



# **AI WAVE**

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## **Abstract**

This project, titled "Harnessing the Power of AI Models for Multifaceted Automation," presents a comprehensive exploration of three distinct applications within the realm of artificial intelligence (AI) and machine learning. The project is comprised of Word Wave, Vision Wave, and Wave Researcher, each targeting specific domains to optimize processes and enhance user experiences.

Word Wave focuses on leveraging AI models to automate the generation of subtitles for video clips in multiple languages. The primary objective is to develop an AI-powered system capable of accurately transcribing spoken content in videos and synchronizing subtitles. By doing so, Word Wave aims to improve accessibility and user experience, catering to diverse linguistic preferences.

Vision Wave encompasses various facets of computer vision, including object detection, object tracking, instance segmentation, and pose estimation. Object detection involves identifying the location and class of objects in images or videos, while object tracking maintains unique IDs for detected objects as the video progresses. Instance segmentation goes beyond detection, isolating individual objects in an image through masks or contours. Pose estimation identifies key points in an image, offering insights into the spatial configuration of objects. Vision Wave integrates these capabilities to empower video analytics with advanced visual understanding.

Wave Researcher introduces artificial intelligence software designed to generate scientific research based on reliable sources. Leveraging large language models (LLM), this application analyzes existing research to derive new insights and generate scientific papers. The primary goal is to streamline and expedite the research process, providing researchers with a powerful tool to augment their scholarly endeavors.

Together, these applications exemplify the versatile capabilities of AI models in automating complex tasks across linguistic, visual, and academic domains. The project underscores the potential for AI to revolutionize various industries, from media and accessibility to research and academia, ushering in a new era of efficiency and innovation.

## **Acknowledgements**

“Realizing your way of thinking is the beginning of change.” Ibrahim Al-Faqih

First and foremost, praise be to God, who has power over all things and his grace is upon us in accomplishing this work.

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# CHAPTER 1

## INTRODUCTION

AI Wave is the ideal Vietnamese language for researching and communicating in the distinct world of global communications.

Wave Artificial Intelligence is a transformative application designed to serve the diverse needs of our society. It is far ahead of gadgets, strives to break the barrier of access to basic communications across all sectors of our population, and users can hide functions that facilitate access to information.

### 1.1 Project Background

In response to the evolving demands of modern technology, the "AI Wave" project strategically focuses on leveraging AI models to address distinct challenges in multimedia content processing and scientific research. Word Wave targets the automation of subtitles for video clips, Vision Wave delves into advanced video analytics, and Wave Researcher employs AI to expedite scientific research processes. This multi-faceted approach reflects the project's commitment to pushing the boundaries of what AI can achieve.

### 1.2 Problem Statement

Manual processes in subtitle generation for videos prove time-consuming and error-prone, limiting accessibility to diverse audiences. Video analytics encounters challenges in accurate object detection, tracking, segmentation, and pose estimation. Meanwhile, the traditional research process lacks efficiency, prompting the need for innovative solutions. The "AI Wave" project is positioned to tackle these challenges head-on by introducing AI-powered solutions tailored to each domain.

### 1.3 Project Objectives

- Develop an AI-powered system to accurately transcribe spoken content in videos and automate the creation of simultaneous subtitles in multiple languages to enhance accessibility.
- Build a powerful AI model for accurate object recognition in photos or videos.
- Implement object tracking using a unique ID maintenance system for continuous monitoring.
- Develop an instance segmentation model for detailed object recognition and segmentation.
- Build a pose estimation system to identify specific points in images, represented as key points
- Utilizing large language models (LLM) to analyze existing scientific research and create new insights and scientific papers through processes that rely on artificial intelligence, to facilitate and accelerate the scientific research process by taking advantage of artificial intelligence.

### 1.4 Project Significance

The "AI Wave" project stands as a beacon of innovation, poised to significantly impact the fields of multimedia content processing and scientific research. By seamlessly integrating AI into these domains, the project aims to elevate standards, ushering in a new era of accessibility, precision, and efficiency. The outcomes are anticipated to reshape industries, positioning "AI Wave" as a trailblazer in the dynamic landscape of artificial intelligence applications.

## 1.5 Project Gantt Chart

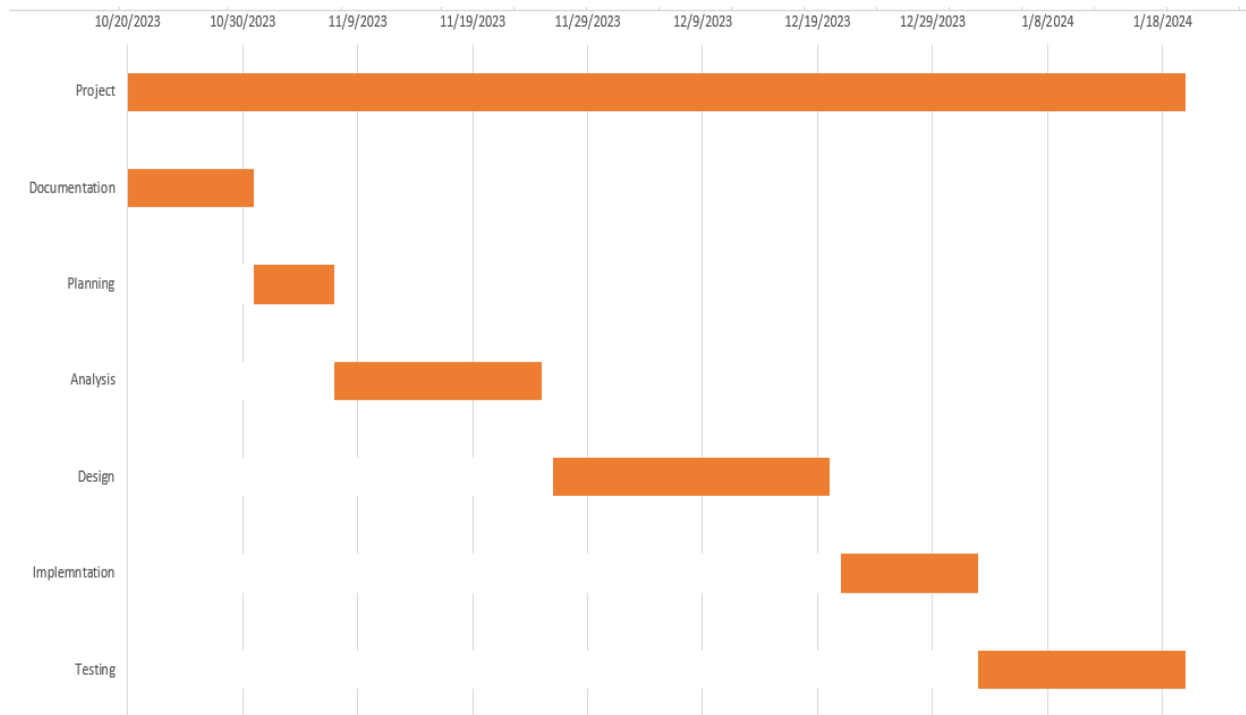


Figure 1.1 project Gantt chart [1]

# CHAPTER 2

## LITERATURE REVIEW

### 2.1 Definition of AI Wave

"AI Wave" is an innovative project leveraging artificial intelligence (AI) models to automate subtitle generation in multiple languages through Word Wave, ensuring enhanced accessibility and user experience. Vision Wave delves into video analytics, addressing tasks like object detection, tracking, instance segmentation, and pose estimation, optimizing precision. Additionally, Wave Researcher facilitates scientific research by utilizing large language models to analyze existing research and generate new insights, streamlining the search process

. In summary, "AI Wave" is a holistic initiative utilizing AI to redefine accessibility, user experience, multimedia content processing, and scientific research facilitation

### 2.2 Advantages of AI Wave

In the ever-evolving technology landscape, AI Wave is emerging as a versatile and invaluable tool for users looking for a wide range of AI features bundled into one easy-to-use platform. This innovative application is designed to enhance user experiences in multiple dimensions, combining cutting-edge capabilities to meet a variety of needs and features including:

1. **Enhanced Accessibility:** Word Wave's automated subtitle generation enhances accessibility to video content, breaking language barriers and catering to diverse audiences globally.
2. **Improved User Experience:** By accurately transcribing spoken content and synchronizing subtitles, Word Wave contributes to an enriched user experience, making multimedia content more engaging and inclusive.
3. **Precise Multimedia Content Processing:** Vision Wave's capabilities in object detection, tracking, instance segmentation, and pose estimation

contribute to the precise processing of multimedia content, ensuring accuracy and reliability.

4. **Efficient Scientific Research:** Wave Researcher accelerates the scientific research process by using AI to analyze existing research and generate new insights. This results in more efficient literature review and knowledge generation.
5. **Time and Resource Optimization:** Across all components, the project optimizes time and resources by automating complex tasks, allowing for increased efficiency and scalability in various domains.

## 2.3 AI Wave Applications

The AI Wave Application has the potential to make a significant impact across various sectors, including healthcare, education, and more. Here's an overview of its potential influence in these areas:

### 2.3.1 AI Wave and Healthcare:

The “AI wave” has huge potential to transform healthcare through AI integration. Vision Wave helps in detecting objects in medical imaging to detect anomalies, and advanced analytics to track patient movement through instance segmentation and pose estimation. The application also enhances the accuracy of diagnosis and patient care. In addition, Wave Researcher's ability to accelerate literature review and idea generation processes can accelerate progress in medical research.

### 2.3.2 Educational Institutions:

The AI Wave aims to significantly transform educational institutions by integrating AI across different dimensions. The Word Wave component can automate transcription services, ensuring accurate translations of educational videos and improving accessibility of content. The Wave Researcher component simplifies literature review and knowledge acquisition, promoting a more efficient, research-oriented learning environment



### 2.3.3 Business and Customer Support:

In business and customer support, AI Wave delivers transformative applications by harnessing the power of artificial intelligence. Word Wave's automated transcription services facilitate seamless communication within organizations, while Vision Wave's object detection and tracking capabilities improve security measures. The project instance segmentation and pose estimation features can be used to analyze customer behavior, providing valuable insights for marketing strategies. Furthermore, Wave Researcher integration accelerates market research and supports data-driven decision making.

## 2.4 Competitors and Differences

There are many intelligence applications available that meet the needs of many individuals. Each application has its own unique features and benefits, and choosing the appropriate option depends on several factors such as the user's need, the artificial intelligence features present in it, and the cost.

We have made an effort to compile a list of some existing apps that can be compared to ours and emphasize how different we are.

### 2.4.1 Translate subtitle: [2]

It is an application that helps in automatic translation of videos, adding annotations, and converting audio into text in several languages of the user's choice. It also works on smartphones running the Android operating system.

