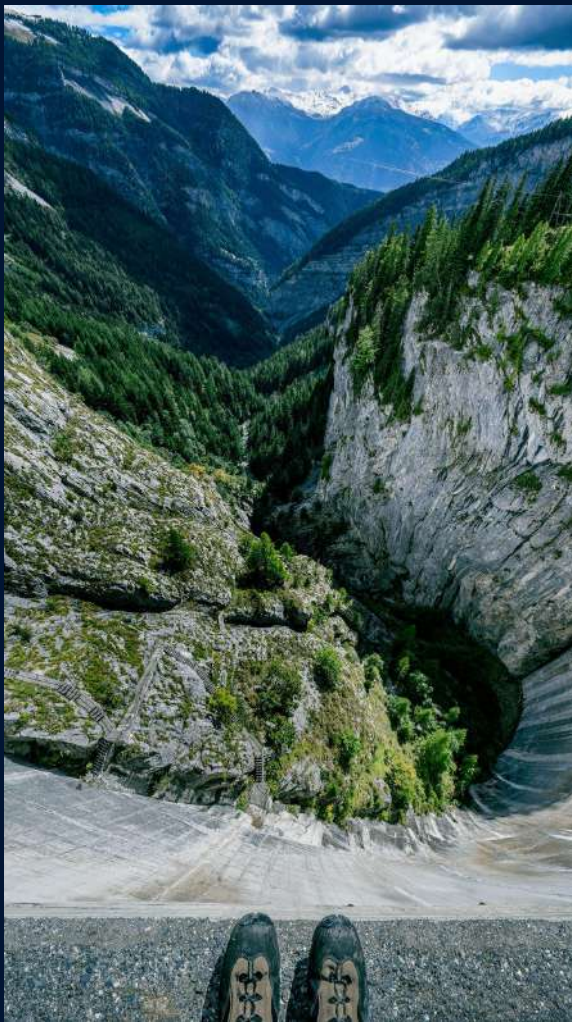# Unreal Haptics

Why we're doing this

CSU's land grant mission, as well as our own, is to give back to the community and to grow through service.

- Make new friends.
- develop skills and gain experience
- Learn good teamwork practices
- Free food

"Our task is to overcome ever-larger challenges; not to reach the place where we are no longer challenged."

The challenge they face...

Acrophobia - its nature, need, and treatment.

Acrophobia

1. What is Acrophobia:
- An **irrational** fear of heights:
  - "What distinguishes many anxiety-related phobias from other forms and origins of fear is their irrational nature, meaning - beyond the phobia itself, there is a very small probability of any negative event actually occurring as a result of exposure to the specific situation or object feared." (Andrews, 2007)
  - "Acrophobia is a relatively common condition, and is certainly one of the most common phobias. " (Andrews, 2007)

2. What causes it:
- Often a **traumatic experience** followed by avoidance:
  - "When avoidance occurs instead of re-engagement following trauma, then the structure and association remain and may even strengthen and grow over time as the survivor becomes more convinced of the unhelpful associations." (Rauch & McLean, 2021)
- It could however be **hereditary**:
  - "Because some individuals who fear heights have often been unable to report a clear height-related aversive experience as a primary etiological factor, some authors have proposed hereditary or non-associative accounts in the disorder's development (Menzies & Clarke, 1993, 1995c)

How to treat it

Exposure Therapy:

1. **What is exposure therapy and how do you do it right?**
   - "Exposure therapy - gradually familiarizing a patient with the source of his or her fear by repeatedly presenting it in a safe environment." (Ahmed, 2017)

2. **Is it the right treatment for Acrophobia?**
   - "By far the most effective treatment for many anxiety disorders has been exposure therapy; encouraging someone with, say, a fear of heights to gradually walk closer to the railing of a balcony or to ride in a glass elevator. When nothing bad happens, the fear begins to diminish. But most psychiatrists don't like doing it because its difficult to find suitable location and take all those trips out of the office." (Waldrop, 2017)

3. **Is VR a suitable environment for the treatment?**
   - "To date, VR technology is most commonly used to treat phobias and other anxiety disorders." (Kniffin, Carlson, Ellzey, Eisenlohr-Moul, Beck, McDonald, & Jouriles, 2014)
   - "It was in 1995, in a pilot study that was the first published account of VR used to treat any kind of psychiatric disorder, the team showed that 7 of the 10 people who received the treatment then went out and voluntarily subjected themselves to real high place- a success rate similar to non-VR-based exposure therapy." (Waldrop, 2017)

The challenge we faced

Teamwork

Aside from a brief meet up when we first formed Unreal Haptics, most of us hadn't even met in person before the event.

