Problem Statement and Goals
Mechatronics

Team #20, Team Name
Robert Zhu zhul49
Zifan Meng mengz17
Jiahui Chen chenj194
Kelvin Huynh huynhk12
Runze Zhu zhur25
Mirza Nafi Hasan hasanm21

Table 1: Revision History

Date	**Developer(s)**	**Change**
Date1	Name(s)	Description of changes
Date2	Name(s)	Description of changes
...	...	...

1 Problem Statement

Communication is a key component of both the professional workplace and personal life. Many difficulties can occur especially when the individual has a disability that prevents them from being able to speak properly. Sign language has been a method to help bridge those who are deaf/mute with other people, but as with language, both parties are required to understand it to clearly communicate with each other. The Sign Language Translator is a device to help further close that gap by introducing a sensor that can translate hand motions and gestures from the American Sign Language (ASL) into a text to speech application on their phones. This method will be able to provide real-time instant feedback to simulate a spoken conversation and can eliminate the need for a third party translator as the individual is able to express themselves freely, thus improving their quality of life in society.

1.1 Problem

1.2 Inputs and Outputs

[Characterize the problem in terms of "high level" inputs and outputs. Use abstraction so that you can avoid details. —SS]

1.3 Stakeholders

TThe stakeholders for our project are people who have hearing problems and need to use sign language for their daily communication. This can also include various accessibility services for various companies, whether that be in education or entertainment. Our project can benefit anyone or anything that requires a sign language interpreter.

1.4 Environment

[Hardware and software —SS]

2 Goals

Reliable and Accurate Translations:
The Sign Language Translator requires extensive training on the sensors to capture precise hand motion and ignore any human error on the user's part. The processing unit should be able to identify each letter within the American Sign Language using the data collected and transmit dialogue accurately to the user's request.

Real Time Translations:
User's should never be required to wait an extensive period of time for the device to process their hand motion and provide a translation. The Sign Language Translator should simulate a real time conversation between regular people to deliver a seamless transition for other parties during presentations or social interactions.

Affordability:
The Sign Language Translator should be affordable for most of the end users.

Keep the Database Up-to-date:
Since there are always new words appearing in English every year, the database for the Sign Language Translator should be able to easily update with the new words timely.

3 Stretch Goals

Portable: The final device, while requiring OpenCV to scan and process hand motion, should become more portable and lightweight for the user to move around, so as to not interfere with the user's regular activities. The translator text to speech should become an application on all phone brands as for any user with the required equipment to be able to begin using.

Expanding to Different Languages: As a universal sign language does not exist at the moment, there exists dead/mute individuals who use another form of sign language other than the American Sign language. These include the British, Australian and New Zealand Sign Language (BANZSL), the Chinese Sign Language (CSL), Arabic Sign language, and much more. The device should be able to understand and translate these new hand motions and generate a translation in their native language for this product to be used on a global scale.