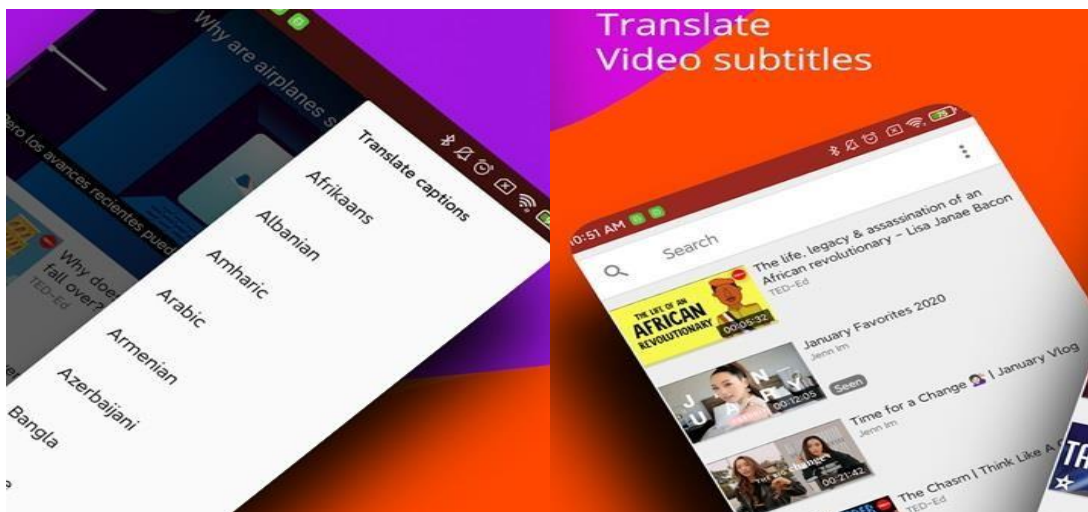


Figure 2.1 Translate subtitle

### **2.4.2 Researcher: [3]**

It is an application that includes thousands of research and studies. It is one of the applications that keeps us informed of new published scientific research and allows the user to choose the research topics that he prefers or for which the user needs to write other research to discover what is new in your field of study.



Figure 2.2 Researcher

### **2.4.3 Clip champ [4]**

An application that translates video clips textually into the desired language. It allows the user to modify the text in the event of errors, whether letters or missing words. It also allows the user to download the subtitle as a file and add it to the video.



Figure 2.3 clipcharm

## 2.4.4 Comparison

Table 2.1 Competitors between applications

Services that provide	Translate subtitle	Researcher	Clip charm	AI Wave
Transcribes spoken video content into a conversation	X	X	X	✓
Translate video into any language	✓	X	✓	✓
Tracking objects in video	X	X	X	✓
Generate a research paper	X	X	X	✓

## CHAPTER 3

# METHODOLOGY

### 3.1 Incremental Methodology definition and concepts

When building an AI Wave application using artificial intelligence, the best methodology to follow is an iterative and incremental approach.

The incremental and iterative approach of the AI Wave Application represents a deliberate and strategic choice that prioritizes user satisfaction, efficient development, and continuous growth. As we embark on this journey, we remain committed to the principles of adaptability and user-centric design, bringing AI-driven innovation to user's one increment at a time and refining it iteratively to meet their evolving needs.

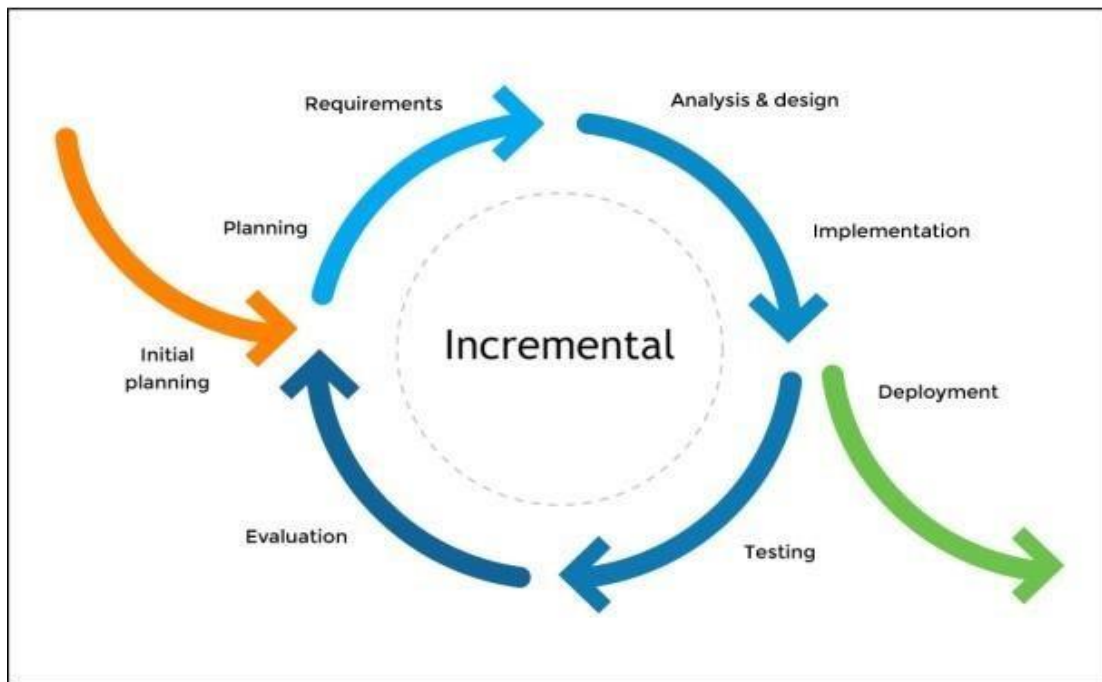


Figure 3.1 Incremental Methodology [5]

## **3.2 Steps of Incremental Methodology**

### **3.2.1 planning**

It is regarded as the stage of making an initial decision at this point since the main lines of the project are established and the project schedule is being studied.

### **3.2.2 Requirements**

In this stage of the incremental model, the needs are identified by the product analysis expertise. The requirement analysis team also comprehends the system functional requirements. This phase is extremely important for the incremental paradigm of software development.

### **3.2.3 Analysis**

All possible requirements of the system to be developed are captured in this phase and documented in a requirement specification document.

### **3.2.4 Design**

The requirement specifications from first phase are studied in this phase and system design is prepared. System Design helps in specifying hardware and system requirements and also helps in defining overall system architecture.

### **3.2.5 Implementation**

With inputs from system design, the system is first developed in small programs called units, which are integrated in the next phase. Each unit is developed and tested for its functionality which is referred to as Unit Testing.

### **3.2.6 Testing**

All the units developed in the implementation phase are integrated into a system after testing of each unit. Post integration, the entire system is tested for any faults and failures.

## **3.3 Benefits and Drawbacks of the Incremental Model**

### **3.3.1 Advantage of Incremental Model**

- Errors are simpler to identify, easier to test and debug, and more adaptable.
- Risk management is straightforward because it was managed during its iteration.
- The client receives crucial functionality earlier.

### **3.3.2 Disadvantage of Incremental Model**

- The need for careful planning.
- The total cost is high, and it's necessary to have well-defined module interfaces.

## **CHAPTER 4**

### **ANALYSIS AND DESIGN**

#### **4.1 Analysis**

The demand determination phase, the first stage of the software project life cycle (SDLC), is known as the analysis phase and is regarded as one of the most crucial phases because all other phases are completely dependent on it. The analysis of the current crisis is what provides the data.

The demands and specifications of the project, the detection of the issue, and the identification of the objectives in order to guarantee the project's effectiveness and satisfy the expectations of the clients.

At this stage, a number of procedures, such as approaching customers, eliminate illogical notions and questionnaires in order to better understand the project.

##### **4.1.1 Requirements Determination [6]**

Since it is the requirements that make up a particular system, there must be some critical requirements at this point.

A feasibility study should be conducted at this stage to determine if the client's requirements are feasible. If they are, we must convert the requirements into a set of specifications and validate those specifications with the customer.

For this study, we used Microsoft Forms to create a questionnaire with 10 questions that was anonymous and available to the public. We received 232 responses, which were distributed as follows:

1. هل تثق في أن تقنيات الذكاء الاصطناعي يمكن أن تساعد في تحسين جودة الحياة وإتاحة فهم أفضل للمحتوى المرئي والبحث العلمي

[More Details](#)



Figure 4.1 questionnaire 1

2. هل ترغب في استخدام تقنيات الذكاء الاصطناعي لإنشاء ترجمات تلقائية لمقاطع الفيديو بلغات متعددة؟

[More Details](#)

[Insights](#)




Figure 4.2 questionnaire 2



3. هل تهتم بتحسين إمكانيات الوصول وتجربة المستخدم من خلال استخدام نظام مدعوم بالذكاء الاصطناعي لتوليد ترجمات متزامنة لمحتوى الفيديو بلغات متعددة؟

[More Details](#)

 Insights


نعم	188
لا	12
ربما	31



Figure 4.3 questionnaire 3

4. هل تعتبر مهمة تعقب الكائنات وتحديد مواقعها في الفيديو مهمة حيوية في تحليل الفيديوهات؟

[More Details](#)

 Insights

نعم	152
لا	23
ربما	56



Figure 4.4 questionnaire 4

5. هل تفضل تقنيات التقاط اللحظات الرئيسية لكائنات محددة في الصورة، مثل المفاصل أو العلامات المميزة؟

[More Details](#)

[Insights](#)

نعم	164
لا	24
ربما	43



Figure 4.5 questionnaire 5

6. هل ترى أن التعرف على مواقع وفئات الكائنات في الصور أو مقاطع الفيديو يمثل مهمة حيوية في تحليل الوسائط المرئية؟

[More Details](#)

[Insights](#)

نعم	170
لا	17
ربما	44



Figure 4.6 questionnaire 6

7. هل تعتقد أن التقنيات التي تمكن من تحديد هويات الكائنات الفردية وتقسيمها عن باقي الصورة تعزز فحص الوسائط بشكل أفضل؟

[More Details](#)

 Insights


نعم	169
لا	16
ربما	46



Figure 4.7 questionnaire 7

8. هل تفضل استخدام برامج الذكاء الاصطناعي لتوليد أبحاث علمية بناءً على مصادر علمية موثوقة؟

[More Details](#)

 Insights

نعم	183
لا	19
ربما	29



Figure 4.8 questionnaire 8

9. هل تعتقد أن استخدام نماذج لغوية كبيرة لتحليل الأبحاث الحالية وتوليد رؤى وأوراق علمية جديدة يسهل ويسرع عملية البحث العلمي؟

[More Details](#)

[Insights](#)

نعم	188
لا	9
ربما	34

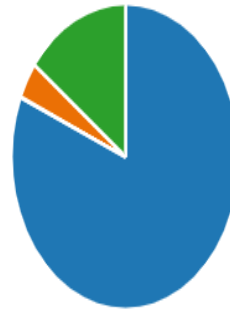


Figure 4.9 questionnaire 9

10. هل ترى أن تحليل الأبحاث العلمية بواسطة برمجيات الذكاء الاصطناعي يمكن أن يساعد في توفير رؤى علمية جديدة بشكل فعال؟

[More Details](#)

[Insights](#)

نعم	178
لا	21
ربما	32



Figure 4.10 questionnaire 10

The aim of the questionnaire was to obtain the opinions of a group of people about the wave of artificial intelligence with customized requirements.

