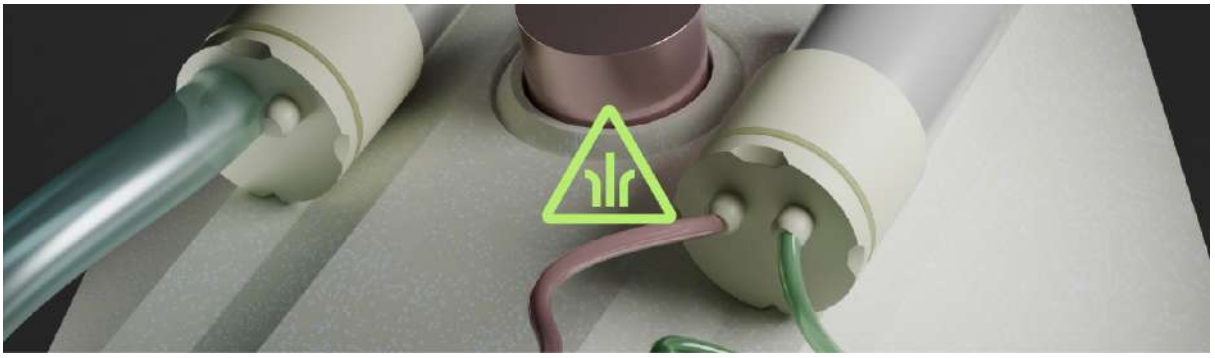


My Second Skin: The exploration on Sensory Reconstruction with the perspective of Posthumanism Arts (Development)

☰ By Category

🤨 Bibliography

🛠️ ToolKit/ Plugins

📺 Video

Expense Tracker

Aa Name	Category	Date
Week 1: Initial Research and Planning1.My design Idea	Rsearch	@July 10, 2024
Week 2-4: Topics and ideas with timeline	Rsearch	@July 18, 2024
Week 5-6: Share my development in the online school in UE/BLENDER Course	Others	@August 15, 2024
Week 6-8: Development of Physical part and Experiment plan	Development	@August 29, 2024
Week 9-11: User Testing and analyze, Promote the device - touch and feeling	Development	@September 12, 2024

Aa Name	Category	Date
Week 12-13: Refinement of Physical Device	Development	@October 3, 2024
Week 14-16: VR Environment Expansion	Development	@October 17, 2024
Week 17-19: Arduino and Unreal Engine 5 Communication	Development	@October 31, 2024
Week 21: Final Adjustments	Showcase	@November 21, 2024
Week 22-23: Project Documentation	Showcase	@November 29, 2024

Week 1: Initial Research and Planning1.My design Idea

Category	Rsearch
Date	@July 10, 2024

Posthuman Kathryn Hales points out that we are posthumans themselves. Even if many individuals in modern society are not fully cyborgs, Haraway(1995) says, "we all live in a Cyborg society. The Cyborgs depicted in the posthuman films have already entered reality and grown into a new type of subject. The body of Cyborg contains the concept of subject from binary opposition to pluralism and integration, and with the deepening of the trend of posthuman turning, the changes of the body and the progress of technology. In science fiction films, posthuman images have gradually formed mature narrative, cultural and aesthetic paradigms, which provide unique samples for us to think about various posthuman phenomena.

In this project, human films and works of art will be studied, and the boundary between life and technology will be discussed on the basis of Cyborg theory and assisted by programming and other technical knowledge. Firstly, this paper retrospects the concept of Cyborg and proposes to create a robot arm with the characteristics of Cyborg through the analysis of artworks starting from the technical conception from a visual perspective, and rethinks the relationship between humans, machines and life in practice.

2.Posthumanism art/ Cyborg arts/humanism

Humanism started in the 15th century as an Enlightenment period that closed the dark period of the Middle Ages, but the origins of the dualist body understanding of humanism go back further and are connected to the soul-body dualism in Antiquity philosophy and the mind-body dualism in Ancient Greece.. In these periods, the mind and soul were considered more important than the body, and human was seen as the measure of the whole universe thanks to his mind.

(Cevizci, 1999). While the Renaissance thinkers of the 15th century defended human will and individuation, the artists of this period such as Leonardo da Vinci and Albrecht Dürer produced works that took the perfection of human as a criterion. The understanding that instrumentalizes the body in these works was combined with the easing of the church's prohibitions on the body in the 16th and 17th centuries, and the body continued to be instrumentalized as an object of surgical examination in science and art.

In the Age of Enlightenment in the 18th century, with thinkers such as Immanuel Kant and John Locke, the mind and human freedom came to the fore, and with the effects of the Industrial and French Revolutions, the Aristocratic Baroque style was abandoned in art, and Neo-Classical works that interpreted the body with the Ancient style of Greek and Roman sculptures were produced. (Gombrich, 2007). Since the 19th and 20th centuries, world wars and industrialization have affected art, and the body has been visualized in avant-garde art with a contrasting aesthetic to the people of the society ruled by the objective reason. While dualities such as beauty and ugliness were overthrown by this counter-aesthetic; black-white, European-African dualities became controversial in the context of the ethnicity of the body as well. While Picasso liberated the female body in his Cubist paintings, artists like Hannah Höch created hybrid bodies with non-human figures in her collages. Dadaist and Surrealist painters also painted surreal, irrational bodies in parallel with the rationality criticisms of thinkers like Adorno. The criticism of the mind and the treat of the body as a phenomenon, which were effective in the second half of the 20th century, also changed the perception of the body in art. With body art and performance art, the body has been interpreted as a self-evident phenomenon that is present there at that moment. Artist Yves Klein used the body as an energy center in his performances; artists such as Nitsch and Burden have explored the limits of the body in their performances. In parallel with the discourses of Poststructuralist and Postmodern thinkers such as Foucault, Baudrillard, Deleuze; the body has been an element of a critical language in the works of artists such as Hamilton, Gilbert & George and Abramovic in the context of consumer culture and the surveillance-control mechanisms of power. (Antmen, 2008)

Posthuman Body as an Interdisciplinary Concept in Today's Contemporary Art

1This is my artistic and academic research documentation on the posthuman subject since 2001 which includes some of my artworks and texts from my PhD thesis entitled with the same topic above.This research process started after I had a surgery on my

https://www.thespace.gallery/post/posthuman-body-as-an-interdisciplinary-concept-in-today-s-contemporary-art

Marcel·lí Antúnez Roca · Home

Marcel·lí Antúnez Roca Web Site

https://marceliantunez.com/

ArtAsiaPacific: Home

Delving into narratives of complex social psychologies across China.

https://artasiapacific.com/

Jeroen van Loon / Cellout.me - Selling my DNA data online.

Cellout.me is an artwork in which Jeroen van Loon offered all his DNA data for sale to investigate data privacy and data ethics.

https://jeroenvanloon.com/cellout-me/

- **Activities:**
  - ☑ ~~Conduct literature review on cyborg art, sensory reconfiguration, and VR technology.~~
  - ☑ ~~Define project scope, goals, and deliverables.~~
  - ☑ ~~Outline research goals for both the physical (device) and virtual (VR scene) components.~~
  - ☑ ~~Begin conceptual sketches for the emotional transmission device.~~
- **Deliverables:**
  - ☑ ~~Research notes and bibliography.~~
  - ☑ ~~Initial project timeline and milestone schedule.~~

😐 Bibliography

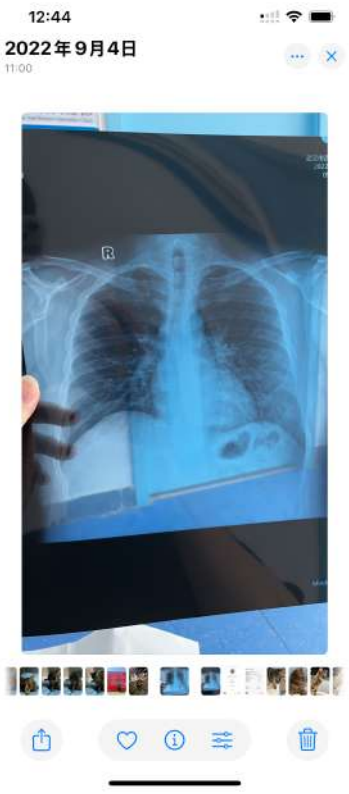
Week 2-4: Topics and ideas with timeline

Category	Rsearch
Date	@July 18, 2024

Motivation

I injured my lung and had surgery. Nearly one year after this, I started to have fun by thinking that I'm a cyborg because the doctors have attached the **syringe** on my body and said to me that I was going to live with these fixtures forever.

When my advisor asked me what I was thinking as a subject for master research; I said that now I am a cyborg and wanted to explore my own species.



Let’s start

The background is based on the art after posthumanism . The cyborg arts.

Posthumanism is a historical and cultural perspective that extends from the present to five centuries ago and to the future. The body is an interdisciplinary concept that transcends the boundaries of this perspective. In this perspective, the body has been the subject of research in disciplines such as biology, anthropology, medicine, sociology and philosophy. However, art has evolved from the classical fine arts to contemporary art. In today's contemporary art, body interpretations have acquired post-humanist layers with new perspectives of digitalization as well as performance art. These layers first emerged with the mechanization of the body by the effects of the Industrial Revolution and the First World War in the art; since the middle of the 20th century, it has been influenced by artistic expressions such as happening and performance and with the development of information technologies until today, it has turned into digital art works.

Projected Research Outcome:

1. An in-depth analysis and study of the theory of cyborgs and how cyborg art in different mediums affects art works.

2.Trying to introduce different sensory perspectives into the creative part, in order to seek more possibilities of art creation and different physical sensations.

Projected Technical Outcome:

#Virtual Part

A combination of visual and auditory perspectives (VR perspectives) are ultimately presented as a physical installation to explore whether Cyborg can expand the possibilities of the senses.

#Physical Part

By using a physical device to stimulate the sense of touch as an interface to connect the body, the link between the person and the virtual world is realized through the sense of touch.

Timeline:

Dates	Project Phase	Description
01 July – 10 July	Research	• Study existing cyborg art pieces • Research films and games like "Cyberpunk 2077" and "Blade Runner," and explore the ethical issues they raise.
11 July – 20 July	Research	• Gather and review literature on cyborg theory, analyze how cyborg art is represented in various media.
21 July – 31 July	Research	• Summarize research findings and compile a theoretical analysis report. • Define the project concept and technical requirements, draft initial designs for both virtual and physical components.
01 Aug – 14 Aug	Concept Development and Prototyping	• Develop an initial prototype for the virtual component, including visual and auditory VR effects.
15 Aug – 31 Aug	Concept Development and Prototyping	• Design an initial prototype for the physical component, focusing on tactile feedback devices and test it!
01 Sep – 14 Sep	Development	• Enhance the VR part, improving visual and auditory effects. • Refine the physical component, optimizing the tactile feedback device.
15 Sep – 30 Sep	Development	• Integrate the virtual and physical components and conduct combined tests. • development and prepare for user experience testing.
01Oct – 10 Oct	User Experience Testing	• Design the user experience testing protocol and recruit participants. • Collect feedback and data.
11 Oct – 20 Oct	Essay Writing	• Analyze user experience testing data and summarize results.
21 Oct – 31 Oct	Essay Writing	• Write and finalize the essay
01 Nov – 07 Nov	Presentation & Exhibiition	• Prepare the final presentation(Power Point, Portfolio, Photography, User data...)

07 Nov – 15 Nov	Presentation & Exhibiition	• Prepare materials and equipment for display • Install and arrange the exhibition

Week 5-6: Share my development in the online school in UE/BLENDER Course

Category	Others
Date	@August 15, 2024

This week, I attended online courses on
Blender and **Unreal Engine (UE)** to deepen my understanding of modeling, animation, and virtual environment creation. Through these lessons, I gained valuable production techniques and applied them to the creation of three short films:

“Fungal World”

- **Inspiration**: Drawing from the unique communication systems of fungal networks, I envisioned a virtual world where social interactions occur through fungal colonies.
- **Production Process**:
  - Designed fungal structures and growth animations in Blender, simulating the expansion and information exchange of fungi.
  - Integrated particle animation systems in UE to represent energy flow and communication signals within the fungal world.
- **Challenges and Gains**:
  - The challenge was to depict the "intelligence" and unique communication methods of fungi.
  - By leveraging UE's blueprint system, I achieved interactive dynamic fungal structures with light effects, blending vitality and mystery.

https://prod-files-secure.s3.us-west-2.amazonaws.com/0287caed-b731-4582-b95f-5ad291c31b25/5d9e983f-8441-48e8-a639-082fdaba09fe/b1451bf29c3763ace4261d9ec6033ddb.mp4

“A Tech Company in a Post-Curiosity World”

- **Inspiration**: This short film explores the role of a tech company in a world where curiosity has ceased to exist, reflecting humanity's exploration of perception and meaning in a post-tech era.
- **Production Process**:
  - Designed a futuristic office and technological devices in Blender.
  - Incorporated interactive virtual screens and particle effects in UE to visualize abstract technological functions.
- **Challenges and Gains**:
  - The biggest challenge was creating a visually cold yet conceptually rich scene.
  - By experimenting with material mapping and lighting, I achieved an immersive environment that aligns with the theme.

https://prod-files-secure.s3.us-west-2.amazonaws.com/0287caed-b731-4582-b95f-5ad291c31b25/c1de3d62-8b0d-4ddc-a3e8-9240da00093a/curiosity_project_(1080p).mp4

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https://prod-files-secure.s3.us-west-2.amazonaws.com/0287caed-b731-4582-b95f-5ad291c31b25/b762ea90-dbd6-4e65-ae6c-6d53efe86f4e/part_2.mp4_(720p).mp4

This week, combining the online courses with personal projects significantly enhanced my skills in **Blender** and **UE**. Especially during the creation of these short films, I learned how to effectively use tools to tell stories and imbue virtual environments with emotion and philosophical depth. While there is still room for improvement in scene optimization and interaction design, these works have boosted my confidence and provided a strong foundation for future development.

Next Week's Plan

- Optimize the short films further by adding more dynamic elements.
- Begin integrating some elements from these scenes into the main VR project.
- Dive deeper into UE’s blueprint system to enhance interactive design capabilities.

Week 6-8: Development of Physical part and Experiment plan

Category	Development
Date	@August 29, 2024

Development record

1. Thesis support(topic about: sensor, cyber art development, posthumanism, feeling promote, touch and feeling...)

Conceptualising touch in VR

> 💡 it identifies how touch 'connection' is **realised** and conceptualised in virtual spaces in order to explore how digital remediation of touch in VR shapes the sociality of touch experiences and touch practices.

CLYNES, M. and KLINE, N. (1960). *Cyborgs and Space.* In: Astronautics. American: Astronautics, pp.26–27.

Gallace, A., & Spence, C. (2010). Touch and the body: The role of the somatosensory cortex in tactile awareness. *Psyche: An Interdisciplinary Journal of Research on Consciousness, 16*(1), 30–40.

Gray C.H (2014). *Cyborg Citizen : Politics in the Posthuman Age*. London: Routledge.

Haraway, D. (1995). *A Cyborg Manifesto.* 3rd ed. London: Penguin, pp.40-15.

Haraway, D. (1991). *Simians, Cyborgs, and Women : the Reinvention of Nature.* New York: Routledge, pp.149–181.

Hertenstein, M.J., Holmes, R., McCullough, M. and Keltner, D. (2009). *The communication of emotion via touch. Emotion,* 9(4), pp.566–573. doi:https://doi.org/10.1037/a0016108.

Ihde, D. (2002). *Bodies in Technology.* Minneapolis: University of Minnesota Press, pp.20–25.

Kärcher, S.M., Fenzlaff, S., Hartmann, D., Nagel, S.K. and König, P. (2012). *Sensory Augmentation for the Blind. Frontiers in Human Neuroscience,* 6(1). doi:https://doi.org/10.3389/fnhum.2012.00037.

STELARC (2017). *Extended Arm.* [online] stelarc.org. Available at: http://stelarc.org/_.php#page/22 [Accessed 20 Nov. 2023].

Wang, M. (2005). *Body, Space and Postmodernity.* JiangSu: Jiangsu People's Publishing House, pp.15–16.

2. The touch and feeling Experiments (some sample)

How to connect the feeling and machine?

https://www.youtube.com/watch?v=CvmE4TZfeuo&t=75s

🤨

whether people can identify emotions from the experience of being touched by a
stranger on the arm (without seeing the touch).

Do a experiment!

