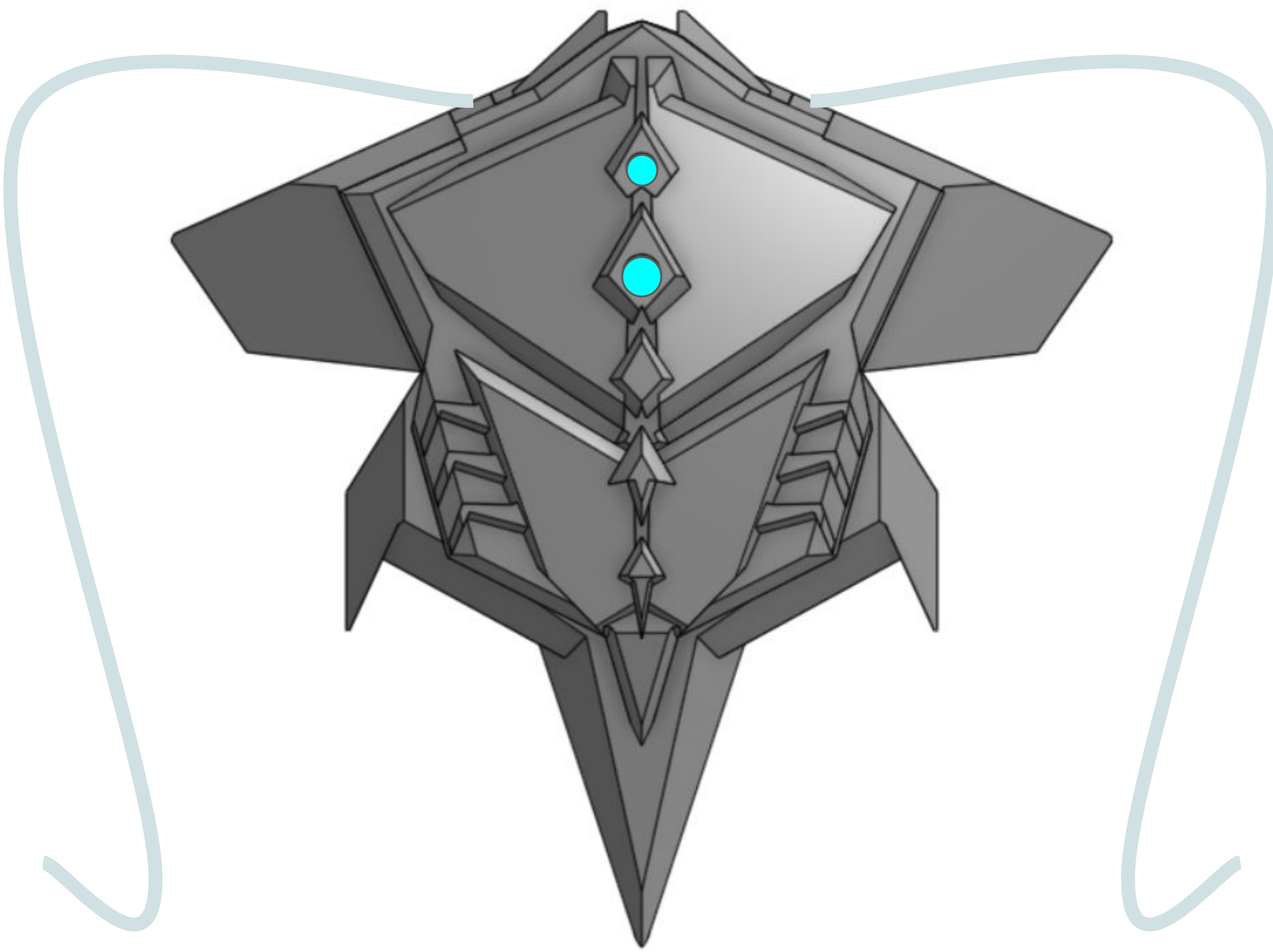
DINOPHYTE:
Wearable System



Light Integrated Clothing as Evolutionary Symbiosis

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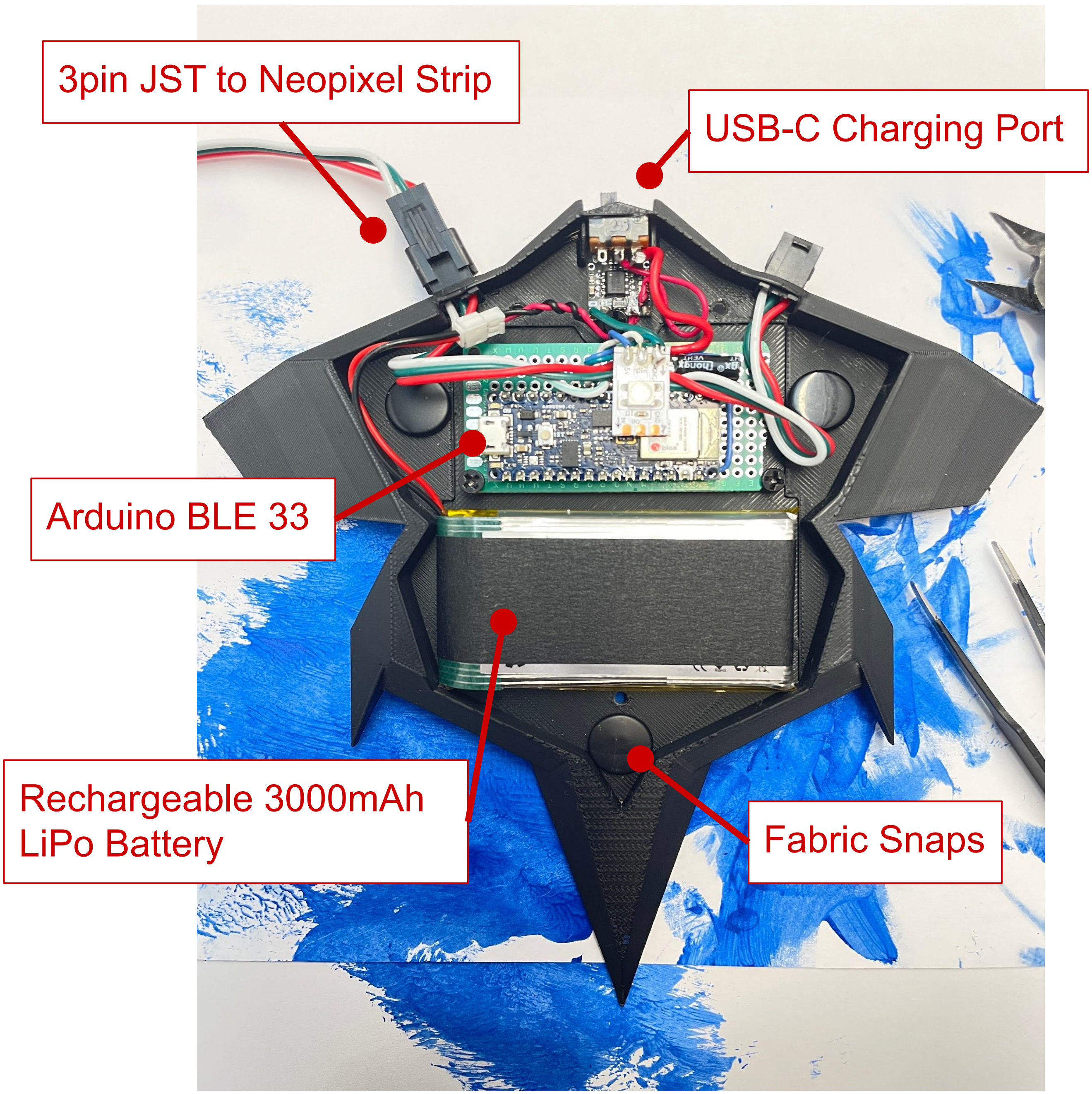
Dinophyte Anatomy

First described in late 2025, the *Dinophyte* is a macroplankton relative of the *Dinoflagellate* exhibiting bioluminescence derived from unique electro-luciferins, sustaining itself off of the cellular ATP of its hosts rather than conventional oxidation.

There is debate whether the subsequent illumination emitted by the *Dinophytes'* tendrils constitutes a symbiotic or parasitic relationship.



Wearable Symbiosis

A modular wearable system that tackles the shortcomings of tech-integrated clothing through an independently removable electronic system. In this act of attachment it draws connection to the symbiotic relationship between people and technology, especially in urban environments where we rely on lights in dark spaces.

