

# CLIMB

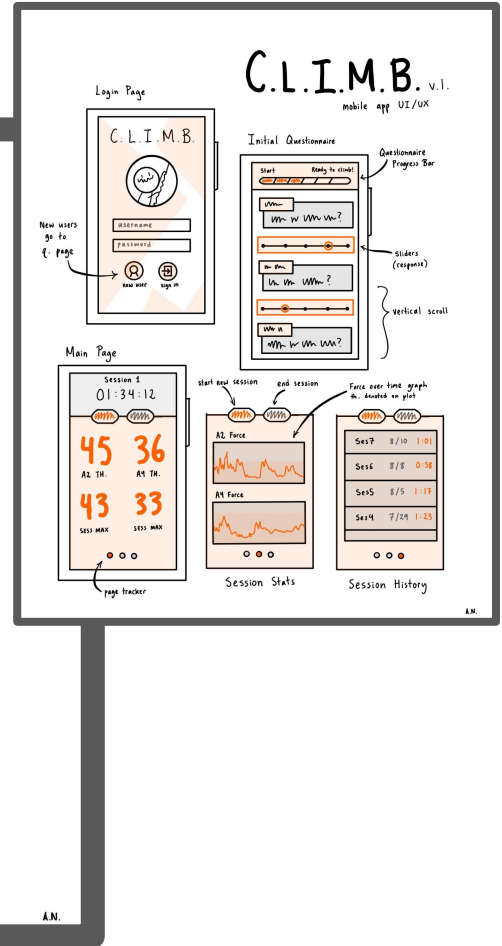
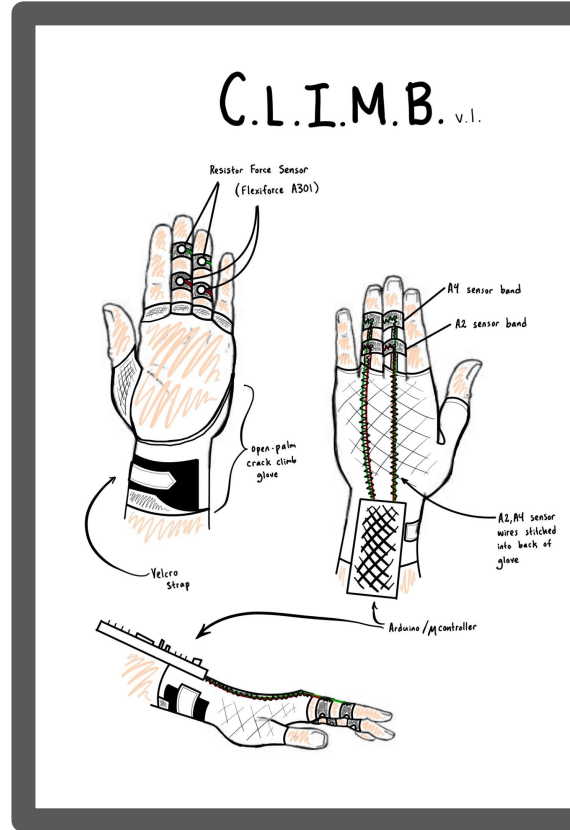
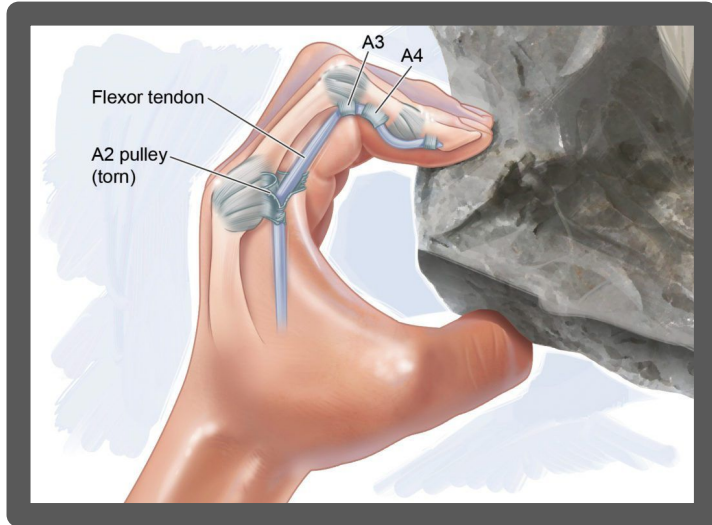
Climbers Ligament Injury Mitigation Band

## Design Review

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# Use Case

## Pulley Injury Prevention



# Use-Case Requirements

**Comfortable and unobtrusive**

**Seamless and user-friendly**

**Prevent pulley-injuries**

**Provide suggestive user-feedback**

# Technical Requirements

The sensors shall be placed such that **less than 30%** of per-finger surface area is covered.