Most answers indicate that our idea was needed.

Then we found that there is a scarcity of features in some artificial intelligence applications

Therefore, we created a prototype of the application based on the requirements.

### **4.1.2 User Requirements**

Here we w explain what the user can do:

The user must create a new user account when he uses the application for the first time and provide his information (email, password, full name, and necessary information), after which he can log in and access the features available in the application and obtain the service that the user needs.

### **4.1.3 System's Requirements**

#### **4.1.3.1 Functional Requirements**

##### **1. Word Wave - Automated Subtitle Generation:**

The system should transcribe spoken content in video clips accurately.

The application must support multiple languages for subtitle generation.

Users should have the option to customize and edit generated subtitles.

Subtitles must be synchronized with the corresponding spoken content in the video.

##### **2. Vision Wave - Object Detection:**

- Bounding Box Output:

The system should identify and label objects in images or videos.

Output should include bounding boxes enclosing objects with class labels and confidence scores.

- **Object Tracking:**

The application must maintain unique IDs for objects across video frames.

Object tracking should accurately identify the location and class of objects as the video progresses.

- **Instance Segmentation:**

The system should identify individual objects in images.

Output must include masks or contours outlining each object, along with class labels and confidence scores.

- **Pose Estimation:**

The application should identify specific points (key points) in an image.

Output should provide 2D [x, y] or 3D [x, y, visible] coordinates representing the location of key points.

### **3. Wave Researcher - AI-Generated Scientific Research:**

The system must analyze existing scientific research using large language models (LLM). It should generate new insights and scientific papers based on the analysis. Users should be able to specify research topics and preferences for generated content. The application must facilitate a quick and efficient search process for relevant scientific information.

#### **4.1.3.2 Non-Functional Requirements [7]**

- **Performance:**

Subtitle generation should occur in real-time for a seamless user experience.

Object detection and tracking should achieve low latency in processing video frames.

AI-generated scientific research should be produced within acceptable time frames.

- **Scalability:**

The system should scale to handle a large number of video clips for subtitle generation.

Object detection and tracking should scale to process videos of varying lengths and complexities.

The AI Researcher should efficiently analyze and generate insights for diverse research topics.

- **Security:**

The application must ensure secure storage and handling of user-uploaded video content.

Access to AI-generated scientific research should be restricted to authorized users.

- **Usability:**

The user interface for subtitle customization should be intuitive and user friendly.

AI-generated scientific research should be presented in a clear and comprehensible format.

- **Reliability:**

The system should provide reliable and accurate results for object detection, tracking, and instance segmentation.

AI-generated scientific research should be credible and based on reputable sources.

- **Compatibility:**

The application should be compatible with common video formats for subtitle generation.

AI-generated research should be accessible across various devices and platforms.

- **Privacy:**

The system should prioritize user privacy by anonymizing and securely handling any personal information.

AI-generated scientific research should not disclose sensitive user data.

## 4.2 Design [8]

The first stage of the software design life cycle, or SDLC, is the process of converting user requirements into a simple arrangement that programmers can use in their code and implementation.

Therefore, an SRS (software requirements specification) document is made to analyze the user requirements, even though more specific requirements are required for coding and execution.

### 4.2.1 Logical Design

Logical design is a conceptual, abstract design. You are not dealing with actual implementation specifics at this time; instead, you are describing the sorts of information that you want.

#### 4.2.1.1 Use Case Diagram [9]

It is a graphical display of all users' interactions with the application, where the user typically appears as a stick shape, use cases are shown as ovals.

- AI Wave use case scenario:

After the login process, the person can make modifications to his personal file, such as changing his personal photo, password, and name. He can also view the existing services and choose the service that suits him.

The role of the administrator comes after the login process, by viewing all users within the application and the ability to remove any user.



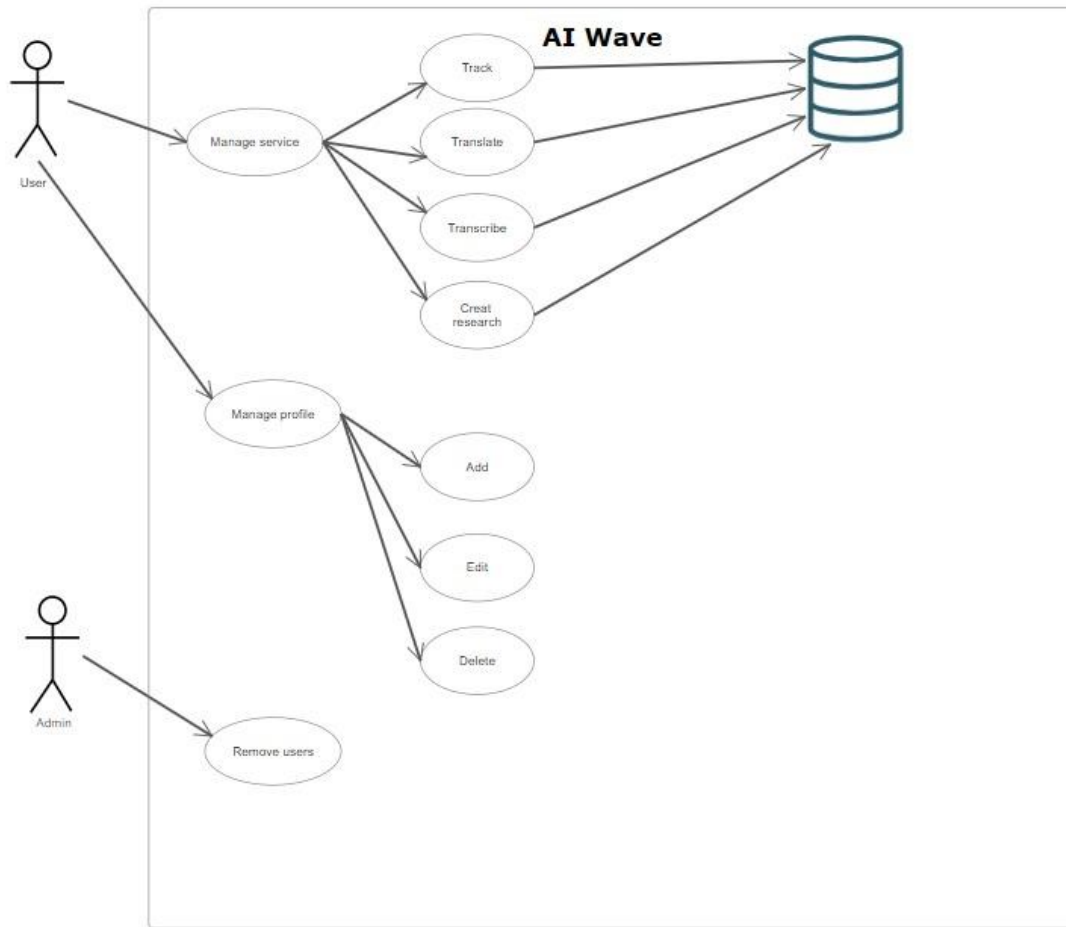


Figure 4.11 use case diagram

#### 4.2.1.2 Sequence Diagram [9]

In UML, sequence diagrams are mainly used to describe interactions between actors and objects in the application, as well as interactions between objects themselves.

- **User - Sign up - Login scenario:**

The user, can use the application by filling in the login credentials on the login screen the app then it verifies the existence of the account in the database. If the user does not have an account, they must create an account by filling in the

personal information such as user e-mail, password, name, then a message is sent to the database to ensure that there is no existing account with the same e-mail, if the information is correct, then the data is saved in the database, then a confirmation email is sent to the user. The user then clicks on the verification link sent to their email to unlock their account and begin using the app.

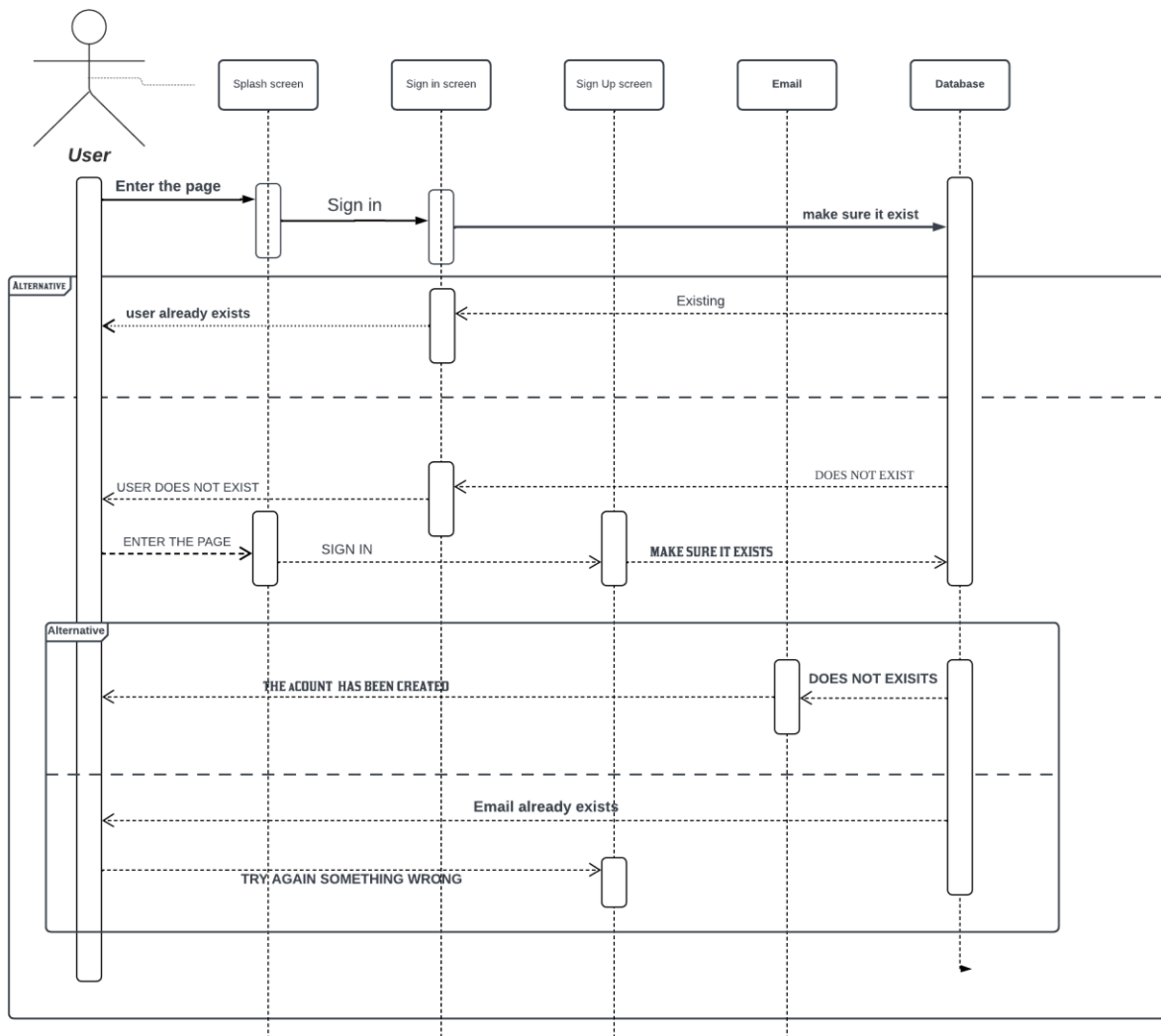


Figure 4.12 User - Sign up - Login scenario

- **Vision wave scenario:**

After the login process, the home page displays the services within the application and the user chooses the service he wants (Vision Wave, Word Wave, Wave Researcher).

