Deliverable D: LifeLine

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Date

Feb 9th, 2020

To: Prof. David Knox, Ms. Rani Damuluri, Mr. Saelameab Demilew

This report will evaluate and compile the best of individually designed components into a final comprehensive overdose detection system

Abstract

The following document is the conceptual design of team 12 in lab section C of the GNG1103 course in the 2020 Winter Term and the University of Ottawa's Faculty of Engineering. The document contains the design components for the Opioid overdose system, designed by each group member. Components were chosen collectively during a group meeting on January 7th, 2020. During the latest meeting which took place January 9th, 2020, the best individual designs were chosen to create a final conceptual design for our project.

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1. Introduction

Our team has adopted a project to create a device that can detect opioid overdoses for the middle class, working users of the name LifeLine. With the help of our schedule and weekly meetings, we hope to have his project done by March 25th, 2020. Our group made a minimum of three individual designs for each of our main subsections in the device. They include the device frame, smartphone application and alarm system, blood oxygen saturation monitor, respiratory rate monitor, and naloxone distributor. Then, collectively we chose the best designs and put them together to create our final conceptual design for LifeLine, our opioid overdose detector.

2. Subsystem and individualized conceptual designs

2.1 Device frame

2.1.1 Abdullah Abdulmajeed

Design A:

The device could be compartmentalized in a boxed design that's attached to a non invasive, easily removable brace. The tension contained within the fabric of the brace can hold the weight of the parts and batteries that power the device. The design is discreet as the box is hidden within the fabric.

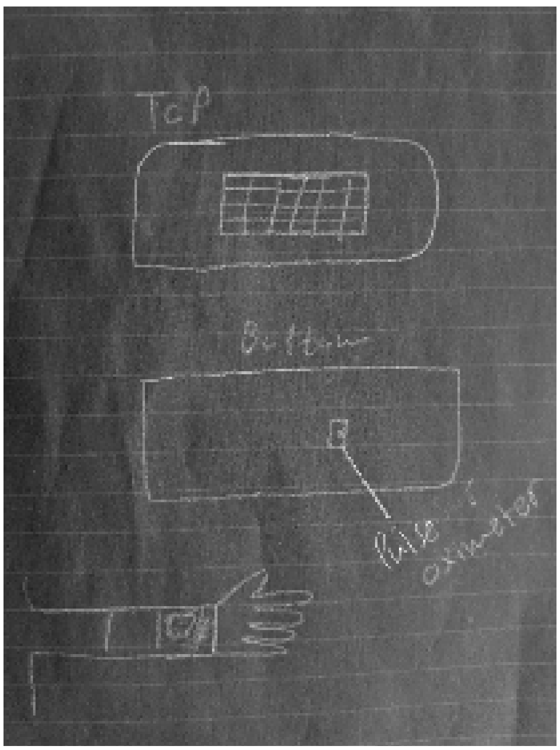

Figure 2.1.1-A. Brace shaped wearable overdose detections system.

Design B:

Boxed components encased in a hat design that provides easy access to the earlobe where the oximeter can take accurate oxygen saturation readings. The device is well hidden within the casings of the hat. It's easily removable and non invasive at all.

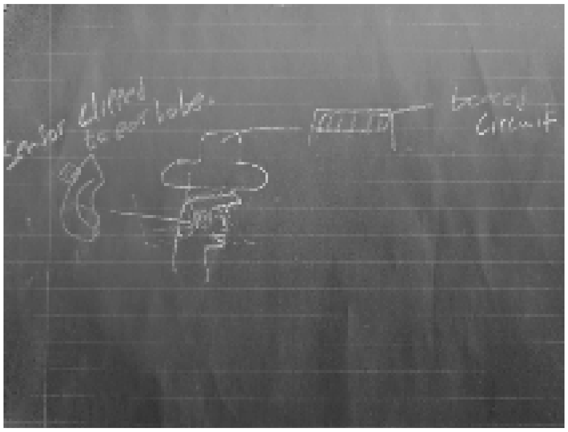

Figure 2.1.1-B. Hat disguised overdose detection system.

Design C:

Boxed components are stored in the fabric where the back is within the vest where its placement is non constricting at all. The vest is worn under other clothes so it's completely discreet and it works well in terms of holding weight as its position on the torso of the body allows it to hold considerable mass without impeding on the balance and movement of its users.

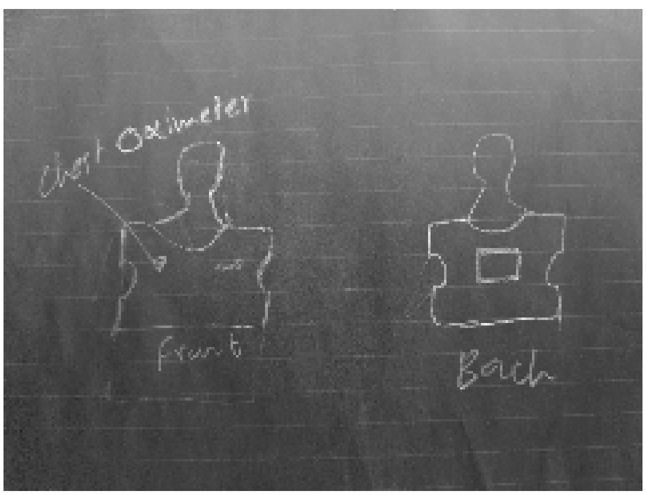

Figure 2.1.1-C. System box attached to the back of a wearable vest.

2.1.2 Alyssa Wang

Design A:

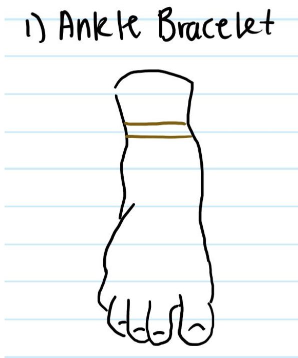

Figure 2.1.2-A. Wearable Opioid Detection Ankle Bracelet.

- The ankle bracelet would contain the necessary components for running the arduino board
- It has velcro at the ends, thus allowing it to be adjustable in size
- It can be easily hidden underneath the clothes
- Close to oximeter point of interest (toes)

Design B:

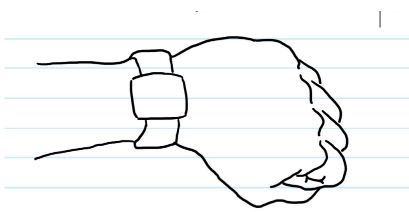

Figure 2.1.2-B. Wrist Watch Opioid Detection Device.

- Wearable wrist watch where the detection device is attached to a wristband that is adjustable in size
- Its discreet as it looks like a typical watch
- Close to oximeter points of interest (wrist, palm, and fingers)

Design C:

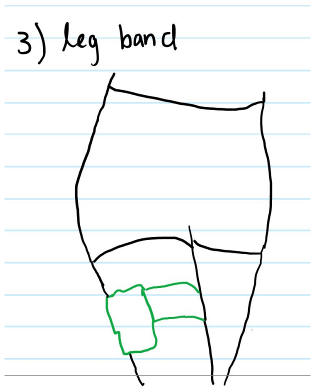

Figure 2.1.2-C. Leg Band Opioid Detection Device.

- Opioid detection device attached to band that wraps around leg
- Comfortable and adjustable in size
- Close to naloxone injection point of interest (large muscle in the leg)

2.1.3 Antonia Zupu

Design A:

"watch portion" with the components needed, and then a simple black band for the watch's band.

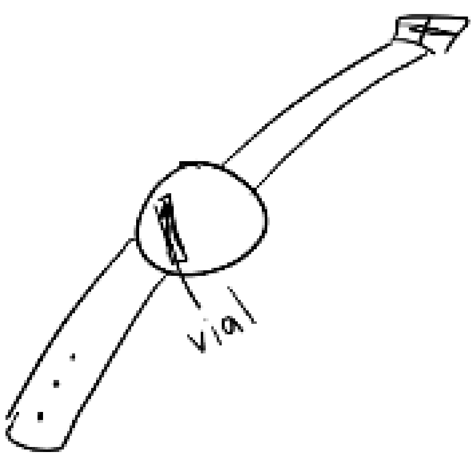

Figure 2.1.3-A. Watch Device.

Design B:

"earpiece" with the needed components attached to it

This design may not be practical as it is very small and may not be able to hold all of the components needed into it.

Figure 2.1.3-B. Earpiece.

Design C:
Wristband with the needed components attached to it and velcro that attaches it to the user.

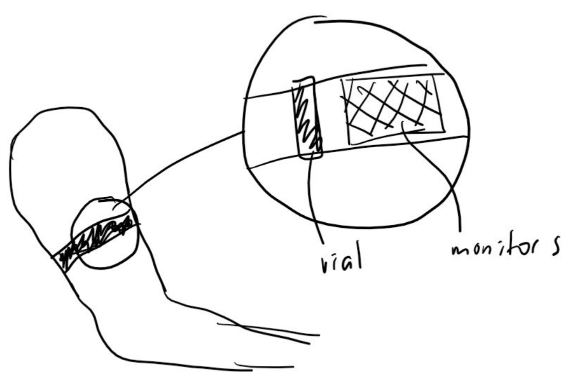

Figure 2.1.3-C. Wristband.

2.1.4 Spencer Henry

Design A:

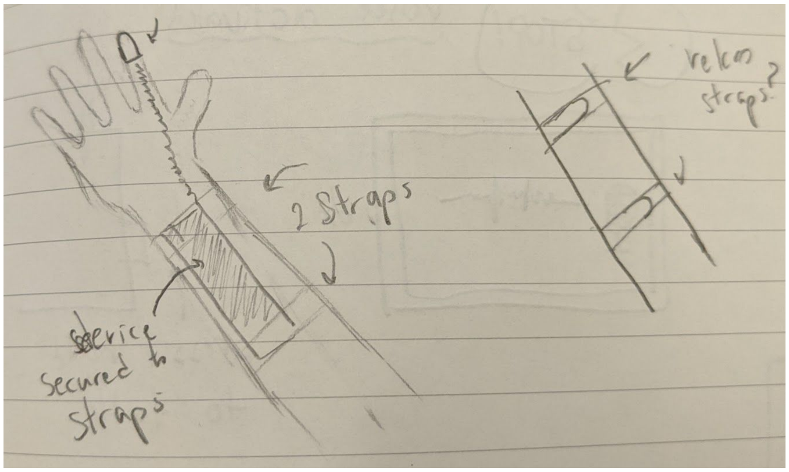

Figure 2.1.4-A. Armband Detection Device.

- Device is secured to an arm brace. Arm brace will have two velcro straps that will secure brace to arm.
- Would allow enough space for device, close to finger to allow oximeter readings, discrete location
- Simple design, easy to attach, comfortable location

Design B:

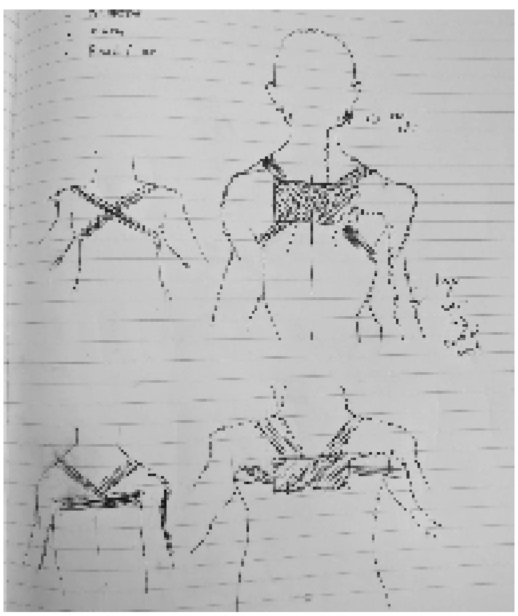

Figure 2.1.4-B. Chest Vest Detection Device.

- Device secured to back support brace, straps will be adjustable
- Allows enough space for device, close to ear and finger giving multiple locations for oximeter, discrete location
- Simple design, extremely discrete with loose clothing

Design C:

Figure 2.1.4-C. Bicep Armband Detection Device.

