

SHARING IDEAS

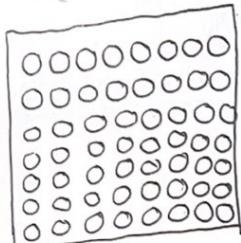
SEMESTER PROJECT 10 + 10

Danh Nguyen

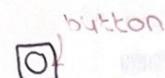
CS 485-3

10-02-24

1 "digital dice"



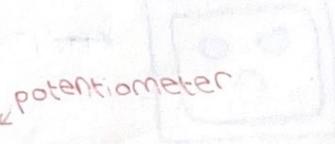
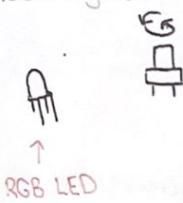
8x8 LED
matrix



button

button press → display random
number 1-6

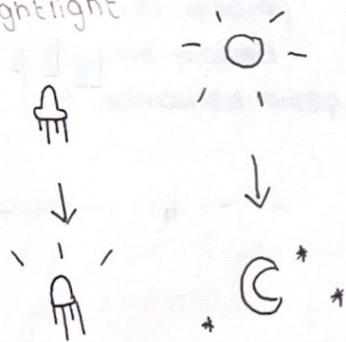
2 "mood light"



turn → change color
gradient manner



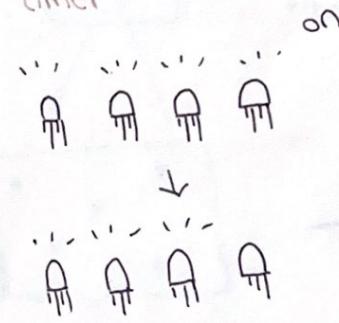
3 "nightlight"



light sensor

turn on if dark

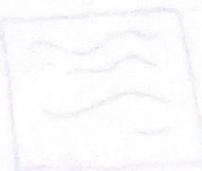
4 "timer"



set timer (~1 min)

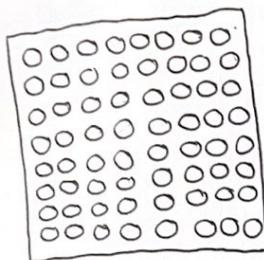
↳ on at start

gradually turn off as a
function of time



off

5 "mini piano"



8x8 LED
matrix

touch sensor → each LED has
different sound ↗ -

- ↳ could make into memory
mini-game
- ↳ i.e. repeat pattern

6 "desk robot companion" *



cycle through moods for the day

- ↳ make display do small activities (play w/ ball, look at sunrise, ...)
- ↳ pixel display
- ↳ time-based
- ↳ scheduled sleep

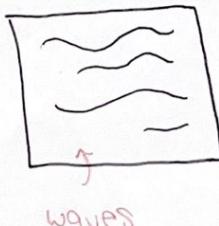
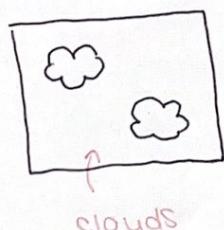
7 "projector" *

