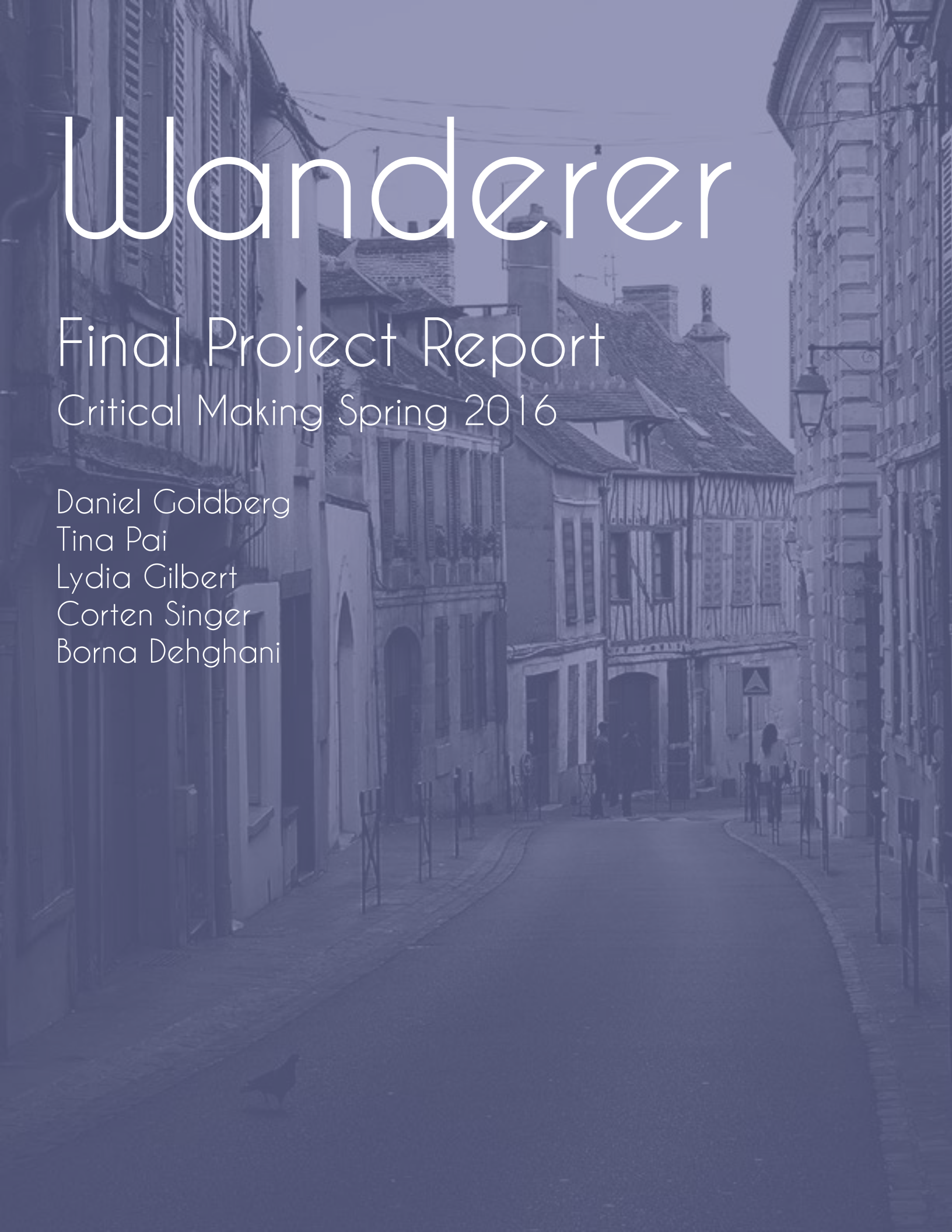

Wanderer

Final Project Report

Critical Making Spring 2016

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What is Wanderer?