- Device attached to a strap located on the upper arm
- Allows enough space for device, close to ear and finger giving multiple locations for oximeter, discrete location
- Simple design, easy to attach, comfortable location

2.1.5 Yomna Elsahli

Design A:

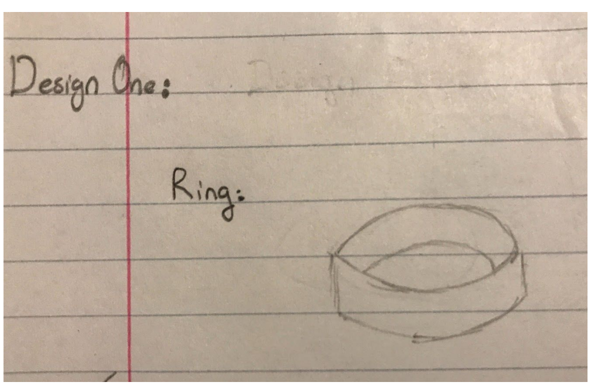

Figure 2.1.5-A. The Ring.

Design B:

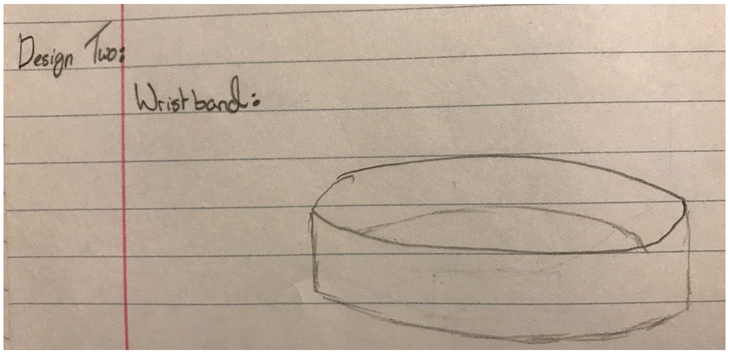

Figure 2.1.5-B. The Wristband.

Design C:

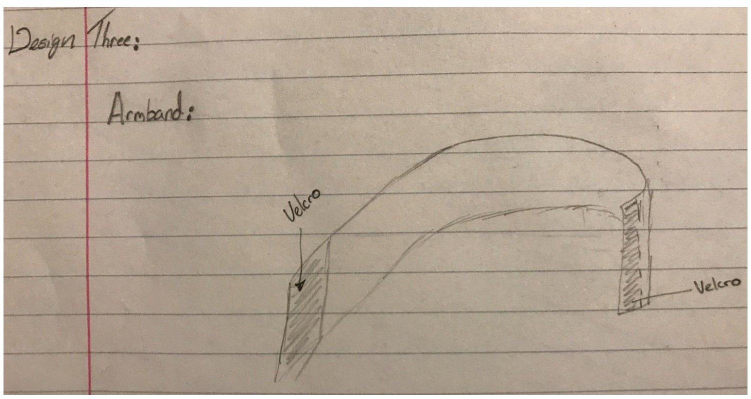

Figure 2.1.5-C. The Velcro Armband.

2.2 Smartphone Application & Alarm Notifications

2.2.1 Abdullah Abdulmajeed

Design A:

The phone app will allow the user to establish an interface to interact with the LifeLine device. The phone app will provide graphical representation of oxygen saturation, heart rate and other measured values. The phone will connect to the Arduino board via a compatible bluetooth module.

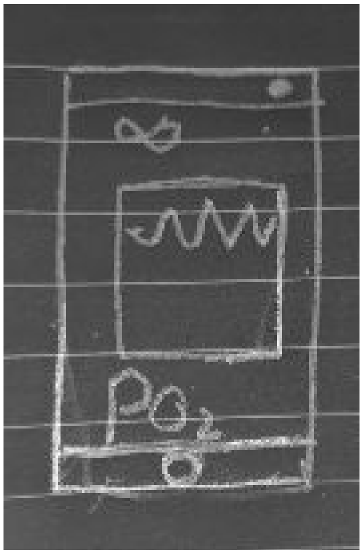

Figure 2.2.1-A. Phone app oxygen saturation readings.

Design B:

The app is crucial as it will connect the oximeter and other Arduino connected components to the phone through which emergency signals can be sent in case of overdose detection.

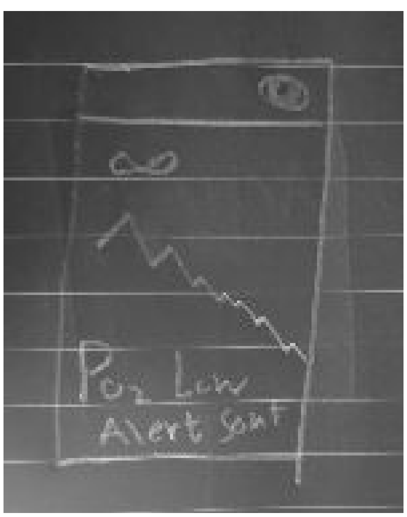

Figure 2.2.1-B. Phone app alert system.

Design C:

An alternate approach is the use of radio signals to alert emergency response units of overdose incidents. Radio signals are far more outraching and provide the basis for the LifeLine device to function independently without the need for a phone bluetooth connection. An arduino compatible radio transceiver is available.

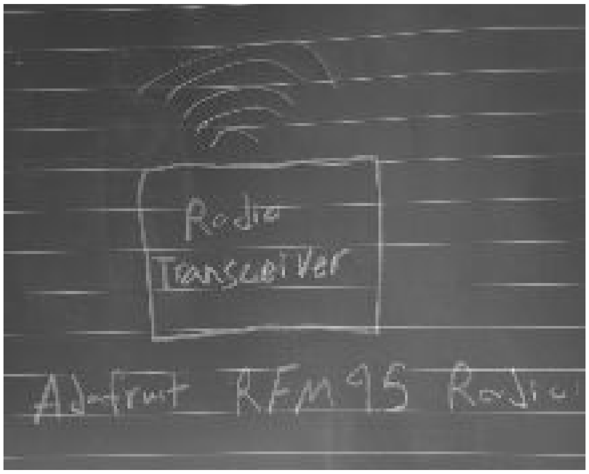

Figure 2.2.1-C. Radio transceiver communication module.

2.2.2 Alyssa Wang

Design A:

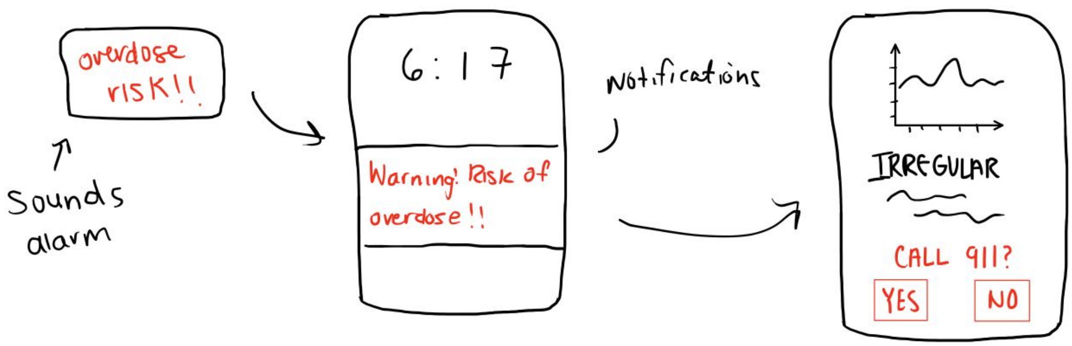

Figure 2.2.2-A. Application including graphical representation of blood oxygen saturation levels.

- Device sounds an alarm when it detects an overdose and tells the phone to send a notification on the phone screen.
- App shows graphs representing the blood oxygen saturation levels
- It gives the person an option to call 911

Design B:

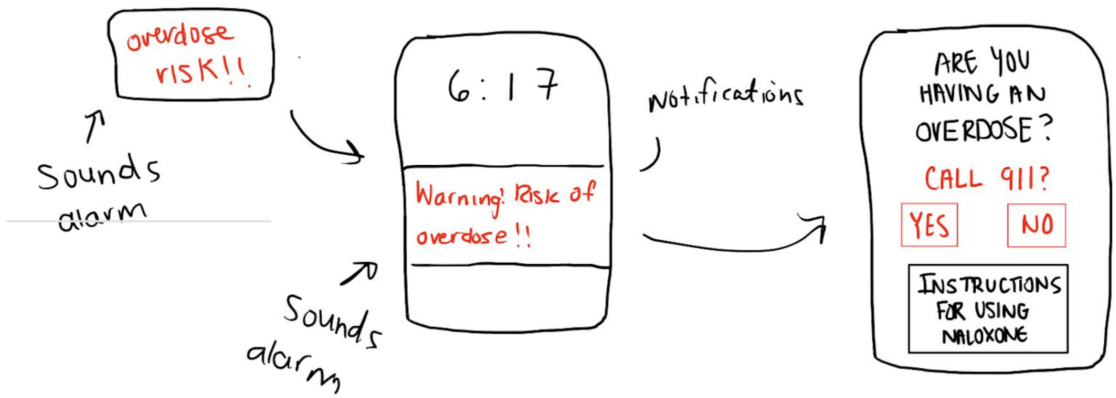

Figure 2.2.2-B. Application for Alerting 911 and Using Naloxone.

- Device sends alert to phone and alarms will sound if the person doesn't respond to the notification
- It provides instructions for using naloxone, just in case there is help nearby

Design C:

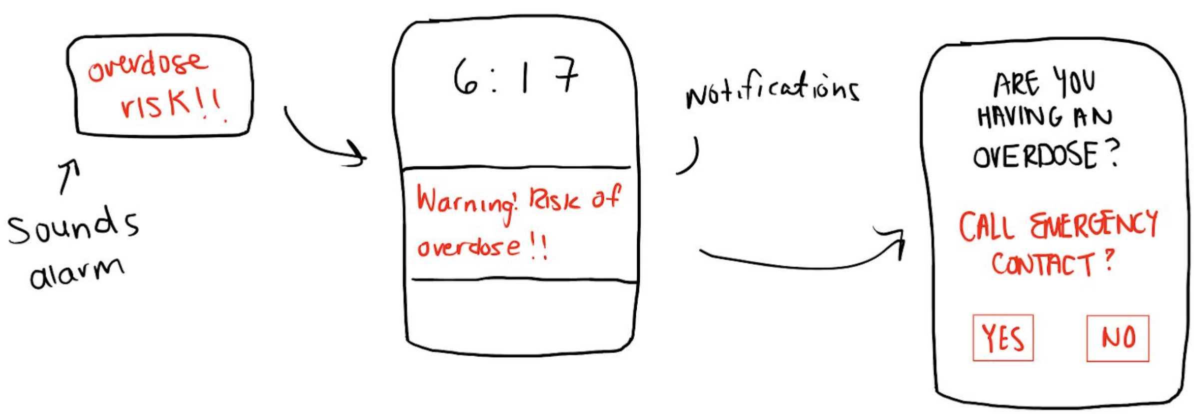

Figure 2.2.2-C. Application for Overdose Help with Direct Design.

- The device with sound an alarm and deliver signals to the phone through bluetooth to tell it that the person is having an overdose
- The screen will directly ask them if they would like to call their emergency contact for help

2.2.3 Antonia Zupu

Application puts out a notification on the device warning of an overdose

Should the user not be able to open the notification and do a simple task within 60 seconds the overdose is certain and the alarm goes off and emergency services are contacted.

Alarm includes:

A flashing led light

A alarm sound system
A direct message to emergency services of the user's location
the alarm can be adjusted to also contact someone close to the user, incase they can get to the user faster than an emergency vehicle

Design A:

Figure 2.2.3-A : Overdose Test No.1.

