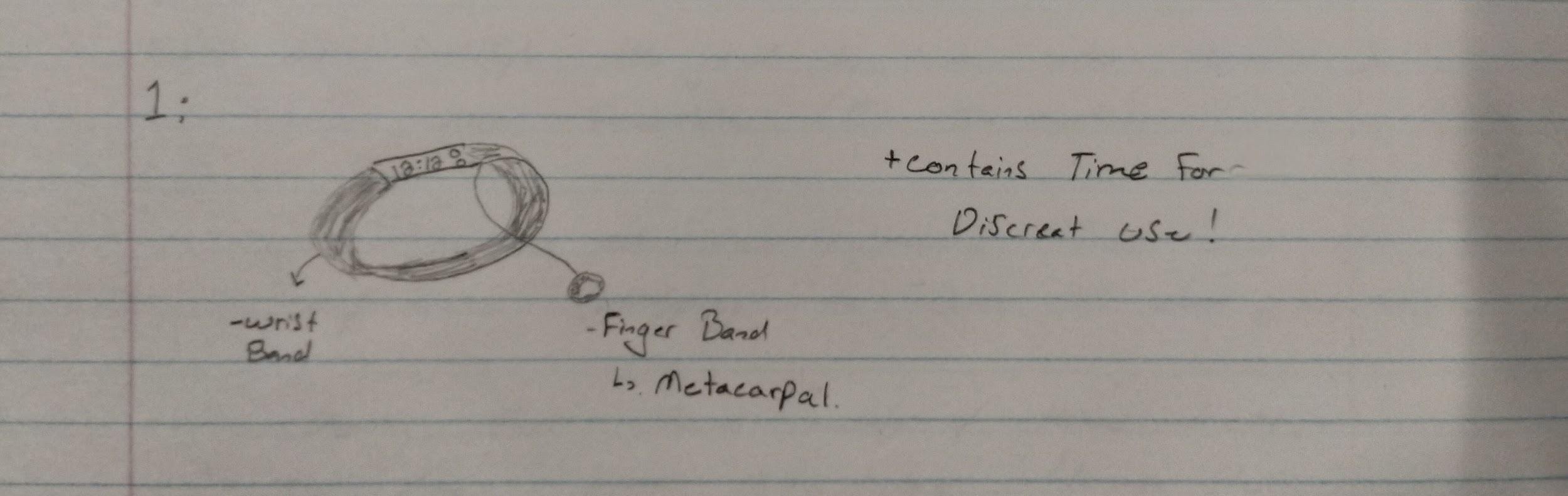
Introduction:

This deliverable will show the in-depth process of brainstorming ideas and isolating a design concept by analyzing them with prioritized design criteria. It will show the various ideas that each member came up with. From these designs, three were found to be the most preferable for a variety of customer needs. Each of the top three was then evaluated based on design criteria and compared and contrasted with the others. Through this process, and by evaluating the best aspects of each design, a singular solution was chosen and will be the basis for the project from here on.