Development

Coming into this competition none of our members had any significant experience coding in unity so we had to learn from scratch!

Time

Like everyone else, we really were pressed for time and had to formulate and execute a plan around that constraint.
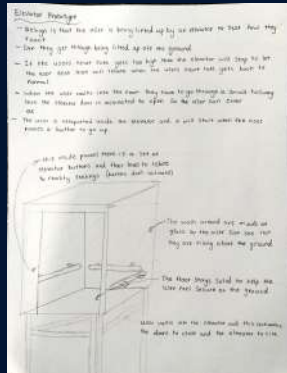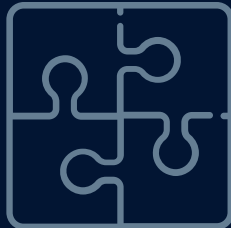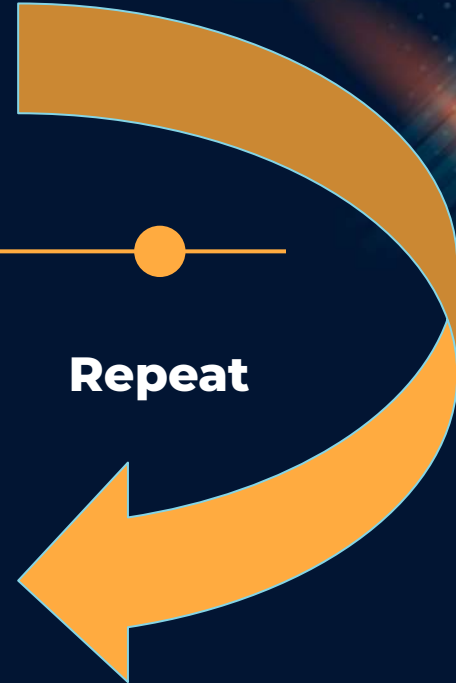
Prototype development

Brainstorming

Revision

Testing

Repeat

The challenges we overcame

BIG PICTURE

- Organise and decide democratically.
- Divide and conquer.
- create, test, revise, repeat.

THE DETAILS

- subdivided coding into environments, patient stadius, interactive mechanics and animations.
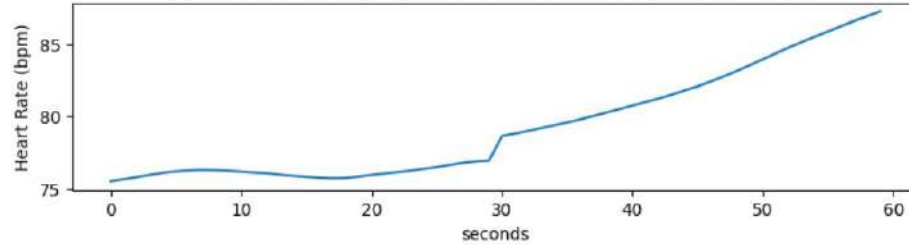- Had one member focus on research and the other on presentation.

Particular issues

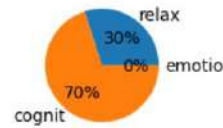- While attempting to utilise live data from the headset to monitor the patient we ran into some trouble...