Design B:

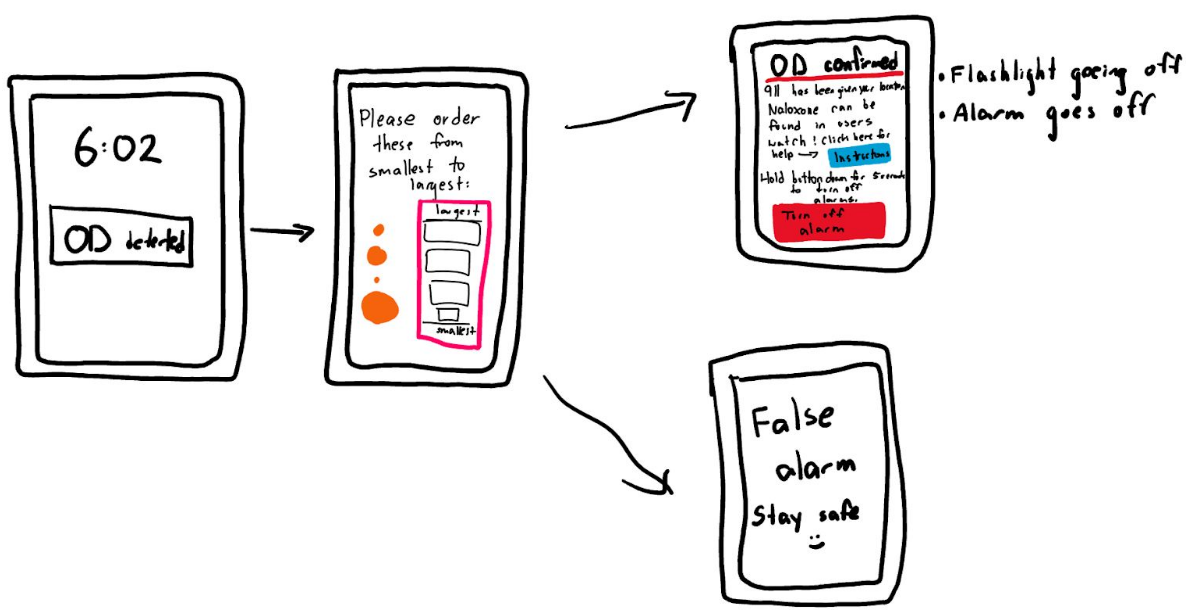

Figure 2.2.3-B : Overdose Test No.2.

Design C:

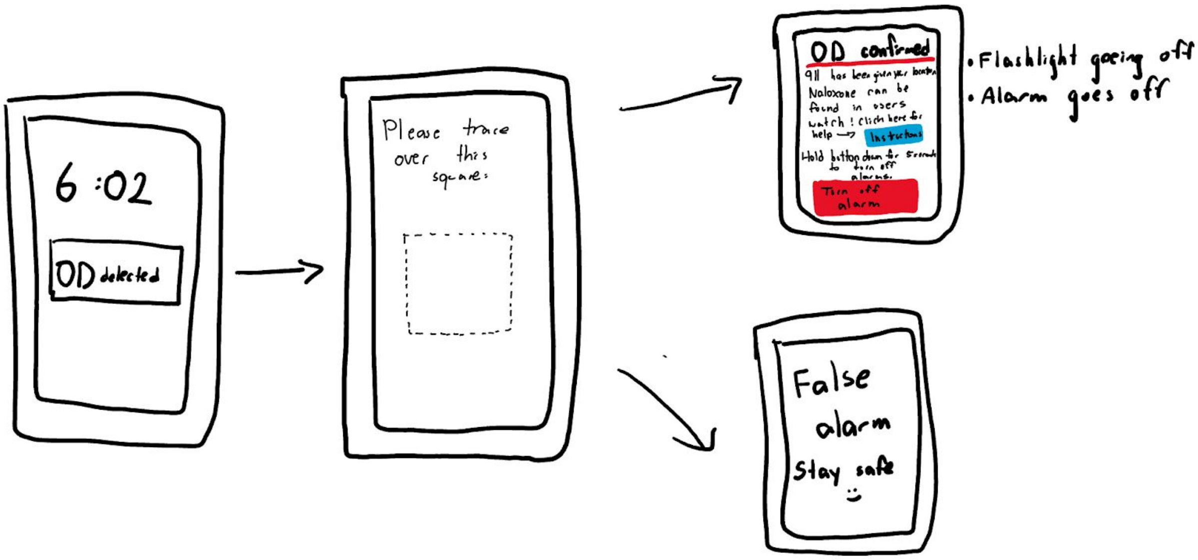

Figure 2.2.3-C : Overdose Test No.3.

Neither of these three designs are perfect since all involve creating a whole new app. We do not have the tools to do that and will rather use the arduino bluetooth app called bluefruit, which means that the task that the user must do should be sending a text.

2.2.4 Spencer Henry

Design A:

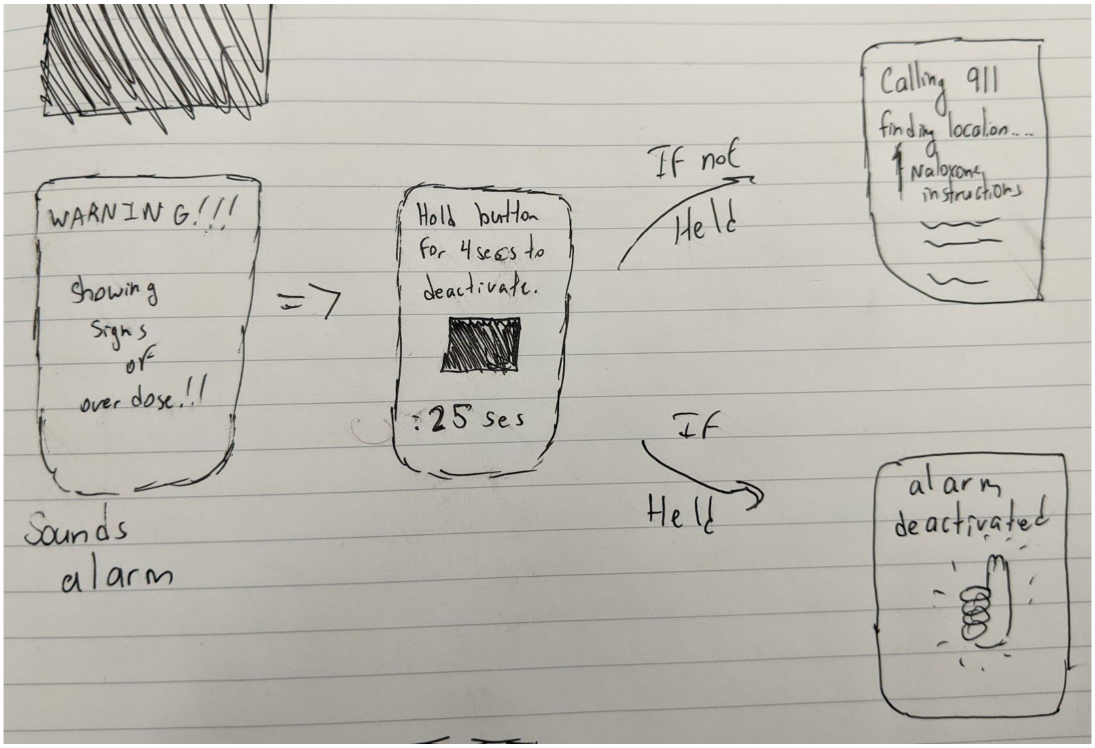

Figure 2.2.4-A. Notification Device.

- Device would send alert to phone if signs of overdose show
- Device will prompt the user to hold a button for 3-5 seconds in order to deactivate the alarm if an overdose is not occuring. If the user does not perform the task, the alarm will continue to go off, 911 will be notified and the GPS in the phone will be tracked. If the user does perform the task, the alarm will deactivate.
- Simple prompts, prompts are bold and big

Design B:

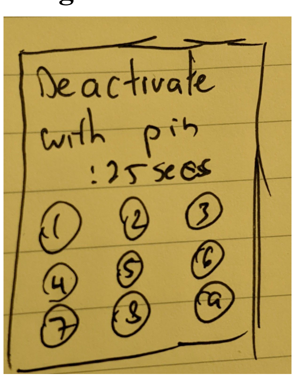

Figure 2.2.4-B. Notification Number Lock Method.

- Instead of button prompt, user will enter a pin code
- Familiar design, big and bold prompt, simple

Design C:

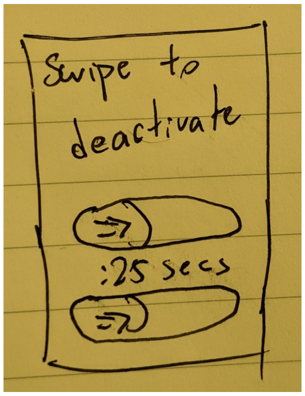

Figure 2.2.4-C. Notification Swiping Method.

- Instead of pin code, user will swipe screen twice
- Familiar design, simple, big and bold prompt

2.2.5 Yomna Elsahli

Design A:

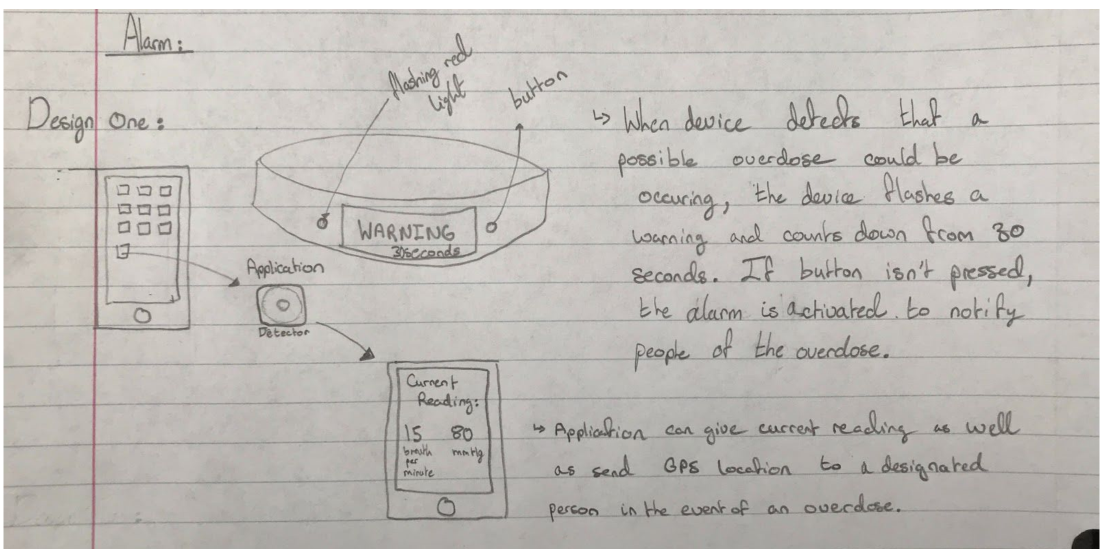

Figure 2.2.5-A. Warning system on Device.

Design B:

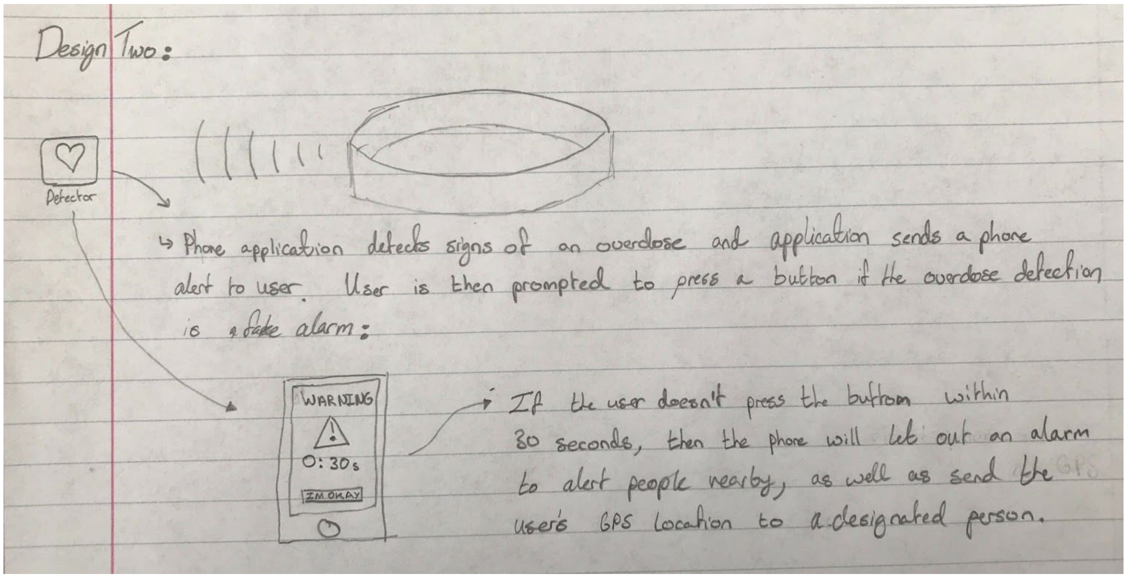

Figure 2.2.5-B. Warning system on Phone.

