

PROJECT PROPOSAL

Problem Space

→ What is the problem you're addressing?

Risk of stroke or damage to the cardiovascular system when playing immersive video games or watching horror movies.

→ Who is the target population/user?

People with heart disease risk or high blood pressure

→ Why is it important?

Because it relates to people's health.

→ What previous work has been done in this space? Where did it succeed? Where did it fail?

Many technologies track heart rate during a VR session. But they are mostly used for fitness purposes and tracking workout-based games/experiences. But there are no technologies that constantly monitor heart rate and alert the user in common activities like watching a movie in VR.

→ Do your research on the problem, population, and related work. Give us any background information we need to understand the problem space. Show us that you understand the *core of the problem* and its complexities. Use the diverse backgrounds your teammates have; understand and deconstruct the problem from multiple perspectives.

A large population suffers from cardiovascular ailments. These patients are at a high risk of cardiac arrests and failures. The best measures are all preventative, like keeping physical activities to a minimum and avoiding any adrenaline-inducing activities. Many entertainment platforms do not consider such a spectrum of the population and create content that might trigger the ailments of the user.

The same applies to entertainment content in VR. We need an intervention that triggers an alert when the content that the user is consuming causes a significant increase in heart rate.

One obvious issue is the threshold for the trigger. Every human is different and has varying tolerance.

How can we decide what the threshold should be for the current user? One way to fix this can be by using Q-learning as the base model. This is just an idea and we need to test it more to identify the flaws and shortcomings.

Intervention

→ How do you plan to address the problem/part of the problem?

By measuring the user's heart rate and showing a message when the value exceeds a set threshold. Depending on the user's response, the threshold will be modified accordingly.

- Why do you think it will help give your problem space (related work, target population, etc.)?

People with cardiovascular ailments who avoid immersive environments will be able to experience it.

- Give us your vision of what your intervention/solution will do and how it will do it. Walk us through what using it will be and feel like. Add pictures and drawings if helpful. Convince us that this is the right solution to your problem.

Using the Samsung watch, we will monitor the user's heart rate. Whenever they are using the virtual reality headset, if their heart rate goes past a certain threshold, the headset will show a warning message. It will allow the user to either dismiss the message or acknowledge the message resulting in the continuation of the immersive experience or termination of the experience.

- Consider that you will be demoing this at the end of the quarter. How will you demonstrate your intervention?

Since everyone in our group can tolerate high levels of heart rates it will be hard to demonstrate the functionality at high levels but we can demonstrate it by setting the initial threshold low and also by giving arbitrary user inputs to demonstrate the learning curve. We can then extrapolate the results for higher thresholds.

Feature List

- Give us a breakdown of the features you intend to implement with your system, what it will do, why it exists, and an example of how someone might use it (a storyboard). You may find drawings useful here to describe user interactions and interfaces.
1. Track heart rate.
 2. Send a warning message based on the perceived heart rate.
 3. Modify the threshold depending on the user's response to the warning message.

Devices

- What devices will you need to implement your intervention? You can use devices that we covered in class, but you are welcome to go beyond those in class if you have access to them. How do you plan to power the devices?

Oculus Quest Pro (for accessibility for people who wear glasses) and Samsung Watch.

They work on battery, so they should be charged before their use.

Architecture

→ Are you using a network?

We have to connect VR and Samsung Watch so that the VR could have access to the heart rate that the watch is gathering.

→ Where is your server? What devices are clients?

A server is not needed. The processing will take place locally on both the devices. The learning model can be embedded into either of the devices (testing is required to find the optimal device for efficient operation).

