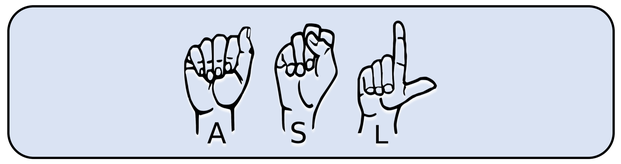
INTERPRETAR

interpretAR uses Microsoft Cognitive Services Speech SDK, Blender Animations, Unity Gaming Engine, OpenCV, and Android Studio to create an application that translates multi-language speech input into American Sign Language (ASL) real time through an Augmented Reality (AR) approach

McMaster University | Electrical & Computer Engineering

INTRODUCTION

When an individual suffers from hearing impairment, there exists a physical barrier that inherently hampers the ability to communicate. Conversations become inconvenient - getting the point across is challenging and meaning can be lost in the process. To combat this, sign language was developed as a tool to help hearing impaired individuals communicate; and while this does help bridge the gap when both parties are proficient, it falls short in situations where one party lacks fluency.



MOTIVATION

Over 5% of the world suffers from hearing loss which totals to over 360 million people. InterpretAR is a mobile application set to improve the quality of life for individuals who rely on sign language as their main medium of communication. Though the application's usability extends universally, its main purpose is twofold:

- To solve everyday inconveniences for the hearing impaired
- To familiarize individuals afflicted with acute hearing loss with sign language

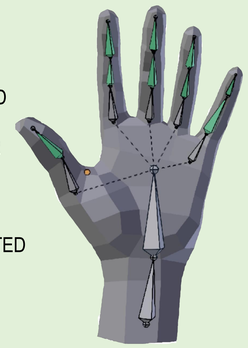
More than 5% of the world's population suffers from hearing loss
THAT TOTALS TO OVER
360 000 000 PEOPLE
ACROSS THE GLOBE

DESIGN

1

HAND MODEL
A WIREFRAME TEMPLATE OF A HAND WAS OBTAINED USING THE BLENDER SOFTWARE.

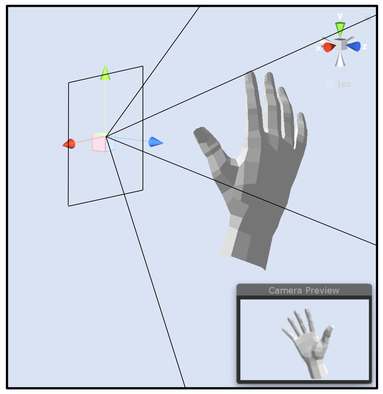
ARMATURE
BONES WERE INSERTED INSIDE THE HAND TO DEFINE JOINTS FOR MOVEMENT.



RIGGING
A CONTROL FUNCTIONALITY WAS ADDED TO THE BONES FOR THE PURPOSE OF ANIMATION.

ANIMATION
THE HAND WAS ANIMATED BY MANUALLY MOVING THE BONES USING KEYFRAMES.

2



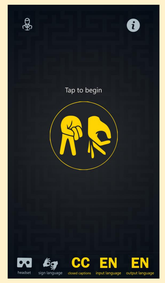
Harnessing the capabilities of the Unity Gaming Engine we are able to bring to life our Blender animations. ASL animations were programmed to respond to their according voice command along with an implemented face recognition feature. The size of the hand was positioned on the screen in such a way to optimize the AR experience.

3

USER OPTIONS

Android Studio completes our product by bringing together all the features within interpretAR. Through a simple and sleek UI, interpretAR provides users with several settings including a vocab page. All of these options ensures the user that our application is practical, flexible, and most importantly convenient for all.

UNITY PLAYER (BACKEND)
GAMING ENGINE WHICH PAIRS SPEECH RECOGNITION WITH BLENDER ANIMATIONS.



ANDROID STUDIO (FRONTEND)
VOABULARLY LIST, OPTIONS FOR TRANSLATIONS WITH OR WITHOUT SIGN LANGUAGE SUPPORT

FEATURES

Face Recognition

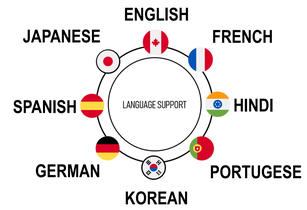
Through pairing ASL translations with face recognition, interpretAR takes a mixed reality approach. We make communication for the user accessible through lip reading and/or ASL translations - not limiting our users to just one mode of communication.

CASCADE CLASSIFIER

- Trains with positive/negative images
- Groups features into different stages
- Real-time images are fed through these staged classifiers one-by-one

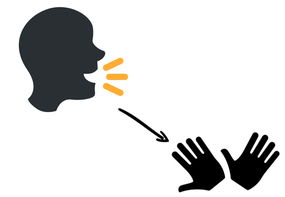
Multilanguage

InterpretAR overcomes speech barriers such as speaking style and background noise using the power of Microsoft Cognitive Speech Services. The speech-to-text service is optimal for conversational and dictation scenarios and allows interpretAR to bridge the gap in communication across the globe.



Sign Language Translator

Currently, interpretAR is able to perform a plethora of English word translations. The full vocabulary for ASL translations are listed under the 'Vocab' icon in our application main page.



CONCLUSIONS

InterpretAR utilizes multilanguage support and face recognition in order to provide an application which converts speech to ASL. InterpretAR hopes to bridge the gap in communication to improve the lives of the hearing impaired.

REFERENCES

Audicus, "World Wide Hearing Loss: Stats from Around the World, "2 January 2016. [Online]. Available: https://www.audicus.com/world-wide-hearing-loss-stats-from-around-the-world/.

ACKNOWLEDGEMENTS

Special thanks to Dr. H. deBruin and Dr. A. Jeremic

- Android Studio
- Blender
- Microsoft Cognitive Services
- OpenCV
- Unity Gaming Engine

TRY OUT INTERPRETAR AT BRANDONRUFINO.COM/INTERPRETAR

THE TEAM: Arvin Angue, Milos Bijelic, Justin Chau, Brandon Rufino