Key Behaviours

- **Glow**: Integrating passive lighting and supporting electronics in a robust and low profile housing system
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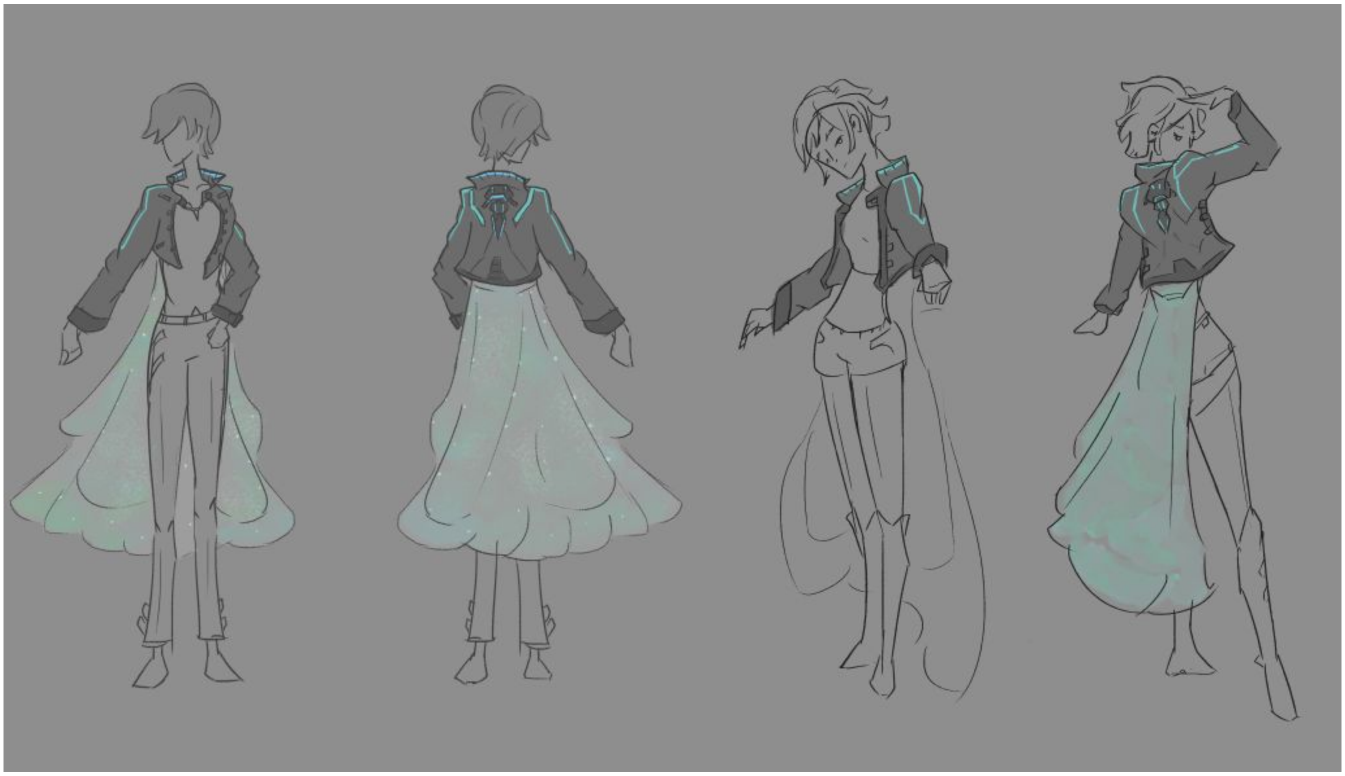
- **Breathe**: Visibly reacting to the body’s motion through variable animations and color shifting

