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COMPOSE THE FUTURE

NMDE-404
INTERACTIVE IV
PROJECT 2

DESIGNING INNOVATIVE INTERFACES WITH HEAD TRACKING AND FACIAL GESTURES

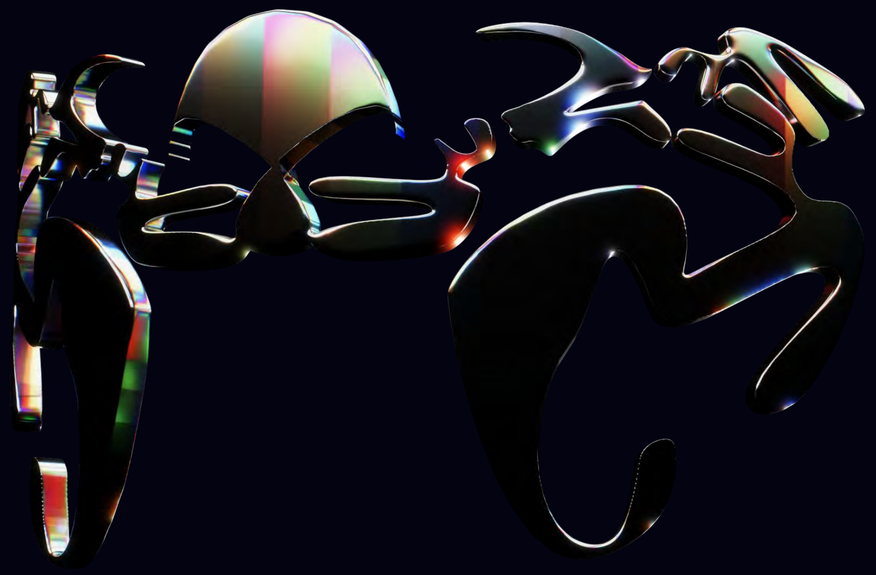
OVERVIEW

TIMELINE

5 weeks

TOPICS

Music & Accessibility



PROMPT

Work in teams to design a product interface that can be navigated and controlled entirely through head tracking and facial gestures.

This project is both product- and business-focused, challenging conventional input methods and pushing the boundaries of UI/UX design to drive innovation.

CONCEPT

Aria is a wearable, extremity-free instrument that produces sound based on the movement of your head and jaw.

The prototype was built with an Arduino Uno, various sensors, wire, tape, and rubber bands. The final design was modeled and rendered in Cinema4D.

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CONCEPT

creating a wearable, touch-free instrument

Taking inspiration from innovative devices like the theremin and Google Glass, we wanted to create a musical instrument that utilizes only facial movements.

Our idea was to create a headpiece that tracks head and jaw motion, where the volume is based from how wide open your jaw is, and tilting your head up and down changes the pitch.

PRODUCT NAME

When it came to the name and tagline, we struggled a bit. So we made a mind map, and eventually reached the name Aria.

Wearmin

Weremin?

Wearemen

Musical + Motion = Mumo

Jaw Harp

Smth with “piece”

Aria / ARia

“Wearable Music”

"Beyond the instrument: Amplifying Your sound "

“Compose the Future”

"Galactic Waves: Ride the Future of Sound."

"Empower Your Sound: Instruments for All, Designed for Tomorrow"

"Cosmic Resonance: Tune into the Future of Sound"

"Orchestrate the Cosmos: Craft Your Sound in a Universe of Possibilities"

ARDUINO

We needed a device capable of two main functions:

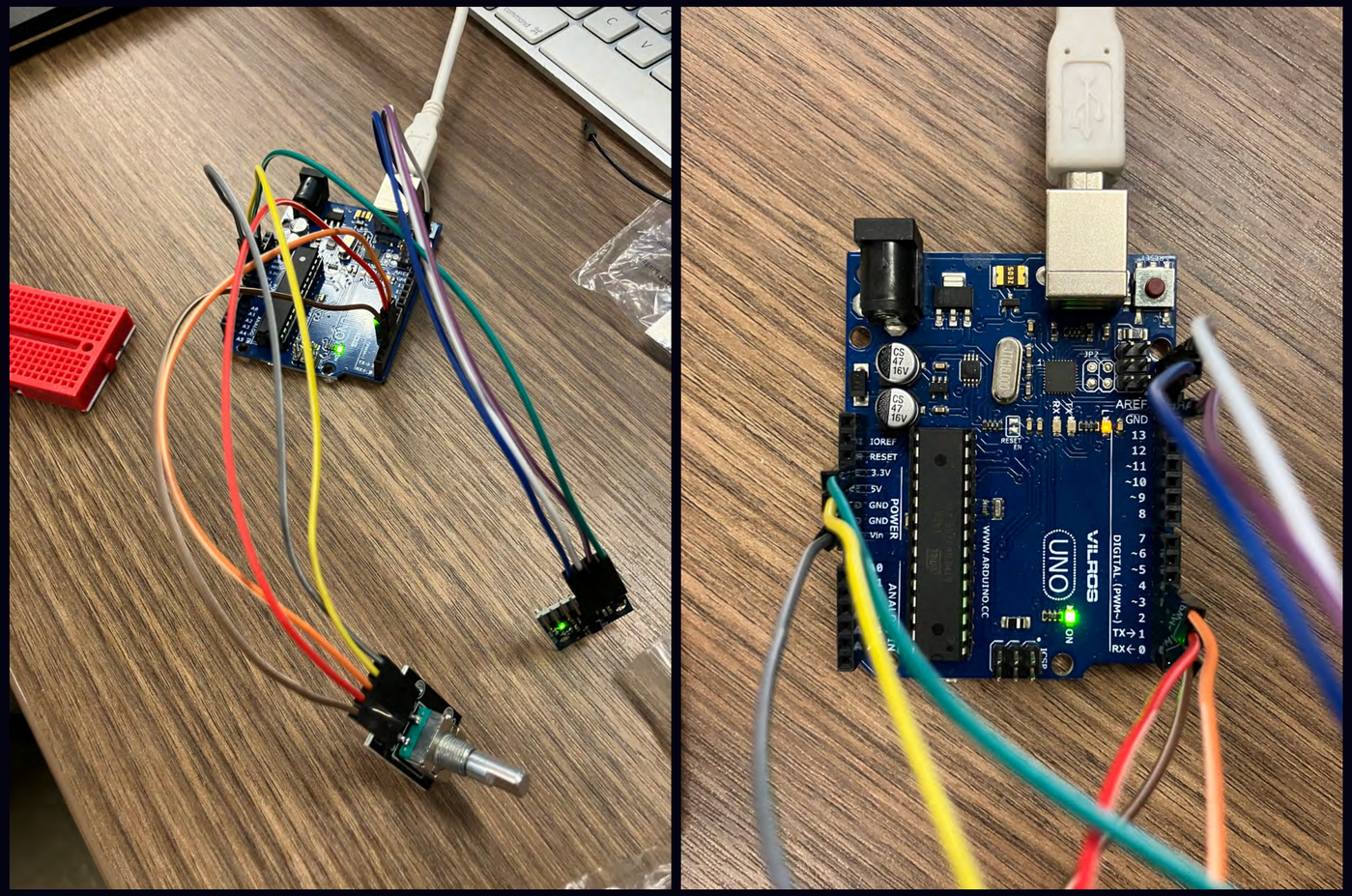
- tracking head movement (nodding/shaking)
- tracking jaw movement (open/close)

RIT's New Media Design program already had several Arduino Unos, but none of the sensors we needed. So we ordered two more parts.

Arduino Uno — open-source, C++ based microprocessor

Rotary/shaft encoder — tracks absolute or incremental angular movement of the axle

Inertial measurement unit (IMU) — multi-axis accelerometer and gyroscope sensor; tracks translational and rotational movement

