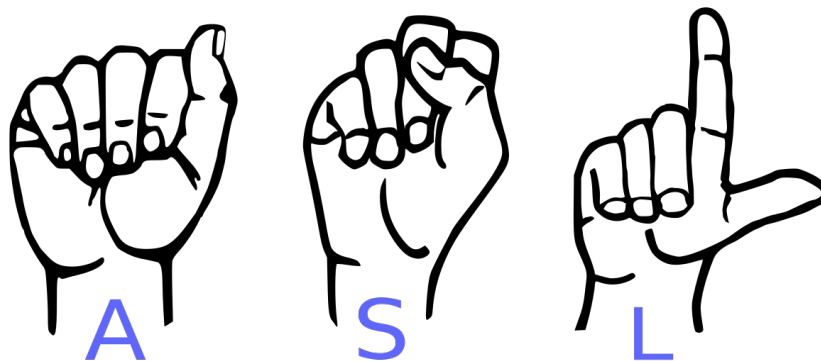# Gesture Glove

Stephanie Zhang, Sophia Lau, Rachel Tang (B4)

Overview

- Motivation: to help people who sign ASL communicate with others who do not understand ASL
- Gesture-sensing gloves
  - Thumbs up
  - Thumbs down
  - Love
  - Peace
  - Stop

A   S   L

Use Case

- Recognizes motion and gesture
- Applications & problem areas
  - sign languages
  - VR/AR experience
  - HCI
  - Assess rehabilitation
- Area: circuits, software systems

Requirements

- Accuracy - 90%
- Latency - 100 ms
- Frequency - 0.5 s per gesture
- How long should users hold each gesture? - 250 ms
- Craftsmanship - <250g

Technical Challenges

- High variance in data from sensors
- Data collection
- Circuit design
- Trade-offs

High Variance From Data Sensors + Data Collection

- Calibrate sensors
  - Ensure all sensors are working accurately
- Combining streams of different data

```
Adafruit LSM6DSOX test!
LSM6DSOX Found!
Accelerometer range set to: +-2G
Gyro range set to: 250 degrees/s
Accelerometer data rate set to: 104 Hz
Gyro data rate set to: 104 Hz
            Temperature 23.87 deg C
            Accel X: 0.57    Y: -0.38        Z: 39.52 m/s^2
            Gyro X: 3.16     Y: -5.15        Z: -27.93 degrees/s

            Temperature 23.07 deg C
            Accel X: 0.15    Y: -0.10        Z: 9.89 m/s^2
            Gyro X: 1.23     Y: 0.11         Z: -0.51 degrees/s
```
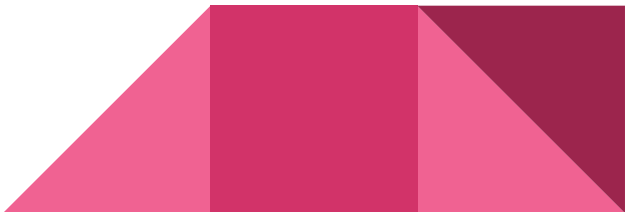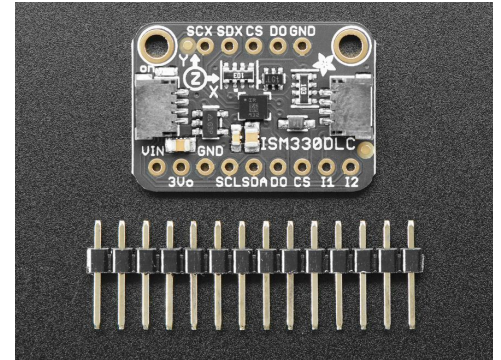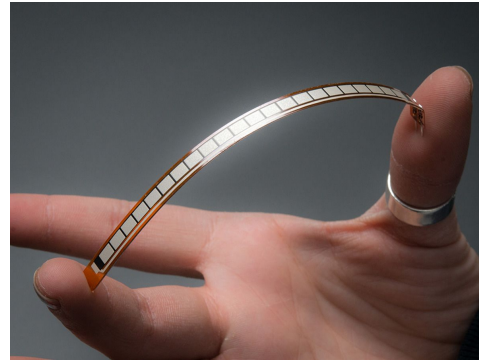
Circuit Design

