University of Waterloo

Faculty of Engineering

Department of Computer and Electrical Engineering

Revised Project Title and Abstract Submission

Voice - Device to Enable Real-time Sign Language to Speech Translation

Group 2017.037

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**Project Title:**

Voice - Device to Enable Real-time Sign Language to Speech Translation

**Project Abstract (Full):**

There are 375,000 culturally deaf people in Canada, and in-person communication barriers between the native sign language speakers and the general populous still remain high. Many people do not understand sign language, and communicating through a text medium is arduous and impersonal. The goal of this project is to design a device to translate sign language to speech in real-time, allowing the deaf or mute to communicate naturally even with those who do not know sign language. Voice uses custom-made ergonomic gloves equipped with various sensors and an onboard microcontroller to track and stream data on a user's hand positions and motions to a Bluetooth-connected mobile application. The application connects to a quorum of pre-trained machine learning models to predict the given sign and speak it aloud, mimicking true speech. Our system can match tens of American Sign Language signs, in addition to signs for the Japanese manual syllabary. Voice is portable and unobtrusive compared to current computer vision variants - requiring the minimum of hardware - giving users a voice that they never had.

**Project Abstract (Shortened):**

Communications between native sign language speakers and the general populous remain high despite technological advances. Voice uses gloves equipped with sensor arrays to track a user’s hands and stream the data to a mobile application. The application then connects to a cloud-hosted machine learning model to predict the given sign and speak it aloud, mimicking true speech. Voice supports many signs in both American Sign Language and the Japanese manual syllabary. It is portable and unobtrusive, giving users a voice that they never had.