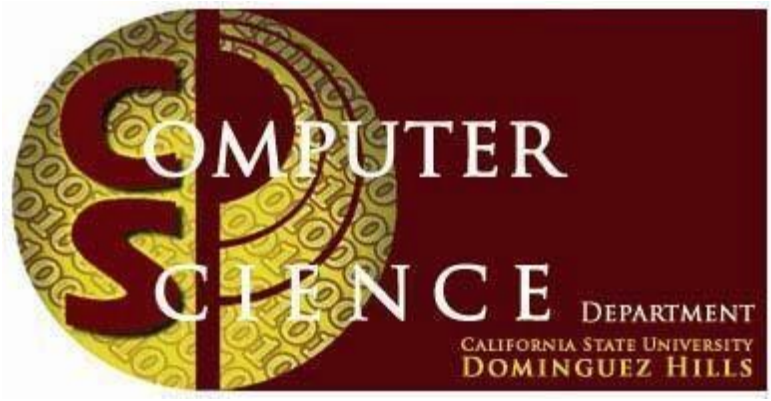

Spring 2018

Master Project

Computer Science Department

California State University, Dominguez Hills

Human Translator

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Project

Presented

to the Faculty of

California State University Dominguez Hills

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In Partial Fulfillment

of the Requirements for the Degree

Master of Science

in

Computer Science

_____

by

Faisal Ibrahim Alharbi

Spring 2018

PROJECT: **Human Translator**

AUTHOR: **Faisal Ibrahim Alharbi**

APPROVED

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Project Committee Chair

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Committee Member

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Peter Blankenship, PhD

Committee Member

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ABSTRACT

As known in this era, a cell phone is one of the most common technology and developers are competing to create a useful application with great ideas. Also, the mobile applications have become the most used and most widely deployed. From this principle, Human Translator designed to be one of the helpful application that benefiting the community. It is the translation application that users can find human translators help them translate any language they want. There are two kinds of users, people who need human translators, and translators who speak two languages or more. The application uses real-time communication (video call) between users and translators to get professional results. Human Translator is a great solution for people who have a necessary situation such as people who have a medical issue and they need to translate what they feel for the doctor. Also, it helps people who travel to a country that does not speak his or her language. This is the general idea of Human Translator which developed in Xcode platform and Swift language for IOS devices.

Chapter 1

Introduction

As known in this era, a cell phone is one of the most common technology and most frequently used. It has become one of the most significant devices in people's daily life. The reason is, there are many applications help people to make their life easier and faster. Consequently, developing an application that can serve the community is important. From this principle, I decided to create an application that can help people to make conversation if there are not speaking the same language. The application is translator app (Human Translator) that has two actors with different attributes. The first actor is people who authenticate with the Human Translator to find a translator who can help them to translate from their language to another language. The second actor is people who can speak more than two languages and authenticate with the Human Translator to translate for users. The application will help people who are planning to visit a country which speak a different language or who want to translate deep details about some necessary situation such as, medical issues or government laws. Additionally, to make the application more professional, the users and the translators in the application will contact by video call.

Goal of work

The goal of Human Translator is to find a professional real-time communication solution to translate from language to another language. As we know, there are many translation applications in mobile devices such as Google Translate, Golden Al-Wafi. However, there is no translation application give you the accurate context of sentences, yet. The human translation is still the best way to translate from language to other. There is no comparison between human and machine translation, because of that, I decided to create an application for the people who have

more than two languages and they want to translate for another people. Also, the second goal is for people who have a hard deal situation and they want someone who can explain to them what they need.

Human Translator overview:

Human Translator overview is explained by the following:

What is Human Translator?

Human Translator is a real-time communication application that has a new translator feature, and everyone can install it on his or her iPhone device. With Human Translator you can:

- Create an account as a regular user or as a translator
- Users and Translators have their own profile which includes (gender, age, picture)
- Users can select any language and search for a specific translator
- Users can make a video call with any available translator
- Users can write a review when they finish calling translator
- Translators can select any language he or she can translate
- Translators can write their own description of themselves
- Translators can see the users review and develop their skills

Requirements to use Human Translator

Human Translator is required to have apple store account to be able to install it. You can install Human Translator on any version of:

- iPhone
- iPad

The Human Translator is running IOS operating system.

When to use Human Translator?

Human Translator has two kinds of users and each user has his special attribute, so we can say, the Human translator has two different ways to use. From user's side, users can use the application when they have a serious situation with someone who does not speak their language. They only need to open Human Translator and select languages and contact with a translator. From Translator side, the translator can use the application when they have free time to help people. They must check the available button to resave video call.

The goal of translation applications

The mean goal of translation applications is to make the conversation between people who do not speak the same language much easier. With translation application, people can travel to any country with no pressure and think how he or she will deal and speak with people. One of the benefit that Human Translator adds to the translation applications is when a person has a deep explanation, he or she can find a human translator who can help them. For example, Arabian man has a medical issue and he finds a good treatment in Germany hospital. the first thing he needs when he goes to the hospital is a translator, so Human Translator provides people who can translate from Arabic to Germany language. He can call them video call and tell them everything he wants, and the translator will translate to the doctor.

Contribution

Human Translator provides a new translation feature that allows for people to be translators. Also, the application uses real-time communication called (RTCweb) which is provided by Google. The communication between users and translators is video call to increase the translator's quality and responsibility. Therefore, the user can find the translator easy and do not wasting his or her time. One of the contributions is, producing users, I develop review

foundation that users can write anything about translator after they finish calling them, so if the translator is bad, no one will deal with him again.

Platform choice

The platform for this Human Translator is Xcode 9 platform. Xcode is developer tools that use to design iPhone, iPod, Apple TV, and Mac application. I chose this platform because of these features [1]:

- It is 100% free IDK which has all the tools that I need
- It is the only program that you can make native apple application
- It has a great support
- Ease of use and transition between interfaces and code
- The workspace in Xcode keeps you focused and finding the errors and fix them easily.

The language used to develop Human Translator

HT is designed by Swift language which is one of the most important programming language these days. Swift is a new programming language provide by Apple company to design iPhone, iPad, Mac, Apple TV applications. It is a new and flexible language appears on 2014. Consequently, it is exciting to learn a new language and design an application. There are some of Swift advantage below [2]:

- Speed
- Less code & less legacy
- Maintenance
- Open-Source and supports dynamic libraries

Chapter 2

Background

Many of mobile devices at the beginning of the history of this technology was made to be "Car Phones" because they were large devices and it was hard to carry around in a pocket. However, in 1983, Motorola company manufactured the first mobile phone that can be carried, called Motorola DynaTAC 8000x. Early, the purpose of using mobiles was only for talking with some small features such as voicemail. Then, companies realized that they had to integrate more features and manufacture mobiles with more active functions and technologies. Some companies started to make mobiles with more advanced technologies like accessing email. In recent years, companies change the concept of mobiles from communication tool to a multimedia tool. Now, everyone has mobile can browse the web, accessing email, taking photos, and installing social media applications. Today, smartphone companies create a competitive environment for applications developers to show their creations and services that benefit the community [3].

Mobile Applications are software programs which specially designed for mobile devices such as smartphones and tablets. They turn mobile devices from limited use to multi-use. The purposes of these applications are to provide services to the users. There are many services applications provide such as entertainment, fitness, translation, and social media apps. The rapid spread of mobile software and its ease of use, a lot of website owners develop mobile applications to support and work beside their website. Mobile application developers create an application reliant on what operating system they use. IOS and Android are the most popular operating system that developers use to create their own apps [4]. For instance, developers upload 9.7K new applications at Apple Store. Also, today Google Store has more than 4,160,583 Apps and every month developers upload more than 190K apps [5]. Apple and Google stores are the best platform for developer to show their ideas.

iPhone Apps

iPhone apps are an application that running on Apple iPhone devices. iPhone apps only can be run on the IOS operating system. iPhone apps cannot be installed on Android devices. We can officially install iPhone apps via Apple Store. We also can install iPhone apps via Cydia Store. But, apps in Apple Store are recommended because they are verified to follow Apple policies. To install iPhone apps, we need an Apple ID that can be free to register on Apple site.

Related work

Translation application is one of the biggest application that developers and companies have developed. It is known as machine translation which means applications or online serves that use machine-leering technologies to translate words or speech from language to another language [6]. Machine translation system has three types [7]:

- **Rules-based systems:** it uses a group of language rules, grammar rules, and dictionaries for common words. It is created to focus on some manufacture or disciplines.
- **Statistical systems:** this type does not have language rules, unlike Rules-based systems. it "learns" translation by analyzing a large of data for each language pair.
- **Neural Machine Translation (NMT):** it is a new approach that makes machines translate from one big neural network (multiple processing devices modeled on the brain). the approach has become popular among MT researchers and developers.