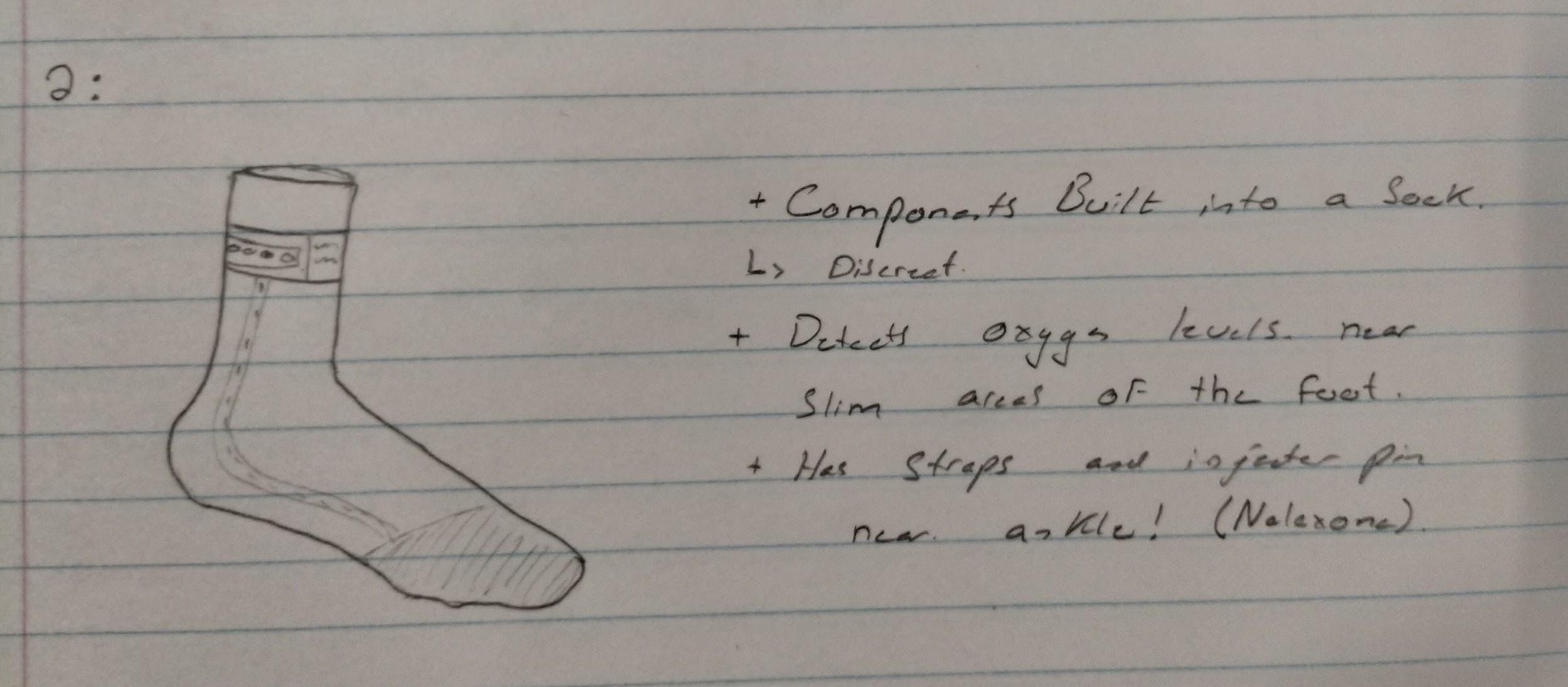
**Josiah’s Concept:**

First Concept Design:



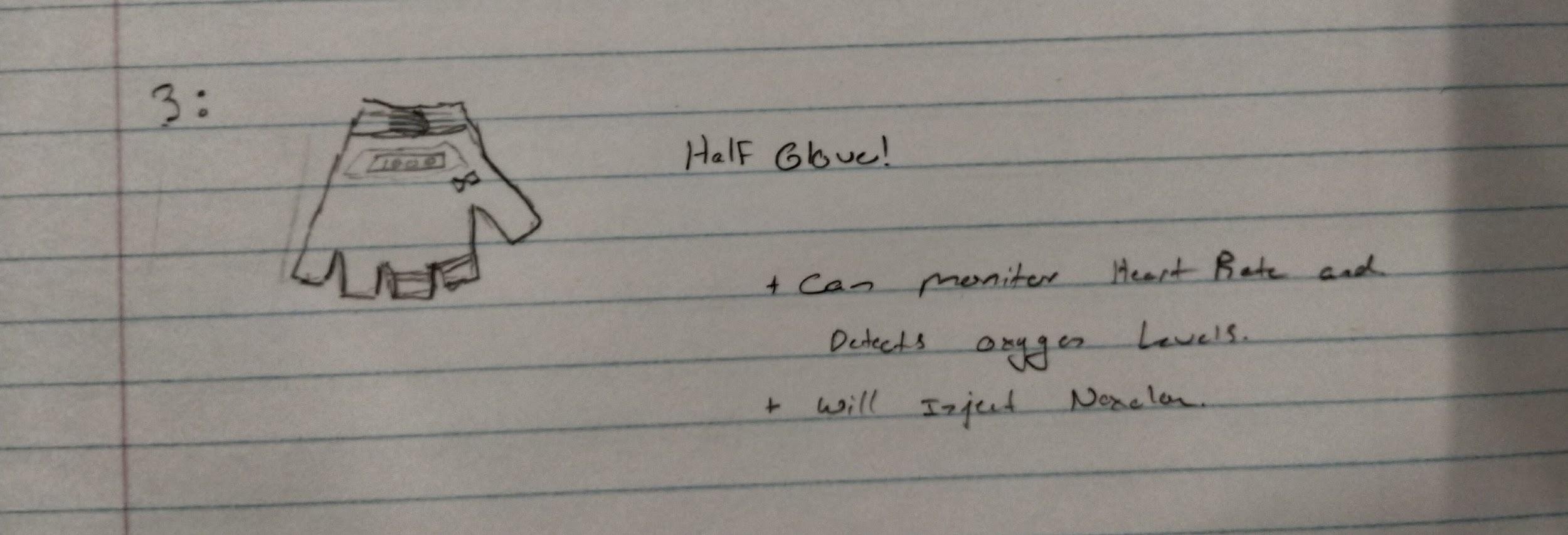
This design is a wristband that contains an integrated clock as well as a finger band that will be connected to the wrist band via a wire. This small finger band will measure the oxygen level and the heart rate. The advantages to this design will be easy to use and install, there will be multiple uses for the device (will contain clock). However, the disadvantages of this design can be that it isn’t very hidden, nor will it be that comfortable.

Second Concept Design:



This design is built into a sock, this design is very discrete and will not interfere with the user much at although, this design may be very uncomfortable. A wire will be running from the ankle section of the sock (the control unit) to the toes where the blood level and heart rate will be measured.

Third Concept Design:



This design is a half glove (a glove with the finger cut off), the heart rate and blood oxygen level can be read for the cut off finger tips. This design is discrete, although may be very uncomfortable for the user, or may even interfere with the actions of the user.

