RunSafe Light Shrug

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Introduction

Running outside in the dark winter months can be dangerous. We wanted to explore this problem space to determine if we could design and prototype a solution applying our user centered design skills. Our project was a culmination of a quarter long group project in User Experience Design at the University of Washington in Winter 2015. This website documents our journey as we define, ideate, research, design, and prototype our solutions.

Below is our project description and problem statement. These are essential documents for any engineering or design project as they define the problem we are trying to solve.The project description and problem statement provide scope for the project and prepare for identifying target users for the project and their specific needs. Identifying target users directs the next phase of the process, research.

Project Description

Our project is to develop a wearable technology that will light up your direct path for running outdoors.

Problem Statement

Outdoor physical activities can be difficult during the winter months because the days are significantly shorter and darker. Invisibility of the direct path and for runners from vehicle operators can feel unsafe and create a barrier to maintaining a healthy lifestyle.

Target Users

We have several target users: Seasonal runners, and runners that are new to running consistently.

Seasonal runners: They run consistently during the Summer when the daylight is abundant and weather conditions are optimal, but during the Winter months feel unsafe running in the dark early in the morning or after work in the evening.

New runners: They are new to running consistently and may not have the sense of awareness or experience to avoid injury from running on unknown routes or avoiding distracted drivers during the darker hours of the day.

Research Findings

Research is the best way to become informed about the current market demands, emerging technologies, and your users. Research uses the project description, problem statement, and target users from the previous phase to strategically investigate resources and gain a better understand of users motivations and goals. This research is the foundation for the creating personas in the next phase of the design process.

We conducted interviews and in-the-wild observations to gain a better understanding of our users behaviors and needs. We looked into emerging technology in LEDS and fabrics that could be beneficial to runners and their unique environment. We explored a variety of running gear that currently exists and how it could be improved for ideal path illumination. We also conducted a literature to understand the dangers that runners were exposed to.

Research Roles

Erin

- Conducted observations
- Literature review

Gail

- Conducted interviews
- Emerging technology
- Current market trends

Anu

- Running culture
- What gear runners wear (focus on shoes)

Literature Review

We conducted a literature review of blogs and other various websites devoted to running safety and distance running. These are some of our findings:

- "Drivers recognized only 5% of pedestrians in the most challenging condition (low beams, black clothing, glare), whereas drivers recognized 100% of the pedestrians who wore retroreflective clothing configured to depict biological motion (no glare)" (Wood)
- "Fatal pedestrian collisions are overrepresented at night, when nearly two thirds (65%) of all fatal pedestrian collisions occur" (Wood)
- "...pedestrian fatalities increase as illumination decreases even when other factors are held constant" (Wood)
- Drivers very consistently (almost 100% in cases of glare) recognize pedestrians wearing the retroreflective clothing that mimics biological motion. Additionally, they are recognized farther out from the road.

- Black clothed peds are only recognized at a distance that wouldn't be sufficient to avoid a collision.
- A high beam headlamp on a black clad pedestrian helps with driver recognition.
- Visual biometric aids at night are the most effective but programs need to be put in place for their public acceptance.
- Warmer clothing color - red, orange, yellow - are most visible during the day.

Observations

One 20 minute observation was conducted at Burke Gilman trail intersection on 50th street near Metro Market. Our goal was to observe users behaviors running in the dark, what gear they were wearing, and how visible they were.

Start Time: 6:30pm
Stop Time: 6:50pm
Where: Burke Gilman trail intersection on 50th street near Metro Market

# of Runners: 10

Gear Visible:

- Jacket – 7
- Hat – 3
- Vest – 1
- Long Sleeve Shirt – 1
- Long Pants – 10
- Headlamp – 3
- Reflective Tape/Stripes – 4

Color vs visible distance:

Erin walked out to three markers from my bench on the path. There were at ~20, ~60, & ~120ft away from her. She plotted the distance a runner became visible in peripheral vision (i.e. She could make out a human figure running towards her) with the first and most noticeable color they were wearing (in this case it was always the jacket or long sleeved shirt).

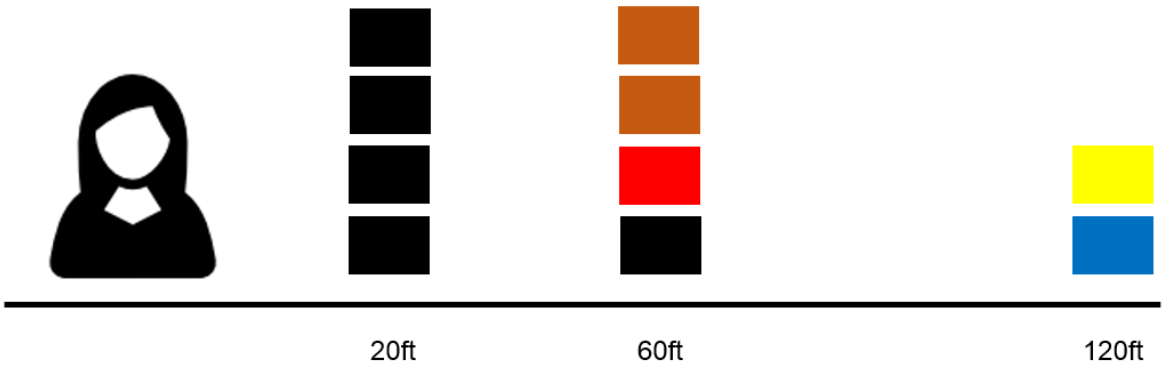


Figure 1: Color of runners clothing vs distance visible from observer

Other notes:

- I saw 17 bicyclists in this period of time. All had reflectors and lights. Most wore all black.
- Runners wearing black appeared to run more assertively whereas runners in brighter colors appeared more relaxed.

Interviews

Four informal interviews with runners who run or used to run in the evening. This is brief summary of each interview"

I conducted three informal interviews with 4 runners who run or used to run in the evening. This is brief summary of each interview"

P1:

- Male, early 30's, personal trainer and fitness expert. No longer runs, but used to habitually run at night.
- What he wears running: Shirt, shorts/pants with reflective gear, shoes, and garmin fitness tracker. Only wears gloves or hat when extremely cold.
- Comments: Would wear a wristband of some sort as long as it didn't interfere with his watch. Maybe a hat, but likely not consistently.
- Issue with safety about running in dark: Reflective makes him feel seen but doesn't help with seeing the path. He mostly ran on streets with street lamps.

P2:

- Female, mid 40's, Fashion Merchandiser, lifetime runner and fitness enthusiast. Usually runs 2-3 times a week.
- What she wears: Her shirt, pants, and shoes are Nike and have reflective qualities. Only wears gloves or hat when extremely cold.
- Comments: She has seen quite a few runners at Greenlake with headlamps on, but she doesn't wear one. Likes the idea of a vest or something that can be clicked on or sticks on.
- Issue with safety about running in dark: Reflective makes her feel more noticed, but doesn't help with lighting path. She runs similar familiar routes at night and is a little less concerned with lit streets, but also live on Capitol Hill were it is heavily populated and well lit.

P3:

- Female, early 40's, Manager at Amazon, relatively new to running but is a long distance runner (1/2 marathons). Usually runs 3-5 days a week.
- What she wears **See Figure 2**: Her shirt, pants, and shoes, hat and jacket all have reflective qualities. Only wears gloves when extremely cold. She also wears a "blinky thing" on her ankle (technical term she used) and a headlamp. On longer runs, she also carries a reflective water bottle.
- Comments: She is extremely concerned with safety and is willing to pay for equipment that will save her life. There is a limit though, she has seen 100% reflective jackets that cost $400 and weigh a ton – which she's not interested in.

- Issue with safety about running in dark: Reflective makes her feel more noticed and safer, but doesn't help with lighting path the headlamp helps with that. Some of the areas near her house are not well lit and she generally doesn't trust drivers. She sometimes feels that her "get-up attracts more people like moths to a flame. She fears that drivers are more drawn to her because she is this slow moving glowing and blinking think on the side of the road. She would consider a vest, but doesn't like it when they are too loose and bounce around a lot.

Figure 2: P3 in her reflective gear

P4:

- Male, in early 50's. Estimator at Electrical Contractor. Lifetime fitness enthusiast. Occasional runner, maybe once a week.
- What he wears: Shirt and pants/shorts, running shoes. Running shoes have minimal reflective qualities. Only ears hat and gloves when extremely cold.
- Comments: He doesn't wear reflective gear (despite the urging of his concerned wife).
- He frequently runs on streets that are not lit early in the morning, but doesn't listen to music so is hyper-vigilant of surroundings and cars. Issue with safety about running in dark: Unable to see his footing in the dark and gets concerned, but doesn't want to/think of wearing his headlamp (his wife bought him). He would consider wearing a vest or something if it didn't rub or bounce. It would have to be lightweight and comfortable that it wouldn't be noticeable, maybe something around the shoulders.

Emerging Technology

Our team looked at emerging technology in fabric, LED lights, batteries, and reflective materials. We found a few interesting products using high intensity LED lights embedded. We were looking for LED lights that could be programmed to be dimmable, responsive and motion stabilizing as well as extremely lightweight. We also looked into alternative power sources such as kinetic power, battery packs, and USB power sources. For fabrics we researched reflective or LED embedded materials that were lightweight and washable. We tried to focus on fabrics that elastic moisture-wicking properties could be incorporated into for maximum comfort for our users. Most of the desired technology is currently cost prohibitive or

Current Market

Our current market research consisted of a study of the variety of products available to runners today and the price range for products. The products fell into four major categories of where the device was worn:

- Head
- Torso
- Hands and arms
- Knees to feet

Devices on the head included hats with LEDs in the brim or headlamps. Runners often complained about the light source obscuring their vision as a result of being too close their eyes. Devices on the torso consisted of belts, chest straps, and vests. Runners were gave the most positive reviews for devices in this category, especially for products that were form fitted and were less likely to bounce or rub. Devices on the hands and arms consisted of knuckle lights, hand-held flashlights, and a version that also hung from the wrist and forearm. Reviews on these devices were mixed as some runners liked the knuckle lights, but others felt strongly about not wanting to hold something in their hands. The last category was hands to feet where the devices were integrated into shoes and socks. These included reflective socks and knee bands, as well as lights that clipped on to the toes and heels of shoes. A relatively new concept that is being incorporated into shoes is reflective material as part of the design, such as the threading, fabric, and cushion in the soles.

Running Culture

Our most significant finding from this initial research is that there is a running culture, or some sort of community or mutual understanding between runners. There are a wide variety of running shoes alone that are built for different running needs, people share their experiences with running over social media, and people are interested in learning and discussing better techniques, either to reach a personal fitness goal (example: a faster time), or to prevent injury. I think I need to have a little bit more of a nuanced understanding of this "culture," before beginning to think of a design for our wearable technology. I say this because I still am not entirely sure if this culture only exists for runners who are already really interested in it and know the ins and outs of running (which is not our primary user), or if it exists for not-so-intense runners as well.

Personas

Personas are a way of characterizing our primary and secondary user groups into a single person. We created our personas to act as a guide for making design decisions throughout our process. For example, we incorporated our personas' goals into our storyboard narratives.

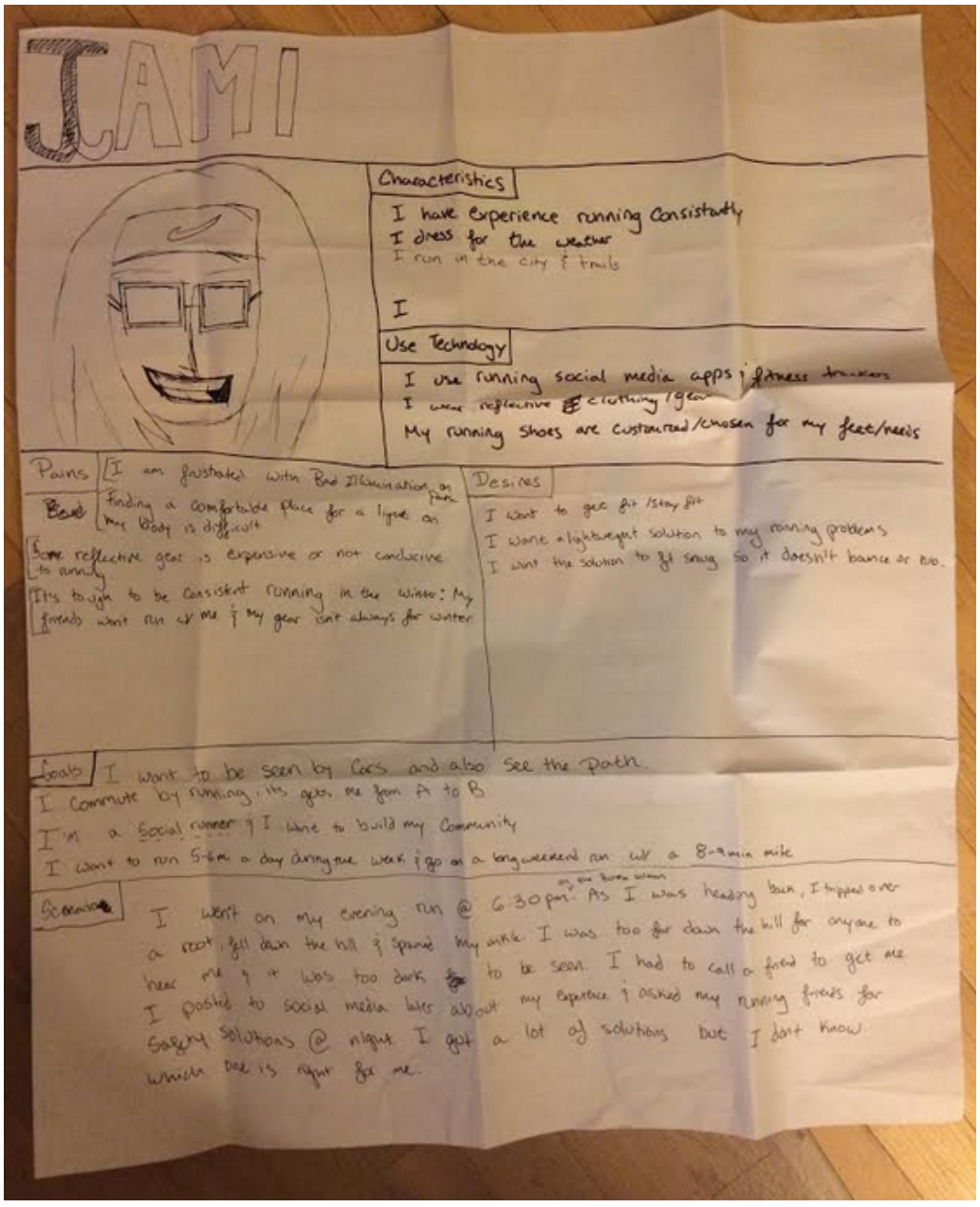
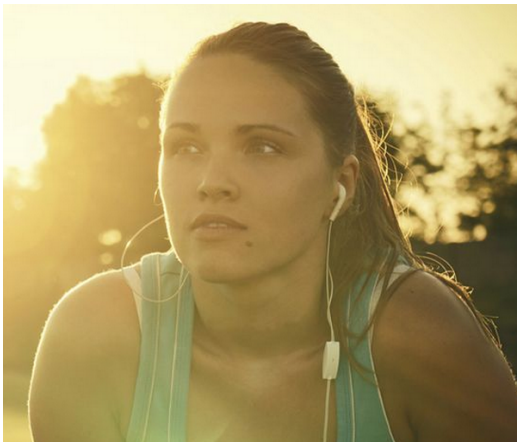


Figure 3: Original ideation on our primary persona Jami, an avid long time runner.

Jami: Experienced Lifestyle Runner



CHARACTERISTICS:

- I have experience running consistently.
- I dress for the weather.
- I run in the city and on trails.

USE/TECHNOLOGY:

- I use running social media apps and fitness trackers.
- I wear reflective clothing and gear.
- My running shoes are customized, chosen for my feet and specific needs.

DESIRES:

- I want to get fit/stay fit.
- I want a lightweight solution to my running problems.
- I want the solution to fit snug so it doesn't bounce or rub.

PAINS:

- I am frustrated with bad illuminations on path.
- Finding a comfortable place for a light on my body is difficult.
- Some reflective gear is expensive and not conducive to running.
- It's tough to be consistent running in the winter.
- My friends won't run with me and my gear isn't always for winter.

GOALS:

- I want to be seen by cars and also see the path.
- I commute by running, it gets me from A to B.
- I'm a social runner and I want to build my community.
- I want to run 5-6 miles a day during the week and go on a big weekend run with an 8-9 minute average.

SCENARIO:

I went on my evening run at 6:30 pm on the Burke Gilman Trail. As I was heading back, I tripped over a root, fell down the hill and sprained my ankle. I was too far down the hill for anyone to hear me and it was too dark to be seen. I had to call a friend to come get me. I posted on social media later about my experience and asked my running friends for safety solutions. I received a lot of suggestions, but I don't know which one is right for me.

