MINI PROJECT – II
(2018-19)

Hearing Aid
SRS

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1. Introduction

1.1 Purpose

This Software Requirements Specification (SRS) identifies the requirements for our software "Hearing Aid". The goal of this document is to illustrate and explain the development of our software. Moreover, it will give a detailed description of system constraints and interactions with users.

1.2 Scope

"Hearing Aid" is a software designed especially for people who are mute but all other users can use it. The main function is to allow the user to use sign language in front of its Intel Creative camera and then the application is recognizing the gesture. Each movement recognized is translate to text. To run the software, the user will need Internet and a Intel Creative Camera.

1.3 Definitions, Acronyms, and Abbreviations

1. SDK : A software development kit (SDK) is typically a set of software development tools that allows for the creation of application.
2. Overlay : An Overlay on the SDK is a block of code that we rewrote because the initially SDK was not enough or complete.
3. Software : A computer program / application.
4. Hardware : An electronic component referring to something link to the computer.

1.4 References

Udemy : It is an online learning platform. It is aimed at professional adults.

https://gogul09.github.io/software/hand-gesture-recognition-p1

https://github.com/gogul09

1.5 Overview

This document includes three main chapters :

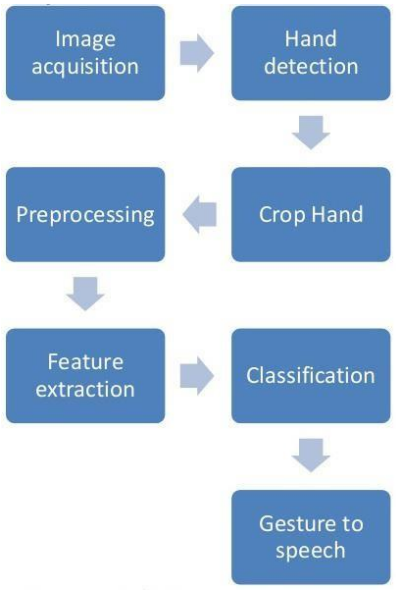
1. The first describe the working of our software and explain most of the development.

2. The second one is about specific requirements, covering functional, non-functional and interface requirements.

3. The third one is about the evolution of our product.

2. General Description

This part will describe in general our software and how we made it. We will see also the interaction with users and the dependencies.



2.1 Product Perspective

Our software is divided in two main different parts:

1.The first one is about the gesture recognition.

2. The second one is about the translation of gesture to text.

2.2 Product Functions

The main functions of our application are can be divided in 2 different parts :

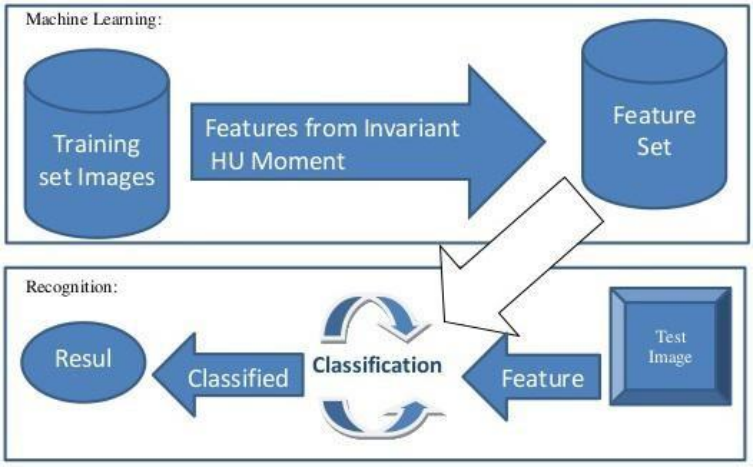
1. Recognition : Hand gesture are used to recognition what user want to say.
2. Translation : It is used to translate hand gesture to text, so that very normal person can understand what is trying to say.

2.3 User Characteristics

There will be 2 different type of users :

1.Normal user : A user that can use the application as another video/audio communication application.

2. Sign language user : A user who will speak thanks to his hand. Movement detection and recognition is especially done for this user.



