Fall 2024 - M02 - UX/UI Design for VR/AR/MR

Norman’s Design Principles to VR

(Part One)

Project Guide:
Prof. Ciera Jones

Project By:
Ankita Borawake

New York Institute of Technology | 2024

Table of Contents

Introduction to VR

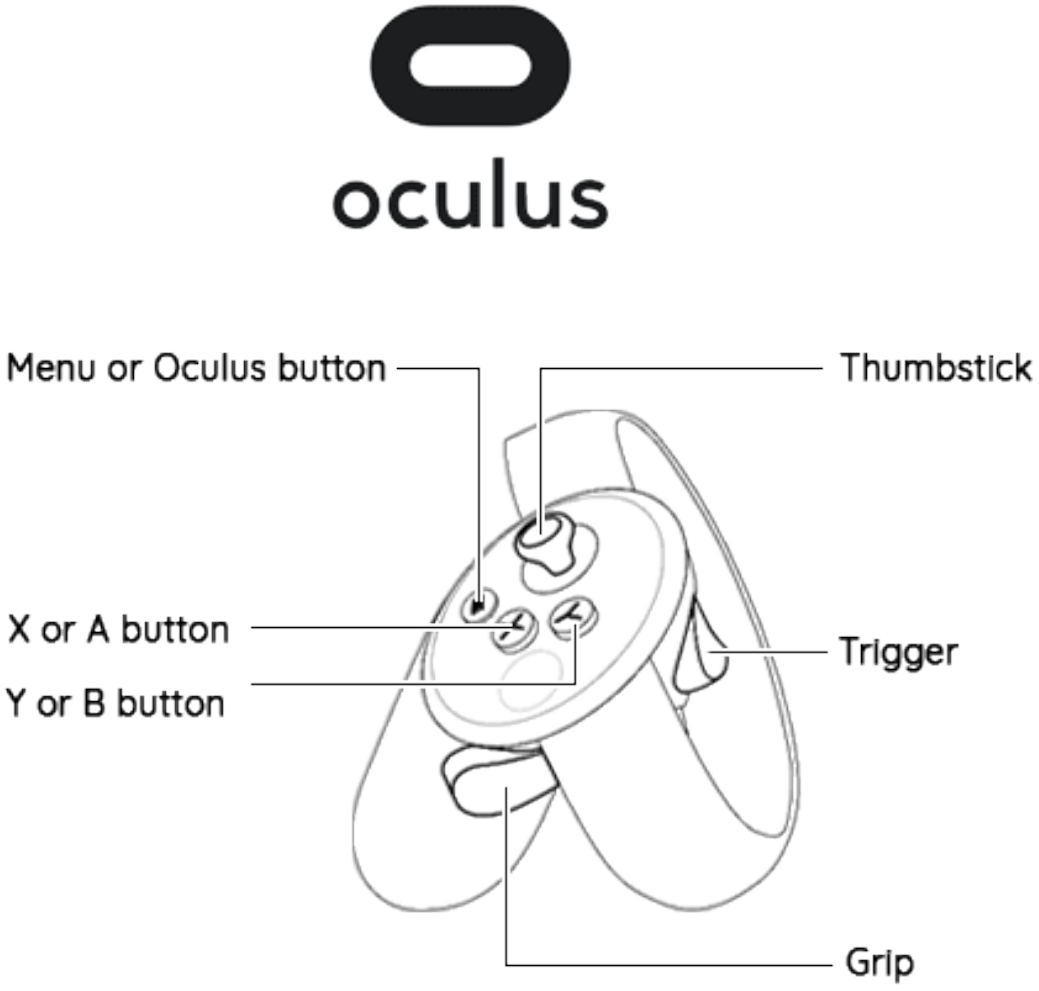
What is Virtual Reality and How to Experience It?

When I was freelancing as a UI designer, I got a project for the G20 Summit in 2023, organized by AIVarse in India. It was the first time I was introduced to VR technology. Our team was tasked with creating a VR experience for school students, showcasing some of India's historical places, like the Golden Temple in Amritsar and Rani ki Vav in Gujarat. My role was to design the onboarding screens for these young students, many of whom, like me, were using VR for the first time.

