**Chapter 2**

**Software Requirement Specification**

**2.1 Introduction**

* + 1. **Purpose**

The purpose of this Software Requirement Specification (SRS) document is to provide a comprehensive understanding of the Sign-Language Transcription application. It outlines the functional and non-functional requirements, design constraints, and interfaces necessary for the successful development and implementation of the application.

**Intended Audience**

The intended audience for this Software Requirement Specification includes, but is not limited to:

**Development Team:** Software engineers, programmers, and designers who will be involved in the development and implementation of the system.

**Testing Team:** Quality assurance professionals responsible for validating and verifying that the system meets the specified requirements.

**Project Managers:** Individuals overseeing the planning, execution, and monitoring of the project.

**Stakeholders:** Investors, sponsors, and any individuals or organizations with a vested interest in the successful development and deployment of the application.

**Documentation Team:** Writers responsible for creating user manuals, technical documentation, and other related materials.

**End Users:** Individuals who will interact with and benefit from the system, including drivers and administrators.

By addressing the needs of this diverse audience, this SRS aims to ensure a common understanding of the project's objectives, functionalities, and constraints, fostering effective collaboration and successful project outcomes.

* + 1. **Scope**

The scope of this document encompasses the entire software development life cycle, from the conceptualization of the Sign-Language Transcription application to its deployment and maintenance. It serves as a guide for developers, designers, and stakeholders involved in the project.

* + 1. **Definitions, acronyms, and abbreviations**
* GUI – Graphical user interface
* DB – Database
* SRS – Software requirement specification
* AI – Artificial Intelligence
* ASL – American Sign-Language
  + 1. **References**

/TODO:

* + 1. **Overview**

This section provides an overview of the entire Software Requirement Specification, highlighting key chapters and their respective purposes. It aims to offer a quick reference guide for readers navigating through the document. //

* 1. **Overall description**
     1. **Product Perspective**

The Sign-Language Transcription application is designed to operate as an independent system, employing advanced AI and machine learning algorithms for real-time sign language recognition. It interfaces with various devices and platforms, striving for seamless integration into modern communication environments in the future.

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* **Admin side**

used for the administration activities just like approval of user’s accounts, managing data for analytics, training and monitoring.

* **User side**

Used to perform the transcription either video or real-time. Users can engage in real-time sign language conversations, with the application accurately transcribing their gestures into text.

* + - 1. **System Interfaces:**

Interaction with AI and machine learning components

* + - 1. **User Interfaces:**

User-friendly screens for gesture input and transcription output.

* + - 1. **Hardware Interfaces:**

The mobile application can be used on android/IOS and web application can be used on any device like laptop, mobile phone as long as it has active internet connection and is compatible with devices featuring cameras for capturing sign language gestures.

* + - 1. **Software Interfaces:**

Software interfaces includes the operating system for mobile, Android or IOS.

For web application, it just needs to have a browser and active internet connection.

* + - 1. **Memory:**

Utilization of primary and secondary memory or database as required.

* + 1. **Product Functions**

The application performs the following key functions:

* Real-time recognition and transcription of sign language gestures into text.
* User-friendly interface design for both sign language proficient users and those less familiar with sign language.
* Accessibility features, including voice output and customizable font sizes.
* Continuous improvement based on user feedback and technological

More functions are formally defined in the tables below:

* + - 1. **User functions**

*Table 1: User Function - Register*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ID** | FR\_01 | | | |
| **Name** | User Register/Signup | | | |
| **Description** | **Input** | **Output** | **Requirements** | **Basic Workflow** |
| User shall able to register through application | Username/email  Password  Full name | Creation of a new account | Database, Internet | Enter these valid inputs for the creation of the account |

*Table 2: User Function - Login*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ID** | FR\_02 | | | |
| **Name** | Login | | | |
| **Description** | **Input** | **Output** | **Requirements** | **Basic Workflow** |
| User shall be able to login to the application | Username/email  Password | Provide access to dashboard upon successful login | Input validation  Account verification Input | Enter inputs if valid, the system will go to it’s dashboard |

*Table 3: User Function - Video Transcription*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ID** | FR\_03 | | | |
| **Name** | Video Transcription | | | |
| **Description** | **Input** | **Output** | **Requirements** | **Basic Workflow** |
| User shall be able to upload a video for transcription | Video of valid format | If video is of acceptable quality/clarity:  Text script,  an error message otherwise | Internet connectivity, local storage access | User selects the option for video transcription and uploads a video. |

*Table 4: User Function* – *Real-Time Transcription*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ID** | FR\_04 | | | |
| **Name** | Real-Time Transcription | | | |
| **Description** | **Input** | **Output** | **Requirements** | **Basic Workflow** |
| Users shall be able to transcribe in real-time | Camera stream | Text transcription | Internet connectivity, camera access | User selects the option for real-time transcription |

*Table 5: User Function – Monitor Vehicle’s Speed*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ID** | FR\_05 | | | |
| **Name** | Track History | | | |
| **Description** | **Input** | **Output** | **Requirements** | **Basic Workflow** |
| User shall be able to look-up past transcripts | Interaction with the history tab/tile | List of past transcripts | Data storage | User would press on the history tab to get a list of past transcriptions |

* + 1. **User Characteristics**

Users vary in sign language proficiency, technical expertise, and educational backgrounds. The application caters to a diverse user base, ensuring usability for both sign language experts and those less familiar with signing but a familiarity with ASL.