"Not all those who wander are lost"
-J. R. R. Tolkein

Wanderer helps you get lost in the world around you while also getting where you need to be. Specify what kinds of places you'd like to explore: parks, shops, landmarks, etc. The Wanderer jacket takes you to amazing places you'll love, while making sure you don't wander far enough away to be late to your destination. LED lights and vibrations in the sleeves help you navigate in an intuitive, non-disruptive way so you don't have to look at your phone. Engage with the world around you and let Wanderer help you discover exciting new destinations. When you're done explor-ing, the lights on your sleeve will show you what types of places you visited.

Observations and Motivation

Our team noticed the omnipresence of technology in our experiences and interactions. We questioned how to find a balance between engaging with our amazing technology, while staying authentically immersed in the world around us.

We spoke to friends who are bothered by the preoccupation with cell phones and their potential to act as a distraction and a barrier between us and our awareness of our environments.

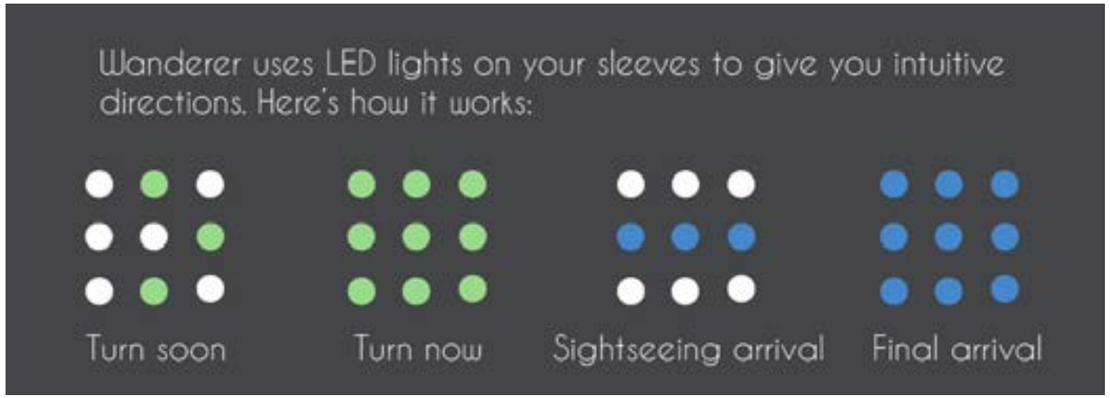
We decided to create a wearable navigation project that makes use of the powerful GPS technology available to us, while providing for an intuitive, immersive journey that allows the user to be deeply engaged in their surroundings.

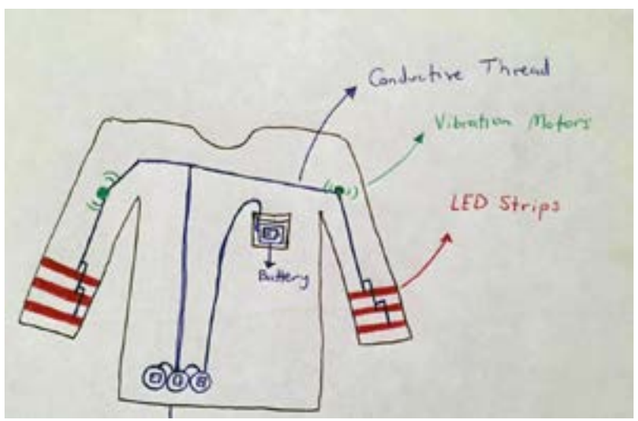
Design Process

Using existing navigation wearables as a point of departure, we decided to use visual and haptic feedback for navigation signals, using an iOS app for GPS information.

Early iterations of our jacket included conductive thread instead of wiring and vibration motors for haptic feedback. We eventually decided to use wires for the majority of the jacket because of voltage dissipation issues. We also eliminated the vibration because it was redundant feedback and took too much power.

Using three adjacent LED NeoPixel strips, we coded different contextual light patterns to signal turns, stops, and other motions to users in an intuitive way.