Experiment Plan: UNDER PRESSURE (Squeeze)

Experiment context

Using airbags to provide pressure feedback is a unique and effective method. It can create a more realistic tactile experience, especially suitable for simulating sensations like hugging, pushing, pulling, and pressing.

Key Questions for Testing

1. Association Between Emotion and Tactile Intensity

- Which tactile intensity (light, moderate, strong) is most likely to elicit specific emotions? (e.g., does "strong pressure" evoke fear or sadness more effectively?)
- Are participants' emotional responses to the same tactile intensity consistent, or are there individual differences?

2. Emotion and Imagined Scenes

- Do the scenes imagined by participants correspond to their emotions? For example, is fear more often associated with dark, confined spaces, while happiness corresponds to open, bright environments?
- Are certain tactile intensities more likely to trigger specific scene associations?
-

3. Device Comfort and Feedback

- How comfortable is the current tactile device? Are there any points of discomfort or areas for improvement?
- Should additional types of tactile signals (e.g., vibration, temperature) be incorporated?

4. Emotional Associations with Virtual Scenes

- Which scenes do participants believe match the emotions evoked by the tactile device? Do these align with the goals of the virtual scene design?
- Are the imagined scenes associated with specific characteristics (e.g., color, lighting, sound)?

Experiment device

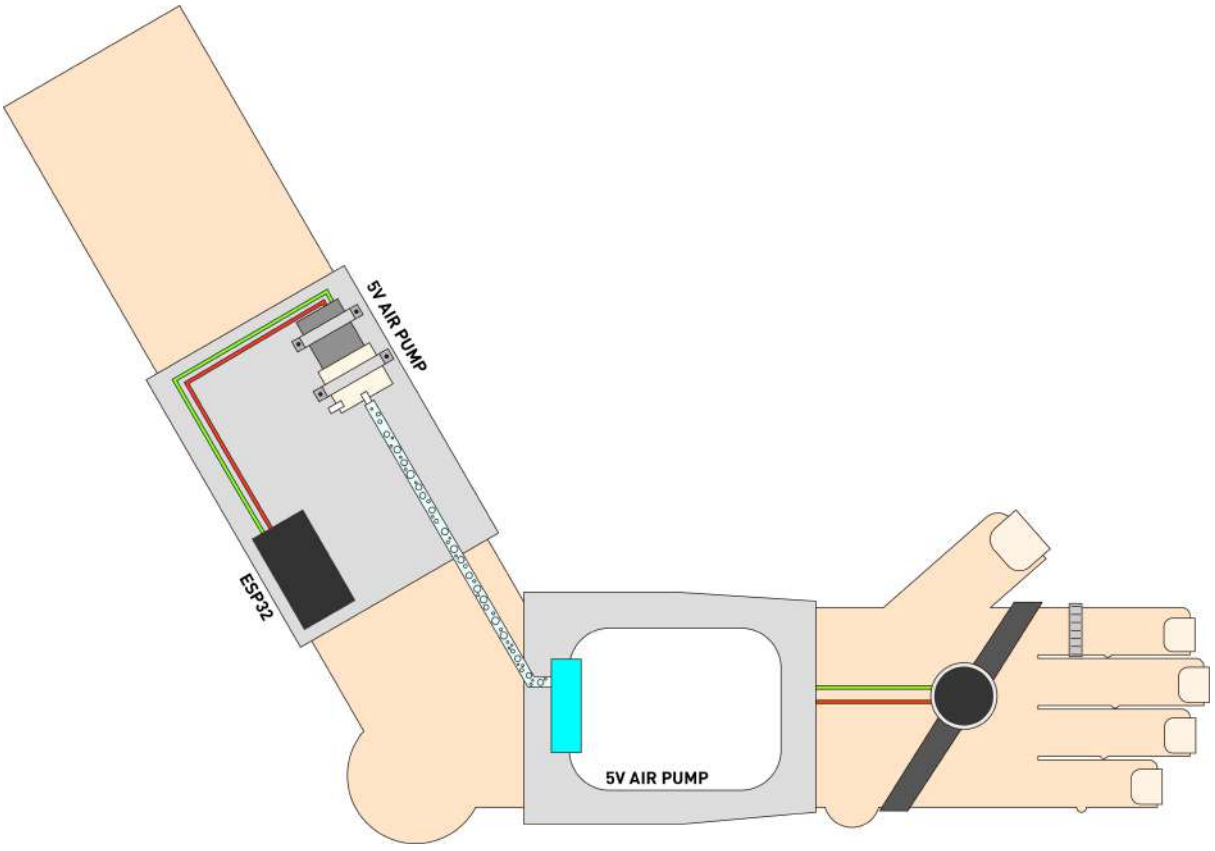
technical data(airbag system)

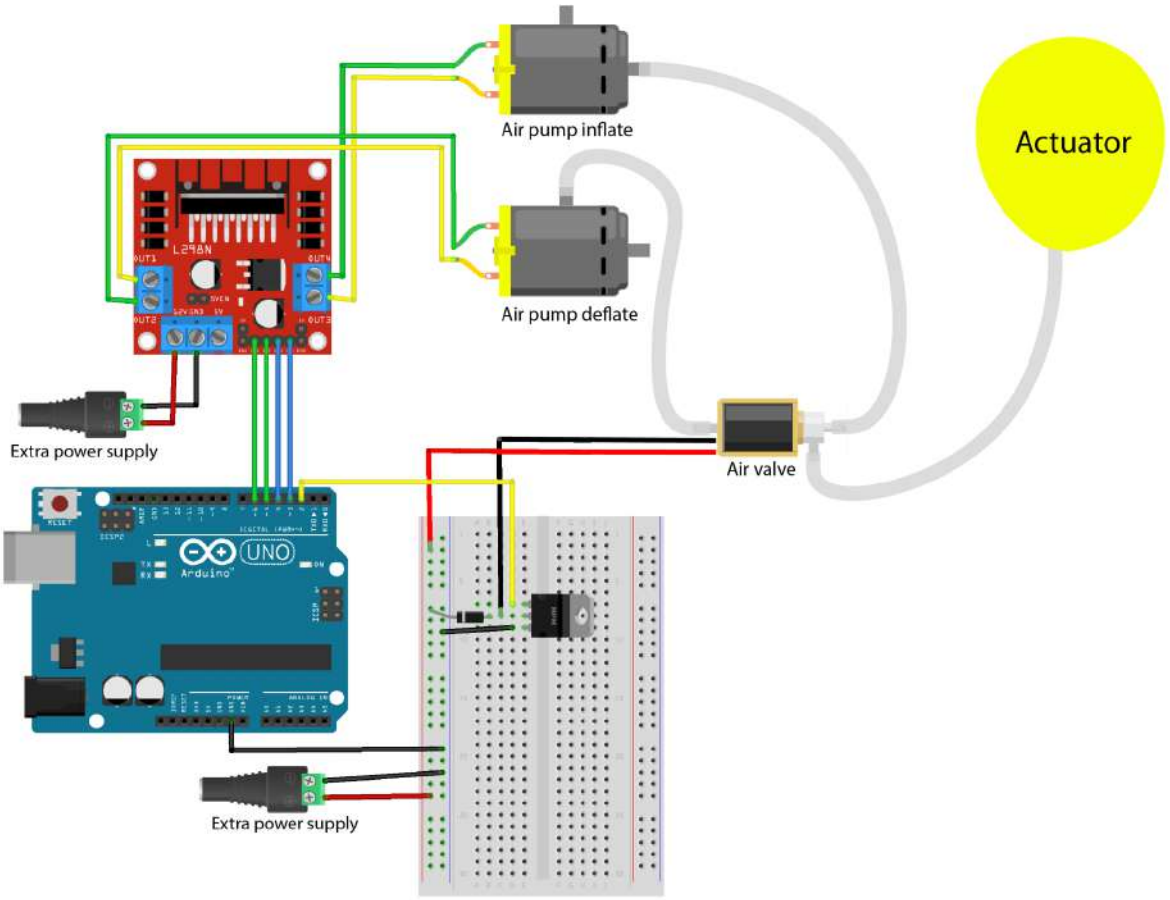
5V Air Pump Guide | Wiki | UAL Creative Computing Institute

We have a number of small 5V air pumps and silicone tubing available for students to borrow for smal...

https://wiki.cci.arts.ac.uk/books/how-to-guides/page/5v-air-pump-guide

Draft Structure





Level

Intensity was defined as follows: (a) light intensity—indentation on the touchee's skin or movement of the touchee's body is not apparent or barely perceptible;

(b) moderate intensity—there is some skin indentation or movement of the touchee's body but not extensive;

(c) strong intensity— indentation on the touchee's skin is fairly deep or movement of the touchee's body is substantial as a result of the pressure or force of the touch.

EMOTION OPTIONAL IS BASED ON EKAMS THEORY OF EMOTION

What is Paul Ekman's theory of emotion?

Paul Ekman theorized that some basic human emotions (happiness/enjoyment, sadness, anger, fear, surprise, disgust and contempt) are innate and shared by everyone, and that they are accompanied across cultures by universal facial expressions.

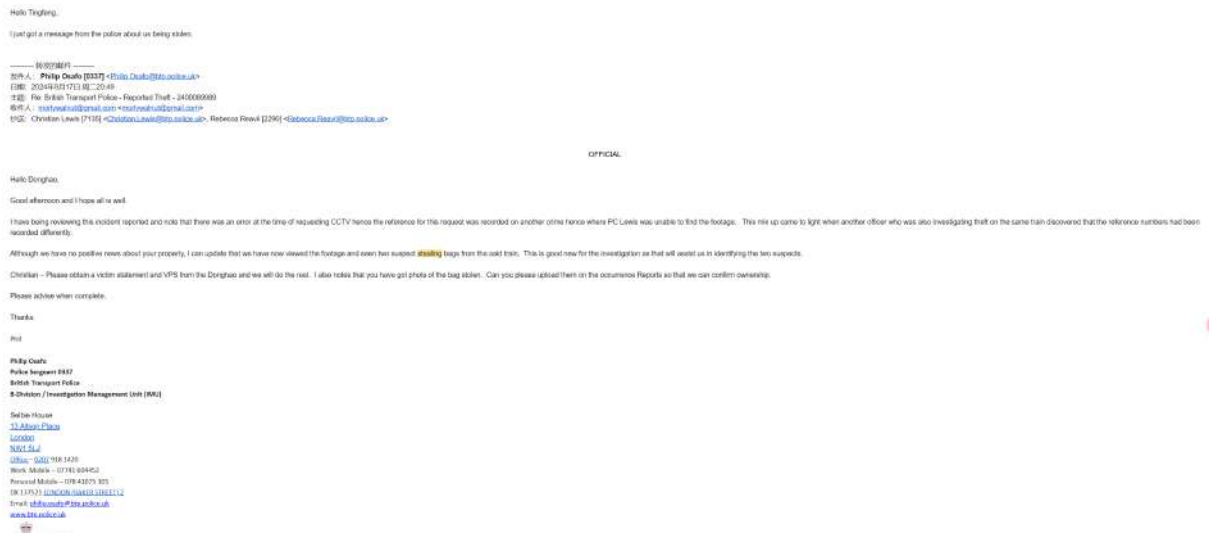
Paul Ekman Group
https://www.paulekman.com › about › paul-ekman

About Paul Ekman | Emotion Psychologist

Week 9-11: User Testing and analyze, Promote the device - touch and feeling

Category	Development
Date	@September 12, 2024

SOMEBODY STOLE MY LAPTOP!!!! I lost my experiment data, i have do a new one!!!!!



Hello Tingfeng,

I just got a message from the police about us being stolen.

---------- 转发的邮件 ----------
发件人： **Philip Ocallo [0337]** <Philip.Ocallo@btp.police.uk>
日期： 2024年9月17日 周二 20:49
主题： Re: British Transport Police - Reported Theft - 240009999
收件人： mattyweiru0@gmail.com <mattyweiru0@gmail.com>
抄送： Christian Lewis [7135] <Christian.Lewis@btp.police.uk>, Rebecca Rewa [2290] <Rebecca.Rewa@btp.police.uk>

OFFICIAL

Hello Donghao,

Good afternoon and I hope all is well.

I have being reviewing this incident reported and note that there was an error at the time of requesting CCTV hence the reference for this request was recorded on another crime hence where PC Lewis was unable to find the footage. This mix up came to light when another officer who was also investigating theft on the same train discovered that the reference numbers had been recorded differently.

Although we have no positive news about your property, I can update that we have now viewed the footage and seen two suspect stealing bags from the said train. This is good new for the investigation as that will assist us in identifying the two suspects.

Christian – Please obtain a victim statement and VPS from the Donghao and we will do the rest. I also notes that you have got photo of the bag stolen. Can you please upload them on the occurrence Reports so that we can confirm ownership.

Please advise when complete.

Thanks

Phil

Philip Ocallo
Police Sergeant 0337
British Transport Police
B-Division / Investigation Management Unit (IMU)

Selbie House
12 Alison Place
London
NW1 5LJ
Office - 020 7918 1420
Work Mobile - 07741 604452
Personal Mobile - 078 43075 955
DK 117571 LONDON 04/03 1382112
Email: philip.ocallo@btp.police.uk
www.btp.police.uk

DATA (5 female, 5 male, 22-27 year)

Aa Charactor	EMOTION	Space u imagine (abstract)	Emotion by urself
1. DONGHAO LIU_MALE_24	a) Disgust b) Happiness (like hug) c) Anger	Space, Forest	Unknow, fear

Aa Charactor	EMOTION	Space u imagine (abstract)	Emotion by urself
2. YALIN CAO_FEMALE_23	a) Surprise b) Fear (under pressure) c) Sadness (more pressure)	Bathroom(taking shower), on the mountain	Happy and warm
3. YUANG XUE_MALE_24	a) Fear (ghost, unknown) b) surprise c) anger	Space station in astronaut	Secret
4. XV_HUANG_MALE_24	a) Surprise b) Happiness c) Fear	lake, swimming	Free, Pride
5. YANRAN WANG_FEMALE_24	a) Disgust b) Sadness c) Disgust	on the top of a building	Fear, under pressure
6. XIANG LI_MALE_24	a) Fear b) Fear c) Happiness	a dark space full of rock	Unknown, fear
7. SHIDI_HU_FEMALE_27	a) Fear b) Fear c) Fear (afraid the pump broken)	in a very small and dark room	Embarrasing
8. SHIHAN SHAO_FEMALE_22	a) Surprise b) Fear c) Disgust	sleeping	Peaceful
9. HAO SUN_MALE_24	a) Happiness b) Fear c) Anger	Backroom, swimming pool	Fear...
10. DIRAN NA_FEMALE_25	a) Surprise b) Happiness c) Fear	Forest, deep and dark, silent.	Peaceful

1. Emotion Distribution by Intensity

- **Key Observations**:

- **Fear** is the most commonly reported emotion across participants and intensities. This indicates that the tactile system, particularly under moderate (b) and strong (c) intensities, effectively elicits fear-related responses.
- **Happiness** and **Surprise** are less frequent but are often associated with lighter intensities or specific tactile contexts (e.g., "hug-like" pressure).
- **Disgust** and **Sadness** are reported less often and primarily under moderate or strong pressure levels.

- **Patterns**:
  - Strong pressure (c) correlates with negative emotions such as **Fear** and **Disgust**, often linked to intense or confined imagined spaces.
  - Lighter pressures (a) are more likely to evoke **Happiness** or neutral emotional responses, suggesting potential for softer tactile cues in less stressful VR contexts.

---

2. Imagined Scene Patterns

- **Trends in Scene Imagination**:
  - Fear-related responses are often associated with **dark, enclosed, or confined spaces**:
    - E.g., "a dark space full of rock" (Xiang Li) and "a very small and dark room" (Shidi Hu).
  - Happiness or warmth is tied to **open, natural, or relaxing spaces**:
    - E.g., "bathroom (taking shower), on the mountain" (Yalin Cao) and "forest, deep and dark, silent" (Diran Na).
  - Surprise tends to evoke more **dynamic or transitional environments**, such as "space station" (Yuanzhe Xue) or "lake, swimming" (Xv Huang).
- **Associations Between Emotion and Scene**:
  - **Fear**: Confined, dark, or isolated spaces.
  - **Happiness**: Open, bright, or natural environments.
  - **Disgust/Sadness**: Often tied to situations involving a sense of discomfort or imbalance, like "on the top of a building" (Yanran Wang).