As a first-time user, I had to learn about VR myself, starting with the basics. VR, or Virtual Reality, is a technology that lets us enter a computer-generated world through a headset and controllers. When you put on the VR headset, it covers your vision with virtual scenes and, with the help of hand controllers, allows you to interact as if you're really there.

(Reflecting on My Experience Working at the G20 Summit's AR/VR Showcase 2023)

VR Controller Design



Buttons	Usage
Trigger Button	It is under your index finger. It’s like a trigger on a gun, so it feels natural to press. You use it to grab or select things.
Thumbstick	It is where your thumb rests. You use it to move around in VR, just like in video games.
Face Buttons (A, B, X, Y)	They are near the thumbstick. They’re used for quick actions, like jumping or opening menus. Having them close together makes it easy to switch between them.
Grip Button	This button is on the side where your middle finger goes. It lets you "grab" things in VR, like squeezing a real object.
Menu Button	This button is out of the way, so you don’t press it by mistake. It opens settings or menus when needed.

Affordances in VR

What are affordances?

There are many definitions of affordances but the most understood definition is that - Affordances are nothing but how the action will take place. (Like to do something to get the results)

In Virtual reality, affordances guide users on how to interact with things, to make something happen.

Here are some of the 20 affordances that can be thought of in general when we hold a controller in our hands.

Writing / Drawing	Boxing Gloves / Punching
Pointing	Flash Light
Throwing	Hair Dryer
Grabbing	Microphone / Calling
Rotating	Climbing
Squeezing	Casting
Tapping	Shooting
Whisker	Hammering
Sword	Riding a bike
Spray Paint Can	Wearing in hands as bracelet

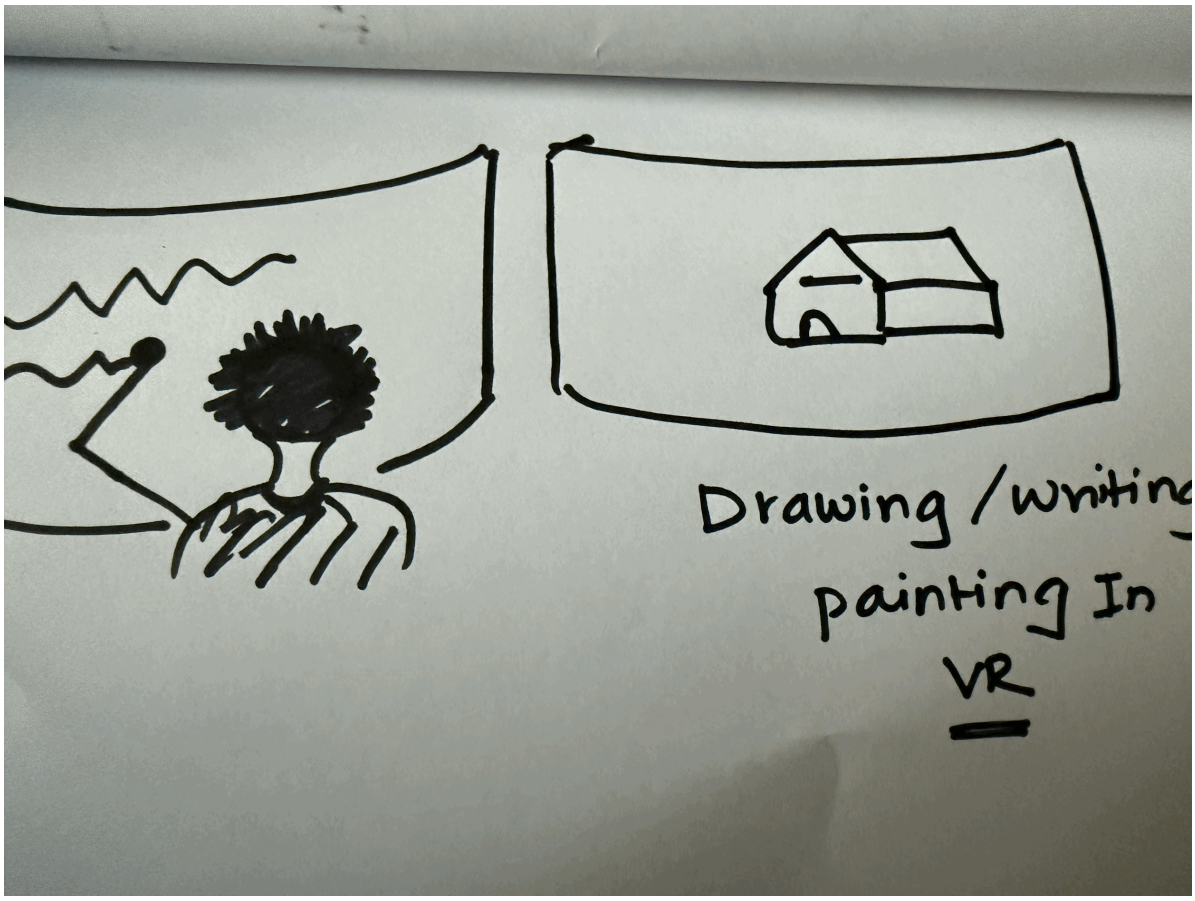
Let's take a deeper look at these five affordances listed above and how they can be used in VR games or applications, with a simple example.