Design C:

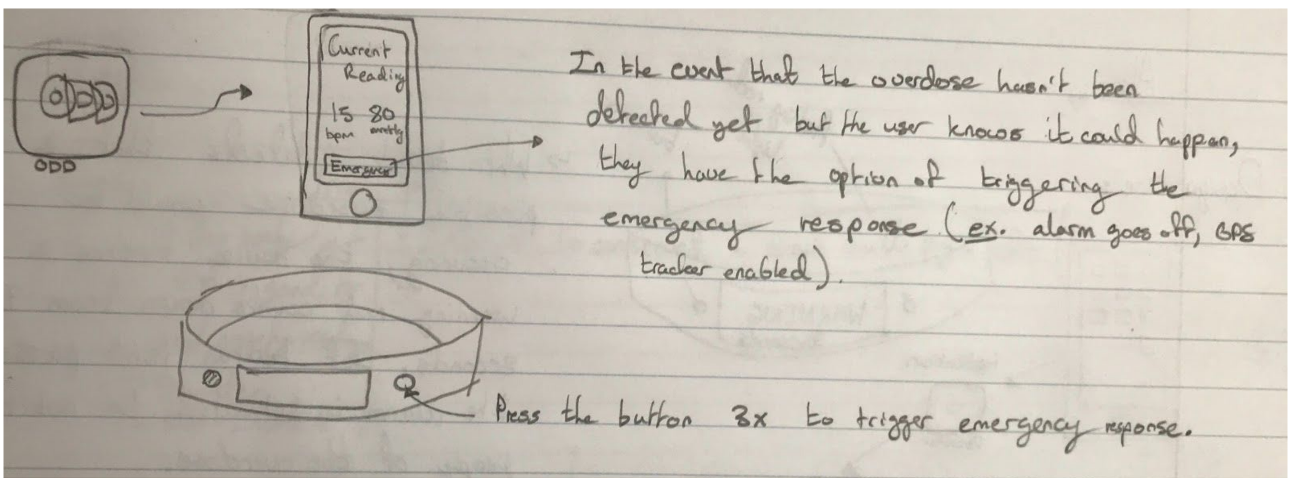

Figure 2.2.5-C. Warning system on device with Emergency Option.

2.3 Blood Oxygen Saturation Monitor

2.3.1 Abdullah Abdulmajeed

Design A:

Chest is a discreet location, compatible with the vest designed device frame. Wires would wrap around the back where the battery and other boxed components to the MAX30100 oximeter at the left chest side. Readings from the chest area might not be as concise as the fingers or earlobe. However, it's less constricting.

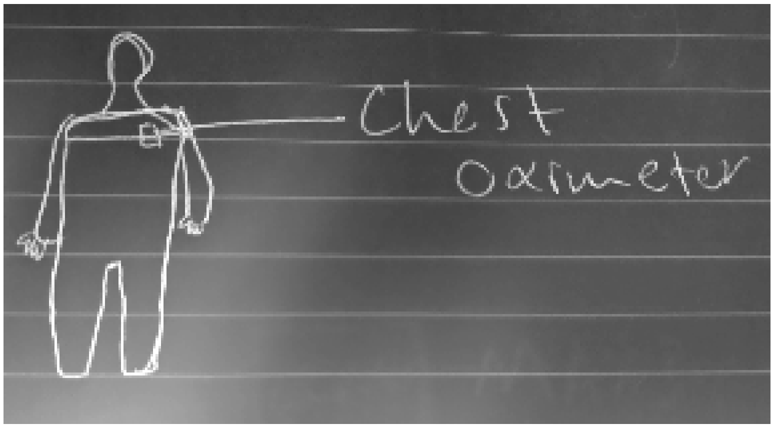

Figure 2.3.1-A. Placement of chest oriented pulse oximeter.

Design B:

Brace compatible wrist oximeter is hidden within brace fabrics. Small opening hole at the bottom would allow the LED of the MAX30100 oximeter direct skin contact on the wrist to measure blood oxygen saturation and heart rate. MAX30100 chip is Arduino compatible, operates with low power usage and is compact so it should work well within a wearable mobile system.

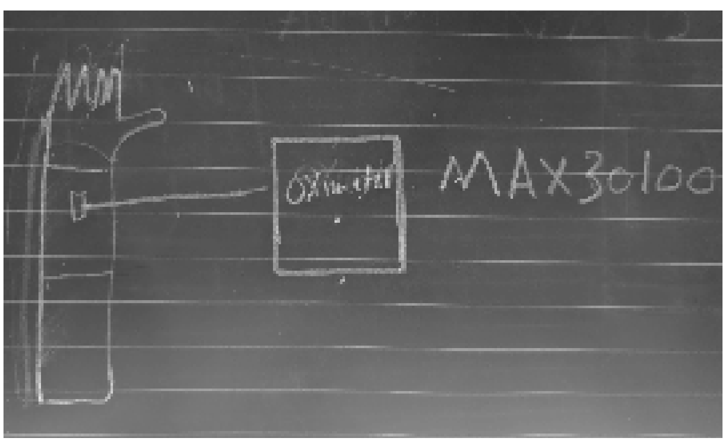

Figure 2.3.1-B. Placement of wrist oriented pulse oximeter.

Design C

In this design the oximeter is clipped onto the ear where oximetry readings are most accurate.

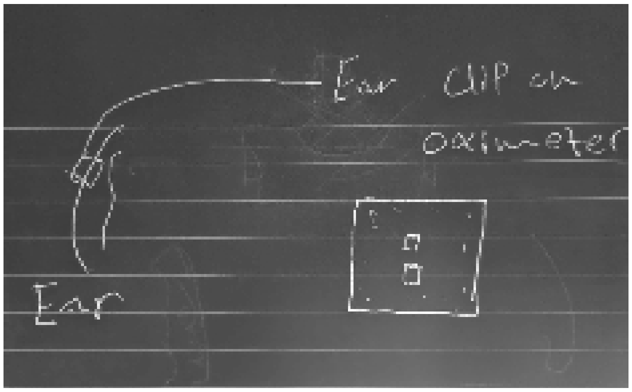

Figure 2.3.1-C. Ear lobe oriented pulse oximeter.

2.3.2 Alyssa Wang

Design A:

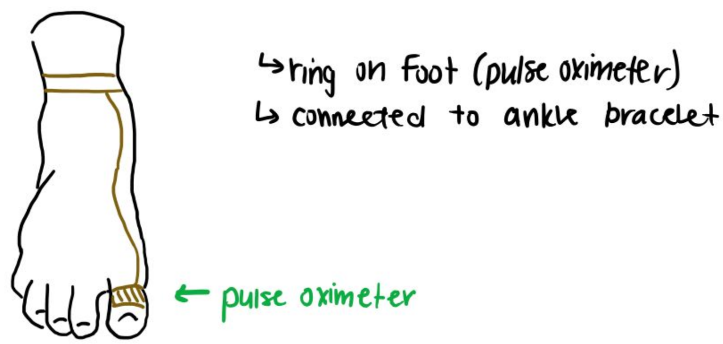

Figure 2.3.2-A. Foot Oximeter by Toe Ring.

- Oximeter around toe and its attached to a ankle bracelet which contains the main system of the design
- Discreet since it can be covered by clothing and shoes

Design B:

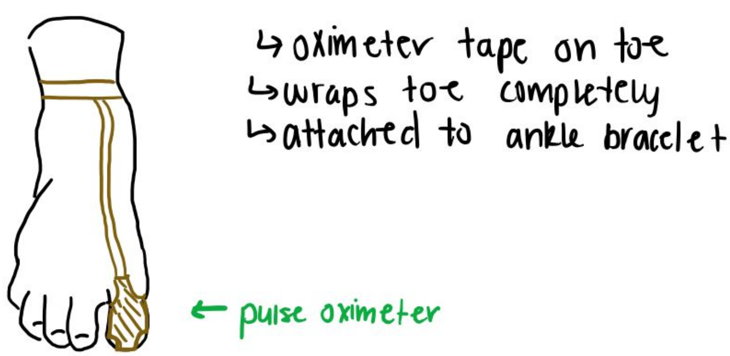

Figure 2.3.2-B. Oximeter Tape Design.

- Oximeter tape wraps around the toe
- It’s attached to a ankle bracelet which contains the main system
- Can be hidden behind shoes and clothes

Design C:

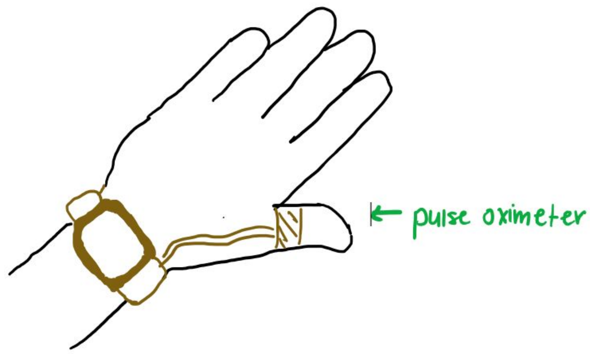

Figure 2.3.2-C. Thumb Ring Oximeter Design.

- The oximeter is located around the thumb finger
- It’s attached to a wrist watch which contains the main system
- Does not restrict person greatly in their life
- Can be more discreet when covered with clothing

2.3.3 Antonia Zupu

Can be attached to wrist, arm or behind the ear

It has a section that can detect the oxygen saturation and record it for abnormalities.

Design A:

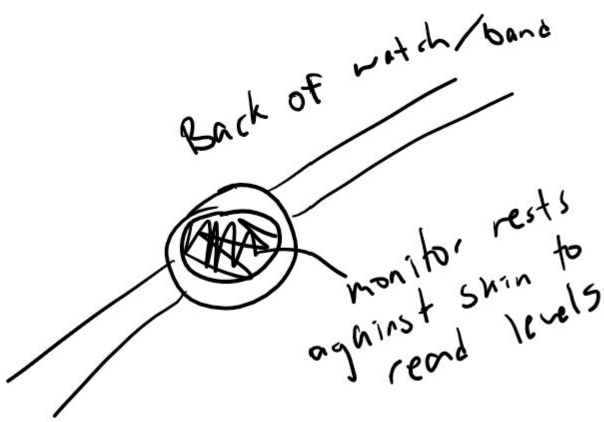

Figure 2.3.3-A : Wrist Blood Oxygen Monitor.

This monitor, like the arduino one, rests against the skin of the user at the wrist and measures the oxygen level rates.

Design B:

Figure 2.3.3-B: Earpiece Blood Oxygen Monitor.
In this design, the monitor is rather right behind the ear, which is also a good spot to measure the oxygen level rates.

Design C:

Figure 2.3.3-C : Thumb Blood Oxygen Monitor.
This device exists on amazon, and is small, discreet, not invasive and can be bought, however it is very expensive and not as discreet as other options, so not the best option.

2.3.4 Spencer Henry

Design A:

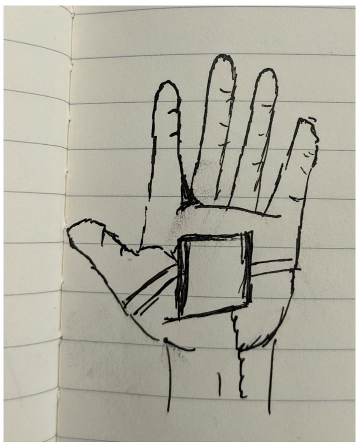

Figure 2.3.4-A. Palm Oximeter.

- Oximeter located on the palm of user
- Comfortable location, simple design, not extremely revealing

Design B:

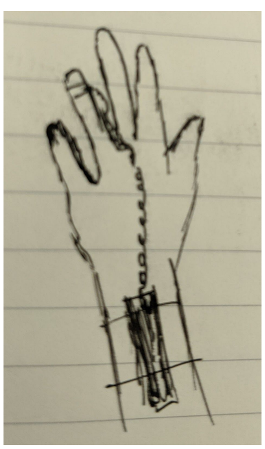

Figure 2.3.4-B. Finger-Wrist Oximeter.

