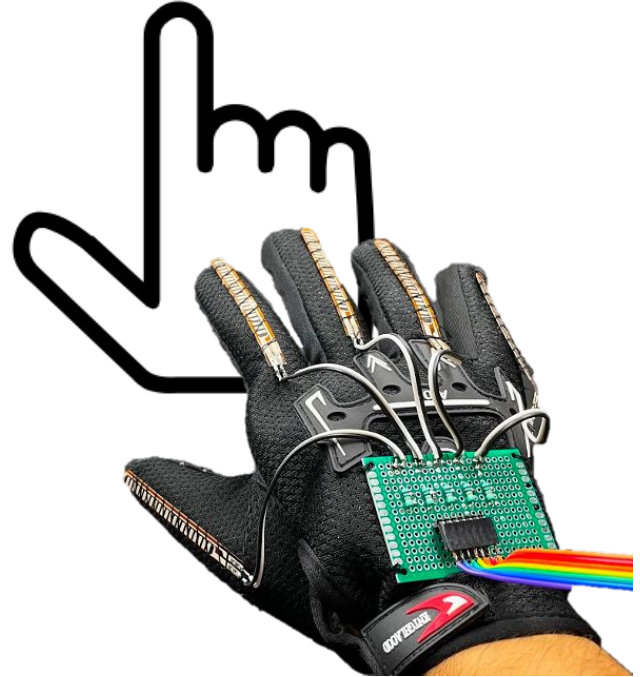# Mouseketool – Use Case

- Controlling your laptop from afar is difficult
- Remotes and mice are cumbersome away from desk

Solution

- The Mouseketool
- Implementation
  - Glove embedded with sensors that converts motion to mouse movement and touch to keystrokes

Solution Approach

- **Tailored to average user**
- **Wearable technology**
- **Uses Bluetooth (BLE)**
- **Accessible for limited mobility**

Use Case – Requirements

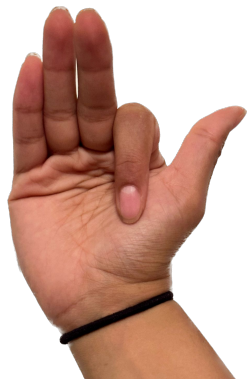| Requirement	Metric
Latency	300 ms
Weight	113-170 grams
Accuracy	90% user rating
Wireless Range	2.28 meters
Battery Life	2-3 hours

