**Solution Design**

To start development of a solution, you will need to work the project statement into a specification of an initial solution with clearly stated requirements for the solution and related data. Your design choices will need to be well justified and requirements will need to be communicated clearly enough to be implemented.

Elements:

● Solution Diagram - diagram of proposed solution.

● Solution Description - description of proposed solution.

● Data Description - description of the dataset required.

● Solution Motivation - reasoning behind the proposed solution.

Qualities:

● Understanding - proposed solution and data are suitable for the problem.

● Technical - technical details are communicated effectively.

● Soundness - reasoning for design choices is sound.

To be **outstanding**, you may provide evidence of a deep understanding of the chosen problem and existing solutions and clear justification for your design choices.

To be **exceptional** your solution design will include ideas beyond the related work, or your design will involve the application of existing methods in a novel way, with clear justification for both.

**Related Actor** **-** Young Children

**Functional Requirements:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ID** | **Name** | **Description** | **Source** | **Priority** |
| **F01** | Live Video | System shall allow user to use application features in real-time via live video. | Trivial | MUST |
| **F02** | Hand/Gesture Identification | System shall identify the hand/gesture of the user. | Domain Analysis | MUST |
| **F03** | Gesture Instruction | System shall provide instruction image to the user on how to perform sign language gestures correctly. | Stakeholder Analysis | MUST |
| **F04** | Gesture/Hand Feedback | System shall output message to the user when no hand is visible. | Developer Analysis | MUST |
| **F05** | Sign Language Recognition for Letters | System shall recognize sign language gestures for letters performed by the user. | Domain Analysis | MUST |
| **F06** | Sign Language Recognition for Basic Phrases | System shall recognize sign language gestures for basic phrases performed by the user. | Domain Analysis | MUST |
| **F07** | On-Screen Translation | System shall provide an on-screen overlay translation of the gestures to the user. | Stakeholder Analysis | MUST |
| **F08** | Subtitles Translation | System shall provide translated subtitles for gestures performed by user. | Stakeholder Analysis | MUST |

**Non-Functional Requirements:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ID** | **Name** | **Description** | **Source** | **Priority** |
| **N01** | Security | System must be secure and protect user data and prevent unauthorized access to systems. | Stakeholder Analysis | MUST |
| **N02** | Performance | System must respond quickly to user input and recognize the signs quickly and accurately in under 2 seconds. | Competitor Analysis | MUST |
| **N03** | Usability | System must provide a simple and intuitive interface that is user-friendly. | Domain Analysis | MUST |
| **N04** | Adaptability | System must be able to function in different lighting levels. | Developer Analysis | MUST |
| **N05** | Scalability | System must be able to handle large video sizes. | Developer Analysis | MUST |
| **N06** | Reliability | System must allow a choice of uploading a video and using live video for translation. | Stakeholder Analysis | MUST |
| **N07** | Compatibility | System must be compatible with most Windows and Mac computers. | Stakeholder Analysis | MUST |
| **N08** | Security | System must adhere to user privacy laws and policies. | Stakeholder Analysis | MUST |
| **N09** | Responsiveness | System UI must be fluid and responsive. | Developer Analysis | SHOULD |
| **N10** | Error Handling | System must handle errors and provide clear error message to the user. | Developer Analysis | SHOULD |
| **N11** | Extensibility | System should be designed to accommodate additional features and new sign language data in the future. | Domain Analysis | SHOULD |

**Hardware Interface Requirements:**

|  |  |  |
| --- | --- | --- |
| **ID** | **Name** | **Description** |
| **H01** | CPU | **Minimum** - Intel Core i3 | AMD Ryzen 3 | Apple M1 |
| **H02** | RAM | 4GB RAM or more |
| **H03** | HDD/SSD | At least 300MB for video analysis |
| **H04** | GPU | **Minimum** - Intel HD Graphics 520 or more | NVIDIA GeForce GT 635 | Radeon HD 8470D |

**Software Interface Requirements:**

|  |  |  |
| --- | --- | --- |
| **ID** | **Name** | **Description** |
| **S01** | Operating System (OS) | **Minimum** - Windows 7 | MacOS Yosemite |
| **S02** | Communication app | Visual Studio Code (**Recommended**) |
| **S03** | Programming Language | Python |
| **S04** | Libraries Used | NumPy, Scikit-Image, customtkinter, … |

**Solution Diagram:**

Diagram

Description automatically generated

**Solution Description:**

a

**Data Description:**

a

**Solution Motivation:**

a

**Solution Review**

To consider how your solution might generalise to new problems and environments, you will need to compare your results to other results in the existing literature. This mission will require you to identify suitable comparisons and explain why they are fair or not.

Elements:

● Comparison - comparison of your results to others in the literature.

● Discussion - justification for and fairness of comparisons.

● Recommendations - recommendations based on comparisons.

Qualities:

● Suitability - the articles for comparison were suitable and well justified.

● Depth - the comparisons were thorough and fairness was considered.

● Insight - the recommendations were insightful.

● Clarity - comparisons were presented and explained clearly.

To be **outstanding**, you will choose a number of suitable articles for comparison with well justified reasons, the comparisons will cover key similarities and differences, and have strong arguments for whether the comparisons are fair or not. To be **exceptional** your comparisons will lead to novel insights and recommendations that go above and beyond what already exists in the literature.