



PRESENTED BY: GRACE FOO

TABLE OF CONTENTS

Introduction	2
What is robeats	2
Link to the game.....	3
Background	3
Core objectives.....	3
Issues with robeats	3
Input System	3
Issues with knowing accuracy during gameplay	4
Research on makey makey	6
Rewiring Makey Makey input.....	6
Conductive materials Research.....	7
Everyday conductive materials	7
Everyday Non conductive materials.....	7
Target audience.....	7
Persona	7
Empathy map	9
Day in a life of.....	10
Analysis and research.....	10
1. Project Diva	11
1. Divaller	12
2. I Pega	13
2. Sound Voltex	14
1. Gamo2 FauceTwo Sound vortex controller	14
2. Pocket SDVX Pico V5	15
3. Beat Mania	15
1. Synths Labs Solo Macropad	16
2. Phoenixwan Brandnew PCB IIDX Controller.....	17
Summary of competitive analysis	18
Design rationale	19
Visual Research	20
Sketches	20
Mind Map.....	24
Features	24
Adding brightly colored buttons	24

Adjusting the layout of buttons	25
Adding rubber feet.....	28
Making the buttons large.....	29
User journey.....	30
The final product.....	30
Manual	33
Works Cited	35
References.....	36

INTRODUCTION

WHAT IS ROBEATS

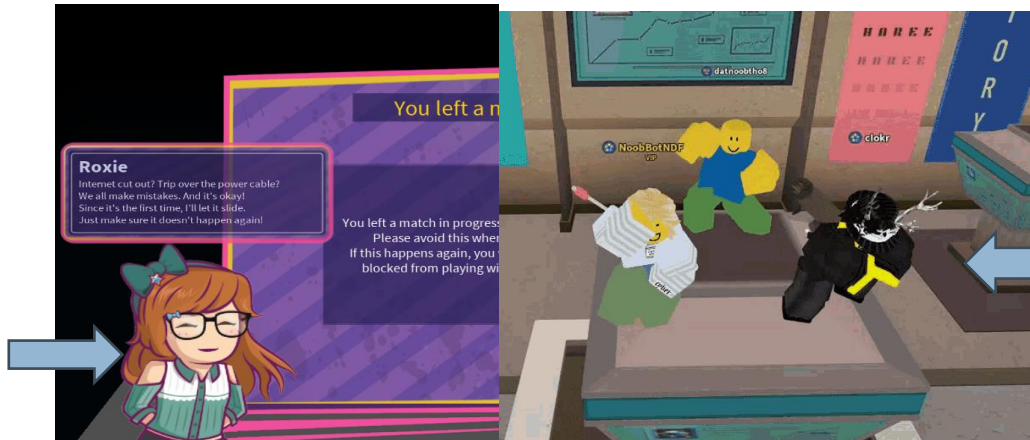


Created on 17 March 2018, Robeats is a MMORPG rhythm game, created by RoBeatsDev, on the website roblox. Its main gameplay feature is playing through a song, where you have to press the notes on time on the 4 button lane and to keep you accuracy and combo high.

It is both a single player game and a multiplayer game (letting 4 players play together at a time). You can play from original songs to songs from games to Vocaloid and other popular songs on the internet.

You can also explore and dance around the lobby and interact with npc's.

This is an npc/
original
character in
the game
named roxie
she is in
charge of the
robux shop



Here are
some
players just
dancing in
the lobby

It got an award in 2022 for best audio design in the roblox innovation awards. (Curtis, 2022)

LINK TO THE GAME

<https://www.roblox.com/games/698448212/SPOOKY-RoBeats-Music-Rhythm-RPG>

BACKGROUND

Me and my friends have been a fan of rhythm games for a while thus, we tried out the game together and we quite enjoy it, however over time we realize there are some issues with controls due to our keyboards, and some of them wish to have a dedicated controller for this game thus I decided to make a controller that makes the game easier to play and control, to fix those issues.

CORE OBJECTIVES

A user who can use a controller where the buttons are easier to see and press

A user who can enjoy a cool looking controller for the game they like (which is robeats)

ISSUES WITH ROBEATS

INPUT SYSTEM

There are input issues, where if players press a key, it doesn't register properly, or the game registers that the player has lifted their fingers of the key. Here are some people in the community complaining and asking if they are the only ones who are facing the issue

My friend plays robeats on pc and the game would randomly miss while they hold on a long note

Like, not even accidentally letting go of the hold note. The game makes it so even if they are still holding on the note (it doesn't go transparent on the screen like letting go would), it would sometimes miss. From what I've seen they're the only one who has had this problem, but how does this happen?

<https://robeats.fandom.com/f/p/4400000000000130522>

Why cant i press four keys at once?

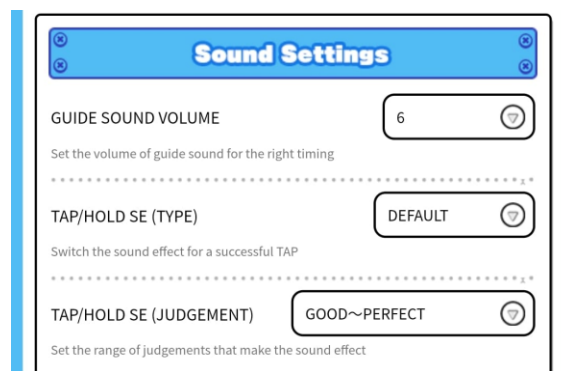
Robeats is a good game. But there is one problem. Every time i press four keys at once it counts as a miss!! I dont know if its my pc or its just the game. Please help.

<https://robeats.fandom.com/f/p/4400000000000072922>

ISSUES WITH KNOWING ACCURACY DURING GAMEPLAY

In rhythm games, there is an accuracy system, where they calculate how accurate you are when you press down the buttons, the accuracy is crucial to a rhythm game as it determines the player's score and combo. There is usually an indicator telling you mid game how accurate your presses are.

For example, in an arcade game in Maimai, one of the indicators is the sounds, it will make a different sound depending on how accurate your press was, and each sound is unique to the different type of accuracies (Perfect, great, good, bad miss). You can even change the different sound indicators of the accuracy on the arcade machine or on the website



However in Robeats, it is completely silent, except when you miss there will be a sound going "booooo!", which doesn't give the player feedback based on sound how accurate their presses were other than misses. What I would improve on this is to have proper judgement sounds playing during the gameplay, so that users can listen to the sound to know if they are accurate or not.

Another issue is the UI showing the accuracy of the button presses. When pressing the button, the UI will show the accuracy of the press on the note itself. This is a big issue especially when players play much harder songs as it will be harder to see when to press the button with such bright big words. Additionally, since the perfect and great text blend together in quick succession, it's also hard to see what the accuracy is based on color. This issue can be seen downwards.

