



Sign Language Translator

Team Members: Brandon Lo, Harshitha Mohanraj, Brandon Ngo, Daniel Phan
Team Advisor: Professor Mohammadi Yaghini
Department of Electrical Engineering and Computer Science



Background

Sign Language is a universal language using gestures for people who suffer from loss of hearing or speech to communicate with others. However, it is difficult for them to communicate with others as many people do not know sign language. The project aims to bridge this gap by using a glove that translates sign language to text and speech, making verbal communication more accessible to sign language users.

Implementation

1. Outfitted a glove with (1) Arduino Lilypad, (1) accelerometer, (5) flex sensors, and (6) contact sensors.
2. Trained an LDA model with flex sensor values to predict a gesture from the defined dictionary.
3. Added contact sensors to help distinguish between signs with similar flex sensor values by verifying and correcting the predicted value.
4. Used the accelerometer to account for signs which have motion.
5. Calibrated the glove to make predictions suited to each user's hand size.
6. Translated and transmitted gestures to either a Laptop or iPhone via Bluetooth on each button click.

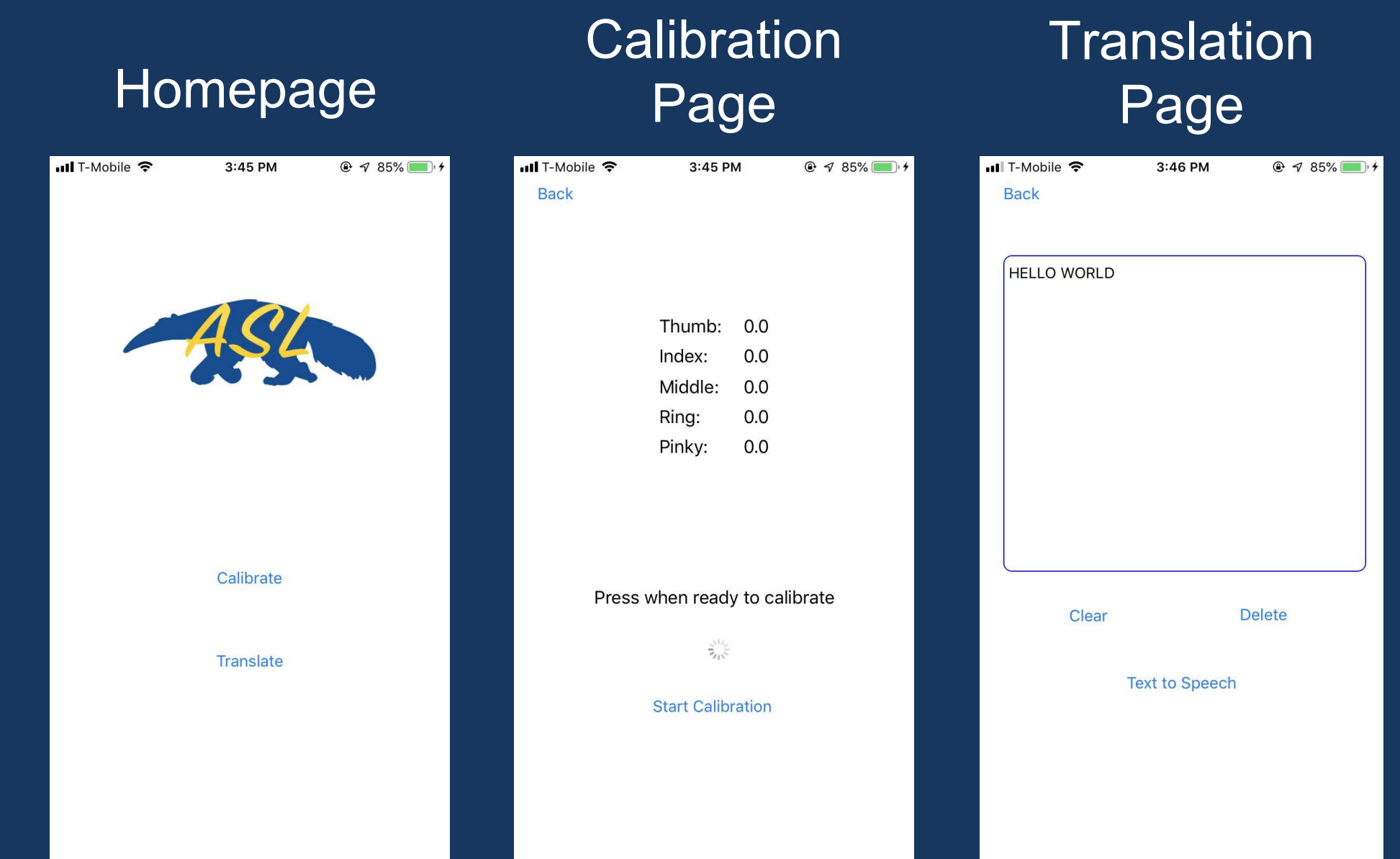
Hardware Results

The glove is able to translate gestures on each button click as a stand-alone device. It is able to successfully send flex sensor, contact sensor, and accelerometer values from the Arduino to a Laptop or iPhone via Bluetooth.

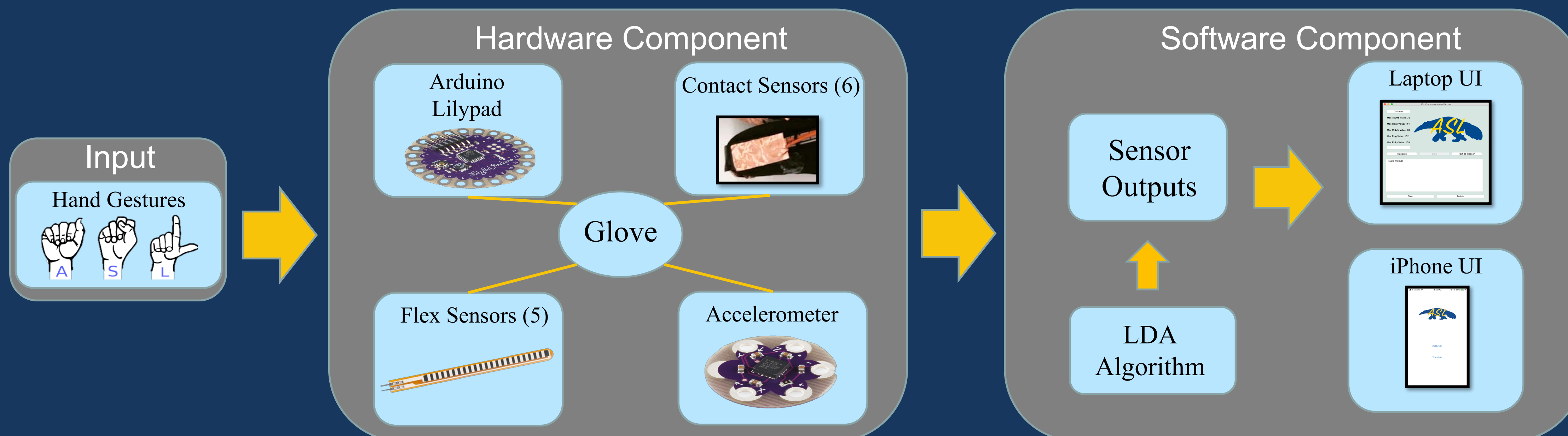


Software Results

The glove has a 91% accuracy in predicting letters from the English alphabet and other common words. The translated signs are transmitted via Bluetooth to an iPhone application or Laptop UI where the user is able to view the translation and convert the text to speech.



System Diagram



Website

<http://projects.eng.uci.edu/projects/asl-communications-device>

References

- Alapati, Sreejan & Yeole, Shivraj. (2017). A Review on Applications of Flex Sensors. International Journal of Emerging Technology and Advanced Engineering. 7. 97-100.
- M. A. Ahmed, B. B. Zaidan, A. A. Zaidan, M. M. Salih, and M. M. Lakulu, "A Review on Systems-Based SensoryGloves for Sign Language Recognition State of the Art between 2007 and 2017," *Sensors (MDPI)*, vol. 18, no. 7, Jul. 2018.



THE HENRY SAMUELI SCHOOL OF ENGINEERING
UNIVERSITY of CALIFORNIA • IRVINE