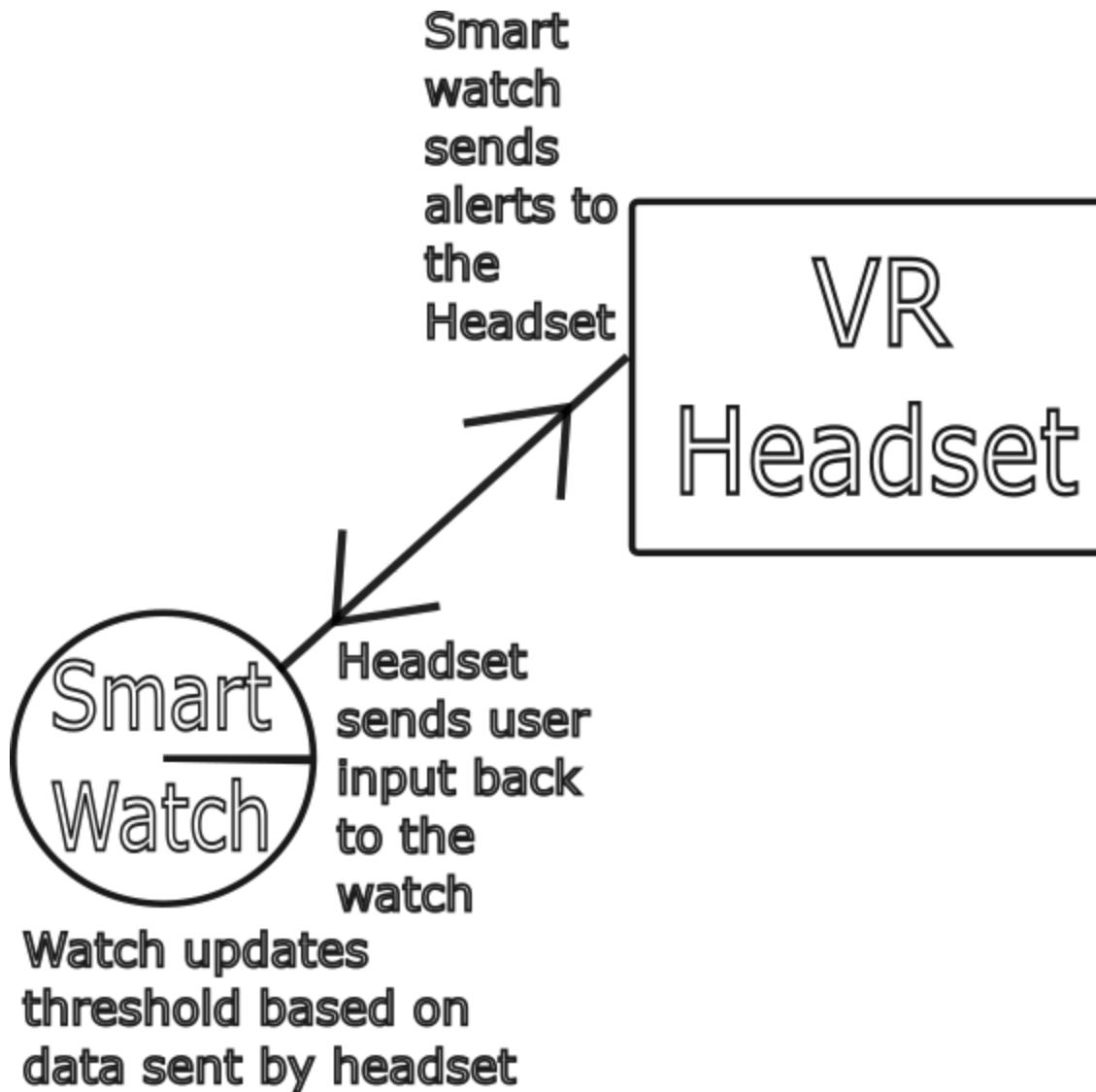
→ How is data stored?

The data will be stored locally on the device memory

→ Are you doing anything to protect user information?

No internet access is required. However, heart rate data or something similar will be sent via Bluetooth to the VR headset. We can try implementing a magic key or some encryption to lock the data packets.

→ Create a diagram or series of diagrams showing the flow of information through your system. Show how devices are connected and what protocols they use. Describe how information on each device is handled, whether it is saved, sent, or discarded. Give us a graphic of your system/network architecture. Don't forget to show th



user where the data is relative to the user

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- We will cover computer networks in class on 11/14/23 and don't expect you to know what protocols to use where, but do your best, it's okay to be a little vague, but try to look up what protocols will be best for your purposes.

Timeline

- You have 3-4 weeks. Give us a weekly breakdown of what features you intend to implement for that week. Keep in mind that the best plans are adaptable and give yourself some buffer room in case you fall behind schedule; have extra/bonus features planned if you find yourself with extra time. Distribute the work between your teammates. Don't forget to leave room for testing and make everything stable for the final demo.

Week 1: Heart rate monitoring on the watch and sending data packets via Bluetooth.

Week 2: Receiving data packets on Oculus.

Week 3: Create alerts on Oculus based on received data overwriting the current output stream on Oculus.

Week 4: Implement Q learning either on the watch or on Oculus but not both to update the threshold.

Extra features: enable the passthrough feature and play soothing music when the user acknowledges the alert.