home
- Administrator view all customers and their information
- Admin view all doctors and their information
- Admin view all contributions from users
- Admin view all medical declarations
- Administrators view all gift codes and add or remove them
- Administrators view all services and add or remove them

### Sprint 3:

- Test user interface and functionality
- Client predict disease by x-ray image and skin disease photo
- Client call/chat with doctor
- Client ask the doctor questions
- Clients buy some medical services they want
- Client view all hospitals

- Client, Doctor like, comment can post articles
- Client, Doctor register to create a carepay account
- Client, Doctor Scanning payment code
- Client, Doctor deposit money from the card into carepay

## **Scope**

The purposes of the test phase:

- Unit
- Integration
- System
- Accuracy

These types of tests will be performed as part of the plan.

- Check the database
- Test UI

## **Test environment**

Below is a test field of Y.Doctor

	Tool	Browser	Device
Test Functions	Android studio		Samsung Galaxy J4
Test AI	PyCharm		Processor AMD Ryzen 9 5900HX with Radeon Graphics, 3301 Mhz, 8

			Core(s), 16 Logical Processor(s)
Test Database	Xampp		Processor AMD Ryzen 9 5900HX with Radeon Graphics, 3301 Mhz, 8 Core(s), 16 Logical Processor(s)
Test Back-end	PyCharm		Processor AMD Ryzen 9 5900HX with Radeon Graphics, 3301 Mhz, 8 Core(s), 16 Logical Processor(s)

*Table 22: Test environment.*

### Manage risk

No	Risk	Impact	Description	Responsibility
1	clear alarm	little effect on the interaction	Samsung Galaxy J4	create alarms for users

		between the user and the app		
2	scan to no payment	affect user functionality		help users scan the payment code

*Table 23: Manage rick.*

### Schedule Test

Task	Date	Priority
Sprint 1	1/2/2022	High
Sprint 2	15/3/2022	High
Sprint 2	2/4/2022	Medium

*Table 24: Schedule Test.*

### 2.2 Test logs

Here is the test log:

No	Action	Input	Expected output	Actual output	Test result
1	Login with wrong account and password	Thang111 1111111	Report wrong account and password	Report wrong account and password	Pass
2	Notice correct account and wrong password	<a href="mailto:thang@gmail.com">thang@gmail.com</a> 1231231	Report wrong account and password	Report wrong account and password	Pass

3	Notice correct account and password	<a href="mailto:thang@gmail.com">thang@gmail.com</a> 123123	Home page	Home page	Pass
4	Update information and image in profile then click save		Profile page	Profile page	Pass
5	Recharge into carepay	1000\$	Increase the amount	Increase the amount	Pass
6	Redeem with money in carepay	1000\$	Reduce money and increase points	Reduce money and increase points	Pass
7	Add to profile relative		More success	More success	Pass
8	Edit to profile relative		Edit success	Edit success	Pass
9	enter gift code	Thangnngch18753	Successful message	Successful message	Pass
10	enter gift code	Thangnngch18753	Error message	Error message	Pass
11	Donation functions	3000\$	Successful message	Successful message	Pass
12	Health declaration		Successful message	Successful message	Pass
13	See your		Show	Show	Pass

	doctor's appointment		appointment with doctor	appointment with doctor	
14	View medical history		Show medical history	Show medical history	pass
15	View transaction history		Show transaction history	Show transaction history	pass
16	Invite friend		Show invite	Show invite	pass
17	Add remind		Add success	Add success	pass
18	Delete remind		Delete success	Delete success	pass
19	Comment - Questions	I have some questions	Successful message	Successful message	pass
20	Set lock		Show turn on and turn off	Show turn on and turn off	pass
21	Set notification		turn on and off successfully	turn on and off successfully	pass
22	Change password	Pass old :123123 Pass new :111111 Pass new Again :111111	Successful message	Successful message	pass
23	Logout		Login page	Login page	pass
24	Sign up for	Provide ID card	Active	Active	pass