The device shall be sensitive up to **70 lbs of force per sensor**.

On-device haptic alarm shall fire **within 200ms** from when user's breach the safety threshold.

Analytics and suggestive feedback shall display **within 10s** of workout completion.

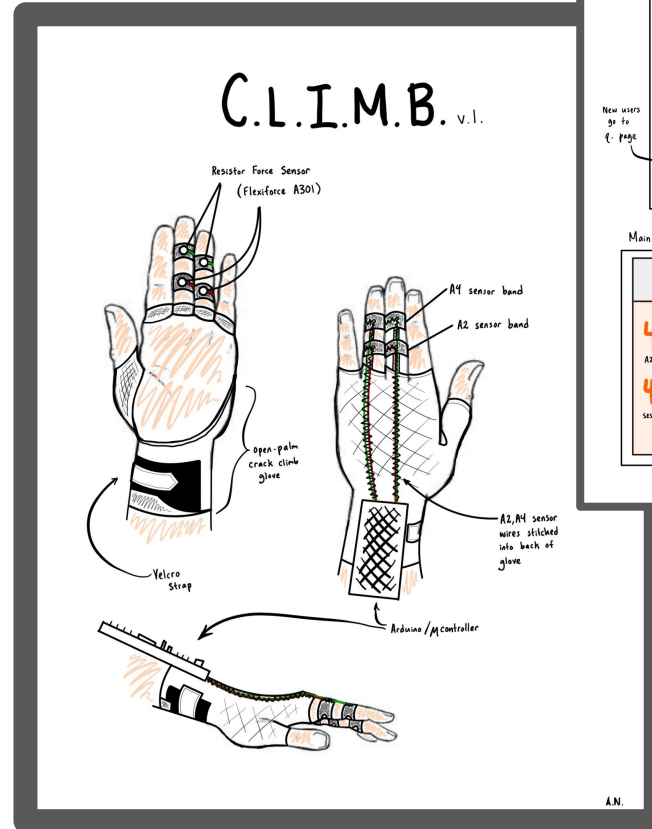
# Solution + Approach

## Wearable Device

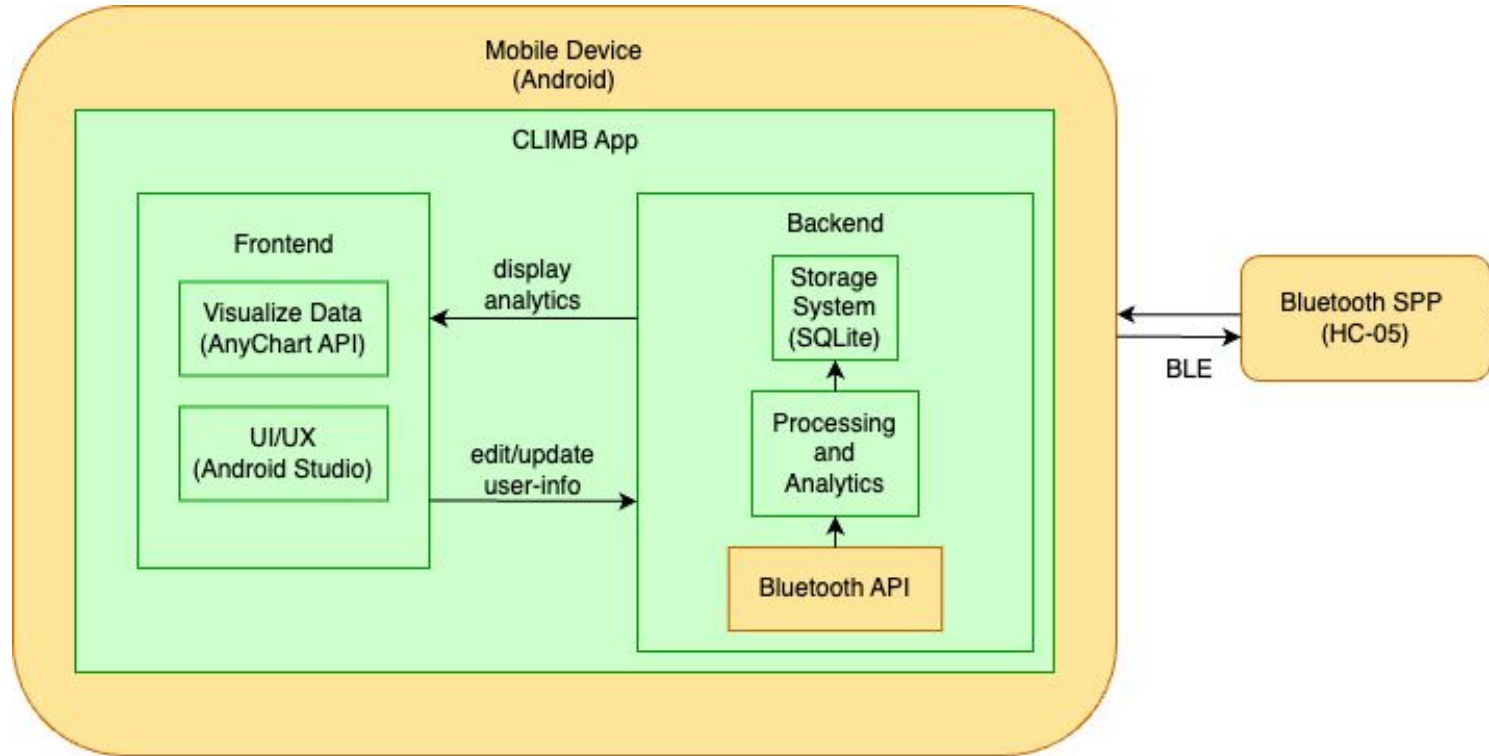
- **Safety:** Sensors to measure force distribution
- **Safety:** Alarm systems to prevent injury
- **Economic:** Mitigates healthcare costs incurred by injury