mini projector

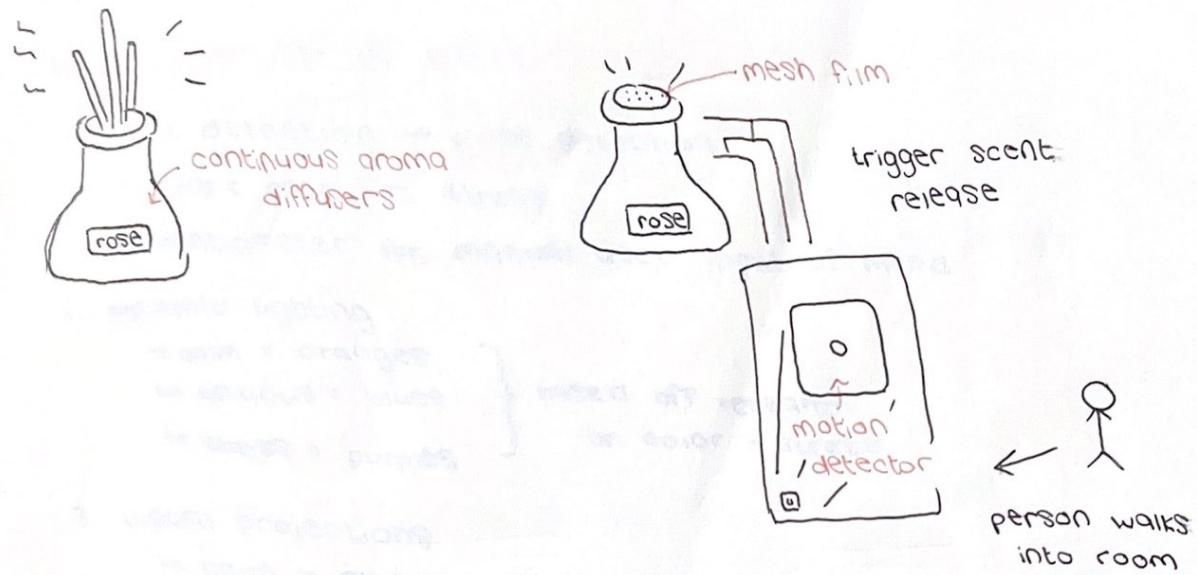


nighttime activation

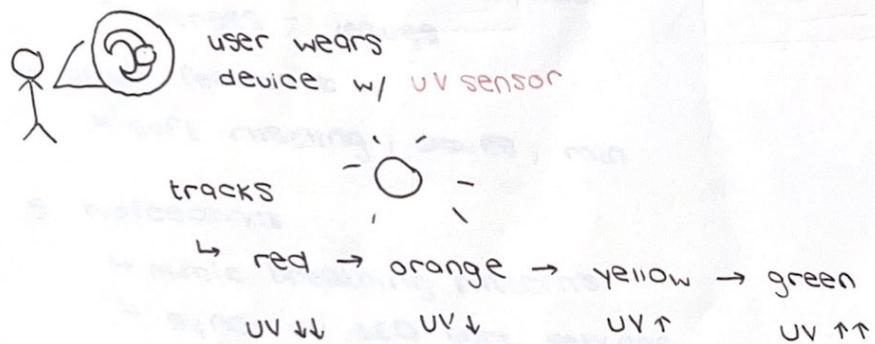
- + heart rate monitor (pulse sensor)
- ↳ mood-based sleep assist



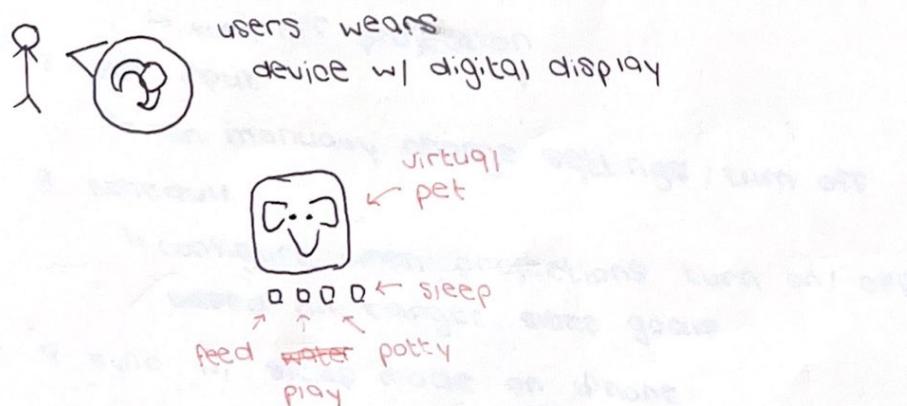
⑧ "automatic aroma diffuser"



⑨ "sunlight tracker"



⑩ "virtual pet"