	care pay	and face	carepay page	carepay page	
25	Scanning payment code		Scan and complete payment successfully	Scan successfully	Fail
26	Transfer		Transfer money successfully and save in history	Transfer money successfully and save in history	Pass
27	Recharge		Recharge to airpay successfully and save it in history	Recharge to airpay successfully and save it in history	Pass
28	Withdraw money		Withdraw money from carepay to card successfully	Withdraw money from carepay to card successfully	Pass
29	Add card		Add card successfully, only one card at a time	Add card successfully, only one card at a time	Pass
30	Carepay information		Show carepay	Showcarepay information	Pass

			information		
31	Top up to carepay		Top up to carepay success and save to history	Top up to carepay success and save to history	pass
32	Like		Click once to like, click again to remove like	Click once to like, click again to remove like	pass
33	Coment		Can comment on both pictures and text, now commenting time	Can comment on both pictures and text, now commenting time	pass
34	Post		Can post both pictures and text , showing Post time	Can post both pictures and text , showing Post time	Pass
35	Book an appointment		Can set a schedule and save it to your booking history	Can set a schedule and save it to your booking history	Pass
36	Test at home		Can set a schedule and	Can set a schedule and	Pass

			save it to your booking history	save it to your booking history	
37	Online pharmacy		Can take a picture of the prescription and send it to the doctor	Can take a picture of the prescription and send it to the doctor	Pass
38	Dr.Hera		Diseases can be predicted from X-rays and Skill	Diseases can be predicted from X-rays and Skill	Pass
39	Call/chat with doctor		Can view information and call a doctor	Can view information and call a doctor	Pass
40	Q&A		You can ask questions to the doctor	You can ask questions to the doctor	Pass
41	Other health care services		Some services can be purchased and saved in history	Some services can be purchased and saved in history	Pass
42	Medical examination for patients	Input information about exam	Show all schedule about patients with doctor and	Show all schedule about patients with doctor and	Pass

			can take exam for doctor	can take exam for doctor	
43	Prescriptions	Choose dug for each exam	Shows all patients being examined and can prescribe medicine for them, writes test results to the patient.	Shows all patients being examined and can prescribe medicine for them, writes test results to the patient.	Pass
44	Online pharmacy		Show all prescriptions the patient ordered online	Show all prescriptions the patient ordered online	Pass
45	Call status		when turned off the user cannot call the doctor, when turned on the user can call the doctor.	when turned off the user cannot call the doctor, when turned on the user can call the doctor.	Pass
46	Answer questions		Doctor can answer patient	Doctor can answer patient	Pass

47	Register a doctor	Input face and certificates	Users can post carefully by providing photos and certificates to become a doctor	Users can post carefully by providing photos and certificates to become a doctor	Pass
48	Register doctor active		show doctor profile including name, specialty, hospital, certificate.	show doctor profile including name, specialty, hospital, certificate.	Pass
49	All hospital		Hospitals with no information can be deleted and hospitals can be added	Hospitals with no information can be deleted and hospitals can be added	Pass
50	Test at home		One doctor can be considered for each patient's appointment	One doctor can be considered for each patient's appointment	Pass
51	Client account		Show all	Show all	Pass

			patients and information	patients and information	
52	Doctor account		Show all doctor and information	Show all doctor and information	Pass
53	See all contribute		Show all contribute from doctors and patients	Show all contribute from doctors and patients	Pass
54	Add gift code		Show all gift code and admin can add gift code or delete	Show all gift code and admin can add gift code or delete	Pass
55	Service		Show all service and admin can add service or delete	Show all service and admin can add service or delete	Pass

Table 25: Test log.

### 2.3 Review failed cases

There are 97% of the test cases working well, there are 2 failed functions.

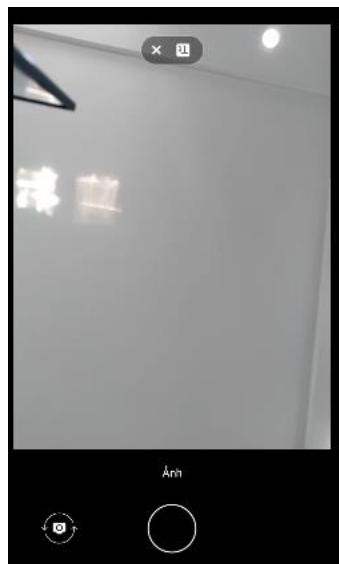
No	Action	Input	Expected output	Actual output	Test result
1	Scanning payment code		Scan and complete payment successfully	Scan successfully	Fail

2	Delete Alarm and back		Profile page	Need to 2 click go to Profile page	Fail
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Table 26: Review case fail.