If a vision is chosen, the user will go to its page, then the user will insert the video to be processed, then choose the operation he will perform on the video (segment, detect, pose), then the processing will be performed on it and stored in the database. After that, he will display the result to the user.

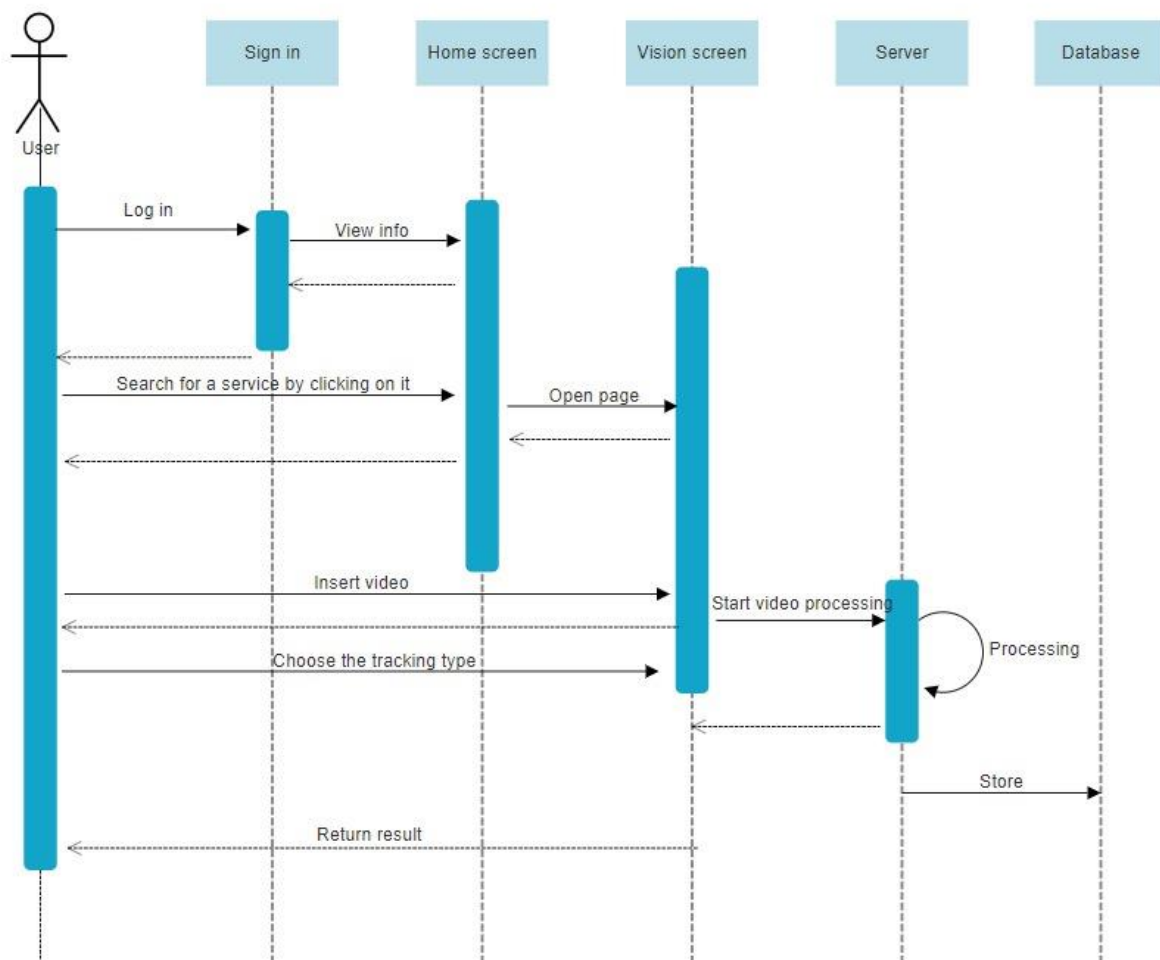


Figure 4.13 vision wave scenario

- **Word wave scenario :**

After the login process, the home page displays the services within the application and the user chooses the service he wants, if the word wave is chosen, the user will go to it and then insert the video he wants to translate. After that, this video will be processed and stored in the database and then displayed to the user after processing it.