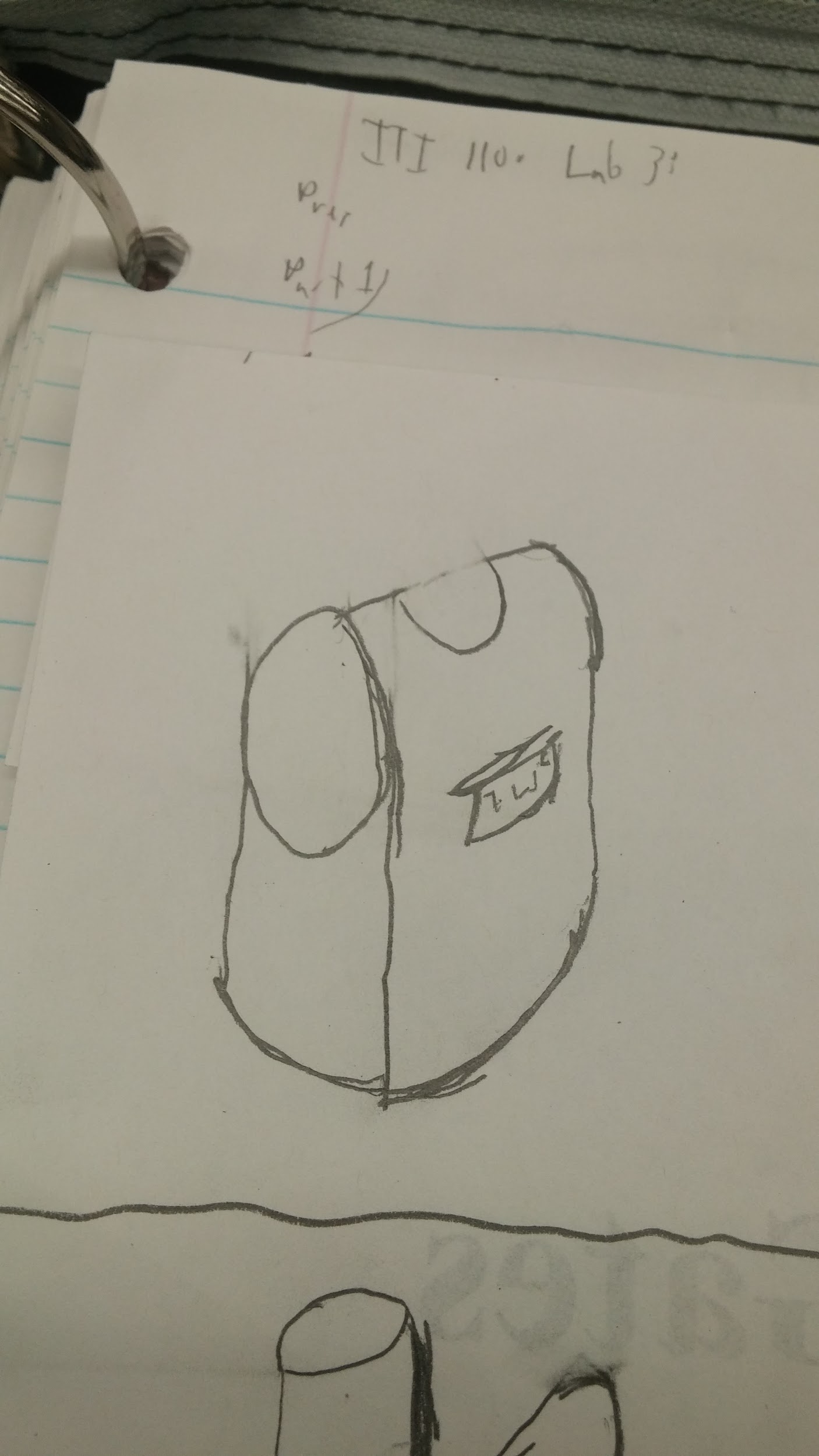
**Gabriel Concept:**

First Concept Design:



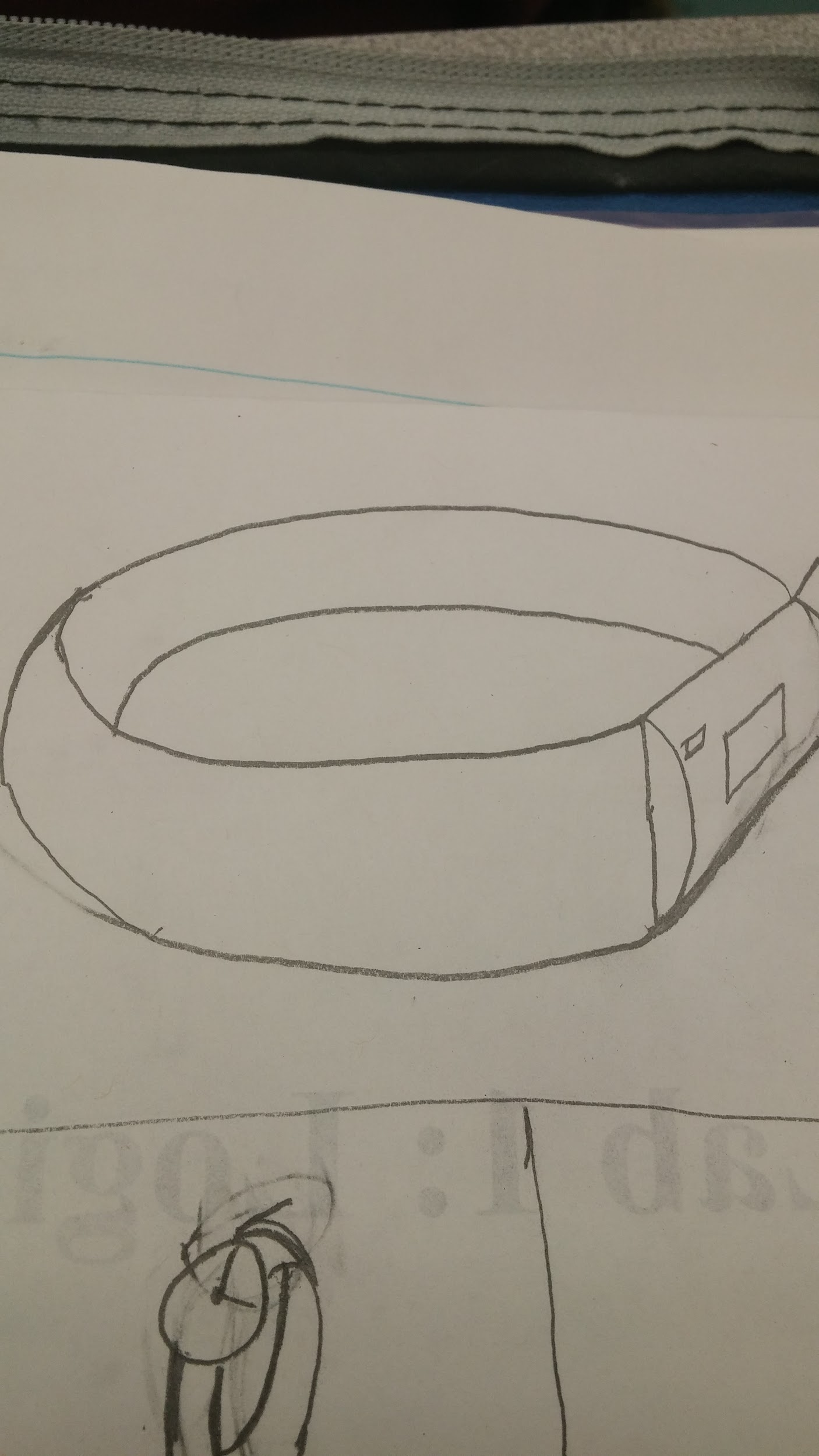
A Glove design would allow the device to be concealed rather effectively, give a fair amount of leeway for size, and it would give the device access to the wrist which is a good measuring point. The device is of course placed on the inside of either the front or back of the wrist.