1. Writing/Drawing/Painting

This action lets users create things in the air, like writing text or drawing images.

Examples:

1. In a VR art app, you can hold a paintbrush and use it to draw or paint freely in 3D space. You could paint a scene around you or write your name in the air. This feature feels like magic since you're creating something that stays "floating" in front of you, visible from all angles.
2. Taking notes or writing on white board. This will give the exact feeling of how we write and erase on boards in real time.

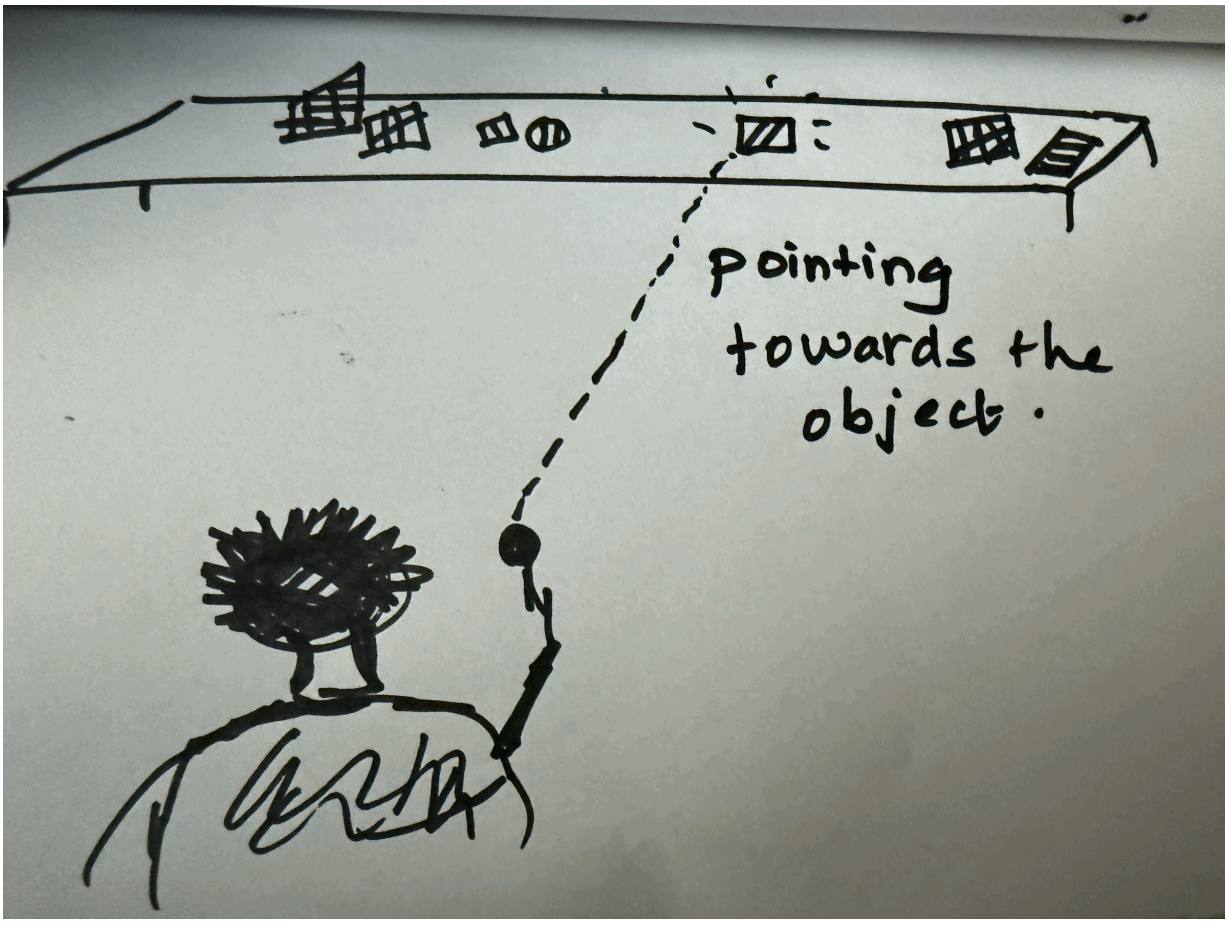


2. Pointing

Pointing allows users to select or highlight objects at a distance without needing to walk towards them.

Example:

1. In a VR menu or game, you could point at options to choose different items. Pointing at a gem in the game, and it lights up, showing it's ready to perform some action on it. Pointing feels very natural, just like when you point at something in real life, making it an easy and direct way to interact.
2. Pointing at a floor to navigate from one place to another in VR.