Multidisciplinary complement:
Machine Learning based analysis of Happy Height users Neurological Patterns
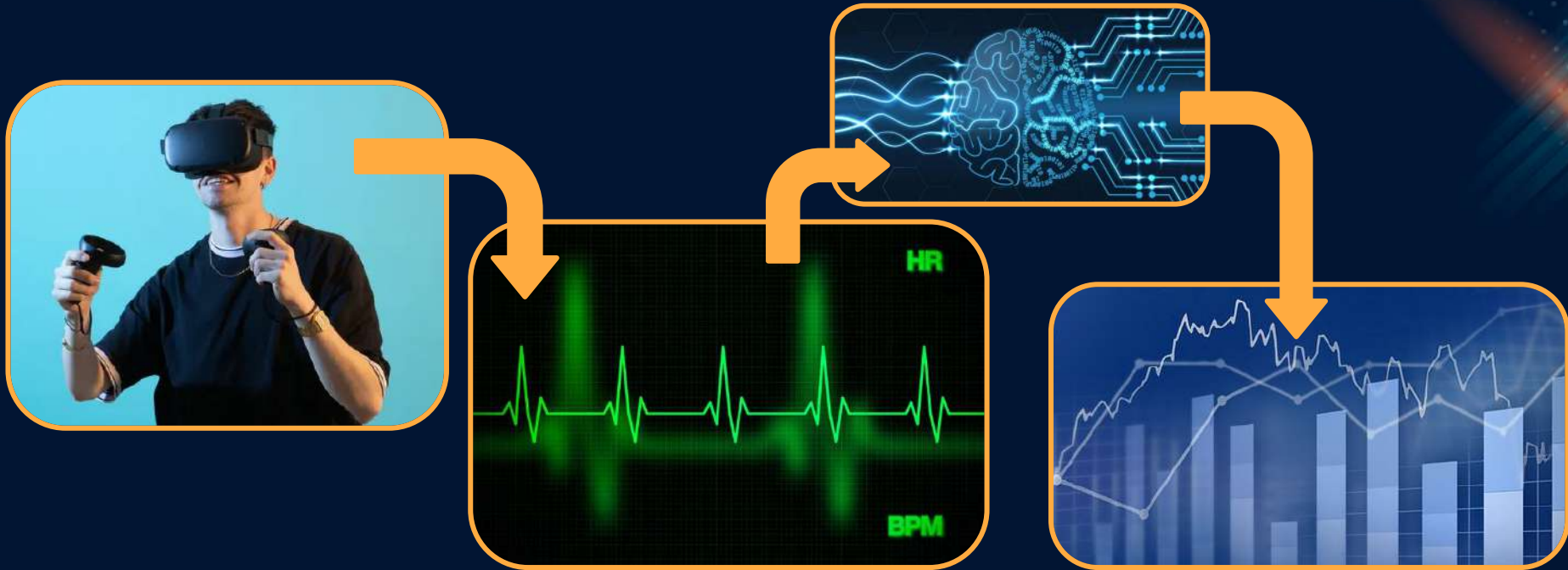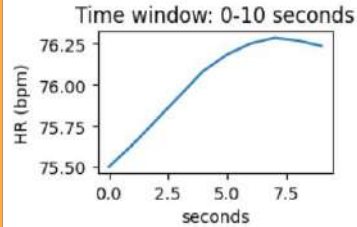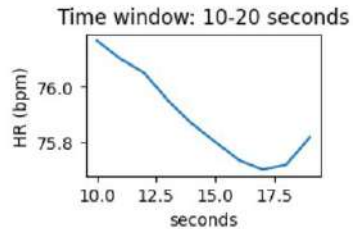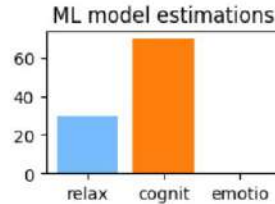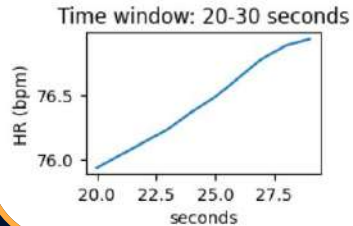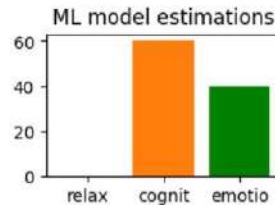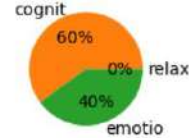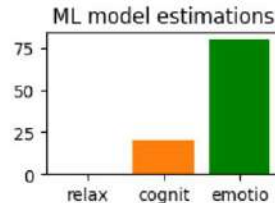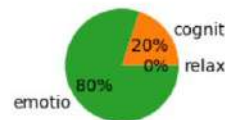
An estimation is made per each 10 seconds of the VR experience