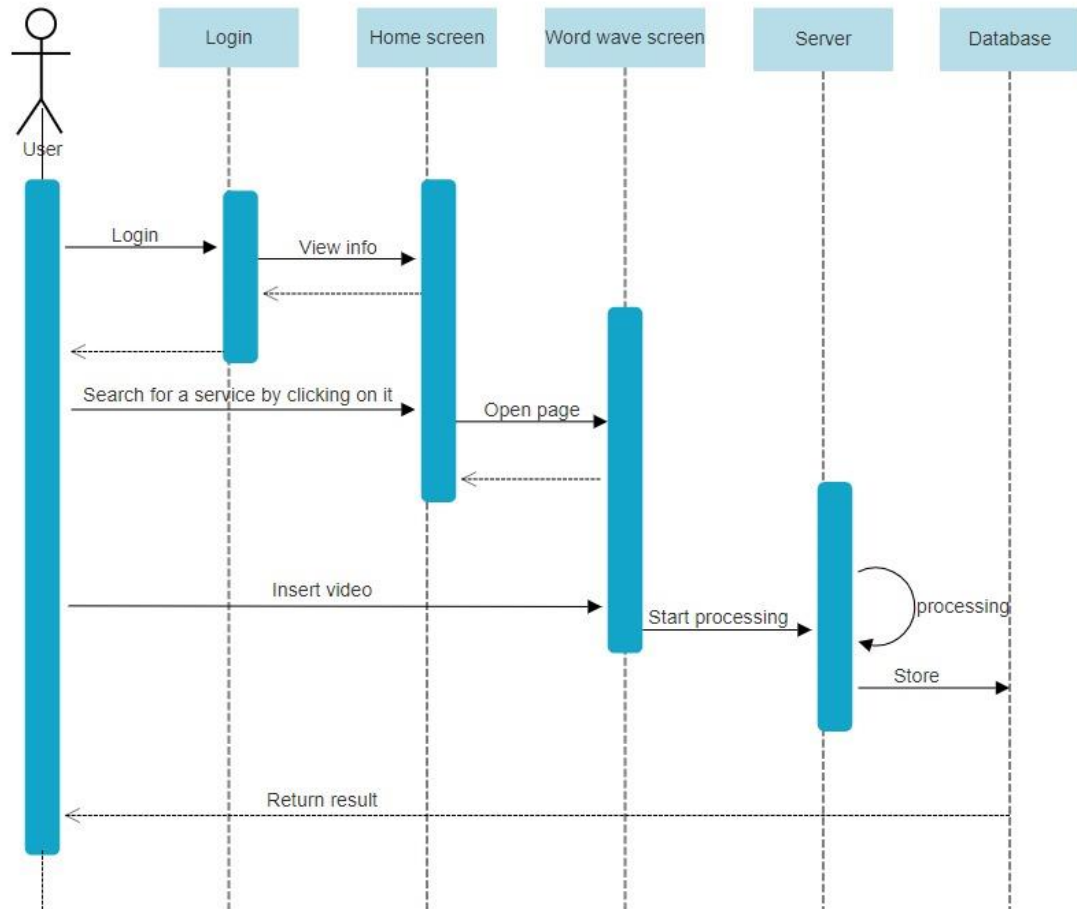


Figure 4.14 word wave scenario

- **Researcher wave scenario :**

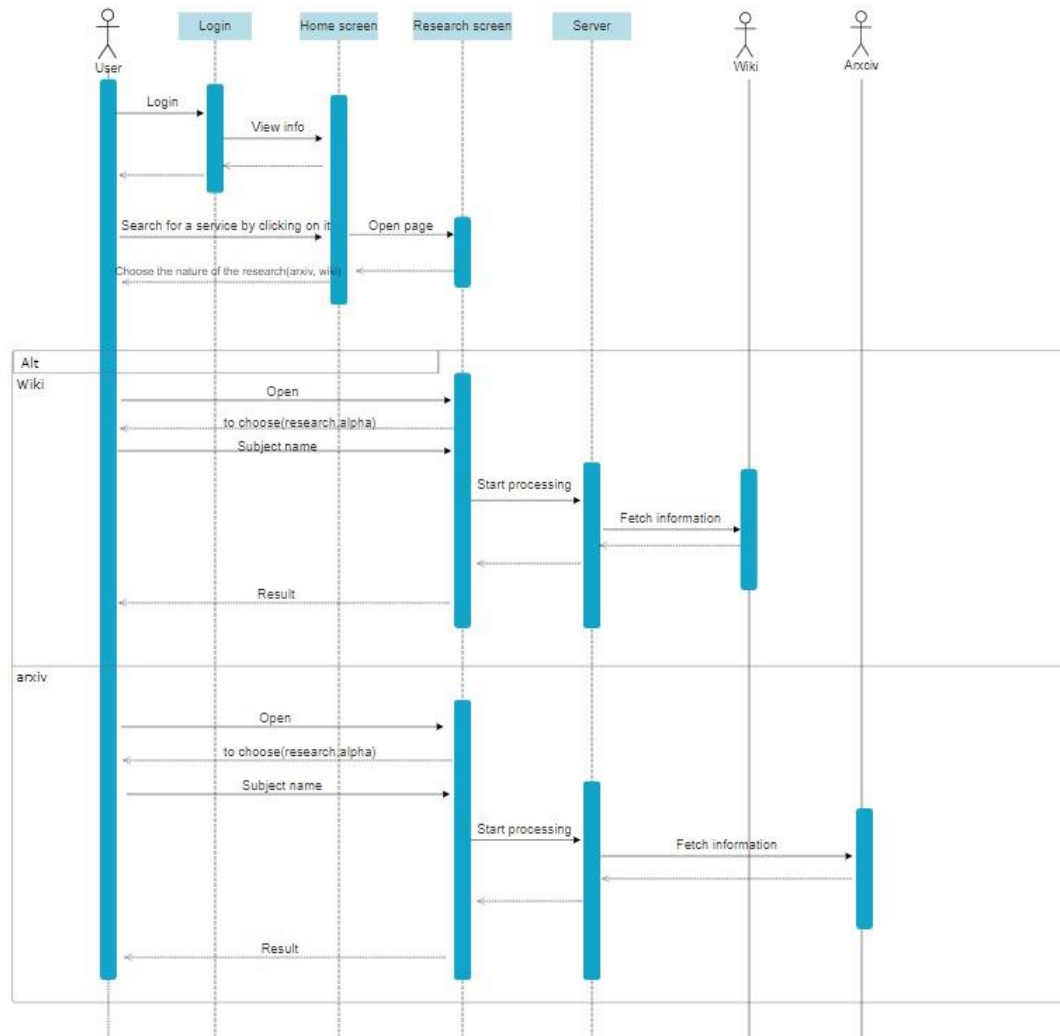


Figure 4.15 Researcher wave scenario

- **modify user profile information scenario:**

After logging in, the user has the option to enter his profile page and view his information. The information they provide to the app, and from there they can edit their information adjustments will then be made it will be stored in the database.

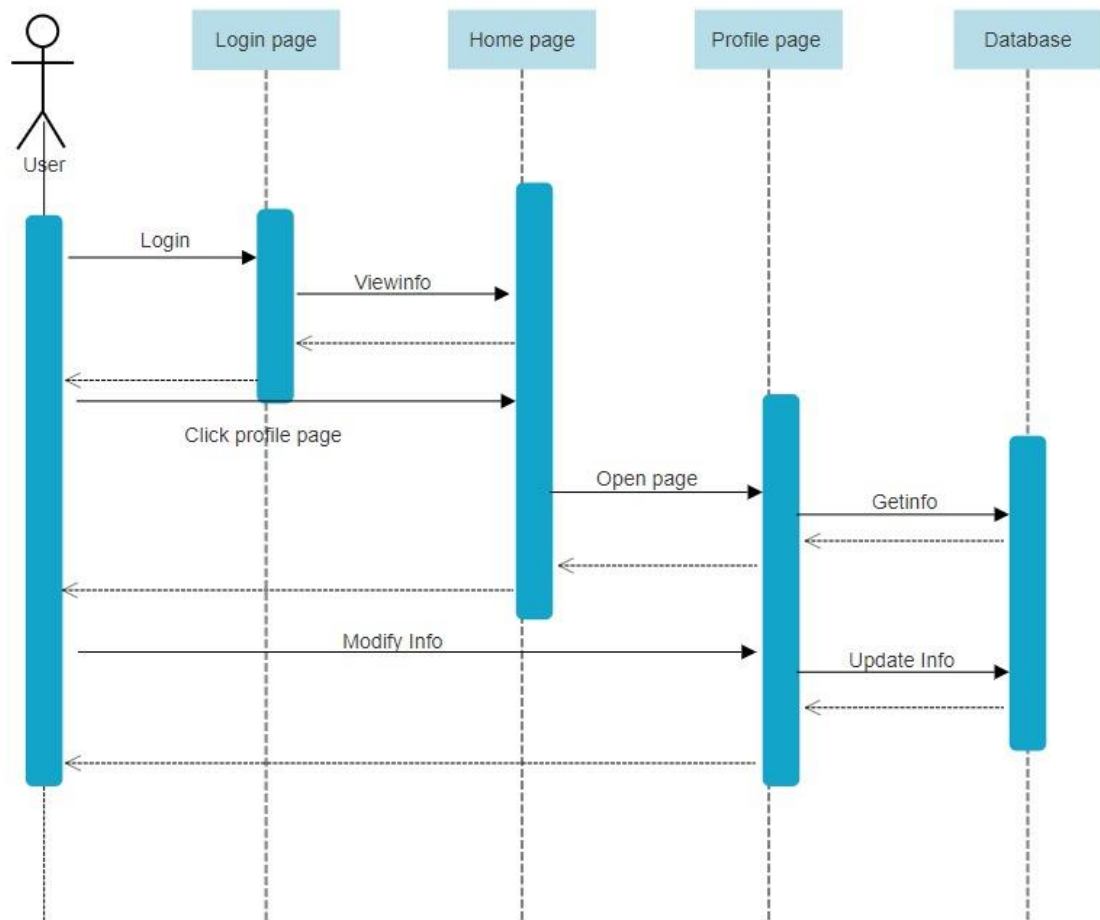


Figure 4.16 modify user profile information scenario

### 4.2.1.3 Data Flow Diagram

Information flow for a certain process or system is routed by a (DFD), where system components are symbolically represented.

#### 4.2.1.3.1 Context Diagram [10]

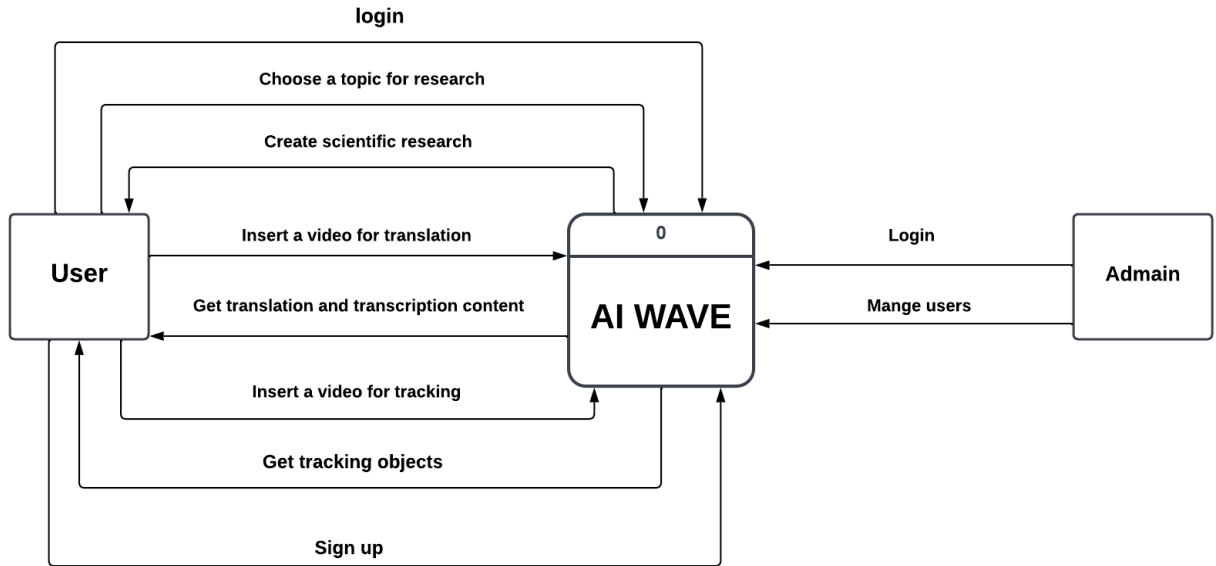


Figure 4.17 context diagram

#### 4.2.1.3.2 Level 1 Data Flow Diagram

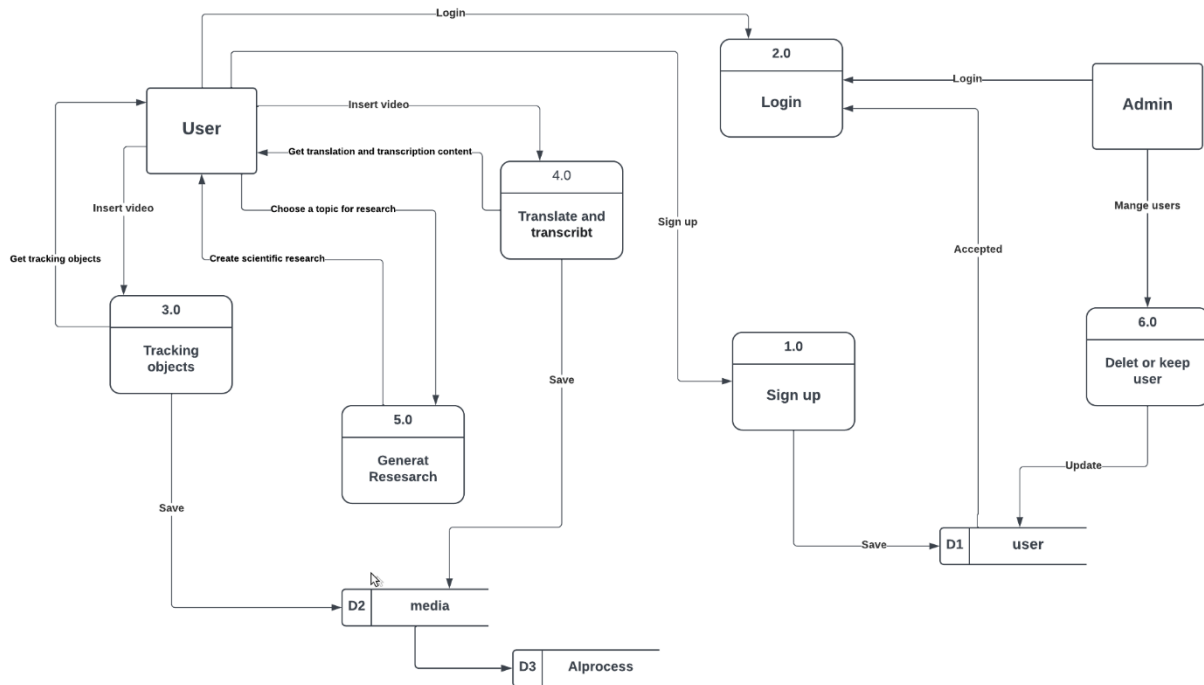


Figure 4.18 Level 1 Data Flow Diagram

### 2.4.1.3.3 Entity Relationship Diagram

It is a data modelling tool that uses a high-level conceptual design to achieve the goal of describing data or depicting it in an abstract way and describing the relationship of entities with each other and also helps reduce errors and redundancy in the database. Among the main concepts in this model are: entity, attribute and relationship.