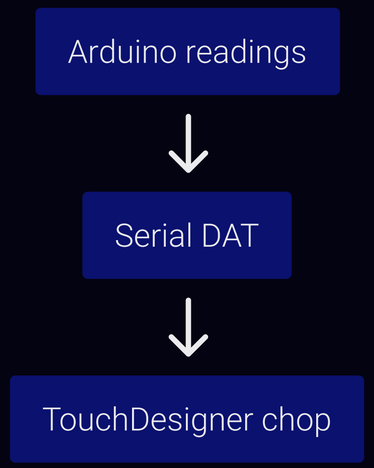


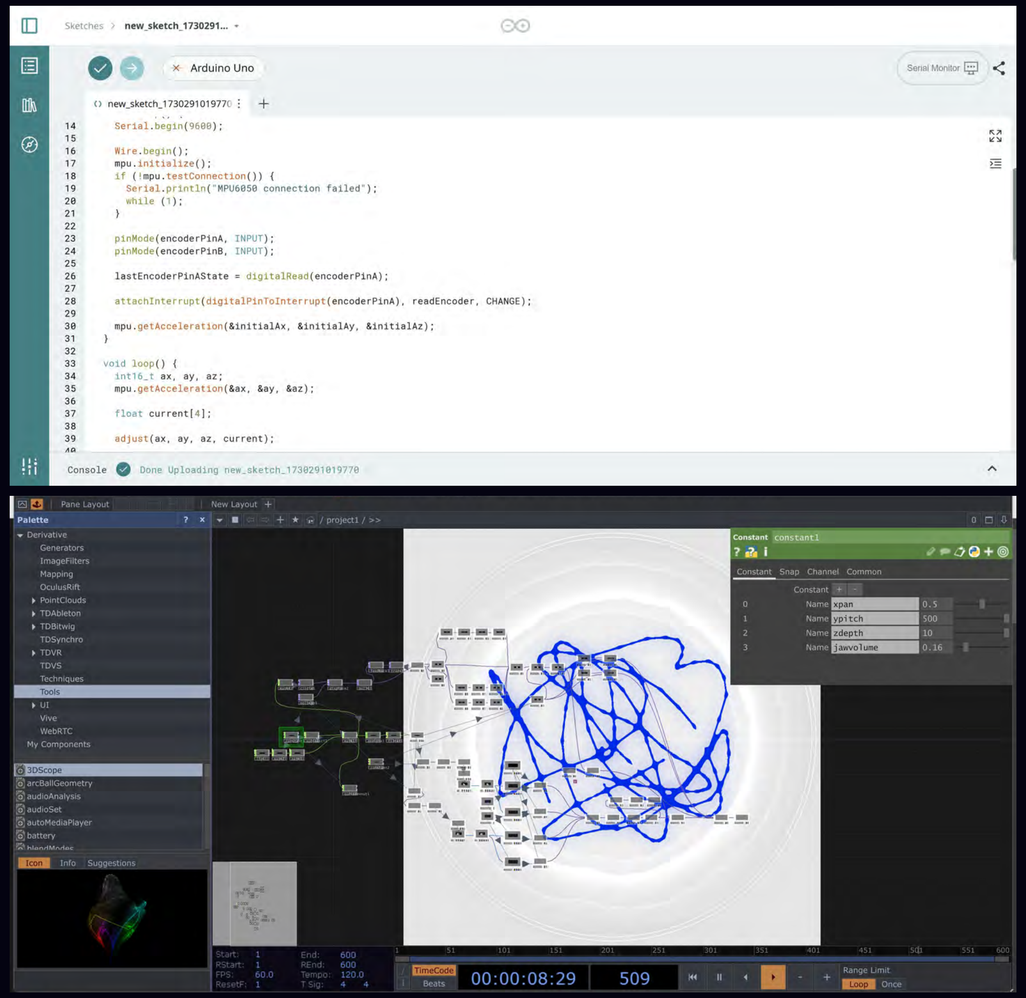
Our Arduino Uno connected to the rotary encoder (bottom center) and IMU (middle right).

PROGRAMMING & TOUCHDESIGNER

We wrote a C++ script to scale and return the readings from the Arduino, which is then returned TouchDesigner inside of a Serial Dat. A DAT Execute then monitors this node which executes a python script that parses the data into usable numbers.

The file then takes these inputs and plays sound with corresponding volume and pitch. It also displays reactive abstract motion graphics.