You can see here how its tough to see when to press the keys as the words are almost covering it up, its very distracting , additionally its very bright which may hurt or make it harder to see especially with the little contrast of colors within the words which is not helpful in a rhythm game like robeats where you need to focus a lot on when to press your keys



My personal fix is to move the accuracy words underneath the buttons and to adjust the colors to contrast each other better, just incase the user cant read the words in such quick time, they can guess the accuracy based on the color of the text

On the left is originally from the game and the second is a edit done by me



RESEARCH ON MAKEY MAKEY

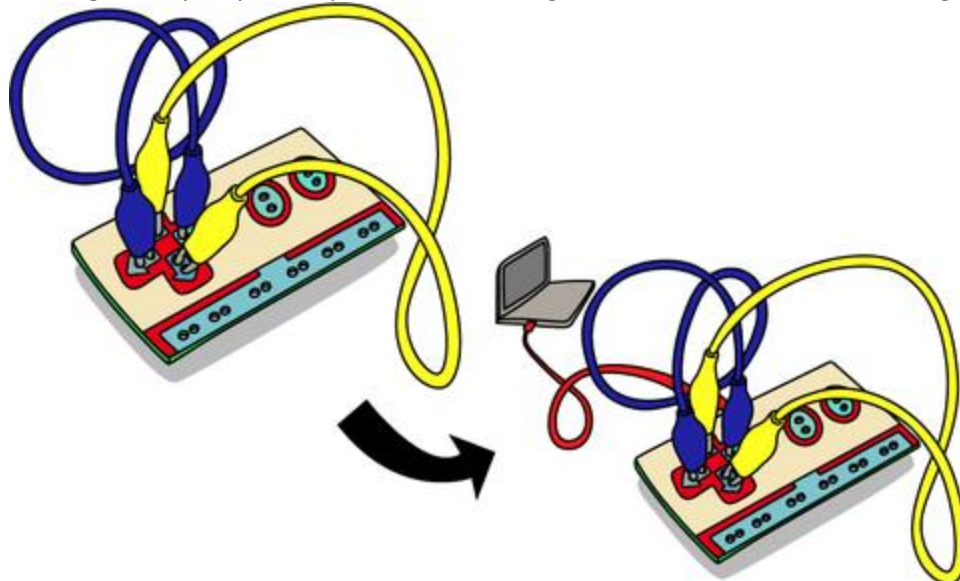


Makey makey was originally created as a project under two students named Jay Silver and Eric Rosenbaum, where people can connect everyday objects to computer keys, using a circuit board usb cable and alligator clips . “Makey Makey is a resistive touch board that means it is programmed to sense when an item is conductive.” So when two conductive things touch, it allows the electrons to flow, thus there will be a signal “send a signal to your computer when you complete a circuit that you've pressed a computer key.”

REWIRING MAKEY MAKEY INPUT

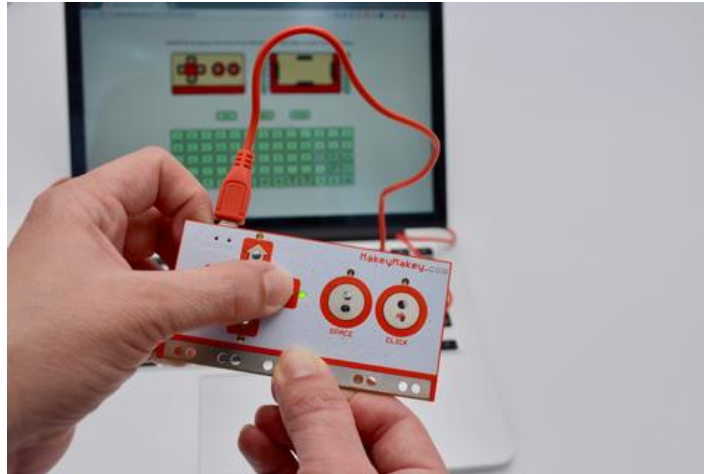
In order for the player to still be able to walk around only using the controller, I needed to change the keybinds of makey makey to WASD.

1. First get one alligator clip, clip it to up and down, then get the second one from left to right.



After doing so, plug in the makey makey into the computer

2. Using one of your hands, hold on the EARTH, and use the other arrow keys that you want to remap. When you have the key you want, click to remap the makey makey to register the new keybind and then press save



CONDUCTIVE MATERIALS RESEARCH

EVERYDAY CONDUCTIVE MATERIALS

- Coins
- Aluminum foil
- Play doh
- Copper wire
- Pencil Graphite

EVERYDAY NON CONDUCTIVE MATERIALS

- Plastic
- Cardboard
- Paper
- Felt
- Lego
- Glass
- Wood
- Foam
- Sponges

TARGET AUDIENCE

The target audience is for dedicated Robeats players who want a controller dedicated to playing robeats that improves on the user experience.

PERSONA

The persona's named, often plays robeats and other rhythm games during their free time thus I decided to interview them

"I want to work hard so I will be able to achieve the goals I want while playing games I love."
- Marie Foo



Marie Foo

Student



Age: 17



School: ITE College Central

Bio

Marie is studying cyber and network security at ITE college central. She loves games and her favourite genre is the rhythm game genre

