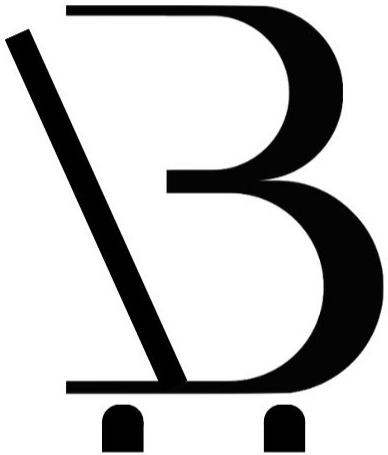
forge

Showcase

Back Buddy

Northeastern University
Michael J. and Ann Sherman Center for Engineering Entrepreneurship Education

SUPPORT THAT HAS YOUR BACK



BACK BUDDY

Problem Statement

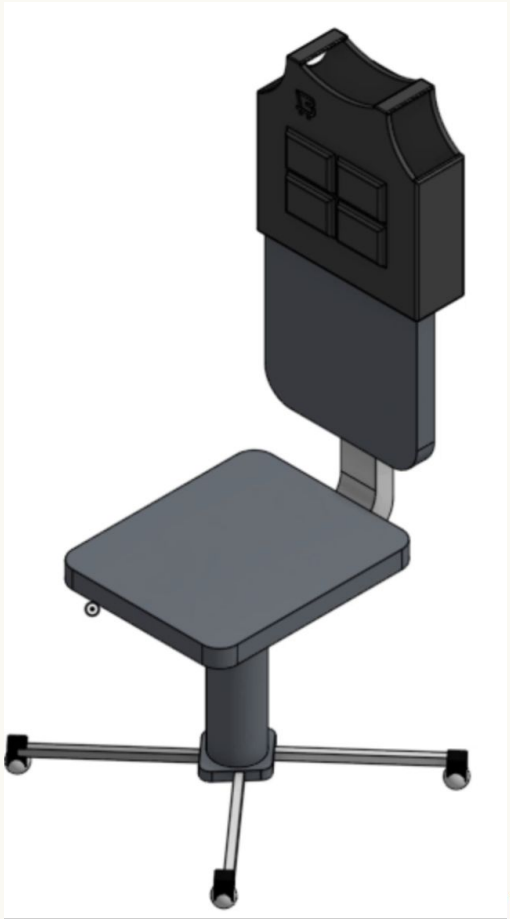
Over **619 million people** worldwide suffer from low back pain, the leading cause of disability globally (WHO). In the U.S., **80% of adults experience back pain**, often linked to poor posture from long hours of sitting. Those who sit over 8 hours a day are twice as likely to develop chronic pain (ACA). Despite this, posture awareness tools remain limited and underused.

Our Vision

To create a world where good posture is **effortless, accessible, and integrated into everyday life**. Back Buddy empowers people to take control of their spinal health through smart, intuitive support

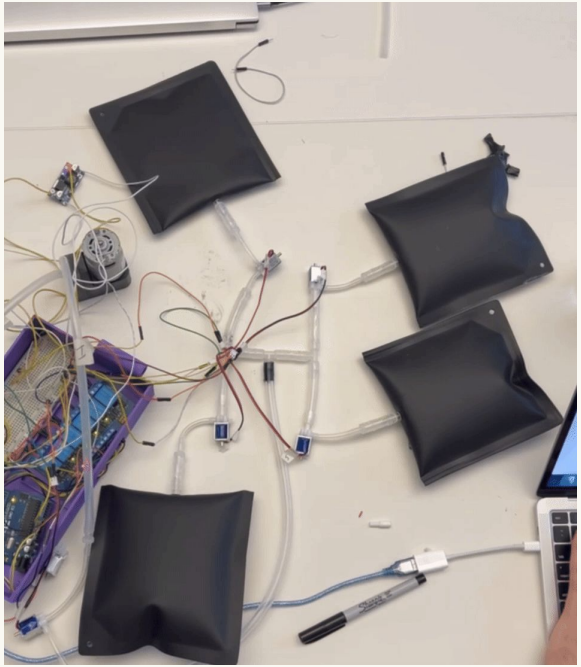
Product Pitch

- Portable posture pad that provides instant, adaptable support for maintaining proper posture while seated.
  - Lightweight, easy to carry, and rechargeable!
  - Features **air cells that inflate** in response to pressure sensors, gently pushing the user to **adjust their posture** and maintain proper spinal alignment.
  - App that provides progress, control, and allows for setting goals!