* + 1. **Constraints**

**Regulatory Policies:** The application must comply with data protection regulations regarding the collection, storage, and processing of user information. User consent for data processing and clear privacy policies should be implemented.

**Hardware Limitations:** Compatibility and optimization considerations for diverse hardware environments, the application is dependent on camera hardware some of its features.

**Interfaces to Other Applications:** Integration constraints with existing applications and systems.

**Multiple Sign-Languages:** The fact that there are multiple Sign-languages used around the world poses a constraint on the application of which on to cater too.

**Reliability Requirements:** Mandated reliability standards to ensure consistent performance.

**Safety and Security Considerations:** Implementation of measures to address safety and security concerns in the application.

**2.2.5 Assumptions and dependencies**

This section outlines the assumptions made and dependencies identified for the successful implementation:

**Assumptions:**

1. **Stable Network Connectivity:** The assumption is made that users will have stable and reliable network connectivity for real-time data exchange and communication.
2. **Camera Access:** The application assumes that camera access is always available to use certain features.
3. **Familiarity with the language:** The application assumes that the user is familiar with ASL.
4. **User Device Compatibility:** The application assumes compatibility with a range of user devices, including smartphones and tablets, for optimal accessibility.

**Dependencies:**

1. **Internal APIs:** The project is dependent on internal API’s to communicate the data between applications.
2. **Hardware Components:** Dependencies on specific hardware components, such as cameras.
3. **Third-party Software Libraries:** Dependencies on third-party software libraries, particularly for machine learning like computer vision (CV).
4. **Data Security Protocols:** The project relies on robust data security protocols to ensure the confidentiality and integrity of user and system data.

**2.2.6 Apportioning of requirements**

There is a requirement we have delayed until future version of the system. This include payment method for the users to purchase the subscription.

**2.3 Specific Requirements**

Every system has its own specific requirements according to its nature. The requirements is of two types including functional and non-functional requirements. These are as follow:

**2.3.1 Functional Requirements**

This section is describe the functional requirements at a sufficient level of detail for the designers to a design a system satisfying the user requirement and testes to verify that the system satisfies the requirement.

**User**

* User shall be able to Register
* User shall be able to login
* User shall be able to logout
* User shall be able to receive text transcription of their signed communication
* User shall be able to select video transcription
* User shall be able to select real-time transcription
* User shall be able to track history to past transcriptions
* User shall receive clear visual cues and feedback during sign language recognition and transcription

**Admin**

* Admin shall be able to create, view, edit, and delete user accounts
* Admin shall be able to manage user roles and permissions
* Admin shall be able to export and download conversation data for analysis or archiving
* Admin shall be able to delete conversation data upon request or according to data retention policies

**2.3.2 Non-Functional requirements**

This section outlines the non-functional requirements for the application, ensuring that the system meets certain quality attributes and performance criteria:

1. **Scalability:**

Requirement: The system should handle a large number of concurrent users and vehicles.

Rationale: To accommodate potential growth in user base

1. **Security:**

Requirement: Ensure the security of user data and communication between devices.

Rationale: Protect sensitive information and prevent unauthorized access or manipulation.

1. **Reliability:**

Requirement: The system should operate with high accuracy and minimal false positives.

The system should operate in real-time with minimal latency and function in various lighting conditions

Rationale: Ensure continuous and reliable service to users.

1. **Usability:**

Requirement: Provide a user-friendly interface for both the mobile and web applications.

Rationale: Enhance user experience and accessibility, regardless of technical expertise.

1. **Accuracy:**

Requirement: detection systems should be highly accurate and adoptive.

Rationale: Ensure precision in the resultant transcript.

1. **Performance:**

Requirement: The system should in real-time with minimal latency.

Rationale: Enhance the system's responsiveness.

1. **Data Storage:**

Requirement: Implement efficient data storage and retrieval mechanisms for historical data.

Rationale: Optimize storage resources and ensure quick access to past data for analysis.

**3.Appendixes**

* 1. IoT (Internet of Things): A network of interconnected devices that can communicate and share data with each other over the internet.
  2. ML (Machine Learning): A subset of artificial intelligence that enables systems to learn and improve from experience without being explicitly programmed.
  3. SRS (Software Requirement Specification): A document that outlines the functional and non-functional requirements of a software system.
  4. Regulatory Compliance: Adherence to laws, regulations, and standards relevant to the development and operation of the software.
  5. API (Application Programming Interface): A set of rules that allows one software application to interact with another.

**4. index**

- A: Android, ASL

- C: Computer Vision, Communication Interfaces, Compatibility

- H: Hardware Interfaces

- I: Interfaces, Introduction

- M: Machine Learning, Memory, Mobile Application

- N: Non-functional Requirements

- O: Operations

- P: Product Perspective, Purpose

- R: Regulatory Compliance

- S: Safety, Scalability, Security, Site Adaptation Requirements, Software Interfaces, System Interfaces

- U: User Characteristics, User Interfaces, Usability