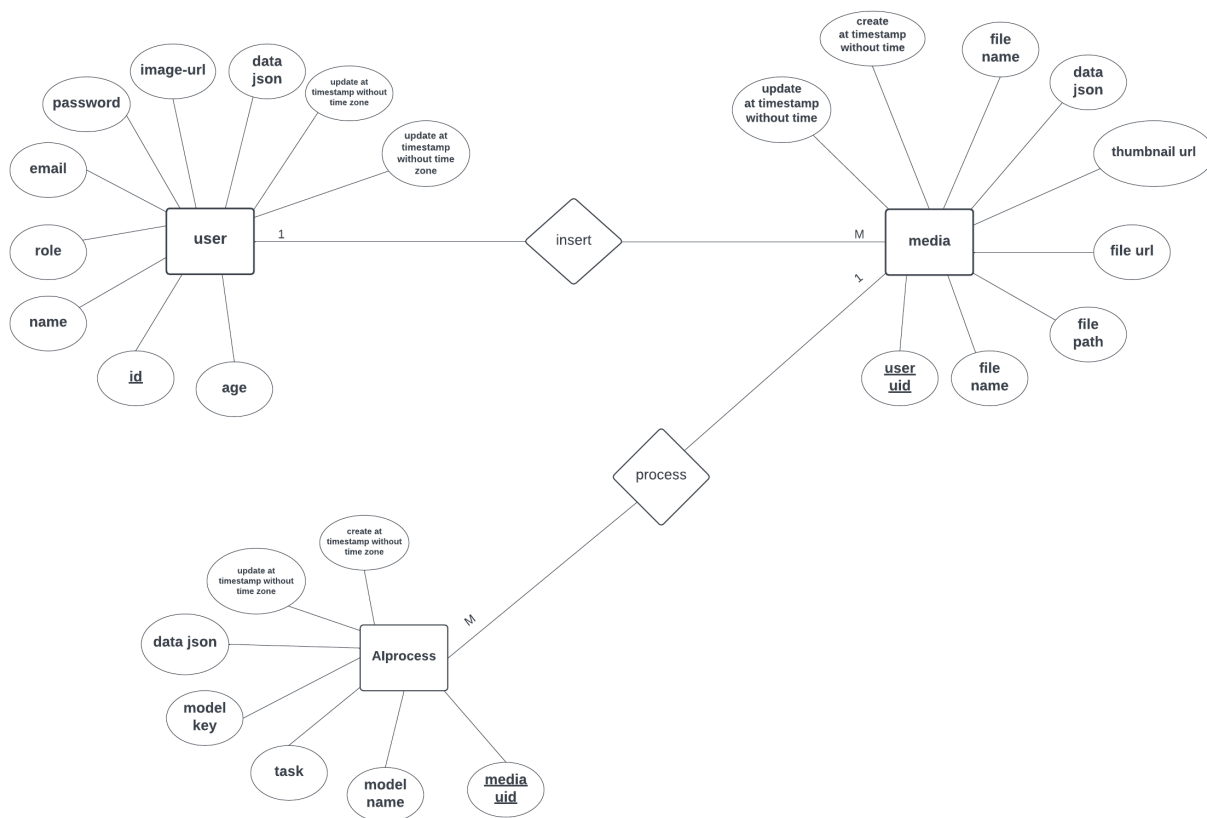


Figure 4.19 Entity Relationship Diagram

### 4.2.2 Physical Design

On the other hand, physical design deals with translating logical design into a more technical specification for system development. While building the system's physical components, all the diagrams made during the logical design were transformed into designs for structured systems.



During physical design, the researcher selected the hardware platform, operating system, and network environment, as well as the programming language and database system that will be used.

Table 4.1 Software Specifications

<b>Purpose</b>	<b>Requirements</b>
Front-End Back-end	Dart, Framework (Flutter) MySQL , Python
Write code environment	Visual studio code.
Operating System	Any operating system that can be connected to the internet and open browser
Hardware	Computer, laptop, phone, and any compatible device that connect to the internet and open browser

## **CHABTER 5**

### **FINDING**

## **5.1 Introduction**

We have a set of tools and software to complete the project in addition to a programming language and framework, and we will mention them as follows:

## **5.2 Languages and Platforms**

In the following sections, we will cover the programming languages utilized in the project as well as the applications that assisted us in its completion.

### **5.2.1 Programming Languages**

#### **5.2.1.1 Dart [11]**

Dart is a programming language designed to develop web applications, Android, and iOS applications, developed by Google, which targets web and mobile application developers. One of the goals of the language is to work on all advanced web browsers and mobile devices all the way to web servers.

This language is easy to learn, especially for developers who have a prior knowledge of one of the programming languages, as it has a syntax close to the syntax of other languages.

#### **5.2.1.2 Flutter [12]**

Flutter is a framework its applications are written using Dart programming language, and it is an open-source software development toolkit developed by Google for building user interfaces for Android, iOS, Windows, and web applications.

#### **5.2.1.3 SQL**

SQL, or Structured Query Language, is a programming language used to manage and manipulate data in a database. SQL is the standard language for working with relational databases, which are organized into tables and columns of data. SQL allows users to create, modify, and query databases, as well as to control access to the data and maintain the integrity and security of the database.

#### **5.2.1.4 Python**

It is a high-level, easy-to-learn, extensible source programming language, based on the educational programming (OOP) approach. Python is an interpreted, versatile language that is widely used in many fields, such as building innovative programs using technical interfaces and in web applications. It can be used as a scripting language to control the performance of many programs such as Blender. In general, small Python scripts can be used for beginners, and for creating large objects at the same time. Most of the time, we advise a programming beginner in the field to learn this basic language, one of the fastest programming languages to learn.

### **5.2.2 Compiler and Editor**

#### **5.2.2.1 Visual Studio Code**

Visual Studio Code is a free and open-source code editor developed by Microsoft. It is a cross-platform program that runs on Windows, MacOS, and Linux, and it is designed to be a lightweight and fast code editor for writing, debugging, and testing code. Visual Studio Code supports a wide range of programming languages, and it includes a number of features and tools that make it easier to write and work with code, such as syntax highlighting, code completion, and debugging tools. It also includes built-in support for version control systems like Git, and it can be easily extended with additional plugins and extensions. Visual Studio Code is a popular choice among developers because of its speed, simplicity, and flexibility.

#### **5.2.2.2 PyCharm**

PyCharm is an integrated development environment (IDE) used for programming in Python. It provides code analysis, a graphical debugger, an integrated unit tester, integration with version control systems, and supports web development with Django. PyCharm is developed by the Czech company JetBrains.

It is cross-platform, working on Microsoft Windows, macOS and Linux. PyCharm has a Professional Edition, released under a proprietary license and a Community Edition released under the Apache License. PyCharm Community Edition is less extensive than the Professional Edition

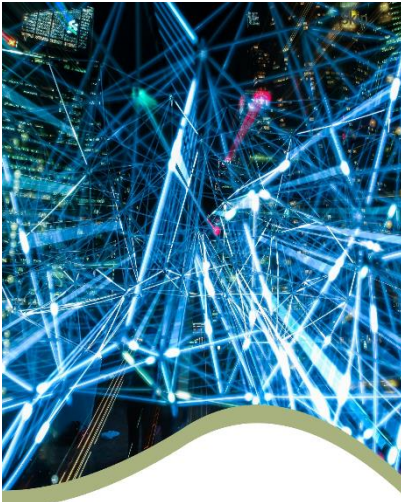
## 5.3 Project Interfaces and their Description

### 5.3.1 Logo



Figure 5.1 logo

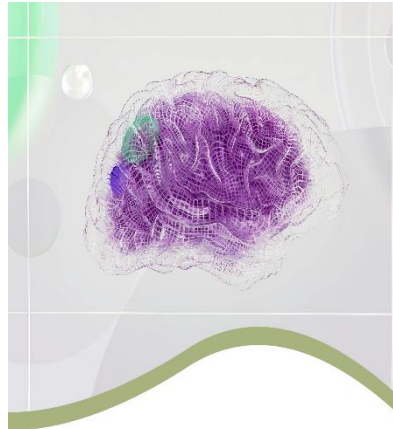
### 5.3.2 Introduction Page



### Unleashing the Power of AI for Seamless Experiences

Welcome aboard AI Wave, where innovation meets intelligence! Let's embark on this transformative journey, exploring the boundless possibilities that our projects unfold.

[Next](#)



### Vision Wave - Illuminating Perspectives

Embark on a visual odyssey with Vision Wave, where AI takes center stage in reshaping how we perceive images and videos. From precise object detection that identifies and labels elements, to the intricacies of object tracking maintaining a dynamic understanding of the visual context — Vision Wave is rewriting the rules.

[Get Started](#)



### Word Wave - Revolutionizing Subtitles

Dive into Word Wave, An AI-powered system that seamlessly transcribes spoken content in videos, creating synchronized subtitles that transcend accessibility barriers.

[Next](#)



Figure 5.2 Introduction Page

**Description:** It gives an overview of the application and the services it provides.

### 5.3.3 Sign in Page



**AIWave**

Sign in to your account

Email \*



Email

Password \*



Password




Sign in

Don't have an account? [Sign up](#)

Figure 5.3 sign in page

**Description:** On this page, the user can enter his data to access his personal file and enter the application. The required email and password that he created on the registration page are entered.


### 5.3.4 Sign-Up Page




**AIWave**


Sign up to your account

Email \*

 Email

Password \*

\*\*\* Password 

\*\*\* Password 

☐ I accept all terms and conditions and privacy policy

Sign up

Do you have an account? [Sign in](#)

Figure 5.4 sign-up page

**Description:** On this page, the user must enter data to create an account in AI-Wave, so that each person fills in the required personal information (username, email, password ).