## Mobile App

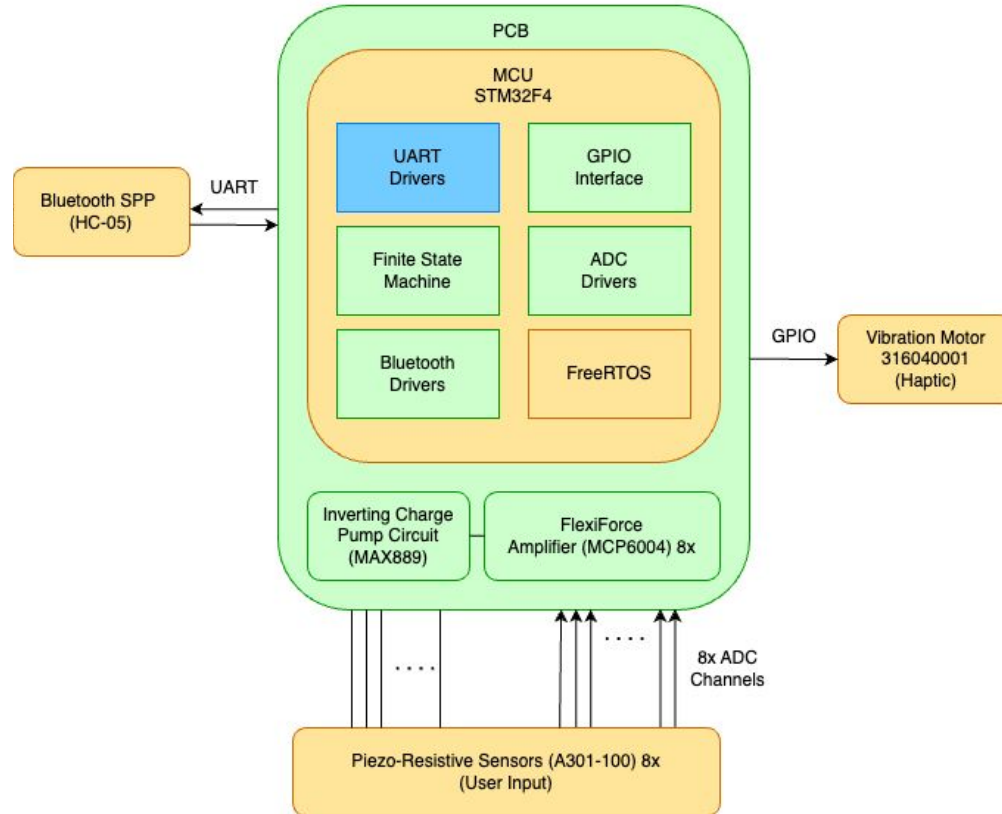
- **Safety:** Determine safety thresholds
- **Safety:** Display and analyze session data
- **Social:** Compare training progress with others