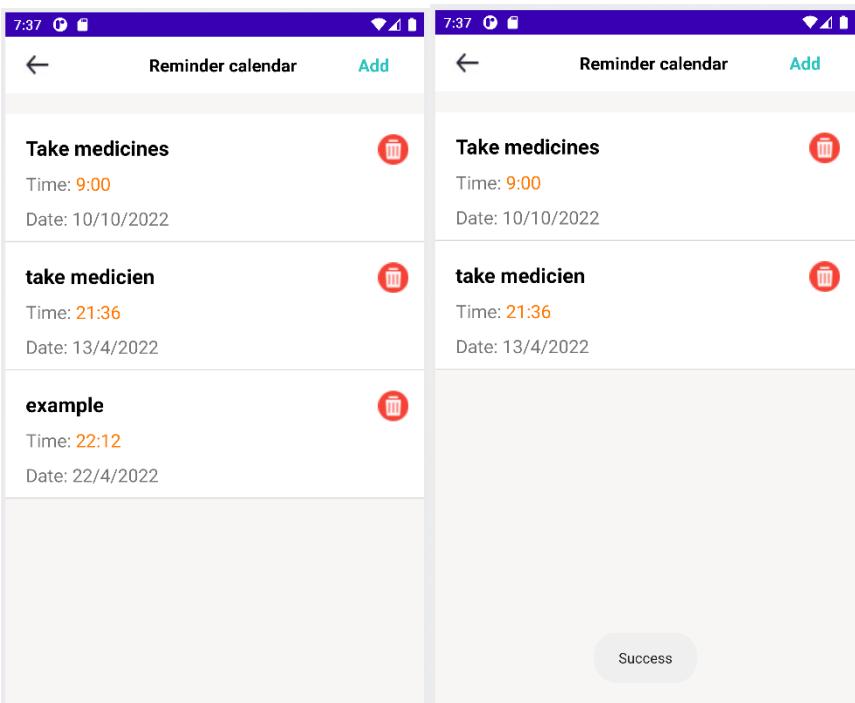
### Scanning payment code

It can only scan codes and cannot pay

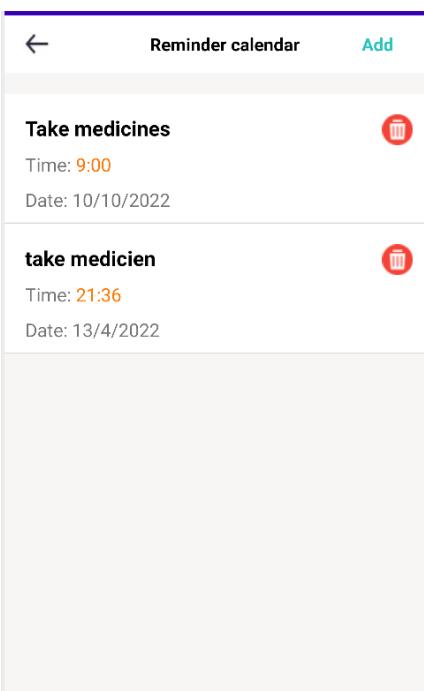


### Delete Alarm and back

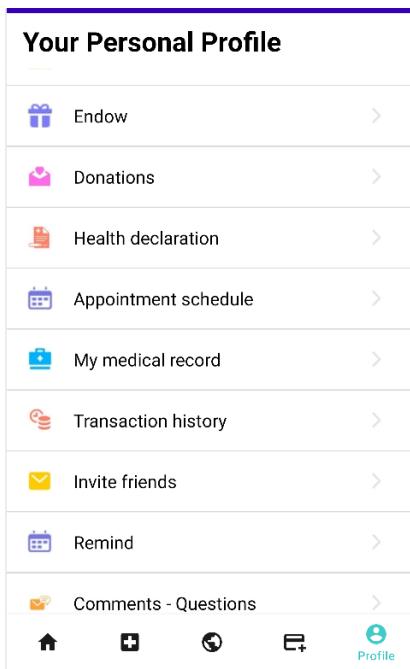
When deleting need to back 2 times to go back