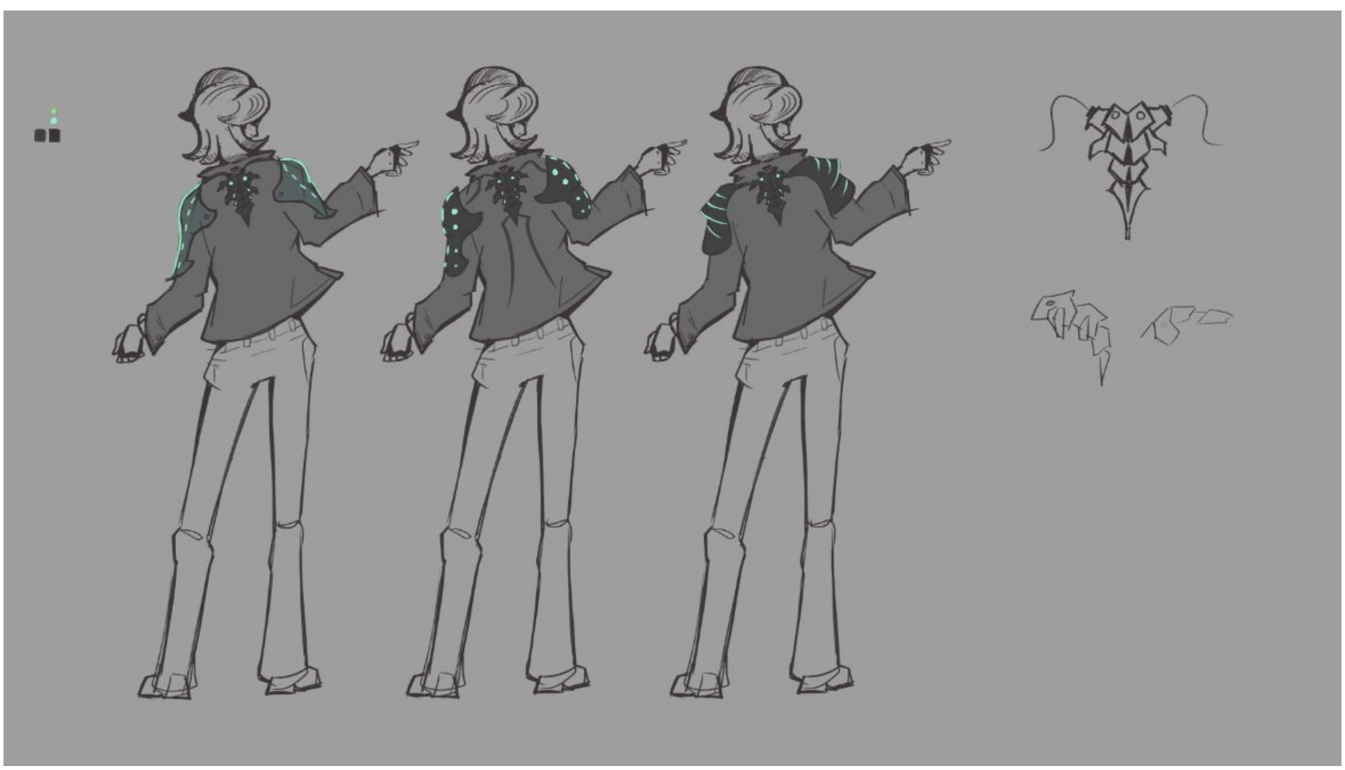
- **Shimmer**: Demonstrating a high action state in response to external stimulus.

- **Modularity**: Isolated and removable system, minimally invasive to base clothing. Streamlined interface act as platform for customizable attachments

Early Concepts

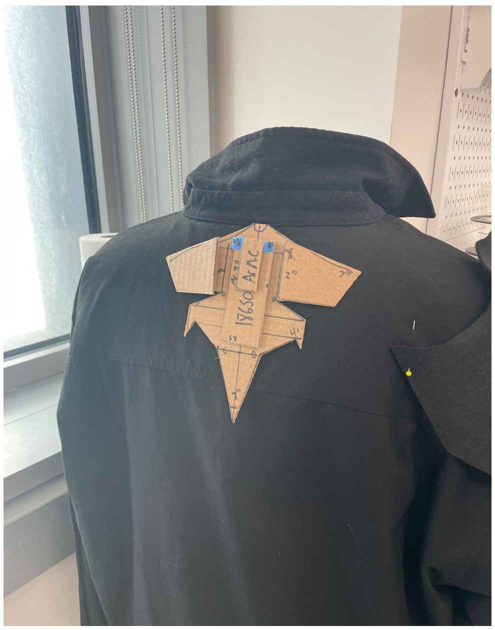
2024 first concept envisioning EL tape on top and vibration reactive leds below
2026 refined concept focusing on shoulder mounted leds and compact housing