Needs



A controller that has large bright buttons that is nice to play with

Personal Traits

Patience ▼65%

Flexibility ▼60%

Problem-solving ▼70%

Frustrations

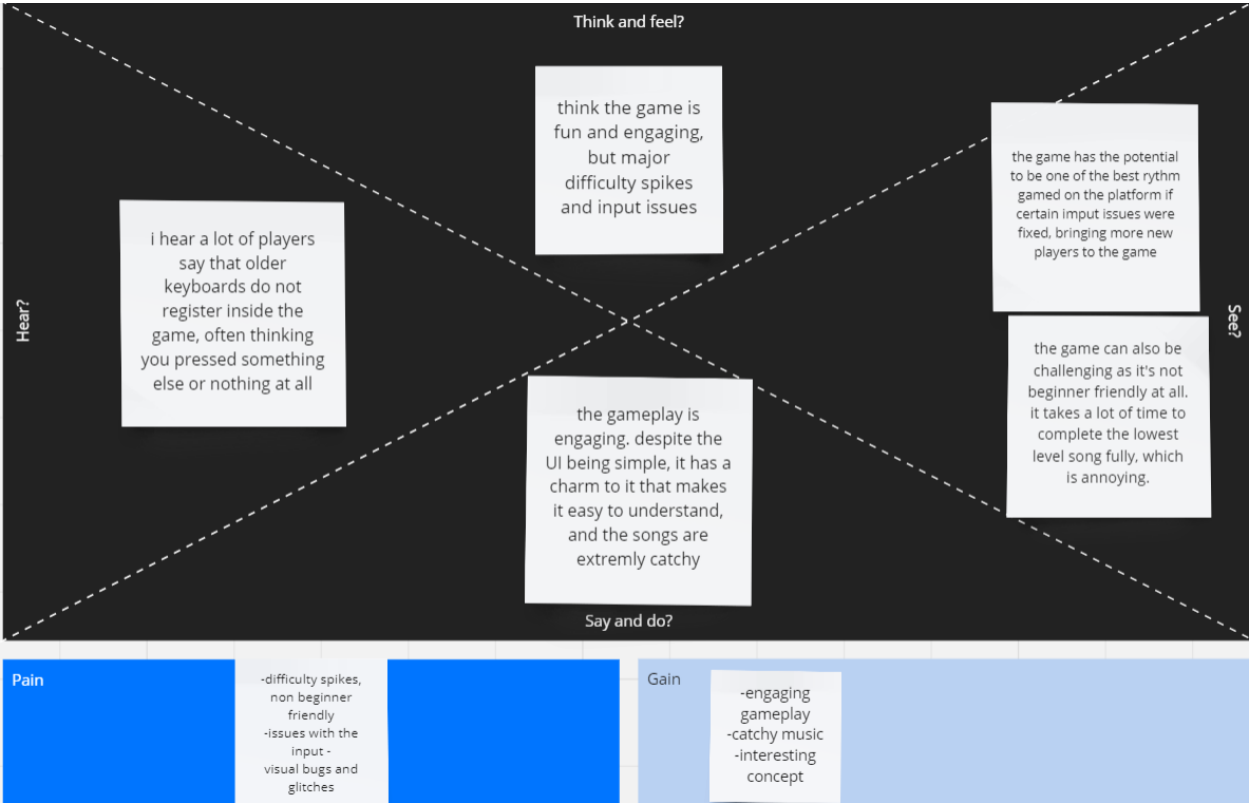
→ Due to her keyboard, she receives input issues which makes her scores worse

→ Keyboard keys are small so she easily can make mistakes tapping the wrong button

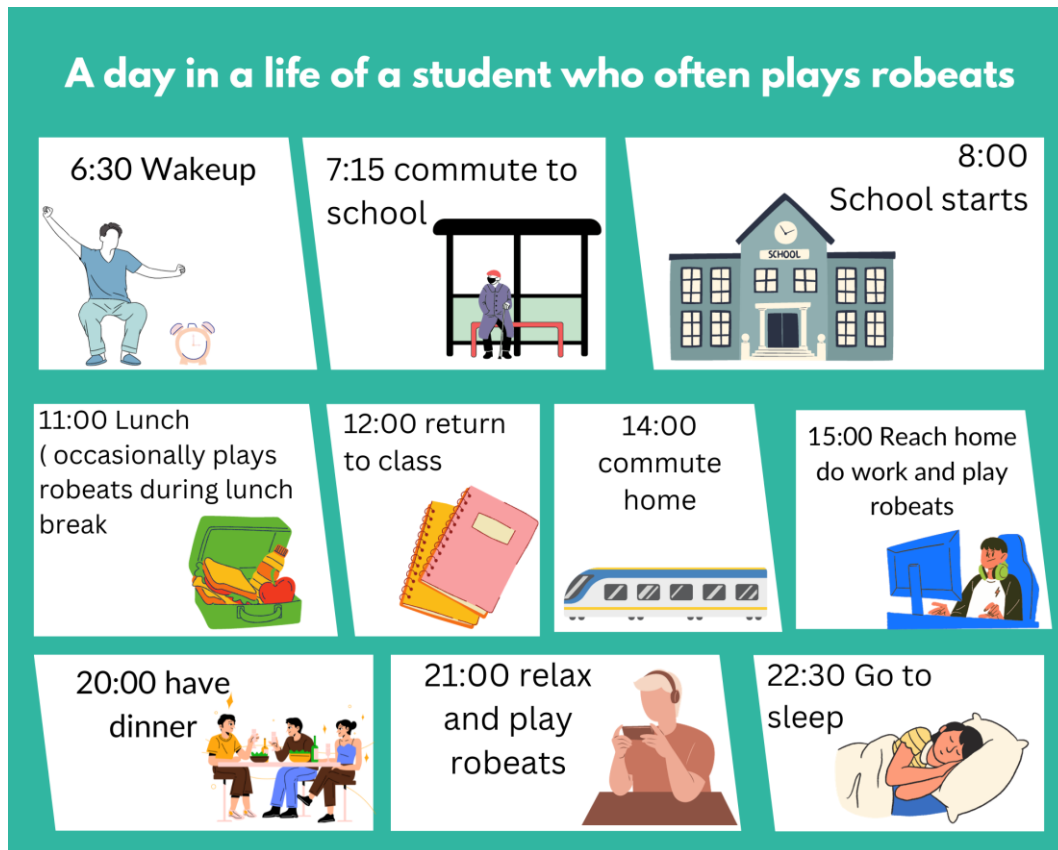
Free Time

During her free time she likes to play roblox, especially robeats, and listening to music

EMPATHY MAP



DAY IN A LIFE OF



ANALYSIS AND RESEARCH

This section is to do research and analysis for games with similar potential controllers to my final product for inspiration and to learn what advantages there are in different controllers and disadvantages to improve on the features or design.

1. PROJECT DIVA



Project diva arcade, made in 2010, is a port of the game “Hatsune Miku : Project DIVA” by SEGA (Hatsune Miku: Project DIVA Arcade, 2023), is a rhythm game with the popular character Hatsune miku. The game uses mostly only 4 buttons and a swipe sensor



The arcade cabinet looks like this



People liked the controller's of the arcade so much that people started making controllers similar to the arcade, for home use.

1. DIVALLER



<https://www.dj-dao.com/en/divaller>

It is 69.9cm by 24cm by 12cm and it weighs about 9.2kg

Advantages

- The lights are nice and bright thus easy to know where your pressing

- The build quality is good
- Visually very nice

Disadvantages

- The buttons tend to stick in place easily
- The buttons are very loud
- Springs weight could be heavier

2. I PEGA



<https://www.amazon.co.jp/s?k=ipega+project+diva>

The size of it is 29 x 17 x 4 cm and it weighs about 657g

Advantages

- Not that loud
- Cheaper
- Smaller, lighter, and more portable

Disadvantages

- Doesn't support well to the Nintendo switch
- Visually not very charming
- Lag issues from using this controllers

2. SOUND VOLTEX



Sound voltex is a rhythm game made by Konami, released in January, 18 2012.
It uses analog dials and have 4 main buttons and 2 sub buttons.