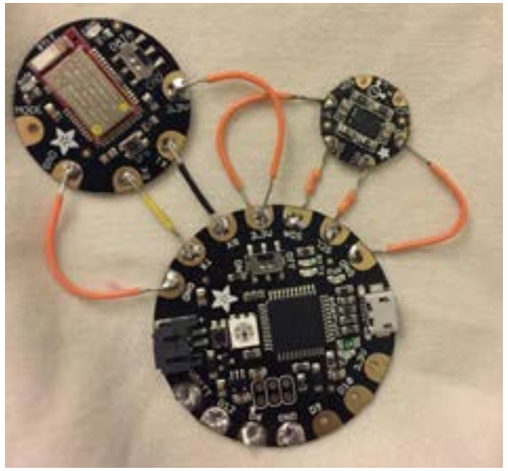




Process and Making I

Things You'll Need

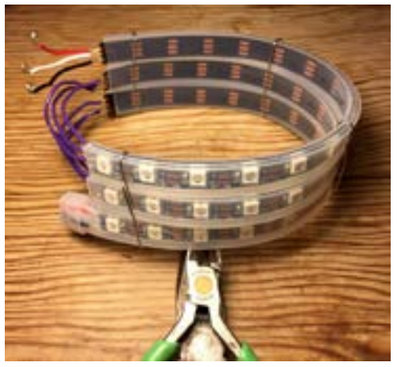
-Adafruit Flora Wearable Platform V2
-Flora Magnetometer and Accelerometer Compass Sensor
-Flora Bluefruit LE Module
-45 NeoPixels per arm (90 total)
-3.7 v rechargeable LiPo battery
-Solder, Soldering Iron, and Wires
-Jacket or sweatshirt
-Sewing tools and extra fabric
-Smart Phone



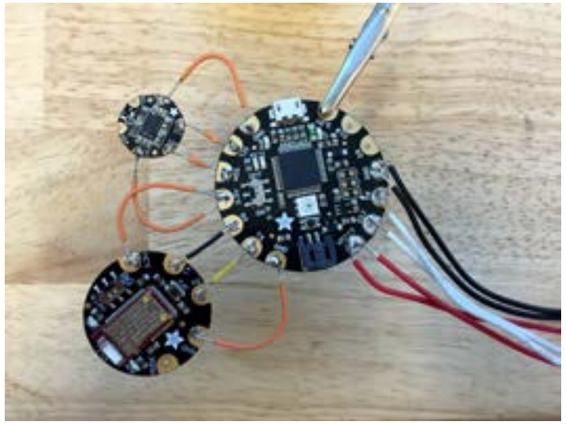
Test the hardware functionality before adding it to the sweater to ensure things are working properly. This allows for easy debugging. Connect the BLE module and compass sensor to the Flora MCU with a soldering iron.

Next, you can cut up your NeoPixel strips into 3 bands of 15 NeoPixels per arm. Then, you can shape them in a circle to prepare for placement in the jacket. Using paper clips allows you to maintain this form while you solder.