Second Concept Design:



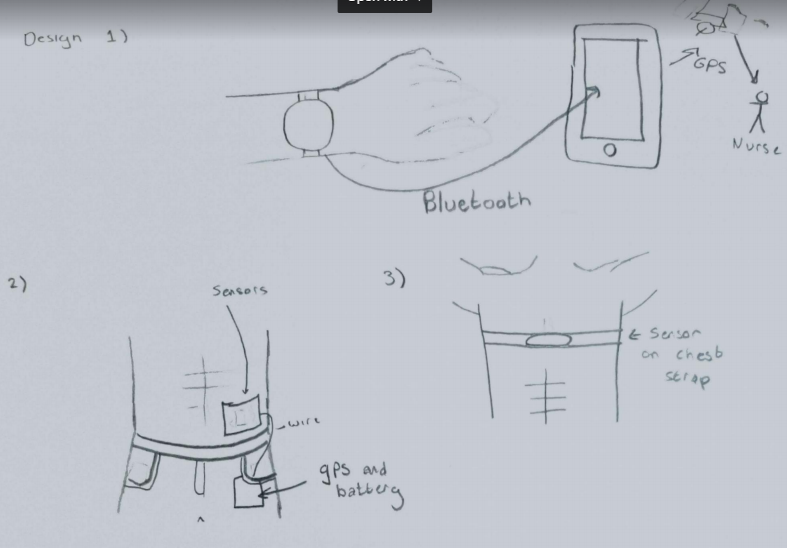
A vest/sweater-vest design would also allow access to the entirety of the chest, give lots of space for a bigger device if needed and is practical to move around in. The device would be sewn into the fabric to best conceal it. Possible issues with this design are potential bulkiness due to sewing in the device which could make it uncomfortable, and it may hinder performance slightly since it is not directly on the skin.

Third Concept Design:



This design is the device placed in the form of a belt buckle/belt decoration. This also allows for reasonable flexibility with weight and size, is practical for day-to-day life, and is fairly inconspicuous. A possible weakness of the design is the placement as the waist may not be an ideal measuring place for overdose detection.

**Ethan’s Concept:**



Design 1)