The arcade cabinet looks like this

1. GAMO2 FAUCETWO SOUND VORTEX CONTROLLER



https://www.gamo2.com/en/index.php?dispatch=products.view&product_id=361

Advantages

- It is visually appealing
- The controller is quite light
- The buttons light up thus are easier to see
- The buttons sound nice but aren't too loud

Disadvantages

- It needs to connect to 2 usb ports
- There's a weird vibration noise that can make it noisier for the player and may distract the player

2. POCKET SDVX PICO V5



<https://www.speedylabs.us/product/pocket-sdvx-pico-assembled/>

Advantages

- Has rubber feet at the bottom of the controller to prevent it from moving
- Smaller in size thus is more portable
- The sounds of the button are good but not too loud

Disadvantages

- It's not very friendly to new players if they want to get into the game with this controller, because it is very expensive and some may be uncomfortable with the smaller size when playing for the first time with all the buttons and nobs

3. BEAT MANIA

Beat mania is a rhythm video game developed and distributed by Konami, released back in December 1997. In modern day it uses 7 keys and the dj spinner.

The arcade cabinet looks like this



Over time like the previous instances stated in this document, people have made custom controllers so that they can also play beat mania at home.

1. SYNTHS LABS SOLO MACROPAD



<https://synthlabs.io/products/solo>

Advantages

- It is visually appealing
- It is small thus there is great mobility
- The sound of the buttons sound nice and aren't too loud

Disadvantages

- Due to its size, when playing the game its very cramped for the hand, causing worse gameplay, if you see the gif/video downwards you can see how cramped the users hand is from using this controller

You can see how cramped this player's hands are trying to press all the buttons with such a small controller



- Have to download firmware just to run it with the game that it is intended to play with

2. PHOENIXWAN BRANDNEW PCB IIDX CONTROLLER



<https://www.gamo2.com/en/product/phoenixwan/>

Advantages

- Visually attractive with all the lights
- You can change the sides easily of where you play from
- The extra instructions it includes makes it much easier to understand how to set up the controller

Disadvantages

- The turn table part gets dirty and the texture of it feels uncomfortable after certain use
- You need to buy an exclusive extra adapter for audio to play
- Bit to loud

SUMMARY OF COMPETITIVE ANALYSIS

Controller	Buttons	Advantages	Disadvantages
Divaller	4 buttons and a slider	<ul style="list-style-type: none"> • Visually appealing • Buttons light up so easy to see • Build quality is good 	<ul style="list-style-type: none"> • Very loud • Very heavy
I Pega	4 buttons and a slider	<ul style="list-style-type: none"> • Not so loud • Light and portable 	<ul style="list-style-type: none"> • Not very visually appealing • Doesn't support well to the device • Lag issues
Gamo 2 Faucetwo Sound Vortex Controller	Analog dials, 4 main buttons and 2 sub buttons	<ul style="list-style-type: none"> • Visually appealing • Quite light • Lights make the buttons easier to see • Buttons sound nice 	<ul style="list-style-type: none"> • Needs 2 usb ports • Makes weird noises distracting the player
Pocket SDVX Pico v5	Analog dials, 4 main buttons and 2 sub buttons	<ul style="list-style-type: none"> • Has rubber feet • Light smaller and portable • The buttons sound good 	<ul style="list-style-type: none"> • Not friendly to new players
Synths lab solo Macropad	7 buttons and a dj spinner	<ul style="list-style-type: none"> • Visually appealing • Small portable light weight • Buttons sound nice 	<ul style="list-style-type: none"> • Can get extremely cramped • Need to download extra software to run the controller
Phoenix Wan IIDX cntroller	7 buttons and a dj spinner	<ul style="list-style-type: none"> • Visually attractive 	<ul style="list-style-type: none"> • Bit too loud

Controller	Buttons	Advantages	Disadvantages
		<ul style="list-style-type: none"> Can change which side you want to play from Extra instructions to make it easier to set the controller up 	<ul style="list-style-type: none"> Need to buy an extra adapter Turn table part feels dirty and uncomfortable after few use

DESIGN RATIONALE

I wanted my controller to look like a dj set, where the play buttons look like a record so it looks like your playing a song for the roblox avatar to dance too. (for explanation, the avatar will start dancing if you are playing well in the game)



As you can see the roblox avatar is dancing here

Additionally since there are a DJ character that queues in the next track you will play in the game,



The DJ character in question



I wanted the controller to look like it may have belonged to the character in question

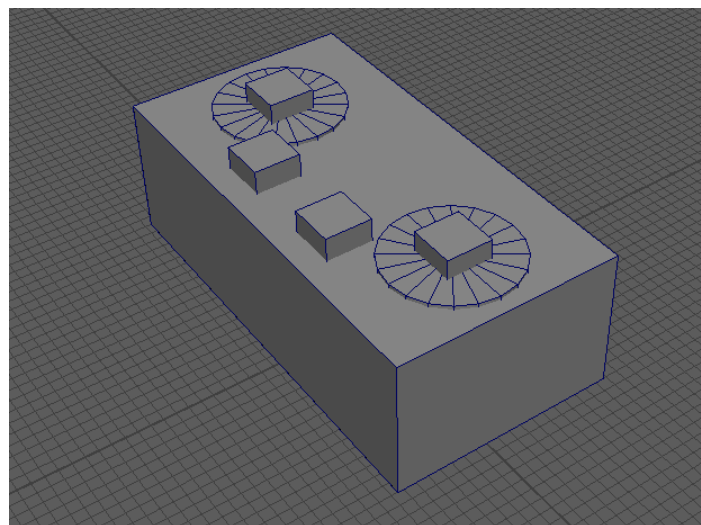
VISUAL RESEARCH



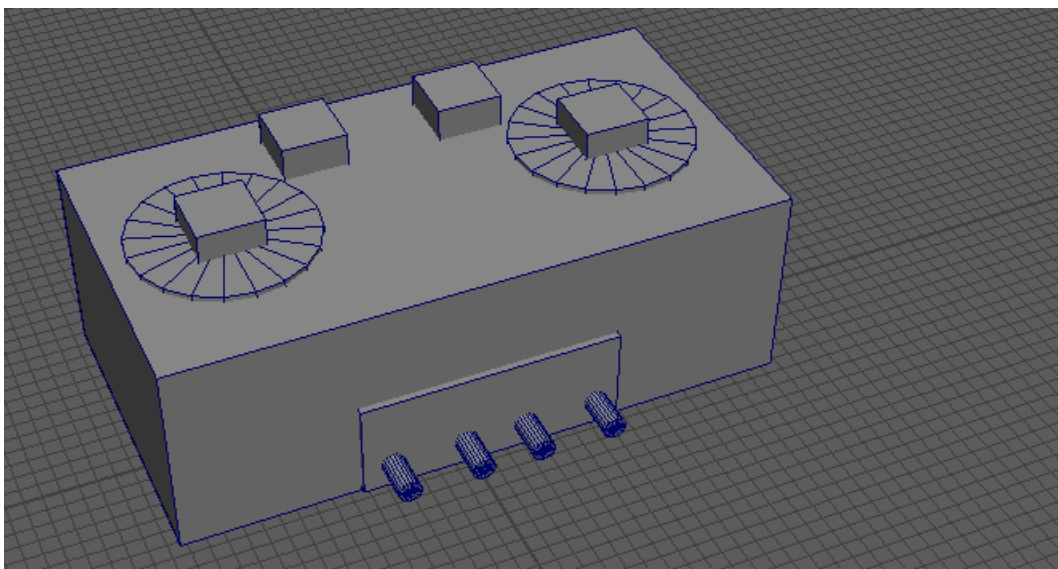
SKETCHES

I decided to first sketch out my immediate thoughts after the assignment was announced .