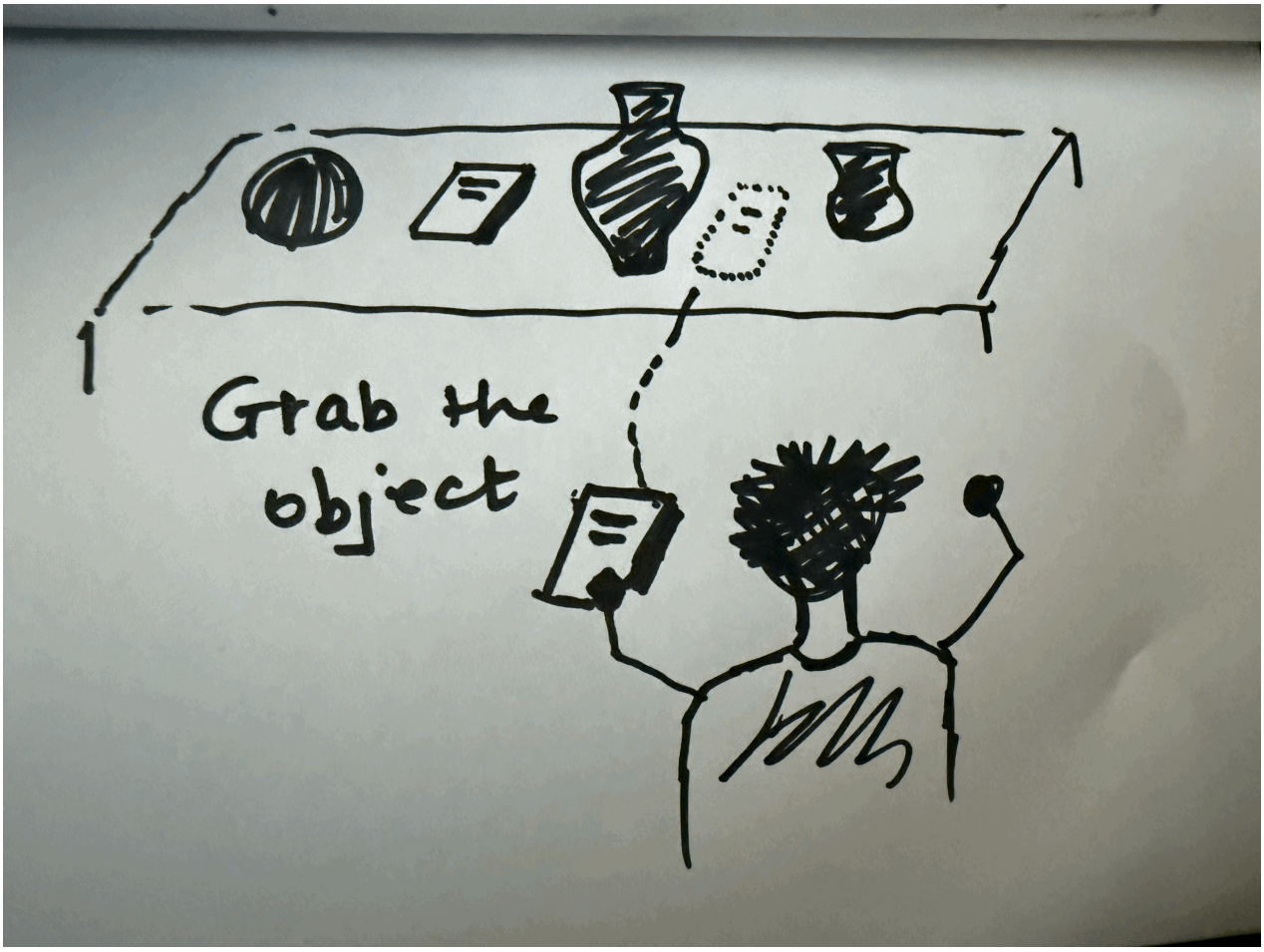


3. Grabbing

Grabbing lets you pick up objects, hold them, and then place them elsewhere if you want.

Example:

1. In a puzzle VR game, you can grab pieces to solve a jigsaw puzzle.
2. You can pick up a gem, and place it where it belongs like a basket. Grabbing feels very intuitive since it mimics real-life holding. Once you leave it falls off from your hand.