### 5.3.5 Home Page

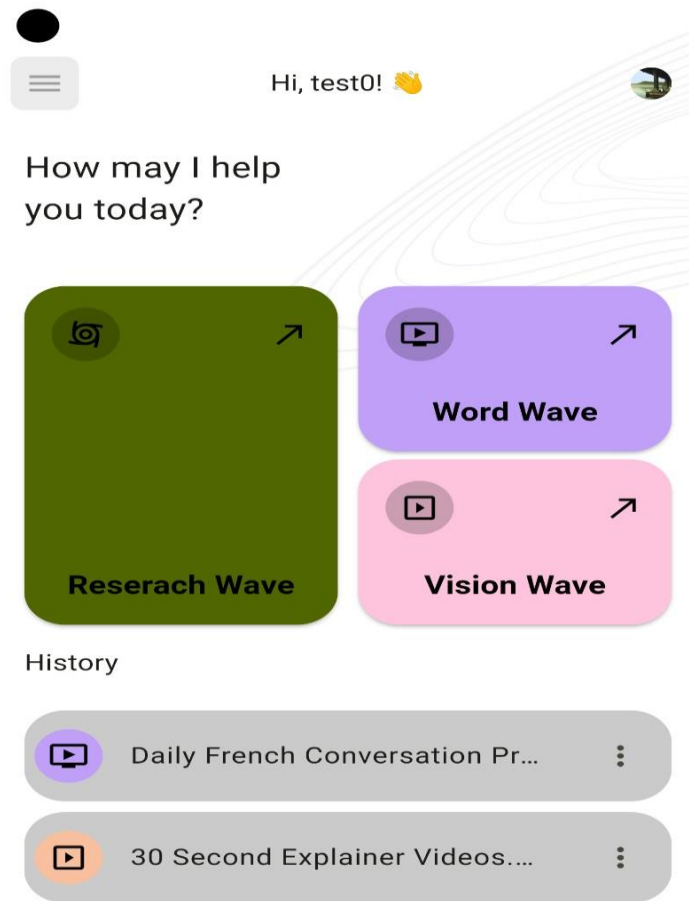


Figure 5.5 home page

**Description:** This page contains all the services and categories provided to the user. When choosing a service, it opens its page and displays the categories available within it.

### 5.3.6 Research wave page



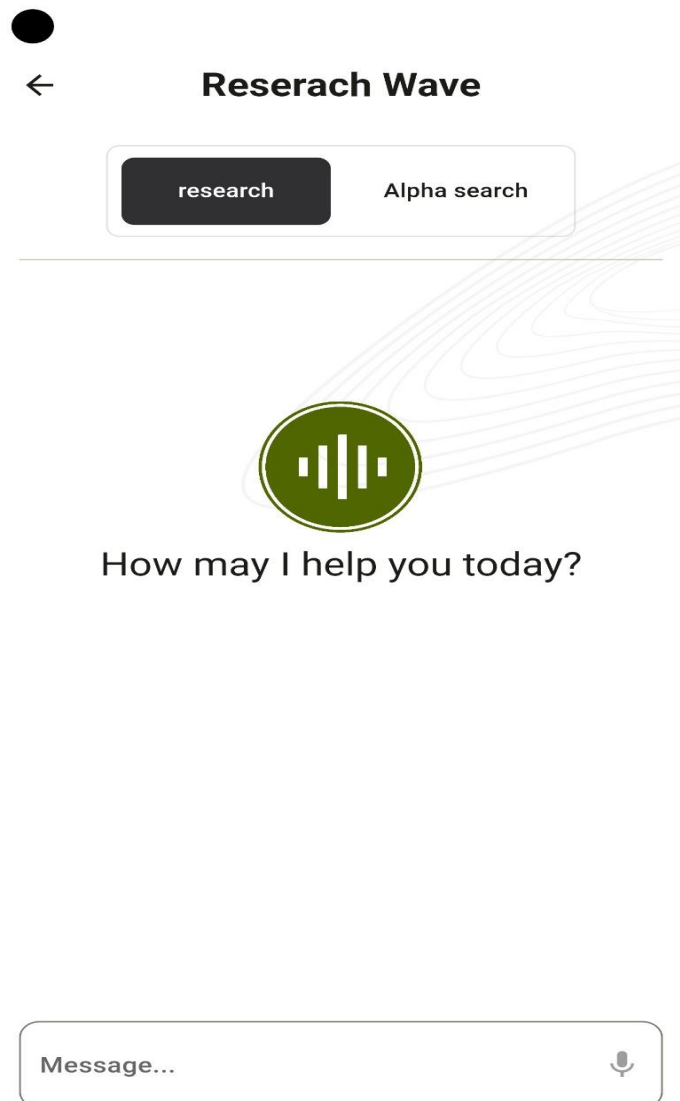


Figure 5.6 Research wave page

**Description:** Wave Researcher is an artificial intelligence program designed to create scientific research based on reliable scientific sources. The goal is to facilitate and speed up the search process, and there are two methods for it. The first is the research, which performs a search in the usual and brief form. The second is the Alpha search, which performs a longer search and allows the user to download it as a file. The working principle of both is report in apa format and markdown syntax.

### 5.3.7 Vision wave page

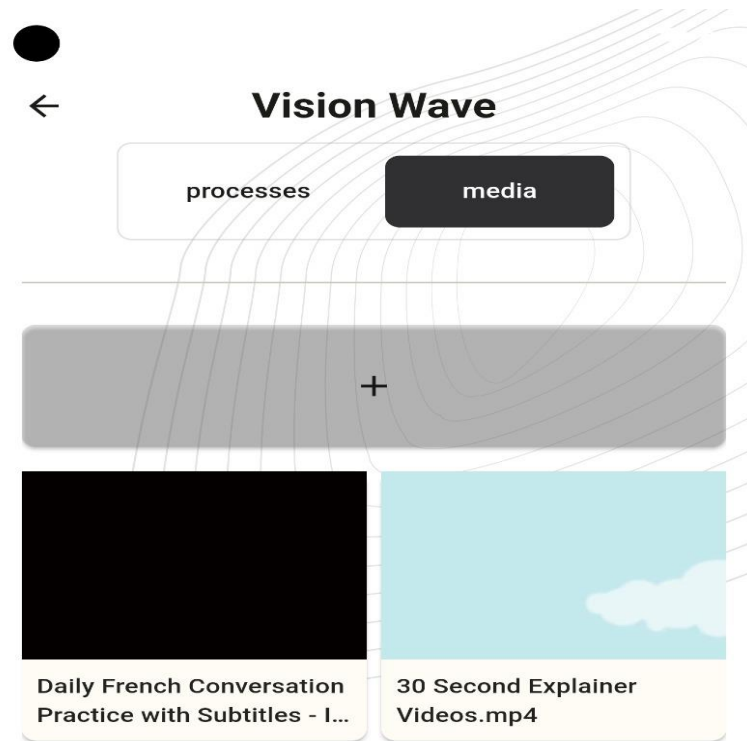


Figure 5.7 vision wave page

**Description:** Object detection is a task that involves determining the location and class of objects in an image or video and then tracking those objects after which they are segmented from the rest of the image. The output of an instance segmentation model is a set of masks or outlines that define each object in the image, as well as

class labels. It provides confidence scores for each object, and also identifies the location of specific points in the image, which are commonly referred to as key points.

### 5.3.8 Word wave page

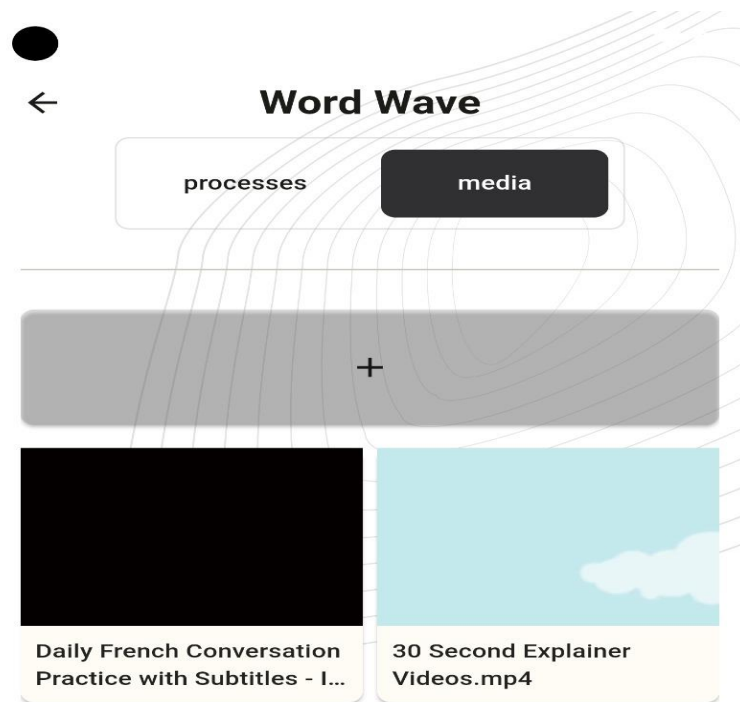


Figure 5.8 word wave page

**Description:** Word Wave is a project focused on leveraging artificial intelligence, specifically the “Ai Model” to automate the subtitle generation process for videos in many languages. The goal is to develop an AI-powered system that can accurately transcribe spoken content in videos and create synchronized subtitles to enhance accessibility and user experience.

