Motion Sickness Solutions for Virtual Reality

Group O3

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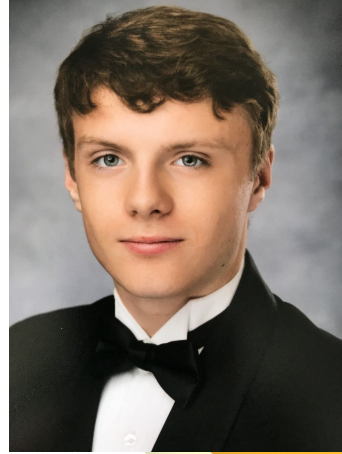Zoe Katz

Meet the Team

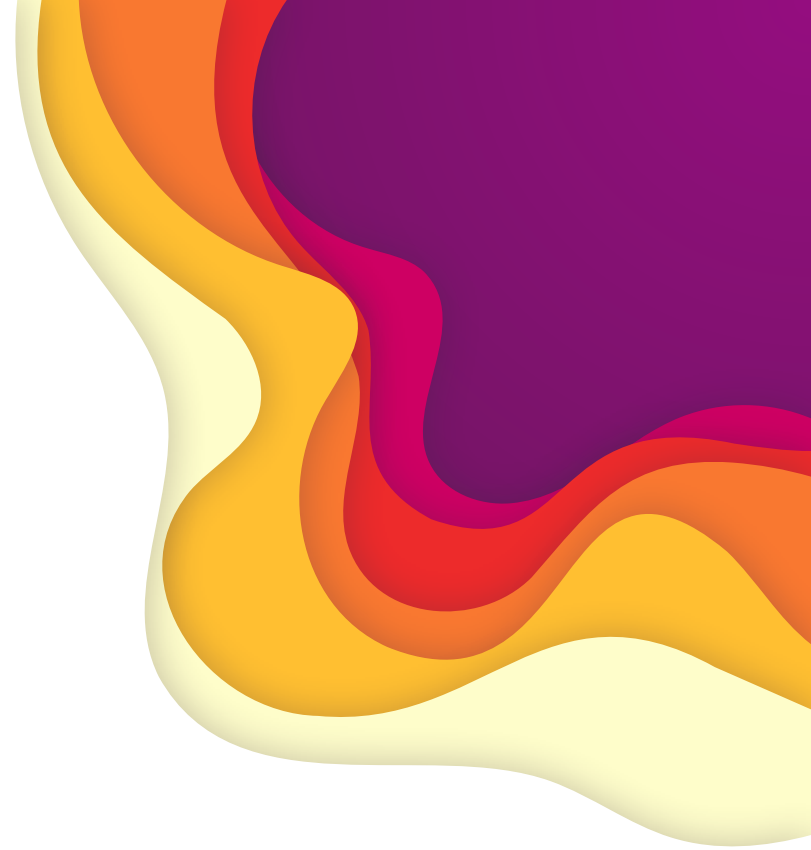Azaria
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Credibility of Presenters Established

- Interviews
  - One person was interviewed
  - Associated with VR
- Sources
  - Found 5 sources
  - We rated them as medium quality
- Observations
  - VR club at Krach
  - HRD virtual lab
  - Gaming lab

GLOBAL CHALLENGE:
Enhancing Virtual Reality

Stakeholders

- The stakeholders for this project are any VR users
- VR users frequently experience cybersickness while using virtual reality systems
- Rationale for why stakeholders were selected
    - These people were associated with VR in some way
    - They will be able to give valuable information about VR so we can implement that knowledge into a final solution to our problem
- **POV Statement:** Frequent VR users need a way to eliminate the "cybersickness" that is associated with using the headset because the side-effects cause its users to feel uncomfortable using VR.