- Oximeter located on user's finger
- Discrete, comfortable, and a simple design

Design C:

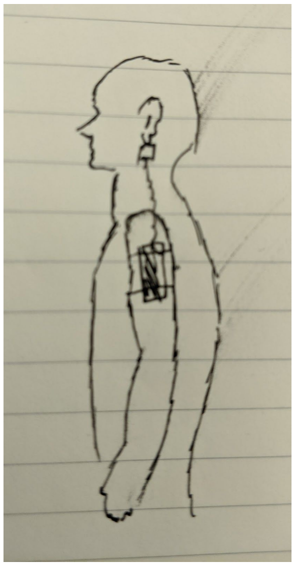

Figure 2.3.4-C. Arm Oximeter.

- Oximeter located on user's ear
- Clip should be tight and secure, comfortable enough to wear, and slim enough in order to be discrete.

2.3.5 Yomna Elsahli

Design A:

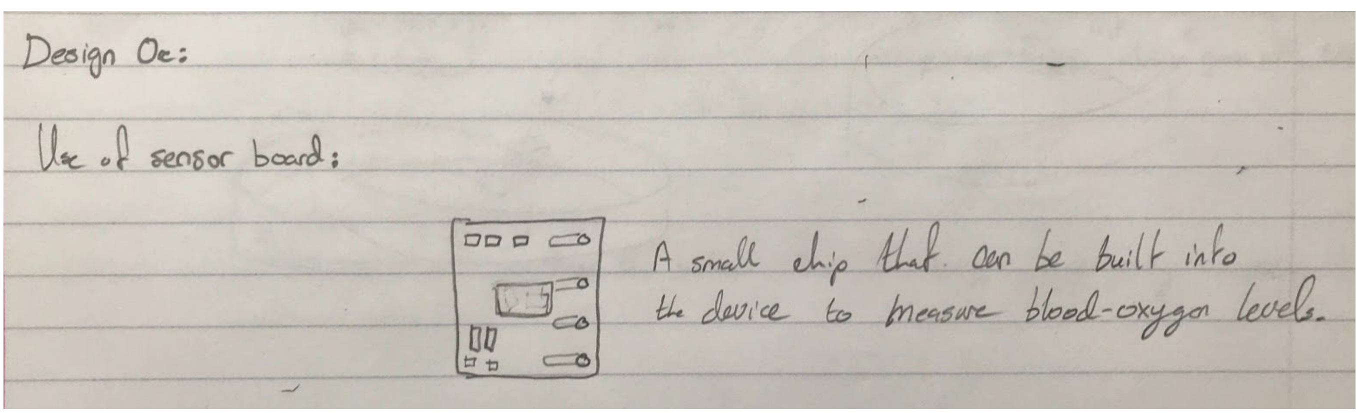

Figure 2.3.5-A. Arduino Compatible Sensor.

Design B:

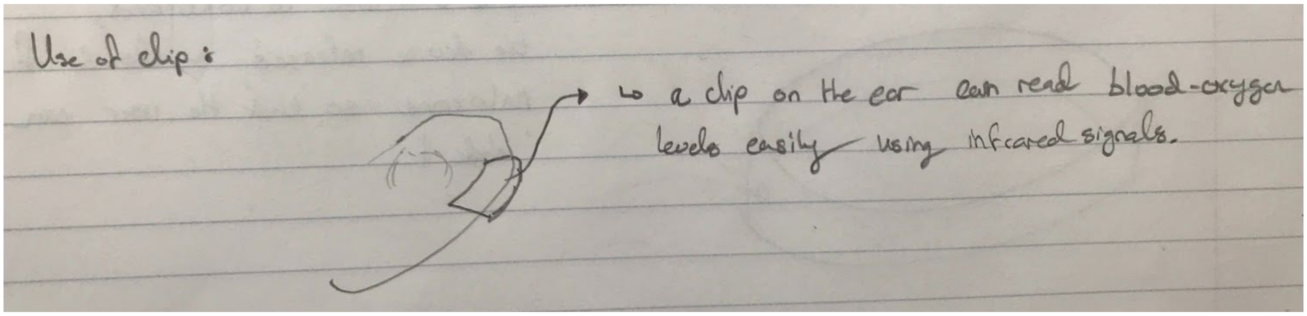

Figure 2.3.5-B. A thin clip-like sensor that measures blood-oxygen level.

Design C:

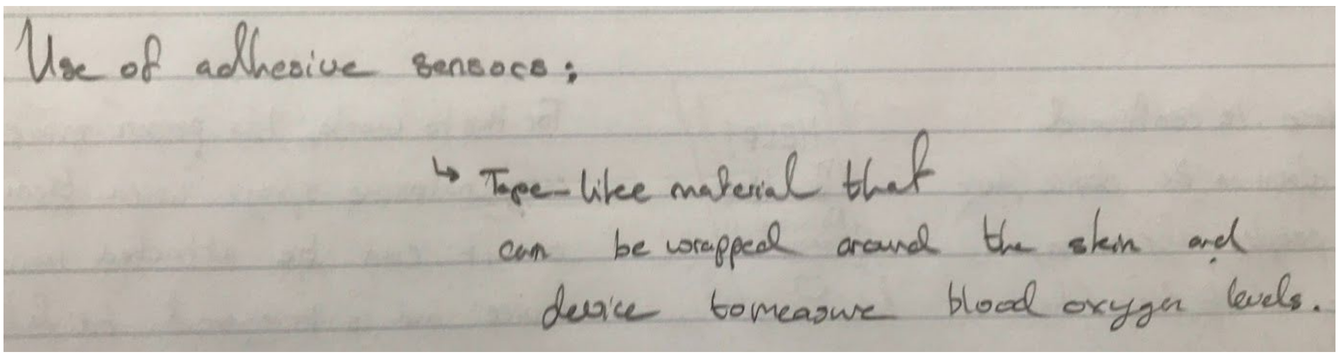

Figure 2.3.5-C. Tape with sensors.

2.4 Respiratory Rate Monitor

2.4.1 Abdullah Abdulmajeed

Design A:

The ADS1292R chip is an Arduino compatible electrocardiography machine. It uses two electrodes positioned symmetrically across the chest and a third attached to the leg or other body part for ground to measure changes in electrical voltage. Changes in voltage indicate the occurrence of electrical impulses that signal the movement of muscles lining the lungs. Through that is can count breaths and produce a respiratory rate. However, the placement of the electrodes is invasive and uncomfortable.

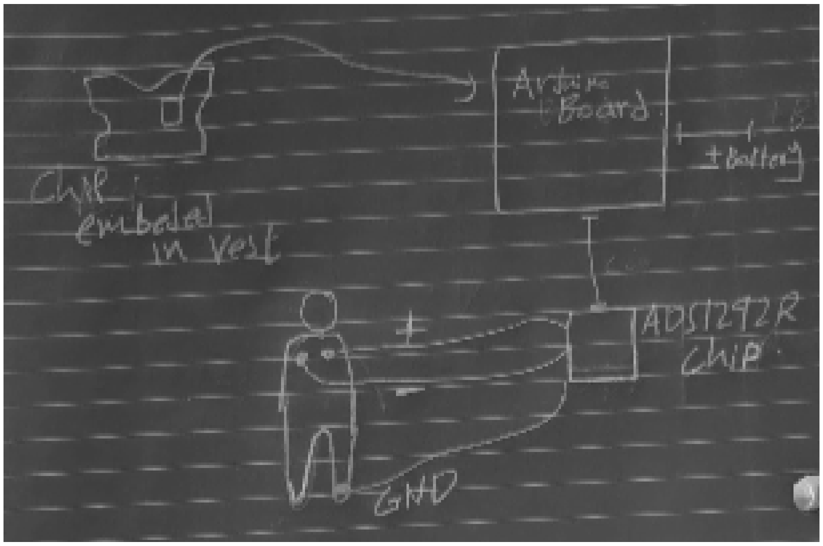

Figure 2.4.1-A. Connection of an ADS1292R chip.

Design B:

A continuous respiratory rate can be estimated using data derived from pulse oximetry. The phone app can be programmed with functions that enable it to analyze pulse oximetry and produce a respiratory rate.

Figure 2.4.1-B. Proposed app interface of visual representations of oxygen saturation, heart and respiratory rate.

Design C:

This is a new proposed solution where the phone app could independently measure respiratory rate through observing and analyzing the reflection of sound waves in a sonar type of way. Breathing would disturb surrounding and change the way sound waves reflect. Acoustic analysis of those reflections can indicate respiratory rate.

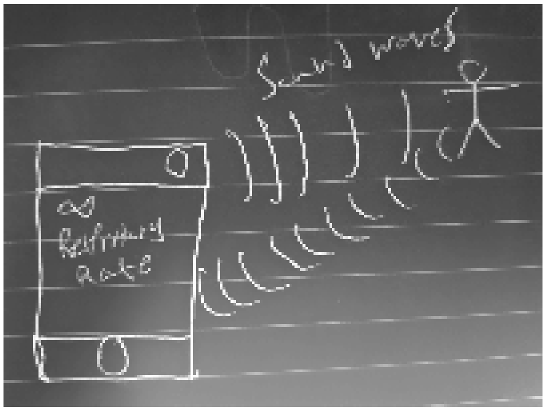

Figure 2.4.1-B. Sound wave method of repertory rate calculations.

2.4.2 Alyssa Wang

Design A:

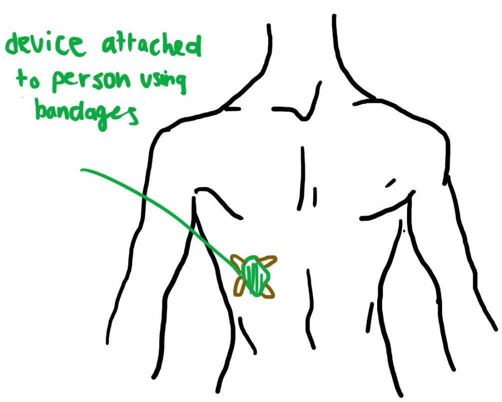

Figure 2.4.2-A. Wearable Respiration Rate Monitor Device.

- Respiration rate monitor is attached to body with bandages
- It measures the movements made during each breath

Design B:

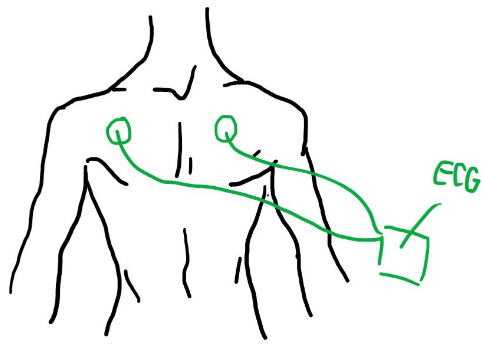

Figure 2.4.2-B. ECG Respiration Rate Monitor.

- Electrode stickers attached to chest
- The stickers connect to the main ECG system which must be held or hooked on clothing
- Can be hidden under clothes, but may be a bit restrictive in daily life

Design C:

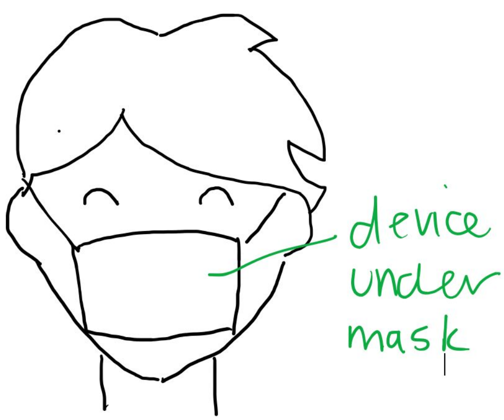

Figure 2.4.2-C. Face Mask Respiration Monitor Design.