Eli: Goal Oriented New Runner

CHARACTERISTICS:

- I started running this summer.
- I am a novice runner.
- I don't really know what running gear works best for me.
- I run on my lunch breaks or at the gym after work.

USE/TECHNOLOGY:

- I got a fitbit for Christmas.
- I don't own any reflective gear.
- I use facebook and share photos from my runs.
- I don't track or share my running data.

DESIRES:

- I want to get fit.
- I want running friends.
- I want running to feel good and not be hard.
- I want to look good in my fancy running gear.

PAINS:

- I struggle to find time for running, it's difficult to make time for it.
- I'm nervous about running in the dark.
- I have trouble determining how to attain my goals and improving my performance.
- I frequently injure myself because over and underestimate my strength and ability.
- I get hot really easily and I don't like wearing hats or gloves.

GOALS:

- I want to run the Rock-N-Roll Half Marathon.
- I want to lose 30 pounds.
- I want to feel comfortable joining a running club.
- I want to set a good example for my family.

SCENARIO:

I went out running at night once and was almost hit by a car, so now I run in the gym after work or on my lunch break. I just got a promotion at work and have to attend a lot of lunch meetings, so I am struggling to find time to run. I want to find a way to run outside any times of day and feel safe so that I have more options to schedule my runs.

Persona Discussion

Jami is a year-round runner and running is a lifestyle for her. Eli is new to running and is trying to fit running into his schedule year round. Both personas have the goal of being safe.

We made some assumptions about the goals and pains of "Eli" as that information could not be gleaned specifically from our users but more from our experience with friends who run. We were somewhat liberal in our assumptions about the use of technology, social networking use, and desire to be social runners. Overall, we do not have a lot of assumptions since we did interviews and observations as part of our research. Most of our pains, goals, etc are based on direct feedback from users or observations.

We can say with certainty that safety is a primary objective for both of them because of research presented in 'Human Factors: The Journal of the Human Factors and Ergonomics Society' on the visibility of pedestrians at night. Additionally, through our interviews and research on running gear, we found that newer runners don't always have gear for safety whereas continuous runners are more in the loop about technical gear, especially in regards to what works with their body.

Scenarios

Scenarios are a method for taking an in depth look at our personas' motivations and expectations. By outlining clear expectations our personas' have, we can determine features, form, and other design elements for our final prototype. Scenarios are also a good launching point for storyboarding because we can visualize and narrate a persona's expectations.

Erin's Scenarios

Jami

As a native Seattleite and longtime runner since middle school, Jami is used to the long dark winter months. Currently, Jami lives in Wallingford and commutes to her marketing job in Fremont by running on the Burke Gilman. Her commuting method is one of many choices she has made to live a healthy lifestyle. Additionally, she has befriended a community of runners on the trail.

Expectation	**Source**
The product should fit without rubbing uncomfortably or hindering running.	Interviews & Observations
I expect a solution that is appropriate for all types of weather and climate.	Kwan, Irene, and James Mapstone. "Visibility aids for pedestrians and cyclists: a systematic review of randomised controlled trials." *Accident Analysis & Prevention* 36.3 (2004): 305-312.
I should be able to customize the product to fit on my body	Interviews & Observations
The product should sync with my running/fitness apps	Interviews & Observations
The product should illuminate my path	Wood, Joanne M., Richard A. Tyrrell, and Trent P. Carberry. "Limitations in drivers' ability to recognize pedestrians at night." *Human Factors: The Journal of the Human Factors and Ergonomics Society* 47.3 (2005): 644-653.

I expect the product to be inexpensive	Interviews & Observations
A long battery/charge life is important to me	Interviews & Observations

As fall sets in, Jami finds herself running to work and back home in the dark. Since parts of the Burke Gilman are under construction, long stretches of path are unlit and the ground is uneven. Jami has been shopping around and asking her runner friends for suggestions on gear that can illuminate her path in low light. A friend recommends Product X and accompanies her to a local fitness boutique to try on and purchase Product X.
Jami starts using Product X during the workweek and on a few longer weekend runs. She charges her product once a week on Sunday nights. As the months get colder, Jami continues to wear the product because it integrates with her winter gear seamlessly. Due to the illumination, and thus an increased awareness of obstacles on the path, Jami notices she had fewer running related injuries that winter compared to years past. Her footing is surer because she can see potholes, roots, etc. with ease, which only improves her running posture and form.
After a full four seasons of use, the product begins to wear and tear at high friction points. Jami brings it to the repair shop at the Northgate REI, where the employees are able to swap out buckles and straps to do a quick repair and refit it to her body shape. Jami is out the door and back on the well beaten path in no time.

Eli

Eli moved to Seattle this past summer to start his first job out of university at Deloitte. To make friends and finally work off the freshman 15, Eli took up running around Greenlake and the Lake Union waterfront. Eli has a goal of training through the winter for the Rock ‘N Roll marathon in March; if only he could find the time of day to run.

Expectation	**Source**
This product will give me more options for what time of day I run.	Interviews & Observations
This product is easy to use	Interviews & Observations
I have a color theme going with my gear, I want my product to match it	Interviews & Observations
I don’t want to look lame wearing this product in my running selfies	Interviews & Observations
Cars and other obstacles should be able to	Wood, Joanne M., Richard A. Tyrrell, and

see me coming from a distance	Trent P. Carberry. "Limitations in drivers' ability to recognize pedestrians at night." *Human Factors: The Journal of the Human Factors and Ergonomics Society* 47.3 (2005): 644-653.
I want this product to connect to my fitbit and take health metrics	Interviews & Observations
This product should help me prevent personal injury	Interviews & Observations
The product should be lightweight	Interviews & Observations

Finding time to get in a quick run during the day is hard, especially with Eli's long hours as a financial analyst for Deloitte. Eli decides to start running after work around South Lake Union but is worried for his safety; especially with all the construction and traffic intersecting pedestrian paths. He looks online for a product that will make him stand out and be visible to moving vehicles. Eli purchases Product X in electric blue to match his Nike's and Fitbit.

Eli wears Product X during his evening weekday runs. He notices that cars stop for him even before he reaches the crosswalk. Other runners have stopped him on the path to ask about Product X and he likes the attention when recommending it. Additionally, he likes taking photos at city skyline viewpoints wearing the product because it looks cool.
Eli uses his first winter in Seattle to develop a consistent running habit and train for the Rock 'N Roll marathon in March. With his increased involvement in running, Eli enables the health metrics sensors on his product and connects it with his fitbit, thus leading to insights on how to improve his running performance.

Gail's Scenarios

Expectation	**Source**
Works in rain	User Interviews
Light weight	
Doesn't rub	
Doesn't bounce	
Works with sweat	
Promotes visibility	
Not intrusive	

Helps me feel safe	
Not additional gear	
Not interfere with other people or cars with brightness	
To be able to see the path when it's dark out	Assumption
To be able to run when it's dark out	
Multi-purpose	Observation
Lights illuminate forward	
Direction of lights is automatic	UX Interview
Lights automatically turn on when needed	
Separate device, not on smartphone	
Wide beam of light	
Located on chest or on the body further down, like waist	
Kinetically powered	
Comfortable	http://www.nathansports.com
Grip-free	
Effortless	
Allows me to run in any weather	
Allows me to run at any time of day	
Flexible	http://www.halobelt.com/
Rechargeable	
Multiple settings	http://blog.walkjogrun.net/2014/10/24/illuminate-the-night-running-gear-for-the-dark/

Persona 1

Our persona, Jami, is an avid runner whose goals are to maintain current fitness levels regardless of the season or weather.

It's just after New Year's and her resolution is to maintain her summer running schedule during the winter months regardless of the weather or season. Her work schedule has changed and the optimum time for her to run during the week is at 6 in the morning before she goes to work.

Jami is getting ready for her morning run. She's putting on all of her reflective gear and adds her running harness as the final touch. She puts on her shoes and heads out the door. She turns on her light harness and starts the timer on her watch and begins her morning run.

Her morning runs are so much more enjoyable with the harness. She can now see the path that is lite in front of her, and feels that cars can see her better. As she runs through her neighborhood she can see the cracks in the sidewalks that she used to trip over. Just before she finishes her run, she sees a car up ahead that stops at the intersection to allow her to cross. She safely returns

home just as her husband is getting ready to leave for work. He asks her how her run was and then kisses her goodbye as he walks out the door.

Anu's Scenarios

Persona 1: Jami

Our first persona is Jami, and experienced runner, whose goals are to be able to able to keep up with her running plan in the winter months, feel confident that she is visible when she runs at night, and to reduce her risk of injury as much as possible.

Persona Expectations

Expectation	Source
My running path will be illuminated	Persona/the main point of our product
I will be visible to other runners, cyclists, cars, and whoever else may cross my path	Nike Running http://www.nike.com/us/en_us/c/running
This will help me maintain my rigorous fitness goals during the winter months	
This will reduce my risk of injury	Tread Lightly : Form, Footwear, and the Quest for Injury-Free Running Katovsky, Bill; Larson, Peter http://uwashington.worldcat.org.offcampus.lib.washington.edu/title/tread-lightly-form-footwear-and-the-quest-for-injury-free-running/oclc/823385051&referer=brief_results
This product does not hinder my running; it is not too heavy and does not put any specific or unbearable pressure on my body	Nike Running http://www.nike.com/us/en_us/c/running Runners World YouTube Channel https://www.youtube.com/user/RunnersWorldTV

Scenario
Its 6:45am and it's a chilly morning. The sun won't be up for about another hour, but by then Jami will be on her way to work. She turns off her alarm, gets out of bed, and goes over to her closet. She's a bit stiff this morning, but is determined to run her 6 miles this morning.

The air outside is very crisp, and has a bite to it. Inspired by the freedom her new wearable has given her, she decides to go on a new route on a trail not too far from her apartment. She has a marathon in the spring, so finding a way to train outside during the winter has been at the top of Jami's list.

About halfway through her run, (there's almost no light during at this part) she sees reflectors up ahead. As they draw nearer, the cyclist maneuvers out of her way. Jami smiles and picks up speed.

Persona 2: Eli

Our second persona is Eli, a novice runner (started in the summer), whose goals are to find the right running gear, to run consistently, and to enjoy running without it being too hard.

Persona Expectations

Expectation	**Source**
This product will help me stay motivated	
My running path will be illuminated	Persona/the main point of our product
This product will allow me to stay consistent with my new fitness plan/goals	
This will help me get in to running	Instagram, Nike Running http://www.nike.com/us/en_us/c/running
This product will give me the flexibility to run at any time of the day	

Scenario
After a long day of meetings and classwork, Eli was ready for a run. The sun had set a couple hours before, so when he suited up he put on his new [wearable name].

He decided to go on a run through campus. As he ran, he thought about how far he'd come since he started in the summer. He usually went on runs in the evenings, and his [wearable name] let him continue with his schedule. He was consistently working out and he was happy about it.

Directly ahead he saw students walking, maneuvered out of the way. Someone had dropped a book nearby and he jumped over it and heard one of the students say "woah!"

Persona 2

"Our persona, Eli, is a novice runner whose goals are to train for a half marathon and gain flexibility in scheduling runs.

Eli is relatively new to running. He has been trying to lose weight and get in shape and he thought training for a half marathon would be a good goal to work towards. Eli has been running on his lunch breaks during the week, but he recently got a promotion that requires him to attend lunch meetings. He has been struggling to continue his marathon training and has been looking for a way to run in the mornings when it's still dark. He has some concerns about safety as he lives in a neighborhood that doesn't have any sidewalks and is afraid he may be inviting an injury by running in the dark mornings.

Eli doesn't have all the fancy gear for running, but his wife recently bought him a running harness to try for his morning runs. Eli slides his arms into the running harness and he punches the air a few times to see how it feels. He jumps up and down and is pleased to discover that the harness stays in place and feels really comfortable. Eli puts in his ear plugs and heads out the door for him 3 mile run. About a mile into his run, a car comes swerving around the corner fairly fast, but sees him and shift to the other side of the street.

About half a mile later, he sees a pothole up ahead and thinks to himself how that would have been a close call if he didn't have the harness lighting the path. The road he's on is dark and the trees make a canopy from the stars. The light harness illuminates the entire path in front of him including the canopy of trees and it's a beautiful scene of solitude. He gets to the house and is drinking a refreshing glass of water when his wife comes in the kitchen and smiles at him. We cut ahead to the wife standing at the finish line as her husband crosses the finish line.

Design Sketches

Sketching individually and as a group is a great way to come up with multiple designs without getting stuck on one idea. For our group, we were able to sketch three fantastic permutations of solutions to our design problem. We put these ideas before our user group, runners, and surveyed them on which ones they preferred and if it addressed their needs.

Group Sketch 1

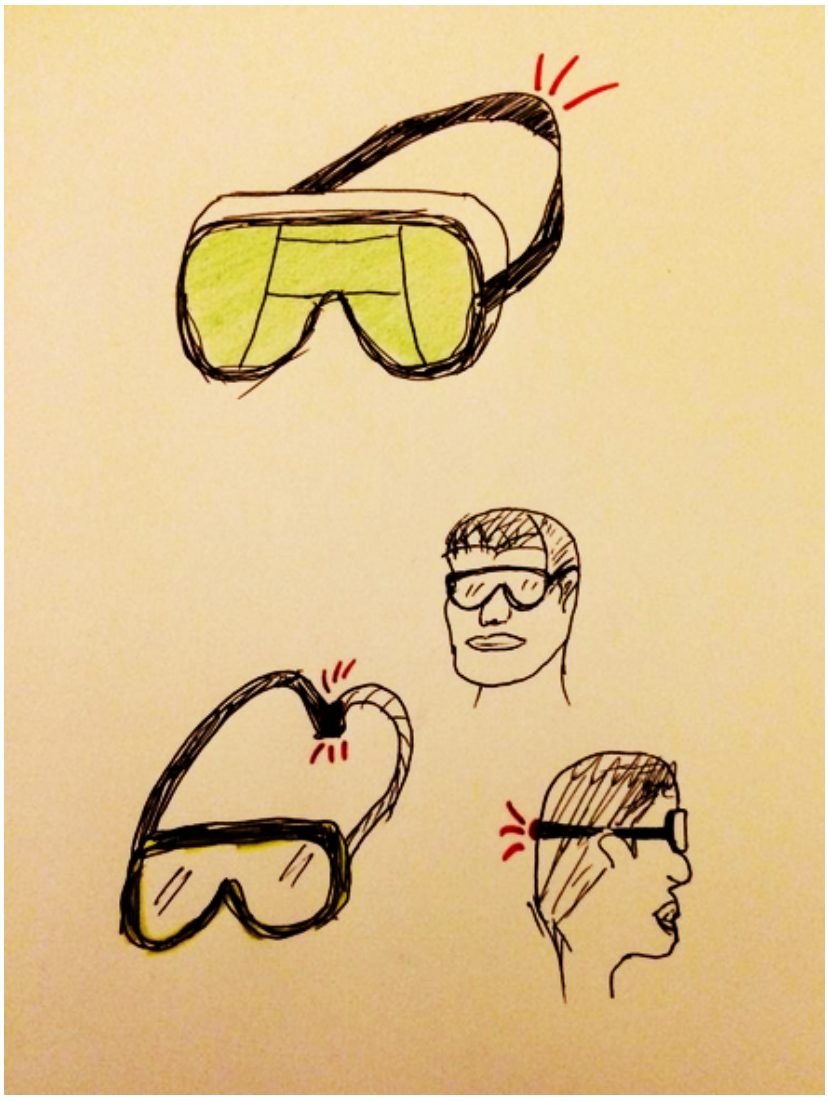


Figure 4: A pair of running goggles with a thermal infrared overlay

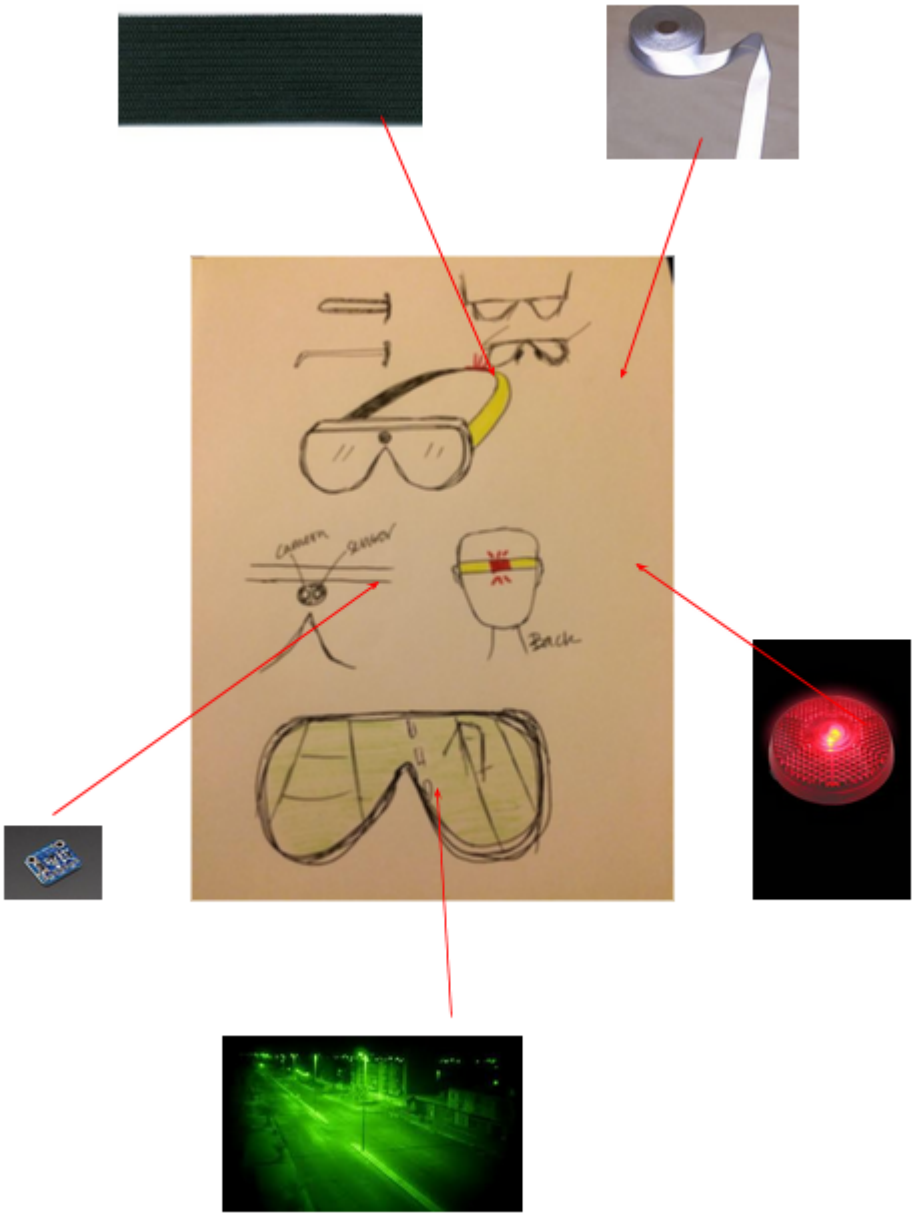


Figure 5: Mood Board of Goggle's Form and Experience

Idea is to get away from the concept of lighting the road for nighttime running and design night vision goggles that are comfortable and lightweight. Our version uses comfortable elastic to create a tight fit on the face so they don't bounce. The outside of the elastic is covered with reflective tape to increase visibility to cars, and also has a blinking light on the back of the head. The running goggles have a luminosity sensor to automatically turn on in the dark and a camera to facilitate the night vision capabilities.