---

3. Participant Variability

- **Gender-based Trends**:
  - Male participants often associate tactile responses with **abstract or external environments**:
    - E.g., "space station in astronaut" (Yuanzhe Xue) and "a dark space full of rock" (Xiang Li).
  - Female participants tend to associate tactile stimuli with **personal or confined spaces**:
    - E.g., "bathroom, taking shower" (Yalin Cao) and "a very small and dark room" (Shidi Hu).
- **Unique Responses**:
  - Participants like Hao Sun and Xv Huang noted more **positive emotions** (e.g., Happiness, Free, Pride), showing potential variability in individual sensitivity to tactile intensity.

---

4. Implications for VR Scene Design

- **Scene Inspiration**:
  - **Confined, dark spaces (e.g., small rooms, dark caves) are strongly tied to fear, which aligns well with intense tactile stimuli. These can inform the design of hallways, dark alleys, or isolated rooms in VR.**
  - **Open, natural scenes (e.g., forests, mountains) work well for lighter tactile stimuli, suggesting potential for calming or exploratory VR environments.**
  - **Dynamic environments (e.g., swimming pools, space stations) could align with surprise-based scenarios, creating transitions or unexpected interactions.**
- **Diverse Emotional Representation**:
  - The findings suggest a range of VR scenes should be designed to reflect the diversity of participant responses:
    - Fear-dominated environments for high-intensity pressure.
    - Relaxing, open environments for low-intensity pressure.
    - Transitional, dynamic spaces for surprise or exploratory states.

5. Device Feedback and Improvement Suggestions

- Several participants mentioned discomfort or anxiety related to the strong pressure, such as "fear (afraid the pump broken)" (Shidi Hu). This highlights the importance of ensuring safety and comfort in future iterations.
- Feedback suggests:
  - **Making the device more wearable (e.g., sleeve design).**
  - **Adding variety in tactile signals (e.g., vibration or pulsing).**
  - **Synchronizing tactile feedback more seamlessly with VR events for better immersion.**

Conclusion

The data provides clear insights into how tactile feedback correlates with emotions and imagined scenes, offering valuable guidance for both VR scene design and device refinement. Here's how the results can guide the next steps:

1. **VR Scene Design**: Focus on developing a range of environments:
   - Confined, dark spaces for fear-inducing scenarios.
   - Open, calming spaces for lighter emotional tones.
   - Dynamic spaces for exploratory and transitional moments.
2. **Device Refinement**:
   - Prioritize comfort and wearability.
   - Integrate additional feedback mechanisms like vibration or temperature.
   - Ensure consistent and safe operation to reduce participant anxiety.

Based on the analysis of tactile feedback testing and the requirements for integrating the physical device with VR environments, ESP32 is an ideal choice for the following reasons:

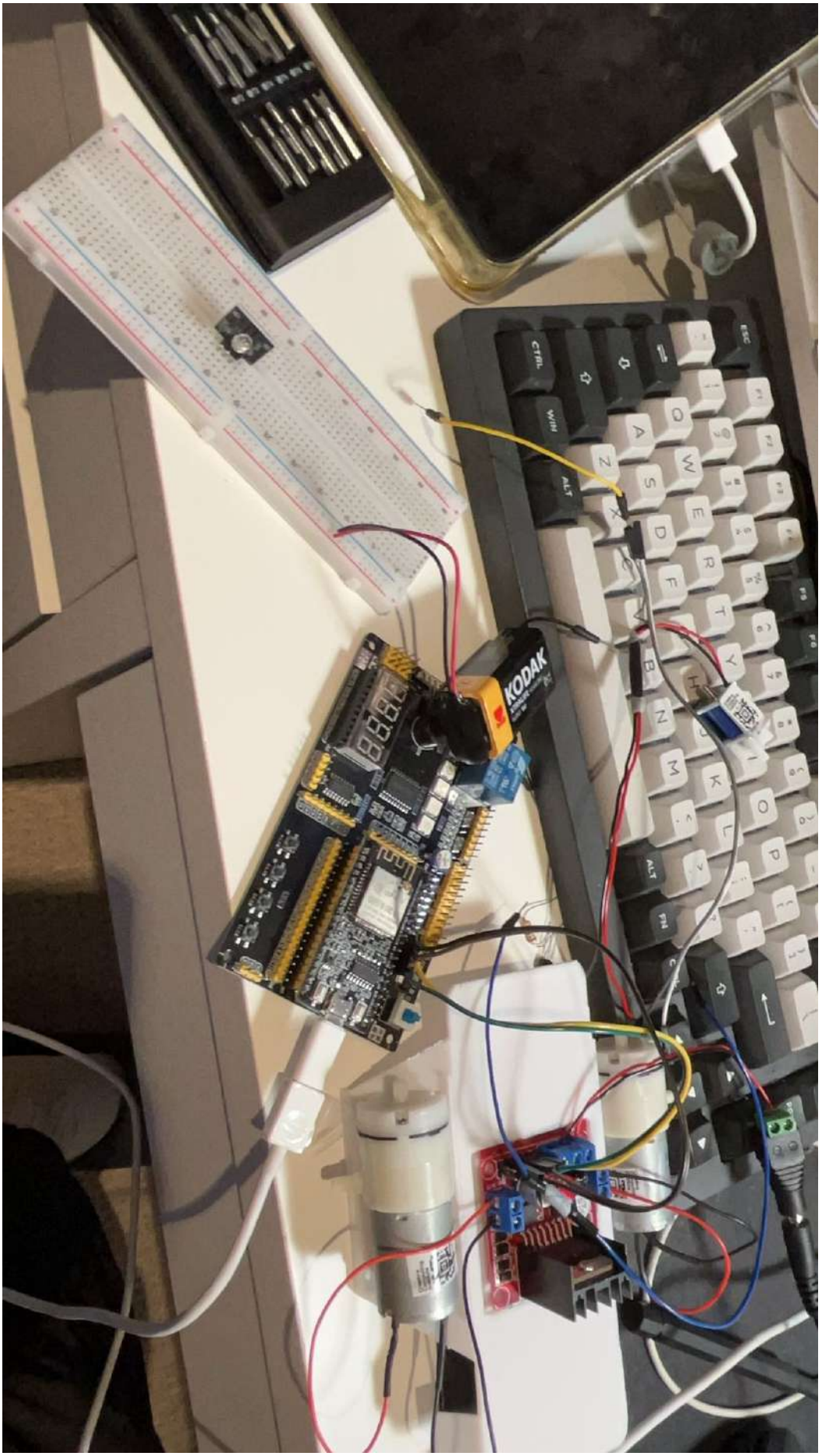
1. Wireless Connectivity for Real-Time Interaction

- **Requirement**: The tactile device needs to synchronize with VR scenes in real time, requiring a reliable wireless connection.

- **ESP32 Advantage**:
    - Integrated **Wi-Fi** and **Bluetooth** modules allow seamless wireless communication with VR systems, such as Unreal Engine or other control devices.
    - Supports **BLE (Bluetooth Low Energy)**, which is ideal for low-latency interactions needed in immersive VR gaming.

2. Compact and Wearable Design

- **Requirement**: The tactile device needs to be lightweight and compact for wearable integration.
- **ESP32 Advantage**:
    - Small form factor and low power consumption make it suitable for embedding in a wearable design like a sleeve or armband.
    - Supports battery-powered operation, ensuring portability.


KODAK

Device Promoting ...

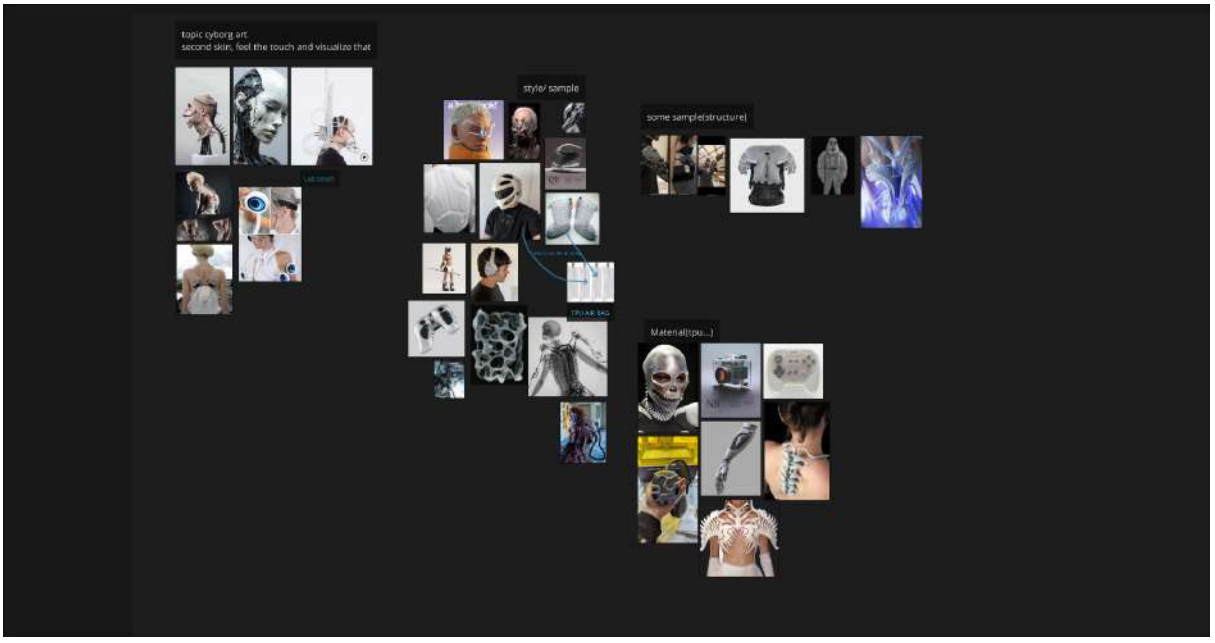
comfusing...

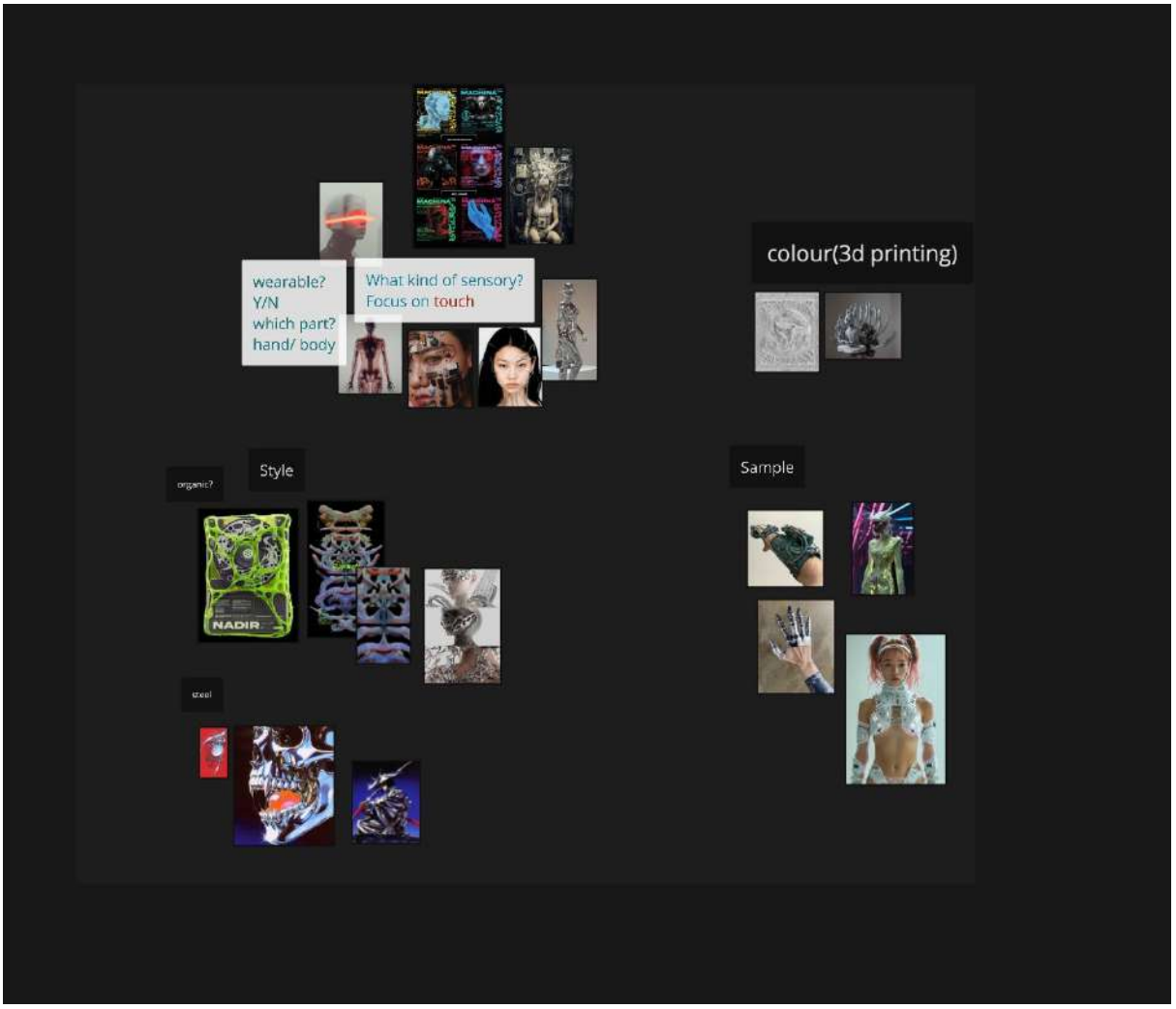
Week 12-13: Refinement of Physical Device

Category	Development
Date	@October 3, 2024

Physical Device development record

The physical component of this project focuses on designing a wearable tactile feedback device to deliver precise and adjustable pressure levels for emotional interaction in VR environments. Here is an account of the progress and challenges encountered during this week's development (**This is my first time to make my imagination come true.**):





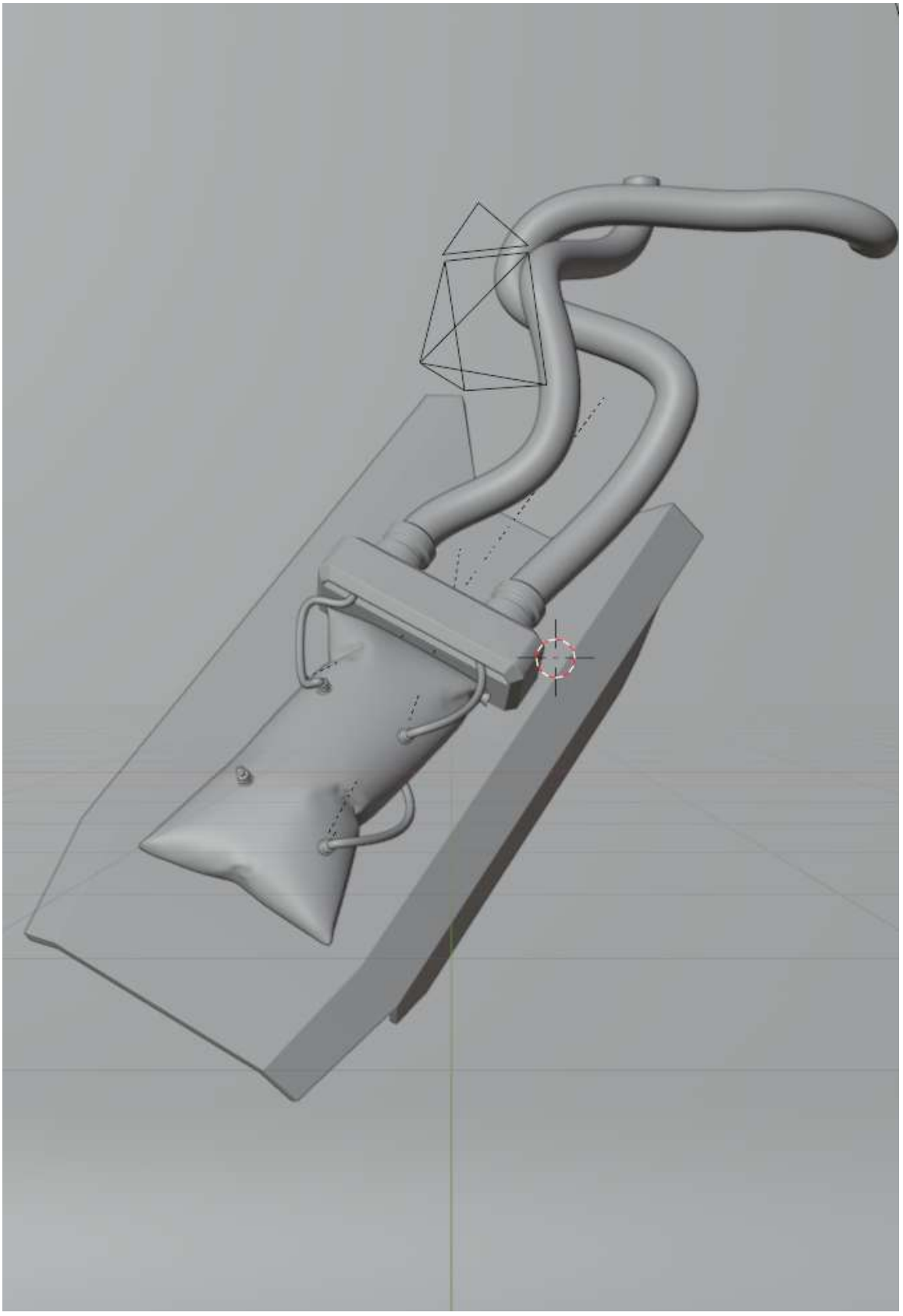
Make a collection in pureRef (Recommand! This is a nice software to create reference for 3d model artist)