- Respiration rate monitor underneath mask
- It measures the amount of air being exhaled
- Not very discreet but efficient

2.4.3 Antonia Zupu

Includes:
Monitor which will detect rates from up to 6ft away using just airwaves
It records in respiratory rate for abnormalities

Design A:

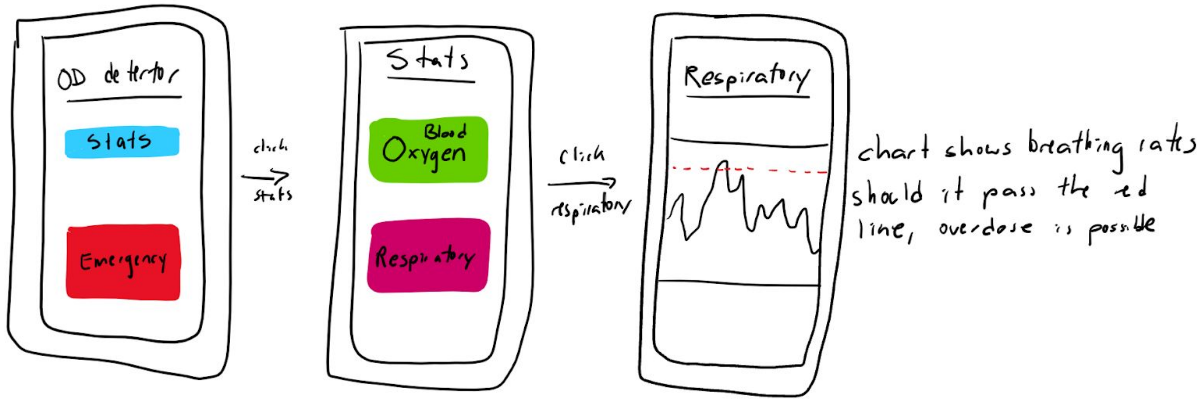

Figure 2.4.3-A. Smartphone Application Respiratory Monitor.

This design is a lot like one of the designs which we benchmarked. It uses soundwaves in the air to measure respiratory rates from up to 6 ft away, and it does it all from the smartphone. This does seem like a great option, however it involves coding a whole application which we do not have the tools for, and the respiratory rates can be influenced by other things around, such as other people, fans, passing cars, etc. making the whole system flawed.

Design B:

Figure 2.4.3-B. Watch Respiratory Monitor.

This design is like the design of the fourth link, however may not be applicable for this project as we don’t think it can be bought or added into our design. It is still in testing and so not available for sale, and if it were it would be far too expensive.

Design C:

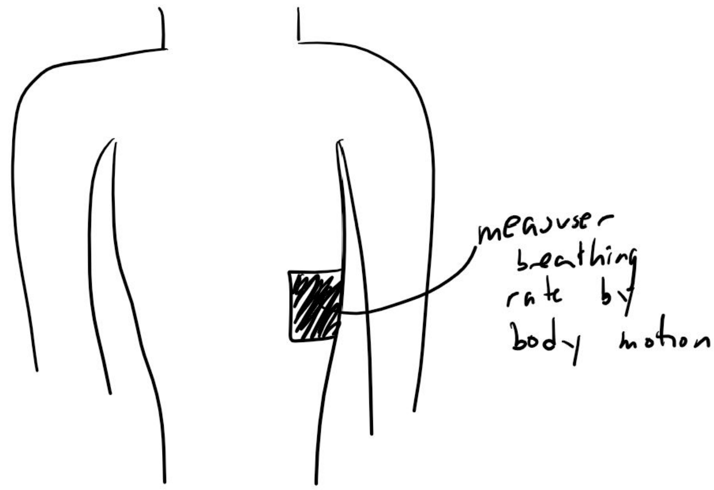

Figure 2.4.3-C. Chest Movements Respiratory Monitor.
More information of this device can be found in citation no. 1
It measures breathing rates from the body's chest motion per breath.
This device can only be found in Ireland and is not available in North America, so getting this device would be too expensive and costly for our project.

2.4.4 Spencer Henry

Design A:

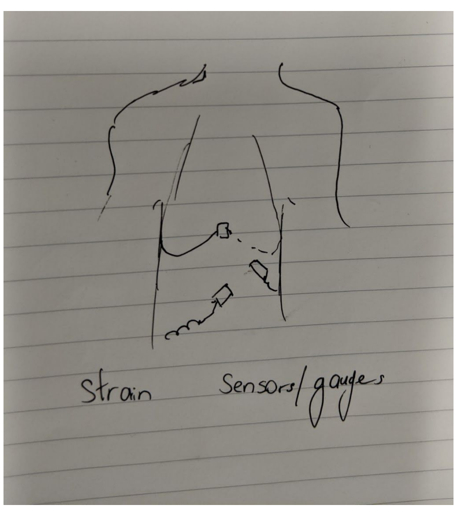

Figure 2.4.4-A. Strain sensor/gauges.

- Measures local strain of the abdomen and rib cage while user is breathing
- Discrete, lightweight

Design B:

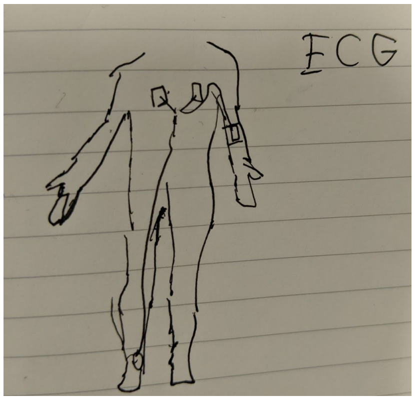

Figure 2.4.4-B. ECG.

- ECG gets attached to various parts of body, detects breathing rate through an algorithm
- Discrete, lightweight, however users may not want to be completely hooked up to wires, and may not like the idea of using an ECG.

Design C:

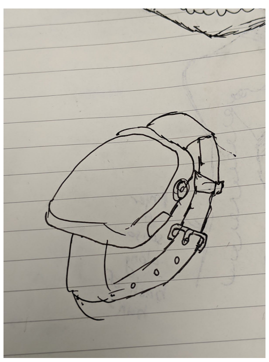

Figure 2.4.4-C. Smartwatch that can detect respiratory rate.

- Small, discrete and stylish
- Expensive product, hard to incorporate into our project

2.4.5 Yomna Elsahli

Design A:

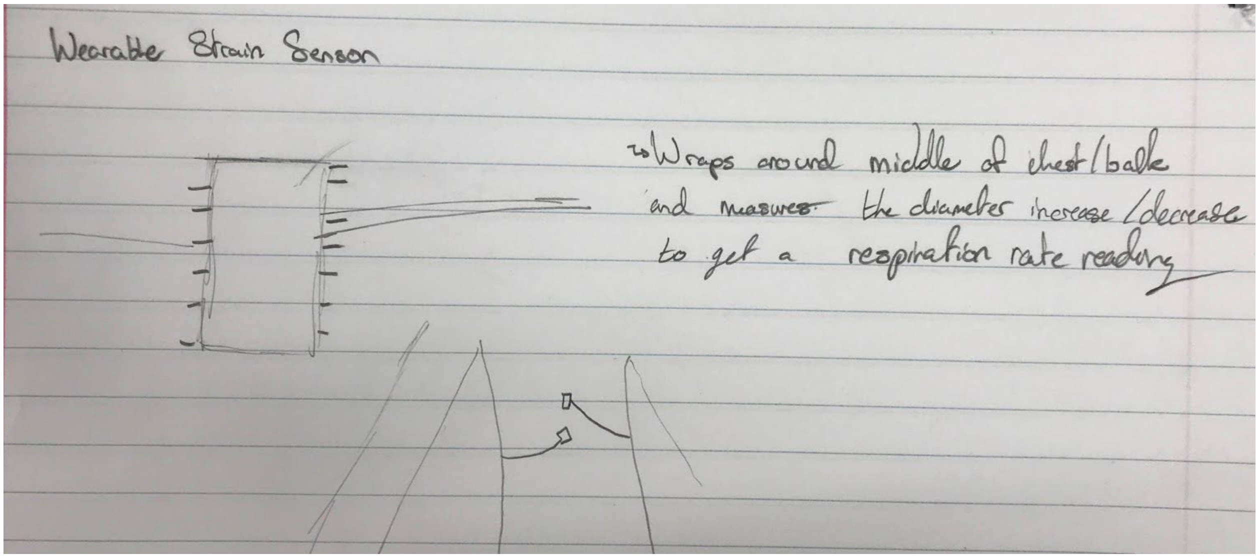

Figure 2.4.5-A. Waist strands that measure waist/chest diameter.

**Cited in References [6]

Design B:

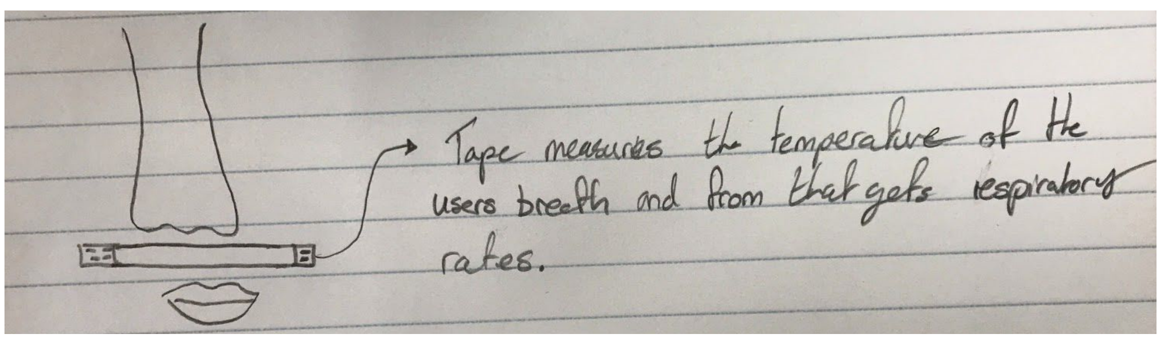

Figure 2.4.5-B. Respiratory Rate Via Temperature Sensor.

Design C:

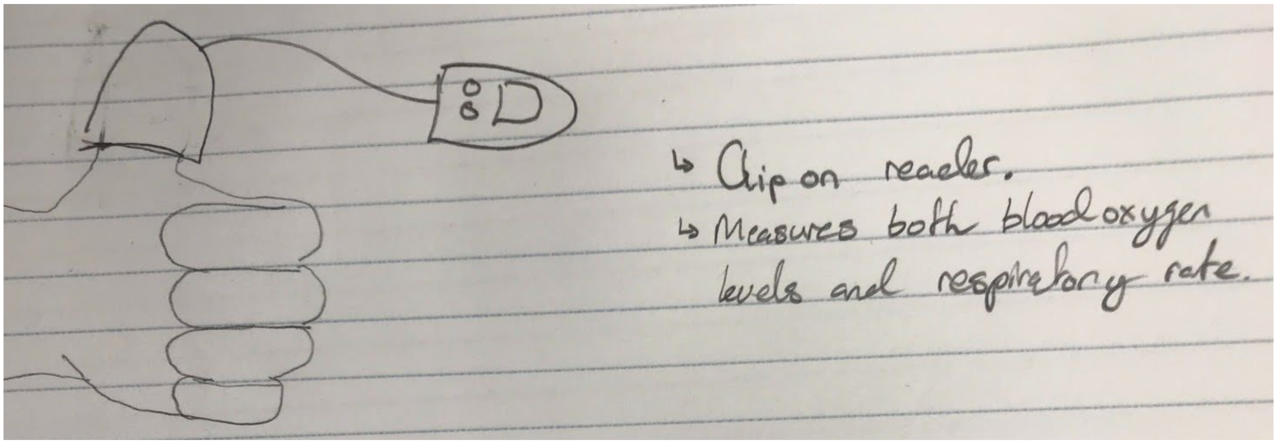

Figure 2.4.5-C. Clip on reader.

2.5 Naloxone Distributor

2.5.1 Abdullah Abdulmajeed

Design A:

This device would employ a retractable syringe where in the case of overdose detection the syringe would be deployed and would deliver the naloxone subdermally. The device would be pressed against the skin at the thigh area. The opening of the syringe would be gated off with plastic until an overdose is detected. The gates would open and the syringe would deploy.

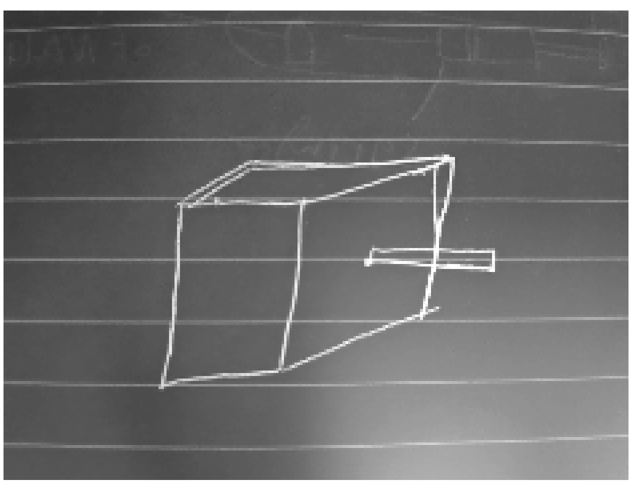

Figure 2.5.1-A. Proposed mechanism for retractable design.