Research

- Articles related to challenge

- Stakeholders and experts interviewed

- Research substantiates the prevalence of the problem
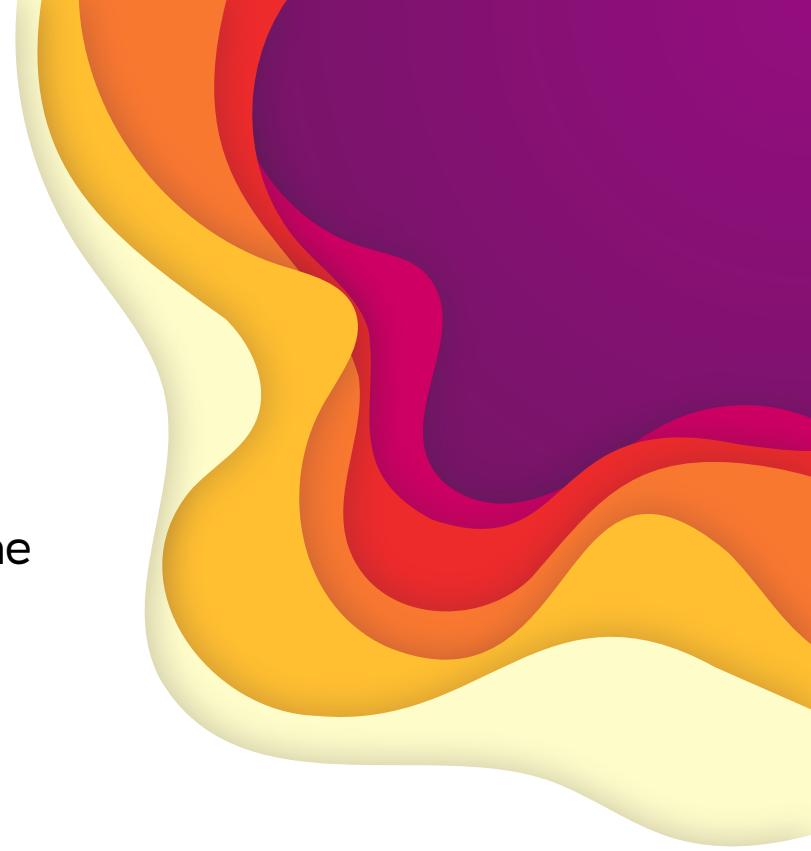
Existing Solutions

Ototech Vibration Device

Strengths:

➡ Effectively reduces VR sickness

Shortcomings:

➡ Product is not integrated with the headset and could get in the way of VR experience
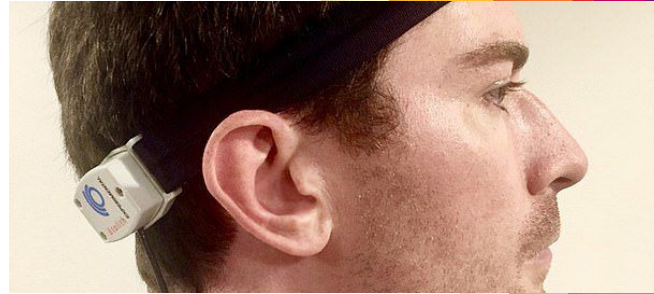
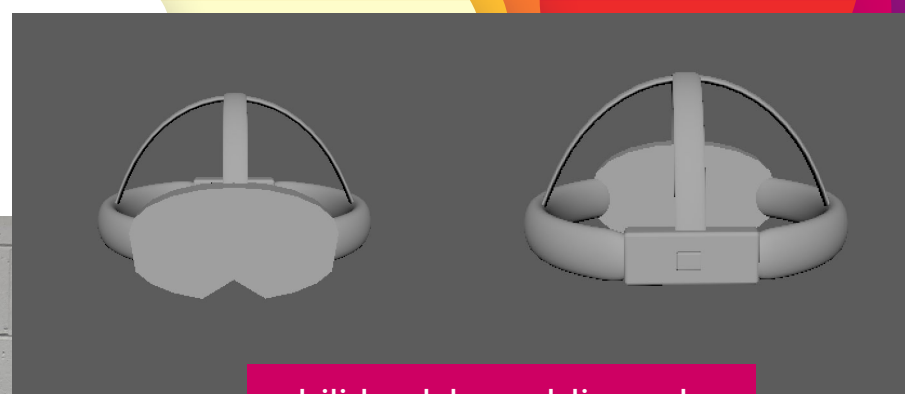## Home Remedies

Strengths:

➡ Home remedies are easily available to everyone

Shortcomings:

➡ Not all home remedies will work; everyone reacts differently

Proposed Solution



Initial prototype solution made using Autodesk Maya

Weights	0.2 (1-5) Easy to implement	X (Y/N) Access to equipment	0.15 (1-5) Cost	X (Y/N) Compatible w/ VR	0.3 (1-5) How well it worked
Dynamic Depth of Field	2 / 0.4	Y	2 / 0.3	Y	4 / 1.2
Vibes	4 / 0.8	Y	3 / 0.45	Y	4 / 1.2
Fan	5 / 1	N	2 / 0.3	N	3 / 0.9
Natural Remedy	5 / 1	Y	3 / 0.45	N	3 / 0.9
Motion Sickness glasses	3 / 0.6	Y	4 / 0.6	N	4 / 1.2

	0.2 (1-5) Comfort	0.15 (1-5) Safety	TOTAL
DoF	3 / 0.6	4 / 0.6	3.1
V	3 / 0.6	5 / 0.75	★ 3.8
F	2 / 0.4	3 / 0.45	3.05
NR	4 / 0.8	3 / 0.45	3.6
G	2 / 0.4	4 / 0.6	3.4