### 5.3.9 Profile screen

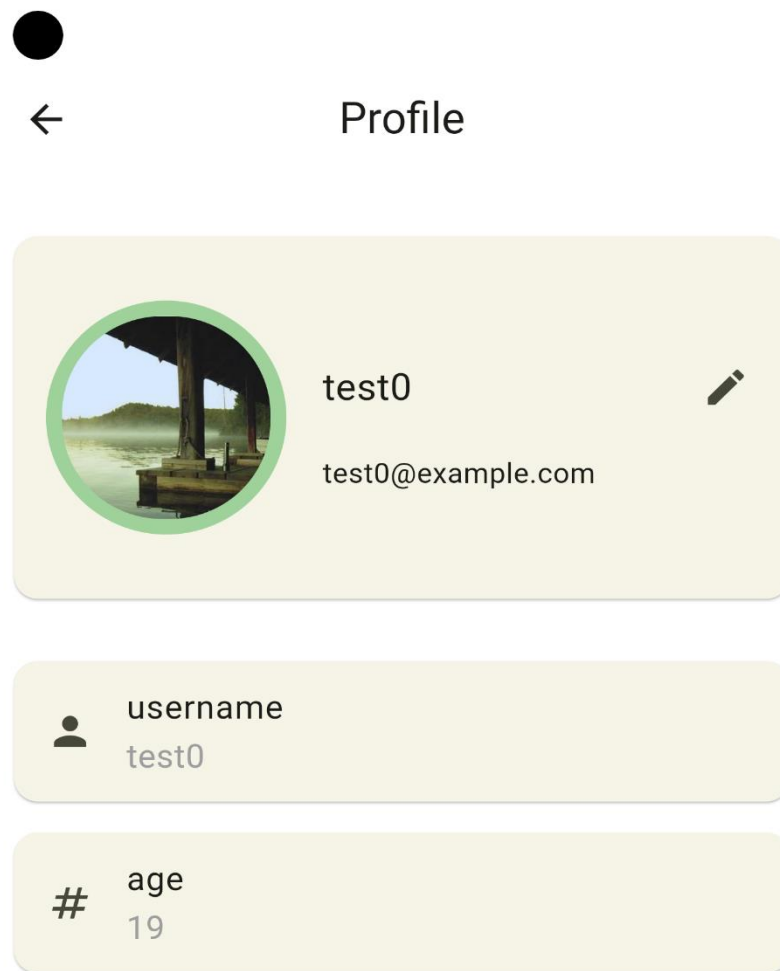


Figure 5.9 profile Page

**Description:** It displays the user's page and can be modified by him

### 5.3.10 Setting Screen

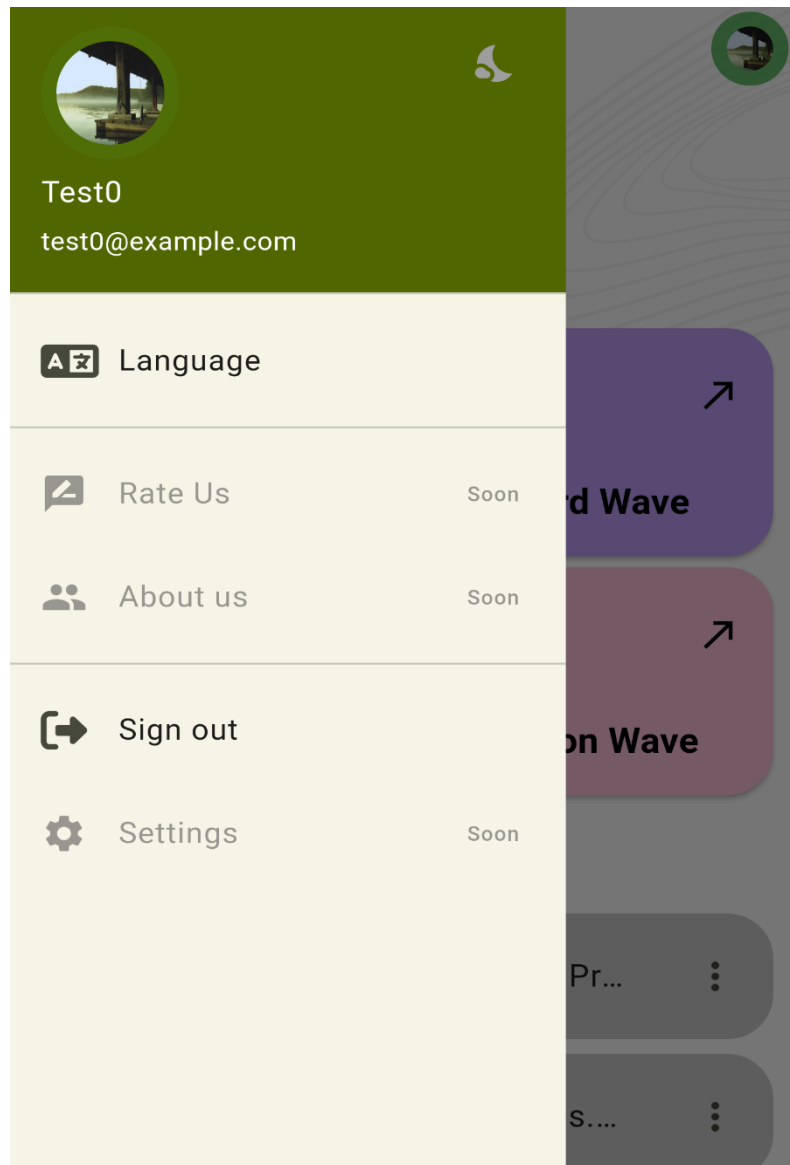


Figure 5.10 Setting Screen

**Description:** It allows the user to choose the application language he wants and log out.

# CHAPTER 6

## OBSERVE AND EVALUATE

### 6.1 Introduction

From the beginning of the application's preparation through its completion, we will discuss testing and assessing it in this chapter.

We will start with the many sorts of testing that may be done during the project, and then go on to the different degrees of testing that can be done.

### 6.2 Testing Levels and Types [13]

We'll go through the many stages of testing we went through over the project's implementation, as well as the several types of testing we employed.

#### 6.2.1 Levels of Testing



Figure 6.1 Levels of Testing

##### 6.2.1.1 Unit Test

It is the initial level of testing, and it is for individual system components. We used it during all development phases on all application components, and it is done by the developers.

### 6.2.1.2 Integration Test

We accomplished it gradually at application units, checking for integration components between two or more units.

### 6.2.1.3 System Test

After completing the development process, we conducted it on the complete system to guarantee that all components and units of the system are functioning properly and without faults or mistakes.

### 6.2.1.4 Acceptance Test

It is the final stage of testing, and we used it to guarantee that we met all the criteria without any flaws or errors.

## 6.2.2 Types of Testing

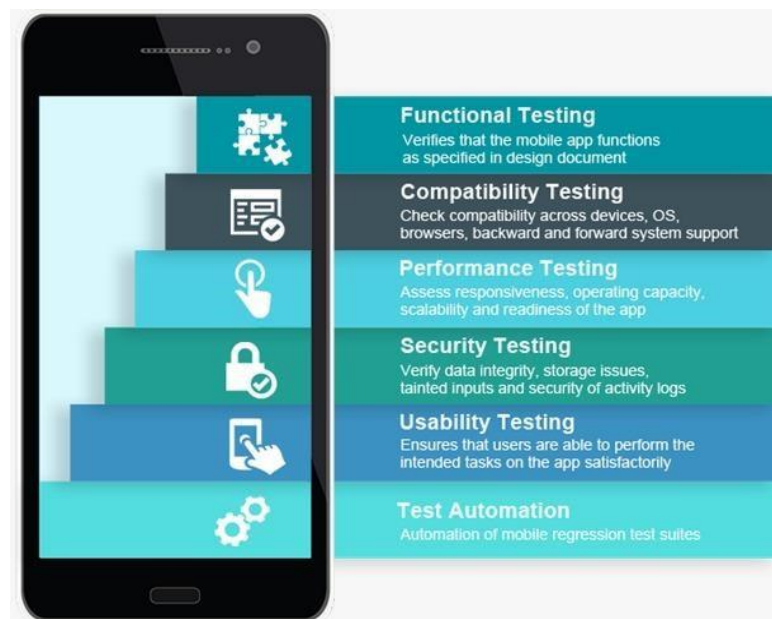


Figure 6.2 Types of Testing

### **6.2.2.1 Functional Testing**

Testing for all functions that exist in the application and ensure that all functions are working efficiently and effectively.

### **6.2.2.2 Compatibility Testing**

As needed, evaluate the application on various devices and operating systems; it should perform similarly on all devices and operating systems.

### **6.2.2.3 Performance Testing**

This testing was done to guarantee the system's reaction time to the user's interaction was fast enough, thus we established a restriction for the highest response time for each interaction to be no more than 4 seconds at a time.

### **6.2.2.4 Security Testing**

This testing is to guarantee that any data entering the system is secure and free of assaults; we believe we have achieved this with the application since we used Google servers, which are secure and trusted across the world.

### **6.2.2.5 Usability Testing**

It is to verify that the system is straightforward and easy to use for the intended audience; we can validate this through the review process, which we shall discuss later.

### **6.2.2.6 Test Automation**

It refers to the process of automating repetitious tests to evaluate quickly and efficiently, although we did not need to use it during the project.



## 6.3 Evaluation

To conduct the evaluation process, we first explained the general concept of the application to a group of people, then we gave them the opportunity to try the application, and after they completed the experiment, we asked them to fill out a questionnaire and based on the findings displayed below, the majority of people were pleased with the final product, and all feedback was taken into account for our list of future tasks.

## CHAPTER 7

### CONCLUSION

#### 7.1 Conclusion

In conclusion, the "AI Wave" project encapsulates the essence of cutting-edge artificial intelligence applications, addressing diverse needs through its multifaceted components. Word Wave revolutionizes video accessibility by seamlessly transcribing spoken content and generating synchronized subtitles in multiple languages, enriching the user experience. Vision Wave, with its robust capabilities in object detection, tracking, instance segmentation, and pose estimation, not only enhances visual understanding but also charts new territories in video analytics. Meanwhile, Wave Researcher emerges as a beacon for scientific inquiry, leveraging large language models to swiftly analyze existing research and generate novel insights. As a unified ecosystem, AI Wave not only exemplifies the power of AI models but also signifies a transformative leap toward a future where technology converges to simplify tasks and propel innovation.

#### 7.2 Limitations

While the Wave AI project demonstrates remarkable capabilities, it is necessary to acknowledge some limitations inherent in its design and implementation.

Although we put a lot of time and effort into refining and developing our project, human work is always limited by some hurdles, as is the case in this case. What our team encountered is listed below:

- Although we initially thought the time frame was realistic, we quickly learned that 3 months was not enough for a team of five people with no previous experience to create a full application.

- In the Word Wave component, the accuracy of subtitle generation may be influenced by factors such as complex accents, background noise, and varying audio qualities, potentially leading to occasional transcription errors.
- Vision Wave, although proficient in object detection, tracking, instance segmentation, and pose estimation, may face challenges in scenarios with low light conditions, occlusions, or highly dynamic environments, impacting the precision of its outputs.
- The effectiveness of Wave Researcher relies heavily on the comprehensiveness of the underlying scientific sources, and any biases present in these sources may be reflected in the generated research insights. It's crucial for users and stakeholders to be cognizant of these limitations to ensure informed expectations and foster continuous improvement in the AI Wave project.

## 7.3 Future Works

Despite finishing a sizable portion of the original project, we were forced to postpone some aspects because of a number of issues.

Here is a list of the characteristics of our expansive project vision:

- **Enhanced Multimodal Integration:**

Explore further integration of language and vision models to enable comprehensive analysis of audio-visual content. This could involve combining Word Wave and Vision Wave functionalities to offer users a more immersive and contextually rich experience.

- **Chatbot Eva:**

In the future, a chatbot can be added for general chat with an artificial intelligence robot called “Eva” about various topics and general questions, so that it helps people accomplish tasks and suggests ways to facilitate the completion of these tasks with less time and effort.

- **Chatbot to chat with files:**

A special chat can be added to chat with the files that are attached by the user in the form of PDF or Word files, and questions are asked within the framework of this file and answered by the chat bot, and the feature of summarizing this file can also be included by the artificial intelligence robot.

- **AIWave Documentation :**

This task involves creating comprehensive documentation for the AIWave project. The documentation should cover various aspects of the project, including installation and setup instructions, usage guidelines, API documentation (if applicable), code structure, and any other relevant information.

- **SQL-Wave**

SQLWave is an AI-powered chatbot designed to facilitate seamless interactions with SQL databases. This chatbot empowers users to effortlessly communicate with their databases, retrieve, update, and manipulate data, as well as seek insights from their structured information.

SQLWave can assist users with various database-related tasks, such as querying, updating, and analyzing data. It leverages the power of SQL (Structured Query Language) to provide users with the ability to manage their data efficiently. Whether you need to retrieve specific information, modify database records, or gain valuable insights from your data, SQLWave is your reliable and intelligent companion in the world of SQL databases.

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