SLEEP ASSIST SENSOR LIGHT

1. mood detection → pulse detection

↑ heart rate = stress

potentiometer for manual user input of mood

2. dynamic lighting

↳ calm = oranges

↳ anxious = blues

↳ stress = purples

} based off research
on color + stress

3. visual projections

↳ calm = static stars

↳ anxious = waves / clouds

↳ stress = leaves

4. audio feedback

↳ soft rustling / waves / rain

5. biofeedback

↳ mimic breathing patterns

↳ sync w/ LED light settings

6. sleep transition

↳ responsive

↳ fade lights + noises

↳ turn off projection

7. user input

↳ can manually change settings / turn off

8. schedule

↳ configure when projections turn on / off

based on target sleep goals

9. sync w/ sleep mode on iphone

10. ceiling projection for direct access to user visual field in sleep position

V1 | Original

As mental health issues continue to seep into the fabric of our reality, sleep becomes a highly impacted factor which creates a positive feedback loop in that poor sleep quality can perpetuate difficulties in controlling stress and anxiety. CoZ is an intelligent and interactive sleep assistance device curated for the improvement of sleep quality in college students and business professionals. By combining efforts to track your pulse and mood, CoZ can project calming visuals and adjust light settings to moderate your sleeping environment, promoting a personalized experience designed just for you. Whether you are feeling anxious, stressed, or calm, the projector adapts to real-time responses in order to promote relaxation, guiding you through a better sleep experience and building a peaceful journey through the obstacles of everyday life.

V2 | Business Major

Tired of chunky projectors that take up your desk space but still want interesting room decoration? Introducing CoZ, a sleek, tech-forward sleep aid for the modern professional or student seeking to elevate their personal spaces without the sacrifices of physical space. Making the most of virtual projection, CoZ will personalize your experience by providing visuals and ambient lighting to create an ideal sleep environment. By combining efforts to track your pulse and mood, CoZ can project calming visuals and adjust light settings to moderate your sleeping environment, making your space truly yours. Whether for productivity, efficiency, or sleep quality, CoZ offers an automated sleep solution to enhance the quality of life through personal responsiveness and integration techniques.

Peer Details:

- ★ experienced with business proposals and pitches
- ★ knows how to appeal to a broader audience to sell the product
- ★ two years younger than me → will be in college for longer and appeals to benefits for students
- ★ no experience with prolonged poor sleep quality or any sleep conditions

V3 | Psychology Major

As mental health issues continue to seep into the fabric of our reality, sleep becomes a highly impacted factor, implicating stress and anxiety management. CoZ is an intelligent and interactive sleep assistance device curated to enhance sleep quality for college students and business professionals. By seamlessly tracking your pulse and mood, CoZ can project calming visuals and adjust light settings to moderate your sleeping environment, promoting a personalized experience designed just for you. Whether you are feeling anxious, stressed, or calm, the projector adapts to real-time responses to promote relaxation, enhancing emotional well-being and establishing a routine for long-term benefit. As CoZ guides you through the mundane and unknown facets of life, a better sleep experience at the end of each day can help build resilience, making itself an essential companion for the betterment of mental health.

Peer Details:

- ★ experienced with factors that impact sleep quality, especially mental health and emotional well-being
- ★ understands how real-world experiences and environments translate and reflect mental health and psychological state
- ★ conducting research on how environments can be mood modulators
- ★ two years younger than me → will be in college for longer
- ★ no experience with poor sleep quality but is well-versed in different sleep disorders and current methods to alleviate symptoms

J. Baumeister et al., "Augmented Reality as a Countermeasure for Sleep Deprivation," in *IEEE Transactions on Visualization and Computer Graphics*, vol. 22, no. 4, pp. 1396-1405, 21 April 2016, doi: 10.1109/TVCG.2016.2518133

Spatial augmented reality (AR) can be an effective countermeasure for sleep deprivation, alleviating several neurocognitive symptoms associated with sleeplessness. For shift workers whose occupations require unconventional sleep schedules and consistent attentiveness at late hours, maintaining task performance may be a significant point of concern. The integration of spatial AR can help maintain alertness by reducing the "cognitive demand for task completion" (Baumeister et al., 2016). Participants were required to press buttons in numerical order according to instructions shown on either an LCD monitor or a wearable SAR projection device. Those in the LCD monitor groups made a significant number of errors and demonstrated a speed-accuracy tradeoff. Compared with an LCD monitor, participants who used a SAR device to complete the monotonous task exhibited better task performance in terms of both response time and errors. Wearable devices and augmented reality have demonstrated substantial benefits when integrated with mundane tasks that make up the fabric of our reality. The prospect these devices have in the realm of counteracting sleep deprivation may also provide some insight into sleep promotion, though this domain has not been thoroughly investigated.