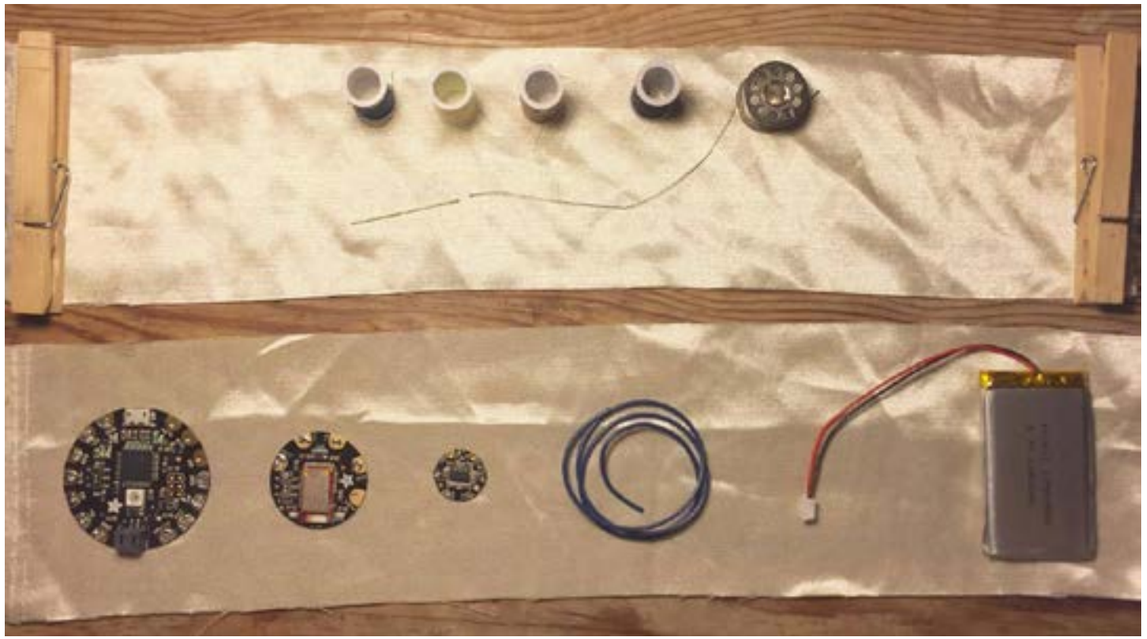
Using your soldering iron, make sure to connect each consecutive LED strip to the same connections that were in place before cutting them up (GND to GND, 5V to 5V, Din to Din)



Process and Making II



Once the hardware is properly connected, download the Adafruit Bluefruit LE app from the App Store and upload our included code to check if the circuit works. If the circuit looks good, get your materials ready for sewing: various thread of your preferred color, conductive thread, needles, fabric, etc.



Process and Making III

Start sewing the NeoPixel wristbands directly onto the sleeve of your jacket. We wrapped the thread around the wristband and through the sleeve multiple times around the circumference to ensure a tight connection.

Once attached to the jacket, sew a layer of any fabric over the NeoPixel strips to hide the circuity and give a sleep feel to the design.

Also, sew a pouch that can hold your battery. Sew a thick fabric like canvas below the hardware for structural support if needed.