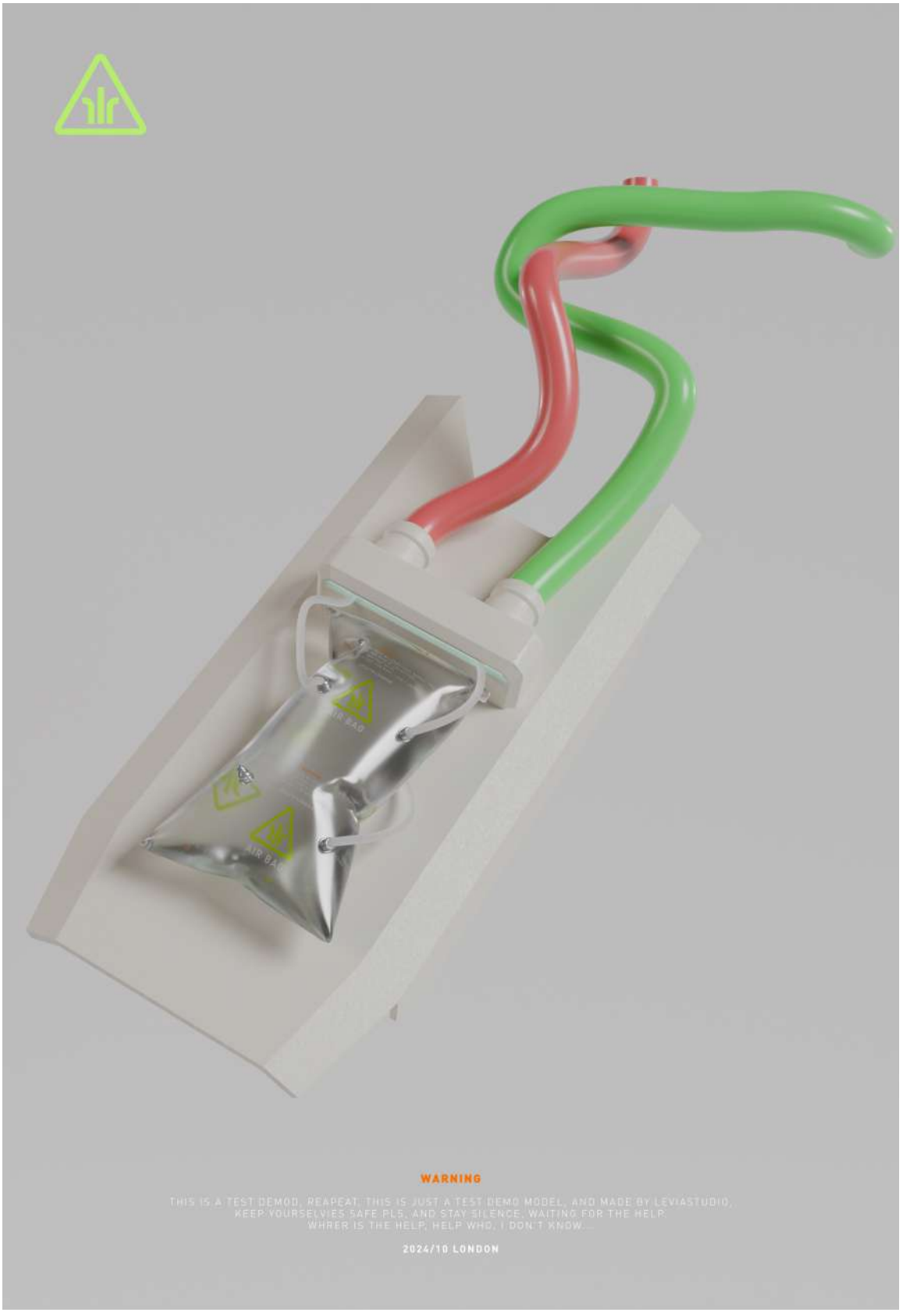
Step 1: Initial Design in Blender

- **Objective**: Create a conceptual model of the wearable airbag system in Blender to visualize its structure and functionality.
- **Details**:
  - Designed a sleeve-like wearable device that incorporates the airbag mechanism.
  - Focused on ensuring the device's structure would allow easy integration of tactile components (e.g., air pumps, valves, and ESP32 chip).
  - Visualized key components such as:
    - **Airbag placement**: Evenly distributed pressure points on the arm.

        - **Device enclosure**: Designed to secure electronic components while minimizing bulkiness.
    - Generated realistic renders to validate aesthetics and functional assumptions.

Demo 01 light




WARNING
THIS IS A TEST DEMOD, REAPEAT, THIS IS JUST A TEST DEMO MODEL, AND MADE BY LEVIASTUDIO,
KEEP YOURSELVIES SAFE PLS, AND STAY SILENCE, WAITING FOR THE HELP.
WHRER IS THE HELP, HELP WHO, I DON'T KNOW...
2024/10 LONDON


WARNING
AND MADE BY LEVIASTUDIO, REPEAT, THIS
AND MADE BY LEVIASTUDIO...
AND KEEP QUITE...
OR THAT, FOR WHAT, I DON'T KNOW
2024/10 LONDON
AIR BAG
WARNING
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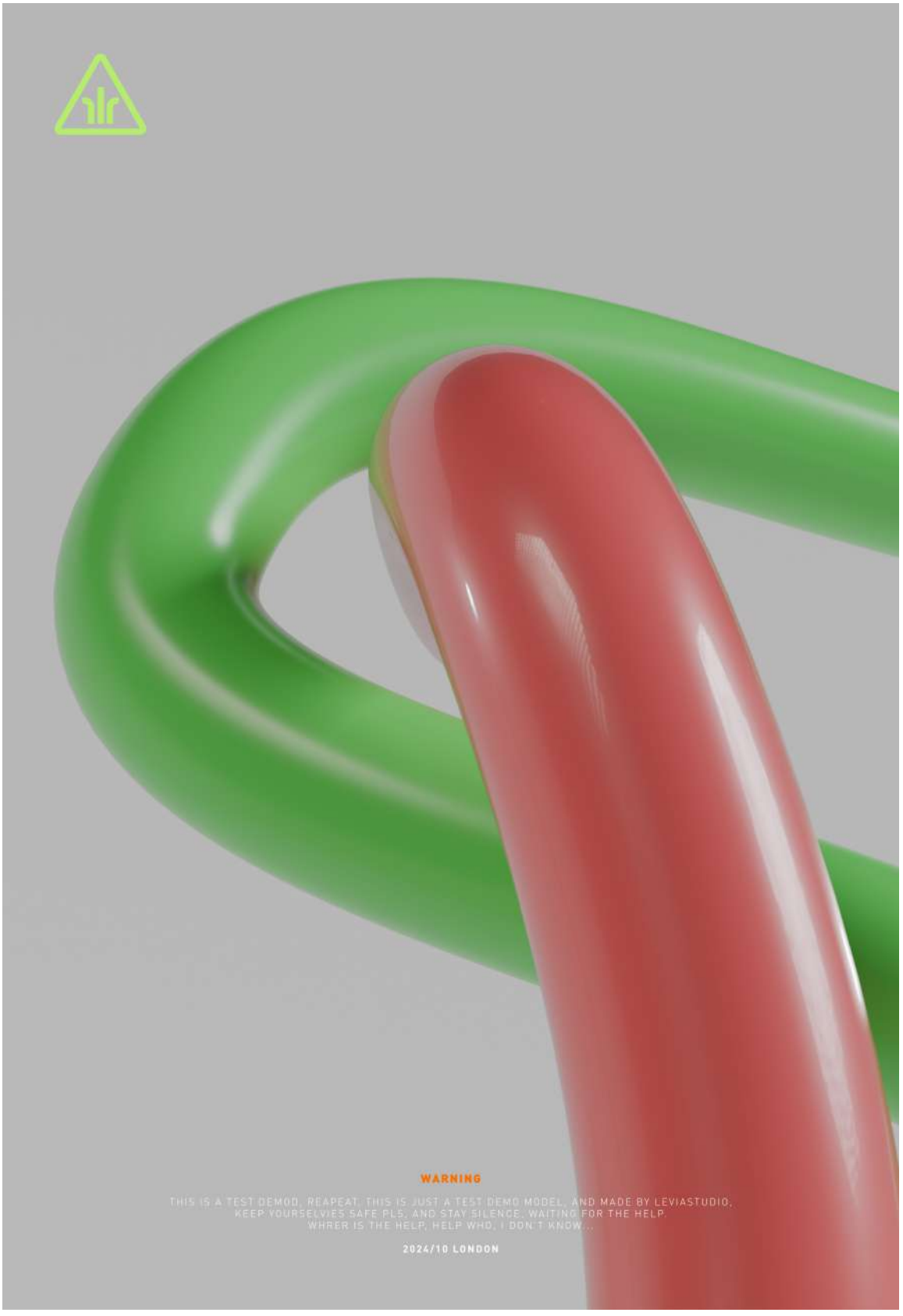
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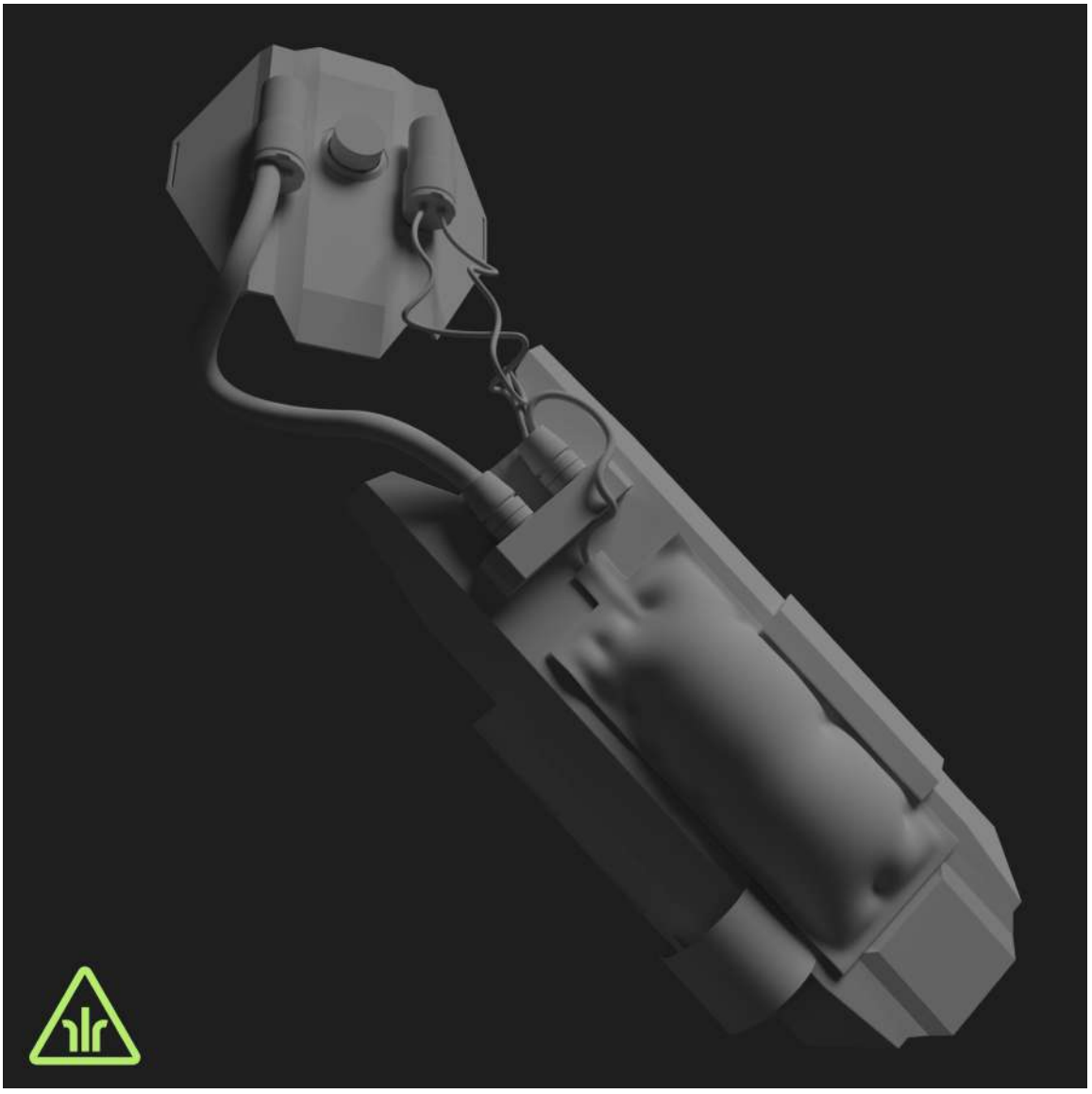
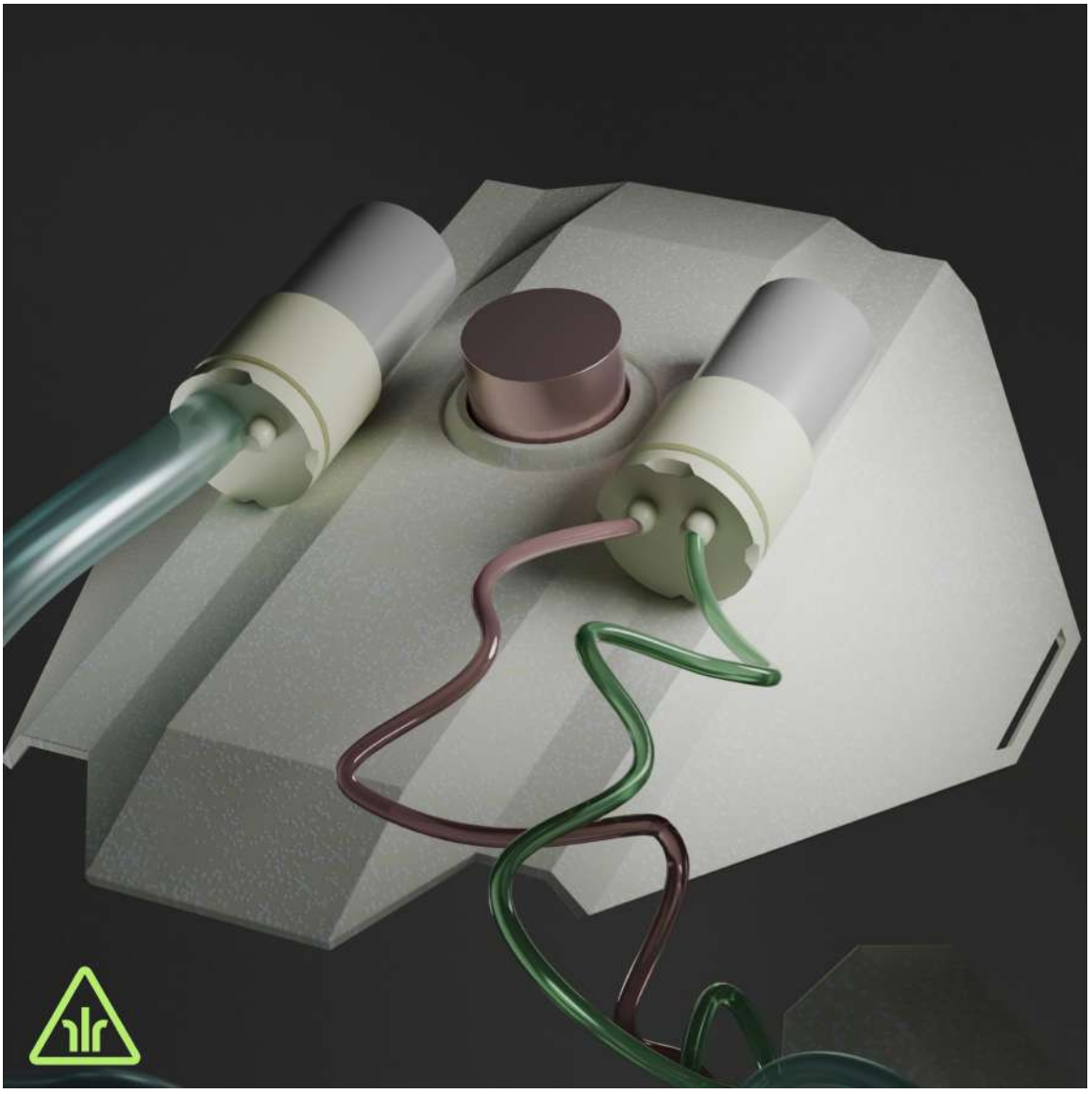
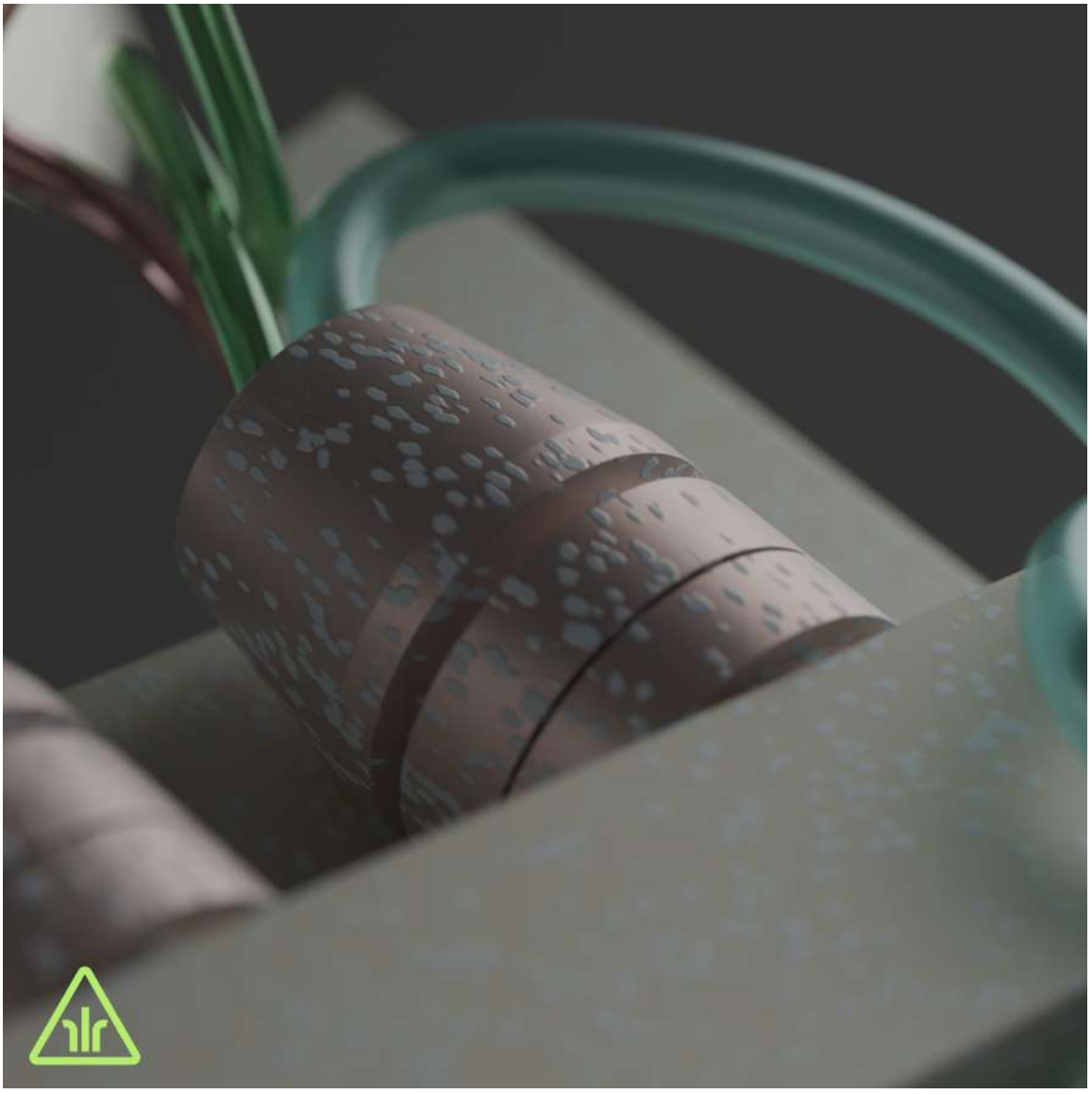
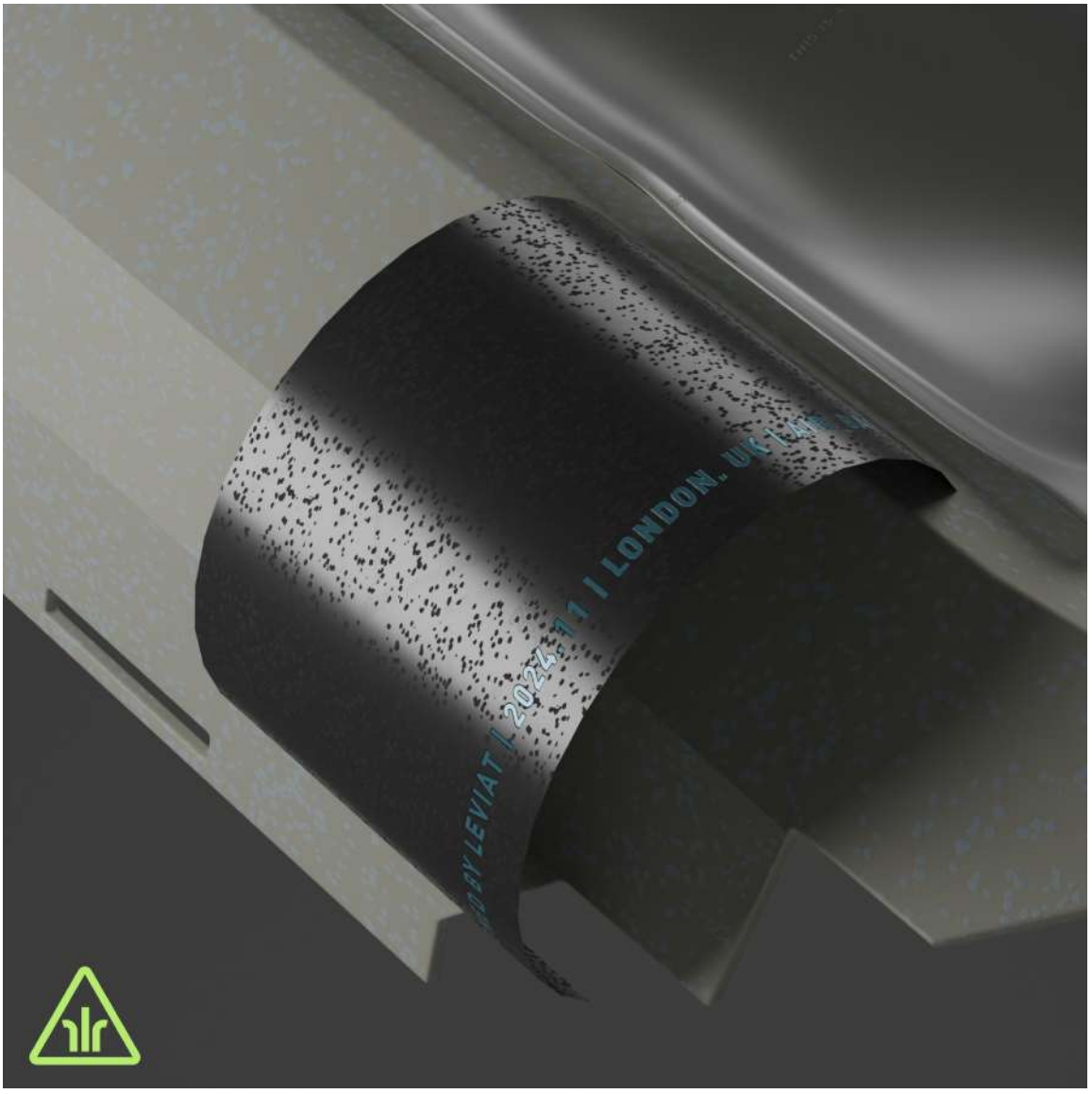
Demo 02 Night