Design B:

This design would propose that users carry their own naloxone nasal kits. However, the app design would include a message that warns people of that.

Figure 2.5.1-B. Naloxone worn on the neck.

Design C:

Carryable syringe pouch. The app would warn surrounding people that the user is overdosing and indicate the placement of the syringe. Other people can administer naloxone.

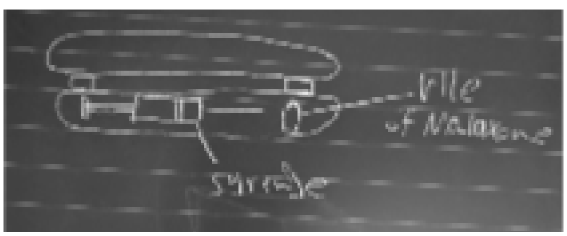

Figure 2.5.1-C. Proposed shape for carrying pouch.

2.5.2 Alyssa Wang

Design A:

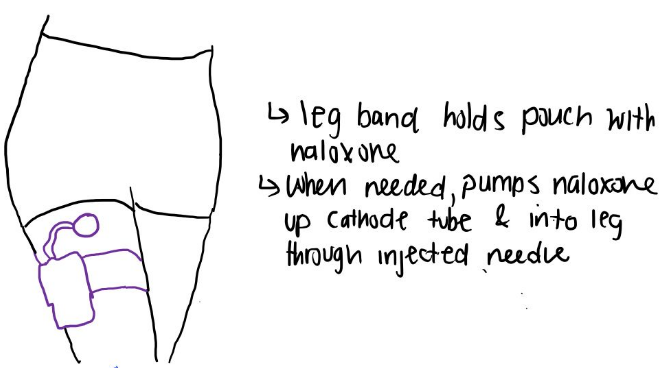

Figure 2.5.2-A. Leg Needle Injection Design.

- Needle is injected in leg and is connected to cathode tube
- The leg pouch holds the naloxone and main device system

- Naloxone is pumped into cathode and injected in leg when an overdose is detected
- It appeals to the naloxone injection points of interest (large muscle in leg)

Design B:

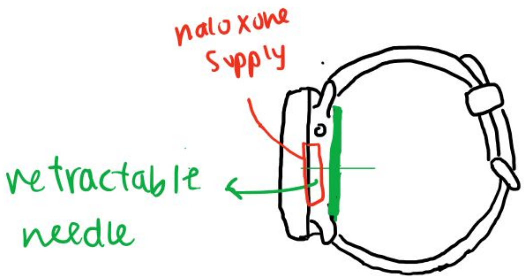

Figure 2.5.2-B. Watch Naloxone Injection Device.

- Retractable needle and naloxone is hidden within the watch
- When an overdose is detected, the needle will be released and inject the naloxone

Design C:

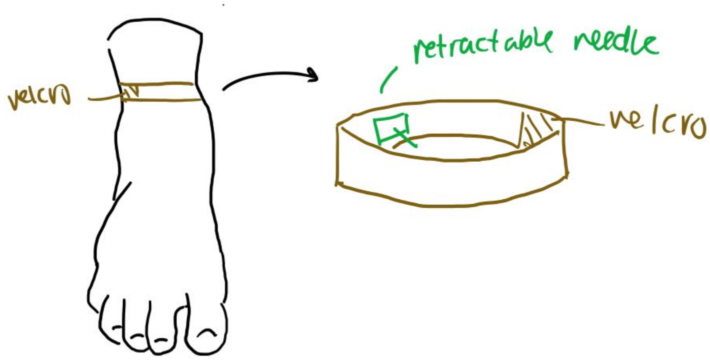

Figure 2.5.2-C. Naloxone Injection Ankle Bracelet.

- Ankle bracelet with hidden retractable needle
- Adjustable sizing (velcro ends)
- Device system and naloxone antidote in bracelet

2.5.3 Antonia Zupu

Includes:
A vial with the naloxone

Design A:

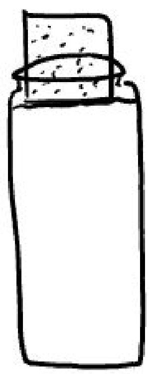

Figure 2.5.3-A. Simple vial Naloxone Dispenser.
This design is just a small glass vial with the naloxone inside of it and a cork stopper on top. This is not ideal as opening it may be difficult and it doesn't come with a needle to inject the naloxone.

Design B:

Figure 2.5.3-B. Needle Cap Naloxone Dispenser.

This is very similar to the first design, except it has a needle stopper so that the vial doesn't need to be opened, but the needle can just be inserted into the vial. Again, this design isn't ideal as it doesn't come with a needle so if the user doesn't have a needle on hand, the vial is useless.

Design C:

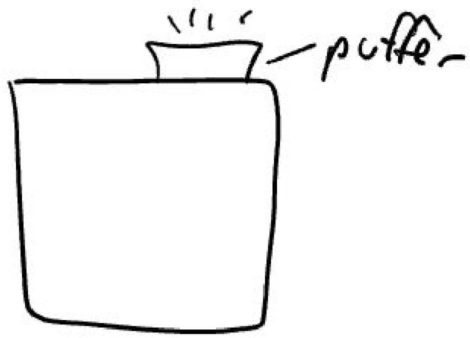

Figure 2.5.3-C. Puffer Naloxone Dispenser.

This design is naloxone in the form of a puffer. It works best for any user. However, it would have to be much larger than a glass vial and so would make the device very bulky and no longer be discreet.

2.5.4 Spencer Henry

Design A:

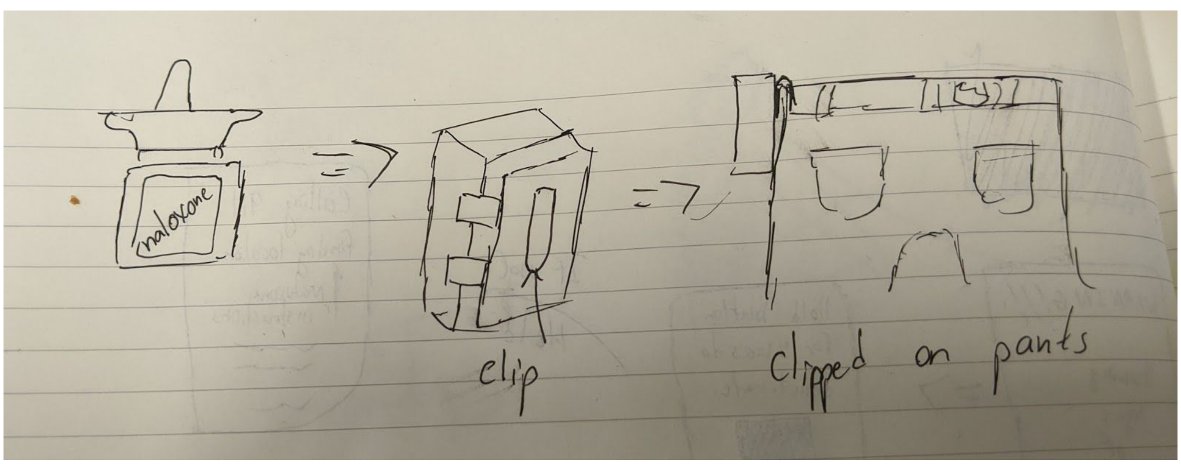

Figure 2.5.4-A. Clip on Naloxone Supply.

- User's will be given naloxone in the form of a nasal spray
- Will be held in a box with a clip that can be attached to user's pants or pocket
- Simple design, bulky but not attention grabbing and will hide naloxone bottle, easy to use

Design B:

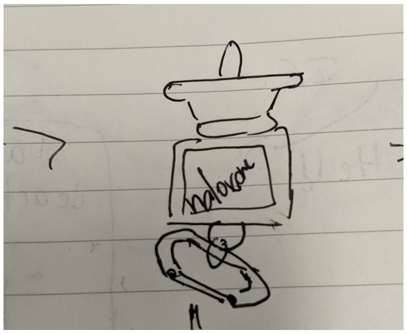

Figure 2.5.4-B. Carabiner attachment for Naloxone.

- Replace box with a carabiner clip
- Easy to use, would not need bulky carrying case, simple design

Design C:

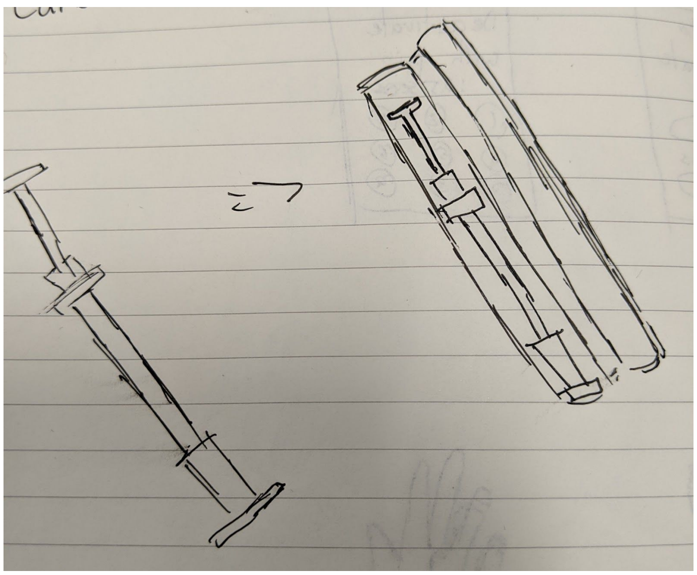

Figure 2.5.4-C. Injection Needle.

- Use needle instead of nasal spray
- Provide slim carrying case for user to hold needle
- Discrete, easy to use container, simple design

2.5.5 Yomna Elsahli

Design A:

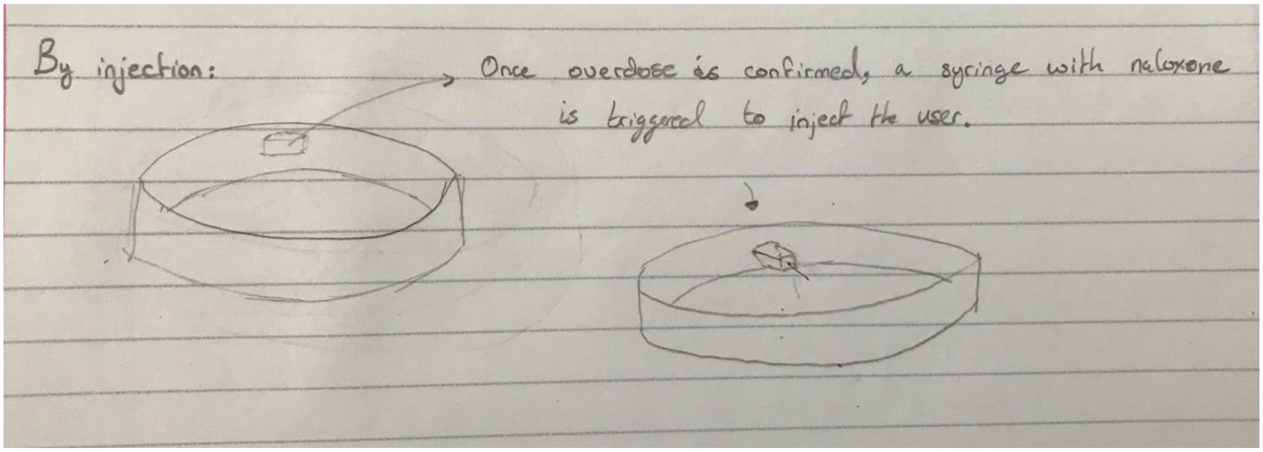

Figure 2.5.5-A. Injectable Naloxone Syringe.