Group Sketch 2

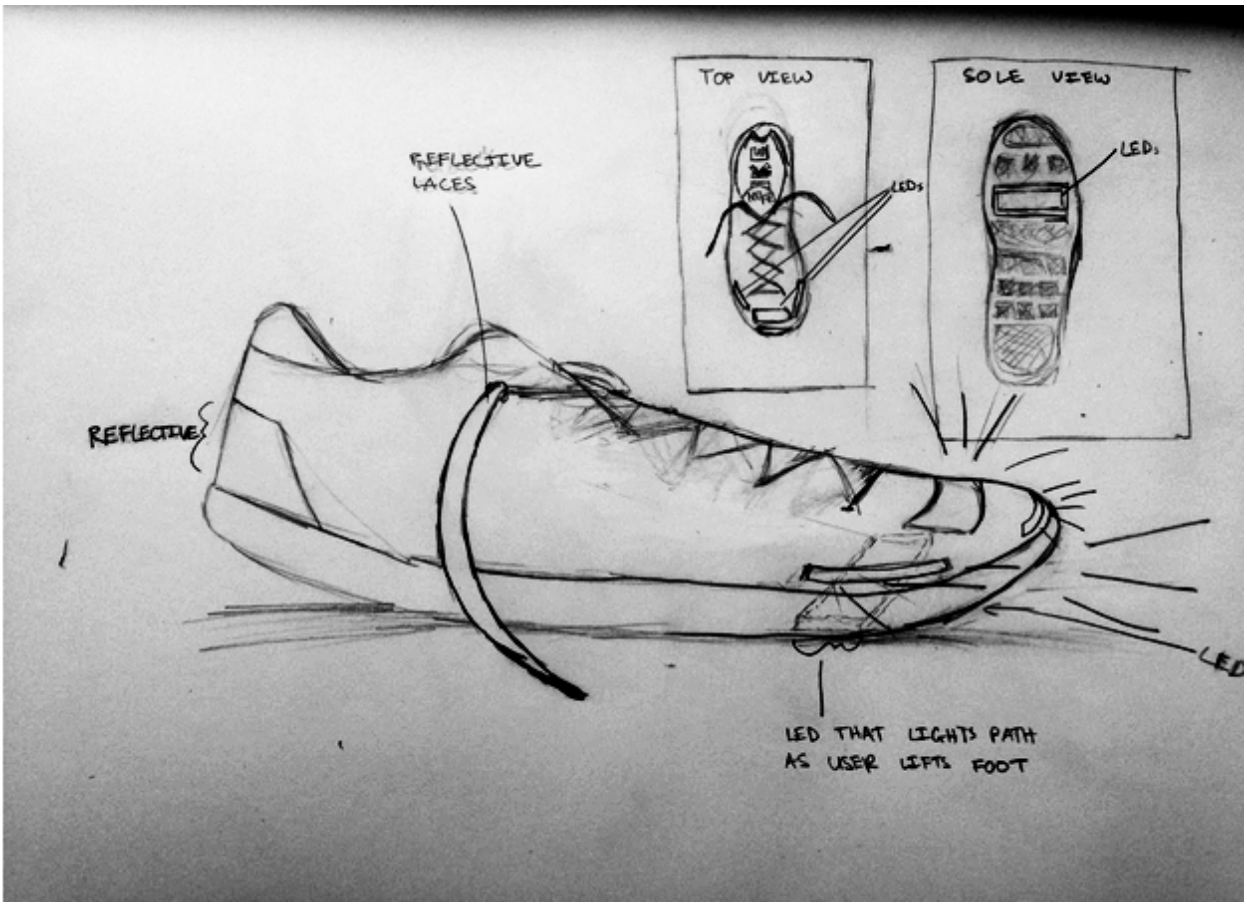


Figure 6: Running shoe with lights embedded in the treads

This is our wearable in the form of a running shoe. The idea is that the user's path/general field of view would be lit by the LEDs woven into the shoes. The one on top of the toes would serve as uplighting for the user's general field of vision, whereas the rest of the LEDs will primarily light up the user's path. The most difficult feature to communicate with this sketch would probably be the light at the bottom of the shoe. It is sketched in the "Sole View" of the shoe, with the addition of a skeletal sketch of it (which is labeled) in the main sketch. The functionality of this feature is that every time the user lifts their foot, the path is lit by this light. Secondary features of the product include both reflective laces as well as reflective material at the back of the shoe.

Group Sketch 3

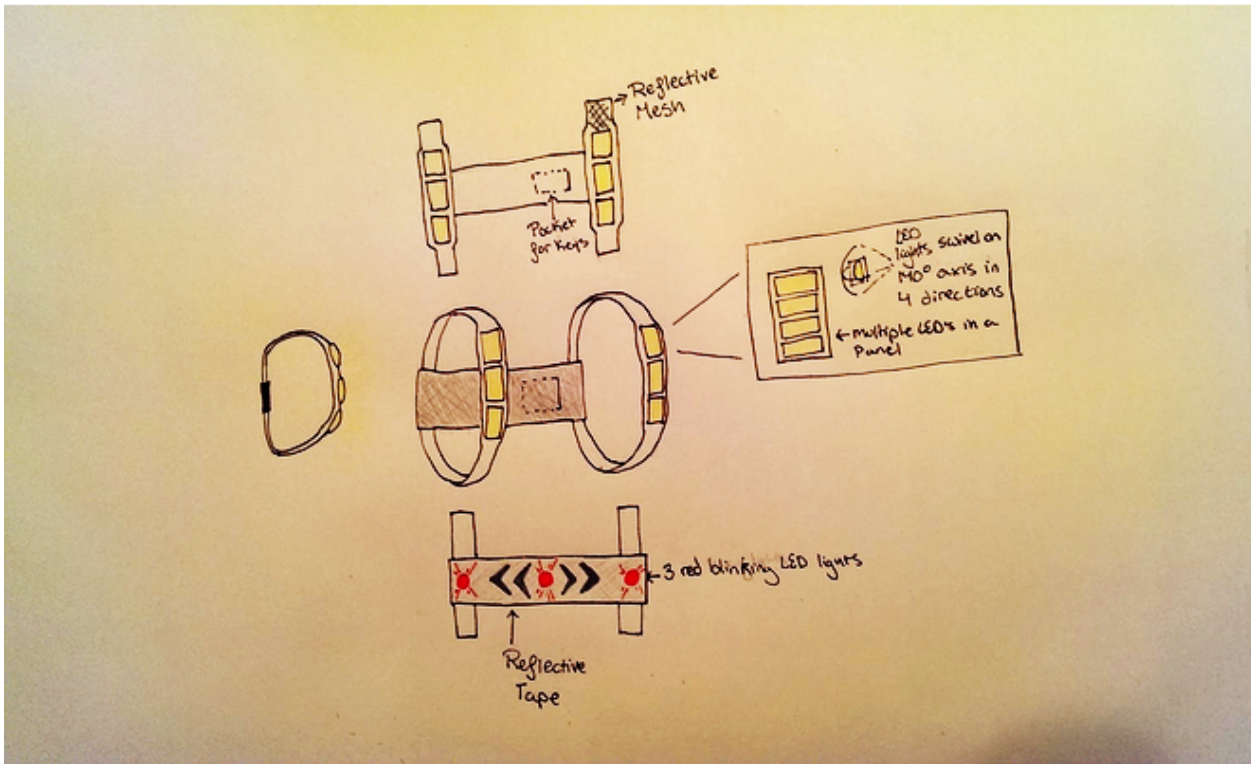


Figure 7: Running Shrug with multiple light panels on shoulders and back

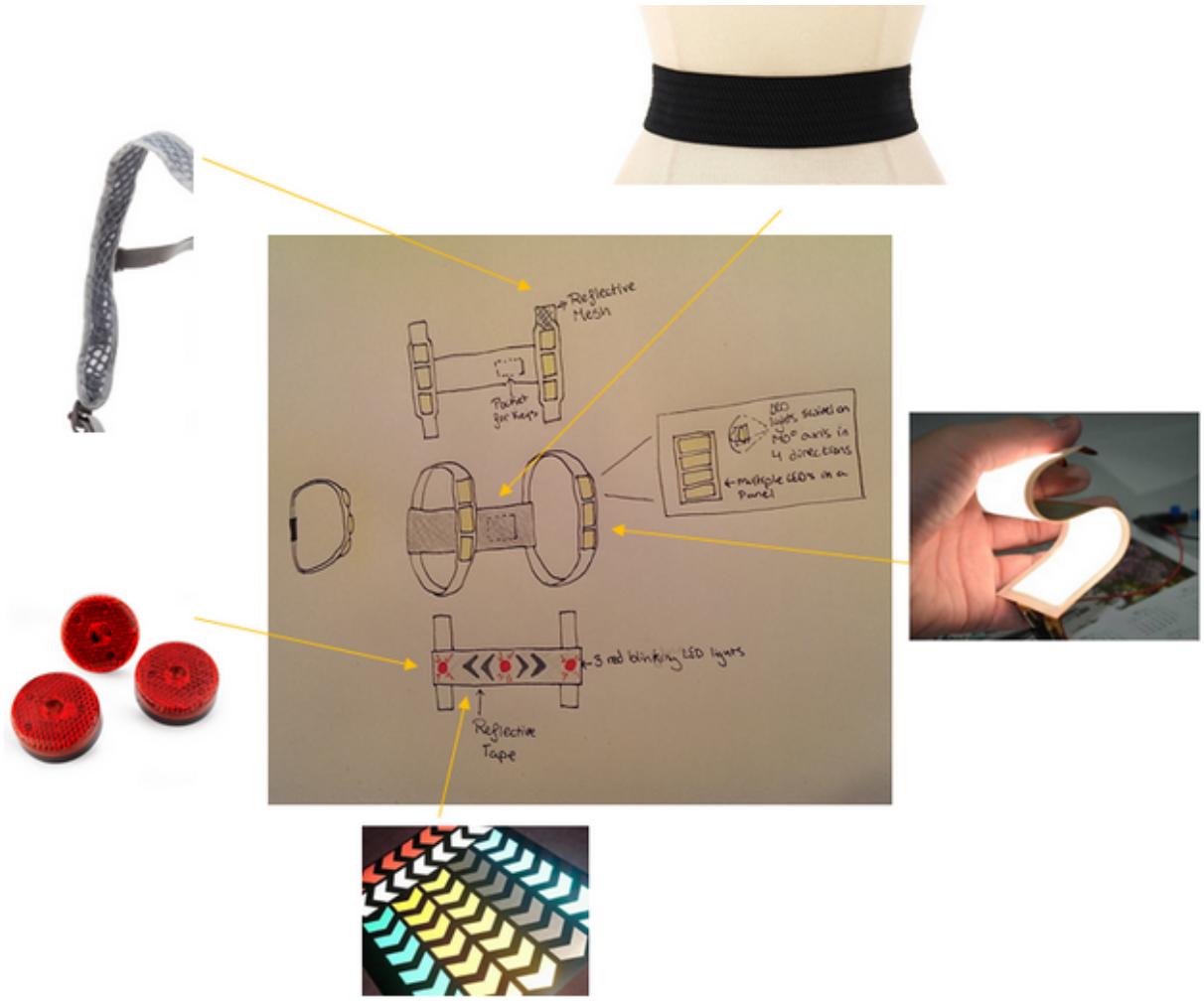
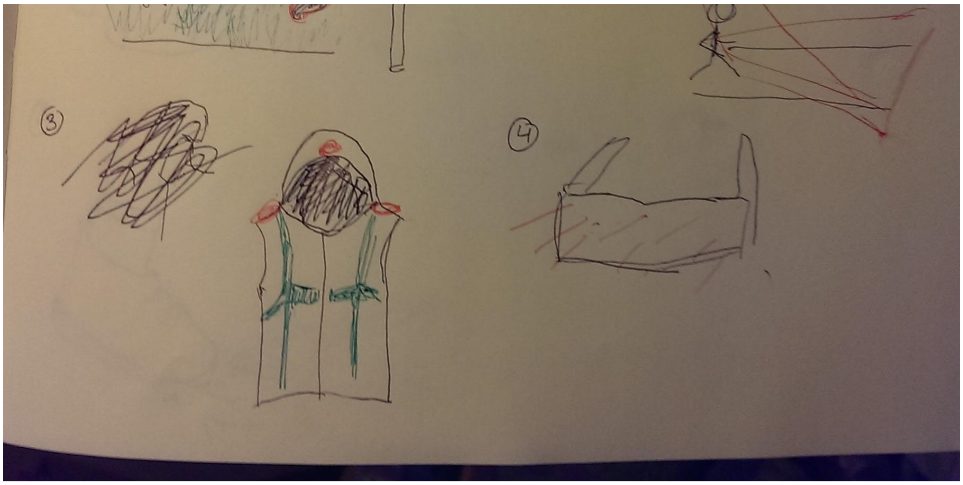


Figure 8: Mood Board for the Running Shrug

During our initial research phase, we observed that the most visible part of runners in low lighting is their chest and torso region. Having a device placed in that region gives the runner an advantage in being visible to others. Additionally, we decided to place the device around the shoulders because it shows the width of the runner, which is key to visibility, and it is one of the most stable areas of the body in motion, thus the lights that illuminate the path do not swing back and forth as much.

For this design, we would use flat panel LED's that track motion and swivel on an axis to keep the path of illumination stable. Additionally, the back of our device would have red blinking LED's, which have been proven to be the most visible at night for tracking runners. The entire product is covered in reflective tape and mesh, so if the lights are not on, the runner is still visible to moving vehicles.