AIR BAG





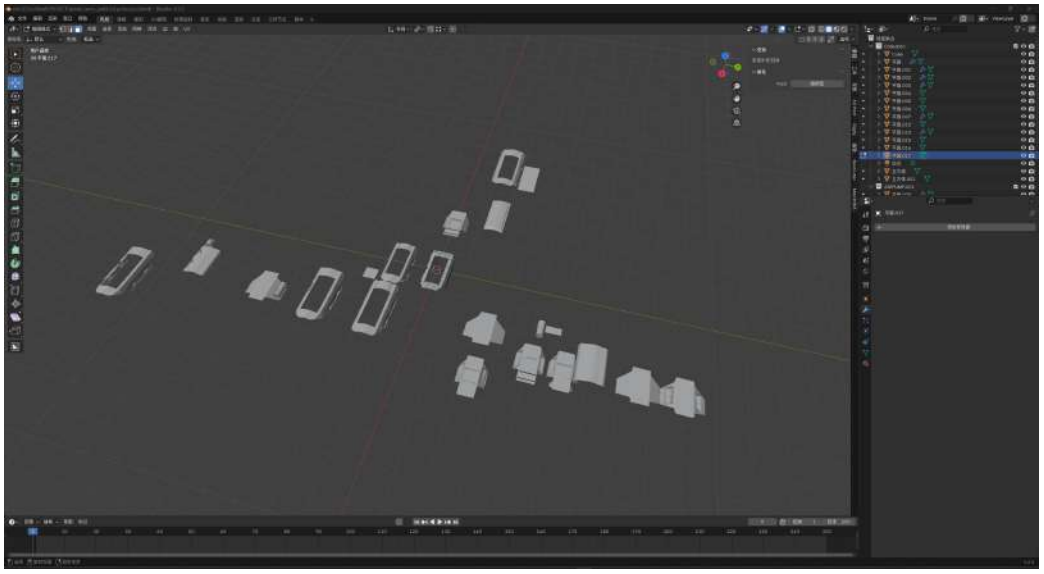


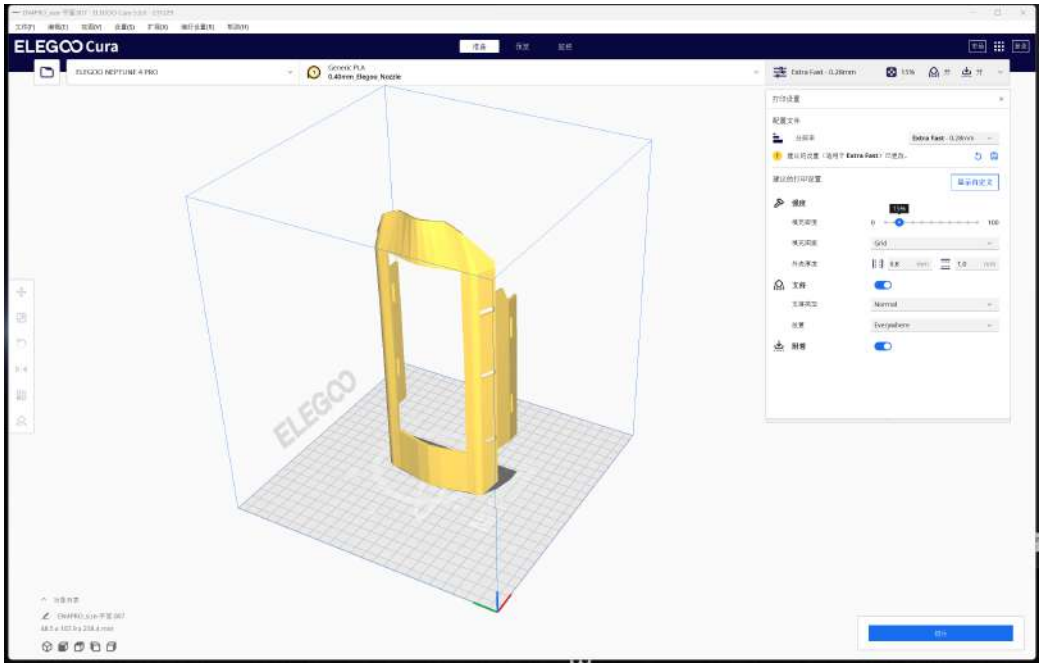
Step 2: Preparing for 3D Printing

- **Objective**: Simplify the Blender model to make it compatible with 3D printing.
- **Key Actions**:
  - Simplified the structural geometry to ensure printability and reduce material usage.
  - Optimized designs to eliminate overly complex features, ensuring the model could be divided into modular, easily printable parts.
  - Adjusted the size and structure to align with the dimensions of common 3D printers and wearable ergonomics.

Step 3: 3D Printing and Iterative Testing

- **Objective**: Create physical prototypes of the device and identify design issues.
- **Challenges and Errors**:
    1. **Size Mismatch**:
        - Initial prints revealed that some components were too large or small for proper assembly.
        - Adjusted the dimensions in Blender to ensure better compatibility between parts.
    2. **Assembly Issues**:
        - The prototype's joints and locking mechanisms did not fit as intended, causing difficulty in assembling the airbag modules and electronic components.
        - Redesigned the joints to be more robust and easier to align during assembly.
    3. **Wearability Problems**:
        - Early designs were bulky and interfered with arm movement, making the device uncomfortable to wear.
        - Simplified the structure, reduced unnecessary bulk, and introduced adjustable straps to improve comfort.
    4. **Device Integration**:
        - Space allocated for the ESP32 and air pump was insufficient in the initial prototype.
        - Reconfigured the internal compartment to accommodate all components without compromising the device's form factor.




ELEGOO Cura


ELEGOO
CREATE THE FUTURE
CREATE THE FUTURE
sunlu
3D PRINTING

Key Adjustments After Testing

1. **Size Optimization**:
   - Scaled down the device's dimensions for better fit and comfort.
2. **Structural Redesign**:
   - Simplified modular designs for easier printing and assembly.
   - Added secure mounting points for air pumps and the ESP32 chip.
3. **Improved Ergonomics**:
   - Added curvature to the design to better conform to the arm's natural shape.
   - Introduced softer materials in the wearable portion to enhance comfort during extended use.