However, all the machine translation systems are still unlike the human translator in terms of quality and accuracy according to Google study in 2016 [8]:

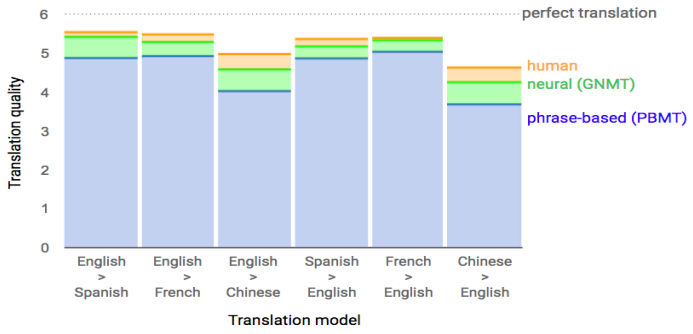

Figure1*: A graphic from Google Research highlighting the 2016 accuracy levels of Google Translate*

Xcode platform

XCode is just as a tool to develop apps for IOS and MacOS which using iPhone, iPad, and Mac. XCode is an Integrated Development Environment (IDE) like Android Studio, Microsoft Visual Studio, or Eclipse. For example, developer code Java in Eclipse, .NET coding in Visual Studio. So, they will develop IOS and MacOS apps in XCode. Also, developers need to know at least C/C++ or Object C to create apps using Xcode [12].

Swift language

Swift is a programming language developed by Apple. The main purpose of this language is to develop for IOS and MacOS apps. Apple introduces Swift to make it simple to develop their apps. Swift can be used in XCode IDE to create apps. We know that C/C++ and Object C are using by the developers to programming apps. But, Swift is a much simpler language to do the tasks. So, now, we can use C/C++, Object C, and Swift to code in XCode. however, Swift is future language that has a great support [10].

Cocoapods

We use the Xcode to develop the apps. If we are using Swift, we usually use the Cocoa framework. Cocoapods is a part of the Cocoa framework. Cocoapods helps to manage library

using in the development of an app. For example, we are developing a VCar app to book car. And, in this VCar app, we use 10 libraries. So, Cocoapods will help to manage these libraries. Cocoapods can help to retrieve, update and check dependencies for these libraries. Thus, Cocoapods is usually called dependencies manager [11].

WebRTC

WebRTC or Web Real-Time Communicate is a set of APIs that allows web browsers and mobile apps can make real-time communication with each other. WebRTC will provide libraries that developers can use to transmit data from peer to peer. Mean that the data can be transmitted from one person to another person directly on a web browser or a mobile app. Data can be a text message, voice call or video call. Today, WebRTC is widely used in the game application as well as an app that allows users to make voice or video calls [14].

Amazon Web Server

Amazon Web Server is known as Web Services (AWS). In this service, Amazon will provide a large number of cloud servers. The servers can be classified by the purposes of data store such as web stores, the document storing, media storing. And, servers are placed in various locations across continents as North America, Europe, Asia, Africa, etc. The target of Amazon is to provide new storing mechanisms. From now, all the data can be stored and online available to retrieve. This is called cloud storing. Users can get data at any time from the cloud without worrying about disruption [9].

MySQL

MySQL is one of the relational database products that used to implement for the database. This is the basic and lightweight database that is the best choice for the small and medium application. Together with SQL.NET and Oracle, MySQL is most three popular

database products in the software development industry. MySQL is compatible with most of the programming language such as C/C++, PHP, Java, etc. [13].

Chapter 3: System Requirements and Methodology

Methodology

Software Development Life Cycle means cycle steps of a software development from starting time to ending time/finish time. In each of the model in SDLC, all of phrases/steps are defined clearly. The order of steps is an important part of the model. Which steps go first, and dependencies of steps are also key factors of the model. Developers also notice the flows of steps to make sure they follow the correct cycle paths. All steps are defined to make sure that there are no essential points missing in the development processes. Thus, we can ensure the success of the project.

In this project, I am following the Waterfall SDLC methodology. This methodology is the simplest one in the SDLC models, and it works with applications projects. And, it is also the first one to be introduced. Sometimes, Waterfall model is also called as Linear Sequence SDLC model. The waterfall is so easy to understand and apply to most of the developers. As the characteristic of Waterfall model, a phrase must be completed before we can move to next phrase. That is the reason we call this as Linear Sequence model [15].

We can take a look at the developments step of Waterfall methodology as:

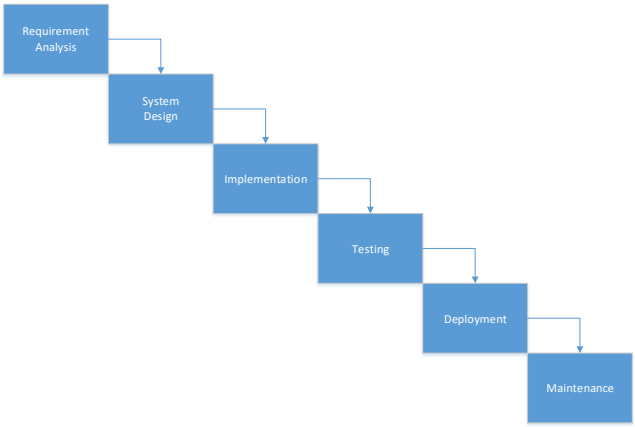

Figure 2: *Waterfall methodology steps*

Project phases using Waterfall SDLC methodology

By looking at Figure 2, we can see that the outcome of a step is the input of the next step. All the steps of the model must be carried out in the linear order.

- **Requirement Analysis**: this is the first step in the project and the most important step. In this beginning step, I made the analysis for requirements that I collected from certain researches. Then, I made sure that I completely collect sufficient requirements and information for analysis for the system. Next, I did the analysis based on collected data that I got from researches.

  Main Project Requirements**:**

  - Database (MySQL)
  - Platform (Xcode)
  - Language (Swift)
  - Design requirement (WebRTC, logical idea depends on previous researches)

- **System Design**: this step will be followed by the requirement analysis step. When I completed the requirements analysis, I started doing the system design based on the analysis outcome. At this step, I designed the system such as Graphic User Interface (GUI) Design, system design, and database design. For the system design, I used the UML to do designs as Use Case Diagram, Sequence Diagram, Class Diagram, State Machine Diagram, etc. And, for the database design, I created MySQL data to work as a backend for the project.

- **Implementation**: in this step, I started doing the coding for the system. I choose the suitable frameworks and programming languages to implement the project which is Xcode,

Swift, MySQL, and WebRTC with a timeline to finish every function. Thus, I manage the time to complete the project.

- **Testing:** This step testing is the whole project testing. It means that we will test all the modules together to make sure they work correctly in an integrated environment. After the implementation of a project is completed and all the individual functions are working, I installed Human Translator on two iPhones and test all the functions. The test covers all of the operations that really use in the system.
- **Deployment**: After the project is fully tested and make sure it passes the quality control and quality assurance, I made a request to publish Human Translator on Apple store.
- **Maintenance:** After Human Translator will deploy to customers, I need to do the maintenance for it. It is just like the warranty that we provide for the customer for a limited interval of time. There are no products that can be run completely perfect with no issues. Therefore, customer support is an important factor to project development product. Customers do not mind that project to have issues if we can give the best support services to solve the issues.

System Design details

Business Model

Actor list:

Actor: people authenticate with the Human Translator to find a translator who can help them.

Translators: people authenticate with the Human Translator to translate for users.

Use Case List and Detail:

U1: Authenticate:

Actor or Translator provides the system with login to HT and provides sign up to register information in the system for re-login, too.

U2: Make Profile:

Actor or Translator can update their profile after creating an account and access the system.

U3: Select languages:

Actor and Translate have the ability to modify the language depend on what the actors need and what the Translators can Translate.

U4: Review:

The actor can evaluate the Translators language quality, and Translators can see the review to develop their skills.

U5: Make or receive Video Call:

Actors can make Video Call for specific Translator as they want is he or she available, and Translator can receive the Call or reject it.

U6: Logout: Actor or Translator logout from the system.

U7: Forgot Password: Actor and Translator change their password if the forget it.

3.2.2 System Requirements

- **Use Case Diagram:**

  Use case diagram describes how the interactions among the elements of a system [16].