Erin's Sketches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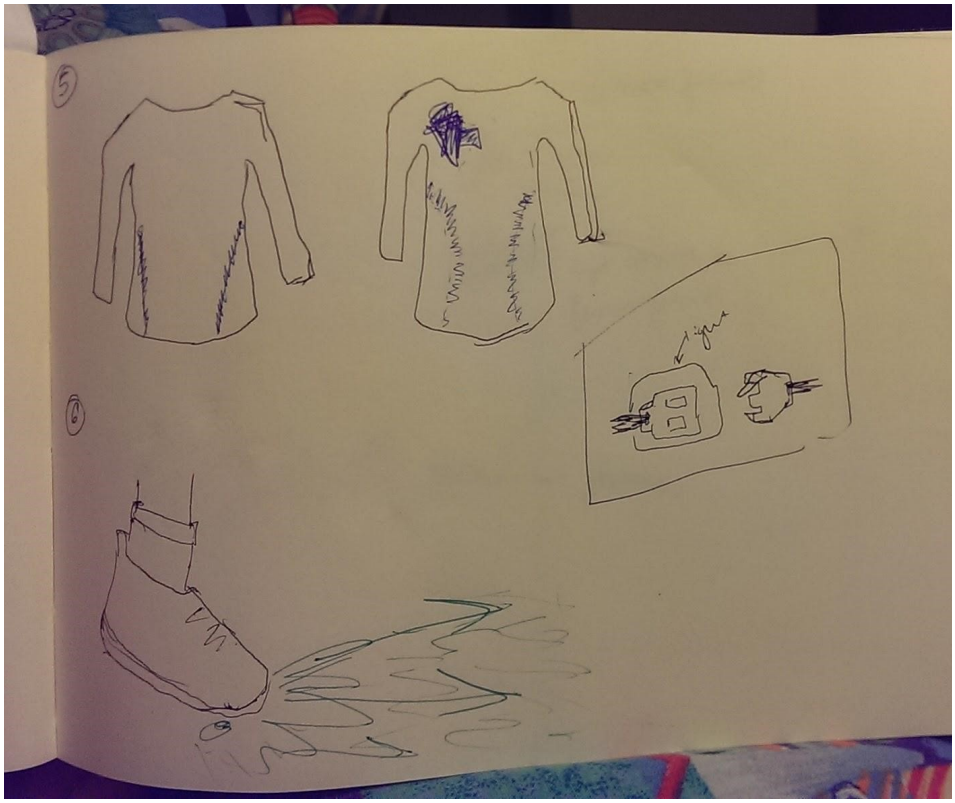
④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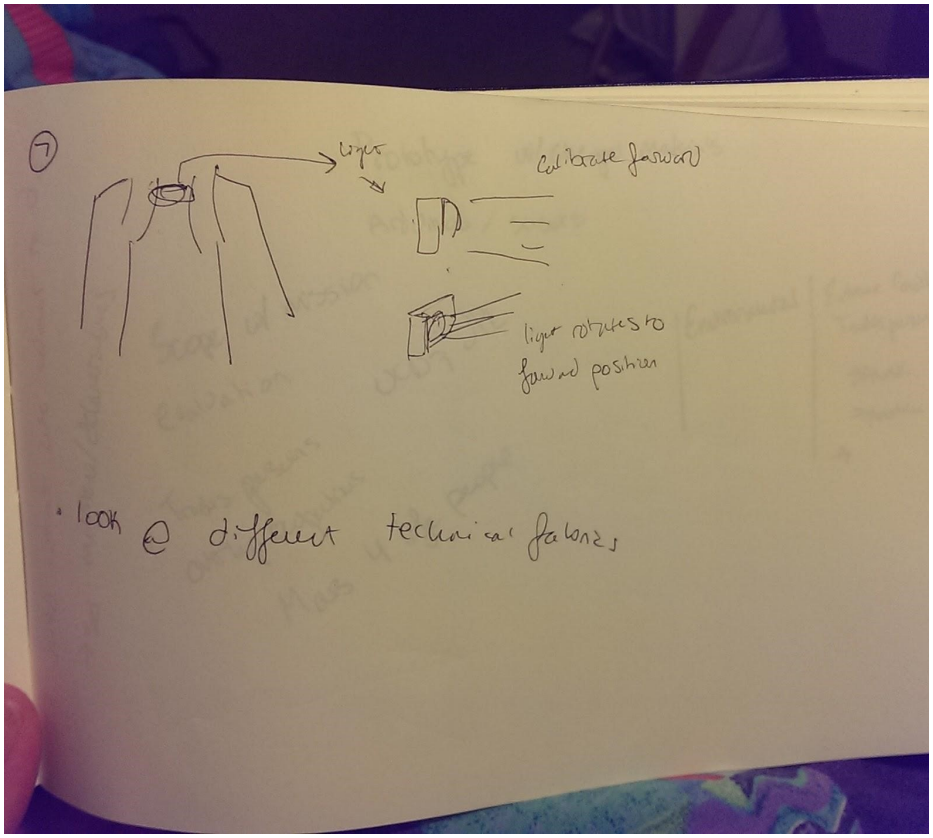
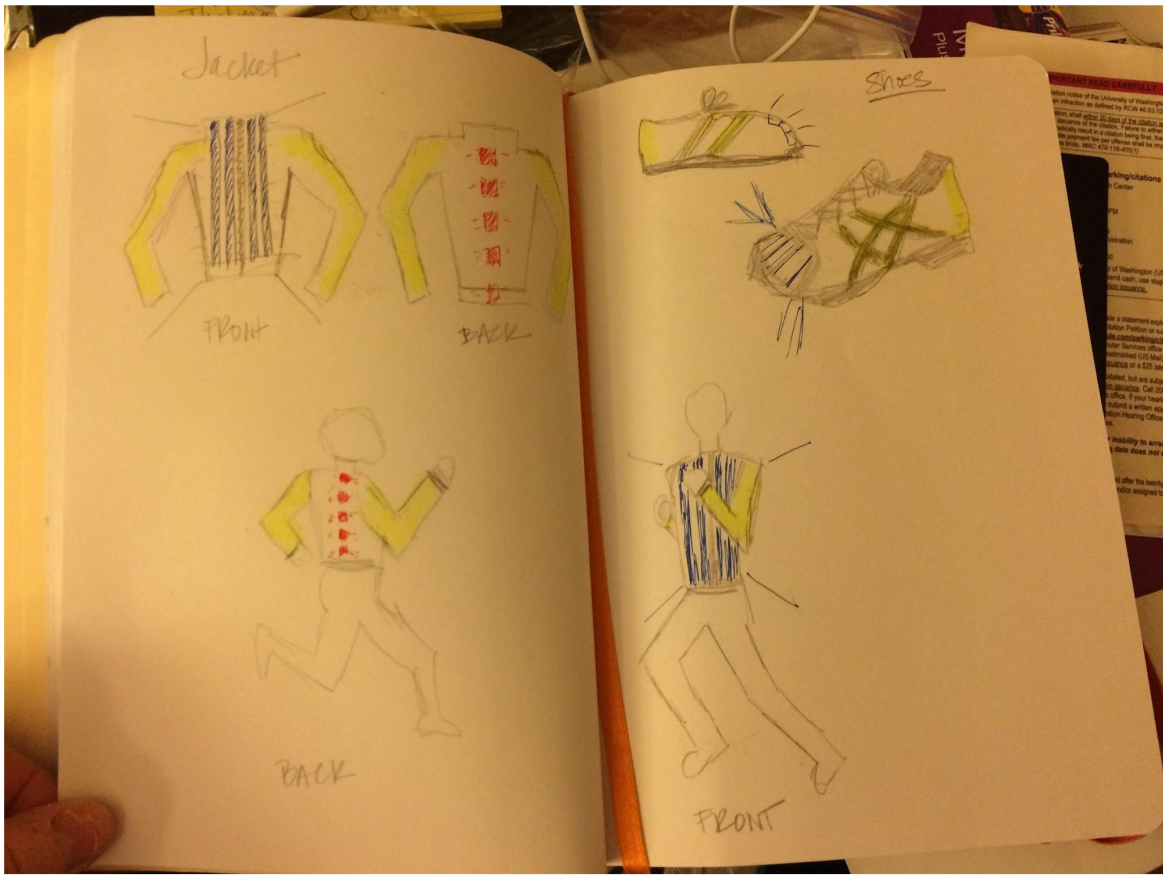
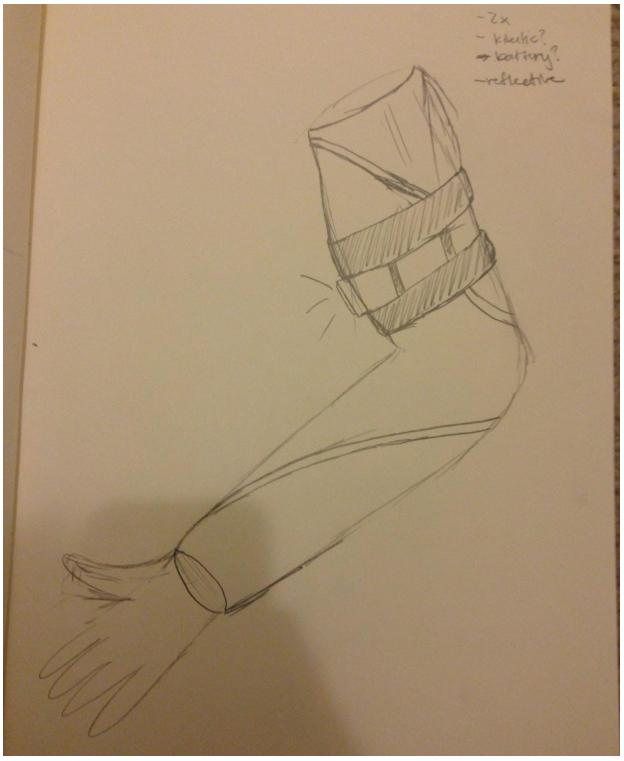
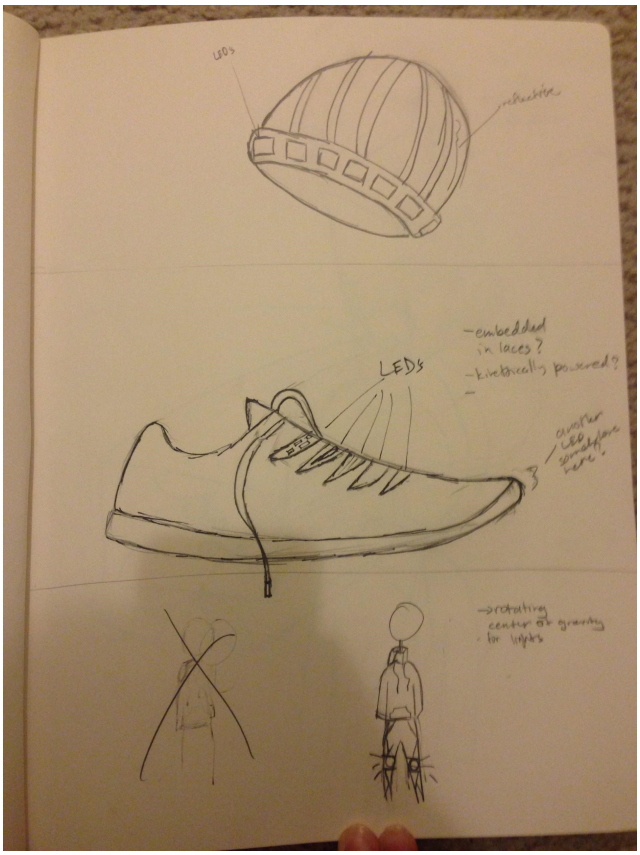

7
light
calibrate forward
light rotates to
forward position
• look @ different technical factors

Gail's Sketches



Anu's Sketches





Survey

We surveyed 200+ runners around the world about their running habits in the dark, what features they would like to see on our device, and what form our device should take. From these data points, we were able to create the following respondent expectations:

1. **Personal Security** and **Well Lit/Even Paths** are the most important issues for respondents.
2. Time is an issue. Respondents run in the morning or night because it works with their schedule.
3. In regards to personal security, some respondents wanted preventative measures while others wanted tools to protect themselves.
4. Many respondents like using headlamps but are looking for a solution that diffuses the light better or is more lightweight.
5. A fair number of respondents do not like headlamps because they are heavy and bounce. Many of these people wanted a solution for the chest and waist area. Others wanted lighting anywhere else on the body.
6. Quite a few respondents wanted running buddies or organized groups to run with at night. Others said it was the only way they would run at night.
7. Some respondents valued stylish or lightweight reflective gear that was better than current products. Others valued affordable reflective gear and lights.
8. One respondent admitted to being a vampire.

These expectations helped us decide to go forward with our idea for a running shrug that fit around the shoulders. The survey as a whole challenged us to revise our overall user expectations and consider factors we hadn't before, such as personal security being a very important factor while running.

Running in the Dark Survey

We are gathering data on running in the dark. This includes people who run in the nighttime, during times of low illumination, or who run in the early morning. The survey should take ~10 minutes. All responses will be anonymous, Thank You!

How often do you run in the dark?

- Every Day
- 3+ times a week
- Once a week
- A few times a month
- A few times a year
- Never

Why do you run in the dark?

i.e. I'm trying to train for a marathon and the only time I can squeeze it in is after work

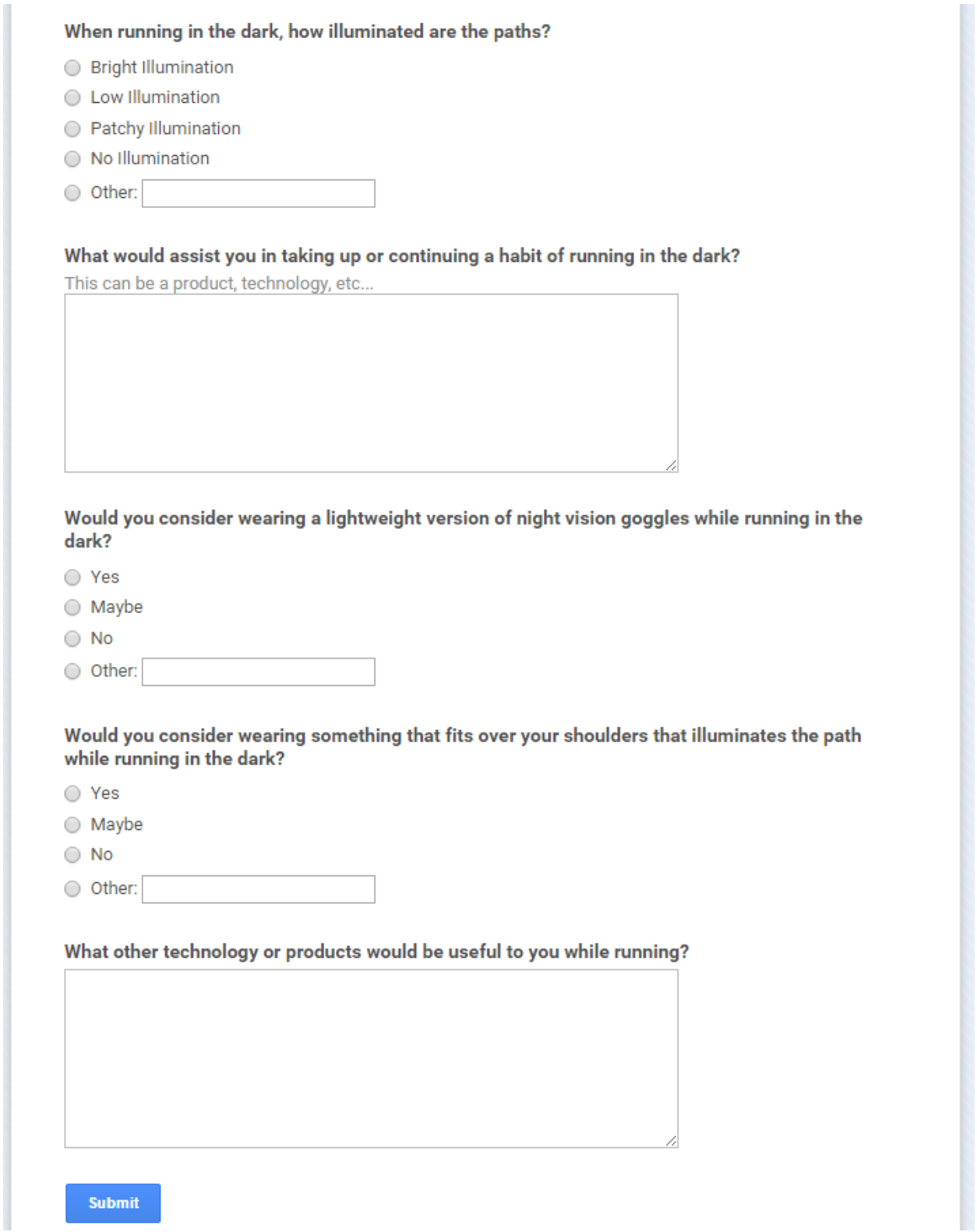
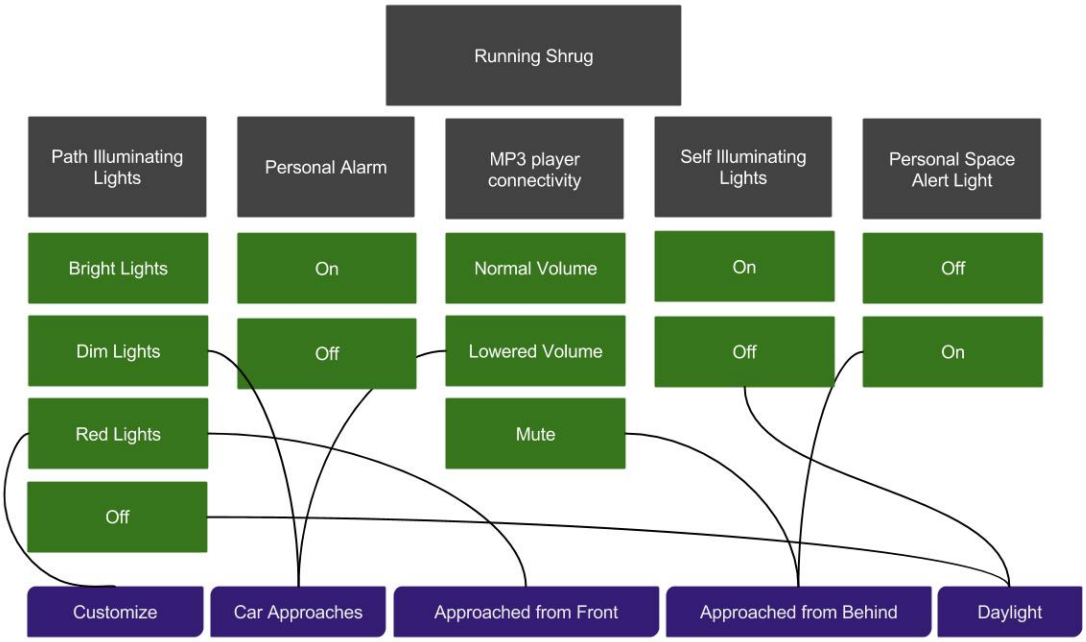