Click back 1 time



Click back 1 more



## VII. Conclusion

### 1. Summary what have been done

In the Y.Doctor project I have completed all the functions . Here I have covered all the steps from the current problem to the completion of the Y.Doctor app. I first talked about the current health care situation of most people then offered the solution. After having the solution, I proceed to choose the technology and implement the project. I finally finished and evaluated the Y.doctor project.

### 2. Lessons learnt

During the project, I learned a lot of skills:

#### About the code

I learned android coding skills like handling API calls, generating XML screens, handling code flow, learned a new paradigm of MVVM. Also about the back-end I learned how to create API using flask and insert, update, delete, add data from server to data base. About Machine learning, deep learning, I learned more lessons about classification, object detection, getting data from images and how to improve accuracy by methods of image processing, data enhancement, transfer learning. About the database I have learned how to create ERD and create a separate database for the project. In addition, I also learned a lot of other skills such as testing for code.

#### About other skills

During the implementation of the project, I have gained a lot of soft skills such as communication skills to present the project every week to the client. Planning skills or, knowledge of Scrum, how to create Sprints. All of them help me better understand a project process.

### **3. Problems / solutions**

In the process of building the project, I also encountered many difficulties. I have prior knowledge in Machine learning, deep learning, MySQL, back-end with flask, so creating a server with Y.Doctor API is not too difficult a problem. But the difficulty that I encountered the most stemmed from my weakness, which was front-end coding skills with java, android app. In the process, I had to read a lot of references to a lot of apps to get the front-end done. I faced a lot of difficulties during front-end building like API call, Multithreading, even XML difficulty. In addition, I also encountered some difficulties when this was my first time creating a project following the Scrum process. But finally, after reading a lot of Scrum docs I was able to create Sprints and backlogs as well.

### **4. Future works**

In version 1.0.1 of the Y.doctor app I will add the following functionality:

- Add a notification when a user comments on someone's post, add a comment reply to the user.
- Add recommendation function for each user. When a user likes or comments on many certain posts, there will be similar articles appearing for interactive users or many posts of the person who posted that article will appear.
- Add AI chat bot doctor function: When users talk to a doctor AI chatbot will be consulted like a normal doctor, they can speak out symptoms for doctor AI chatbot to predict and find solutions . Data will be learned from phone calls and chats with real doctors.
- Upgraded Carepay registration: When users register for carepay in the facial presence section, they will be forced to perform some actions such as turning boy, turning right, waving, turning head... At the same time, check the level. similarity between the user provided face and the face on the identity card.
- Add a new user as care worker: When the doctor does not see the patient in their appointment schedule. At this time, the doctor will transfer the file to the care worker, the care worker will call to ask the user why he did not come to the appointment. From there, it is possible to cancel the medical appointment or reschedule the patient.

- Users can report false or offensive propaganda posts, then Admin can block for a time or permanently these wrong accounts.

## **5. Self-evaluation**

I have 3 criteria to evaluate an app as follows:

### **1. Fast App Loading Speed**

Customers are growing impatient and will leave if your App takes too long to load. There are many factors that make the App slow: not optimizing images, using too many tools / applications, technical problems... In which images account for more than 80% of the cause of slow App. Therefore, it is necessary to optimize images to increase App speed. About the functions of the Y.Doctor app are running quite fast, all functions run in under 1s except for AI functions.

### **1.2. Clear layout**

Aesthetics to evaluate beauty and bad will depend on each person, but there are still common conventions. App has a reasonable layout, harmonious colors will highlight the product image to create the first sympathy in the eyes of customers. The layout of Y.Doctor is arranged in a reasonable way with the user.