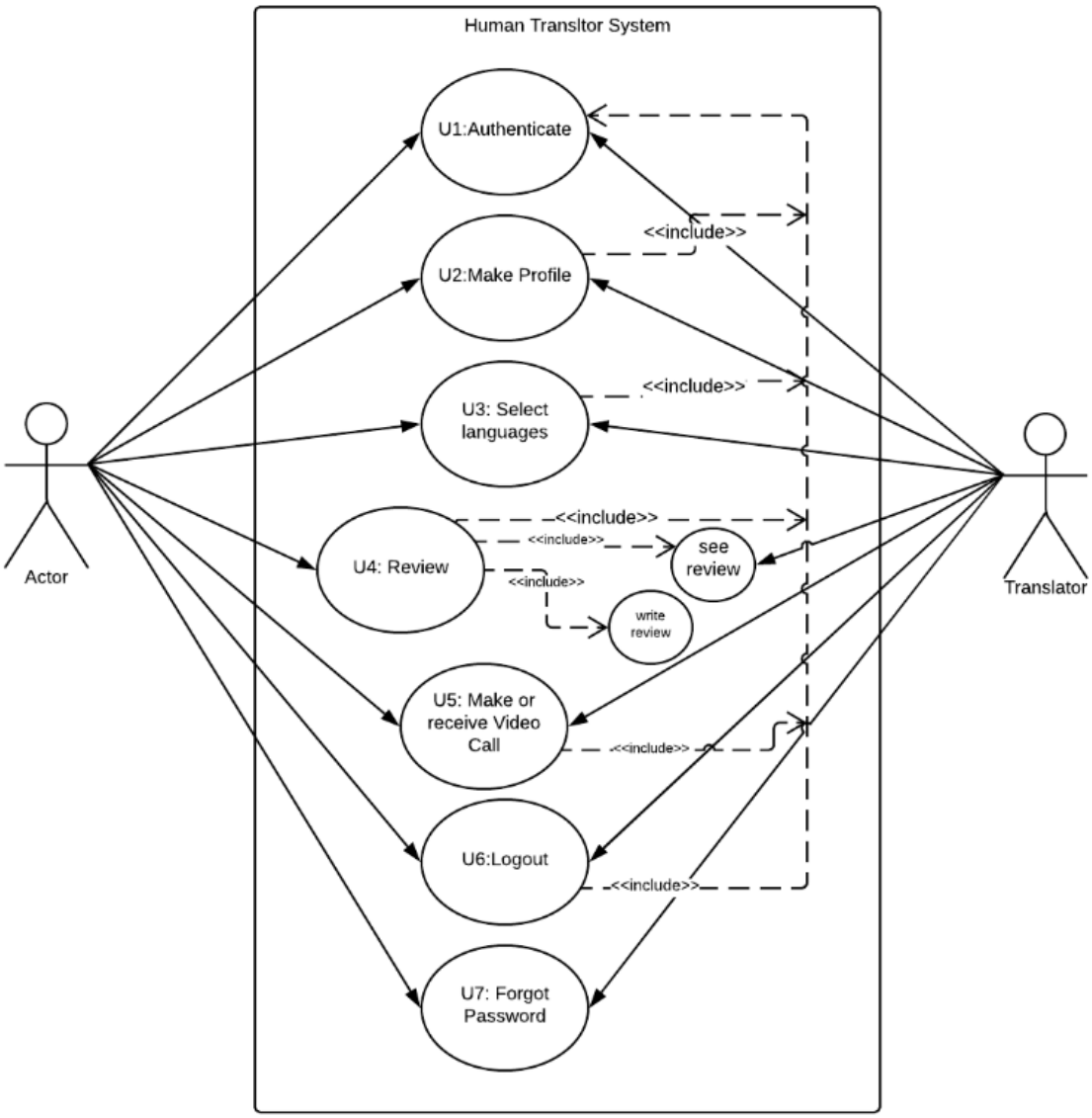

Figure 3: *Use Case Diagram*

3.2.3 Static Analysis

- **Class Diagrams:**

  It is the type of static structure diagram that describes the system, and show system classes (attributes, operations) [17].

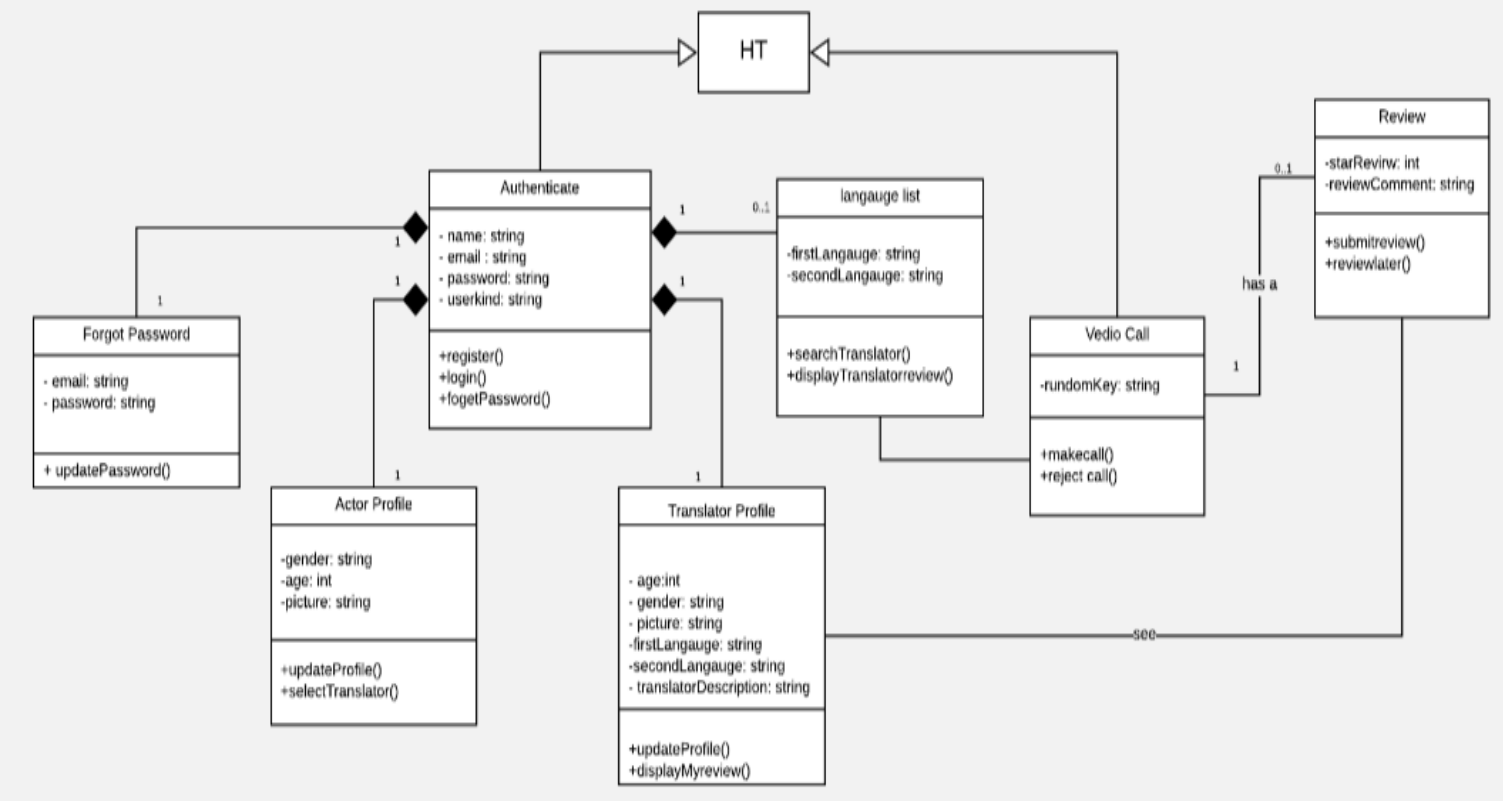

Figure 4: *Class Diagram*

3.2.4 Dynamic Analysis

- **Communication Diagrams:** Communication Diagram is similar to a sequence diagram. It is using to model the dynamic behavior of use case. Also, it focuses on the collaboration of objects.