Figure 10: Screenshot of our user research survey

Sitemap

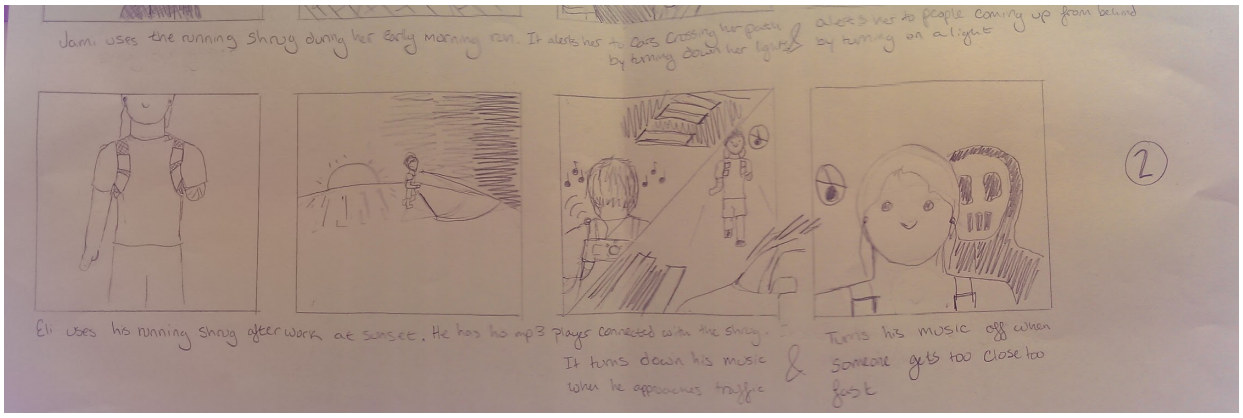


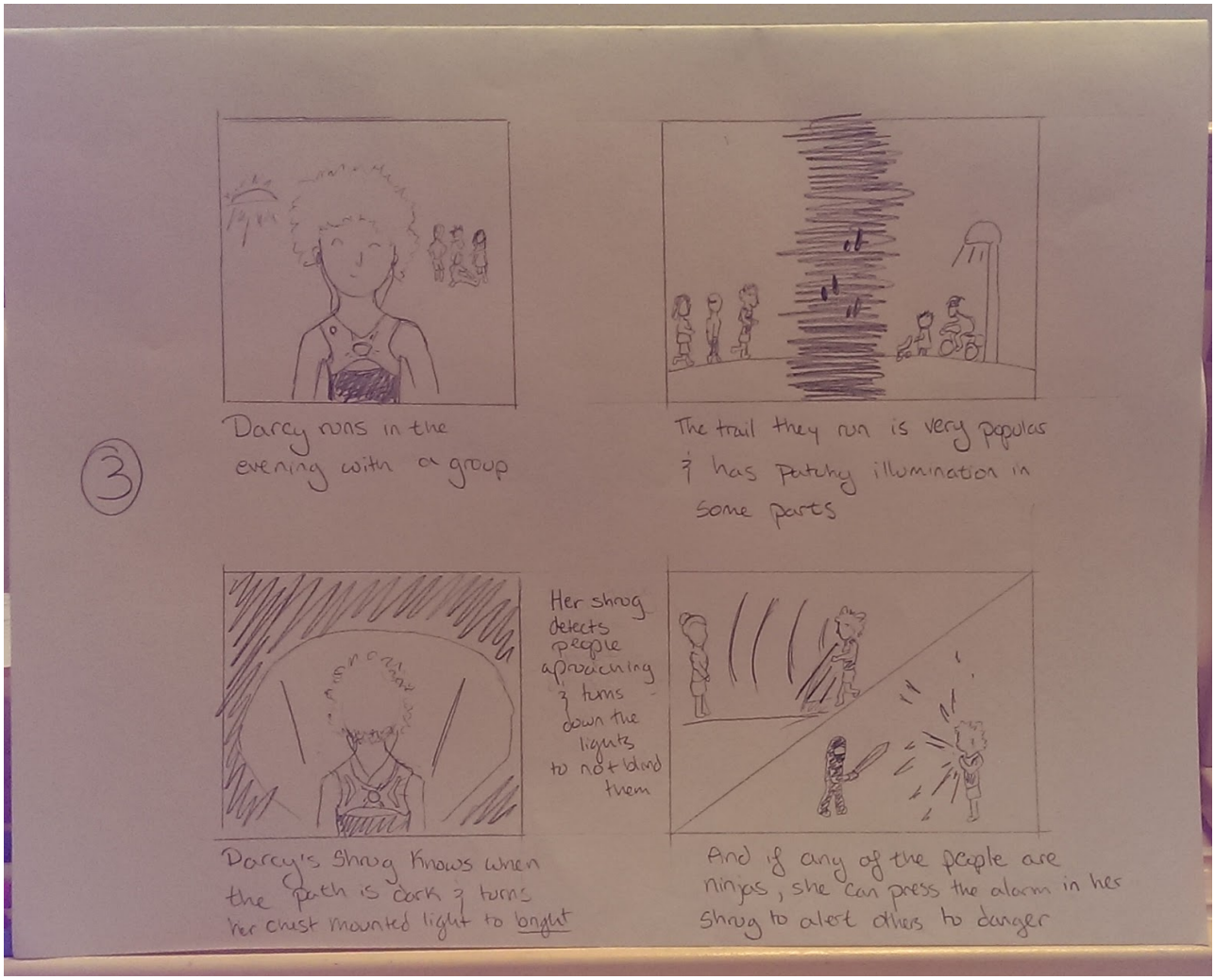
Sitemap Discussion

Creating this sitemap was not particularly demanding, as some components of our product simply have a state of on or off, however, it was still very valuable for us in terms of organizing our thoughts for our design moving forward. Our sketches helped us come up with potential ideas, the survey helped us narrow down what design we would be going with, the map helped us think about what interactions would be built into the design we decided on, and the subsequent storyboards helped us really envision what it would be like for the user to interact with our product. All of this served as a really good foundation for starting our prototyping process.

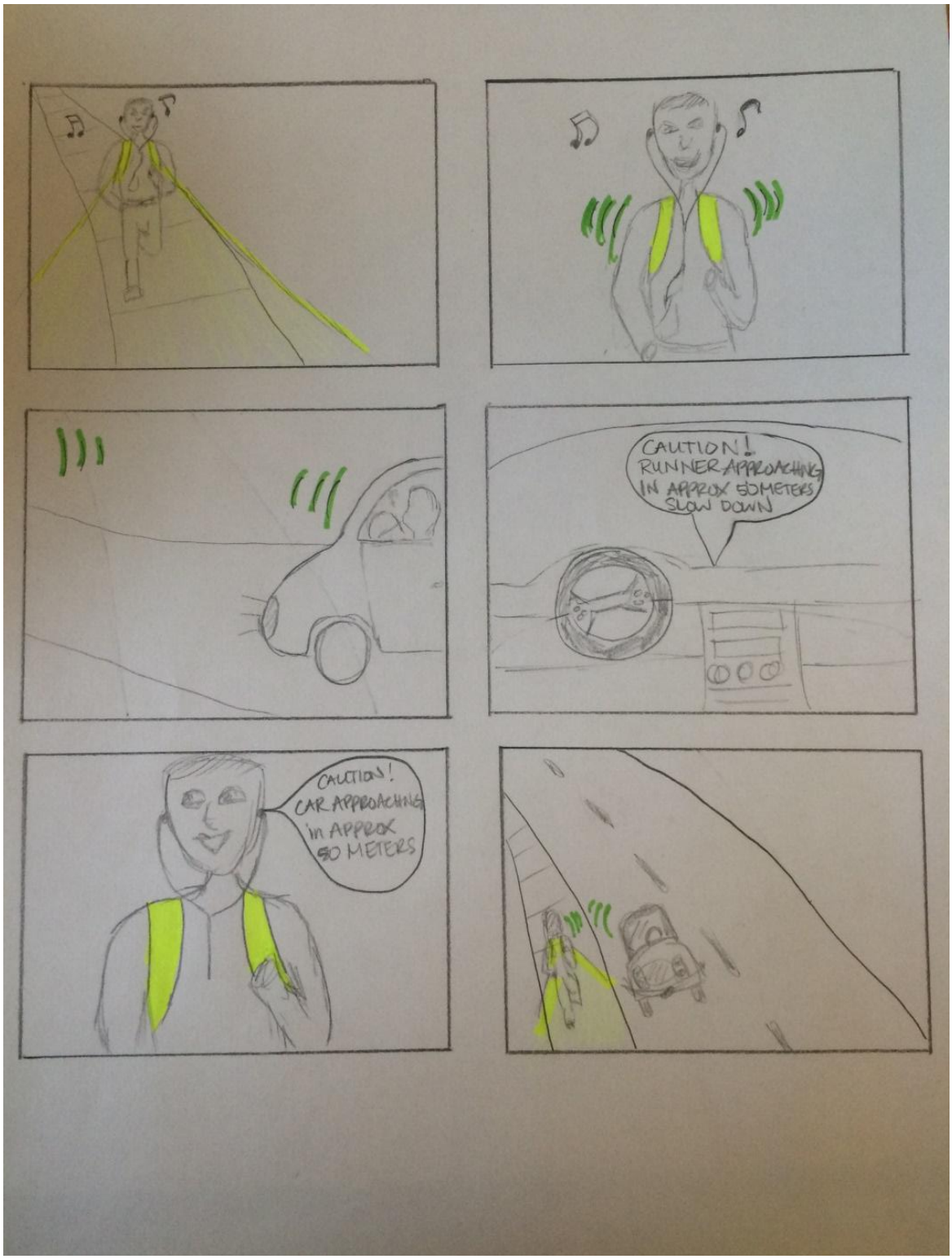
Storyboards

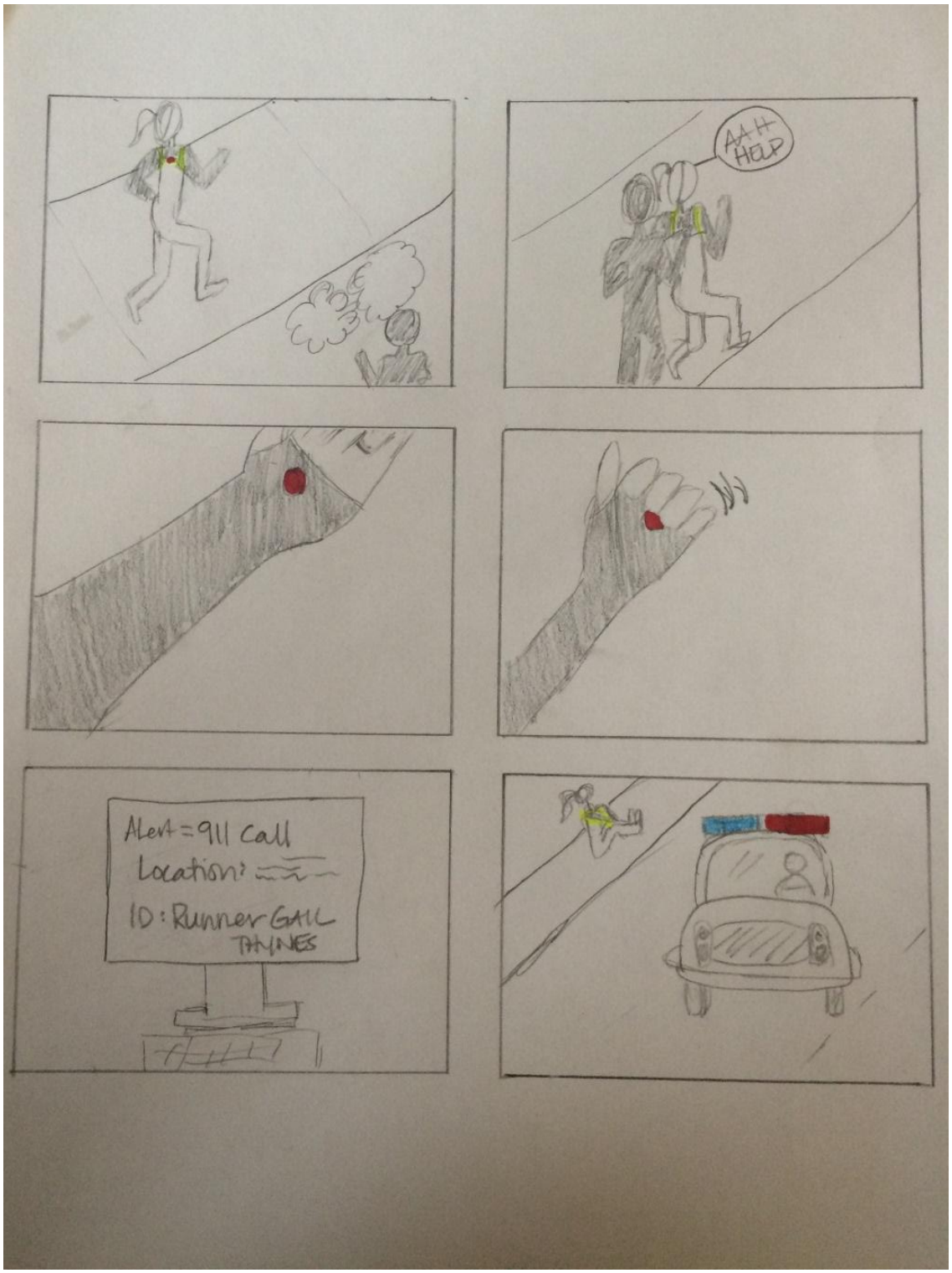
Erin's Storyboards

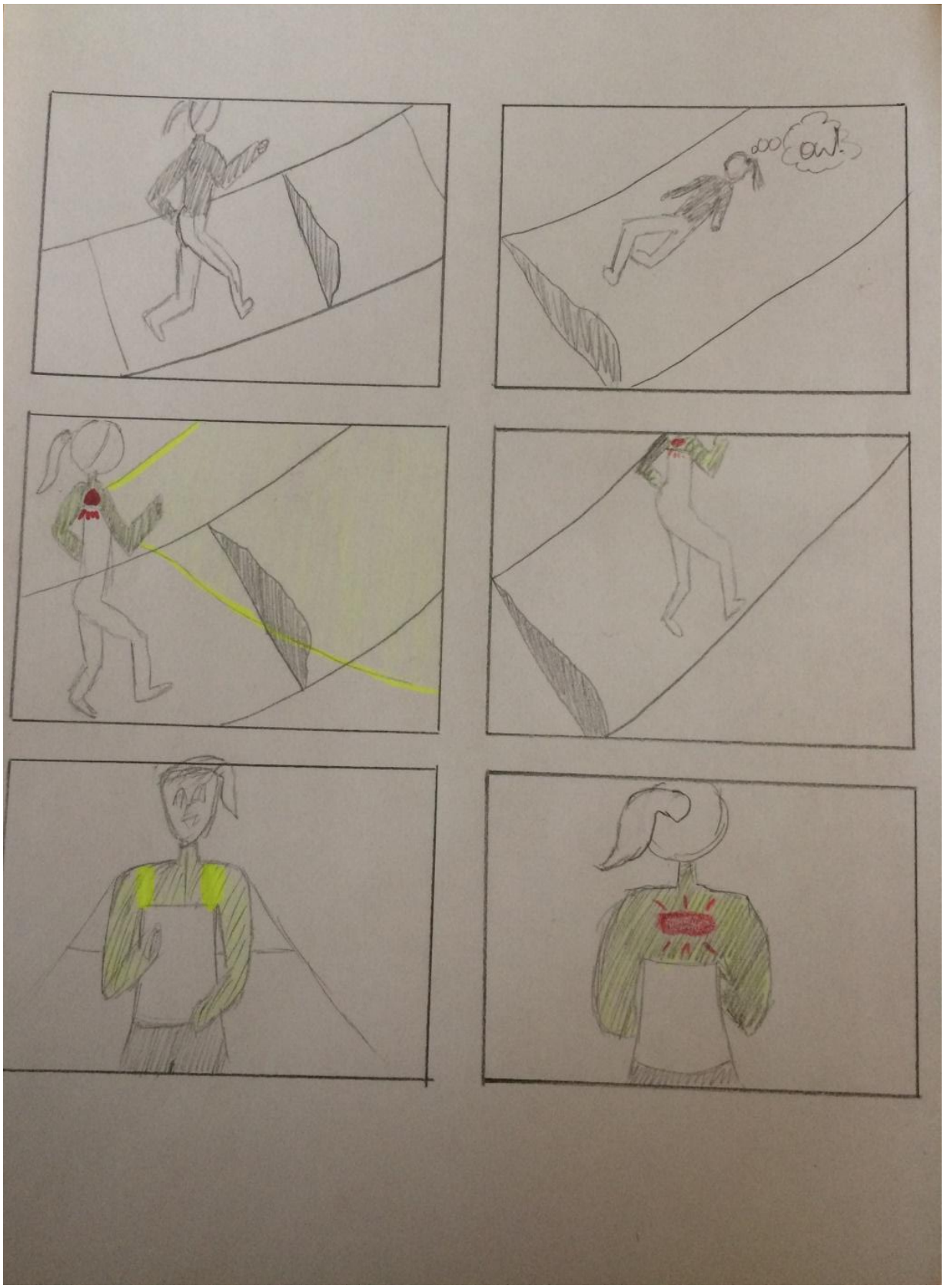



3
Darcy runs in the evening with a group
The trail they run is very popular & has patchy illumination in some parts
Darcy's shrug knows when the path is dark & turns her chest mounted light to bright
Her shrug detects people approaching & turns down the lights to not blind them
And if any of the people are ninjas, she can press the alarm in her shrug to alert others to danger