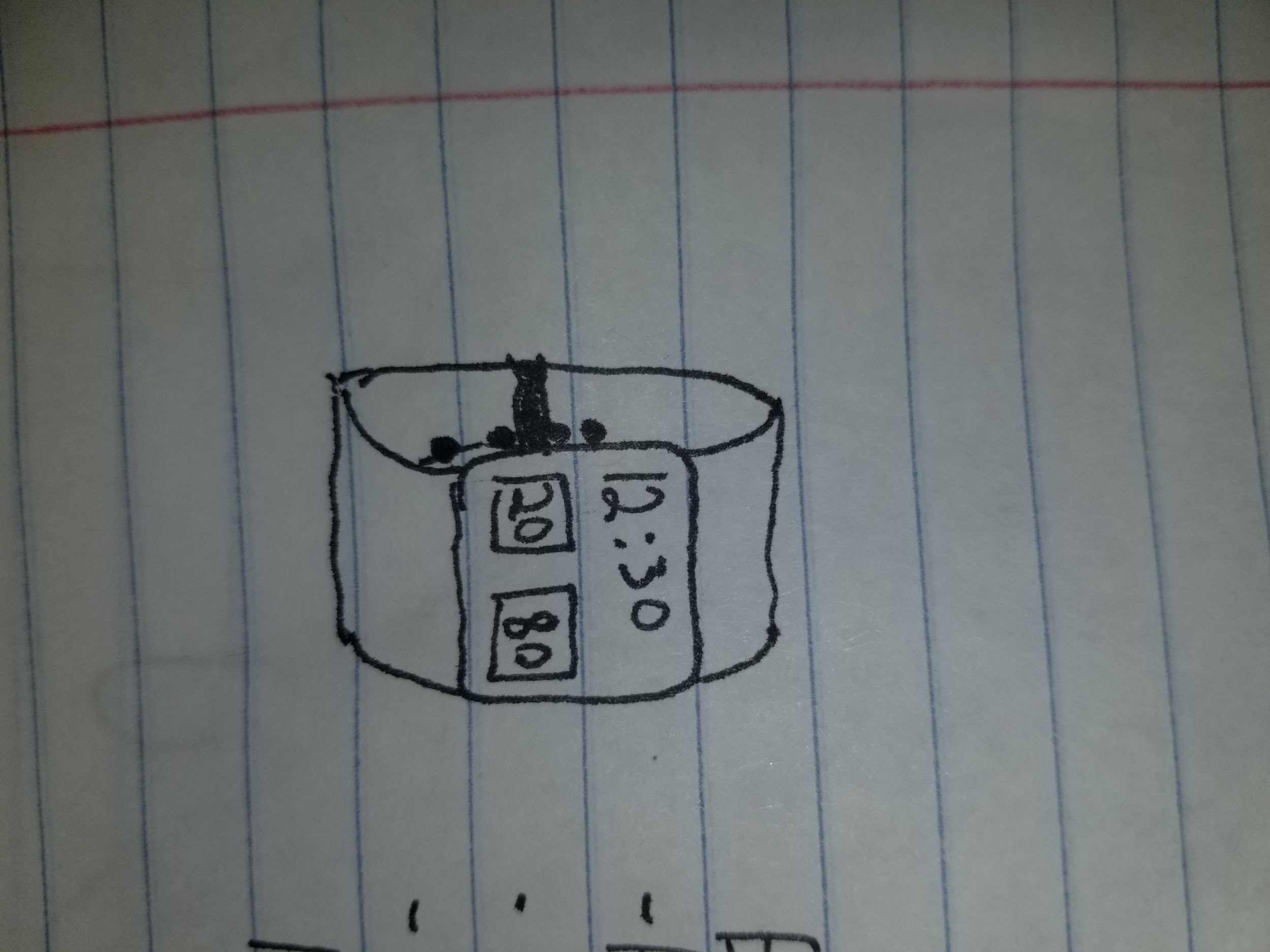
* Wearable watch with a sensor, battery and bluetooth module.
* Connects to users' phones that have GPS to ping EMS.
* Regular digital watch display.

Design 2)

* Adhesive patch on abdomen with sensor.
* Cord to the main device in users’ pocket.
* Main device contains a larger battery and GPS module.

Design 3)

* Chest strap with sensor, battery and gps.
* On an adjustable strap that goes under a shirt against the skin.