2.4 General Constraints

1. The main constraint of our application is, if you want a sign language recognition, to have an web Camera.

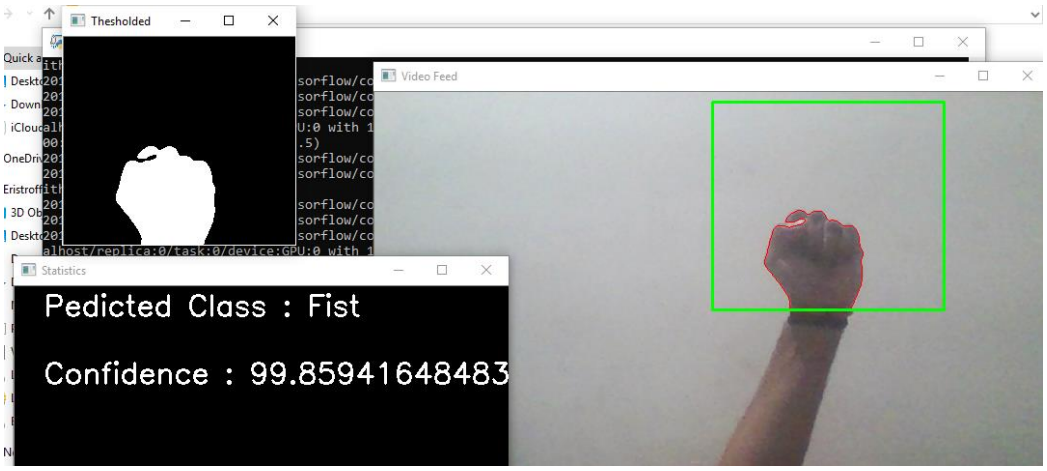
2. The size of the Data Set may be a constraint if too many words are added to it.

2.5 Assumptions and Dependencies

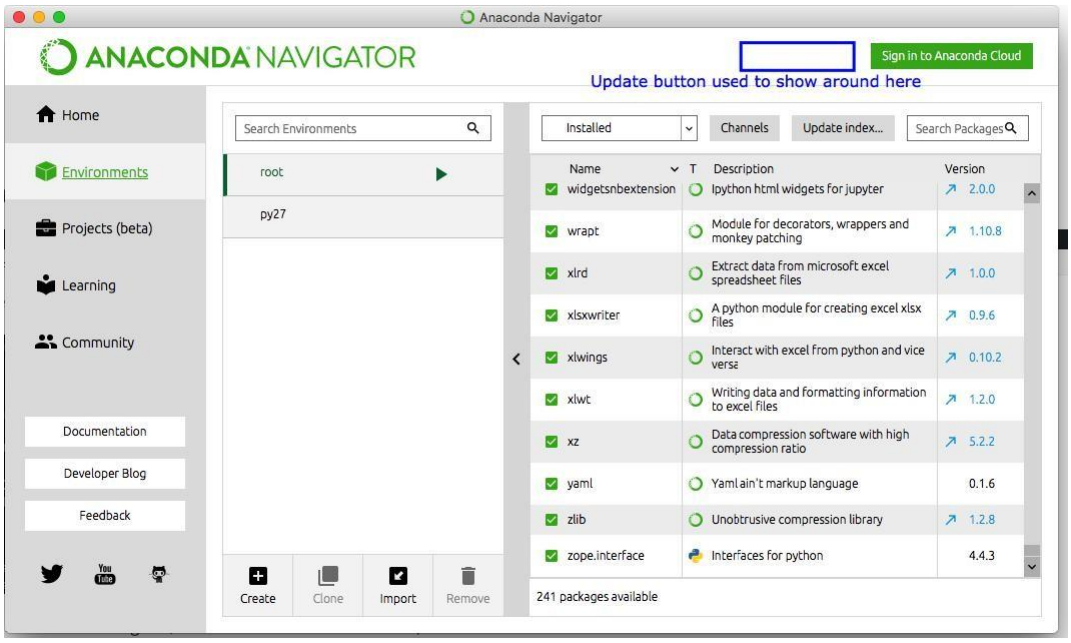
In that way, we will assume that users have to Known about the gesture and of course, having web camera.