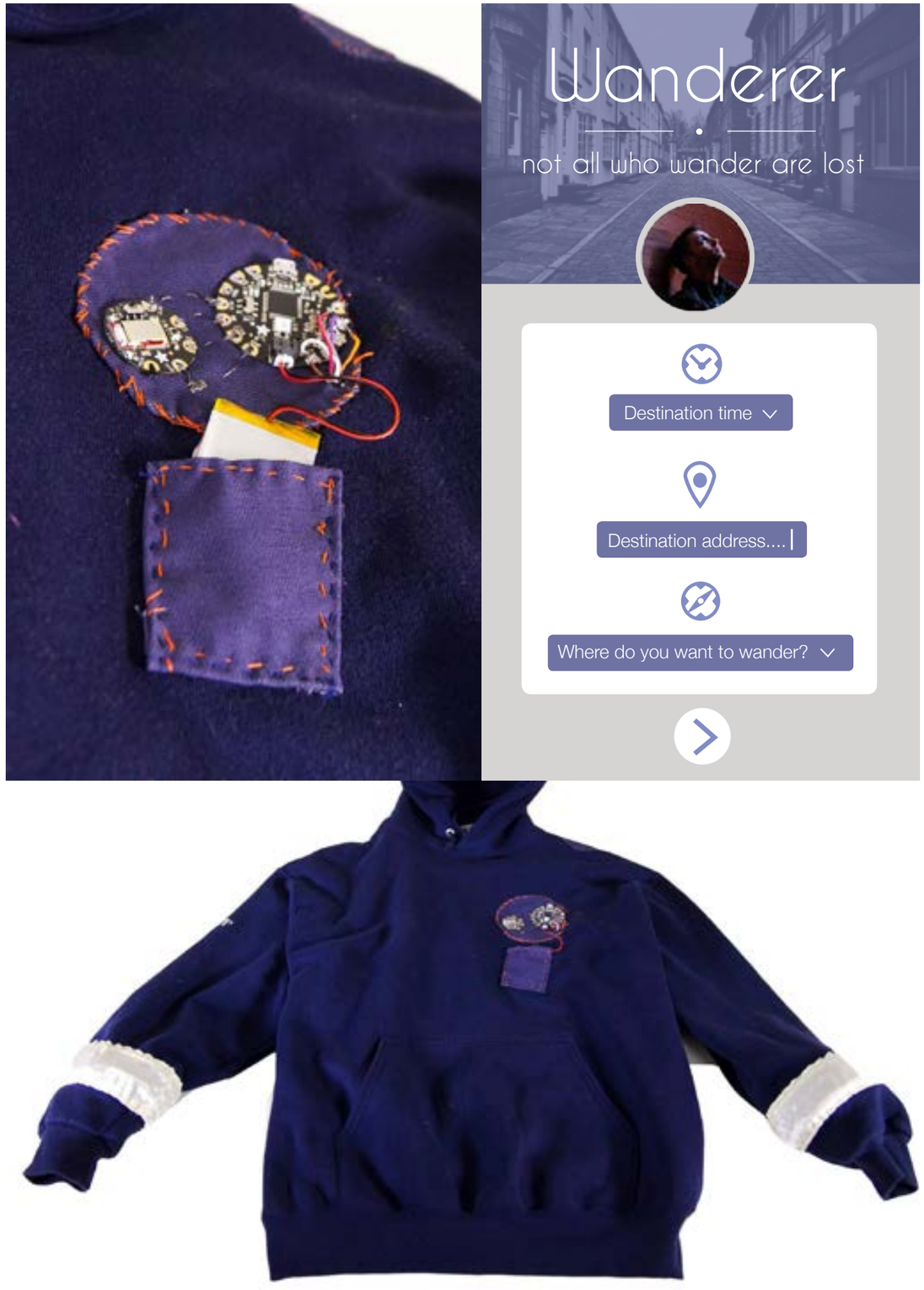
Next, you can use conductive thread to connect the BLE module to the Flora platform. As for the other connections, we used wires run underneath the outer jacket layer.

Finally, plug in your charged LiPo battery and see the jacket glow!

To create the application software, we intended to use a form to take in the user's desired destination, arrival time, and detour type. Then we would use the Google Maps API to select a random location within a radius that matches the description of the kind of detour that the user wants and route to it before the final destination. The app would be connected to the jacket via bluetooth and send GPS navigation instructions from Google Maps to the jacket.

For the purposes of our project, we chose to make a visual prototype using FramerJS. To make this, download the image of our interface from the next page as "imageofWandererAppInterface.png", then download FramerJS and create a project with the attached code.

Final Prototype I



Final Prototype II

Conclusion, Challenges, and Future

Challenges:

-Building circuitry using 2-ply conductive thread as wiring between the microcontroller/power and the NeoPixel wristbands provided insufficient power over long distances. The thread burned off over 1.1v of electricity from the chest-placed microcontroller to the wrist LEDs and could not drive the LED actuation. Larger power supply would have made the jacket more wearable and wash-friendly.

-Outer appearance and layout were challenging due to working with fabric. We would like to have had a more sleek, modern, cohesive, and branded outer appearance. This may include covering the hardware, using a general theme of colors, or adding casing components using glass, metal, or acrylic.

Future:

-We would like to add intuitive sensors for user feedback. Capactivite sensors that respond to human touch, or buttons embedded in the fabric would allow users to turn the LED strips on and off at will. They can have more control over what their jacket communicates, as well as adding functionality to tag and classify locations.

-Since Wanderer uses the GPS of your smart phone and the code from the Google Maps API, Wanderer navigation could potentially be incorporated into biking and driving. New design features geared toward common modes of transportation would not require many changes, but would make the product more versatile.