Bønlykke, S. K., Madsen, K. A., & Jenkins, T. (2024). Taking the bizarre seriously: Dreams as a material for interaction design. *Designing Interactive Systems Conference*, 699-713. <https://doi.org/10.1145/3643834.3661562>

Dreams are a peculiar, subjective phenomenon that epitomizes the distinct sleep behaviors each individual experiences. In a study conducted by Krogh and her colleagues, dreams are an extension of one's sleep behaviors and patterns, though there is a critical disconnect between fantasy and reality. They propose that perhaps by integrating user dreams with AI technologies, people can begin to further understand their dreams, allowing them to be reimagined in the real world. By using an AI image generator to produce physical stickers, a dream trace can be created and shared in both private and personal spaces, allowing user dreams to take tangible form. With this, dreams can become source material for design research. As significant developments in sleep technologies continue to make progress through means of sleep tracking for improved sleep quality, much can be learned about how to optimize sleep by integrating technologies with dreams. An autobiographical study on participants' perceptions of their dreams and what they mean in reality was conducted. Based on user responses, Krogh and her colleagues found that an AI-generated sticker machine was the best medium to integrate dreams with the physical world, creating a connection between the intangible and the tangible. These stickers embellish one's surroundings, augmenting their sleep environments for a greater sense of unity between oneself and both domains of the real and dream world.

Choe, E. K., Consolvo, S., Watson, N. F., & Kientz, J. A. (2011). Opportunities for computing technologies to support healthy sleep behaviors Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 3053-3062. <https://doi.org/10.1145/1978942.1979395>

To properly assess how contemporary technologies can support healthy sleep behaviors, Choe et al. defined and analyzed sleep hygiene practices. Some of which they found included only sleeping as much as needed for proper cognitive function the following day, keeping consistent sleep and wake times, limiting eating and exercising within three hours of bedtime, ridding the sleep environment of light and noises, and so forth. With this extensive list of sleep hygiene practices, they assessed which factors were most important to their study participants in getting quality sleep. Surprisingly, many participants noted that sleeping at controlled temperatures was both an obstacle and benefit to their sleep quality, suggesting that optimal temperatures can be advantageous to an extent but often introduce problems as one's body temperature fluctuates throughout the night. Additionally, the researchers also assessed how current available technologies meet their sleep demands. Many participants appreciated sleep tracking data, means to increase sleep quality, and recommendations for enhanced sleep conditions. However, they noted a remarkable distaste for wearable devices or tools requiring manual input. These kinds of perspectives are valuable in informing product design, ensuring that users can get the best experience tailored to their specific needs.

Ravichandran, R., Sien, S.-W., Patel, S. N., Kientz, J. A., & Pina,

L. R. (2017). Making sense of sleep sensors. Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems, 6864–6875. <https://doi.org/10.1145/3025453.3025557>

Sleep sensing technologies are poorly understood in terms of how they effectively impact sleep behaviors. Commercial sleep technologies are widely available and perform remarkably when it comes to accurate predictions and observations of sleep patterns. However, little is known about how they improve sleep quality. While understanding sleep behaviors and patterns can help a user understand their habits, it does not allow them to make actionable steps to improve their sleep quality. Sleep sensors can increase awareness in prioritizing sleep and promote the development of good sleep hygiene. However, sleep quality is a highly subjective matter and requires a different, more personalized approach to thoroughly address.

