Project Gestur
by Reihlo

Kyle Carson, Ryan Kaveh, Jon Young, Ryan Lee, Ryan Tsukomoto
Introduction

Jon Young
4th Year EE

Ryan Kaveh
4th Year CE

Kyle Carson
4th Year CE

Ryan Tsukamoto
3rd Year ME

Ryan Lee
3rd Year ME
Background

Virtual Reality
Unintuitive controls for 3D
Limited haptic devices
Background

- Gestur glove as a bridge
- Intuitive virtual control
- Applications outside of VR
Subsystems

- Flex sensors
- AHRS
- Vibration motors
- Touch controls
Subsystems

- Flex sensors
- AHRS
- Vibration motors
- Touch controls
Subsystems

- LPC 4088 uC
- Sensor sampling
- Low pass filtering
- Com w/ bluetooth
- Battery board
Hardware

Iterative Design

- Two iterations thanks to Laritech
- First Capstone to use a BGA
- 2nd spin is 80% smaller
- Updated design
Hardware

- Dev kit
- Adaptable
- Redundancies
- Reused designs from past groups
- More of a backpack than glove
Hardware

- Closer to production model
- Significantly better design
- BGAs & 0603s
- Updated design for vibration motors
- Battery powered
- Fully wireless
- Smaller than a smartphone (2.5” x 5.5”)

Rev B
Construction

- All parts sewn onto glove/sleeve
- 3D printed wire rack/mount
- Challenges include:
  - Wire management
  - Sensor placement
  - Longevity
  - Durability (strain relief)
Construction

- Flex sensor testing & improvements
- AHRS testing
- Board reworking
Construction

Integration

**Graph:**

*Pointer, Middle & Ring Fingers When Closing and Opening Fist*

- **Y-axis:** 8 bit Digital Voltage
- **X-axis:** Individual Samples
- **Curves:**
  - Blue: Pointer
  - Red: Middle
  - Orange: Ring

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**Categories:**
- Introduction
- Background
- Overview
- Subsystems
- Hardware
- Construction
- Software
- Demo
- Finances
- Conclusion
Embedded Software

- FSM on LPC4088
- Communicates with host
- Poll & interrupt based state transitions
- Low power idle mode
- Will ensure board is always doing something useful
Software API Hierarchy

- Unity
- GAPI
- com0com
- GMDG
- GCORE

Software Overview

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Software

Gestur Model Data Generator

[Computer screen showing software interface with labels and data inputs]

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Software TouchBox
Demo

Unity

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### Finances

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<th>Description</th>
<th>Manufacturer</th>
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Prototype cost per glove: $888.67

Mass Production cost per glove: < $80.14
Conclusion

- Future Direction
  - New 3D-printed board rails
  - Different physical materials
  - More sensors
    - Optical
    - Heart rate
  - Integrate physical tracking with commercial VR headsets
  - Medical applications
- Reihlo
  - Datasheet
  - Website
  - Github
  - Open Source

GitHub

github.com/reihlo
reihlo.com
Thank you!

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And of course, our wonderful sponsors: