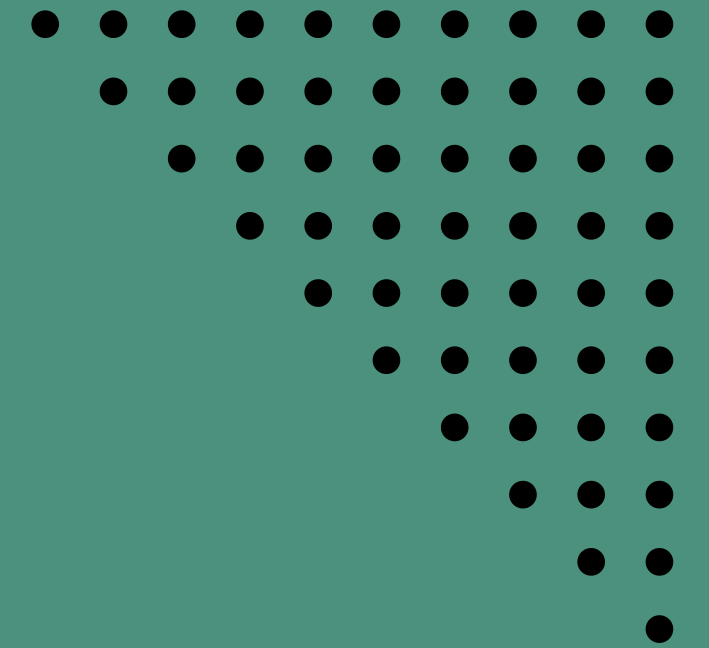
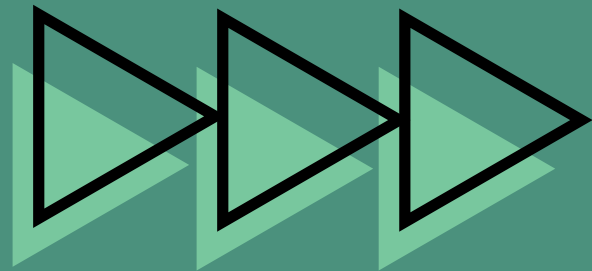
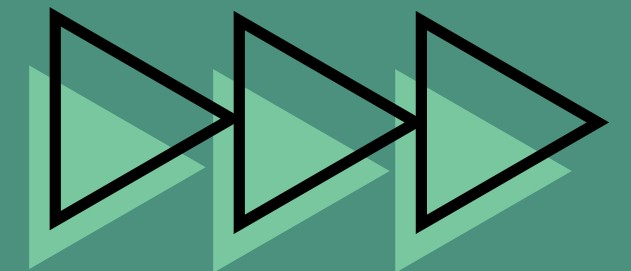
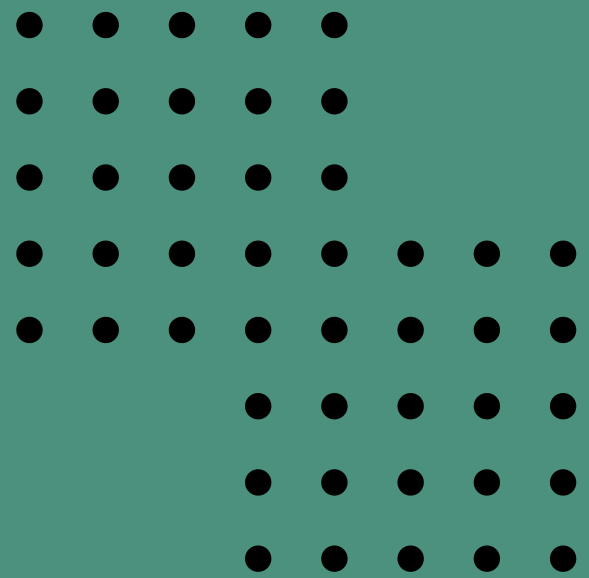


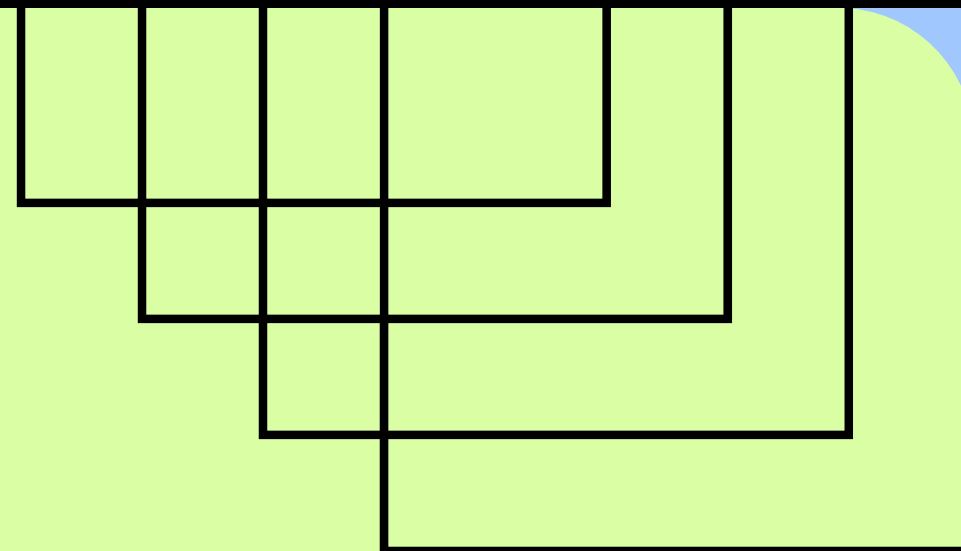
# MAKE - A - THON 2025



# KNEEdless To Say



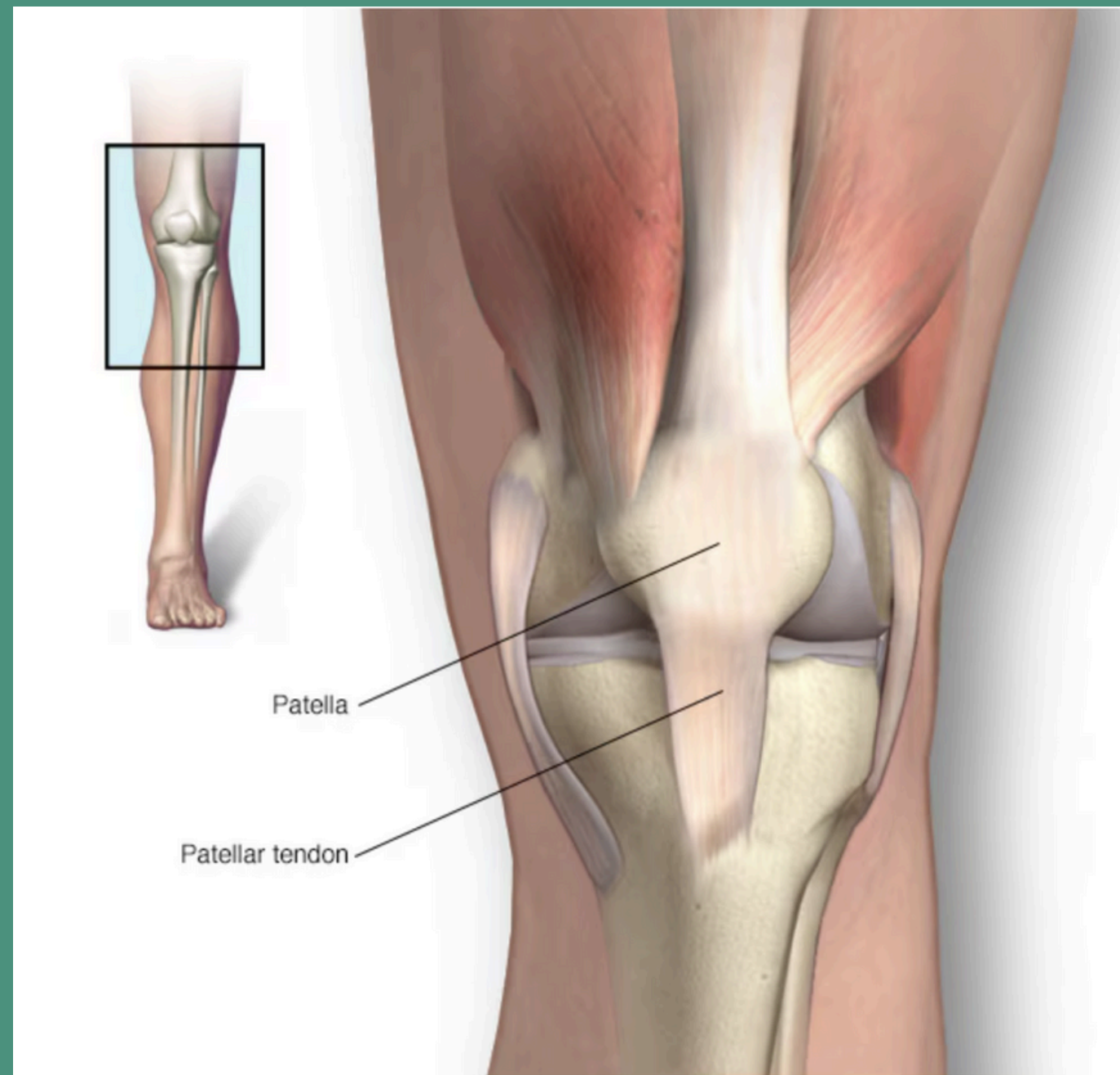
Abir Bhatt, Brenda Santeliz, Joel Etchri, Leo Crampé, Vrinda Gandhi, and Zach Eggleton



# Our Problem



# PATELLAR TENDONITIS



## What is it?

An injury to the tendon connecting the kneecap to the shinbone.

## What causes it?

Overuse from repeated stress on the patellar tendon.

## Who's at risk?

Common in athletes who jump (basketball, volleyball), but anyone can get it.

## Demographic?

15-30 years

## Why is it important?

The patellar tendon helps with kicking, running, and jumping—hence the name "Jumper's Knee."

# MEET OUR PATIENT

NAME: Joel Etchri

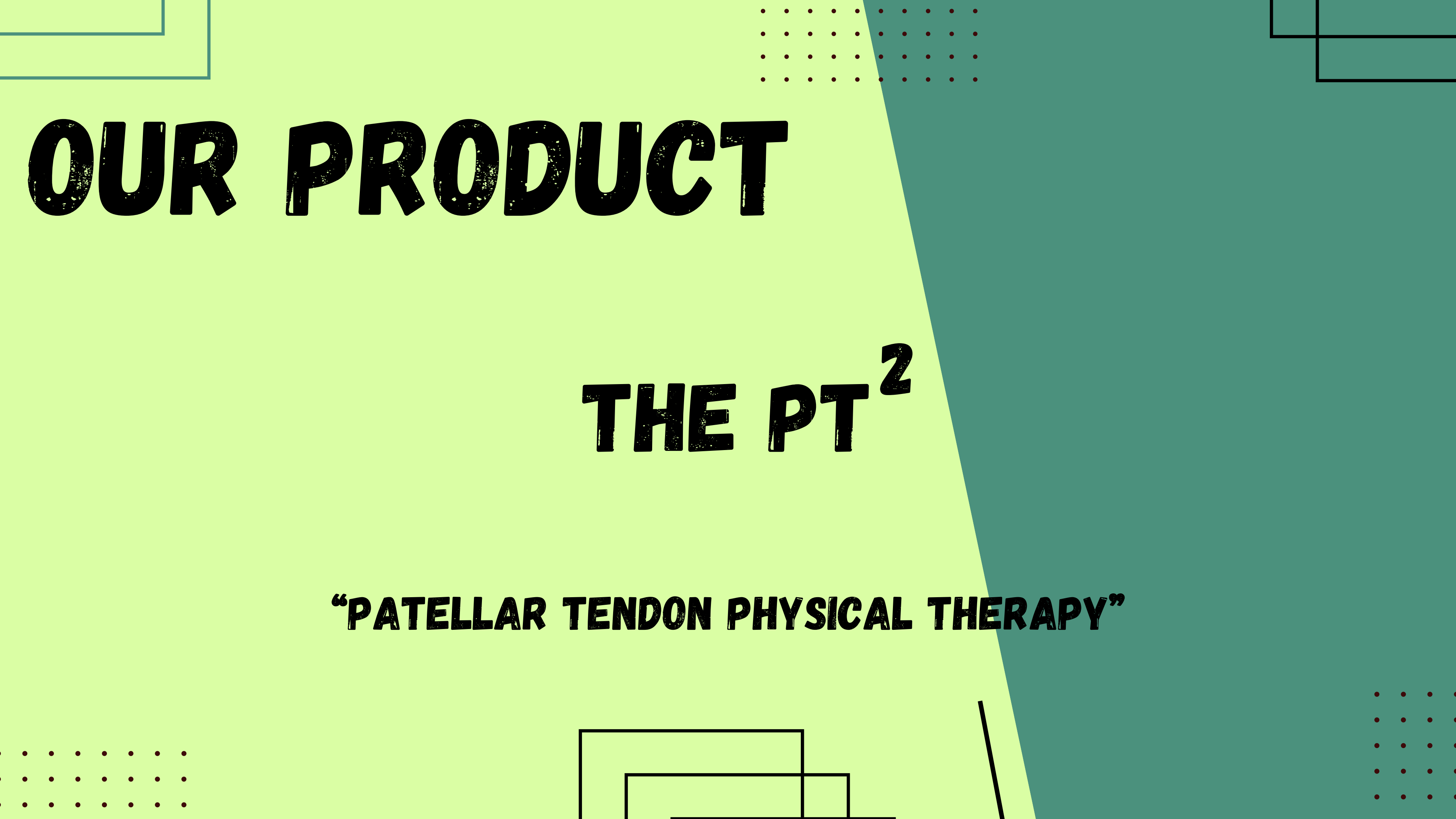
AGE: 16

CAUSE OF INJURY: Repeated  
jumping in soccer

SYMPTOMS: Knee pain when  
jumping, running, squatting

CURRENT TREATMENT IN PT:  
Isometric Strength, Periodic  
Electrotherapy, Ultrasound



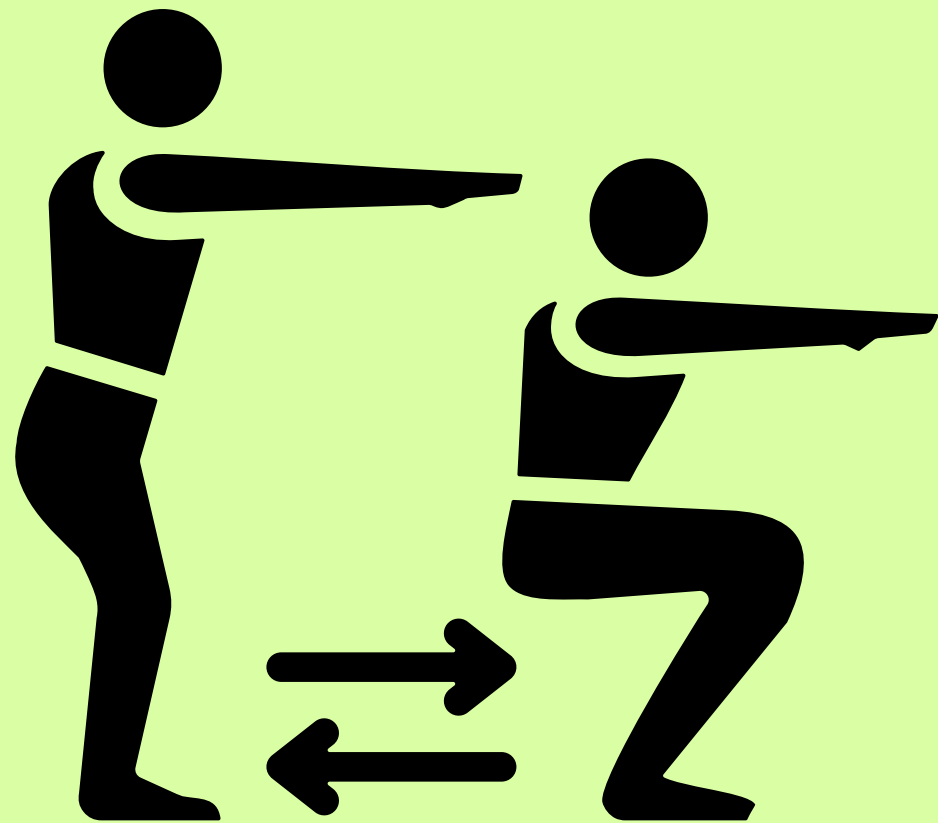
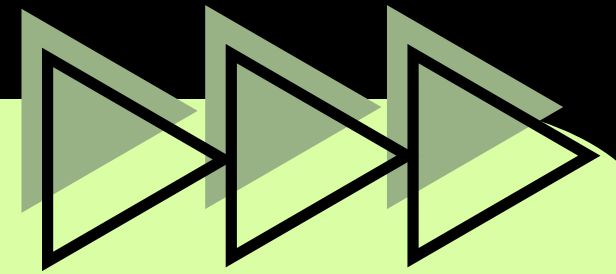


**OUR PRODUCT**

**THE PT<sup>2</sup>**

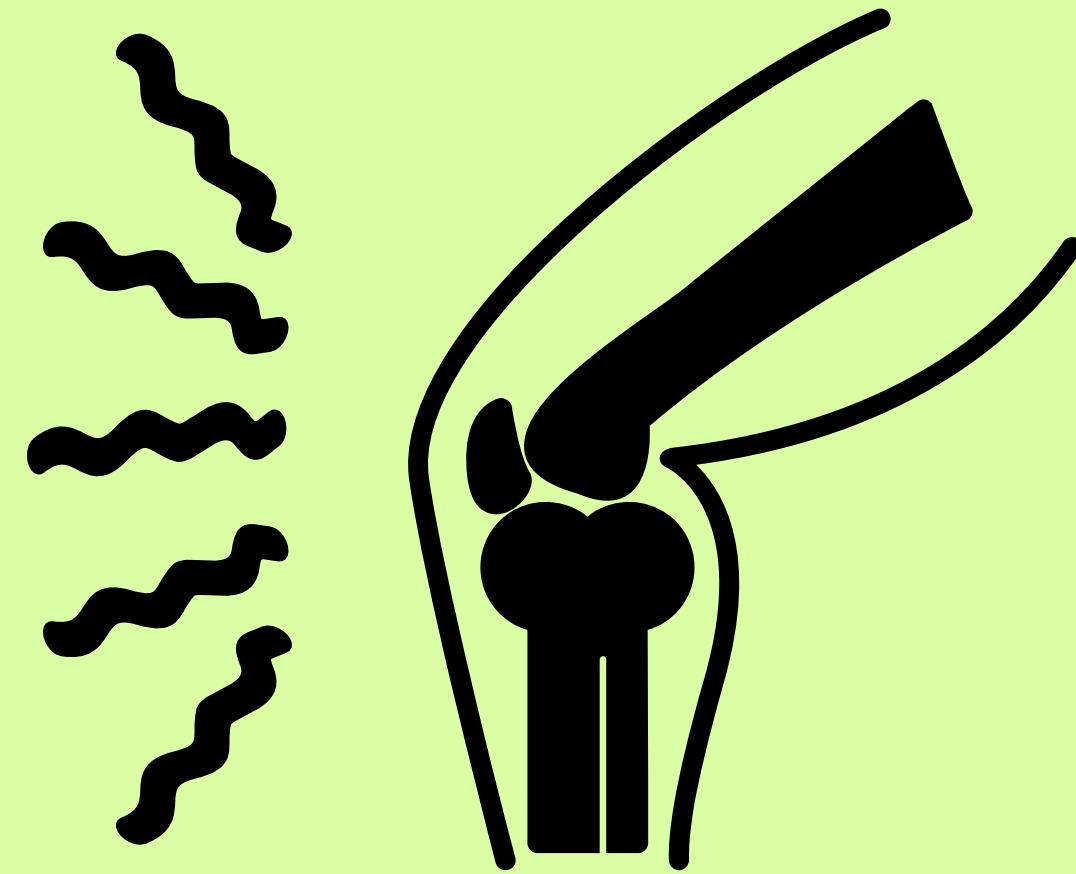
**“PATELLAR TENDON PHYSICAL THERAPY”**

# Treatments



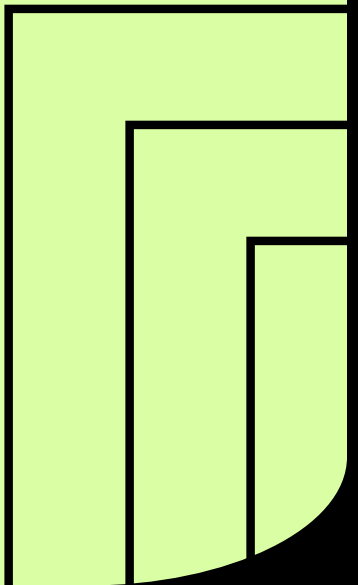
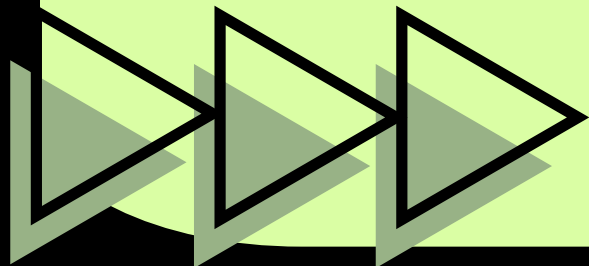
## Isometrics & Strength Exercises

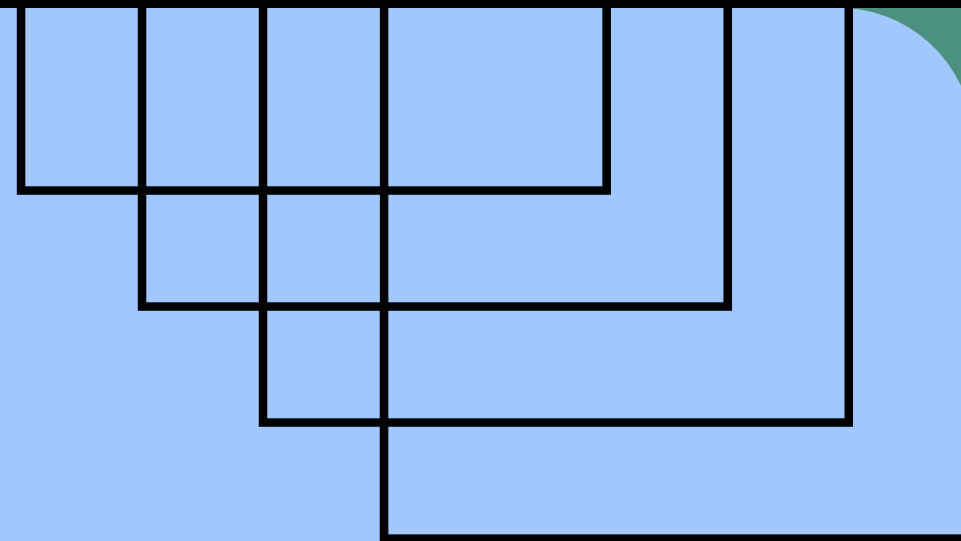
Slow, controlled leg lowers and steady isometrics help heal the patellar tendon.