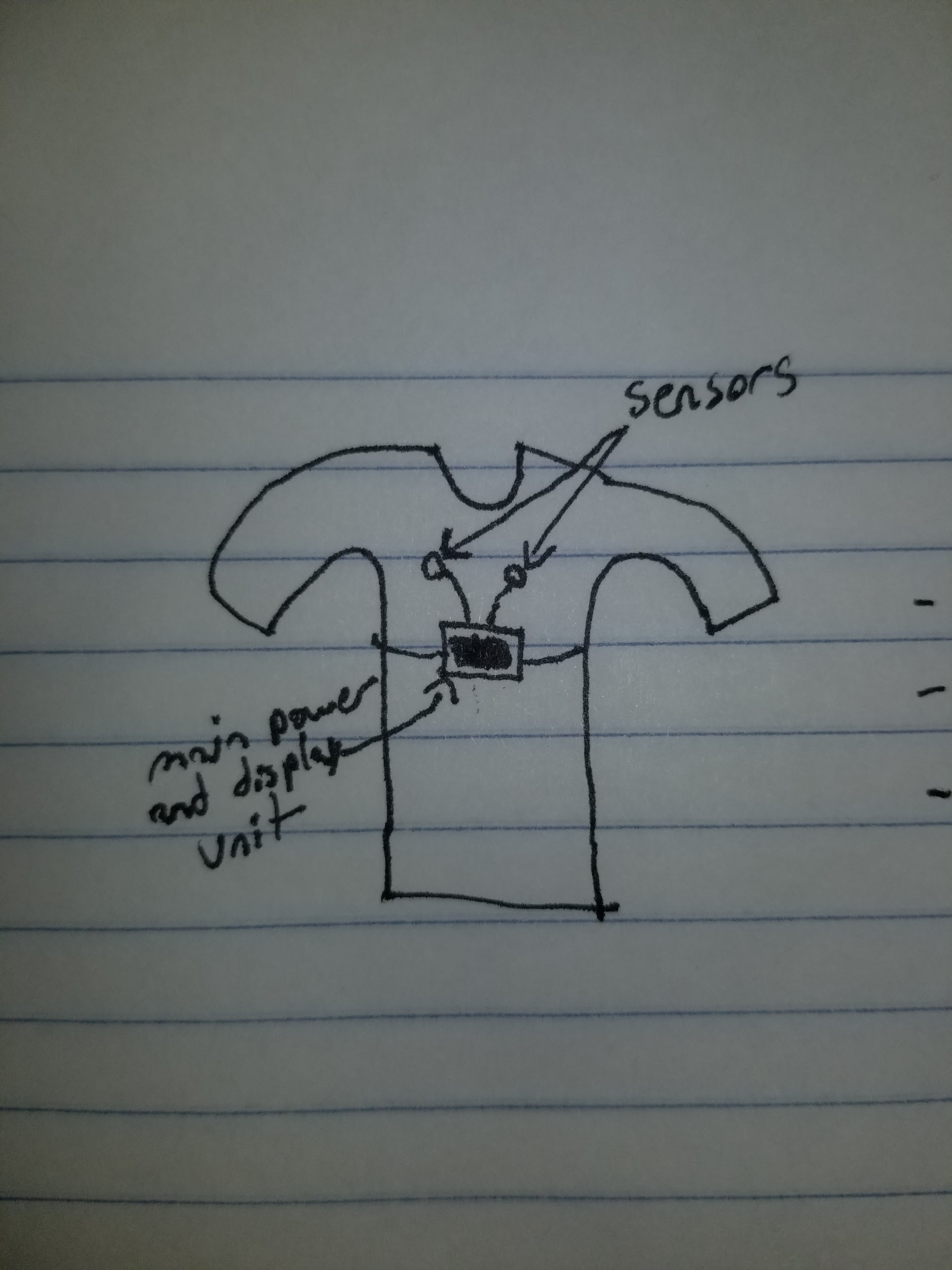
**Joseph’s Concept:**

Digital Watch Style:

-Resembles a normal watch and displays time.

-Rechargable.

-May be difficult to measure blood oxygen levels on the wrist.

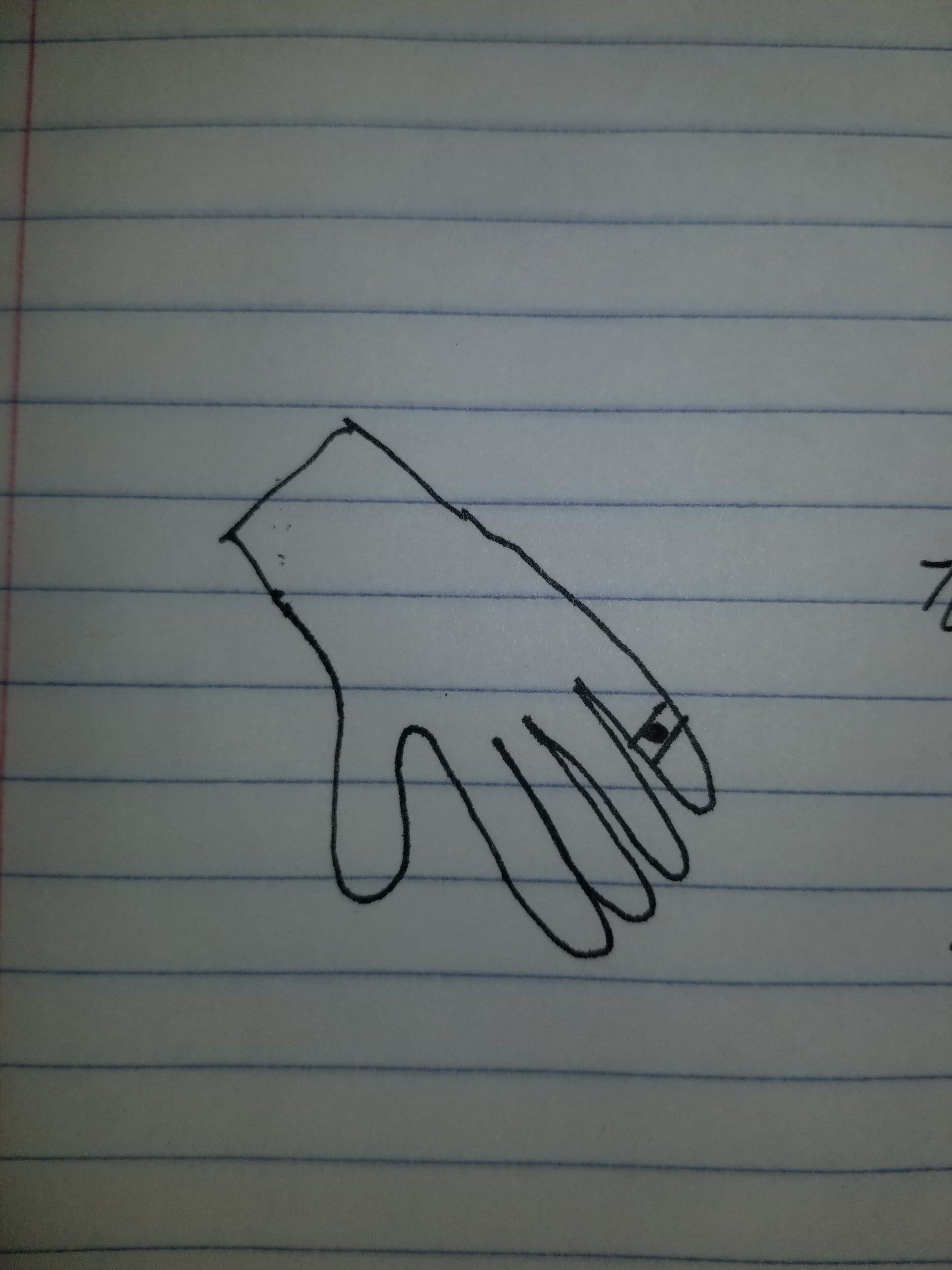


Chest Monitor:

-Similar to a heart monitor.