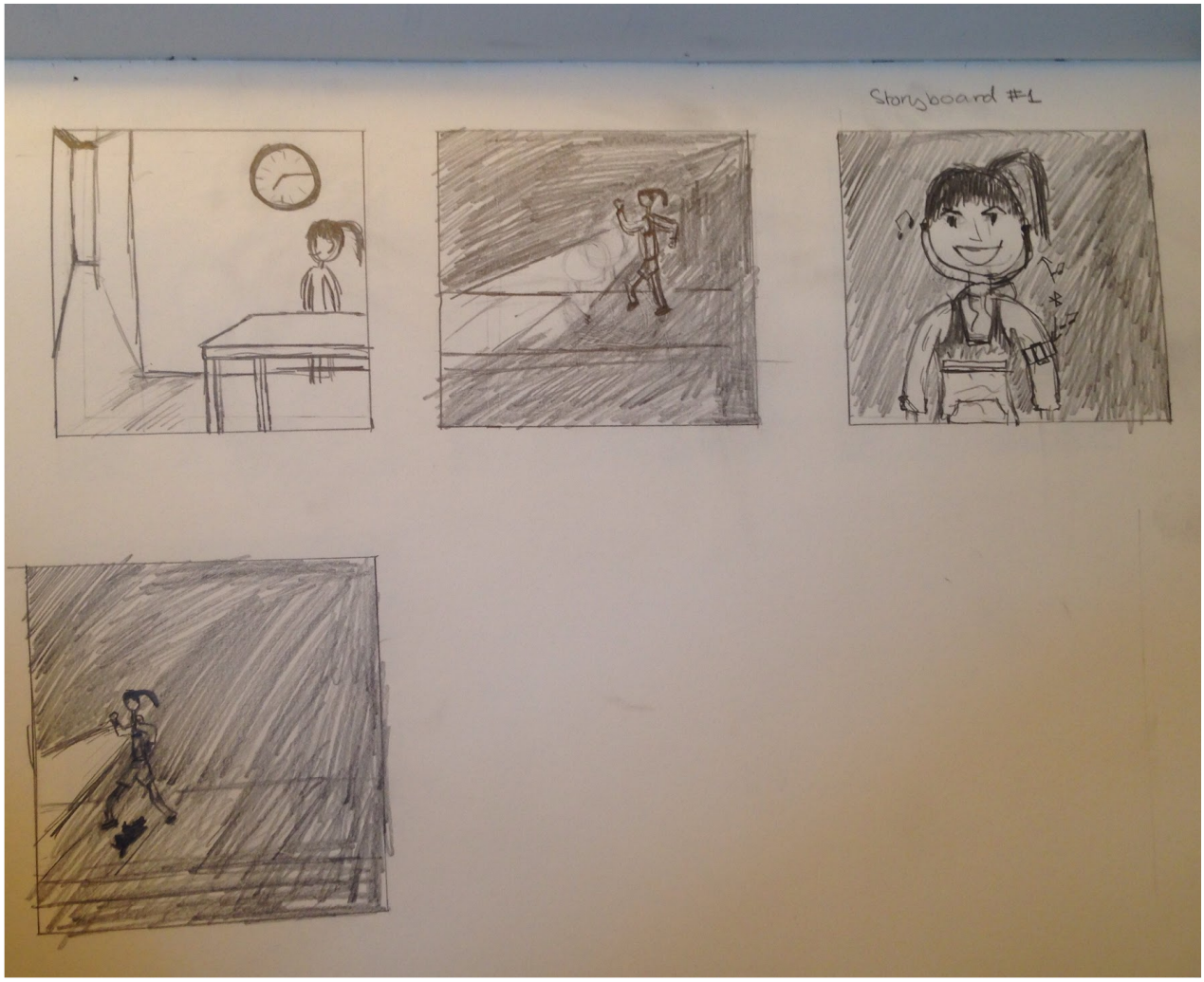
Gail's Storyboards

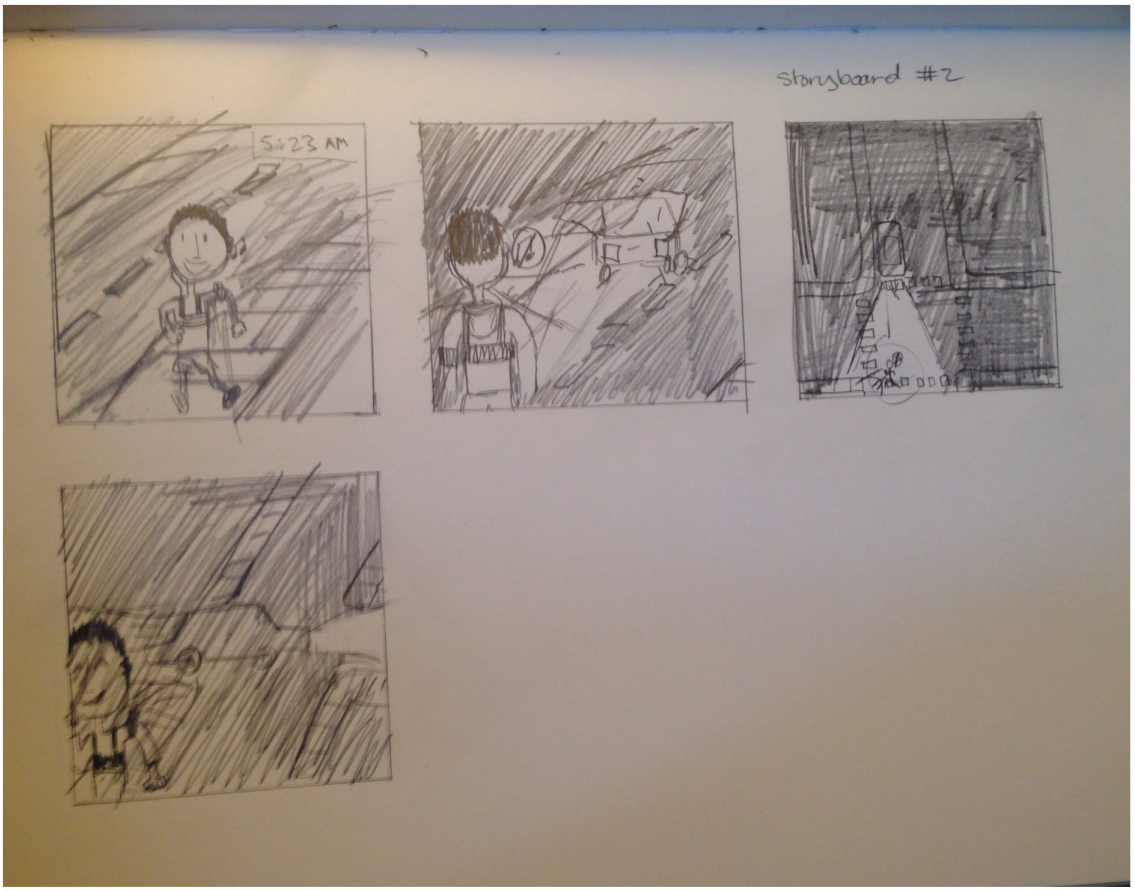


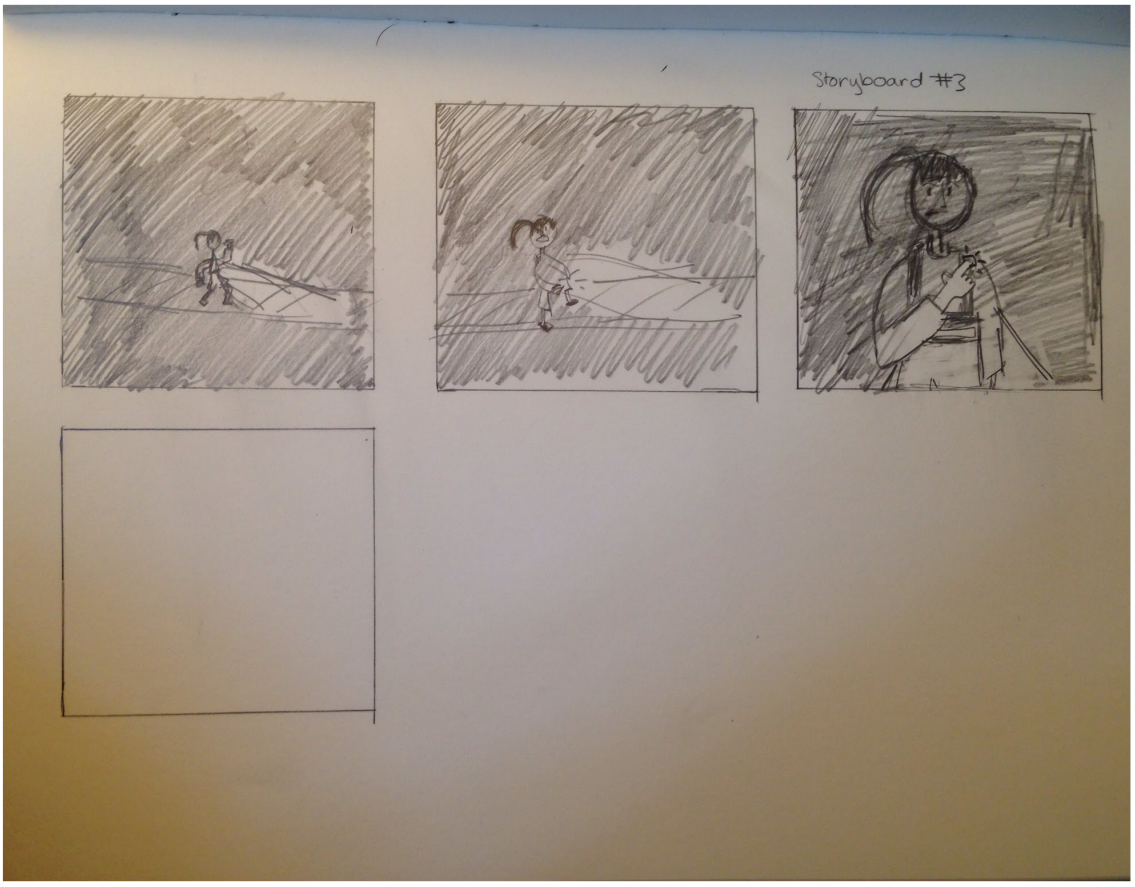

AAH HELP
Alert = 911 call
Location:
ID: Runner GAIL
TAYLNES


ow!

Anu's Storyboards



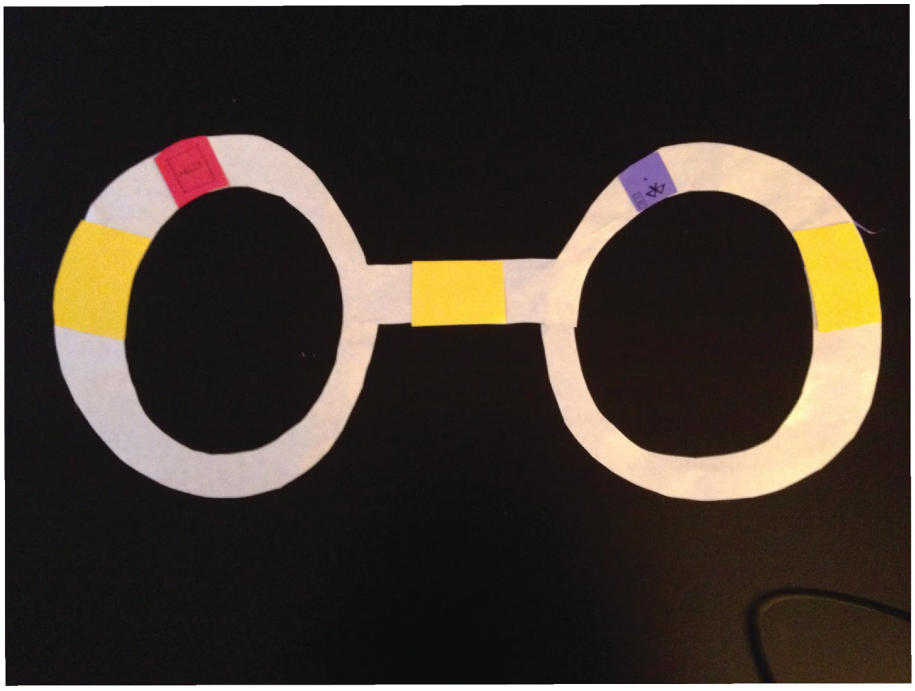

Storyboard #2
5:23 AM

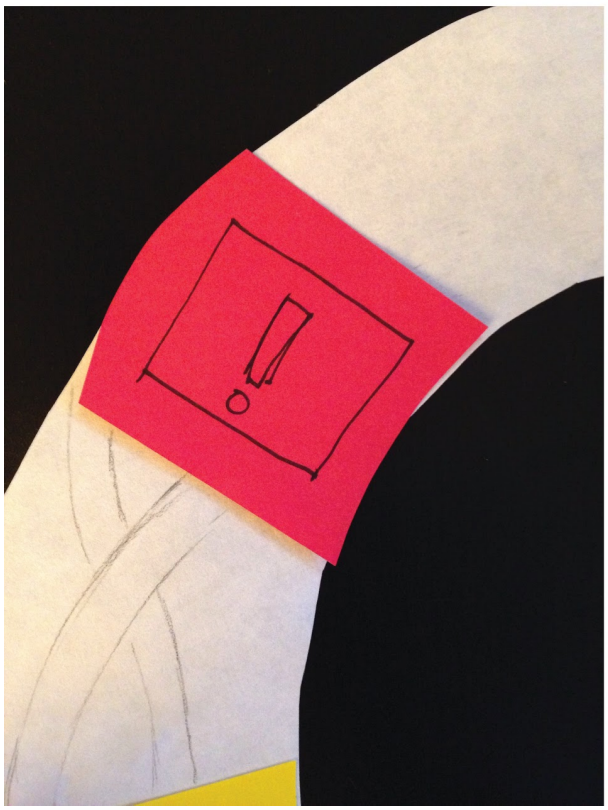

Storyboard #3

Discussion

The three figures above show the storyboards we drew during our design process. They served as a great tool for envisioning all the different scenarios our users may encounter while wearing our product, as well as what interactions with the shrug would look like in these scenarios. Our storyboards also prompted us to further think about what our design itself might look like (in addition to what the experiences and interactions *with it*), and was a valuable precursor to our paper prototype.