Gestures

First Finger Click

Second Finger Click

Third Finger Click

Mouse

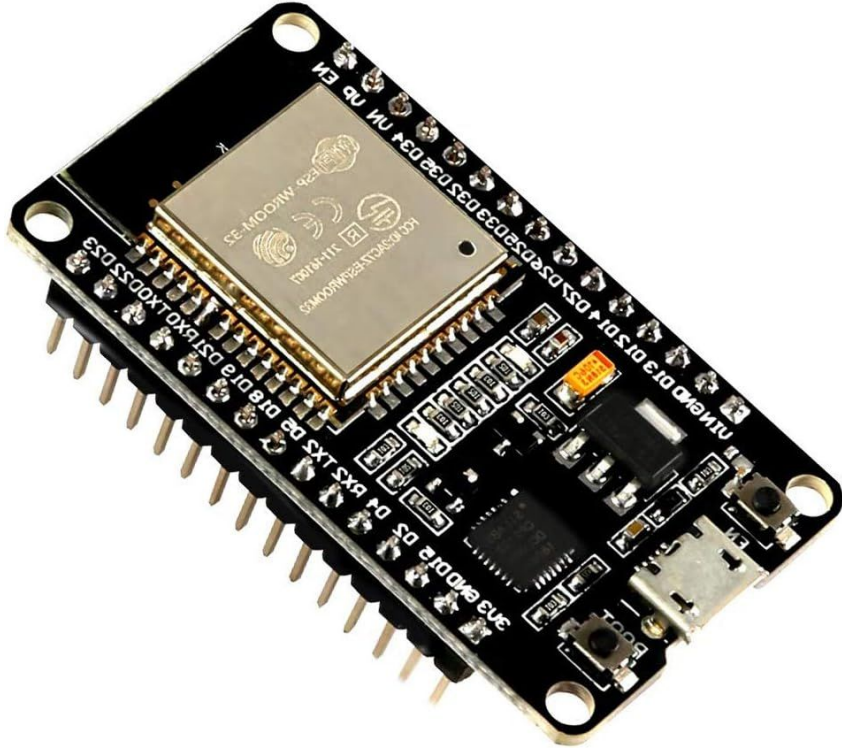First Finger Bent

Multiple Fingers Bent

All Fingers Bent

ESP32S Development Board

-    **> 15 ADC channels**
-    **Bluetooth Capability**
-    Wi-Fi Capability
-    Small Package: ~2 inches wide
-    Low Power Mode
-    Relatively cheap in cost