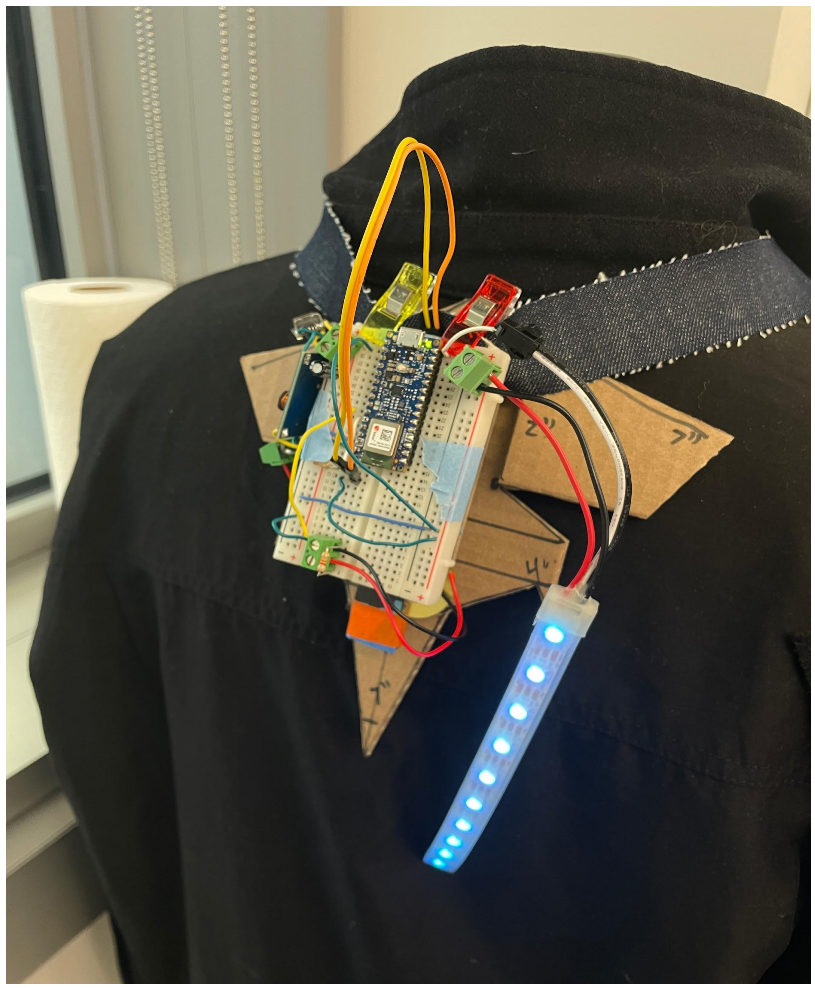


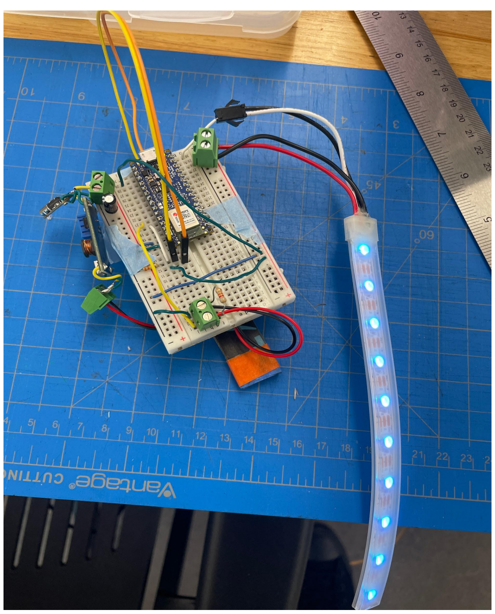


First Prototypes

Early component blocking concerned the allowance of the two main chambers: that of the Li-po and the electronics. An additional constraint lie in the goal of a low profile housing. The first builds were made with the Arduino Nano Every before switching to the Adafruit Trinket M0 for it’s delightful size and ample pinputs.