### **1.3. Professional user interface**

Images are an integral part of every Mobile App design. It is the secret weapon to attract and retain customers on Mobile App. With Mobile App design, it is advisable to use beautiful images right from the banner, product / service images, etc. The more elaborate the image, the more attractive it is to customers. As for the Doctor app's images, I think they're pretty good too.

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## **VIII. Appendix**

### **1. WBS**

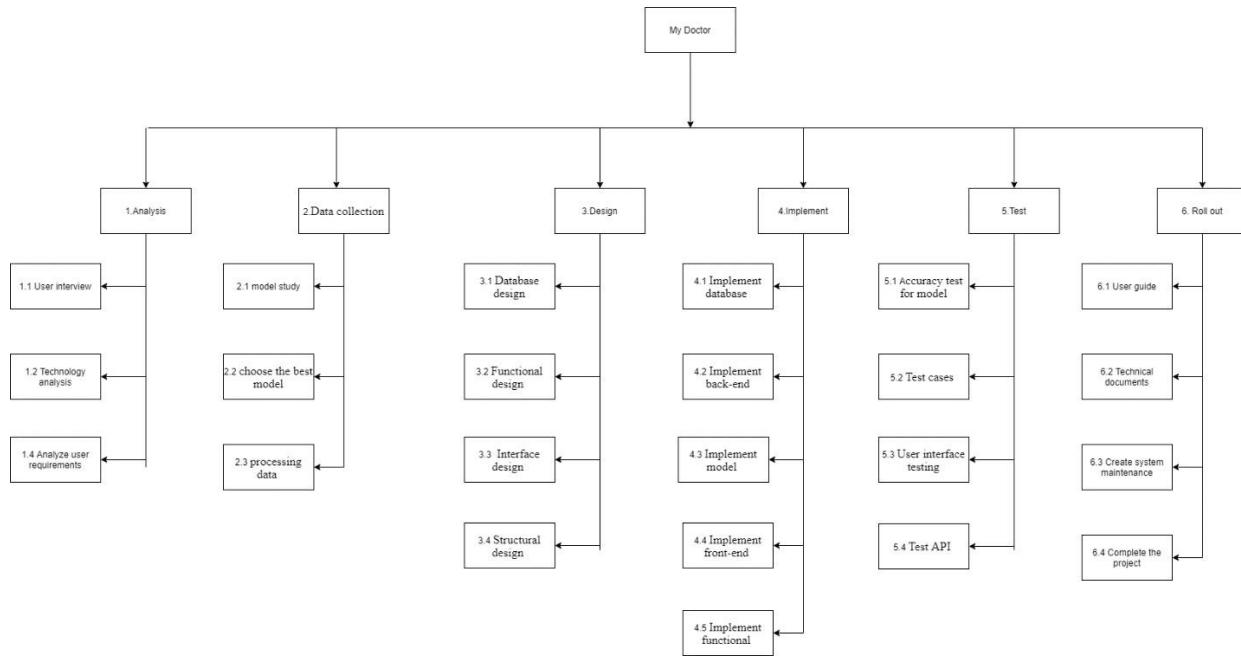
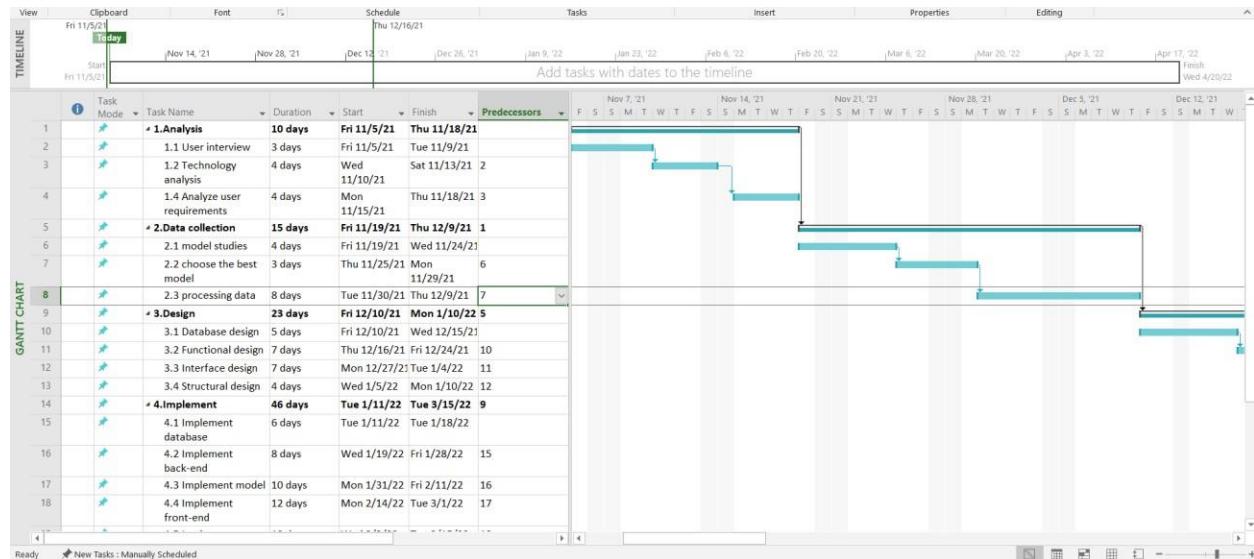
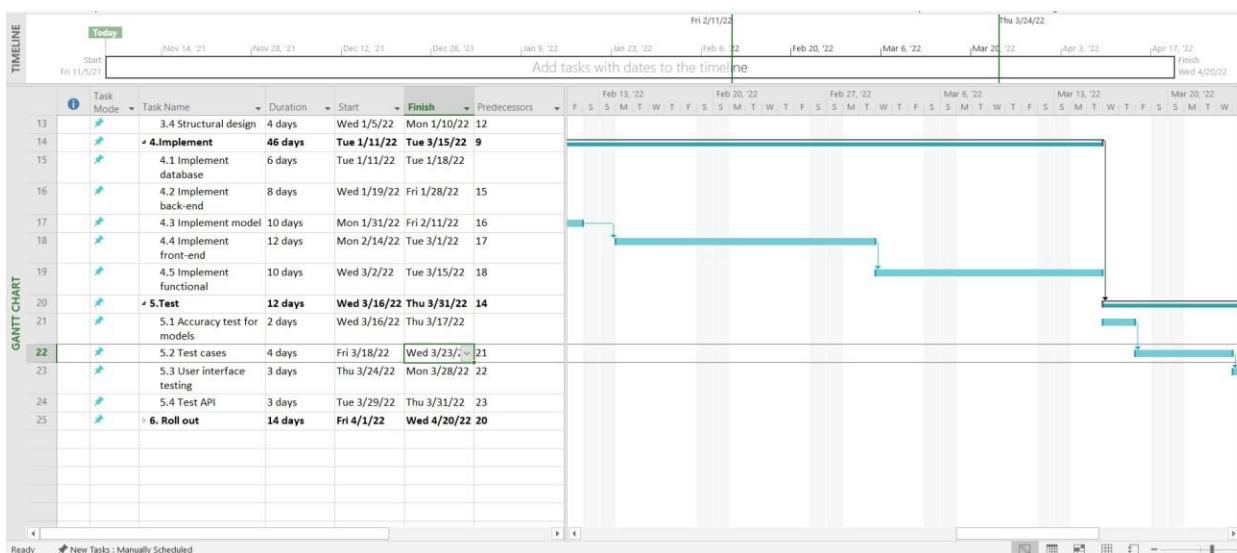
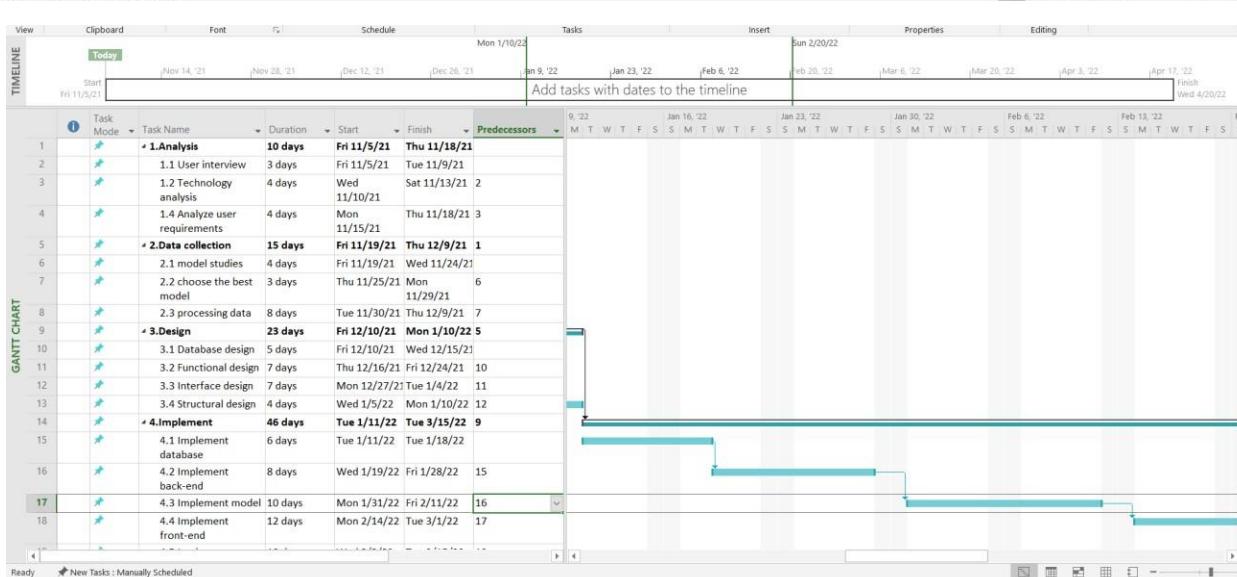
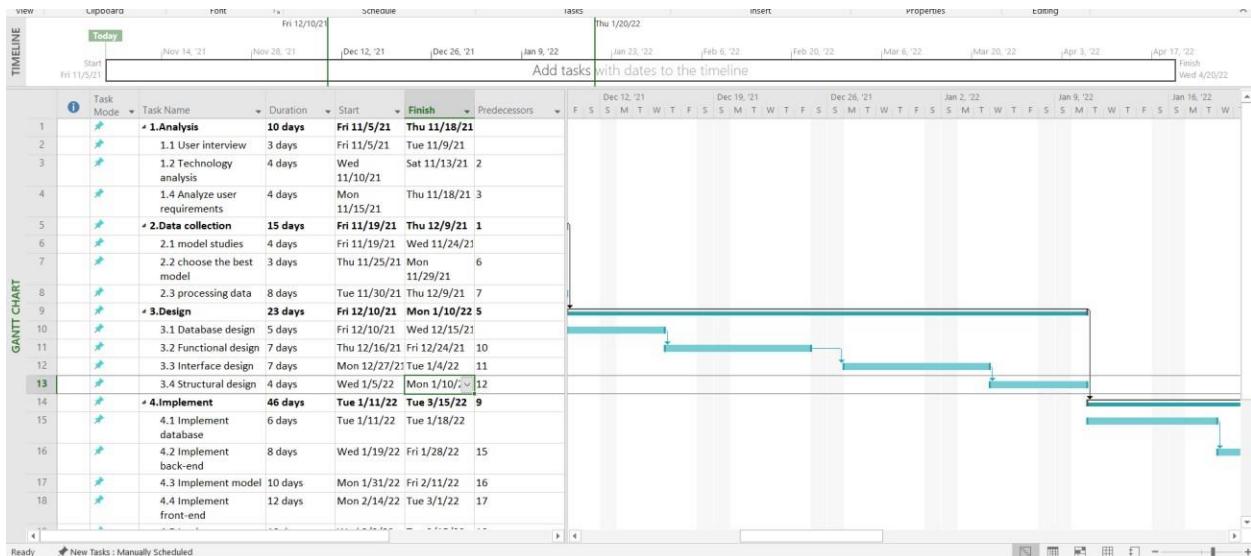
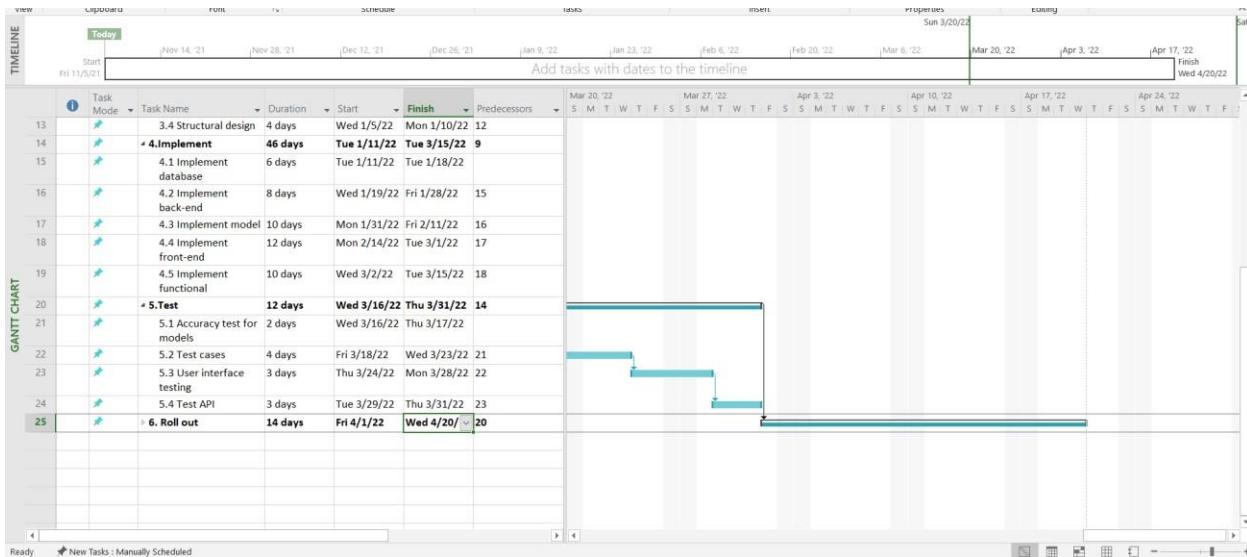