Components

Spectra Symbol Flex Sensor

Force Sensitive Resistors
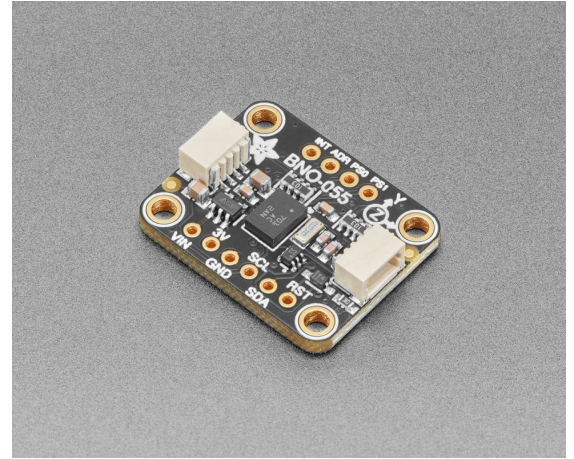
IMU

Hardware Diagram
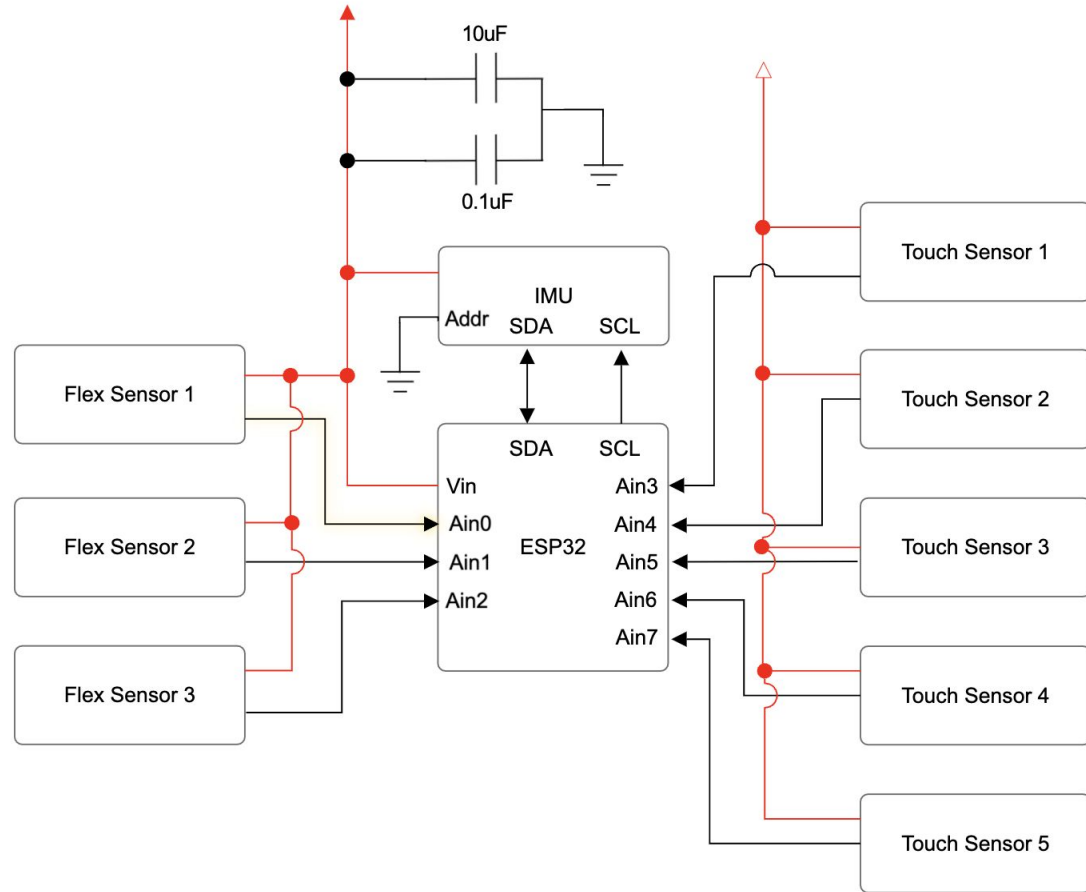
Software Diagram
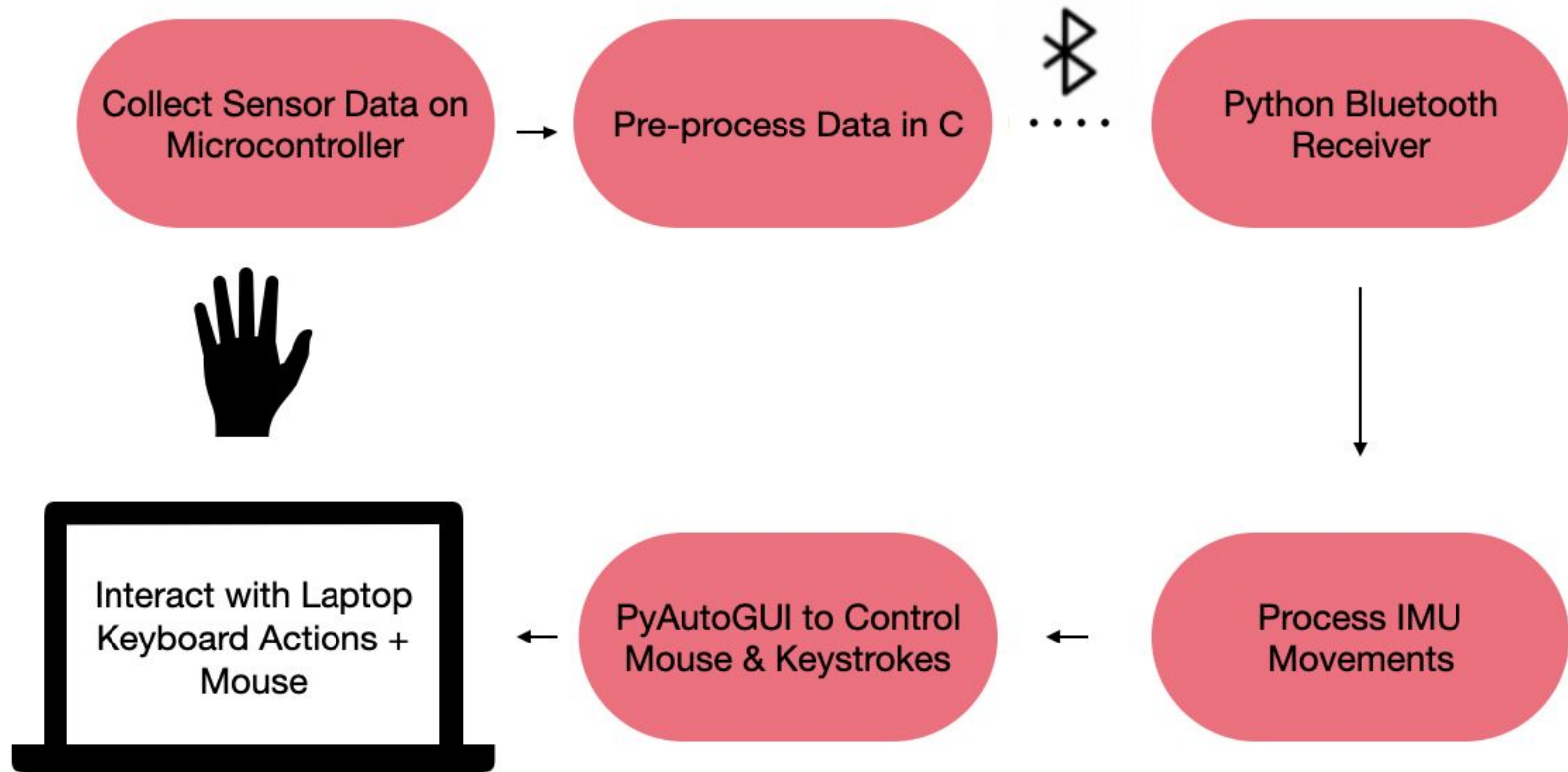
Testing, Verification, & Metrics – Latency

