Software Requirements Specification for Mechatronics: subtitle describing software

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Revision History

Date	**Version**	**Notes**
Date 1	1.0	Notes
Date 2	1.1	Notes

1 Reference Material

1.1 Terms, Abbreviations, and Acronyms

Term, Abbreviation, or Acronym	**Description**
Term	Description

2 Introduction

2.1 Purpose of Document

2.2 Scope

2.2.1 In-Scope

2.2.2 Out-of-Scope

2.3 Usual Operations

2.4 Users and Stakeholders

3 Project Constraints

3.1 Constraints

3.2 Assumptions

4 Context Diagrams

5 Functional Decomposition

5.1 Data Flow Model

5.2 Monitor and Controlled Variables

6 Functional Requirements

6.1 Camera Functional Requirements

Identifier	Requirement	Rationale
CFR1	User hand gestures should be recognized and converted into input for the system	This is the primary and only way that the end user engages with the system. This is to ensure that their signing is picked up by the camera within a certain degree of accuracy
CFR2	The camera must be able to relay its vision back to the program	This enables validation and testing on the development end. In addition to understanding what needs to be corrected to ensure accurate user input

6.2 Machine Learning Functional Requirements

Identifier	Requirement	Rationale
MLFR1	The program should be able to recognize user hand joints	This enables the ML model to compare and match user hand gestures to ASL
MLFR2	The program should output the x, y, and z coordinates of each joint relative to the camera	This will enable system calibration and aid in enhancing predictive accuracy as the training data set will be primarily static images in contrast to the dynamic input from the end product
MLFR3	The program should recognize up to two hands in the input	The complexity of sign language calls for two hands to enable effective communication. Tracking one hand should also be considered as there are words in sign language that require the use of a single hand
MLFR4	The program should be able to process data in real-time	The translator should relay the relevant translation within a reasonable amount of time to ensure conversation fluidity
MLFR5	The program must be able to calibrate the camera	This is to ensure that the image being processed is undistorted and recognizable to the program to prevent inaccuracies and incorrect output from the ML model
MLFR6	The program should be calibrated to match the speed of the signer	The translator should be able to keep up with the user or the likelihood of a mistranslation will increase
MLFR7	The ML model should be easily trainable	This is how the ML model should learn sign language to use in processing. Making it easily trainable should enable expandability as well. In addition, this will enable the program to adapt to users' specific signing habits and allow for manual correction for the future

7 Functional Requirement Change Likelihood

7.1 Camera Functional Requirements

7.2 Machine Learning Functional Requirements

8 Non-functional Requirements

8.1 Accuracy Requirement

8.2 Useability Requirement

8.3 Portability Requirement

9 References

10 Appendix

10.1 Reflection