I decided to model out a rough look how I wanted it to look.



I wanted to put a input system at the back of the controller originally in the first draft till I decided to use a shoe box where it be easier to put makey makey in the inside



I then sketched out what i wanted the visual of the controller to look like

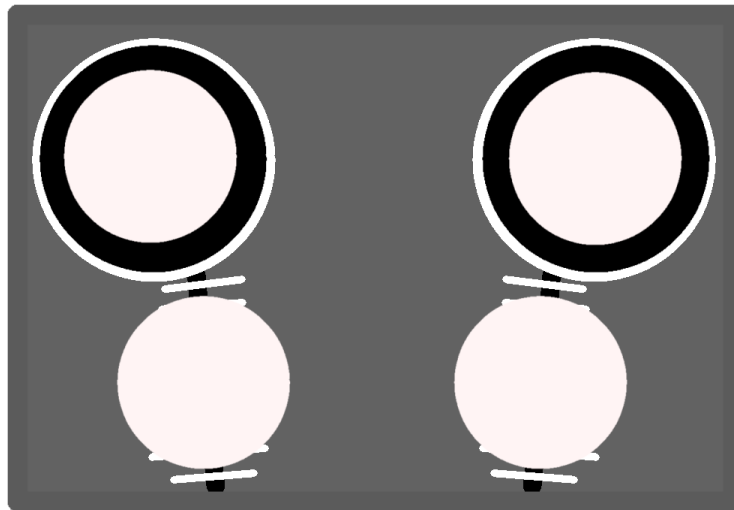
I wanted the top to look like this, similar to the top of a dj set

I wanted two of the buttons to look like the turn tables



I wanted the other two buttons to look like these up and down buttons

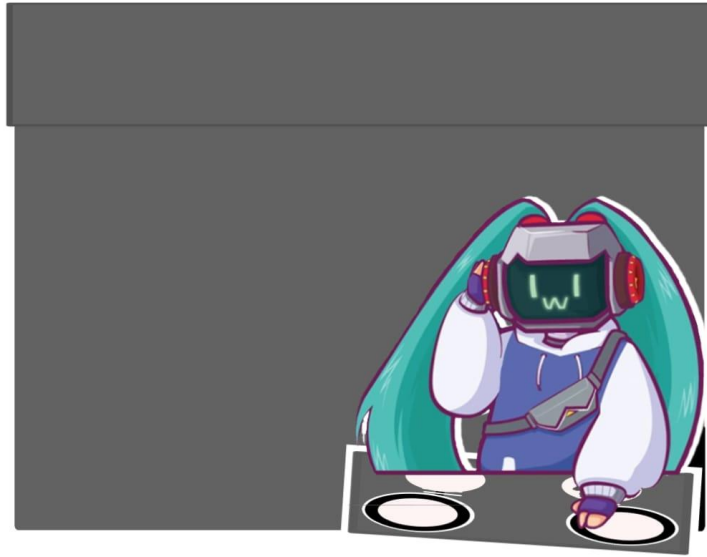
So this was what I sketched out as an idea



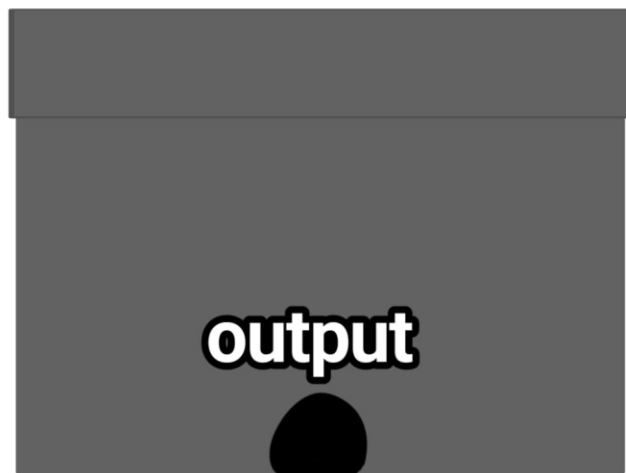
I wanted the side facing the player to have the logo of the game with a white border surrounding the logo to make it pop out more and to emphasize that this controller was made for dedicated Robeats players who want a controller dedicated to the game (the target audience, look back to page 7) , and to make it look branded towards the game



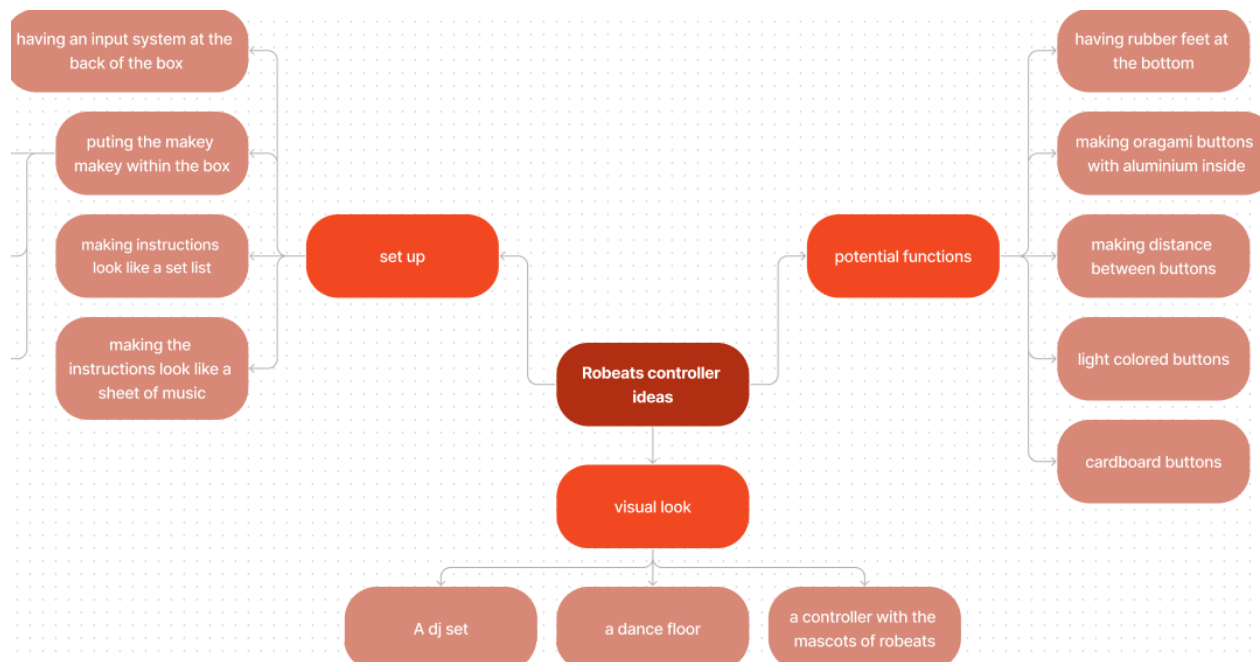
And I wanted to put a picture of the DJ character on the side to make it seem more on theme that the dj controller belongs to him