Latency	
Test Input	Individual sensor movement or target gesture
Passing Output	Gesture recognized & carried out in <= 300 ms
Risks	Various bottlenecks, BLE latency
Risk Mitigation	Speed up individual components, process more at the board-level
Failure Plan	USB
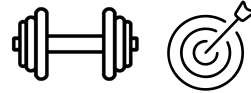
Testing – Weight & Accuracy

Weight	
Test Input	Weight of Glove
Passing Output	Weight between 113-170 grams
Risks	Battery weight
Risk Mitigation	Minimize weight of other components
Failure Plan	Opt for shorter battery life

Accuracy	
Test Input	Target gesture
Passing Output	Correct gesture recognized (>= 90%)
Risks	Sensor thresholding with different hand sizes
Risk Mitigation	Testing groups, wider thresholds
Failure Plan	Reduce gestures or make them more distinct

Testing – Wireless Range & Battery Life

Wireless Range	
Test Input	Distance between glove and laptop
Passing Output	Maximum distance >= 2.28 meters
Risks	Bluetooth networking
Risk Mitigation	Reducing interference
Failure Plan	USB

Battery Life	
Test Input	Time from full charge to dead board
Passing Output	Battery life >= 2-3 hours
Risks	Power requirements, sensor integrity
Risk Mitigation	Assume 85% battery life as our baseline
Failure Plan	Larger battery

ID	Name	11 Sep	17 Sep	24 Sep	01 Oct	08 Oct	15 Oct	22 Oct	29 Oct	05 Nov	12 Nov	19 Nov	26 Nov	03 Dec	10 Dec
1	Select uC board		███												
2	Select sensors & ensure compatibility		███												
3	Bluetooth Research		███												
4	Research Key Mappings		███												
5	Download & Implement uC Drivers			███											
6	Set Up Sensors w Comm Protocols & Drivers				███										
7	Test Sensors for Threshold Values				███										
8	Bluetooth Transmitter Setup				███										
10	Design Presentation				███										
9	Process Received Data				███										
11	Signal Processing Filters					███									
12	Interface IMU and Mouse					███									
13	Slack						███								
15	Write Code for Gesture 1							███							
14	Write Code for Gesture 2							███							
16	Write Code for Gesture 3								███						
17	Write Code for Gesture 4								███						
18	Small User Study									███					
19	Iterate on Design & Make Modifications										███				
21	Final User Study											███			
20	Final Modifications												███		
22	Final Presentation Preparation													███	
23	Final Presentation														███