Figure 107: WBS.

## 2. Gantt Chart







### 3. Plan.

Prepare for research project (5%)	Start day	End day
Write proposal	4/1/2022	7/1/2022
Schedule	8/1/2022	15/1/2022

Figure 108: Plan for prepare for research project

Write literature review (10%)	Start day	End day
Collect and Evaluate materials related to the study question and goal	16/1/2022	20/1/2022
Tutor review literature review and feedback	21/1/2022	29/1/2022
Write final literature review	1/2/2022	6/2/2022

Figure 109: Plan for write literature review

<b>Project Analysis (7%)</b>	<b>Start day</b>	<b>End day</b>
Design user case activity diagram	7/2/2022	20/2/2022
Document product	22/2/2022	28/2/2022

*Figure 110: Plan for project analysis*

<b>Design (10%)</b>	<b>Start day</b>	<b>End day</b>
Design database	1/3/2022	5/3/2022
Design functions	6/3/2022	10/3/2022
Design interface	11/3/2022	16/3/2022
Design model	17/3/2022	20/3/2022

*Figure 111: Plan for design*

<b>Coding (10%)</b>	<b>Start day</b>	<b>End day</b>
Code system	21/3/2022	29/3/2022
Code functions	30/3/2022	5/4/2022
Code interface	6/4/2022	10/4/2022
Code model	11/4/2022	20/4/2022

*Figure 112: Plan for code*

<b>Test (7%)</b>	<b>Start day</b>	<b>End day</b>
Component Testing	20/4/2022	22/4/2022
Test case	22/4/2022	25/4/2022

*Figure 113: Plan for test*

<b>Evaluate product (5%)</b>	<b>Start day</b>	<b>End day</b>
Interview and survey user	25/4/2022	26/4/2022
Collect and analysis data	26/4/2022	27/4/2022
Write evaluation product report	27/4/2022	28/2

*Figure 114: Plan for evaluate product*