I want to put a hole and a sign showing where the usb and alligator clip, connected to the earth of the makey makey should come out of



MIND MAP



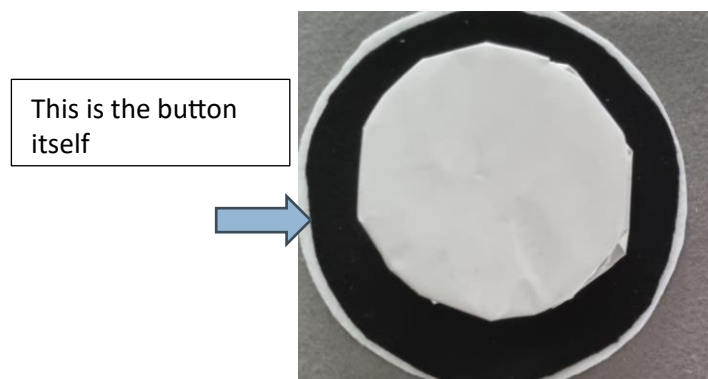
FEATURES

ADDING BRIGHTLY COLORED BUTTONS

Rhythm games in general like robeats has fast-paced gameplay and it uses hand eye coordination, and due to this, visibility of the buttons are crucial in rhythm games, as if they do not press the correct thing they may loose their combo and their scores.

Most robeats players, including my persona, use their keyboards, which are usually fully grey or black, they aren't very eye catching decreasing the visibility of the buttons.

To increase visibility, I decided to use bright color, which is white,



as from looking from this article "Luminosity, or brightness of that color, can help to increase contrast. The brighter something is against its environment, the more it will stand out. High contrast items travel to our brain the quickest, winning our attention and retention". (Grabbing attention with color, and other tips!, n.d.), thus by doing so, the increased visibility can help players quickly locate the correct buttons during fast paced gameplay.

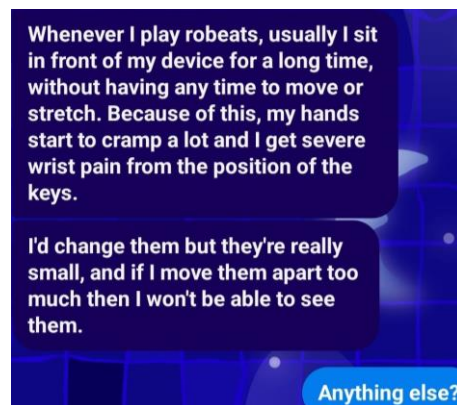
Also looking from my research on controllers, an advantage that some controllers shared like the Divaller was that the buttons could light up making it easier to see, since I was not able to implement lights in my controller, this was the next best thing I could implement, bright buttons to make it easier to see them

Additionally, since my controller is mostly grey and dark in color, the white buttons contrast well against the background of the controller housing to make it easier to distinguish between the buttons, reducing confusion during gameplay.

ADJUSTING THE LAYOUT OF BUTTONS

My persona mentioned to me that when they play robeats for long periods of time, their hands tend to cramp because of the layout of their keyboard.

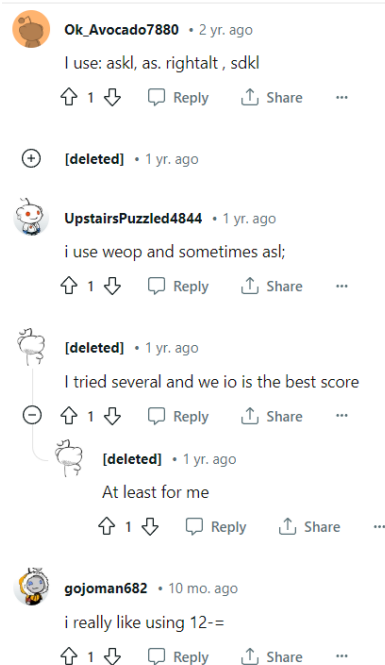
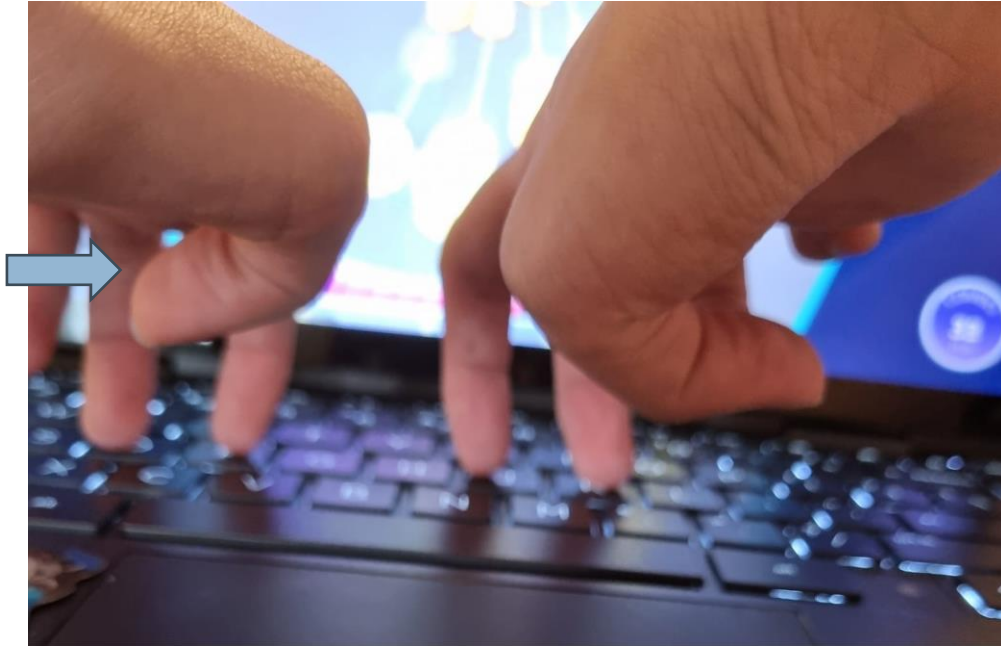
This image bellow shows the image of our conversation



If they adjust the key binds to increase the distance between the buttons to try to make it more comfortable for the long run, it just makes it more difficult to keep up with the game, as players may realize they have to look over a larger area because of this change and with small monotone colored keys, players will have a harder time seeing where the key binds are.