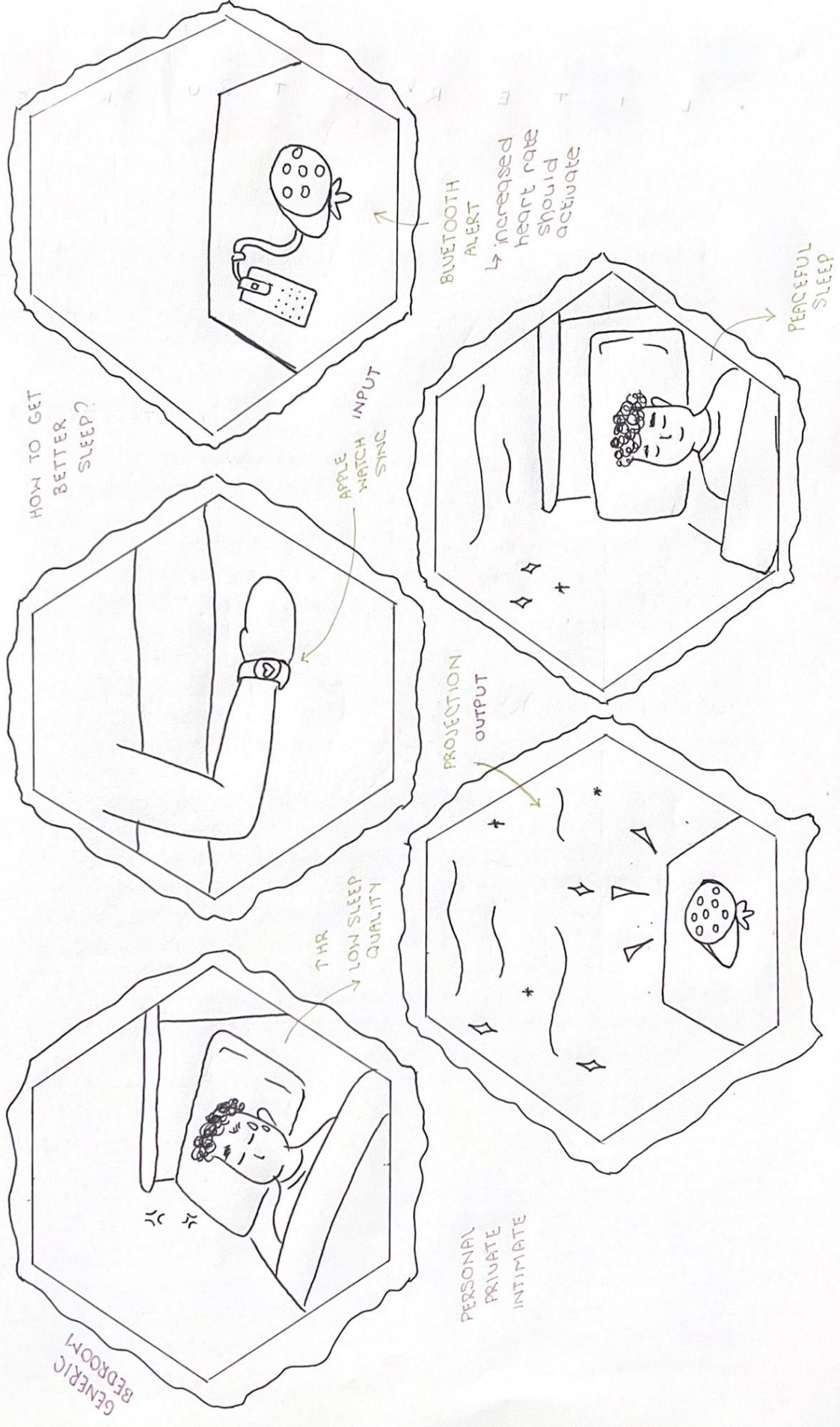
Cláudio, A. P., Carmo, M. B., Pinheiro, T., Esteves, F., & Lopes, E.

(2013). Virtual environment to treat social anxiety. Lecture Notes in Computer Science, 442–451.
https://doi.org/10.1007/978-3-642-39241-2_49

Existing research in cognitive behavioral therapies that integrate VR technology has shown promising results in treating psychological disorders such as social anxiety. By using a VR simulation with an avatar-like audience, therapists can introduce their patients into a public setting and practice social behaviors such as public speaking. With VR technology, they can modify the environment by introducing distractors, more avatars, or changing the environment as a way to increase exposure for their patient. VR therapies can help simulate environments that address underlying neuropsychological issues such as anxiety and depression. With that being said, additional applications for other disorders such as those associated with sleep may be possible.