Design B:

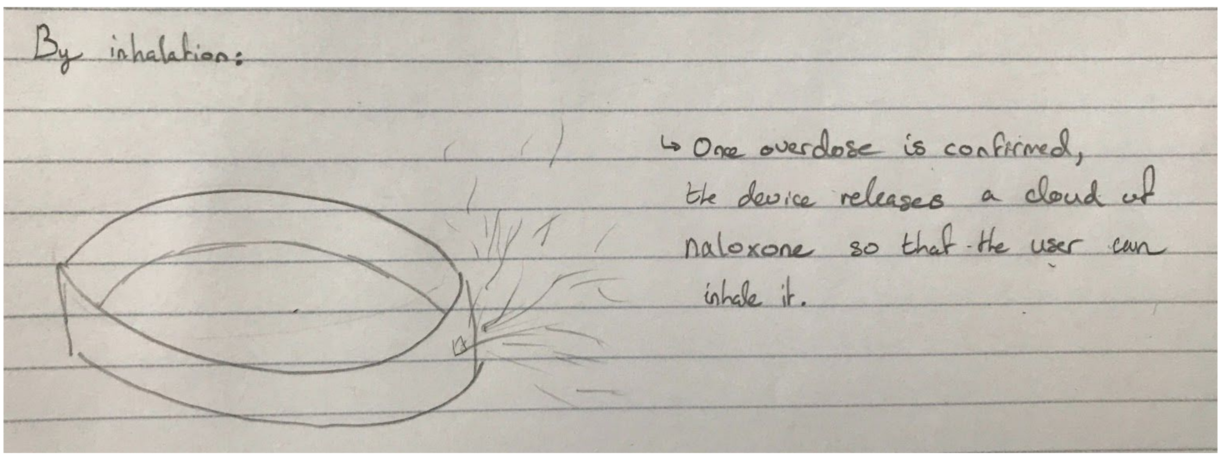

Figure 2.5.5-B. Naloxone Mist.

Design C:

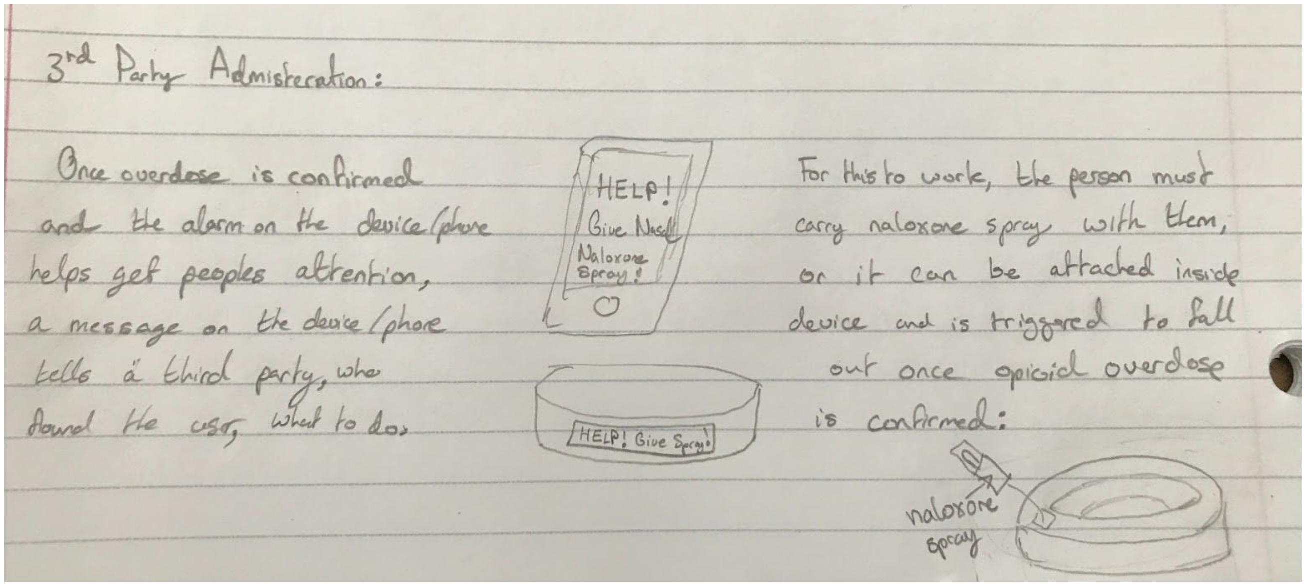

Figure 2.5.5-C. Third Party Injection.

3. Finalized conceptual design

3.1 Device Frame

There was a lot to consider when choosing a device frame. The placement of the device is crucial as the accuracy of the pulse oximeter reading required a body part that was thin, such as a finger, or an earlobe. One of the client's main needs was that the device could not be on the fingers, however, as the user would not want something that interferes/inhibits their opioid use. Additionally, a device on the fingers would not be practical in terms of the construction of the device. If the device were to go on the fingers in a non-invasive form such a ring, then the components of the device would have to be impossibly miniscule. This led the team to decide against any device frame that a was too small, or on a body part that would make measuring blood-oxygen levels difficult. We decided against designs that had the device on odd parts of the body, such as the ear and ankle, because, although they might be good body placements to measure blood oxygen levels, they are not desirable objects that people would want to wear. As discussed in past deliverables, the aesthetics and discreteness criteria is very important in this device design as the reason people are at such a high risk is because the stigma against opioid users is so high that they are ashamed.

We decided on our final design for the device frame to be a large wristband. This device satisfies our criteria as it is aesthetically pleasing and discrete enough that it wouldn't stand out as an opioid detector device. It keeps the fingers free, as the client requested, and the body placement of the device can accurately pick up blood oxygen levels from the wrist. This device design was chosen and modified from the following combination of the individualized designs above:

- 2.12 Design B
- 2.13 Design C
- 2.14 Design A
- 2.14 Design C
- 2.15 Design B
- 2.15 Design C

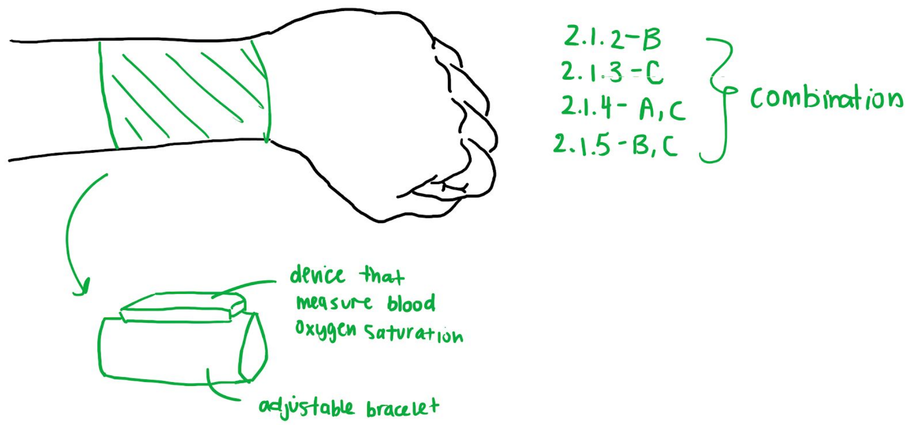

Figure 3.1.1. Final proposed design of the device frame.

3.2 Phone Application

As per the client's request, we decided on having a phone application that works alongside our device. This phone application will be able receive signals from the device when the person is at risk of an opioid overdose. It will create a notification on the phone when the device detects early signs of an overdose. In order to ensure that it is not a false alarm, the person is instructed to enter 5 or more letters. This will ensure that the person can still function mentally and physically. If the person is unable to respond within 25 seconds, then the phone will sound an alarm to alert nearby help as well as contact 911 and the person's chosen emergency contact. After great consideration, we had to strike out many design ideas due to their complexity. This is because we decided that our final design will be made using an Arduino Uno, thus restricting us to only use the premade Arduino app. As a result, we will not be able to design the app to our own appeal like adding graphs that visually show the person's blood oxygen saturation level.

Our final design will be a combination of the designs

- 2.2.3 (A, B, and C)
- 2.2.4 (A)

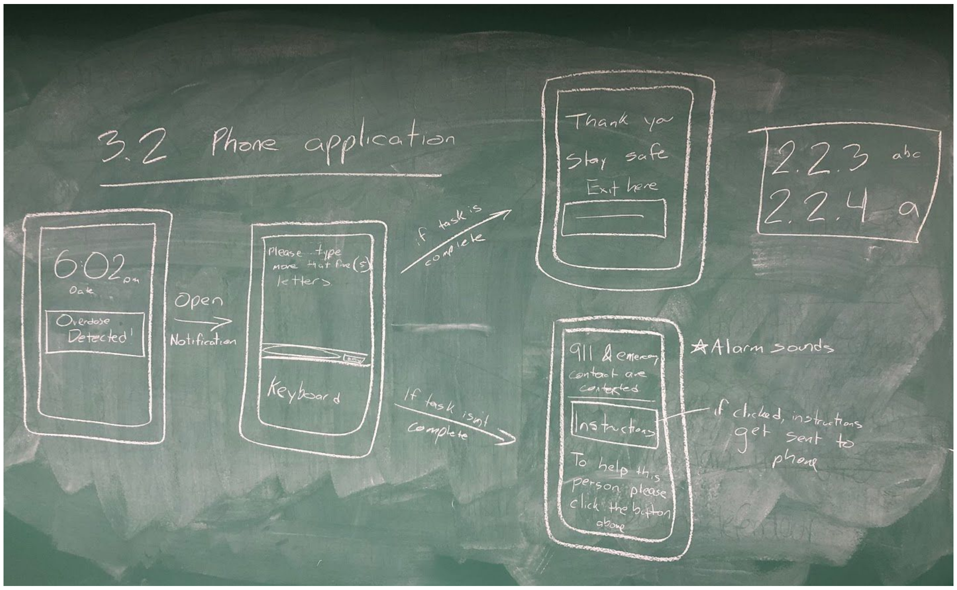

Figure 3.2.1. General interface design of final app.

3.3 Blood Oxygen Saturation Monitor

We have chosen to use the design that is seen in figure 2.3.1-B. This device is arduino uno friendly, small, discreet, accurate and cheap. The monitor itself is on the palm of the hand so does not block the users fingers, and is just a thin wire with a small sensor at the end, so is very discrete and doesn’t draw attention as per user's requests. This device is also very cheap so we can buy it and incorporate it to our wristband very easily. Since it connects to the palm of the hand, it can easily be attached to the wristband which is right near the palm, meaning a very short wire would be needed, so it would not be extremely invasive to the users. The placement of the sensor can obtain a clear blood-oxygen level, therefore it will give accurate results on whether the person is overdosing or not, which is our main criterion in this project. It is also relatively discrete therefore the user can wear it without worries.

3.4 Respiratory Rate Monitor

After great discussion, the team has decided that a respiratory rate monitor is not to be implemented, unless a more definite solution is discovered. We considered figure (), however, the electrodes that would attach from the person’s arm device to chest would be too invasive, bulky, and restrict them in their daily life. There had been a general consensus that the benefits of having a respiratory rate monitor does not outweigh the disadvantages it would bring to the person. Moreover, the respiratory rate monitor is also not the most reliable way in determining if a person is having an overdose on it’s own so we’ve deemed the blood oxygen monitors good enough.

3.5 Naloxone Distributor

As a team we have decided to remove the Naloxone Distributer from the device. A nasal spray would be too large to include into any of our device ideas and would therefore not be discreet for the user. Furthermore, including a vial of naloxone into the device wouldn’t be very much help as a needle would not be included. This means that the user would need to have needles prepared in a kit, in which case we will ask and urge users to also include naloxone in their own personal kits should they have one, or on themselves. This way the device can be smaller and more discreet as per client's request. This isn’t an ideal situation as it adds risk of the user not being saved in time. However, even if there was a needle and vial included, it is unknown if a stranger would help the user and inject them with this unknown substance. By taking it out, the device will be cheaper and more discrete/wearable, making it more likely to actually be used in the first place.

4. Conclusion and Recommendations

After having met up on the ninth of February, many decisions were made for each conceptual design subsection. We compared all of our sketches and researched and had a long conversation about what would be best for our device and why. The reasons for each subsection design chosen is explained in section 3 of this document. This project is very complex for several intertwining reasons. It targets people that use opioids but are not ready/willing to go to get help professionally because of the stigma drug users face, therefore they are at a greater risk of dying by overdose. The goal of this project is to give these people a safety net, and to ensure that if they want to still use, then they can survive an overdose. We faced obstacles when the criteria worked against each other, as there were many times that we debated the importance of extra accuracy versus invasiveness and discreteness. We decided that since the client emphasized that the users need to want to use the device that it is important that it does not interfere with their daily use. We are all agreed upon these subsections and are ready to move forward to looking into finding the parts we need to buy and build our device.

5. References

1.

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