A.S.L.A.

American Sign Language Assistant

Group E - Senior Design Spring/Fall 2016

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Project Description:

The objective of this project is to design a Glove that converts American Sign Language to computer generated speech to help those who are hearing-impaired communicate in everyday life. Connecting via bluetooth to a computer system to output the spoken speech. By using a computer, it would need a microcontroller to communicate with it. The computer will have its own software to process the data received from the microcontroller and to output the computer generated speech.The glove will be able to recognize every letter in the alphabet and basic full word signs. In order to make it more personal for the user, the design will allow the ability to add new words or phrases to the already existing library.

The battery life on the gloves also need to last for at least one day of normal use so to not inconvenience the user with multiple charges daily. Ideally, the glove would also need some battery indicator to show the user how much time is left until it needs to be put to charge. The gloves have to be something comfortable to wear when going out in everyday life.

There will be a flex sensor for each finger that will be used to detect flexing and bending in one direction. By using accelerometers to measure acceleration, one can find out the angle the device is being tilted. Another sensor being used will be a gyroscope sensor that will help determine orientation when detecting sign language. Both gloves need to communicate to a central microcontroller to record to send to the computer. The program will process the data and map it to known letters and phrases used commonly in American Sign Language.
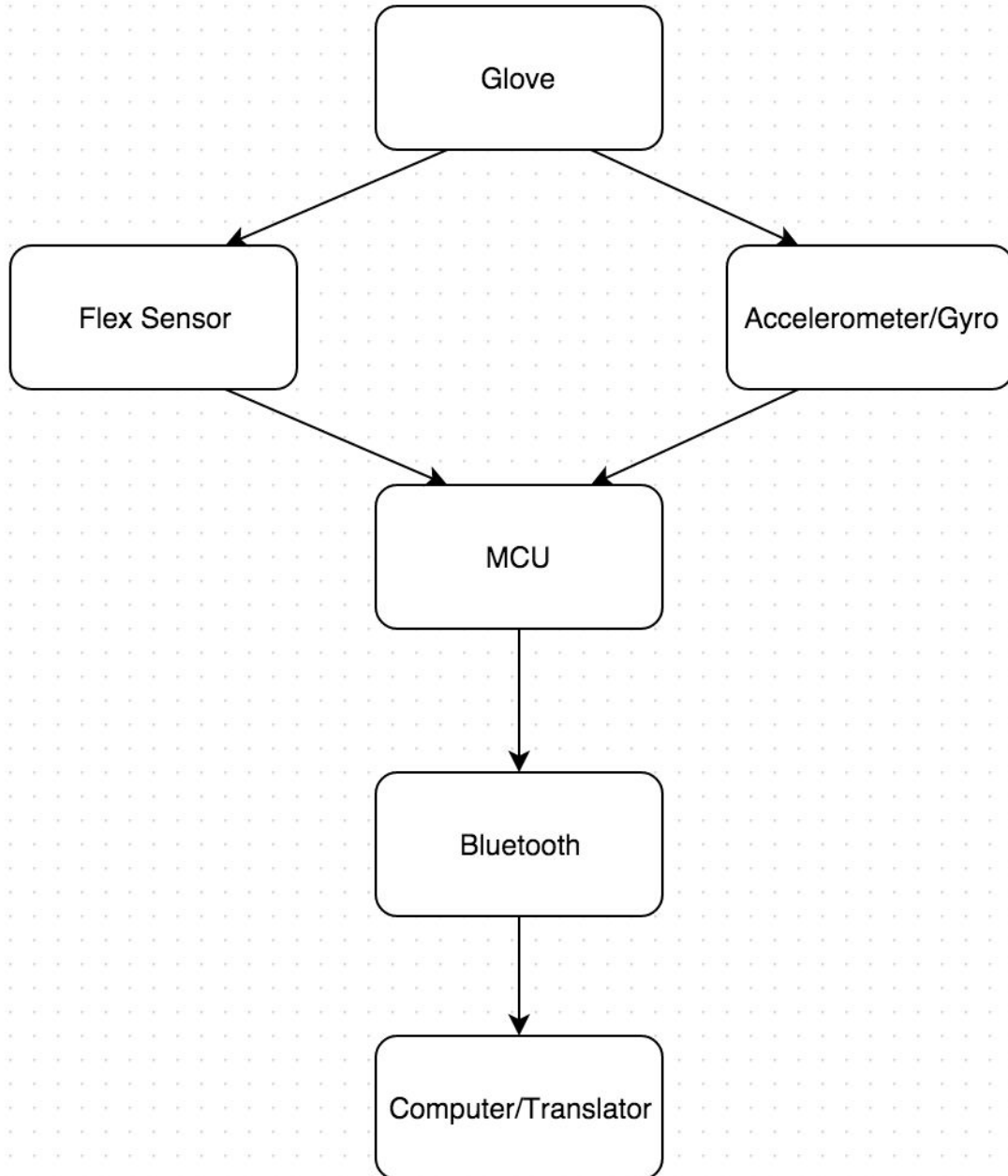
Project Specifications and Requirements:
- Glove translates sign language into text to computer application.