This information will help researchers to understand users' response to the VR app

0.000503 seconds

Approx 0.5 ms (milliseconds)

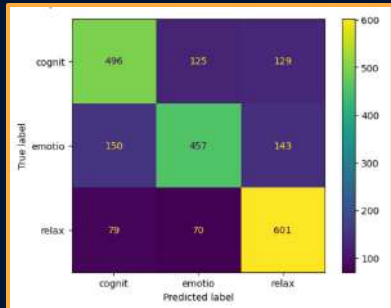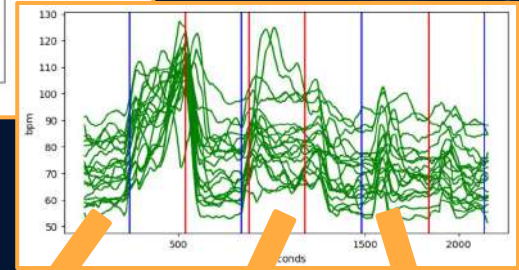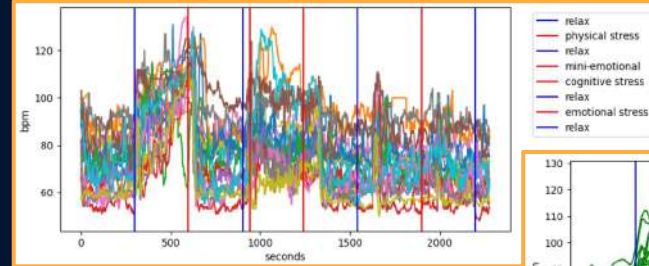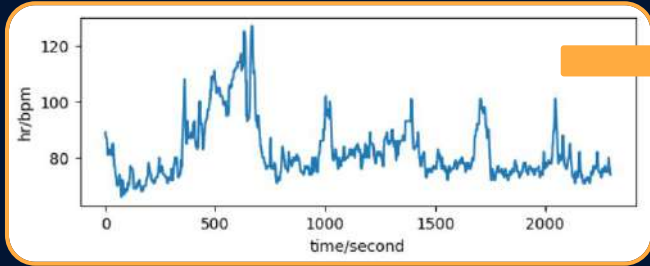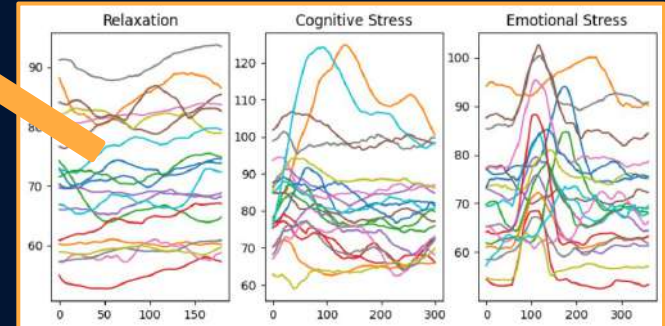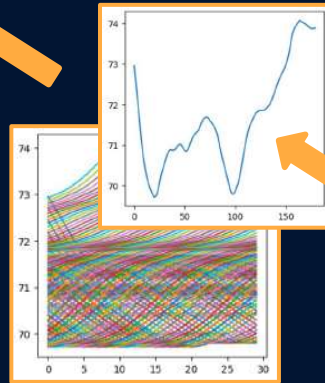Model's (average) execution time

< 50 KB
Hard disk space

The Final Product

See for yourself...

How the model was trained?

Accuracies per class:
Emotional stress = 80%
Cognitive stress = 61%
Relaxation = 66%

Sources

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