Constraints:
Access to equipment
Compatible with VR

Criteria
Easy to implement (1-5) x 0.2
Cost (1-5) x 0.15
Effectiveness(1-5)x0.3
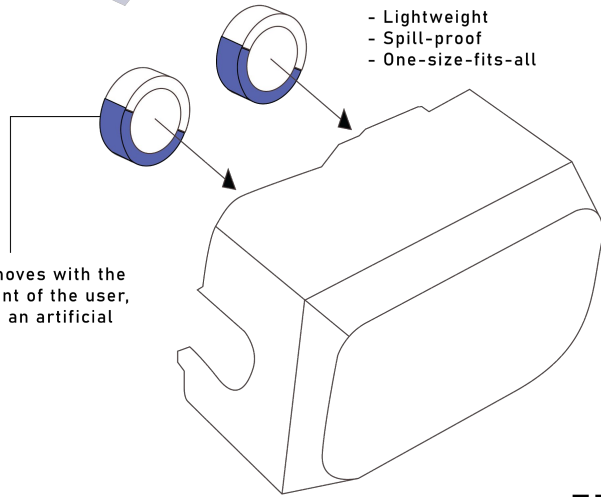Comfort (1-5) x0.2
Safety (1-5) x 0.15

Design Viability
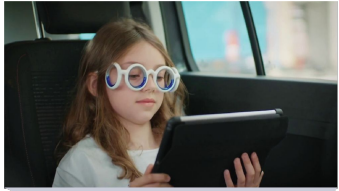
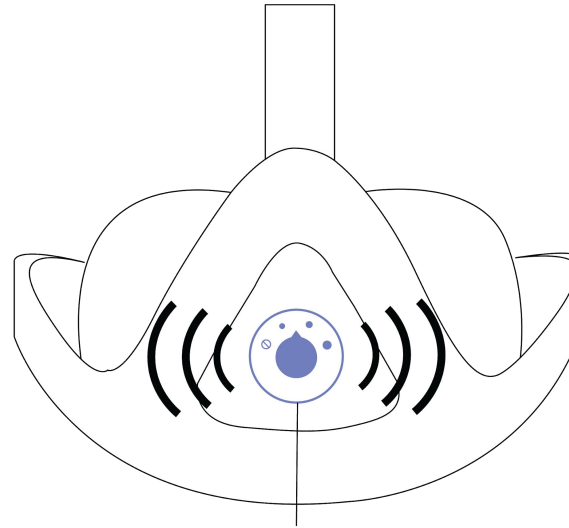Inspired by goggles used to cure people with motion sickness during long car rides

INSERTABLE MOTION SICKNESS GOGGLES FOR THE OCULUS HEADSET

- Lightweight
- Spill-proof
- One-size-fits-all

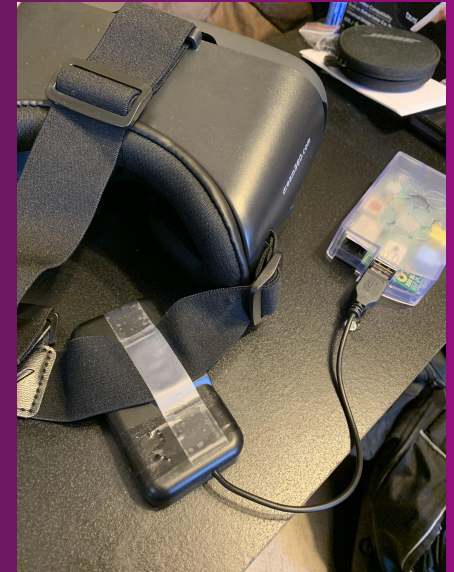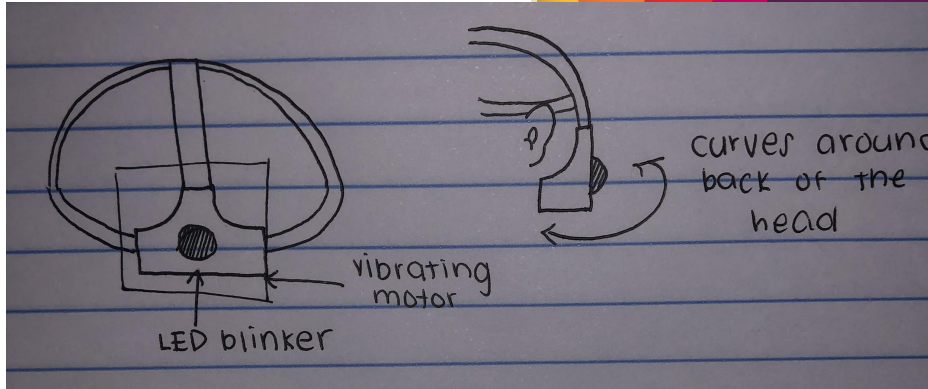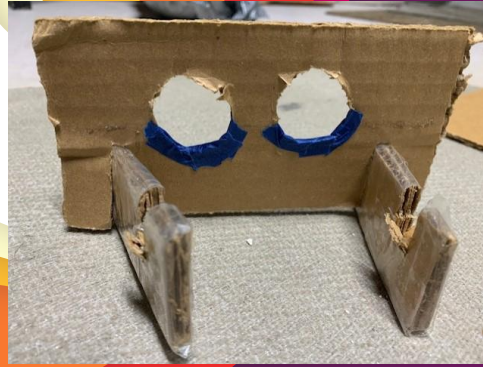Liquid moves with the movement of the user, creating an artificial horizon.