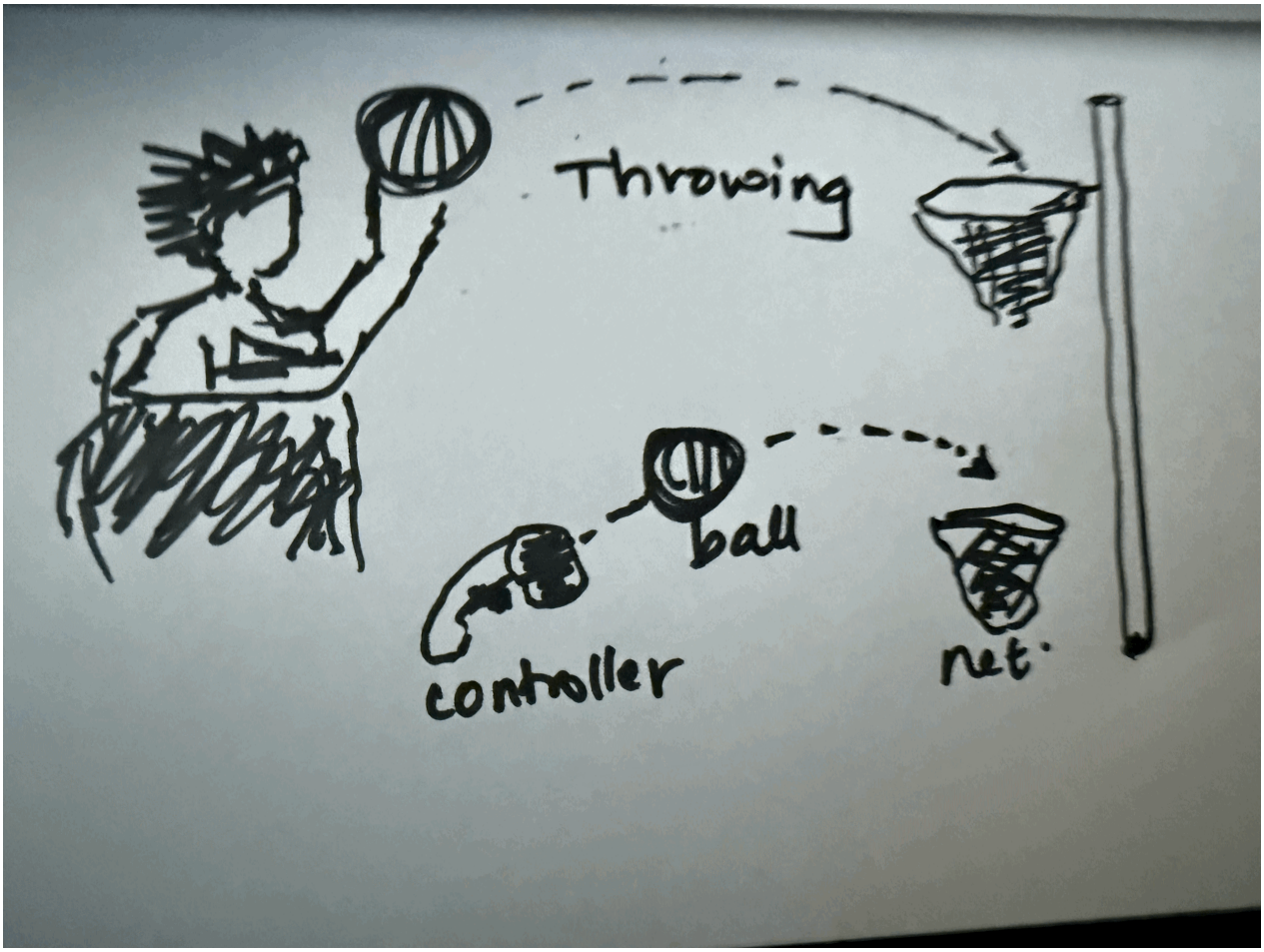


4. Throwing

Throwing is when you can pick up an object and toss it away or towards something.

Example:

1. In a VR game, like a basketball game, you pick up a ball and throw it towards the basket. You aim and release just like in real life, and it feels satisfying to see the ball arc through the air.
2. In a gem collecting game, you can pick up the gems and throw them in a basket which is far away.