OANH NGUYEN
CS485-3 FA24
11/13/24

STORYBOARD



FINAL PROJECT

OANH NGUYEN

CS485-3

12/09/24

IDEA: SENSORY AMBIENT LIGHT

↙ pivot

SOUND RESPONSIVE LIGHT PROJECTOR

→ Apple watch & heart rate sensor integration too out of scope for course timeline

ATTACHMENT LENSES FOR PROJECTOR

3D print or ~~laser cut~~

↓
can make
slightly smaller
to fit within
lens divot/
cavity

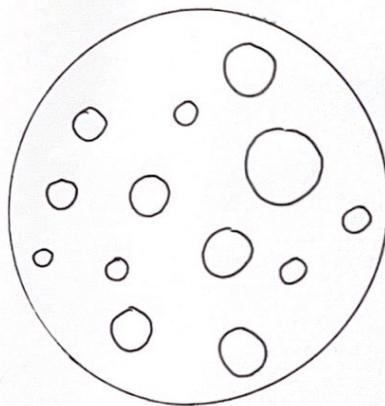
use wood
↳ paper too thin
↳ light bleeds through
acrylic

radius: 3cm

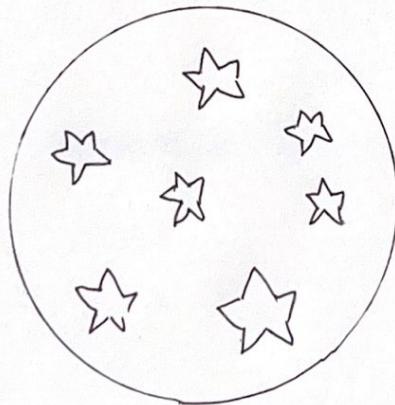
diameter: ~~8.4mm~~ 6cm

NOTE measure projector lens : acquire poster / sticky putty for clean adherence

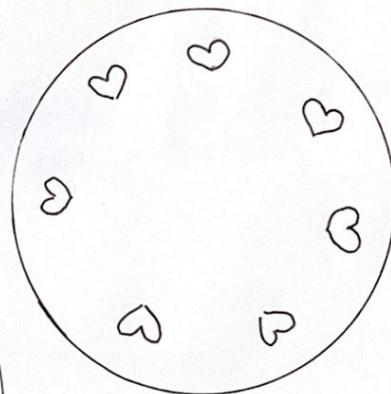
AUTODESK FUSION



simple circle lens

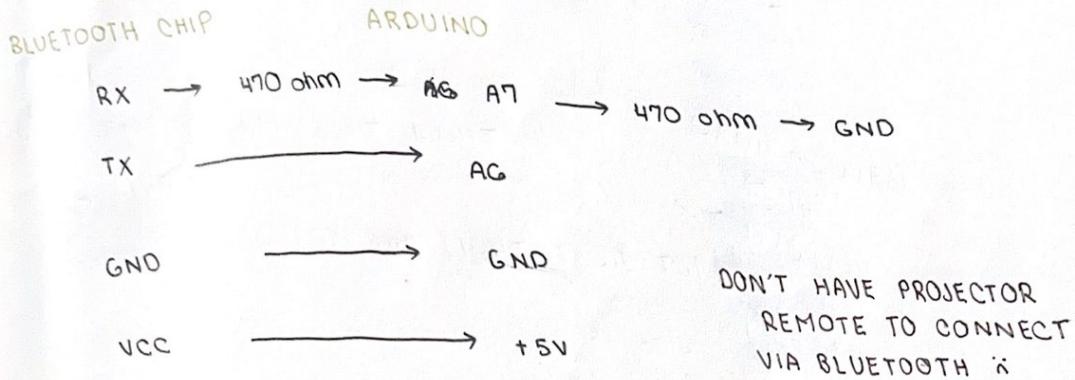


star lens



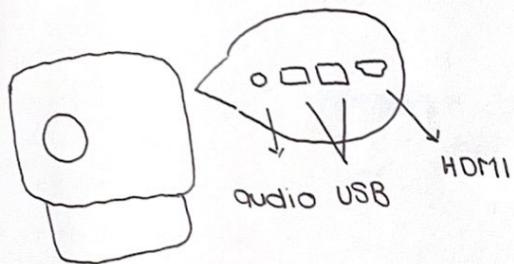
heart lens

BLUETOOTH ARDUINO SETUP



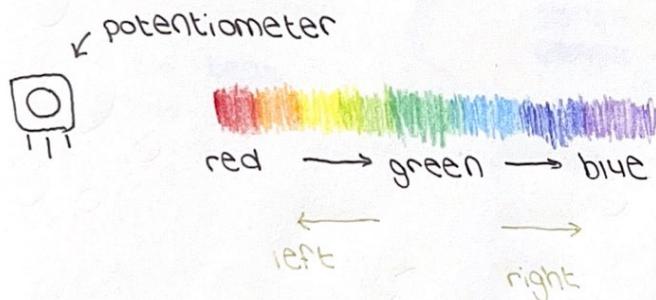
ARDUINO TO HIPPUS MULTIMEDIA PROJECTOR SETUP

↳ connect Arduino Nano to Hippus directly via USB



INTERACTIONS

- button to turn off
- potentiometer for brightness or color manipulation



goes from green → red → blue → green

SONG SAMPLE

Ray Voipe — DROP EM
2:35 — 4:00 min

BEAT MARKERS

163773 flash