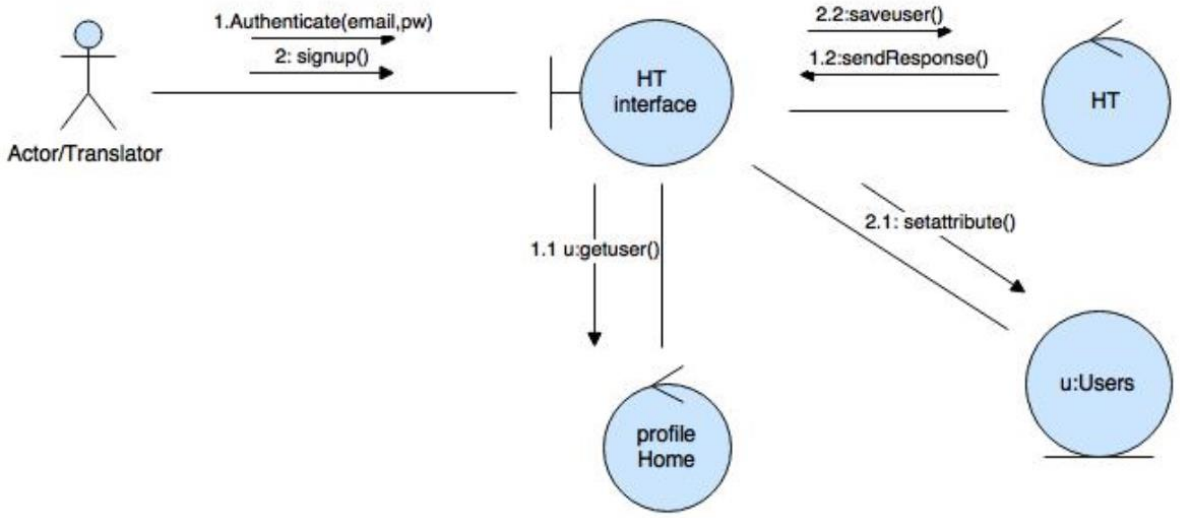

Figure 5: *Authenticate Communication Diagram*

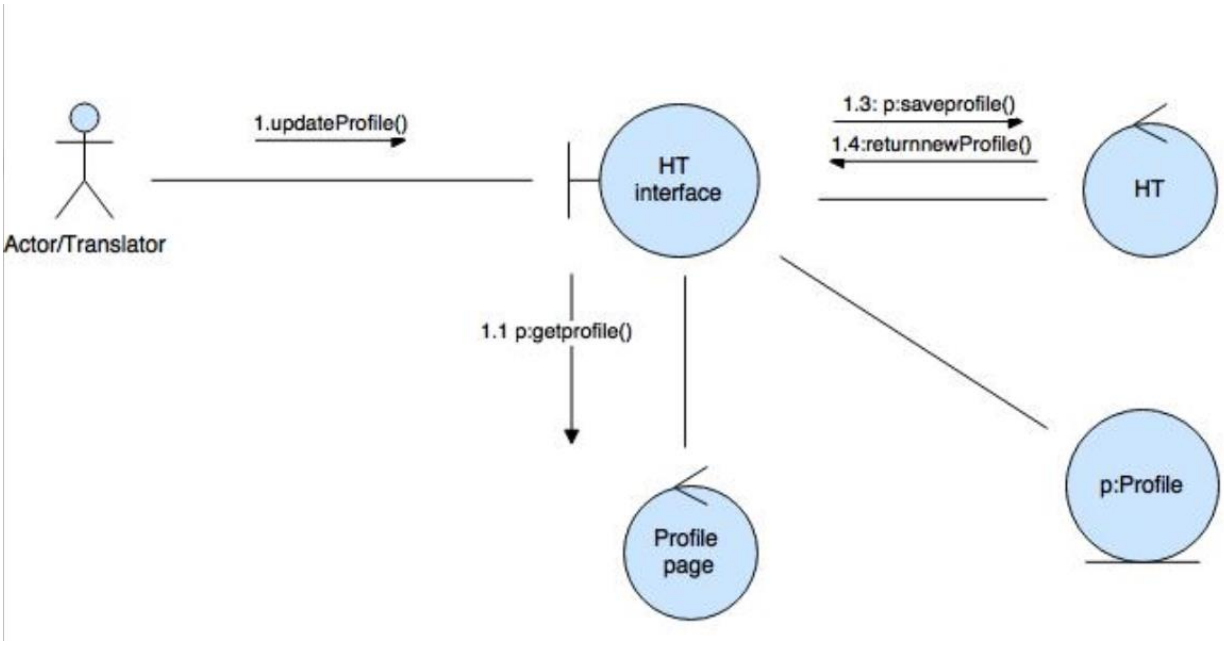

Figure 6: *update profile Communication Diagram*

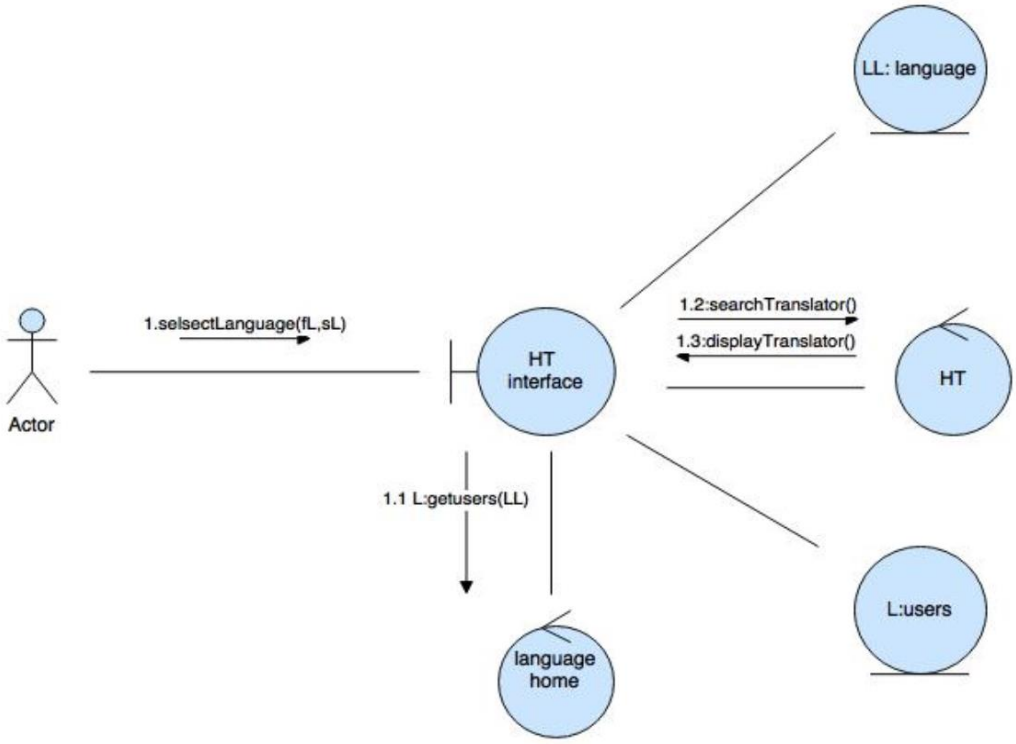

Figure 7: *select languages communication diagram*

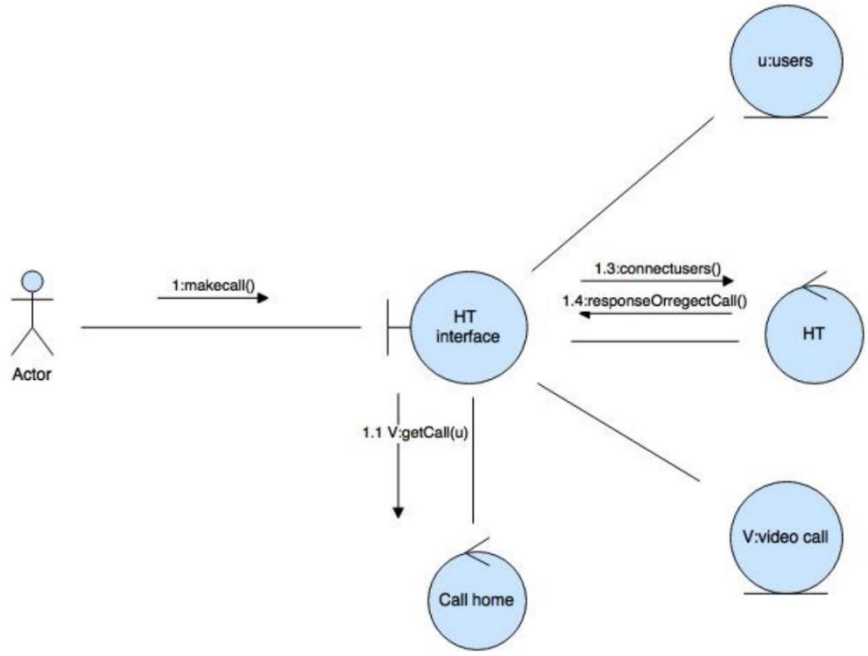

Figure 8: *make a video call communication diagram*

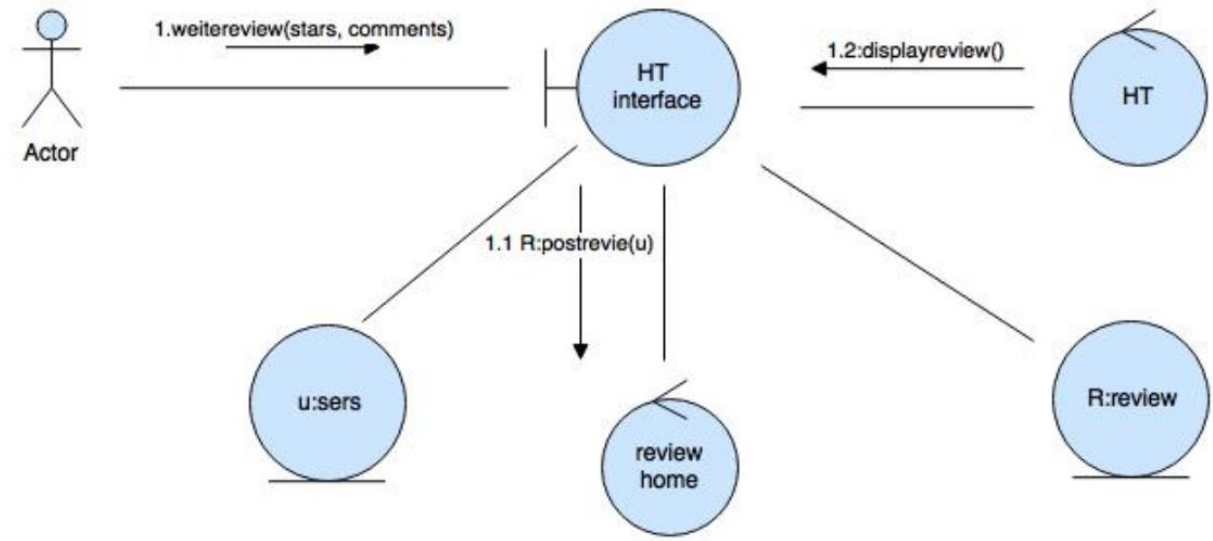

Figure 9: *Reviews communication diagram*

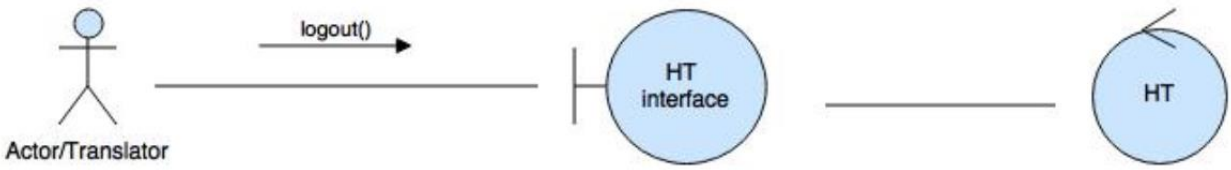

Figure 10: *logout communication diagram*

- **state machine diagram:**

A state diagram is a diagram used to describe the behavior of a system that includes the possible states of an object [19].