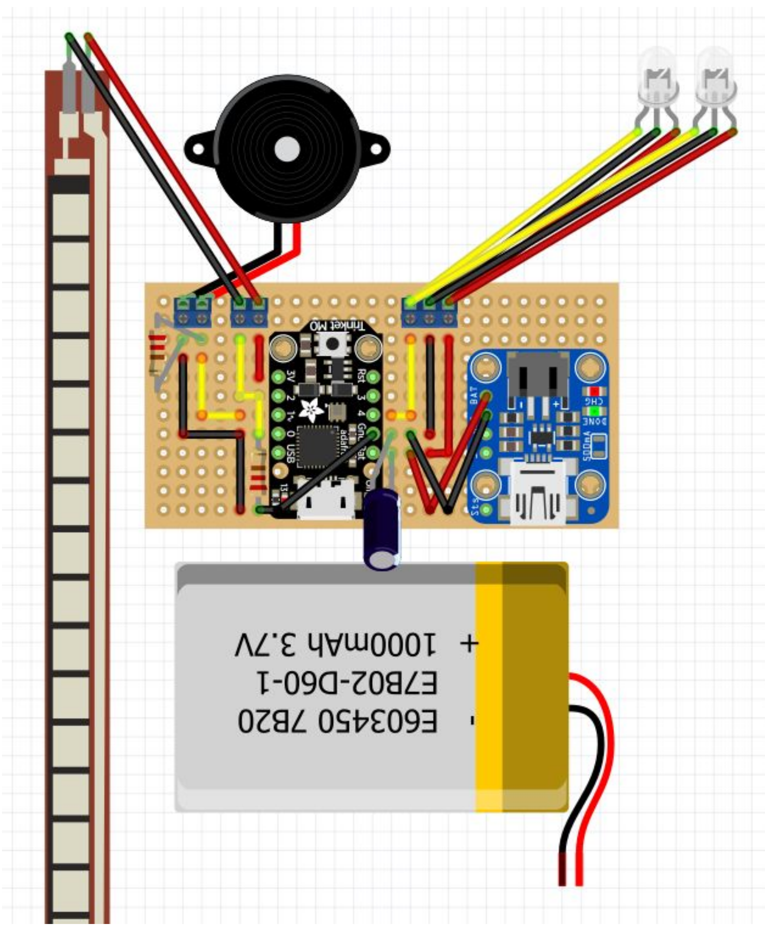


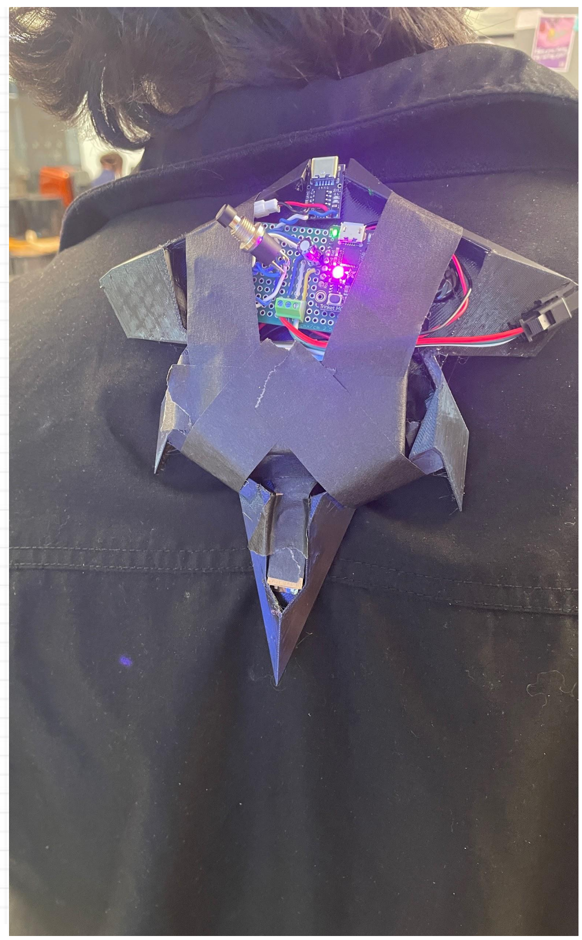




Analogue Sensing

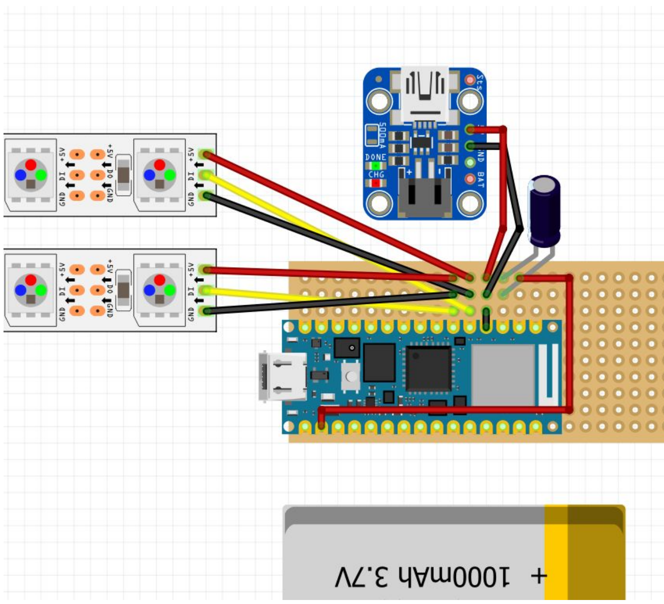
The initial vision was to utilize analogue sensors to read off the body’s movements, primarily focusing on a bend sensor down the spine to detect breathing and a piezo vibration sensor pinched between the weight of the battery and the lower snap to act as a “firing pin” to detect footsteps and impacts. The difficulty lie in capturing the necessary sensitivity from the upper back. Tuning became a matter of physical tensioning which turned into precision design wack-a-mole for very little return.