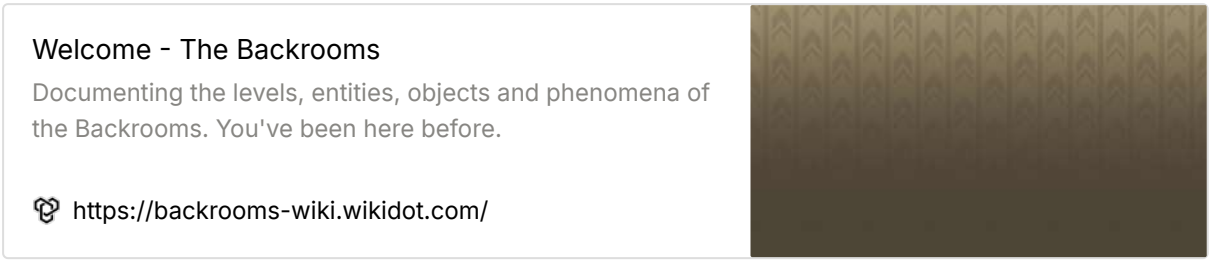
Next Steps

- ☑ ~~Finalize a wearable-friendly prototype based on the revised design.~~
- ☑ ~~Conduct additional user testing for comfort, fit, and performance.~~
- ☑ ~~Begin integrating the tactile system with the ESP32 to test real-time feedback capabilities.~~

Week 14-16: VR Environment Expansion

Category	Development
Date	@October 17, 2024

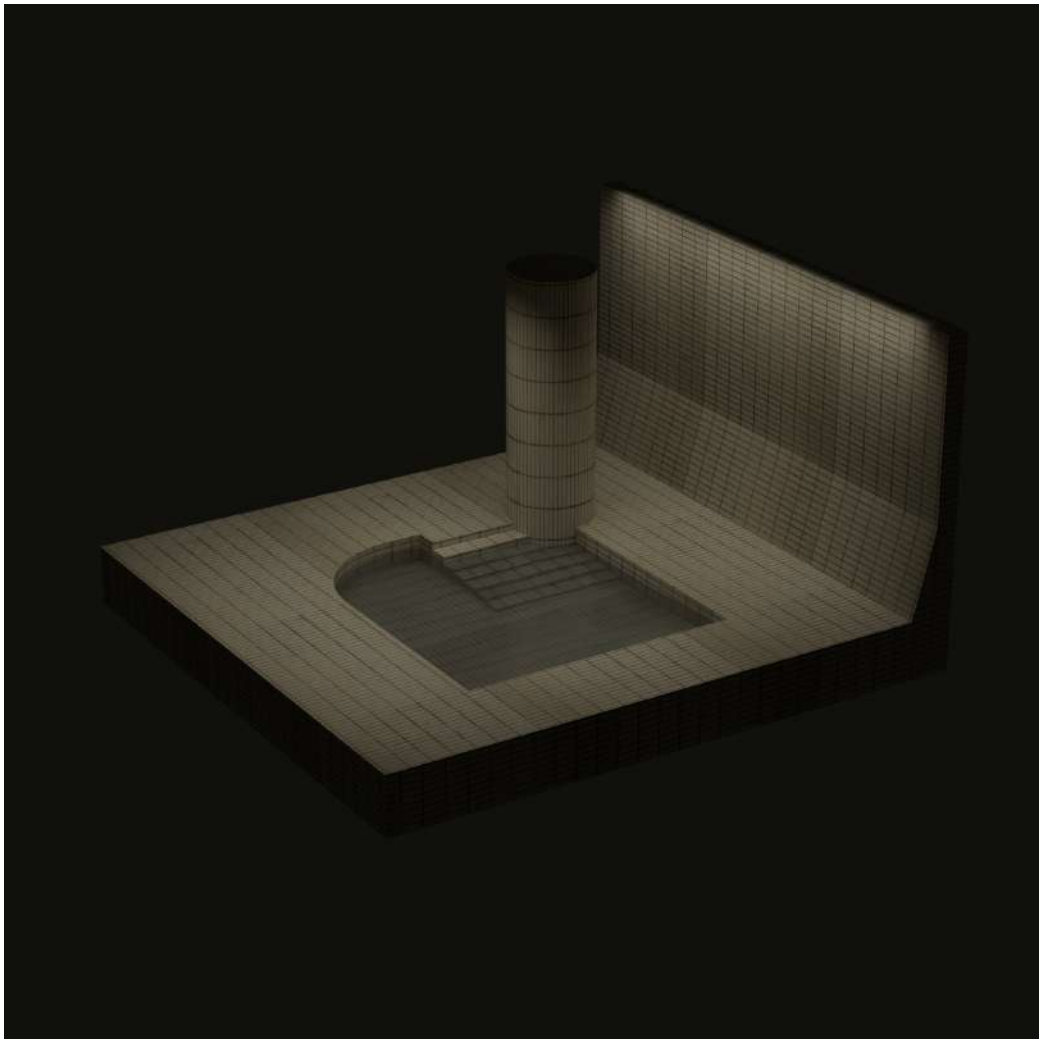
If you're not careful and no-clip out of reality in wrong areas, you'll end up in the Backrooms, where it's nothing but the stink of moist carpet, the madness of mono-yellow, and endless background noise of fluorescent lights at maximum hum-buzz, and approximately six hundred million square miles of randomly segmented empty rooms to be trapped in. God save you if you hear something wandering around nearby, because it sure as hell has heard you... ——— Backroom Wikidot

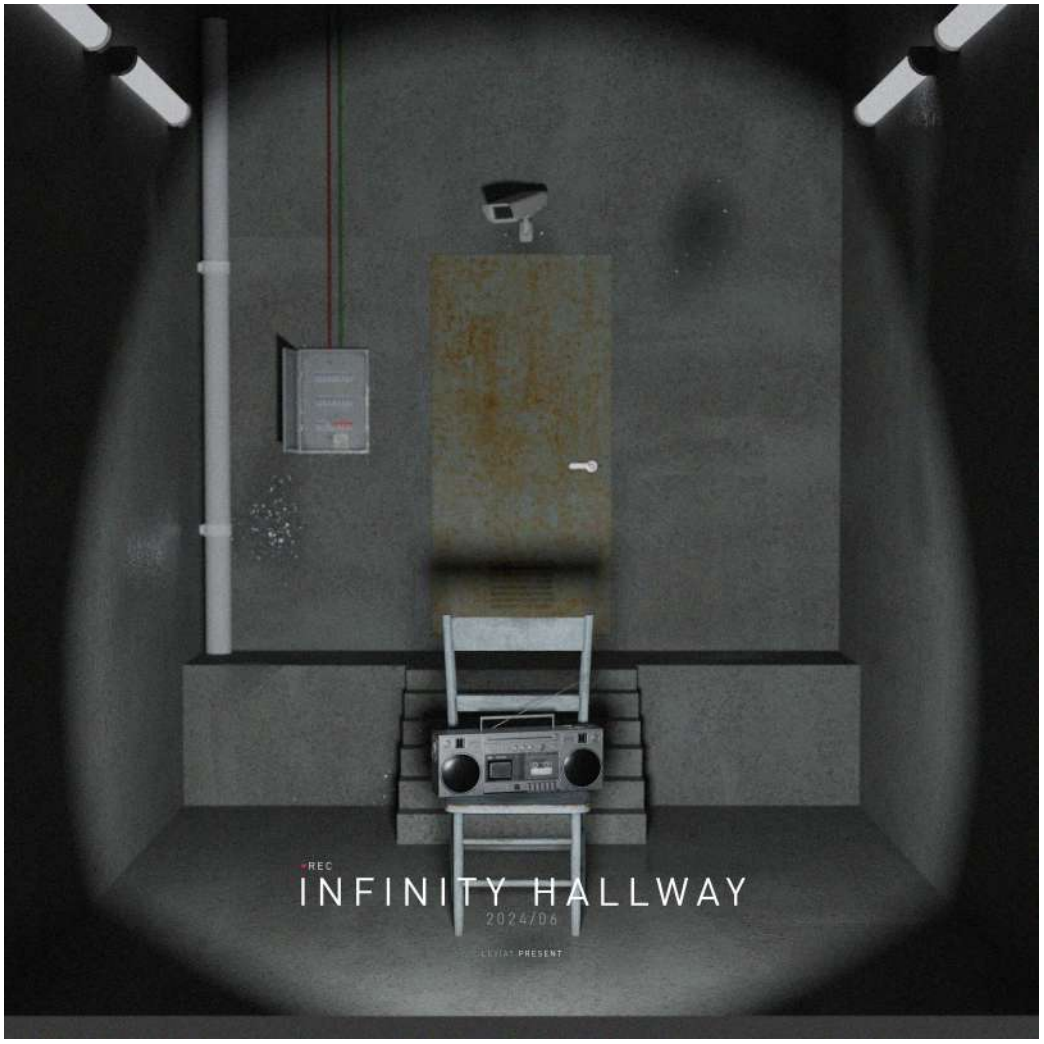


1. VR Scene Prototyping: Backrooms Concept

- **Objective**: Design VR environments inspired by the *Backrooms* concept, aligning with the themes identified in earlier research.
- **Development Details**:
  - Created small-scale scene prototypes to explore the aesthetic and structural elements of *Backrooms*, characterized by:
    - Endless, labyrinth-like hallways.
    - Dim, artificial lighting and uniform textures to evoke unease.
    - Sparse, surreal spaces like empty offices and abstract corridors.
  - Focused on:
    - Geometric repetition to enhance disorientation.

- Minimalist, retro-style textures to capture the uncanny feel of *Backrooms* environments.




REC
INFINITY HALLWAY
2024/06
PRESENT

Screen shot from Half life: Alyx

Analyze the game ambient in half life: alyx

The screenshot from *Half-Life: Alyx* demonstrates effective use of lighting and atmospheric elements to create a deeply immersive experience. Below is an analysis of how the design choices contribute to immersion and how similar techniques can be applied in VR development:

---

1. Lighting Design

Lighting plays a critical role in guiding the player's focus and establishing mood within the environment. Here's how it's effectively used in this scene:

- **Directional Lighting**:
  - The **bright overhead light** acts as a focal point, drawing the player's eye to specific areas of the scene (e.g., the workstation or equipment in the corner).
  - This focused lighting also enhances contrast between illuminated and shadowed areas, creating depth and a sense of three-dimensionality.
- **Ambient Light**:
  - Dim ambient lighting fills the rest of the space, maintaining visibility while preserving the eerie, abandoned atmosphere.
  - The subtle glow ensures the player can navigate the scene without breaking immersion.
- **Light Color Temperature**:
  - The **cool, bluish tone** of the lighting creates a sterile and ominous atmosphere, suggesting a space that is both clinical and unsettling.
  - In contrast, small warm light sources (if added) could be used to highlight interactive or safe zones.
- **Dynamic Lighting**:
  - In VR, using flickering lights or moving light sources can enhance immersion by making the environment feel "alive." For instance, a sparking light in the corner could add to the scene's tension.

---

2. Volumetric Effects

Volumetric lighting, or the use of fog and light scattering, adds a tangible atmosphere to the scene. Here's how it's used effectively:

- **Volumetric Fog**:
  - The **soft mist visible near the ceiling** adds a sense of depth and atmosphere, making the space feel larger and more mysterious.
  - In VR, volumetric fog can enhance spatial awareness, helping the player feel surrounded by the environment.
- **Light Beams**:
  - The light from the overhead source is slightly diffused by fog, creating visible beams or "god rays." This subtle effect draws the player's attention to key areas while reinforcing the atmosphere of neglect or decay.
- **Environmental Dust and Particles**:
  - While not fully visible in the screenshot, the addition of floating dust particles would further immerse the player by reinforcing the sense of abandonment and age.

---

3. Environmental Details

The cluttered workspace and detailed environmental storytelling add layers of immersion:

- **Layered Textures**:
  - The worn surfaces, scattered debris, and disorganized equipment contribute to the environment's realism. In VR, textures with normal maps or parallax effects can make these surfaces feel tactile and real.
- **Foreground and Background Elements**:
  - By placing objects in the foreground (e.g., the headcrab) and having depth in the background, the scene achieves a layered composition. This enhances the sense of scale and space in VR.

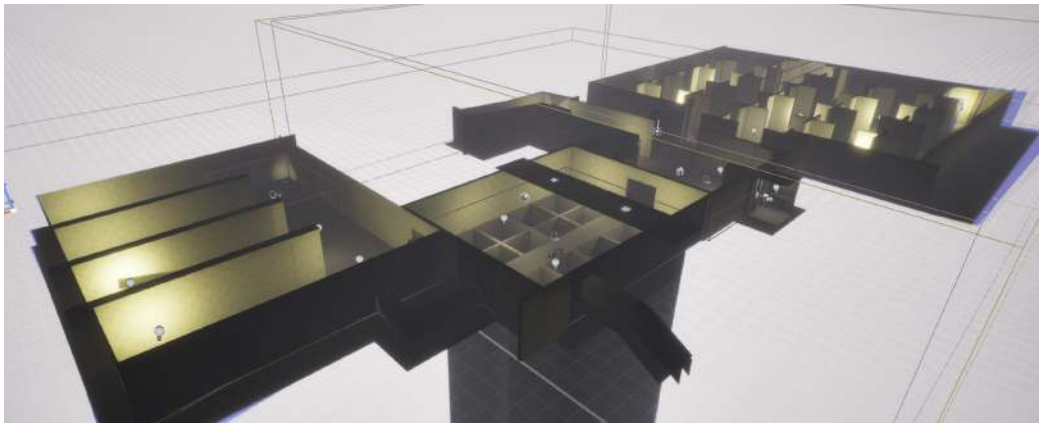
---

2. Scene Design and Environment Development

- **Key Actions**:
  - **Lighting**:

- Used a combination of **directional lighting** and **spotlights** to simulate artificial, enclosed environments.
- Applied **adjustable intensity** to lighting sources, ensuring the spaces felt unsettling but navigable.
- Experimented with **light flickering** effects in some areas to create tension and unpredictability.

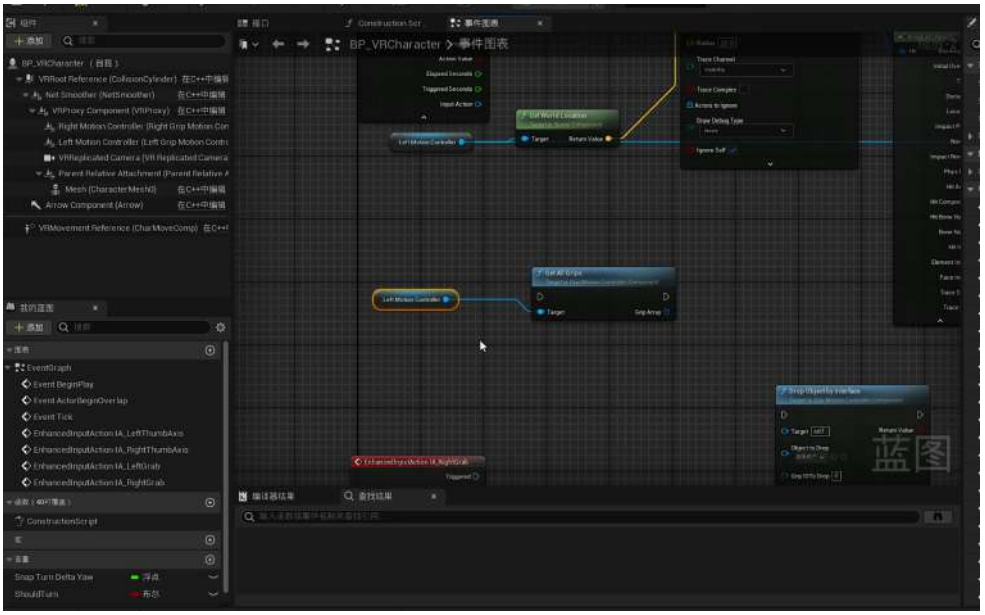
- **Atmosphere**:
  - Introduced **volumetric fog** to add depth and mystery to the spaces, creating a sense of isolation.
  - Adjusted fog density dynamically across different areas to enhance the spatial experience.



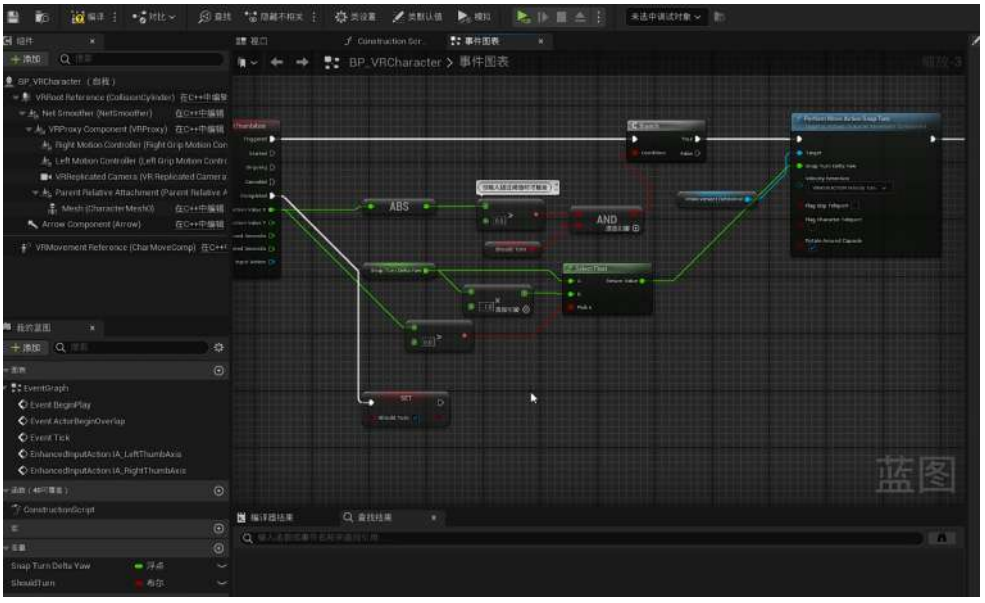
- **Camera Filters**:
  - Applied **cold tone filters** to reinforce the eerie and detached aesthetic.
  - Integrated **film grain effects** for a retro, dreamlike quality.
  - Used **vignette overlays** to narrow the player's focus and increase immersion.
- **Scene Prototypes**:
  - Developed and refined scenes for:
    1. Hallways with repetitive geometric designs.
    2. Empty office spaces with scattered furniture and dull color palettes.