- Must recognize every letter in the alphabet.
- User is able to add new words/phrases to existing library.
- Flex sensors for each finger to track bending or flexing.
- An accelerometer to measure tilt an acceleration of the glove.
- A microcontroller for data collecting.
- A computer for data processing and text generation.
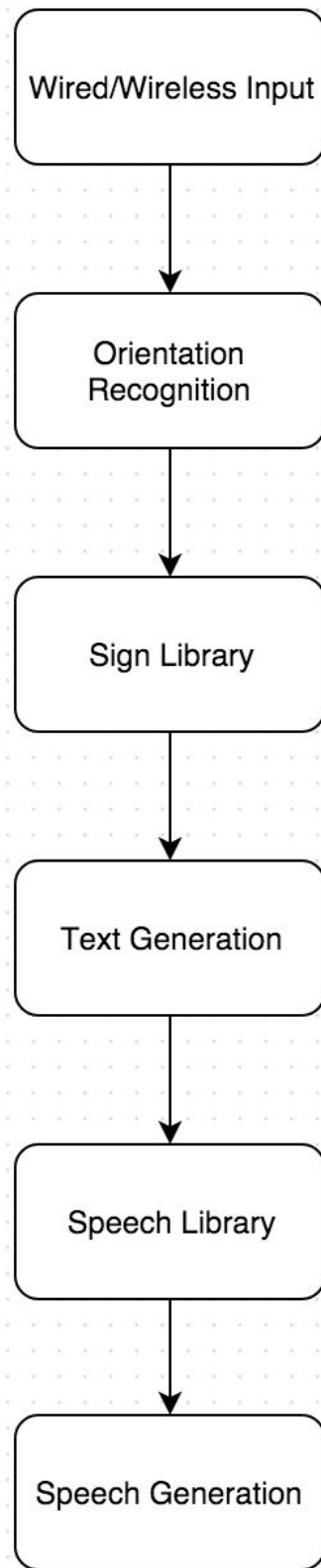- Possible Bluetooth module will be incorporated.

- Computer generated speech.
- Flexible and comfortable glove.
- Battery life to last one day

Project Block Diagrams:

<u>Hardware:</u>

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┌─────────────────────┐
│  Wired/Wireless Input │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│     Orientation      │
│     Recognition      │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│     Sign Library     │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│   Text Generation    │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│    Speech Library    │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│  Speech Generation   │
└─────────────────────┘
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Estimates for components and items:

Item	Amount	Quantity	Total
Flex Sensor	$13	5/hand	$130
Accelerometer/ Gyro	$40	1/hand	$80
MCU	$15	1	$15
Bluetooth	$20	1	$20
Gloves	$20	1	$20
Misc	$55		$55
Total			$320

Initial project milestones:

Spring 2016:

Research American Sign Language

Research components necessary and read datasheets for requirements

Build a schematic of sensor/MCU layout

Research possible open-source/API software for text-to-speech

Develop a full parts list for one glove prototype

Start software prototype (framework and text-to-speech)

Fall 2016:

One glove prototype (not wireless)

Finish software prototype, basic alphabet

Two glove system (not wireless)

Expand the library of words and phrases to include basic conversation

Two glove system (wireless)

Make library user expandable