Paper Prototype





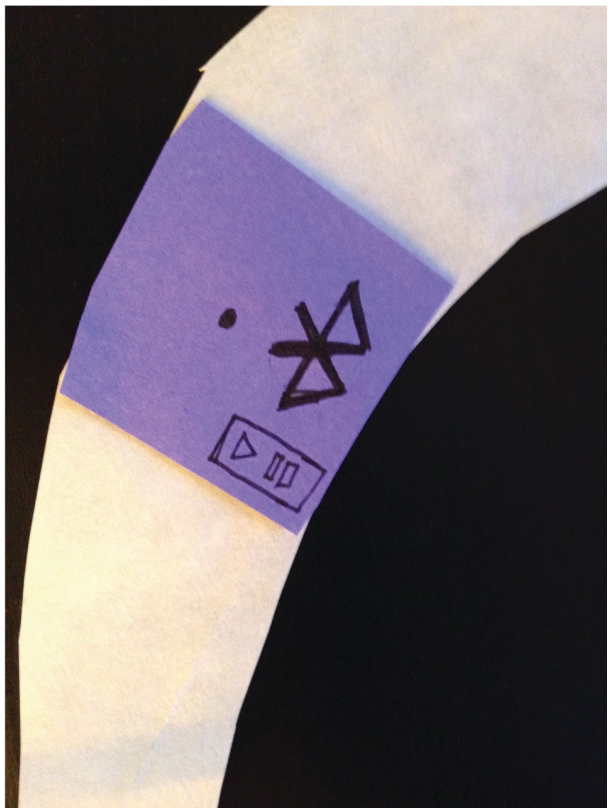


Figure 9: Picture of entire paper prototype with close-ups of bluetooth and alert feature

Paper Prototype Discussion

In the above figure you will see pictures of our paper prototype. There were good and bad things about this part of our process. Making the paper prototype was valuable for us because this was the first physical iteration of our conceived design for the product itself. We even ran guerilla user research on it and received positive feedback over all. Our research consisted of one of us wearing the paper prototype, approaching other students on campus and asking them what they think all the different components of the design did.

This helped us test our product design rather than our user experience design. This prototype was not incredibly helpful with communicating the different possible states of the product, which is something we kept in mind moving forward.

Prototype Evaluation

PART 1: Evaluation Plan

Recruitment and Initial Survey Setup

To evaluate our product, we would recruit ten people who identify as runners. We plan to recruit using two different methods to bring in people who align with our two personas. First, we plan to recruit in running shops, and over running group and club's social media pages. Since our primary persona, Jami, identifies strongly with the running community, we are looking for at least five people who also strongly identify with the community. Thus, recruiting in spaces they frequent is a good strategy. Second, we plan to recruit through marathon organizations and their social media pages.

Through our research, we identified that many new runners, like our secondary persona Eli, often challenge themselves by training for a marathon. Thus, recruiting through those channels should bring in similarly new runners.

In addition to an initial signup of interest, potential participants would have to complete a screener and a contextual in-person interview in order to qualify for the study. The screener will further help us identify who has qualities that align with our personas. Since we would have participants do a diary study, an in-person interview would be helpful in vetting that applicants are regular runners and and can commit to a long-term study.

As mentioned previously, we would plan to conduct a diary study with intermittent questionnaires, logged on the participants mobile phone for real time feedback. Since our product aims to change runner's behaviors and feelings about running at night, a longitudinal study would show how participants change while using the product. We believe a month long study will give participants the opportunity to use the product multiple times and have it influence their behaviors and feelings.

Why a Diary Study

RunSafe is a wearable device for path illumination and safety enhancement for runners. We believe a laboratory setting for studying the effectiveness of our design is inadequate for providing the benefit of user experiences. A diary study is a longitudinal study where users provide feedback on contextual use of a product. We believe that a diary study is ideal for RunSafe for three reasons: context, comfort, and safety.

Runners need to wear the device in the wild to evaluate the effectiveness of the device and its features. Determining the sense of safety and comfort could be difficult to assess with only one use. Our device needs to be lightweight and not inhibit the runners' natural movements, while also providing features like the responsive lights.

Wearing a device like RunSafe could also have an initial learning curve or require the user to adjust to the fit. The issue if safety is best tested in real situations, where users can determine the effectiveness of the product to improve path illumination, respond to vehicle proximity, and the emergency alarm. Safety is a primary concern for our users. Over a period of time the users' perceptions of safety could change as a result of wearing RunSafe, those perceptions could dramatically alter the runner's habits. We believe that a diary study would be the best approach to gathering users' perceptions about RunSafe and measure these changes over time.

As previously mentioned we would conduct the study with ten participants over a 30 day period. Participants would be required to use the device (pictured below) a minimum of three days per week and record their activities. For the diary study we would likely create a higher fidelity prototype that included working versions of the features. The diary would include photos of the participant wearing the device,and their route and distance. We would create a simple mobile application that allowed the user to update their information easily and prompted the user to a questionnaire that measured the effectiveness of RunSafe for context of use, safety, and comfort.

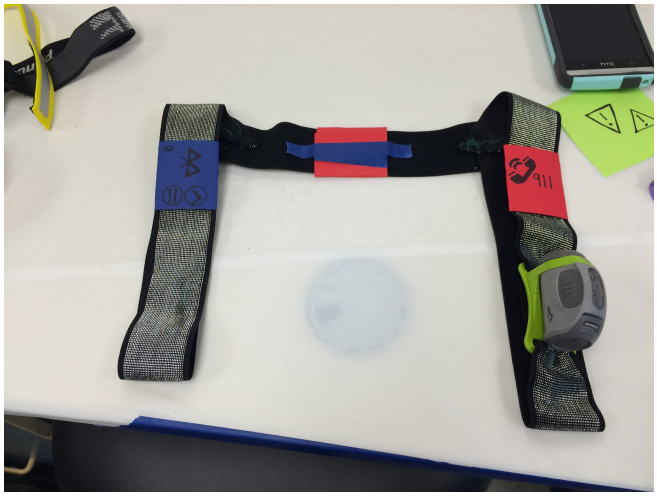


Figure 11: Pictures of the low fidelity prototype including close-up of the buttons

Diary Study Setup

What the diary study will look like

1. Screener survey
2. Short interview
3. Diary study
4. Follow-up interview

Diary studies are labor intensive for users and require a significant commitment from study participants. We will begin recruitment with a screener survey, followed by an interview to ensure that our users are committed to the study. Our screener survey will gauge the user's interest in running and willingness to use our product, and the subsequent interview will provide an understanding of the users' interest in *sharing* about their experiences with our product.

We would use a mobile application to conduct the diary study. This medium would make it easier for the user to participate in the study, and allow us to aggregate the data or make

alterations to the study across all participants. We would collect quantitative and qualitative data from the diaries. The quantitative would include surveys for users to complete after each event (refer to bulleted list below), and event duration, location, and distance. The qualitative data would include, photographs of event sessions (i.e. photos taken demonstrating product effectiveness at path illumination, or participant wearing the device),as well as a journal prompts to document the users perception of safety, and product effectiveness. Photos of their running path would be required once a week, but could be included at each event if desired, and would give us the opportunity to visualize what physical obstacles they may be encountering. We will ask them to annotate the photos as necessary.

We will be looking to answer these kinds of questions with our journal prompts:

- How did they use the device?
- When did they use it?
- How often do they use the device?
- For how long did they use it?
- Do users feel safe when using our product?
- Is the path well lit for users? what do users define as "well lit" (diffused light, direct bright light etc.)?
- is the placement of each secondary feature (headphone jack, life alert button) intuitive and useful? why or why not?
- How does the product make them feel? do they like it?
- How was the fit when wearing the device?
- How were their interactions with vehicles while using the device?
- Did the device work as it is supposed to?
- Did they see potholes and other obstructions on the path?
- What bugs/glitches did they encounter using the device?
- Did they use the alarm button?
    - What prompted them to use the button?
    - What happened when they used the button?
    - Was it effective in resolving the situation?
- In addition to these questions, we plan to ask a few free form guiding questions for journal entries.

The qualitative portion of the diary would provide richer documentation of the participants' experiences in the wild, and the quantitative would provide the statistical insight to support design decisions.. We would anticipate the use of a diary study in the evaluation of RunSafe would provide more contextual feedback on the effectiveness of our design and how we can

better address the needs of our target users. We believe this approach will result in significantly more actionable information to improve our design.

PART 2: Simple Evaluation

Motivation

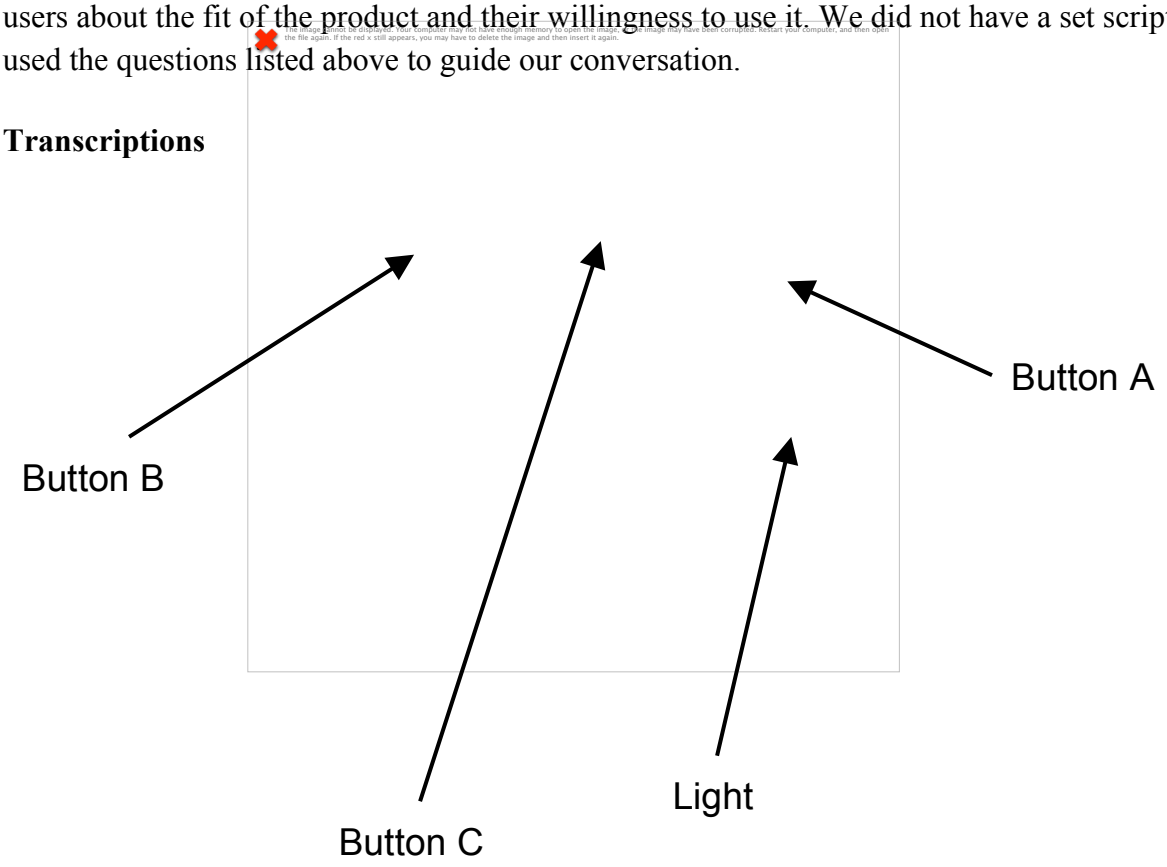
With our physical prototype created, we were ready to test with users. Our main focuses for testing were the following:

- Do users understand the iconography?
- Do users understand the intention behind each of the features on our product?
- What are user's thoughts on the fit?
- Would users wear our product for its intended purpose?

Methods

Testing was conducting in the HUB. We approached students who looked ‘athletic’ and ‘willing to participate’. After introducing ourselves, we gave users the option to try on our product. If they were not comfortable wearing it, one of us would try it on. Our initial set of tasks asked users to identify the function of each feature. After explaining the intended functions,we asked users about the fit of the product and their willingness to use it. We did not have a set script but used the questions listed above to guide our conversation.

Transcriptions



Transcription 1

- Female, Runs at the indoor IMA track because it is easier
- Our first participant decided not to try on the product. Instead, Gail demoed the product
    - Task 1: What do you think button A does?
        - “Calls for help?”
    - Task 2: What do you think button B does?
        - “Is it like, bluetooth?”
    - Task 2.5: Do you think it does anything else?
        - “I don’t think so...oh change between music...a play and a pause button”
    - Question: Do you run at all?
        - “At the gym, not like outside.”
    - Question: Why not outside?

        - "Ummm, Idk, I just like to run longer and it's easier in the gym"
    - Question: If you were to run outside in the dark, is this a choice you would consider?
        - "If I had no choice, then yeah"

Transcription 2

- Male, Non Runner
- Tried on the product but found it too tight and uncomfortable under the shoulders
- Most of conversation was not recorded so answers will be paraphrased
    - Task 1: What do you think button A does?
        - It calls 911 for help
    - Task 1.5: Do you think it does anything else?
        - Maybe it can warn people of danger?
    - Task 2: What do you think button B does?
        - An mp3 player and bluetooth for connecting to your phone.
    - Task 3: What do you think button C does?
        - It's an impact cushion in case you fall down.
- "I think, I think it's a more useful opportunity, especially since it is paired with the phone, I think people would definitely use that."

Transcription 3

- Male, runner and biker at night
- Tried on the product enthusiastically, fit well, provided suggestions for construction
    - Reaction to putting it on:
        - "This is actually kinda nice, it fits, doesn't feel like it's gonna fall off. It's a little bunched up in the arm pits but I'm wearing three shirts so there's that."
    - Task 1: What do you think Button B does?
        - "That..bluetooth connection to your phone. It may work should to hold your phone. They're all touchscreens, it may work, the controls are right there, can you run with a gps anyways now a days...yeah navigate"
    - Task 2: What do you think Button A does?
        - "That calls 911 in case you get hit by a car"
    - Task 3: (We turn on the light) Do you think that could illuminate the path for you?
        - "Yeah actually...seems like it has a wider band so that might actually work for the path...adjustable"
    - Question: Does it feel comfortable?
        - "It doesn't stretch too much, enough elastic in the back"
    - Question: Would you wear something like this to run?
        - "Yeah! It's a hell of a lot better than a headlamp"

- Question: Do you think there would be any issues with your upper body moving while you're running?
  - "Not really, it comes back to how tight it fits in the armpits, that's the only bit of chafing"

Findings

Fit

Overall our users seemed to like to shape of the design and commented that the strip on the back seemed to hold the device in place. One of our male participants was significantly larger than who the prototype was designed for, which contributed to the tightness across the back. Two of the three participants commented on the width of the strap under the armpit being too thick. These same two participants commented on how well the device stayed in place and would be comfortable to wear running with minimal chafing. We had an extended conversation with one of our participants after the interview was over where he made some interesting suggestions about how to customize the fit for variety of users.

All three participants implied the lights were well placed and would be sufficient to light the direct path, although further testing on the the actual lights and their placement would be required in future iterations of the design. All three participants understood the basic use of the emergency 911 button, but one one participant speculated that it would make a sound. None of the participants expected the emergency to light up or blink which we considered as an important feature for safety. The next iteration could improve the communication of the additional features of the emergency button such as a blinking light and alarm.

Phone

During testing, two users assumed our product linked up with a phone. One user suggested the phone could be integrated with the device as a GPS. In an earlier survey we conducted, runners indicated that their phones, especially iPhones, were an item they commonly brought along running. Thus, there is some merit in having a phone pocket or holding mechanism in our device. Additionally, the phone has many features that address our users' needs running at night. It can call for help, play music, and most phones have powerful flashlights. As we go forward with our design, we should be cognizant of feature overlap between our device and phones to make sure we aren't being redundant but actually addressing runners needs in a more effective way than a phone.

Opportunities

The greatest opportunity for improvement was the red light on the back of the of the device. Users had some confusion about it's purpose highlighted from a user's comment "It's an impact cushion in case you fall down." Using a reflector or an actual blinking red light would better communicate its function.

Our next iteration should address the following issues:

- Have a tailored strap that is narrow under the arms and is wider for over the shoulders.
- Create an option for customizing the strap length across the back
- Ideate on ideas for fit customization at point of sale
- Improve fidelity of 911 button to show it's duality as both an alarm and a call to emergency services
- Consider options for phone inclusion

For our next steps, we plan to create an annotated CAD drawing of our prototype to fully represent our vision for the product. A functioning physical prototype is not possible with the time and technology constraints we currently have. To better represent our physical prototype, we plan to make a few adjustments. First, add a second light on the other shoulder strap and a blinking red light for the backstrap. Having a light on each shoulder strap was in our original design but we could not find a second suitable light for our prototype. Second, we plan to 3D print the 911 emergency alert and bluetooth/mp3 player buttons. This will make the product feel more authentic without adding functionality and complexity to the prototype.