164081 flash
164380 flash

163821
164180

163739
164093
164615
167390
167653
168383

171286
171583
171925
4991

174823
175454
175535
177751 — beat
179338 — beat

181224
183261

184925

185000 - 188827 ⁷⁰⁰
rapid flash

188701 - 190³⁸⁹
~~0000~~ extra rapid flash

190390 - 192376 NO LIGHT

192377 — beat

THE HARD BEATS

195796
196324
196773
197313
197941
198345

THE HARD BEATS

195796
196456
196814
197440
197828
198234
198673
199596
200113
200370
200592

207211 laser noises
207211 → rapid fire

chill → 222050

BEATS TO MARK

~54

TIMESTAMPS → LIGHTING EFFECT

447000

165000 - 177607 → basic color/hue change
no effects

177607
179376
181326
183049
184773

} flash + fade

188814 - 190674 → rapid flash

190674 - 192261 → extra rapid flash

192261 → flash

196065 - 235633 → flash at every timestamp

236372 - 236760 → fade out

MANUAL TWEAKS

S1: ✓

S2: ✓

S3: E

S4: E

S5: ✓

S6: ✓

S7: E

POTENTIAL SOLUTIONS FOR MANUAL SYNC

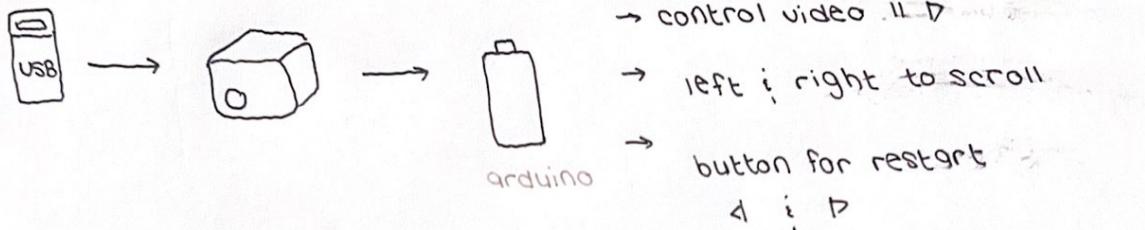
- push to start X
- bluetooth X
- play audio after LED lights up

port: /dev/cu.usbserial-14210

AUDIO VISUALIZER → rave.ajm13.com

ARDUINO AS A REMOTE CONTROL

↳ need an IR led



CANNOT DO

↳ lack of materials &
remote