3. VR Pawn Action System Development

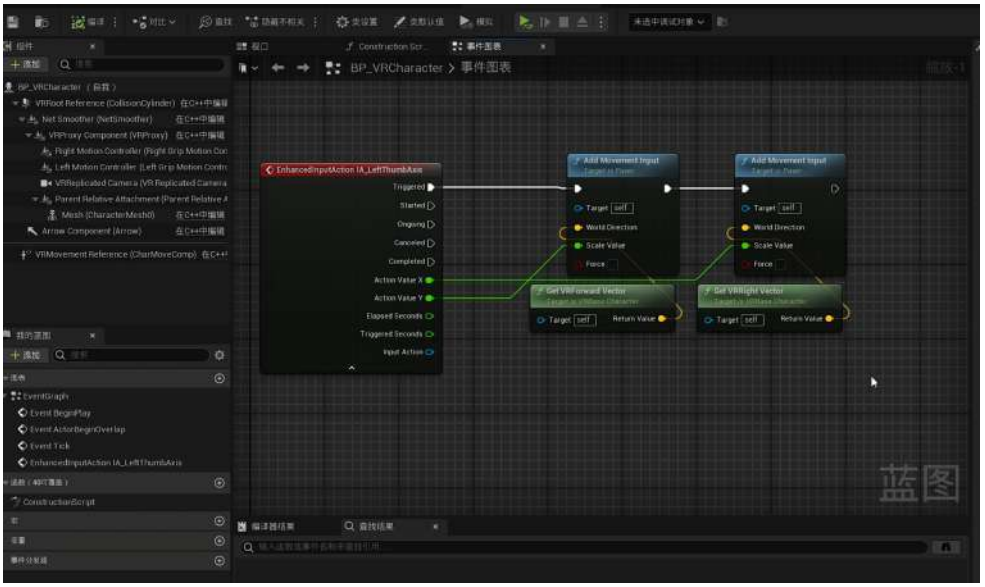
- **Objective**: Implement intuitive and immersive VR motion controls for navigation and interaction.
- **Development Details**:
  - **VR Expansion Plugin**:
    - Utilized the plugin to streamline the creation of motion systems, reducing development time and complexity.
    - Leveraged its built-in functionalities for:
      - **Grabbing System**: Allowed players to pick up and interact with objects in the environment seamlessly.



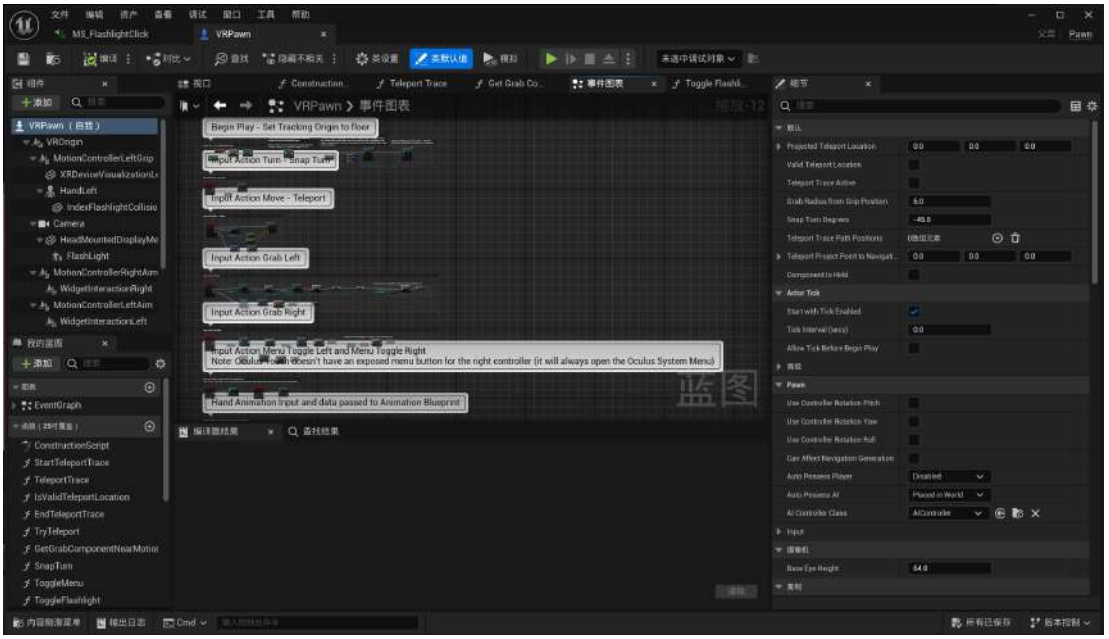
- **Walking System**: Enabled smooth locomotion with adjustable speed and directionality.



- **Turning System**: Integrated snap and smooth turning options to suit different user preferences.



- **Optimization**:
  - Focused on reducing latency and ensuring precise player movement to maintain immersion.
  - Conducted tests to ensure that motion controls felt natural and aligned with the scene's pacing and atmosphere.



I started thinking about whether I wanted to move via teleportation in a VR game, or whether I wanted to simulate a character walking to move.

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celebrate finishing the movement!!!

Challenges and Solutions

- **Lighting Balance**:
  - Challenge: Achieving the right balance between visibility and atmosphere in dimly lit scenes.
  - Solution: Dynamically adjusted light intensities and incorporated ambient occlusion to maintain navigability without compromising mood.
- **Performance**:
  - Challenge: Volumetric fog and post-processing effects introduced potential frame rate drops.
  - Solution: Optimized scene assets and reduced unnecessary geometry or effects in non-visible areas.

- **Motion Responsiveness**:
  - Challenge: Ensuring the VR motion controls felt smooth and responsive in complex scenes.
  - Solution: Fine-tuned the plugin settings and conducted iterative tests with placeholder environments.

Next Steps

1. Expand and finalize additional VR scenes, including more diverse layouts and interactive elements.
2. Integrate tactile feedback from the physical device into VR gameplay for synchronized user experiences.
3. Conduct user testing to evaluate scene design, motion responsiveness, and overall immersion.

Week 17-19: Arduino and Unreal Engine 5 Communication

Category	Development
Date	@October 31, 2024

SHOWCASE, TEST CONNECT SUCCESSFUL

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This week's focus was on establishing seamless communication between the Arduino microcontroller and Unreal Engine 5 (UE5) to synchronize the tactile feedback device with virtual reality (VR) scenes. The goal was to allow real-time data exchange, enabling the device to respond dynamically to in-game events and vice versa.

https://github.com/videofeedback/Unreal_Engine_SerialCOM_Plugin

---

Development Process

1. Hardware Setup

- **Arduino Integration**:

    - Utilized an **ESP32 microcontroller** to handle wireless communication and control the tactile device's components (e.g., air pumps, valves).
    - Connected the Arduino to a PC via USB for initial testing and debugging, ensuring consistent data transmission during development.
- **Device Configuration**:
    - Programmed the Arduino to receive commands (e.g., pressure levels: light, moderate, strong) and execute corresponding actions on the airbag system.
    - Configured the device to send real-time feedback (e.g., pressure status, device state) back to the UE5 environment.

---

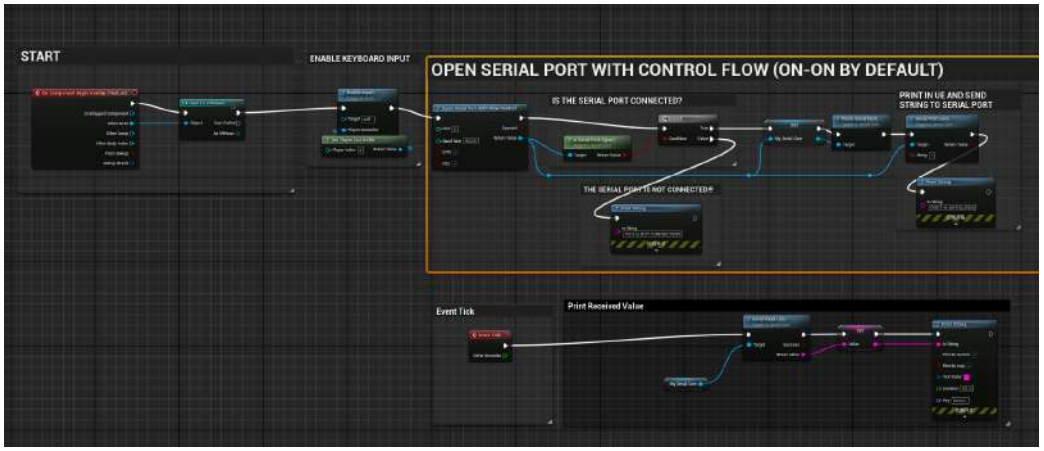
2. Communication Protocol

- **Serial Communication**:
    - Established a **serial connection** between Arduino and UE5 using Unreal Engine's **Serial Communication Plugin**.
    - Programmed the Arduino to send and receive JSON-encoded data packets for easier parsing in UE5.
- **Message Flow**:
    1. **From UE5 to Arduino**:
        - Commands for triggering tactile feedback (e.g., `{"pressure": "strong"}`) were sent based on in-game events (e.g., entering a dark room).

```
void loop() {
  if (Serial.available() > 0) {
    String input = Serial.readStringUntil('\n');
    input.trim();

    if (input == "start") {
      currentMode = 0;
      isRunning = true;
      Serial.println("Command received: start. Inflate 10s and hold.");
    } else if (input == "1") {
      currentMode = 1;
      isRunning = true;
      Serial.println("Command received: Mode 1. Inflate 5s, then alternate 2s inflate/2s deflate.");
    } else if (input == "2") {
      currentMode = 2;
      isRunning = true;
      Serial.println("Command received: Mode 2. Inflate 5s, deflate 5s.");
    } else if (input == "3") {
      currentMode = 3;
      isRunning = true;
      Serial.println("Command received: Mode 3. Inflate and hold 10s.");
    } else if (input == "stop") {
      currentMode = 4;
      isRunning = true;
      Serial.println("Command received: stop. Deflate 10s.");
    } else {
      Serial.println("Unknown command. Please use 'start', '1', '2', '3', or 'stop'.");
    }
  }
```

2. **From Arduino to UE5**:
    - Feedback data, such as the current state of the device (`{"status": "active"}` or `{"error": "pressure out of range"}`), was transmitted to UE5 for monitoring and adaptive scene adjustments.



3. Unreal Engine 5 Implementation

- **Blueprint Integration**:
    - Created a **Blueprint Node System** in UE5 to handle incoming and outgoing serial data.
    - Mapped tactile feedback triggers to specific in-game actions and events:

        - Example: Strong pressure activation upon entering a confined space or a danger zone in VR.
- **Dynamic Scene Feedback**:
    - Integrated Arduino data into UE5's event-driven architecture, allowing the game environment to adapt dynamically:
        - If the airbag device is inactive or malfunctioning, the VR scene adjusts by displaying a visual warning or pausing gameplay.

Challenges and Solutions

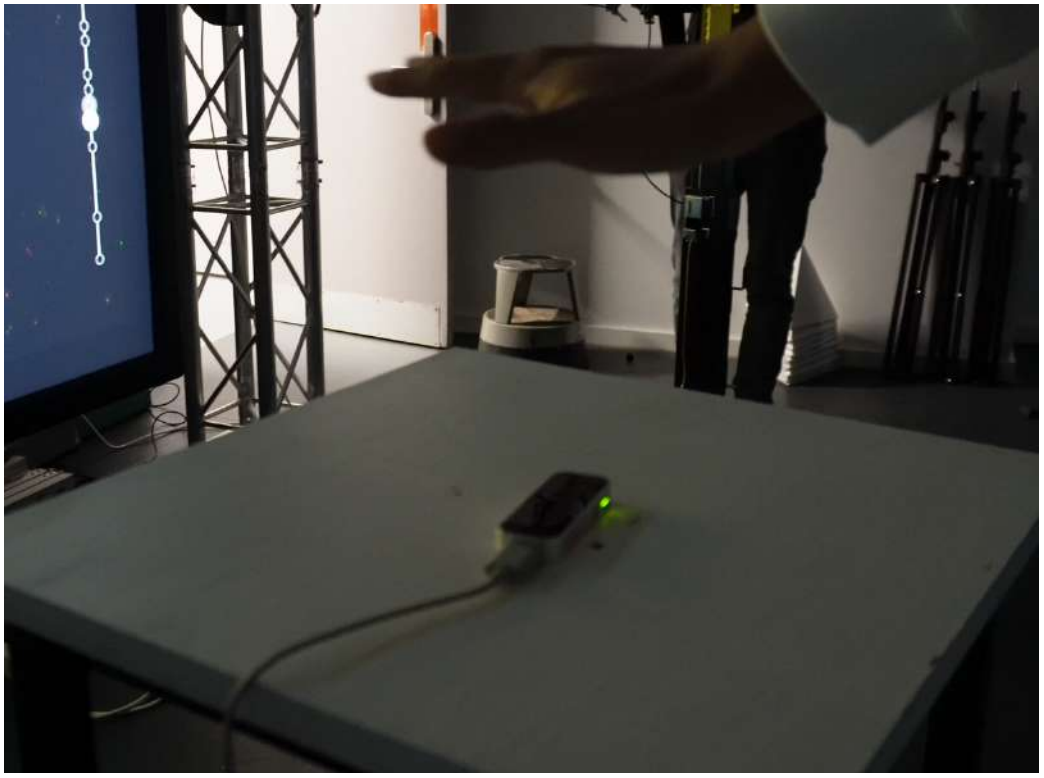
- **Challenge 1: Data Latency**
    - Latency in serial communication caused noticeable delays between game events and tactile feedback activation.
    - **Solution**: Optimized the communication loop by reducing data packet size and ensuring only necessary data was transmitted.
- **Challenge 2: Error Handling**
    - Device errors (e.g., pressure exceeding safe levels) occasionally disrupted gameplay synchronization.
    - **Solution**: Implemented a feedback verification system to ensure commands were successfully executed, with fallback mechanisms in case of errors.
- **Challenge 3: Integration Complexity**
    - Mapping tactile feedback to specific in-game actions required extensive Blueprint modifications.
    - **Solution**: Developed reusable Blueprint templates to streamline the integration process for future use.

Failed Processed

1. Leap Motion Setup

- **Hardware Configuration**:
    - Installed the Leap Motion Controller and mounted it to the VR headset for real-time hand-tracking in the VR environment.

    - Calibrated the Leap Motion device for accurate detection of finger positions and movements.
- **Software Integration**:
    - Integrated Leap Motion with Unreal Engine 5 using the **Leap Motion Plugin**.
    - Mapped hand-tracking data to control the airbag system:
        - **Finger Bending**: Specific finger angles (e.g., bending the index or middle finger) were programmed to trigger the airbag at varying intensities (light, moderate, strong).