Most robeats players including her uses key binds that have a gap in the middle but the two keys side to side

This is a visual to help understand what this means. Usually the keybinds are two letters next to each other for each hand with a large gap in the middle. In this picture im pressing DF JK while playing robeats



This is a screenshot of a forum asking robeats players what keybinds they like to use
Where all their keybinds are similar to the picture shown above, two keys next to each other for each hand with a large gap in the middle

https://www.reddit.com/r/robeats/comments/ho9pvf/anyone_best_keybinds/

I realized that playing with these keybinds on the keyboard is not very ergonomic, especially in the long run, where they press the keys in one straight line, as well as research showing that modern day keyboard layouts QWERTY is not ergonomic,

QWERTY
modern
keyboard



which the research states that “The QWERTY keyboard was not designed to be ergonomic. It has a high same-finger ratio, which increases strain. If you type constantly on the QWERTY keyboard, your chances of developing carpal tunnel syndrome are higher than with a more ergonomic layout.” (Balton, n.d.).

Therefore for my controller I decided to take inspiration from a more ergonomic keyboard named the Alice style keyboard originally designed by “keyboard enthusiast Yuk Tsi in 2018. She split the keys in half and slightly angled them to make them feel more ergonomic” (Chaney, 2023)

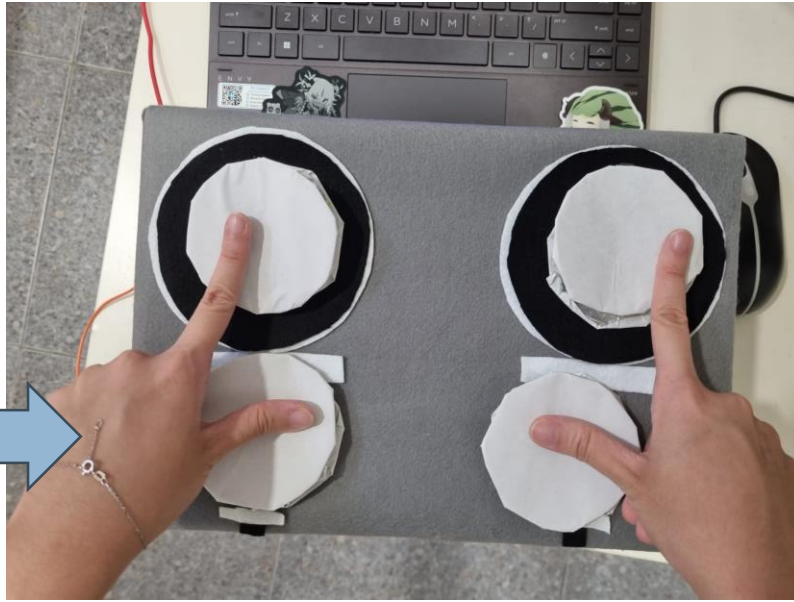


This is what an Alice keyboard looks like

Additionally, when looking at my research on controllers the Synths lab solo Macropad, one of its disadvantages is that since it's small the distance between the buttons are small too, making it more cramped and harder to see where your pressing and making your hands feel cramped and uncomfortable

The take aways I got from this keyboard, research and my persona, is to increase the distance slightly between buttons but not to far that players can't press all 4 buttons at the same time, and to also to have the buttons slightly angled and not in a straight line, so the player can stretch their hands more to be more ergonomic and for their hands not to feel cramped or in pain after long play.

As you can see their hands are more slightly angled making it more ergonomic



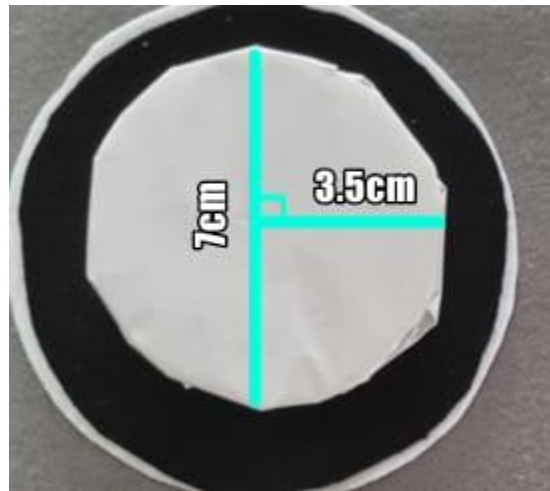
ADDING RUBBER FEET



When playing with a controller, most of the time it tends to slide away easily when the player is too focused on the game, especially for rhythm game players who mostly focus on the screen, they may not realize their controller is sliding away and when pressing on where they thought the button was, they realize the controller has slid away, causing them to lose their focus, combo, and score in the game.

Additionally since looking at my research on controllers, this was also an advantage point from the Pocket SDVX Pico v5. Thus I decided to add rubber feet to increase stability and reduce slippage so that the controller stays in place and players can continue to focus on the game.

MAKING THE BUTTONS LARGE



The buttons have a radius of 3.5cm and a diameter of 7cm, the area of the circle is 38.5cm^2