## Vibration Therapy

Massage guns relieve pain and break down scar tissue.



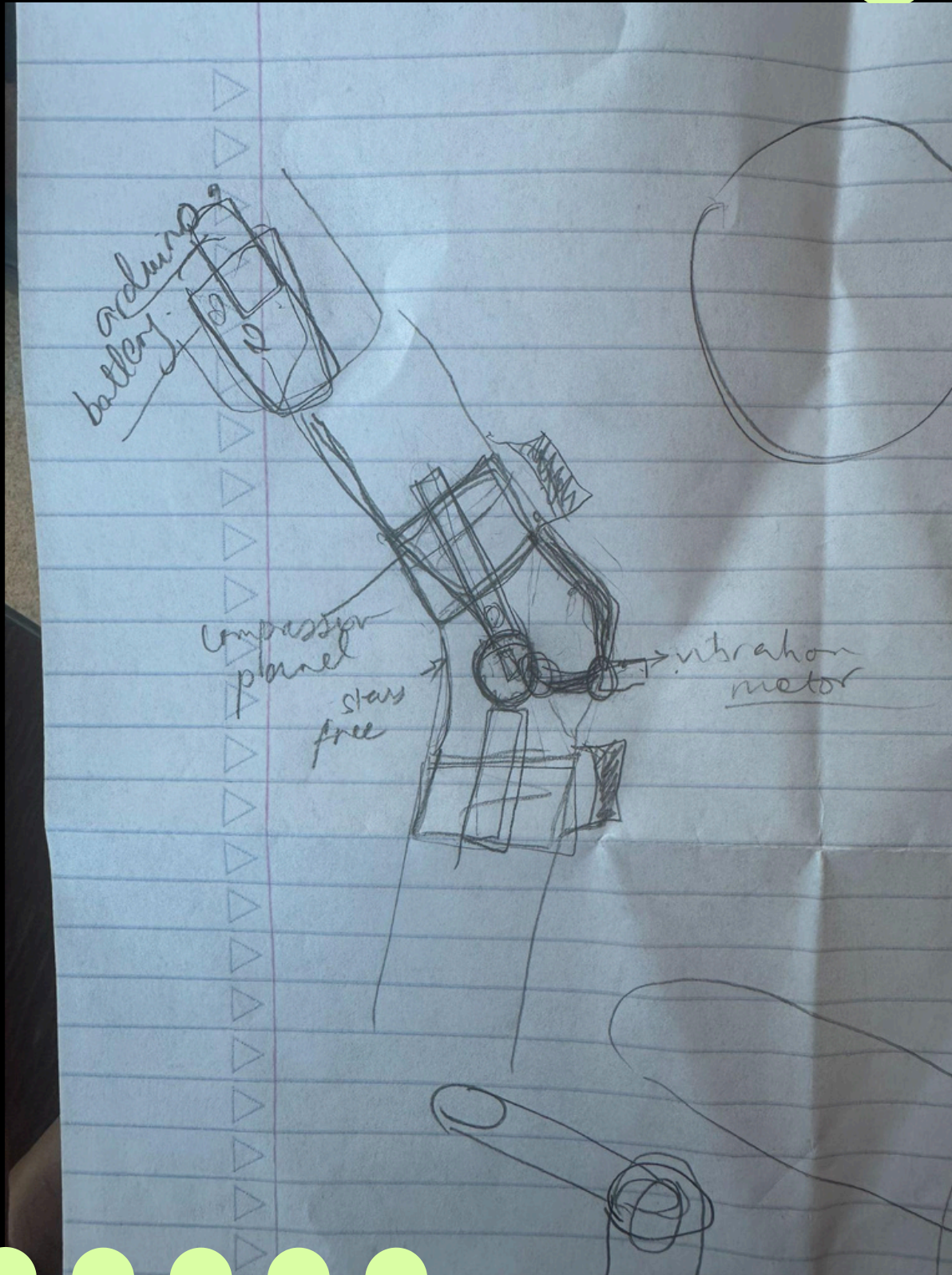


# Our Solution & Design

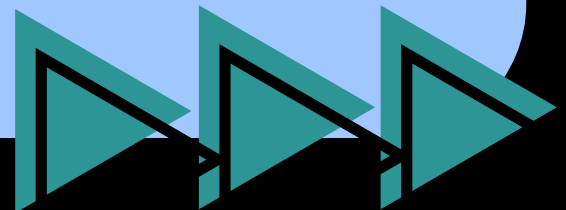




# Initial Design



1. A corrective brace that alerts users of poor form during exercises.
2. Attachable vibrating module to break down scar tissue and relieve pain.
3. Comfortable for compression and support