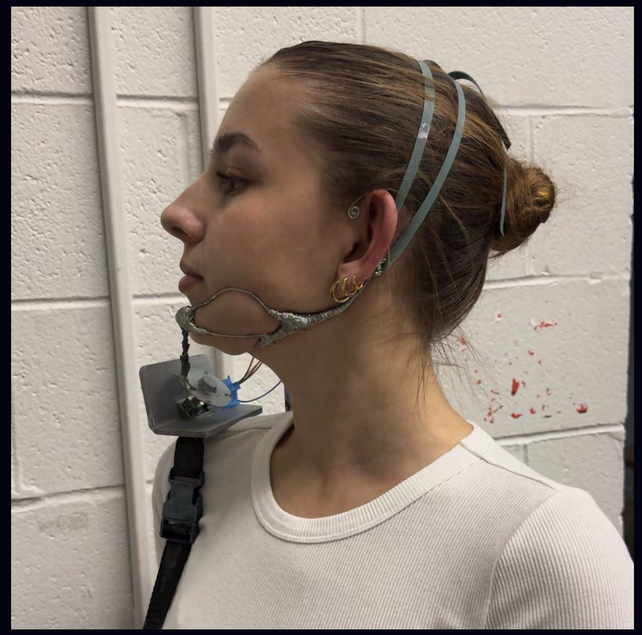


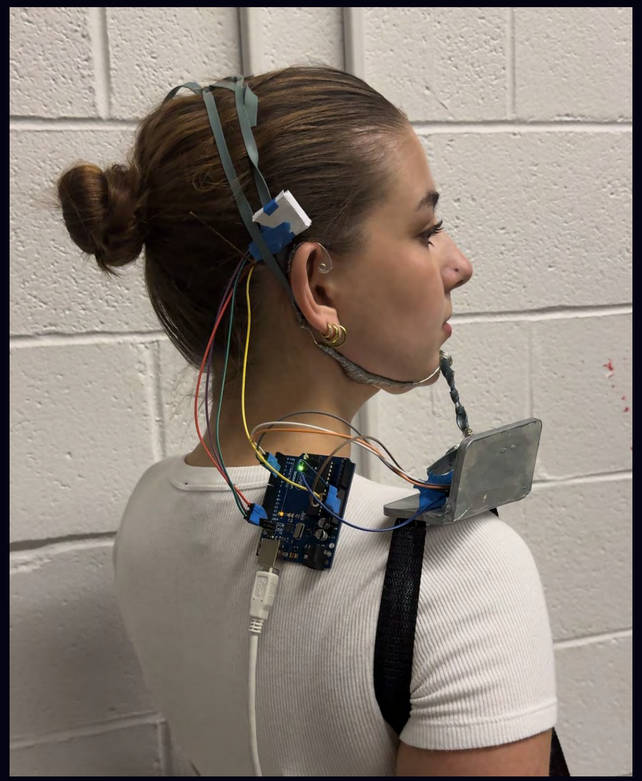
The live TouchDesigner file, with inputs from the Arduino.

PROTOTYPING

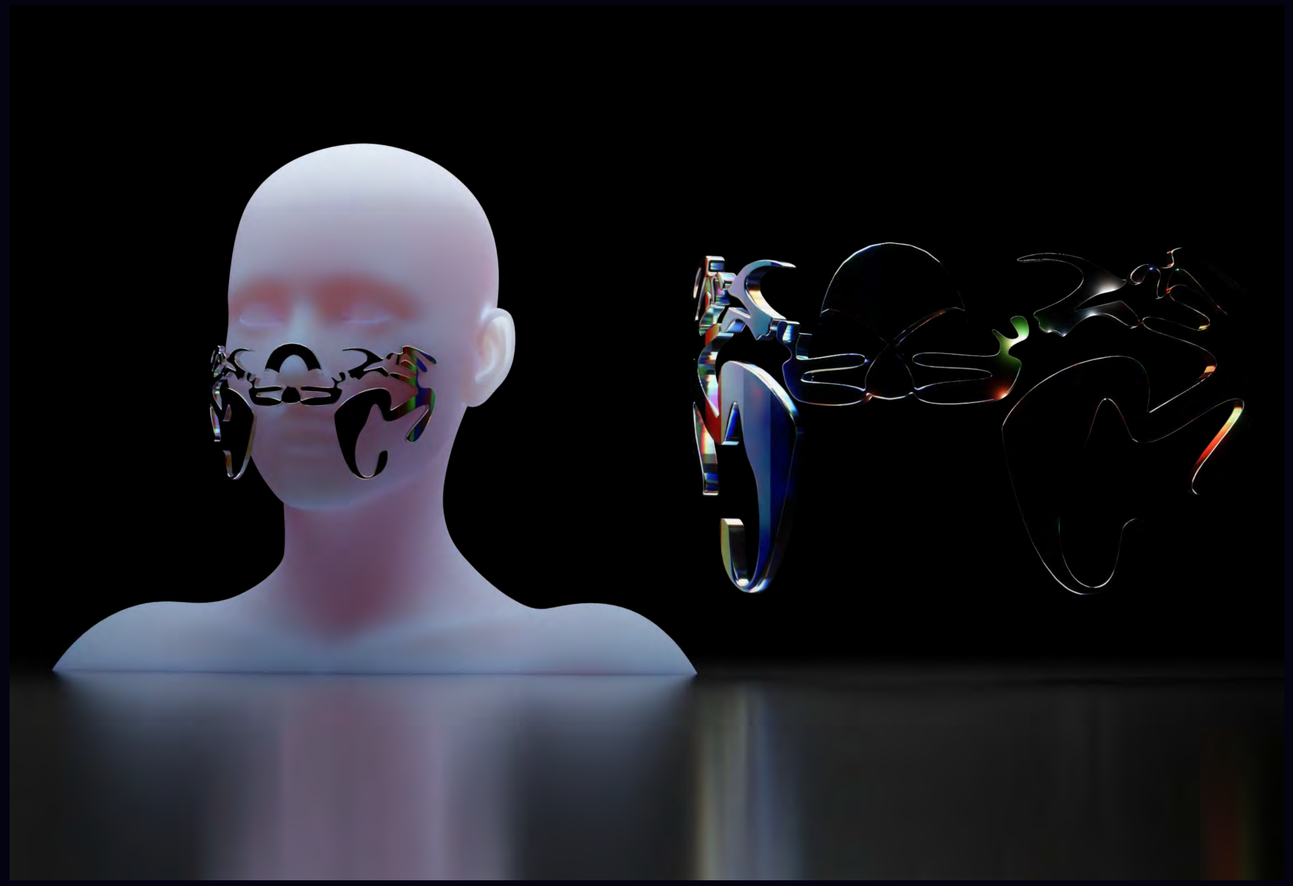
Using a combination of a **spring-loaded lever** and a **rack and pinion** mechanism, we successfully moved the rotary encoder by translating jaw movements into rotational motion.