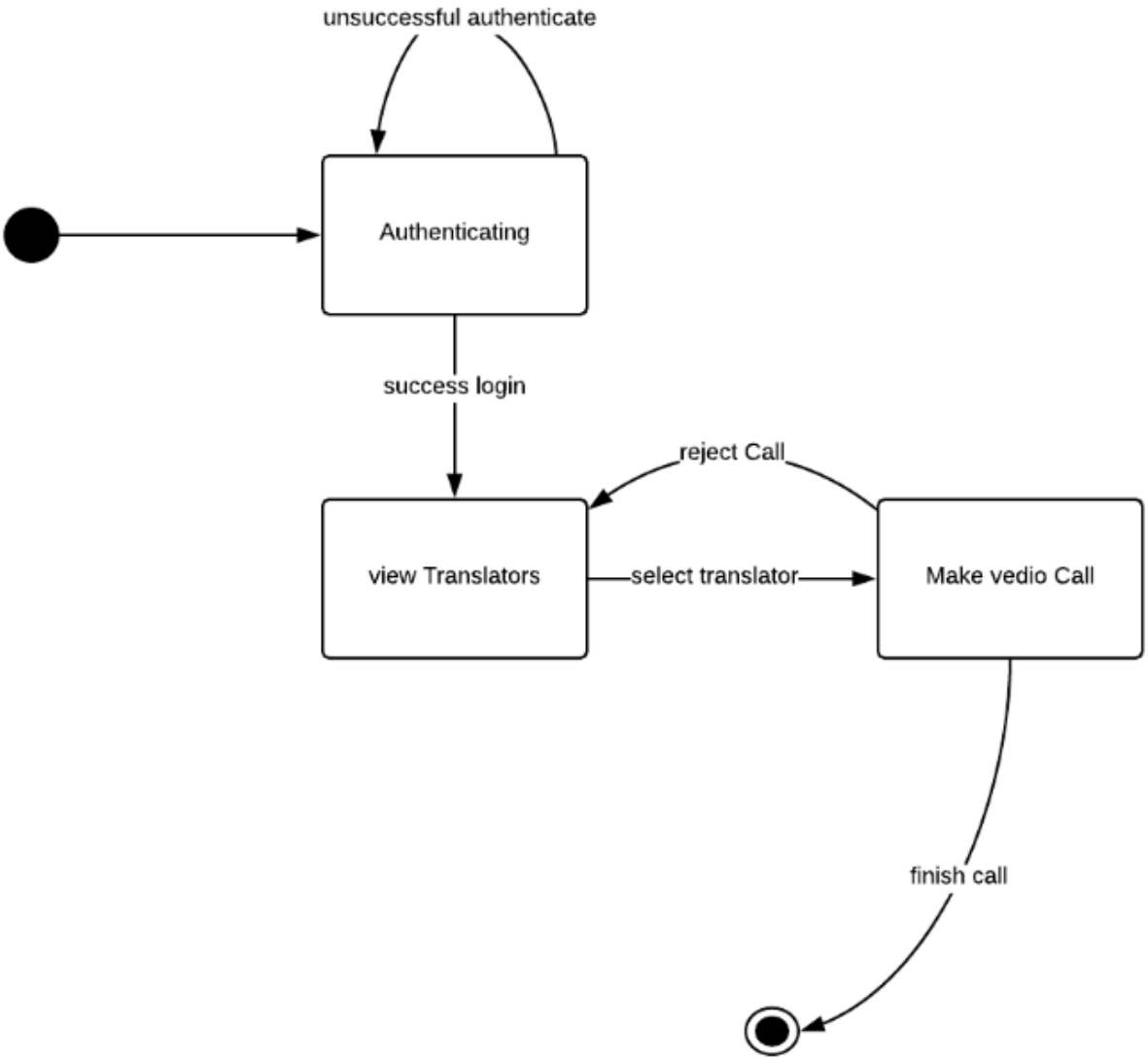

Figure 11: system *state machine diagram*

3.2.5 Subsystem Design

- **Database Design: application uses MySql Database. The tables are:**

Users :
P: UserID : int
name : varchar(50)
Email : varchar(50)
Password: int(20)

user Profile:
F: userID: int
gender : varchar(50)
age: int
picture: image

Language list:
languageId: int
languageName: varchar(50)

Translator Profile:
F: userID: int
gender : varchar(50)
age: int
picture: image
availability: char
Description: varchar(250)

Review:
F: userID: int
stars: int
comments: Varchar(100)

- **Business Services(sequence Diagrams):** interaction diagrams that show details about the system, and how the operations work.