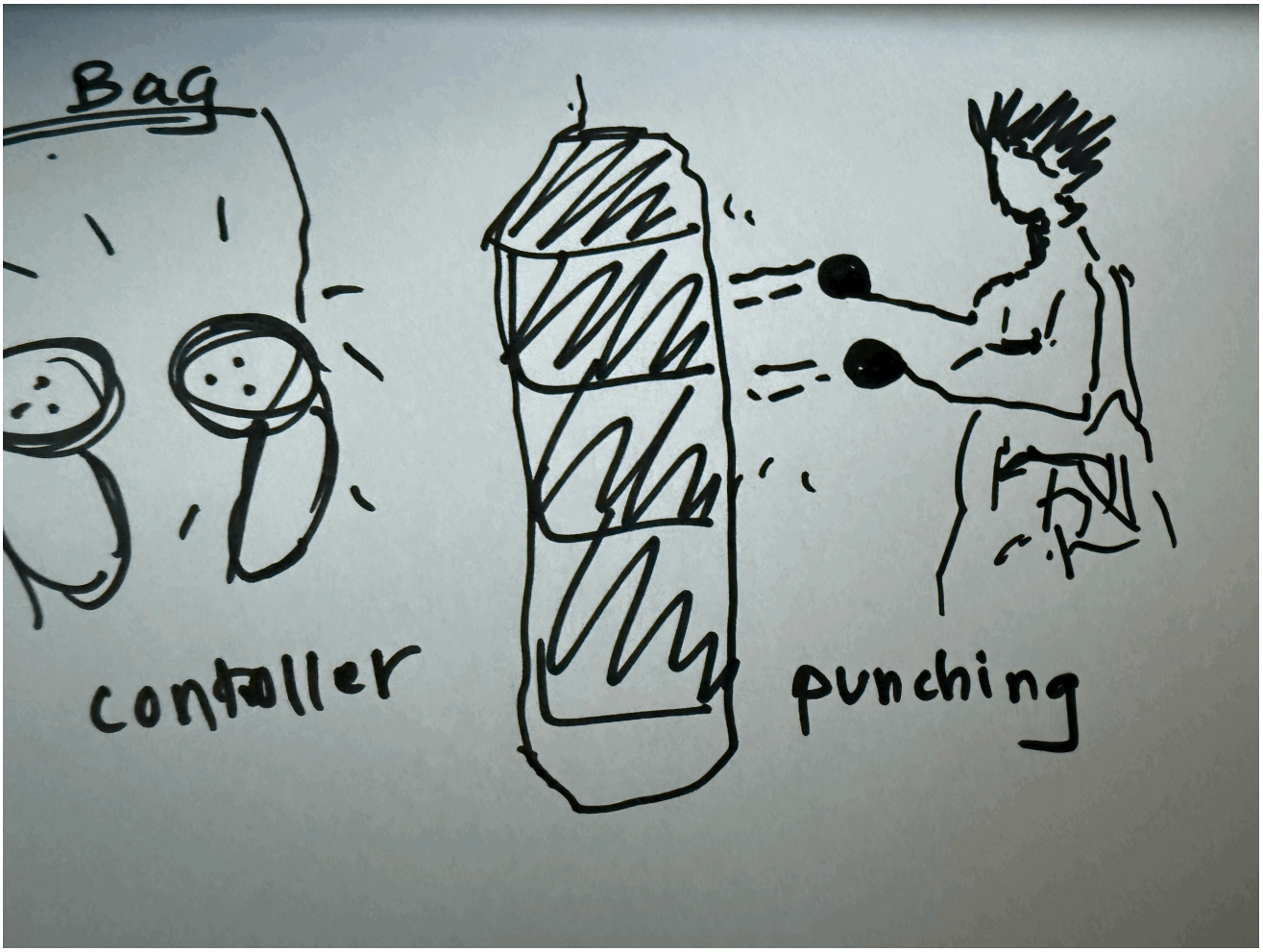


5. Punching

Punching can be used in VR to hit objects, obstacles, or enemies.

Example:

1. In a VR boxing game, you can throw punches to defeat opponents. It can give you the thrill of boxing in real life without getting hurt.
2. Imagine making a pizza dough in VR, where you punch it a little lightly to make it soft as you like.



Some of the usages of affordances in unity game

In one of my Unity projects, I used pointing, grabbing, and throwing to create a gem-collecting game.

- To collect gems, I first pointed at them to select them.
- Then, I grabbed the gem to hold it.
- Finally, I threw the gem into a basket.
- Each action added to the gameplay, making it more interactive and enjoyable.

Norman’s principles inspired me to recreate real-life actions in VR, like the simple act of grabbing items and putting them in a bag. I applied this idea by designing interactable affordances for collecting objects in the game, where players point, grab, and throw gems into a basket, making the experience feel more realistic and familiar.

Conclusion

---

1. In conclusion, learning the basics of VR design has shown me how important Don Norman's design principles are for creating better VR experiences.
2. As a UX/UI designer, I can use these principles to design interactions in VR that feel natural and close to real life. By applying these ideas, I can make VR easier and more enjoyable for users, helping them feel more connected to the virtual world.
3. This approach shows how Norman’s principles can guide us in making VR experiences both effective and user-friendly.

Thank You

Special thanks to Prof. Ciera Jones