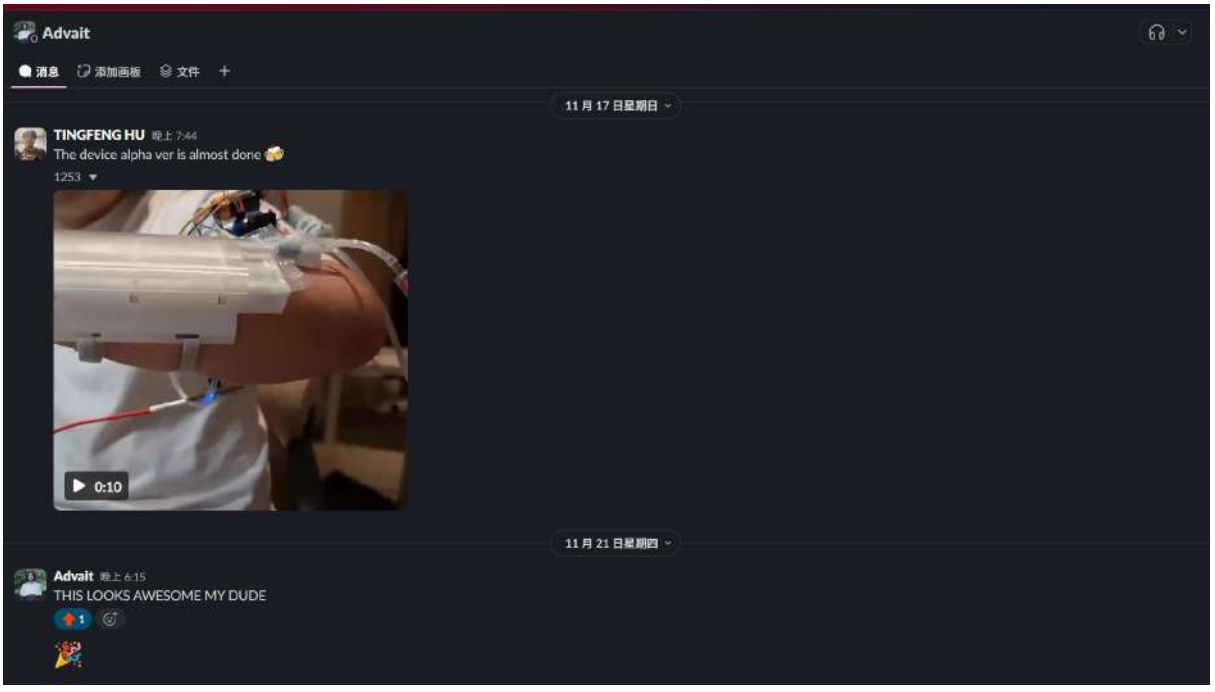
The integration of Leap Motion for hand gesture control of the airbag system was ultimately **unsuccessful** in its current form due to the following reasons:

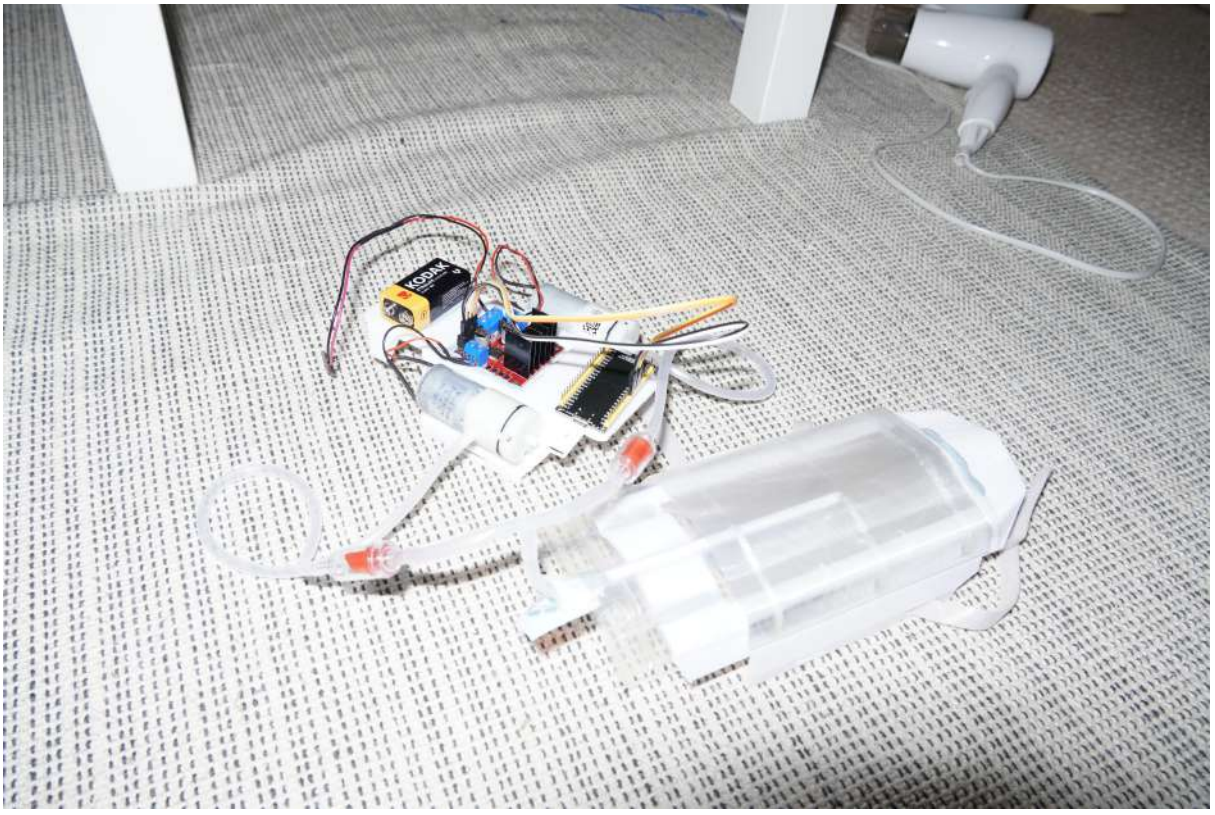
- Overly sensitive gesture recognition led to frequent misinterpretations.
- Lack of stability in gesture-to-action mapping disrupted the user experience.

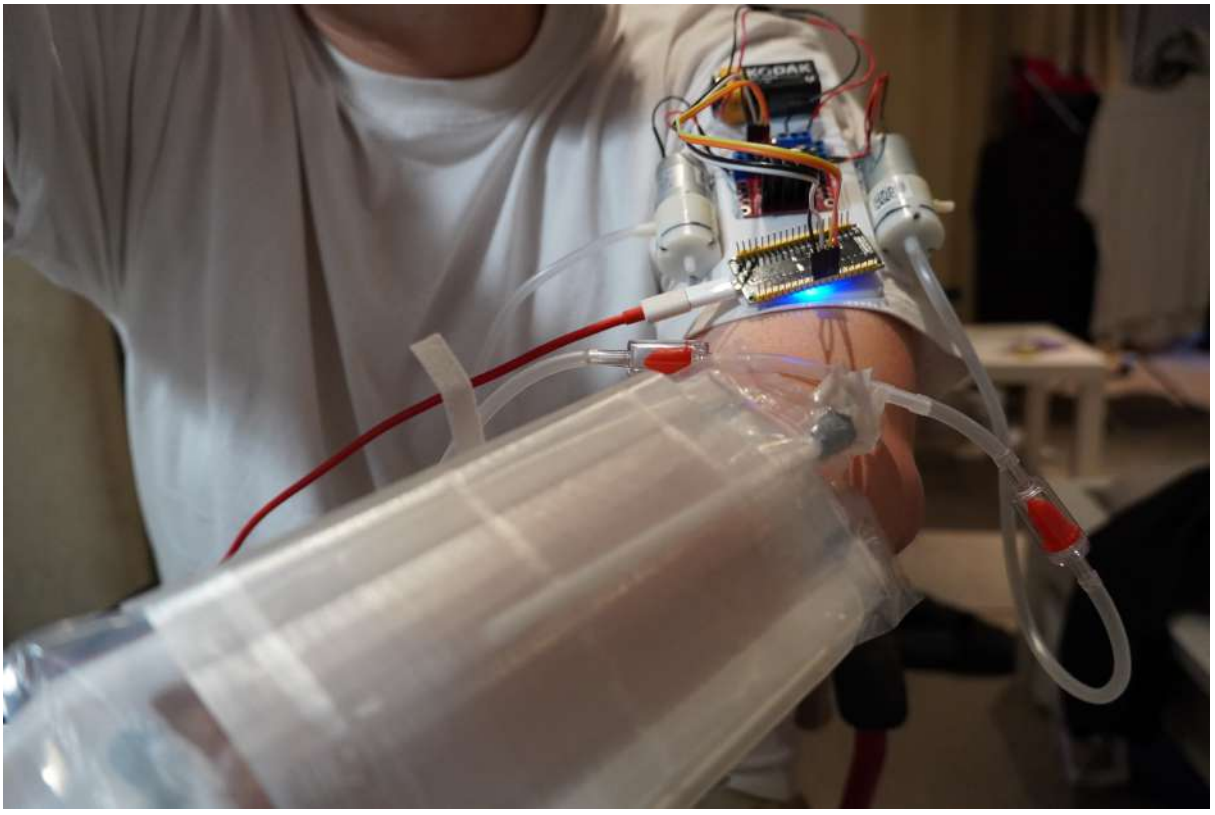
Week 21: Final Adjustments

Category	Showcase
Date	@November 21, 2024

Refining The device:



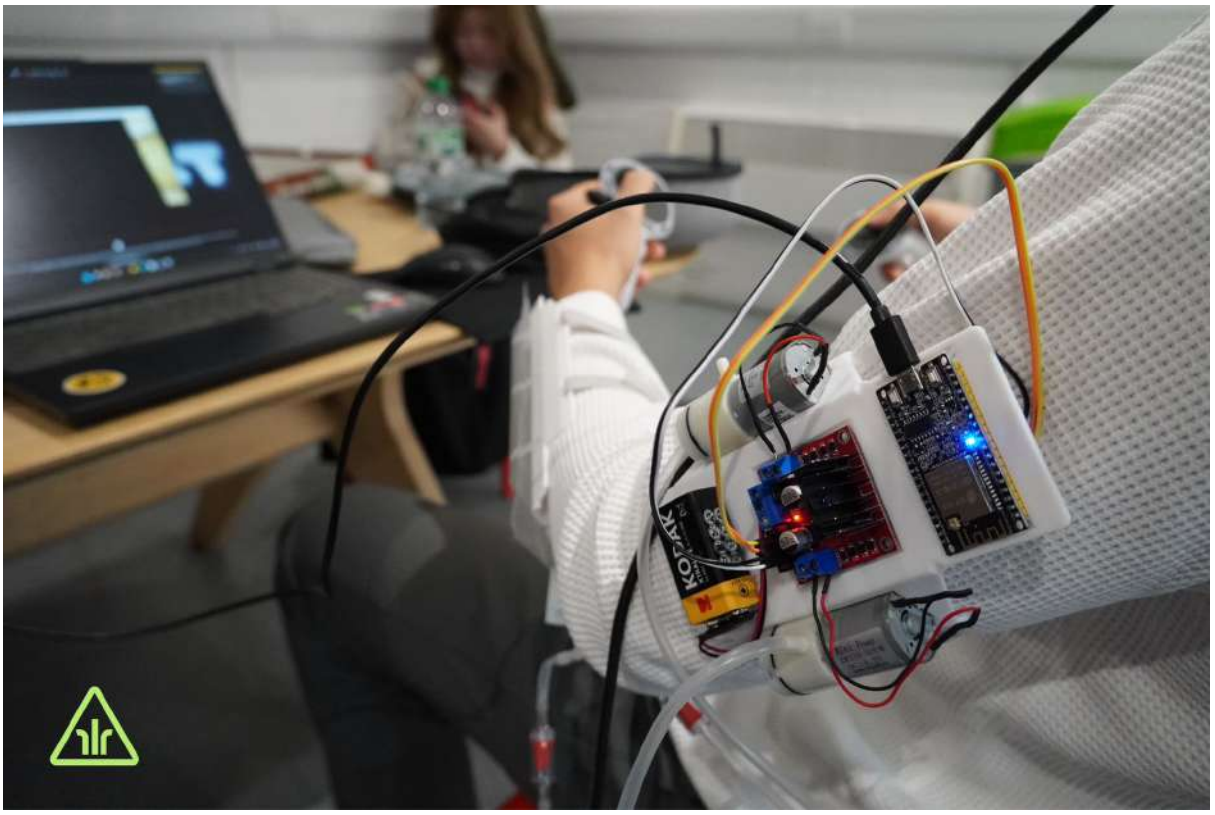

KODAK



Week 22-23: Project Documentation

Category	Showcase
Date	@November 29, 2024

Final Test:



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🤨

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Bullinger, H.-J., Bauer, W., Wenzel, G. and Blach, R. (2010). Towards user centred design (UCD) in architecture based on immersive virtual environments. *Computers in Industry*, [online] 61(4), pp.372–379. doi:https://doi.org/10.1016/j.compind.2009.12.003.

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Video

VR Hands and Animations in UE5 & UE4.27 | Tutorial Part 1 | Adding Hands and Gesture Animations

In this Unreal Engine 5 VR tutorial, I will be showing you the step-by-step instructions for adding your own custom hand assets to the VR pawn in the Open XR template. This tutorial will cover adding hands to the pre-existing VR pawn inside the Open XR template and creating a new animation blueprint to drive hand animations

https://www.youtube.com/watch?v=mee_6vIWZ8c&t=381s

Procedural VR Hand Animation in UE5 | Tutorial Part 3 | Half Life: Alyx Procedural Grip Animations

This tutorial is outdated!! For the updated version please go to - https://youtu.be/m3xanGZ5ETI?si=X6TzpwV6kPNNe0GL

https://www.youtube.com/watch?v=Lq65clDAttA

https://www.youtube.com/watch?v=i3xNb5R_xos&list=PL6hVyRoWTF6_yMZr4Q6ToWL3ZRGRsiUg2

Get Started With Unreal Engine 5: Build VR Worlds for Virtual Reality

#unrealengine5 #vr #unrealenginetutorial

Lesson 1: Follow step by step on how to create a VR environment using Unreal Engine 5.3 or 5.4. In this tutorial you'll learn how to download and customize a Museum using free assets from the Epic

https://www.youtube.com/watch?v=QxoB20j0cEE

How to Change AI Movement Speed with BEHAVIOUR TREE in the GAME ANIMATION SAMPLE | Unreal Engine 5

This video is a follow up to my last video (linked below) where I show you how to update the NPC Movement Speed using Behaviour Tree in the Game Animation Sample from Epic Games.

https://www.youtube.com/watch?v=M3SfbTxHssw

Motion Capture / Mocap Sensor to Unreal (UE4 / UE5) using BNO055 and ESP32 Feather with perfection

Mocap Suit Building Part 12

In this video, I have covered the steps required to integrate BNO055 all the way to Unreal (UE4 / UE5). While doing the integration, I have covered some essential and basic understanding of UDP and JSON. I have given a detail

https://www.youtube.com/watch?v=NXbJPScS5fI&t=1186s

UE5 | 盒体触发器触发事件_哔哩哔哩_bilibili

-, 视频播放量 1790、弹幕量 0、点赞数 13、投硬币枚数 12、收藏人数 47、转发人数 7, 视频作者 小fu2019, 作者简介 黑龙江省大庆市虚拟制片爱好者，相关视频：Aximmetry触发爆炸，Aximmetry中实现场景切换，Aximmetry | 告示板跟踪，虚拟制片 | 虚拟空间与现实的精确匹配，虚拟制片 | 利用闲置的iPhone手机或平板

https://www.bilibili.com/video/BV1ke4y1L76S/?spm_id_from=333.337.search-card.all.click

虚幻引擎5.5文档 | 虚幻引擎 5.5 文档 | Epic Developer Community

虚幻引擎5的完整学习资源

https://dev.epicgames.com/documentation/zh-cn/unreal-engine/unreal-engine-5-5-documentation

ToolKit/ Plugins

FOR UE VR DEVELOPMENT

About

The VR Expansion Plugin (VRE) was created to help facilitate advanced Virtual Reality interactions and gameplay elements in UE4/UE5. It is an MIT licensed and open source overhaul of many of the engines elements to better accommodate VR.

https://vreue4.com/

Quickstart

OpenXR Toolkit

https://mbucchia.github.io/OpenXR-Toolkit/

This software provides a collection of useful features to customize and improve existing OpenXR applications, including render upscaling and sharpening, foveated rendering, image post-processing and other game-enhancing tweaks.

Unreal Engine 5.4.x for Meta Quest VR | Community tutorial

XR Meta Quest setup guide covering everything

https://dev.epicgames.com/community/learning/tutorials/y4vB/unreal-engine-5-4-x-for-meta-quest-vr

Downloads | Meta Horizon OS Developers

https://developers.meta.com/horizon/downloads/unity

https://github.com/RVillani/UE4Duino

https://github.com/videofeedback/Unreal_Engine_SerialCOM_Plugin

FOR BLENDER DEVELOPMENT

Premium Game Assets - MACHIN3.io

https://machin3.io/

Meshmachine

MESHmachine is a blender mesh modeling addon with a focus on hard surface work without subdivision surfaces, combining innovative chamfer and filleting tools with custom

https://blendermarket.com/products/meshmachine

Decalmachine

DECALmachine is a blender addon, which through mesh Decals, allows for surface detailing in a very non-committal, non-destructive, UV-less way. And as such, it represents an

https://blendermarket.com/products/decalmachine

Machin3Tools

MACHIN3tools is a continuously evolving collection of blender tools and pie menus in a single customizable package.

https://blendermarket.com/products/machin3tools

Blender 4.3 Manual

When 2 percent of users donate, more developers will be supported to work on UI and tools. Free and Open Source for everyone, forever.

https://docs.blender.org/manual/zh-hans/latest/