-Goes underneath the shirt to hide it.

-Can be battery powered or rechargeable.



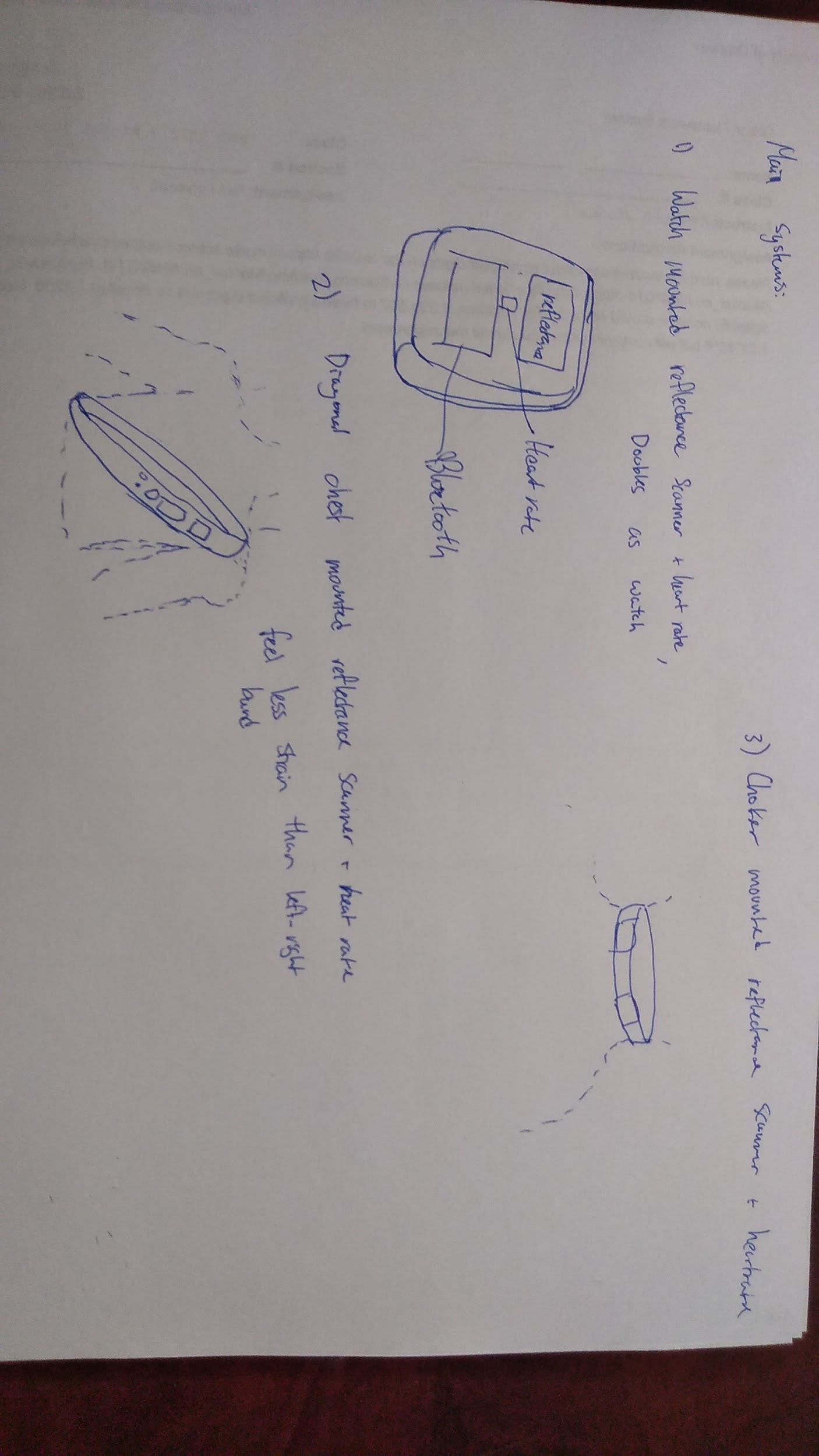
Ring Style:

-Small device that reads blood oxygen levels.

-Will send an alert if levels become too low.

-May be difficult to make a ring that is small and discrete.

**Austin’s Concept:**



Design 1:

This first design incorporates a watch form factor, allowing the device to seem like an everyday piece of hardware. This piece may be comfortable to wear and the user may not even notice that they are wearing the device. One major disadvantage is the lack of a strong power source, where the battery may not last as long as desired.

Design 2:

The second design is a chest strap that is slung diagonally across the shoulders. This may seem uncomfortable however it is able to include all the necessary hardware without any compromises. It will be able to include all the features necessary, and be able to run on the same battery for multiple days.