Prototype Evaluation Discussion

The first part of this assignment asked us to come up with an evaluation plan for our product, and the second part asked us to conduct a simple evaluation. Although we weren't able to actually execute our evaluation plan due to the time and resource constraints of the term, coming up with

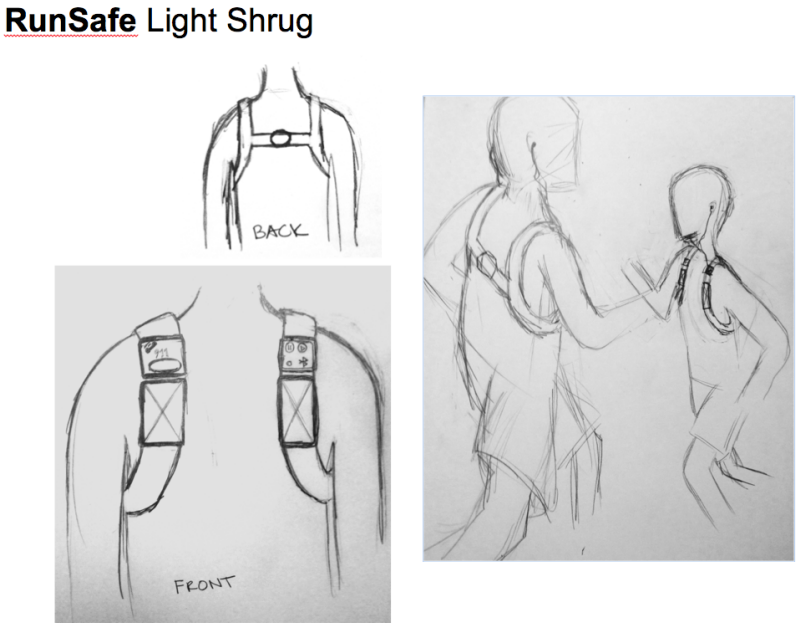
a test still very much focused our design. Considering what type of test to run, thinking of what questions we wanted said test to answer, and then coming up with a step by step process for our users to engage in helped us center our thoughts on the UX of the design and our users needs. Also, in the future, when time and resources do become available, we will have materials to refer to and work with for usability testing.

As for the second part of this assignment, we took our higher-fidelity prototype with us to conduct some more guerilla user research. This was more informative than our paper prototype evaluation as the fidelity of this newer iteration allowed for more nuanced responses that had to do with interactions and how the product *felt* rather than just what it does.

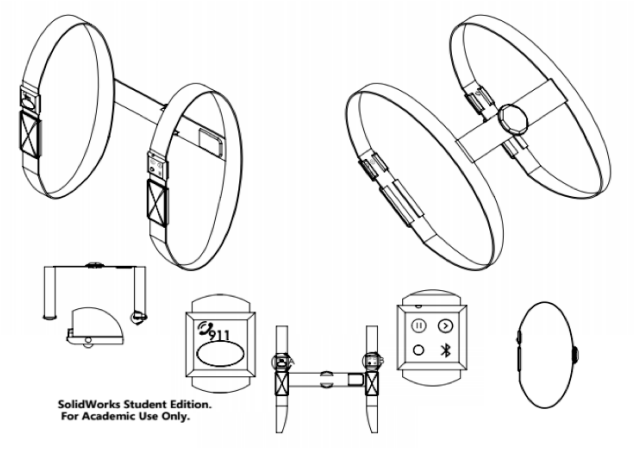
Annotated Wireframes

Annotated wireframes are an ideal way to document interactions with the interface of a design. Since we are creating a physical product, we took an industrial design approach for our assignment using sketches for context and CAD drawings to show the dimensions of the components. We applied user feedback from our simple evaluation to improve on the previous version of the design.
The changes we made were:

- Customizing the size
- Contour the elastic under the arm
- On/Off feature to the personal alarm

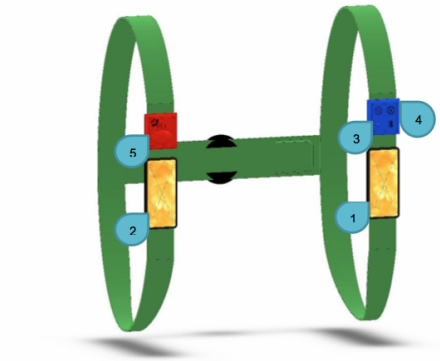


RunSafe Light Shrug



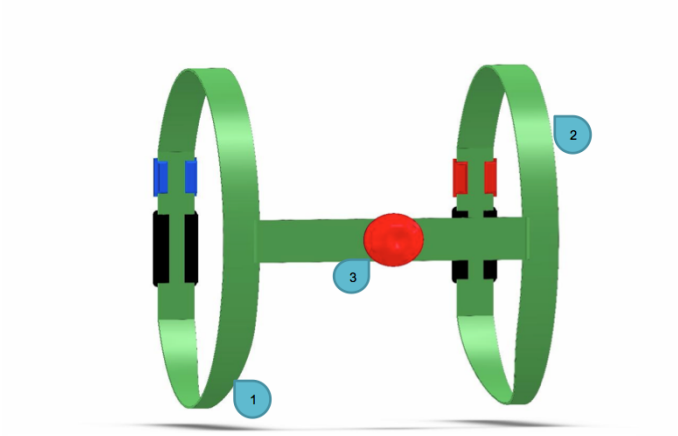
The **RunSafe Light Shrug** provides runners with a comfortable and safe way to illuminate their path. The shrug includes features such as a responsive lights, personal body alarm, and automatic volume control to improve runner safety.

RunSafe Light Shrug



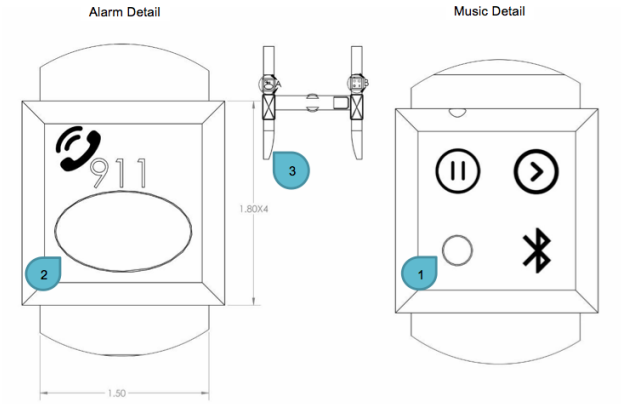
1. Sensor that pings off vehicle IP addresses and Bluetooth signals from nearby cars. Interacts with Bluetooth connectivity feature and LEDs.
2. Responsive LEDs that light the runner's direct path. Lights have dimmable response to vehicle proximity to reduce blinding effect on drivers.
3. Power on/off. Pressing the button (location) of the LED light activates the front and rear LED lights.
4. Headphone jack with Bluetooth connectivity and play and pause buttons. Music is turned down when nearby cars are pinged to direct the user's attention to the car and their own safety.
5. Personal Body Alarm and Strobe. Pressing the button activates the red strobe light and body alarm. A secondary feature is that it sends the police the user's location.

RunSafe Light Shrug



1. Contour shape: Arm straps are thinner under the arms to reduce chafing on runners and improve comfort.
2. Fabric is quick dry elastic to fit closely to the runners' body. The elastic allows the device to move with the runners' body eliminating bouncing and chafing.
3. Red LED strobe to alert vehicles and runners from behind.

RunSafe Light Shrug



1. Power on/off. Pressing the button (location) of the LED light activates the front and rear LED lights.
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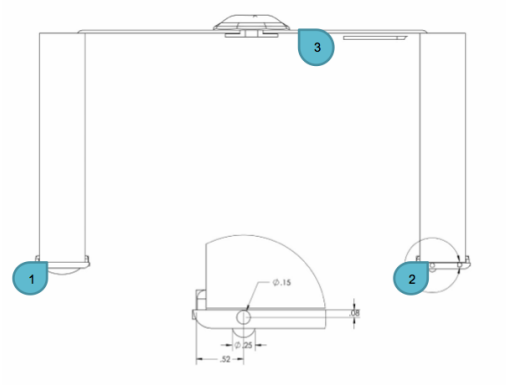
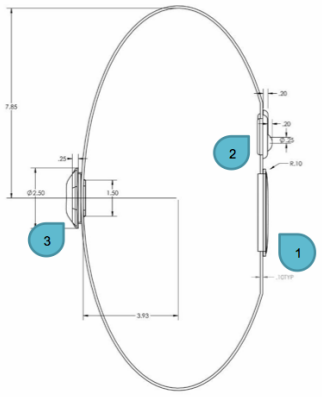


Arial View

1. Responsive LEDs that light the runner's direct path. Lights have dimmable response to vehicle proximity to reduce blinding effect on drivers.
2. Headphone jack with Bluetooth connectivity and play and pause buttons. Music is turned down when nearby cars are pinged to direct the user's attention to the car and their own safety.
3. Red LED strobe to alert vehicles and runners from behind.

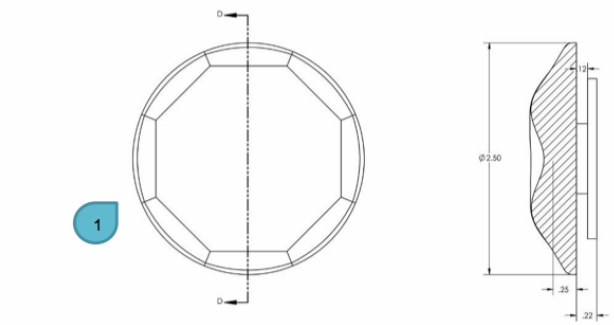
RunSafe Light Shrug



Side View

1. Responsive LEDs that light the runner's direct path. Lights have dimmable response to vehicle proximity to reduce blinding effect on drivers.
2. Headphone jack with Bluetooth connectivity and play and pause buttons. Music is turned down when nearby cars are pinged to direct the user's attention to the car and their own safety.
3. Red LED strobe to alert vehicles and runners from behind.

RunSafe Light Shrug



Rear Strobe Detail

1 Red LED strobe to alert vehicles and runners from behind.

Design Critique Feedback

- Concern about the Personal Alarm and 911 button
  - Could be accidentally pressed and send false alarms to police
  - Include a "cancel" or "nevermind" button for the 911 call
  - Could add in time delay feature (i.e. 30 seconds) for light and sound to alert user that the button has been pushed prior to alerting police
  - Could add a twist feature instead of button to reduce false alarms
    - Question was raised about whether this would be too difficult to use in the case of a real emergency
  - Was the feature limited to use with phone reception?
    - Could similar technology to Life Alert be used instead for more consistency
    - If user was hiking (not running) device could be useful, but cell tower reception is often limited and inconsistent
  - make it clear to other people how to use 911 straps if user is unconscious and needs help (not necessary)
- Music/Bluetooth Feature
  - If user running on the side of a road where there are a lot of cars passing by, music might go up and down because of the constant pinging
  - Critiquers liked this feature and said there's nothing on the market that does this
- Unintended users
  - Question was posed about providing alternative setting for bike riders to adjust proximity setting for speed and city traffic
- Context of use
  - Suggestion was made to show an illustration of a runner wearing the device to show placement and scale.
  - Critiquer was confused about how the device would be worn and the size
- Adjustable straps
  - Users want the ability to adjust the size between shoulder blades and around arms
  - Feedback was that body types can vary within a given size range and including adjustable straps would improve the design
- Future use
  - Most students though it was a great idea and useful design
  - Four students thought we should take our design on Shark Tank and try to make and market it.
  - Three students said they would use it.
- Order of sketches
  - The color renderings should come before the detailed sketches of the features to provide context
  - The detailed sketches are not well understood without having seen the other views
- Additional features
  - Pocket for keys
  - Way to include phone pocket

Wireframes Discussion

We participated in a peer design review with our Annotated Wireframes and received some valuable feedback and questions that we had considered. Most feedback fell into one of four categories:

- Concern about Personal Alarm and 911 button
- Customization of fit and components
- City use and proximity features
- Future features and unintended use

Our peers raised some interesting concerns about the Personal Alarm. False alarms could be a potential issue and incorporating a cancel button or time delay feature for messaging the police to minimize this issue. Customization of fit, which was also a concern for our users, was discussed during the critique. Body types can vary within a size, suggestions were made for ways to improve the straps to allow users to adjust the straps around the arm and across the back. These two categories of concerns address the safety and comfort of the product.

The categories of context of use and future features address some of the technical requirements and limitations of RunSafe. The restricted use of our device on busy city streets where traffic could interfere with the music player was a valuable insight. Generally speaking, roads with higher traffic levels in a city are usually well lit. The main goal of RunSafe is to improve path illumination, which is less of an issue on busy city streets. However, over the course of a 5 mile run, a user could weave in and out of busy sections of the city. Traffic and the near proximity of cars could greatly reduce their ability to listen to music or cause the volume to oscillate creating frustration for the user. We returned to our original problem statement and realized that this is beyond the scope of our original problem, but it is still an issue we are working on solving.

The last area of feedback was regarding future features and unintended use. Future features could include a pocket for users' keys and a detachable sleeve for their phone. Unintended use is another interesting insight that caused us to return to our problem statement and target users. This could be a great device for cyclists or hikers to use to support their activities. While both of these are great target user groups, we needed to be more specific about our target users for the purpose of scoping the assignment. RunSafe 2.0 could have a cycling persona added to the design cycle, where speed and the ability to override the proximity feature is important. A hiker could also have persona, where the device addresses the issue of requiring cell phone connection in remote locations and alternative forms of emergency contact.

Overall we received great support from our peers about the potential for our design and lots of encouragement to continue working on it after class. Some of these suggestions were implemented in the final phase of our design the High Fidelity Mockup.

High Fidelity Mockups

For our high fidelity mockup we used feedback from our Annotated Wireframes peer review to modify the previous physical prototype of RunSafe. In this iteration we used the files from the CAD drawings to 3D print most of the components to represent the actual size and location of the buttons. We used a reflective elastic for the straps, but were unable to make them customizable due to time limitations. While this is the final phase of design for the class, we plan to continue working on RunSafe and implement the design suggestions and conduct more usability testing. Our next phase will be to create a function physical prototype.

RunSafe

High Fidelity Prototype

Outdoor physical activities can be difficult during the winter months because the days are significantly shorter and darker. Invisibility of the direct path and for runners from vehicle operators can feel unsafe and create a barrier to maintaining a healthy lifestyle. Our project is to develop a wearable technology that will light up your direct path for running outdoors.

Front View

1. Personal body alarm
2. 3D printed light which represents the actual location and size of the LED lights.
3. Bluetooth connected music controller
4. Live example of second light with LED that works

Back View

1. Elastic is reflective, washable, and moisture wicking.
2. Red LED on the back blinks continuously for safety.
3. Contour shape helps improve runners' posture and prevents the shrug from slipping off the shoulders and improves fit and stabilization.

Detail of Personal Body Alarm

Alarm button that when pressed initiates a loud sound and red blinking LED Light.

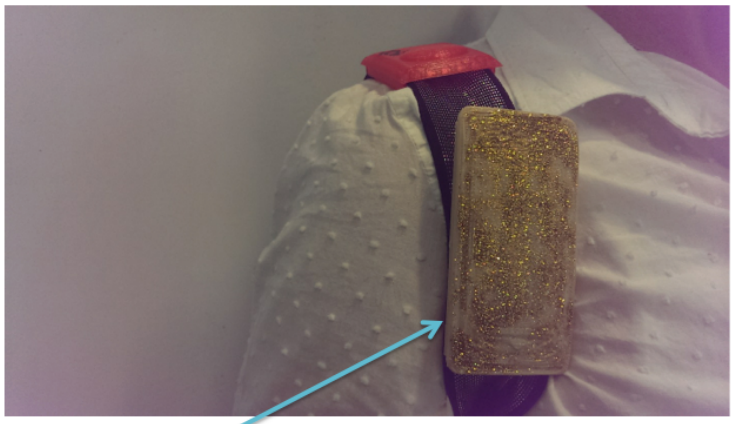
Alarm can be pressed by hand or by chin in case of emergency.

The button also sends a notification to the police with the location of the runner.

Additional feature is to include a slight time delay in case the button is pressed accidentally.

Future versions could include a second setting (like pressing the button twice) for immediate police response.

LED Light Detail



3D printed light which represents the actual location and size of the responsive, motion-stabilized, light-weight LED lights.

Future versions of the light should be shaped to fit the contour of the body.

Detail of music controller

1. Headphone jack
2. Pause button
3. Play button
4. Bluetooth insignia which represents both a sensor that pings the IP addresses of cars and the connection to a music playing device. When a car enters a 50 meter proximity to the runner LED lights dim and the music volume goes down.
5. On/off button

Detail of LED light

Working LED light represents the actual location and position of the responsive, motion-stabilized, light-weight LED lights.

Note: this is not the shape of the final LED light. Please refer back to LED Light detail for shape and size of actual light.

Mockups Discussion

We conducted a final peer review session where we were able to have fellow designers try on the RunSafe shrug and provide feedback on fit and placement of the buttons. Everyone who tried it on was surprised at how comfortable it was to wear. Most commented on the need to fix the width of elastic under the arms, which we were unable to address in this iteration without compromising the integrity of the elastic.

Our project spurred some passionate discussion about it's potential and marketability. One student, had some rather insightful feedback about making the bluetooth and personal alarm modular. This would make them interchangeable and allow users to customize their preference for button location, especially in the case of left and right handed users.

Designers really liked the on/off capabilities of the personal alarm and the time delay feature, but suggested we have the ability to override the time delay in the case of an emergency. This could be double pressing the button to notify police immediately of a distress signal. We determined this is a feature that would warrant its own targeted usability testing on and potential solutions.

Acknowledgements

Thank you for taking this journey through our design process with us. We would like to acknowledge Katie Derthick and Saba Kawas for their passionate instruction and guidance, and our fellow HCDE 418 User Experience Design students for their suggestions and criticism. The feedback and support we received was overwhelmingly positive. Stay tuned for the kickstarter campaign!