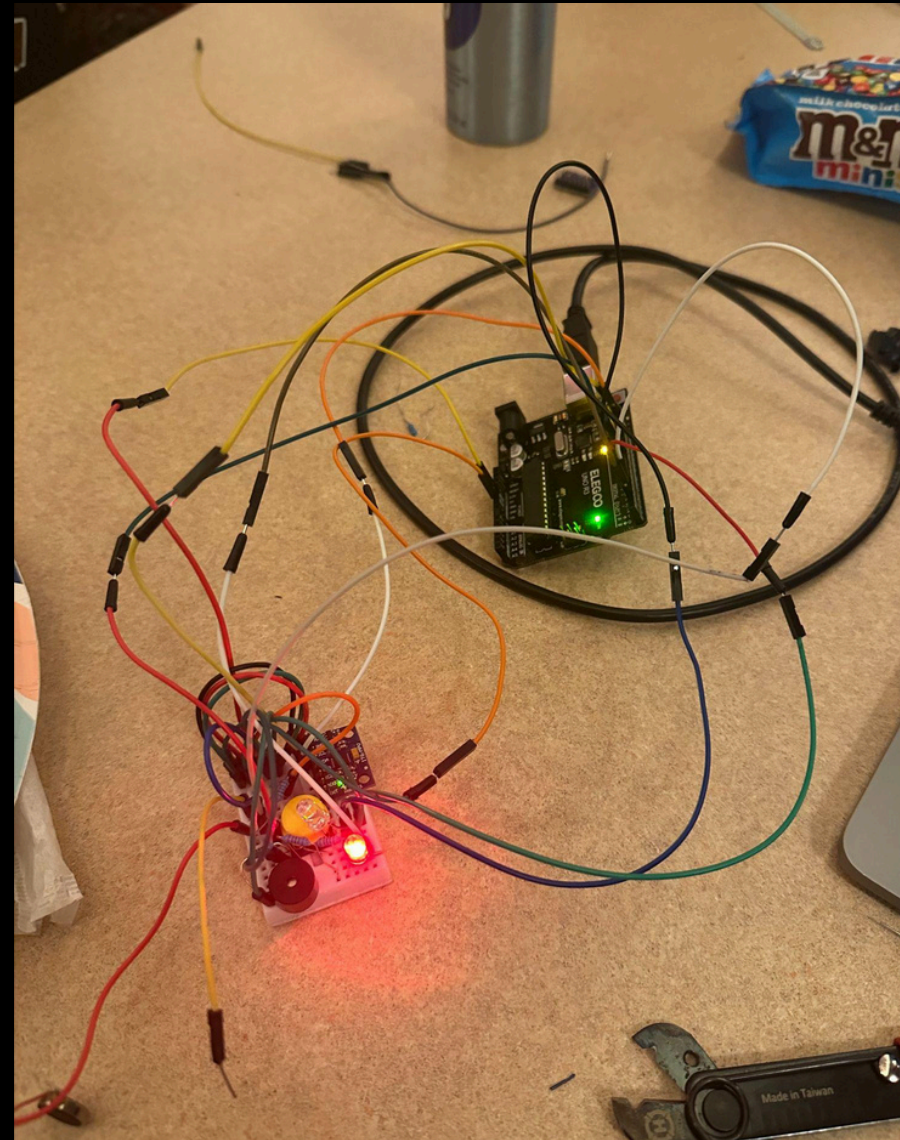




# How it Works



+



=







-----  
Acceleration X: 0.71 m/s<sup>2</sup>, Y: 9.73 m/s<sup>2</sup>  
-----

Acceleration X: 1.34 m/s<sup>2</sup>, Y: 9.15 m/s<sup>2</sup>  
-----

Acceleration X: 0.51 m/s<sup>2</sup>, Y: 9.32 m/s<sup>2</sup>  
-----

Acceleration X: 0.65 m/s<sup>2</sup>, Y: 9.37 m/s<sup>2</sup>  
-----

Knees Caving In!

Acceleration X: 0.79 m/s<sup>2</sup>, Y: 9.17 m/s<sup>2</sup>  
-----

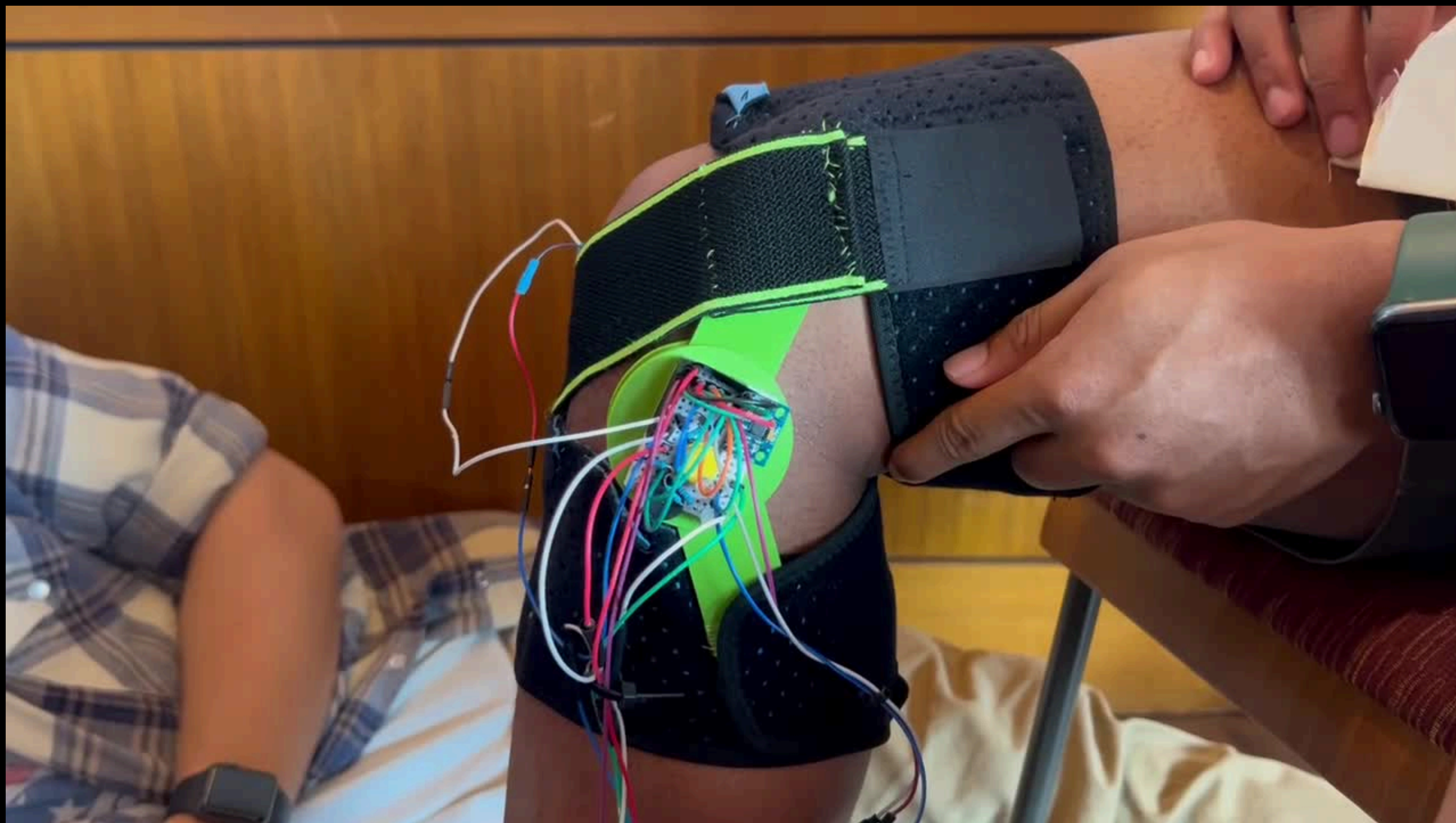
Acceleration X: 0.40 m/s<sup>2</sup>, Y: 9.42 m/s<sup>2</sup>  
-----