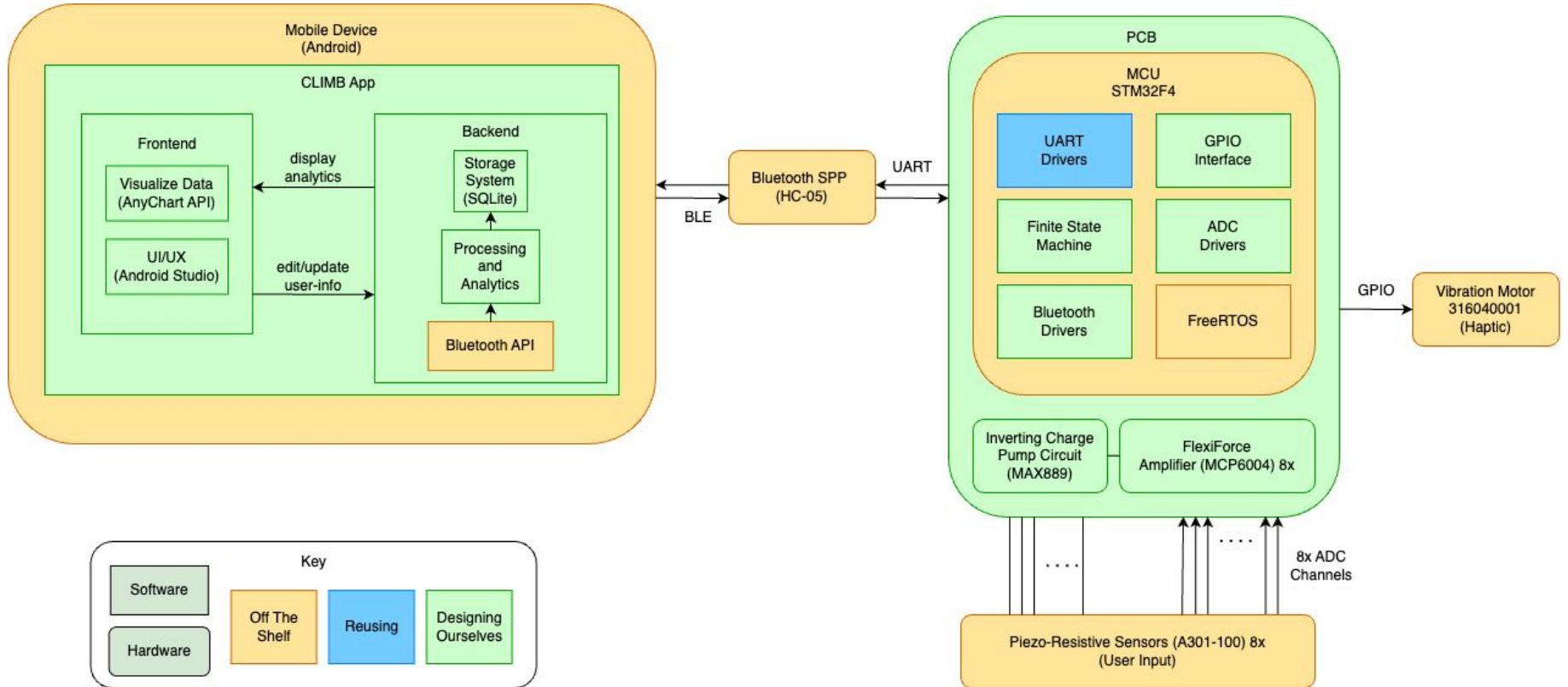
# System Specification: SW



# System Specification: HW



# Implementation Plan





# Unit Testing

## Alarm Test

**Input:** (PRE: threshold == 10lbs), 10 lbs placed

**Output:** alarm vibrates within 200ms

## Force Reading Test

**Input:**  $\Delta 1$  lb

**Output:**  $\sim \Delta 40$  mV

## App Visual Test

**Input:** Mock 50 pressure readings in database

**Output:** AnyChart API displays appropriate graph

## Bluetooth Connectivity Test

**Input:** 5 Hz packet send for 2 mins

**Output:** All packets received

# Verification and Risk Management

## Alarm

**Risk:** If the alarm fails or user isn't alerted

**Mitigation:** Add a second alarm that fires 1s after first if sensors still read above threshold

## Force Reading

**Risk:** Under shear force sensors may lose sensitivity

**Mitigation:**  
cross-reference with neighboring sensors

# Integration Testing

## (SW) Mobile App Test

**Input:** One mocked bluetooth reading into backend processing functionality; one local threshold update query

**Output:** Inputs apply to database within 10ms, datapoint is visualized by AnyChart API

## (SW+HW) System Test

**Input:** varying force placed on sensor over 5 mins

**Output:** app receives and displays all data correctly

## (HW) Wearable Device Test

(PRE: threshold == 10lbs)

**Input:** 10 lbs placed on sensor

**Output:** alarm fires within 200ms and force readings data ship via bluetooth within 1s