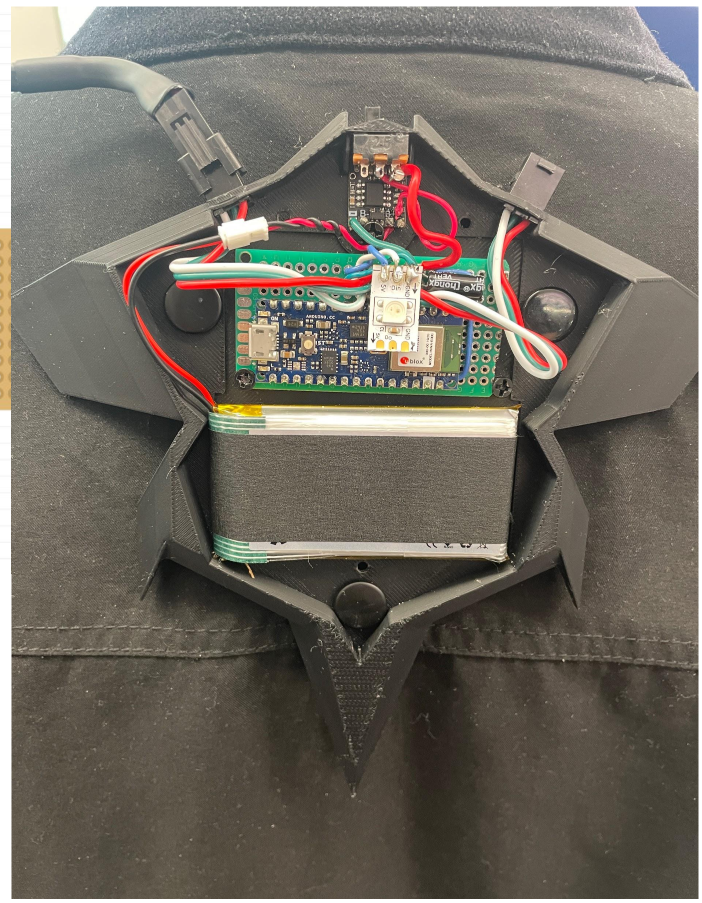


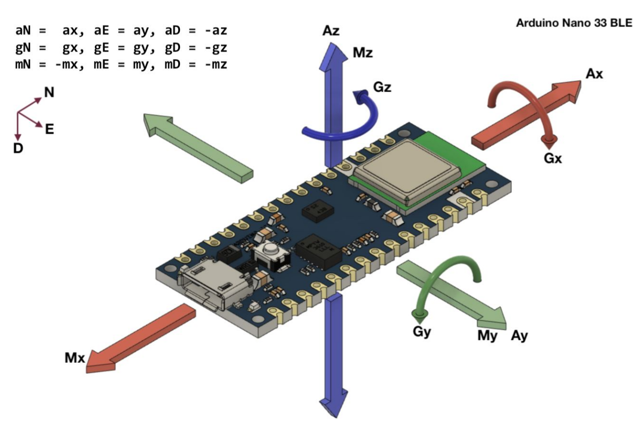


Switching to IMU

A ready fall-back was switching to the Arduino BLE 33 devboard in favor of it's built in gyroscope and accelerometer. Using IMU(Inertial Measurement Units), triggers would be read off of changes in the orientation of the board itself, essentially reading magnitude and angle of directional tilts. This proved much more responsive and flexible while reducing the perfboards footprint.