Mechanical Overview - System

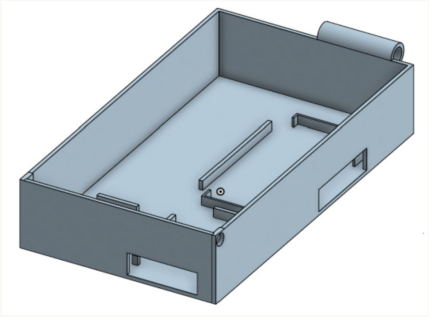
Air Cells



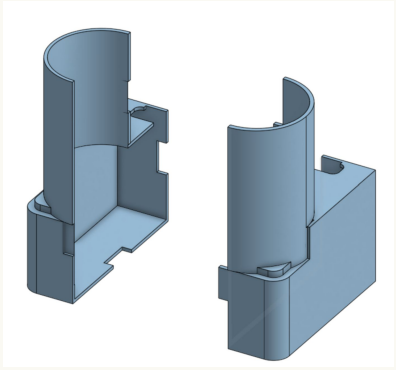
Tubing System

Fabric - Nylon Water Repellent

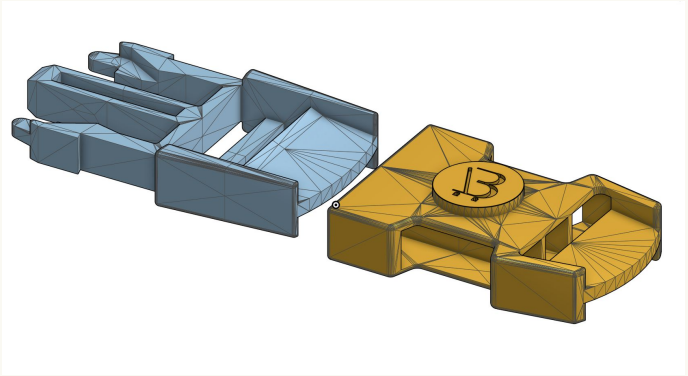
Mechanical Overview - CAD



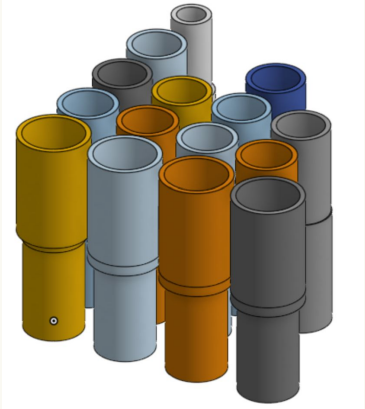
Electronics Box



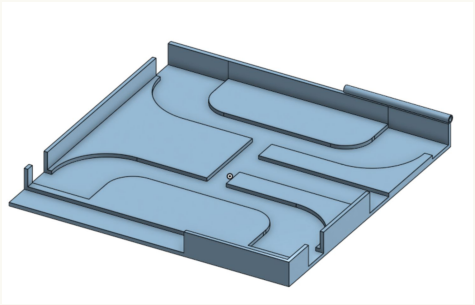
Pump Housing



Branded Buckles



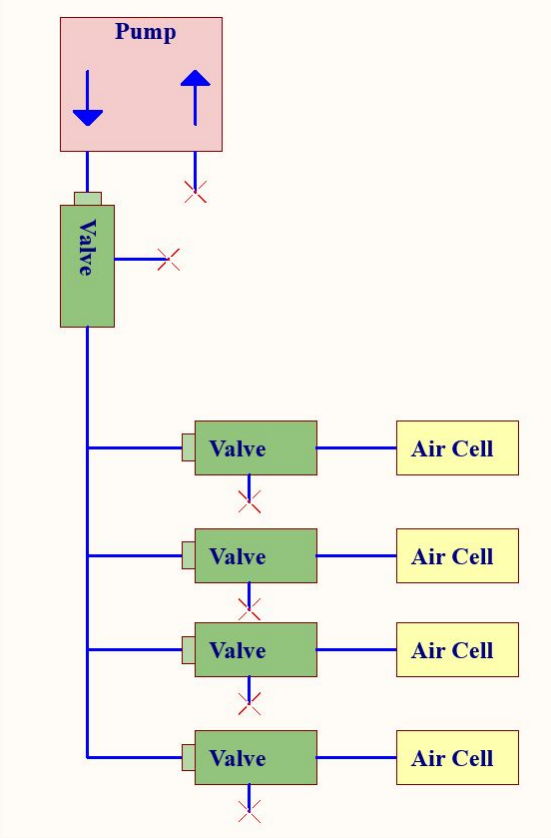
Tubes' Connectors



Valves Housing

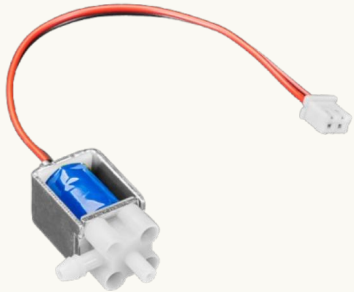
Air Flow System

- Power to the valves changes direction of airflow
- Allows for air cells to be individually inflated/deflated
- Extra valve for extra air flow when exhausting air