3. SPECIFIC REQUIREMENTS

3.1 User Interfaces



3.2 Software Interface



4.Functional Requirements

4.1 Hand Movements Recognition:

Description: The application must recognize hand movements of the speechless user using the computer´s inputs.

Inputs: Stream data

Source: Leap motion and creative camera sensors

Outputs: Data base index corresponding to the recognized gesture

Destination: Local machine

Action: The user must place himself in front of the camera or above the leap motion. He communicate with the computer with hand movements. The movements are recognized by the sensors and the data is transmitted to the program. The program processed it, makes the calculation and determines which sign language movement it is.

Nonfunctional requirements: The recognition process should be done in real time. (3 seconds maximum)

Pre-condition: Using the Creative Camera, ambient light should be enough to see correctly user´s movements. Using the leap motion, hands should be above the sensor. The recognized gesture is present in the data base.

Post-condition: The user hand movement has been well recognized.

Side-effects: Bad gesture recognition

4.2 Literal Translation:

Description: The application must show on the screen the word or the idea that refers to the user movement detected.

Inputs: Processed data (by our program) and sign language gesture data base.

Source: Hard drive of the local machine

Outputs: String

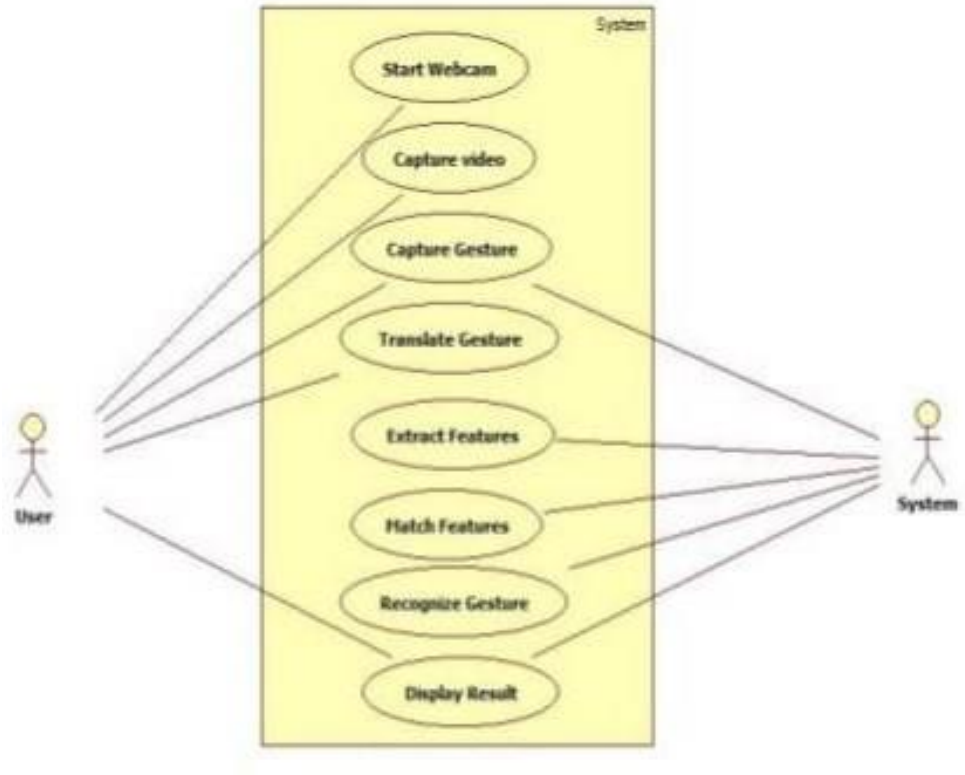
Destination: The screen

Action: The program searches into the data base the literal translation corresponding to the recognized gesture.

Pre-condition: The literal translation of the recognized gesture is present in the data base.

Post-condition: The literal translation is correctly shown on the screen.