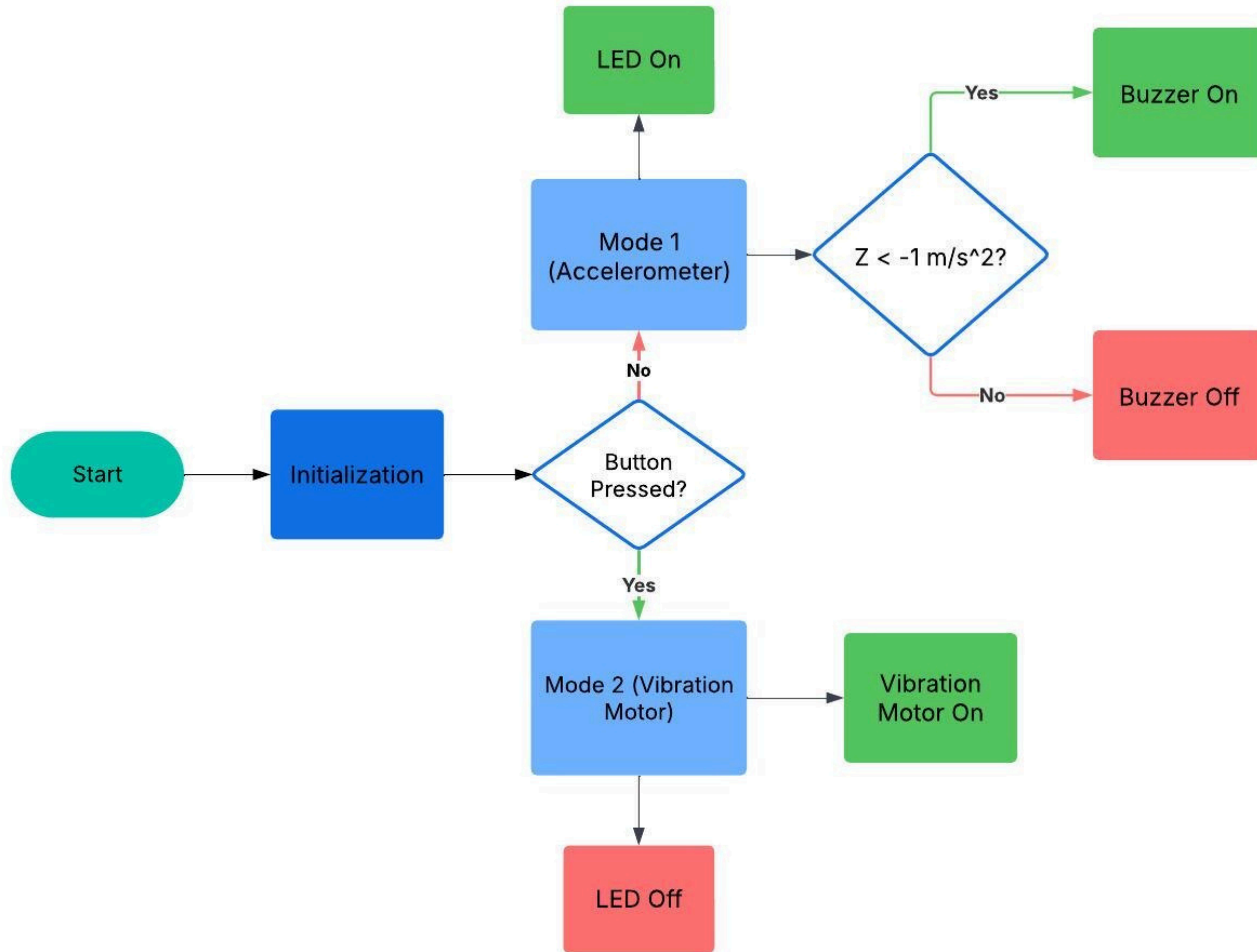
Acceleration X: 0.53 m/s<sup>2</sup>, Y: 9.48 m/s<sup>2</sup>  
-----