We found that the main tension point had to be positioned between the jaw and gear, with a sturdy yet flexible structure to withstand this tension while allowing enough jaw movement and adaptability to different face shapes.





3D MODEL



DESIGN

BRAND IDENTITY

Ag

Android Insomnia

ABCDEFGHIJKLMNOPQRSTUUWXYZ

abcdefghijklmnopqrstuuwxyz

#FFFFFF

#EBEBEE

#002AE4

aria ARIA

aria ARIA

aria

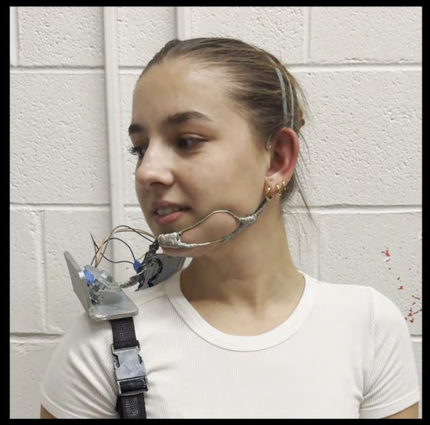
COMPOSE THE FUTURE

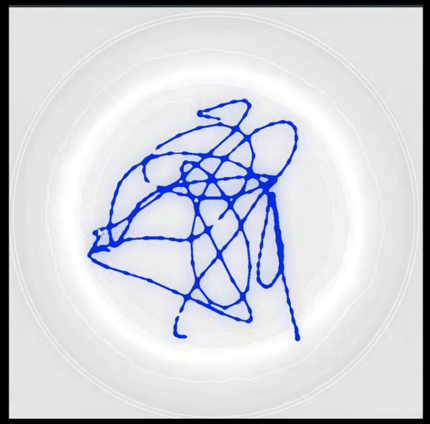
REEL

aria

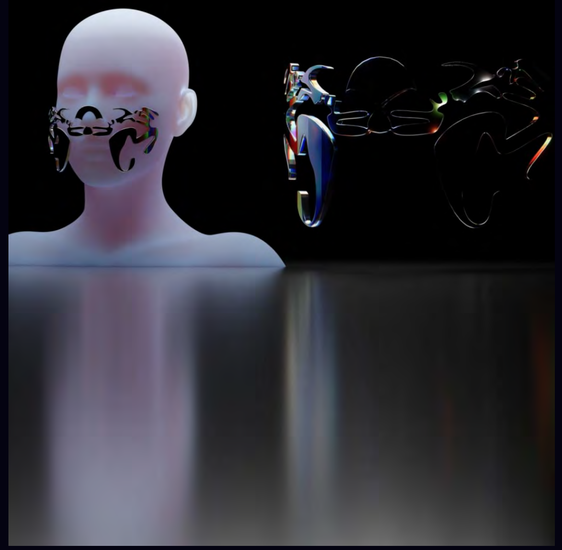
COMPOSE THE FUTURE

Creating a wearable,
touch-free instrument





Coming Soon



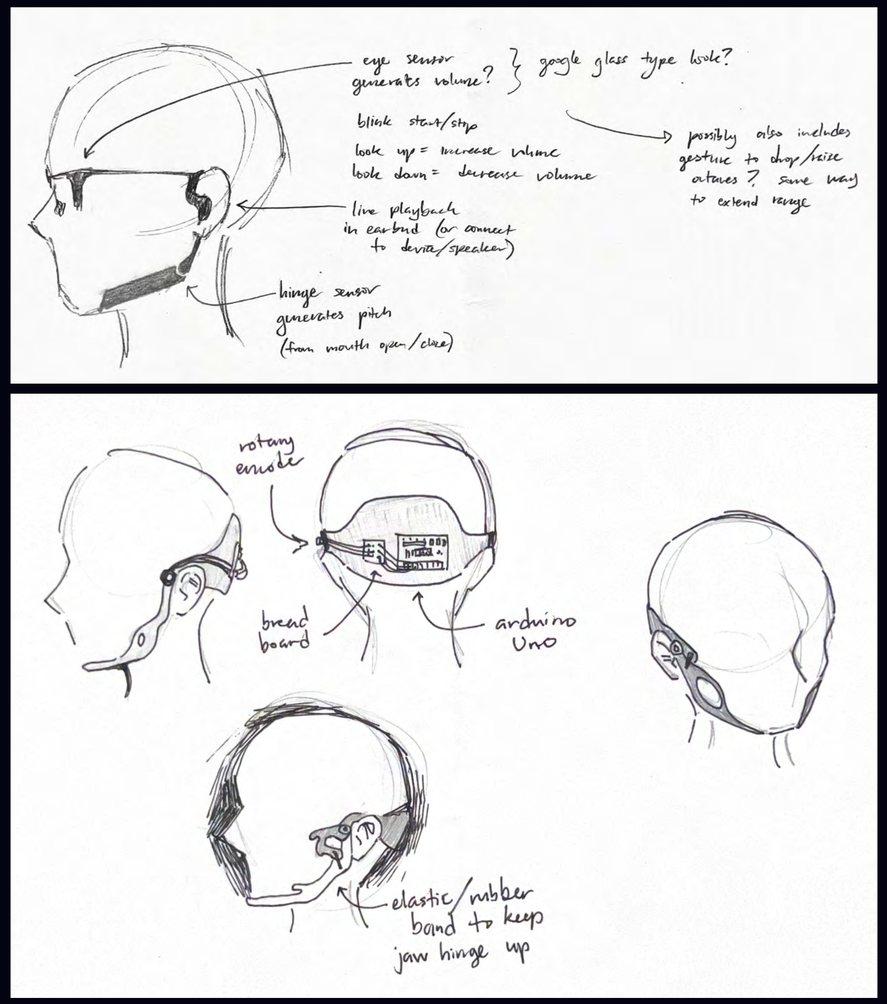
CONTRIBUTIONS

In this project, my responsibilities were:

- concept ideation and development
- researching, ordering, soldering, and wiring Arduino parts
- compiling and organizing the Process Deck
- assisting in brand identity development (tagline, wordmark, typefaces), 3D model rendering, debugging, and reel production (design, sound)

Soldering the IMU pins.

First round wordmark designs.



Some of my original concept sketches.

PERSONAL REFLECTION

This project was my first time working with hardware to produce a physical product (if only in a somewhat-functional prototype). It was a fun challenge to wrap my head around very physical design considerations—or rather, to figure out how to get a device wrapped around someone's head to track their movements.

It was, however, a bit of a struggle to assign tasks evenly. We initially started with what each group member was strongest in, which left me with the hardware. But once the Arduino was worked out, there wasn't much left to do because no one else needed/wanted help. I just ended up making the Process Deck (with empty spaces for text and pictures of everyone else's contributions). I also helped with rendering and production for the 3D model and product reel.

If I were to go back and do the project again, I would work with the team to more specifically divide and delegate subtasks with defined deadlines to keep everything moving. I would also have liked a bit more consistent communication between people working on different tasks. For example, I know it was hard to work on the 3D model without knowing how the physical prototype worked, and the latter was pushed pretty last-minute. Improved time management and communication could've minimized this delay and confusion.

Overall, creating Aria was an interesting, worthwhile learning experience both technically and collaboratively.

THANK YOU FOR READING!