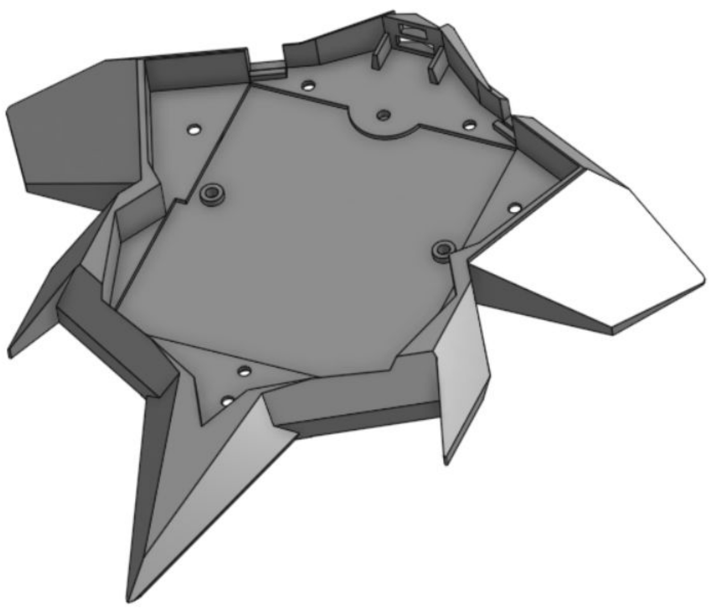


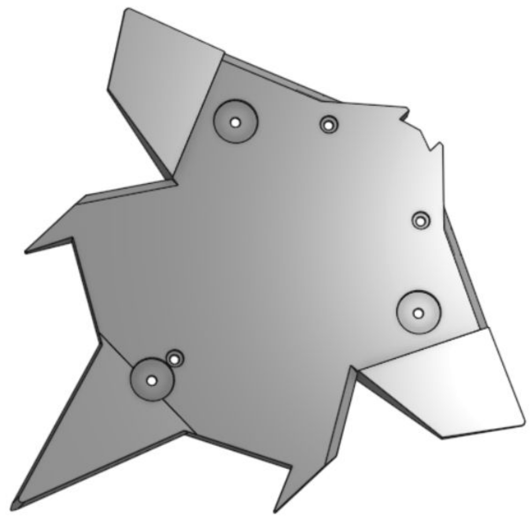


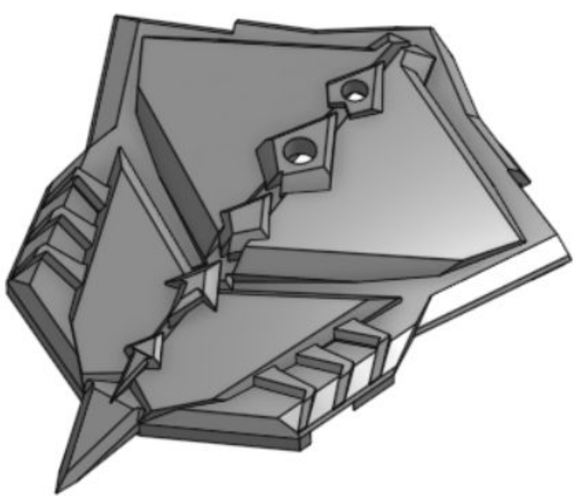


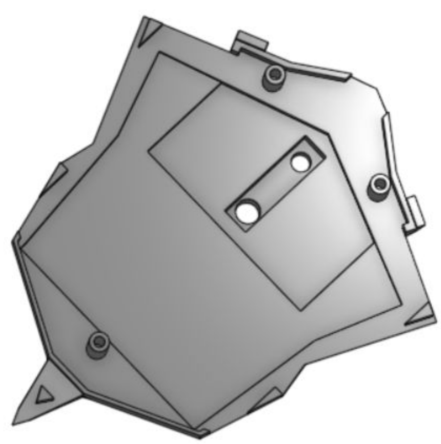
Housing Design

The enclosure was CADed in Onshape and printed using PLA. Early iterations used a more flexible TPU to accommodate the bend tensioning of the analog sensors. Pivoting towards onboard sensors allowed the design to be more angles and feature more press-fit slots. Floor thickness is 0.06” with 0.03” for the grooves in which the snaps firmly press in to. The total dimensions lie around 7”x7”x0.6”









Modular Fins

A key intention for the project was for it to act as a modular platform for easily DIY'ed expansion. Adafruit RGB Neopixel strips are low cost and easily replaceable. The system is outputting one shared signal to a defined strip of 10, meaning that any amount of additional strips of 10 can be added to the JST output at the cost of increased battery consumption.

A color switcher is planned for future iterations as well as expanded compatibility with other LED strips. I've also considered adding "input" ports that allow for an external sensor attachment to be taken and read.