4.3 Use Cases


System
Start Webcam
Capture video
Capture Gesture
Translate Gesture
Extract Features
Match Features
Recognize Gesture
Display Result
User
System

4.4 Non-Functional Requirements

4.4.1 Performance

This software shall minimize the number of calculations needed to perform image processing and hand gesture detection. Each captured video frame shall be processed within 350 milliseconds to achieve 3 frames per second performance

4.4.2 Reliability

The Hearing Aid software shall be operable in all lighting conditions. Regardless of the brightness level in user’ s operating environment, the program shall always detect user’ s hands

4.4.3 Availability

Our software will be available to all the users and valid for dumb and normal persons.

4.4.4 Security

Our software is secure and does not save any data of user.

4.4.5 Maintainability

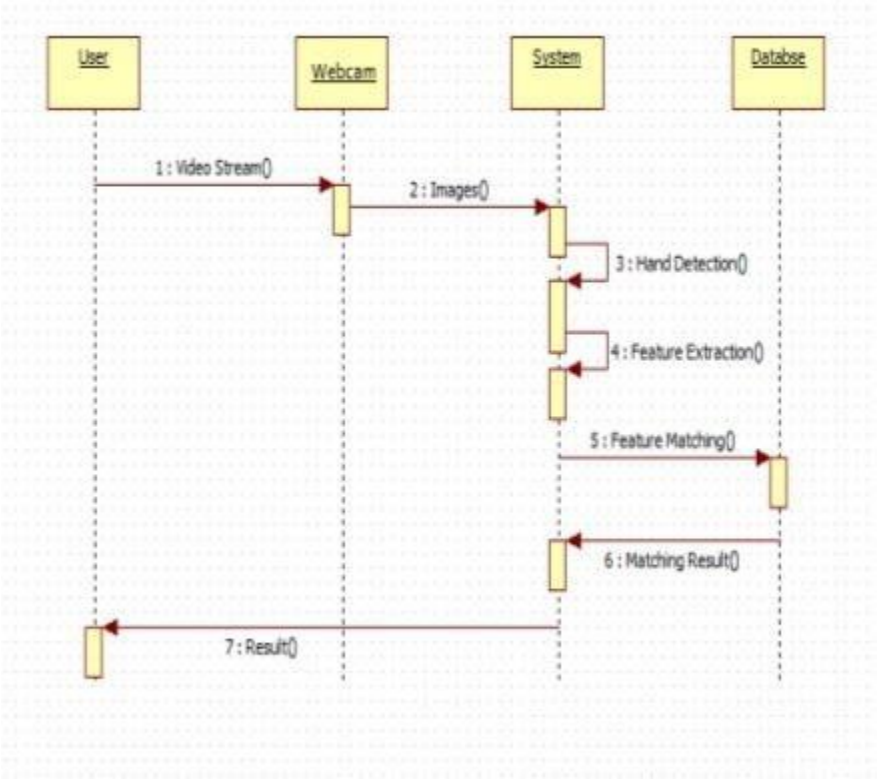
It require nothing to maintain only data set should be updated after every new gesture.

4.4.6 Portability

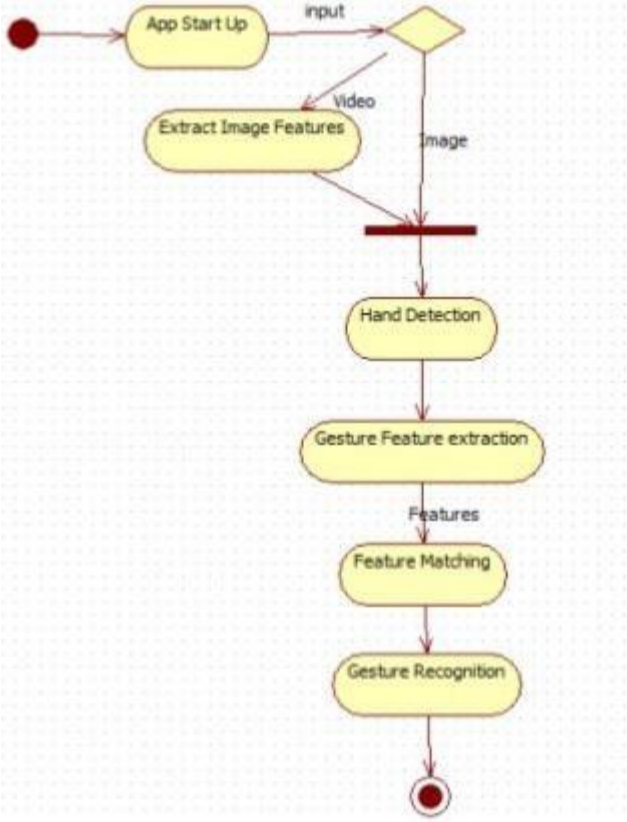
Our software shall be 100% portable to all operating platforms that support Python.