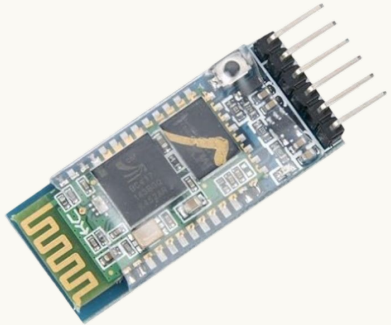
Electrical Components Used

Valves



Pressure sensors

BLE Bluetooth Module



Arduino Uno

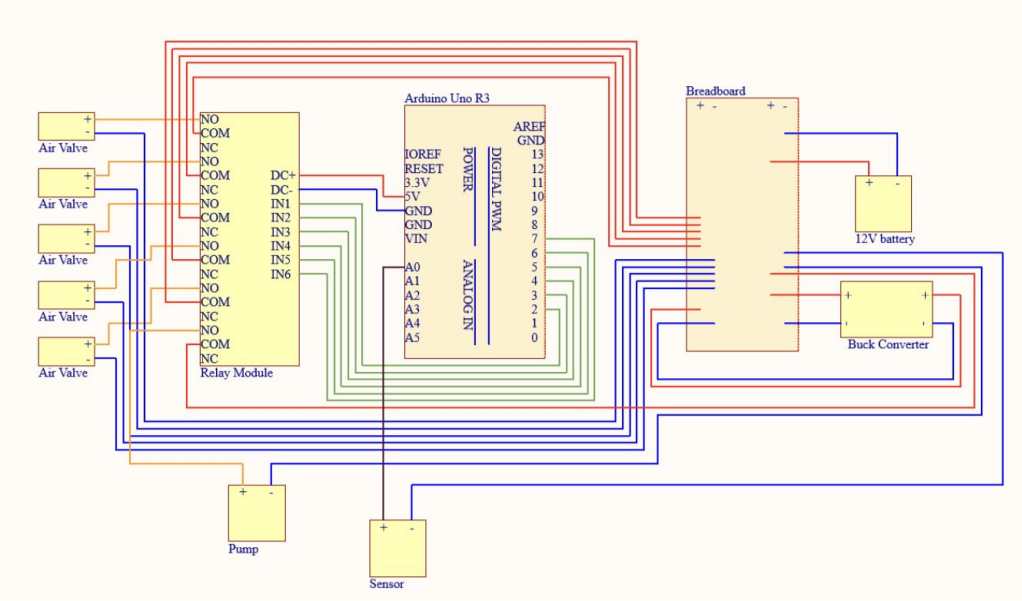
Air Pump

Relay Module

Rechargeable Battery

Electrical Overview

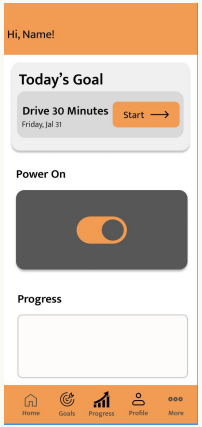
- Arduino controls pump and valves to adjust air cells.
- Relay module manages individual valve activation.
- Pressure sensor provides real-time feedback.
- Powered by 12V battery with buck converter.



Software/App Overview

- Developed using React Native, which is a cross platform compatible app development library.
- BLE integration with react-native-ble-plx and react-native-ble-manager libraries.
- Demo on the next slide!

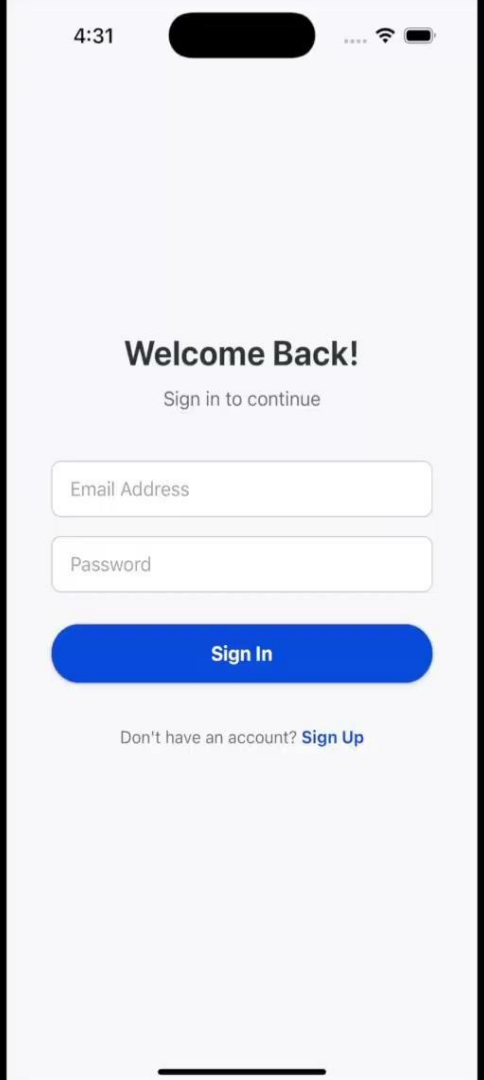
Design



Figma

Implementation

React Native


4:31
Welcome Back!
Sign in to continue
Email Address
Password
Sign In
Don't have an account? Sign Up

App Key Features

- User account creation through Firebase
- Log and track posture goals
- Remotely power the device on/off
- Email reminders and stats about user posture settings
- Monitor exact pressure values from the hardware, monitor pressure

Next Steps

- Mechanical
  - Redesign the back of the fabric to allow for better wire management to make the product as seamless as possible
  - Using thinner tubes for easier tube management inside the fabric
  - Creating different sizes of Back Buddy to accommodate more people and different types of chairs
- Electrical/Software
  - Clean up wiring
  - Utilize bluetooth module to communicate between the product and the app
  - Incorporate additional sensors to enhance the data from Back Buddy
  - Add more air pumps for more precise control

Lessons Learned

- Increasing the scope of testing to different scenarios
- Assemble the product as soon as each of the individual components are tested
- Achieve the attainable goals first before trying to get to the reach goals to ensure functionality first
- Cross-disciplinary collaboration is powerful :)