SMALL DISK ATTACHMENT WITH ADJUSTABLE VIBRATION KNOB

Reduces motion sickness by creating the illusion of movement

FRONT

BACK

Functional Prototype

Final Prototype

Testing & Data Collection

- 4 VR videos used for testing
  - Tried to represent every intensity of movement in VR
  - Spacewalk, History of Flight, Rollercoaster, and the Google cardboard demo
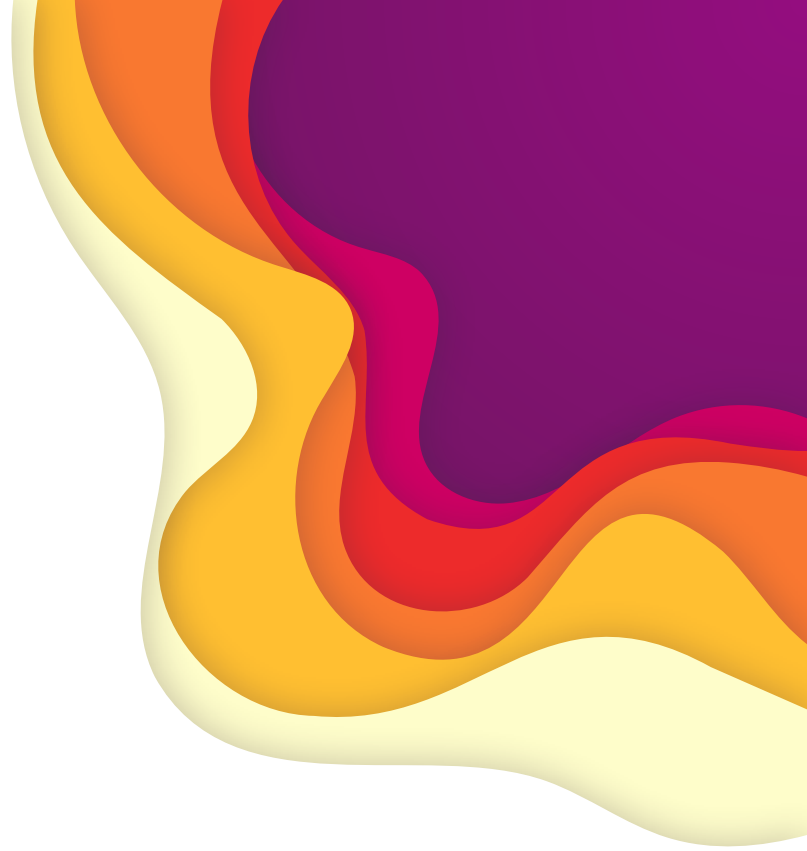
Data Analysis & Implications

VR scenarios→ All started standing except for google cardboard demo	Spacewalk VR video (4:21)	A Brief History of Flight VR video (6:40)	Rollercoaster (~30 s video watched on repeat)	Google cardboard demo (time variable)
Peyton's Dad Control	Finished entire video standing	Finished entire video standing	3:37 felt no ill effects and stopped due to boredom (didn't sit)	2:47 to complete demo
With Prototype	Finished entire video standing	Finished entire video standing	3:21 felt no ill effects and stopped due to boredom (didn't sit)	2:38 to complete demo
Peyton's Mom Control	3:15 to sit Finished entire video	2:55 to sit 4:00 took off due to dizziness	2:00 to sit 4:06 stopped due to dizziness	2:49 to complete demo
With Prototype	3:12 to sit Finished entire video	2:57 to sit 4:15 took off due to dizziness	2:03 to sit 3:56 stopped due to dizziness	2:47 to complete demo
Peyton Control	Finished entire video standing	Finished entire video standing	5:17 felt no ill effects and stopped (didn't sit)	2:45 to complete demo
With Prototype	Finished entire video standing	Finished entire video standing	5:10 felt no ill effects and stopped (didn't sit)	2:36 to complete demo

Next Steps

Credits

Special thanks to all the people who made this project possible:

- Scott Thorne
- Candela Lloret
- Peyton's Parents

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Thank you!