Design 3:

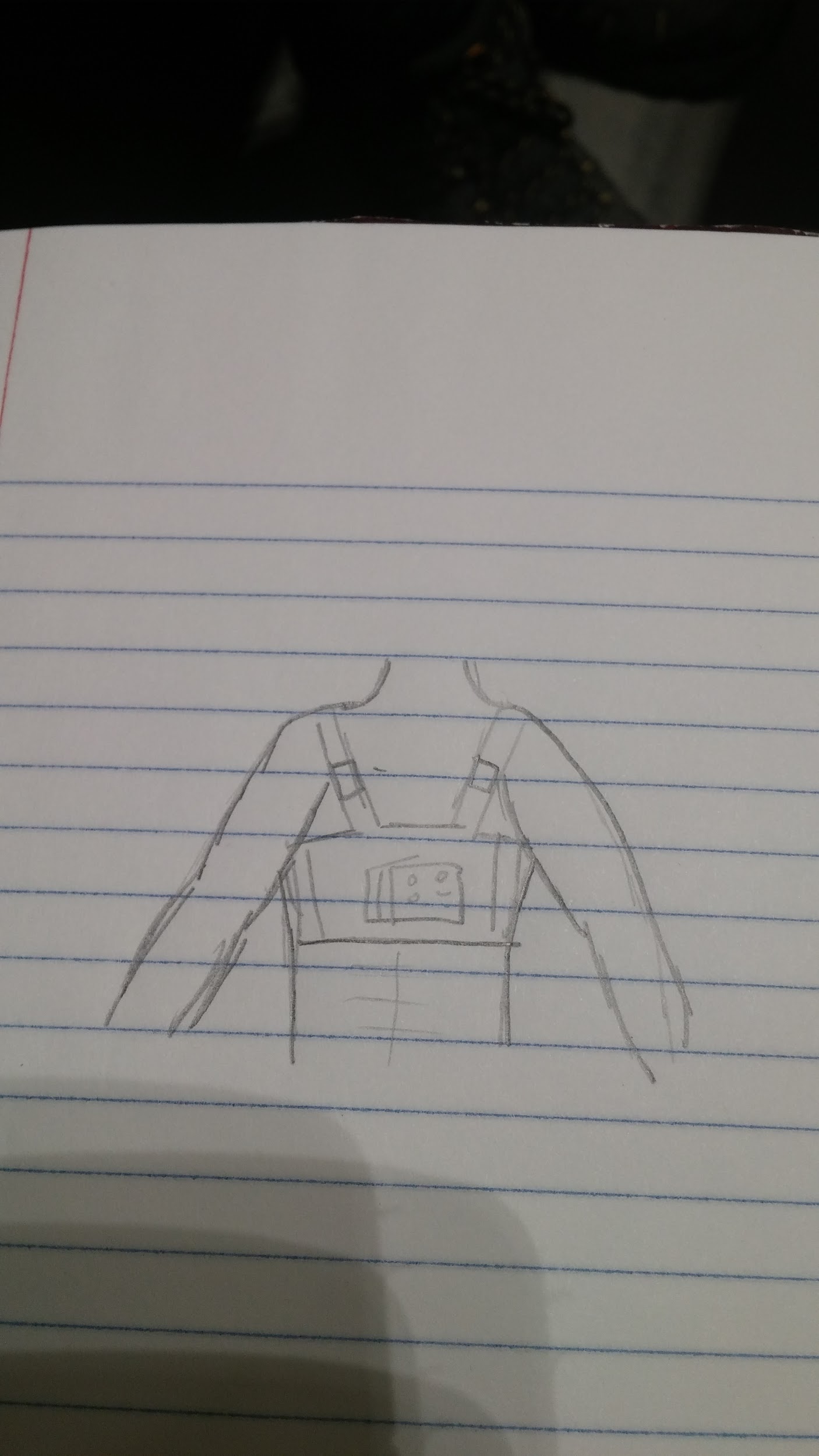
This design is a choker, that rests on the user’s neck. The design is a small form factor, however this use could potentially allow others to categorize the user with stigmatism associated with the device. This design also may be uncomfortable. Another key issue with this design is the usability and the power supply.

Analysis:

3 chosen designs:

|  |  |  |  |
| --- | --- | --- | --- |
| **Feature** | Chest Strap | Glove | Watch |
|  |  |  |  |
| Cost | ↓ | ↓ | ↑ |
| Location Detection/ GPS | ✔ (bluetooth) | ✔ (bluetooth) | ✔ (bluetooth) |
| Overdose Detection | ✔ | ✔ | ✔ |
| Wearability | ✔ | ✔ | ✔ |
| Lightweight | ✘ | ✔ | ✔ |
| Form Factor/ size | ✘ | ✔ | ✘ |
| Durability | ✔ | ✘ | ✘ |
| Discrete | ✔ | ✘ | ✘ |
| Comfort | ✔ | ✘ | ✔ |
| Total | 6 | 5 | 4 |

Final Concept:



This final concept is an integration of the chest strap and the vest. The design will be fit for comfort using stretchy and breathable material, and will be able to measure the client's heart rate as well as the oxygen level in their blood. It will consist of one large band that stretches across the chest, and 2 smaller straps that go over the shoulder to hold the device up. This is made possible since the device is placed so close to the heart. This device is intended to be worn under clothing, so it is discrete and doesn’t get in the way of the clients’ everyday actions.

Conclusion:

After analysing all the designs we managed to decide on a chest monitor design. We analyzed the pros and cons of each device, attempting to incorporate as many positive aspects as possible from each design. After narrowing down our selections to three, we tried to choose the most practical and logical design possible. We tried to use ideas from each top design to form our final design. The final design was chosen because it allowed for larger components including bigger battery and sensors while still remaining hidden and comfortable.