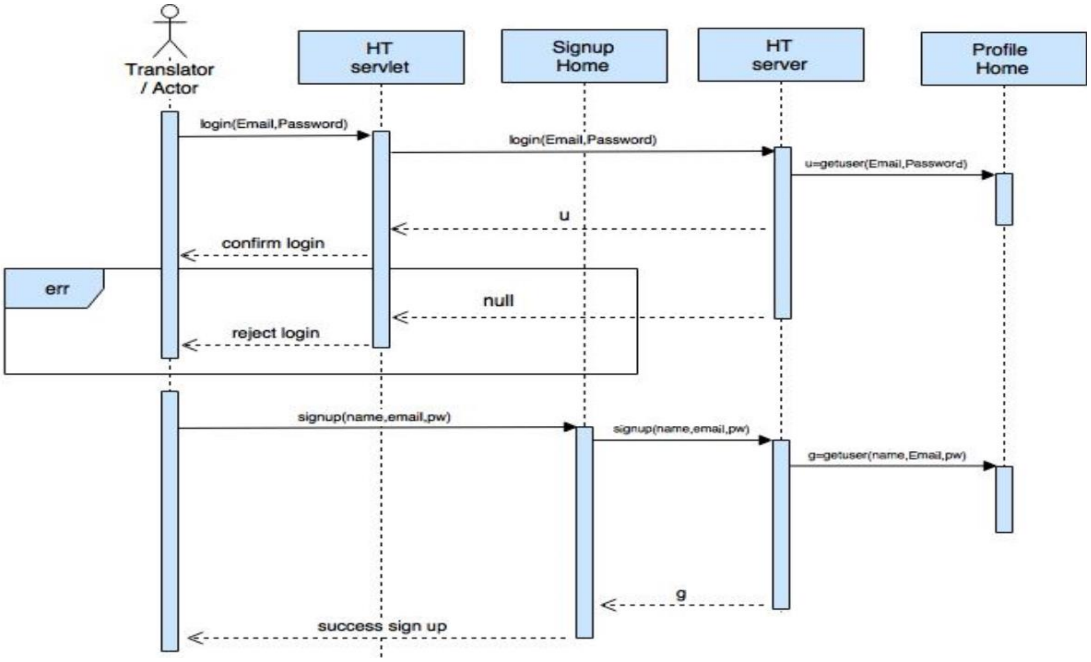

Figure 12: *Authenticate sequence Diagram*

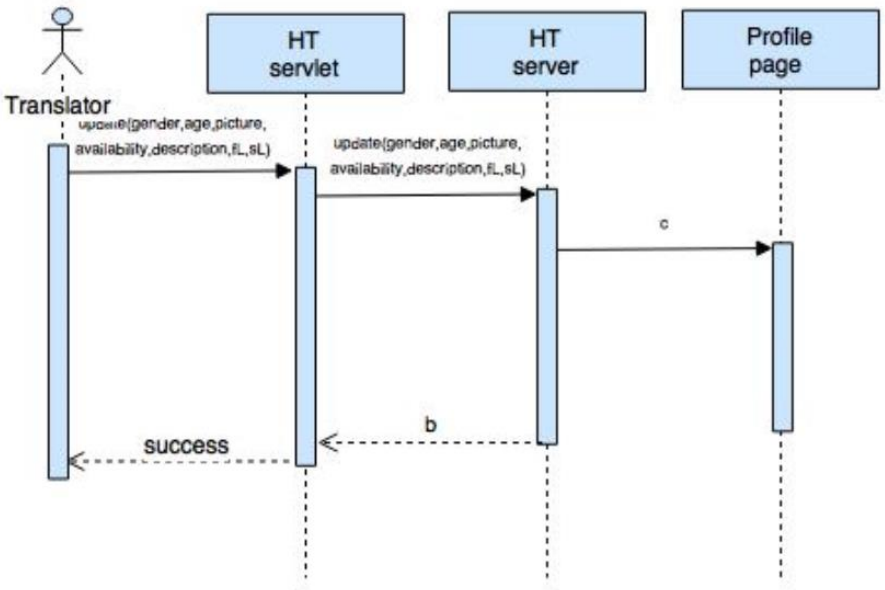

Figure 13: *Translator update profile sequence Diagram*

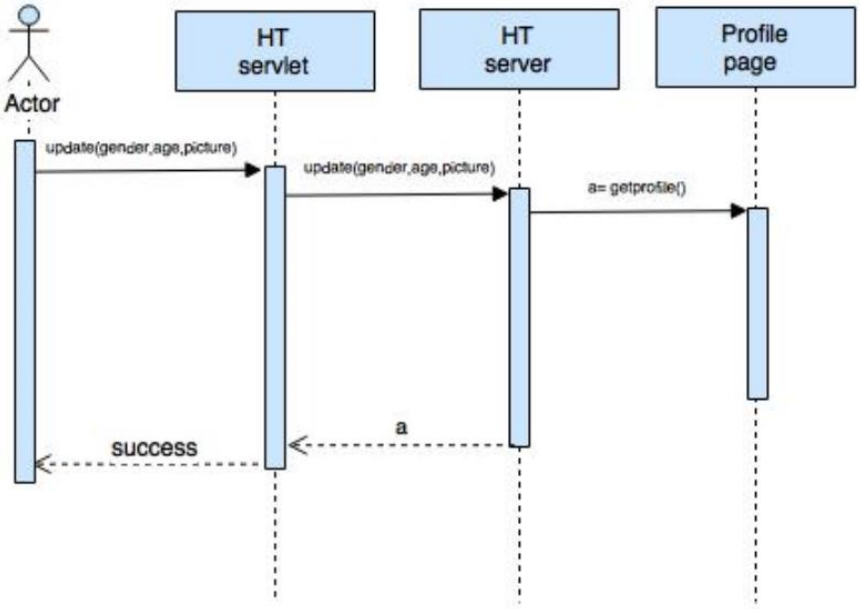

Figure 14: *Actors update profile sequence Diagram*

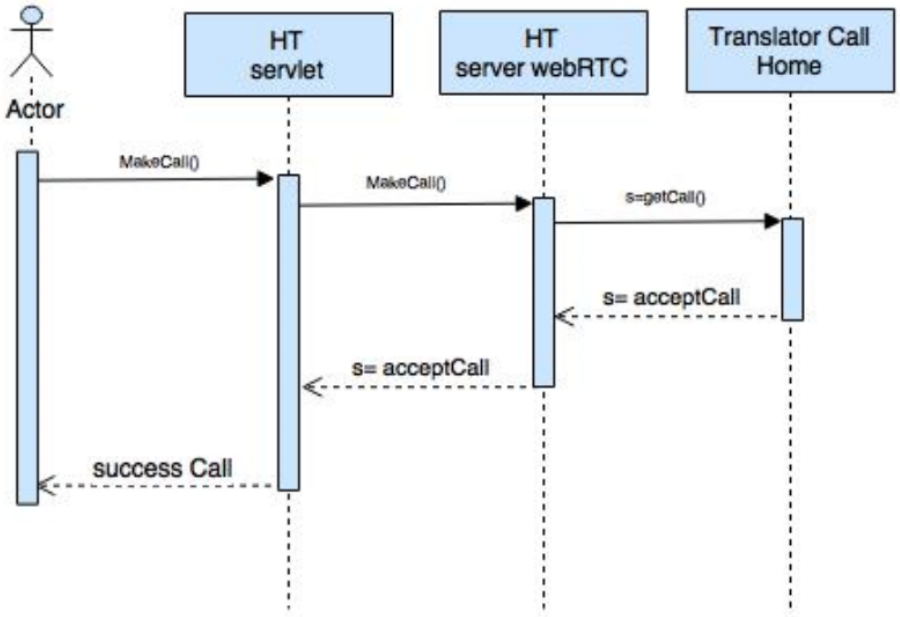

Figure 15: *Actors make call sequence Diagram*

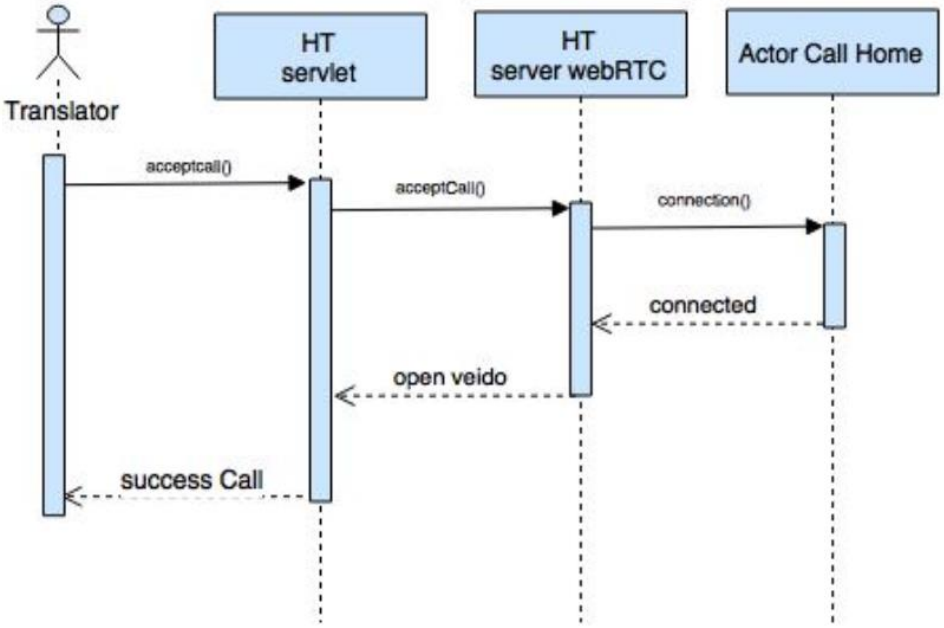

Figure 16: *Translators resave call sequence Diagram*

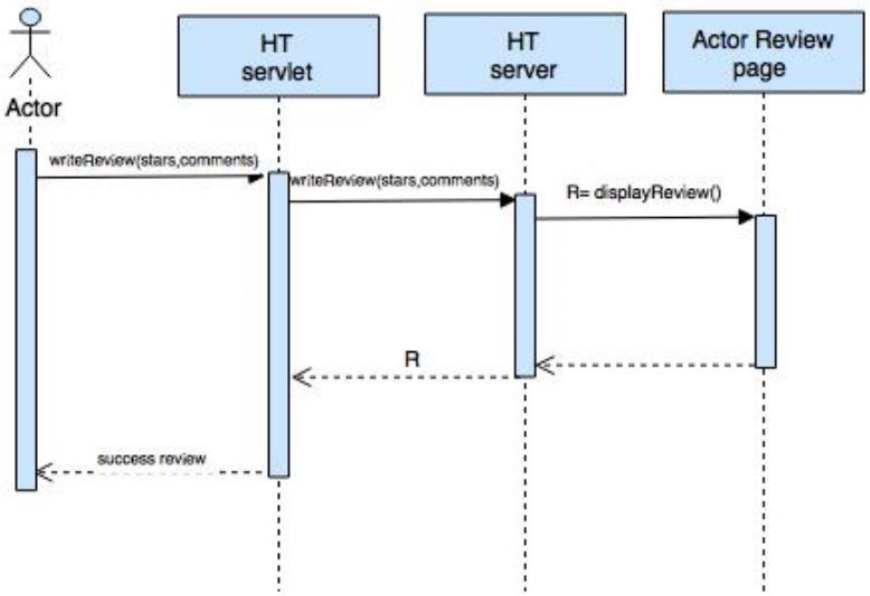

Figure 17: *actors write review sequence Diagram*

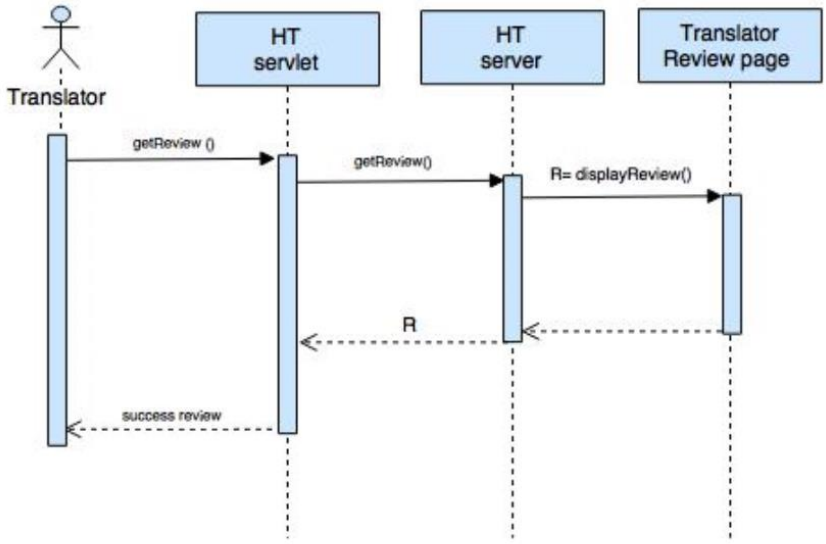

Figure 18: *Translators see reviews sequence Diagram*

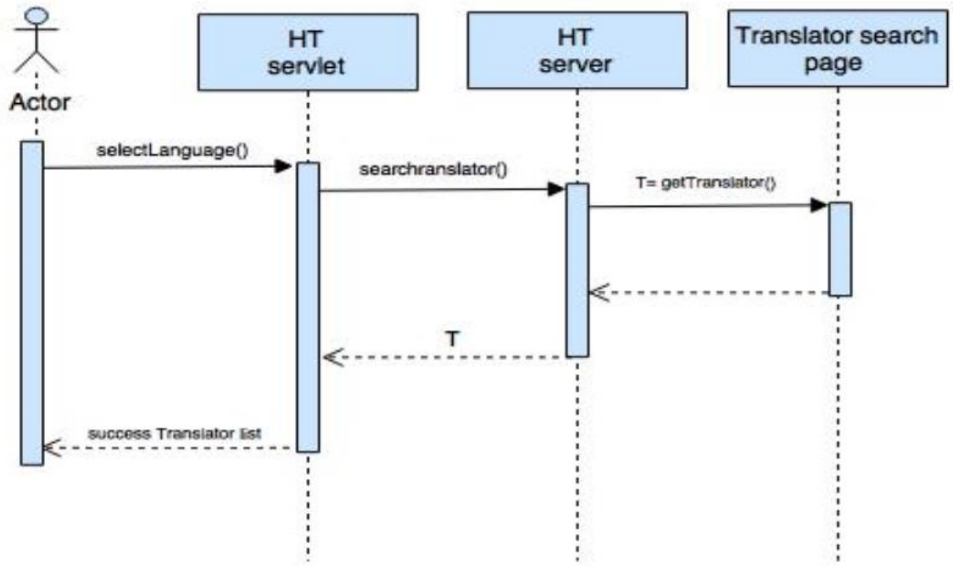

Figure 19: *select languages sequence Diagram*

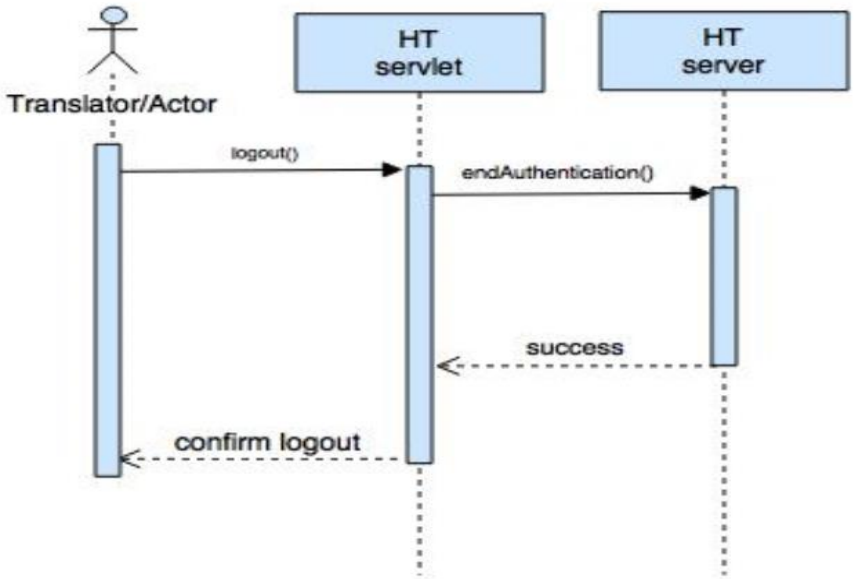

Figure 20: *Logout sequence Diagram*

User Interface Sketches

- **Actor side:**

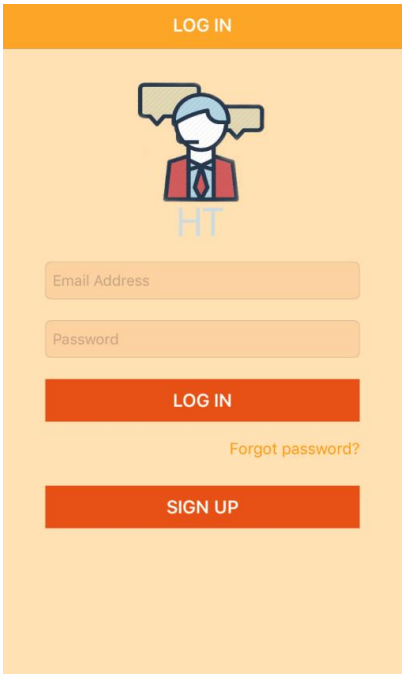

Figure 21: *login*

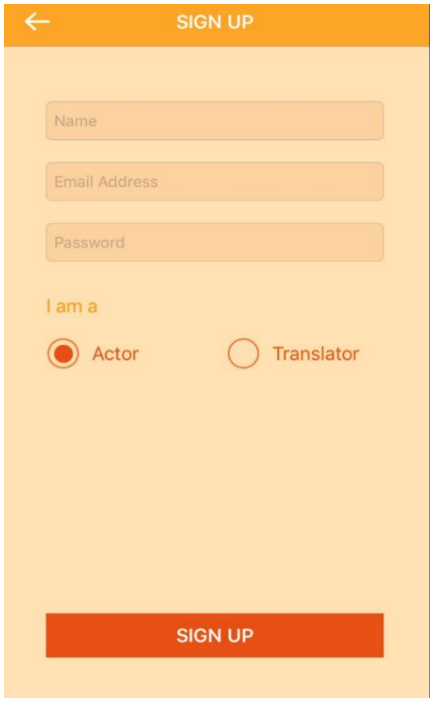

Figure 22: *sign up*

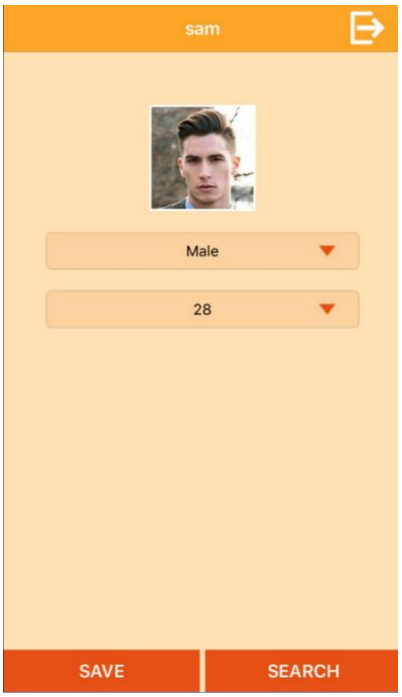

Figure 23: *actor profile*