5. Analysis Models

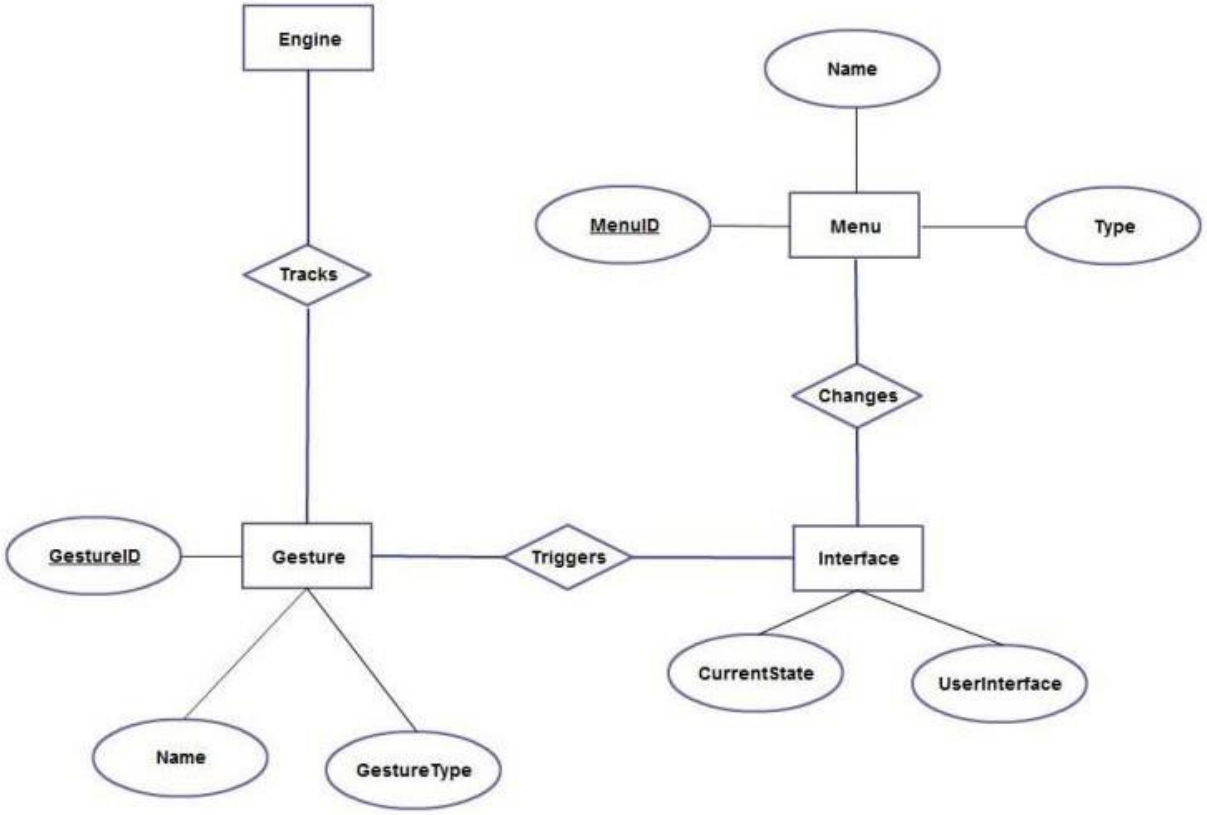
5.1 Sequence Diagrams



5.2 Data Flow Diagrams (DFD)



5.3 Entity Relationship Diagrams (ERD)



A. Appendices

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