- Need to minimize wiring and create a compact circuit
  - The glove should be lightweight
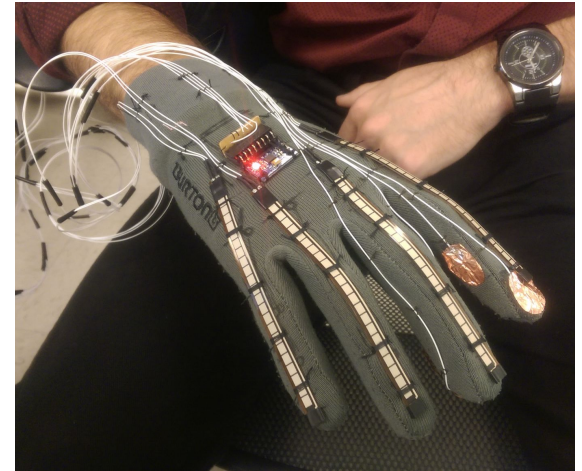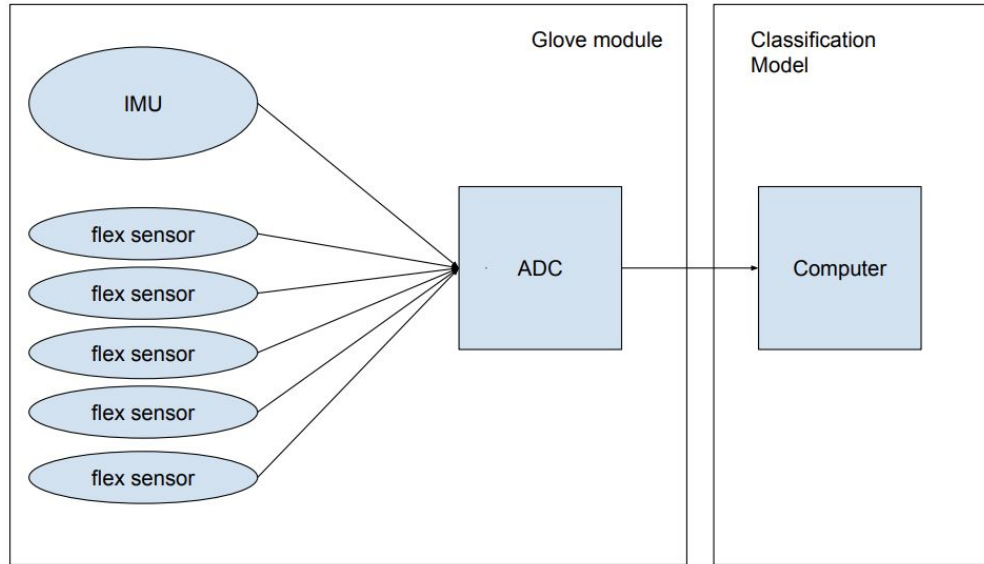 - Movements should be unhindered by wiring

Trade-offs

- Number of classes vs. accuracy
- Number of sensors (usability) vs. accuracy
- Sampling rate vs. latency

Solution Approach

Testing, Verification and Metrics

- Accuracy
- Latency
- Frequency
- How long should users hold each gesture?
- Craftsmanship

Tasks and Division of Labor

- Glove
    - Research and buy flex sensors and IMU
    - Fit glove with sensors
    - Test sensor data collection
- Classification Model
    - Testing out different models
    - Collect data from glove sensors
    - Train model
    - Test model
    - Make necessary adjustments

Schedule

	9/13	9/20	9/27	10/4	10/11	10/18	10/25	11/1	11/8	11/15	11/22	11/28
Make proposal presentation + website	■											
Order parts (arrive by 9/27 - expedite shipping if necessary)	■	■										
Do proposal presentation		■										
Attach flex sensors			■									
Test that we get consistent data from flex sensors with each gester			■									
Prepare design review			■									
Do design presentation				■								
Design report					■							
Attach IMU				■								
Test that we get consistent data from IMU with each gesture				■								
Determine ML Model		■	■	■	■	■						
Collect data (for training and testing)					■	■			■			
Train model						■	■					
Test model ourselves						■	■					
Get other people to test (gather survey data)							■					
Make adjustments as needed from feedback								■	■			
Make final presentation										■	■	
Final presentation												■
Final report											■	

everyone
sophia
stephanie
rachel