Figure 24: *select languages*

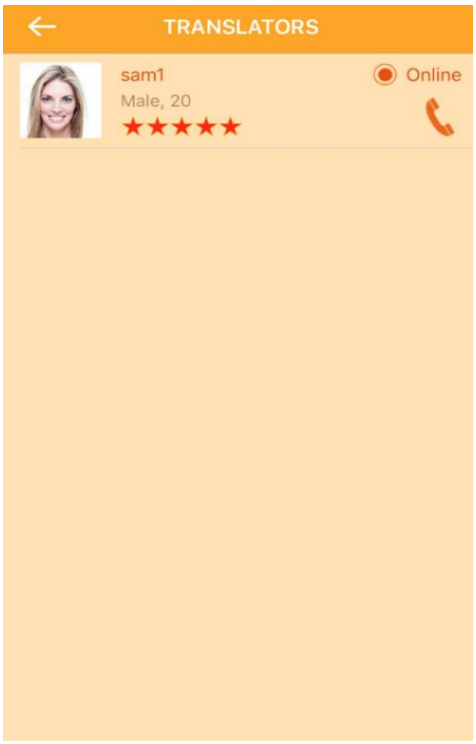

Figure 25: *Translators list*

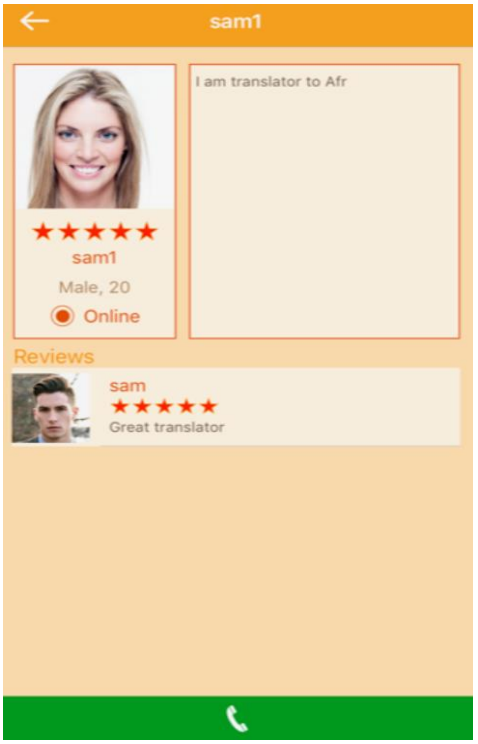

Figure 24: *translator profile*

- **Translators side:**

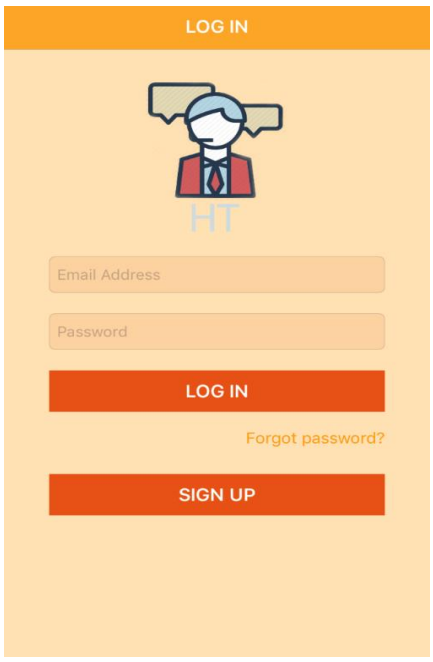

Figure 26: *Login*

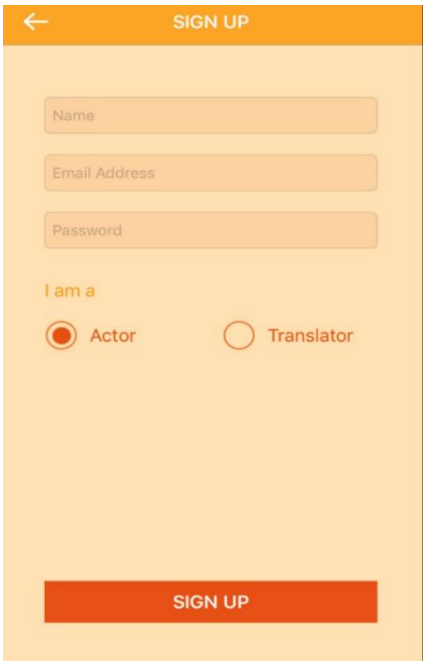

Figure 27: *Translators Sign up*

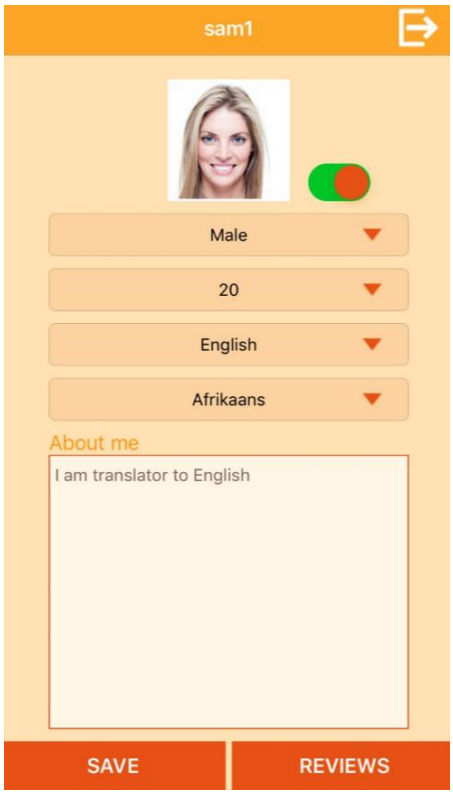

Figure 28: *Translators profile*

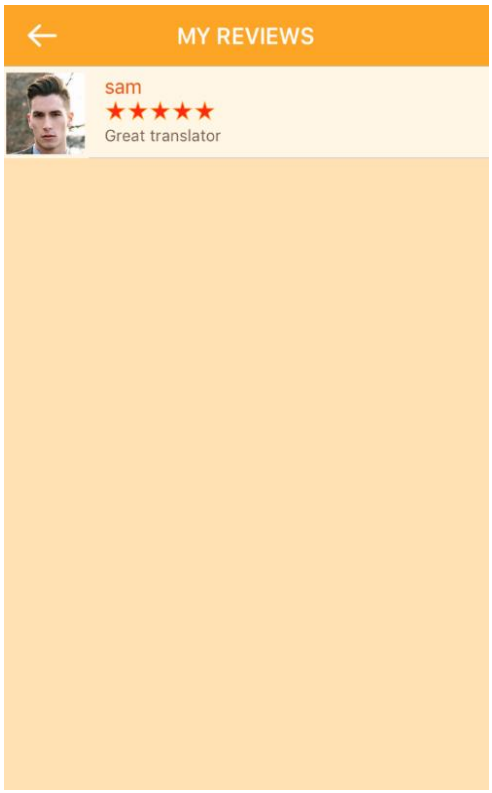

Figure 29: *Actors reviews for translators*

Chapter 4: Conclusion and Future Work

4.1 Summary

Human Translator iPhone application that designed using Xcode platform and Swift language. The application is created to helps people to contact with any person in the world for translation porous. However, I can summarize the application's benefit with this scenario, a person has a medical issue and his situation need to transfer him from local hospital to another hospital outside his country. This situation required a person who can speak the country language to helps the patient if he does not speak it. The patients will spend a lot of many for the translator beside what they will spend for the hospital if he decides to bring a translator with him. Because of that, creating an app that helps to find a person who can translate what he needs will be helpful. So, I made the application with a great professional function which is video call function. Now, the users in the application can make real-time communication (video call) with any available translators.

4.2 Future Work

In the future, Human translator will have two more functions. The first function will be payment method that every translator in the application can get money when he or she translate for users. The second function that I will add is sorting the translators. Now there are a few translators. However, in the future, they will be hundreds, I need to make search button to sort translators for the user. This way will become an easy way to find a particular translator. Besides that, I will develop Human translator for the Android operating system.

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