Acceleration X: 0.27 m/s<sup>2</sup>, Y: 9.32 m/s<sup>2</sup>  
-----

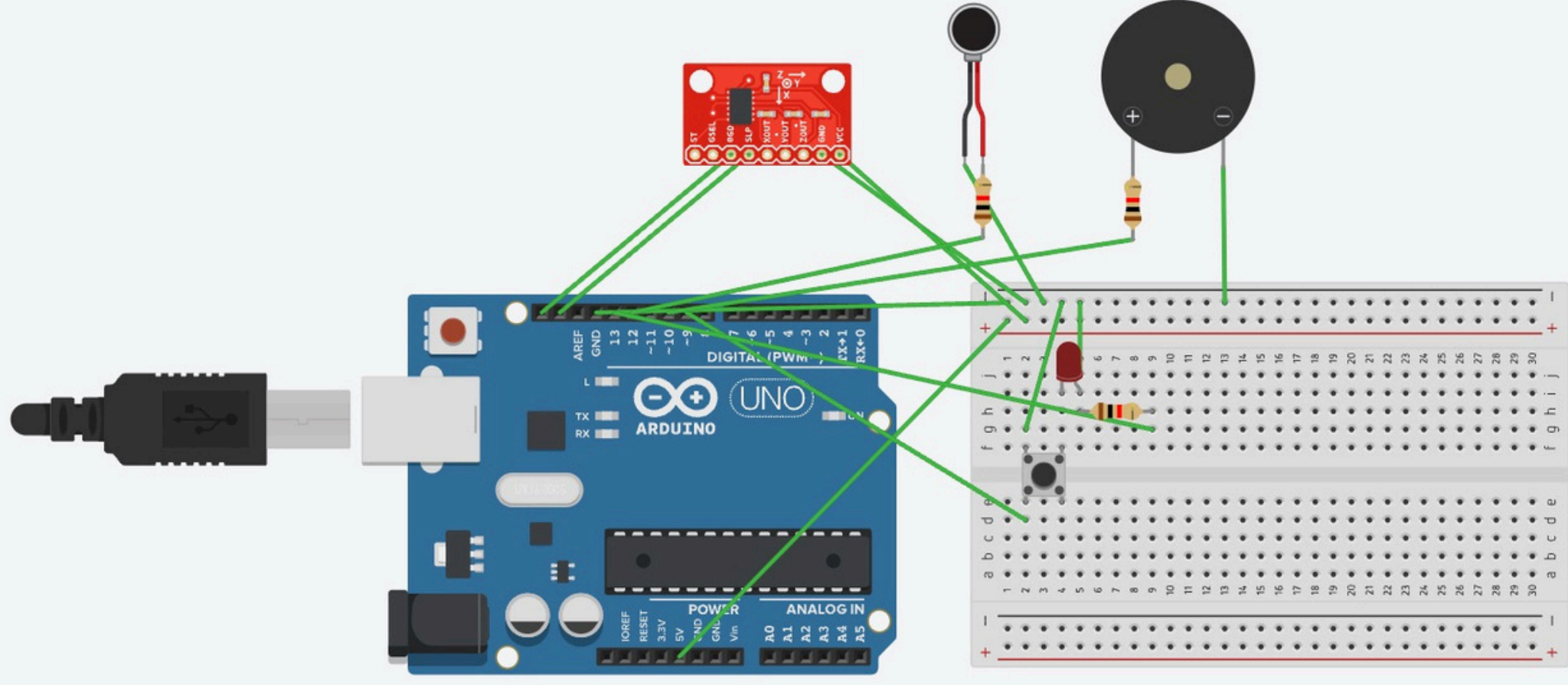
Acceleration X: 0.00 m/s<sup>2</sup>, Y: 9.83 m/s<sup>2</sup>













# Product Instructions



3

**straps**



2

**modes**



1

**brace**



# Why our Product?





**CONVENIENCE.**

Three speech bubbles are arranged on a teal background. The top bubble is the largest and contains the text 'Efficient PT Sessions'. The bottom-left bubble is medium-sized and contains 'No Need for a Massage Gun'. The bottom-right bubble is medium-sized and contains 'At Home Guidance'. All bubbles have a thick black outline and a small tail pointing towards the bottom-left.

Efficient PT Sessions

No Need for a Massage Gun

At Home Guidance

# The Current Market



FEATURES	OUR DEVICE	REGULAR BRACE	MASSAGE GUN
REAL-TIME FEEDBACK	✓		
VIBRATIONAL THERAPY	✓		✓
SMART MOVEMENT TRACKING	✓		
AFFORDABLE	✓	✓	



Cordless Knee Massager with Heat and Vibration, Heating Pad for Knee Elbow Shoulder, Heated Kn...

★★★★☆ 928  
100+ bought in past month  
\$39<sup>99</sup> (\$39.99/Count)



DonJoy Performance  
Webtech Short Knee Brace  
●● \$60.99  
★★★★☆ (40)



# Manufacturing & Cost Breakdown

## COMPONENT

## COST P/U

▶ Arduino

\$22 ◀

▶ Accelerometer

\$6 ◀

▶ Vibration motor

\$3 ◀

▶ Knee brace

\$10 - \$15 ◀

▶ **Total Cost (estimate)**

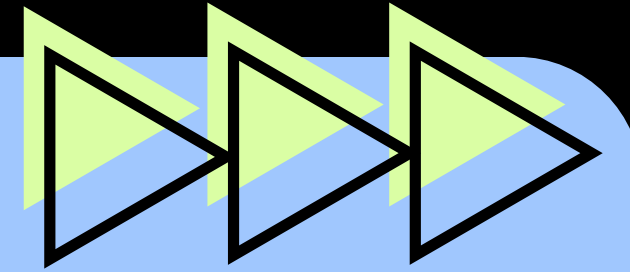
**\$40 - \$47 ◀**

# Future Additions

- Tracks patient progress to inform physical therapists.
- Data is uploaded to an app (with patient consent) for therapists to monitor at-home progress.
- Includes range of motion, squat depth, and exercise frequency.
- Boosts physical therapy productivity, especially for patients with limited insurance coverage.



# References



- <https://www.mayoclinic.org/diseases-conditions/patellar-tendinitis/symptoms-causes/syc-20376113>
- <https://myhealth.alberta.ca/Health/aftercareinformation/pages/conditions.aspx?hwid=bo1598>
- <https://www.mayoclinic.org/diseases-conditions/patellar-tendinitis/diagnosis-treatment/drc-20376118>
- <https://www.donjoystore.com/knee-injuries/patellar-tendonitis-jumpers-knee>
- <https://www.nhslanarkshire.scot.nhs.uk/services/physiotherapy-msk/patellar-tendinopathy/#:~:text=Patellar%20tendinopathy%20can%20affect%20anyone,such%20as%20football%20and%20tennis.>
- ChatGPT helped with writing some of the code.