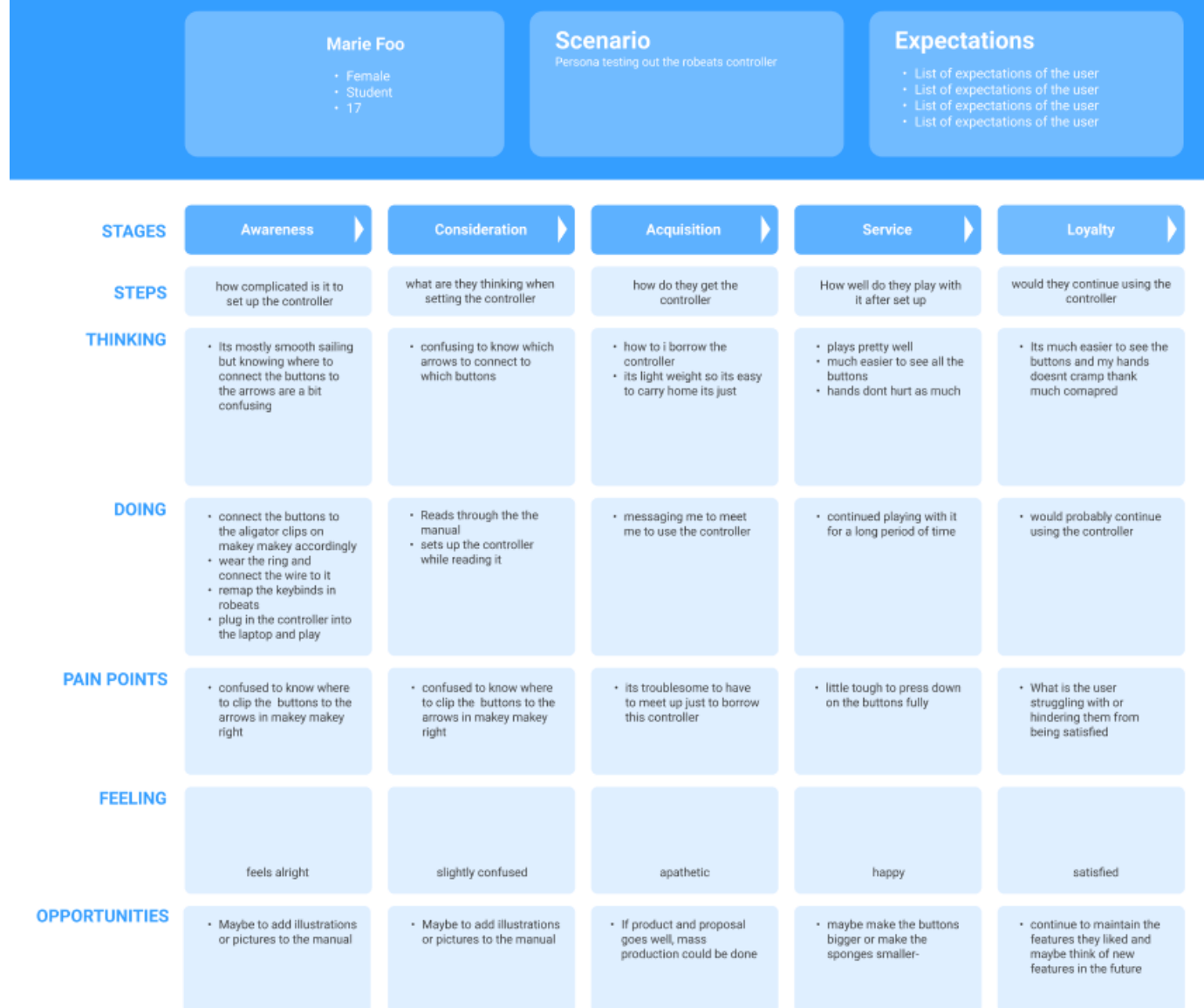
I decided to make larger sized buttons, so that there is more visual clarity. The larger buttons can improve on the visual clarity, making it easier for players to identify the different buttons during the quick gameplay of Roblox, as well as increasing the precision and accuracy, since it adds a larger surface area, compared to the keyboard, where the keys are smaller in comparison to the buttons that I implemented, thus harder to see.

Second, the larger buttons makes it more accessible for a wider audience, for different dexterity or players with larger hands. Players with larger hands may have more trouble seeing the keys or hands may hurt with smaller buttons. Thus compared to a keyboard, this controller with the larger buttons can help those who may have difficulty with precise movements can benefit from the increased target size, making the game more inclusive.

Additionally like stated earlier during my point about widening the distance within buttons, the wider surface area allows players to distribute the force across a larger portion of their fingers, minimizing the strain on specific joints or muscles.

USER JOURNEY

USER JOURNEY MAP: Robeats controller



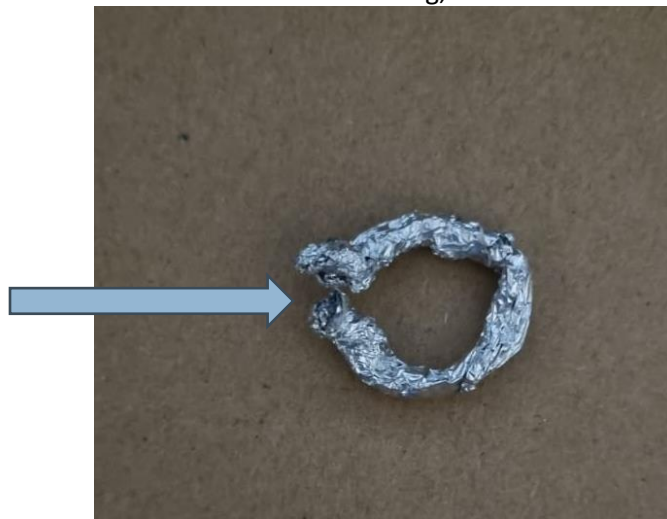
THE FINAL PRODUCT

The top of the controller and the buttons looks likes this



The inside of the controller includes the aluminion ring, where it can be adjusted to any size of finger

Its not fully attached to both sides so when wearing it you can adjust it to your finger and mush it together to make the ring



Underneath the lid of the controller has these metal string where you attach your alligator clips too, their long so its easier to clip them on



The front looks like this, having the robeats logo in the front, I used felt behind the logo to make it pop out



On the side I put dj miku to continue the robeats theme and as a reminder or implying that the controller belongs to him (you can even see that the image I printed I edited in the picture of my sketch of the top buttons of the controller)



This is the output hole (I purposely used the roblox font for this text since robeats is a game on the roblox platform, additionally since I used a shoebox, I can easily hide the makey makey and all its wires inside making it look more neat in general)



And as shown earlier the rubber feet at the bottom of the controller



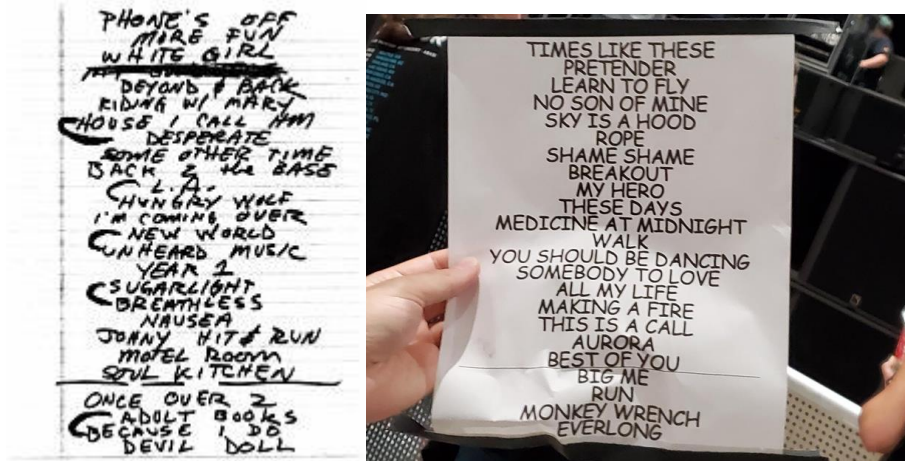
The measurements are 30cm by 20 cm by 10 cm , and it weighs about 405g, which is an advantage since it is light weight.

Here is a video showing the controller off, and me using it in the game:

https://ivid2.np.edu.sg/media/robeats+controller/1_no70tr81

MANUAL

I decided to make the manual look like a set list to fit the dj theme, and to write the words as if DJ Miku (the dj character in the game) wrote this set list and is teaching the user how to start up the controller, in a set list of instructions. (set lists are usually written down in pencil or pen on a piece of paper or use similar font to the one I chose, examples can be seen below)



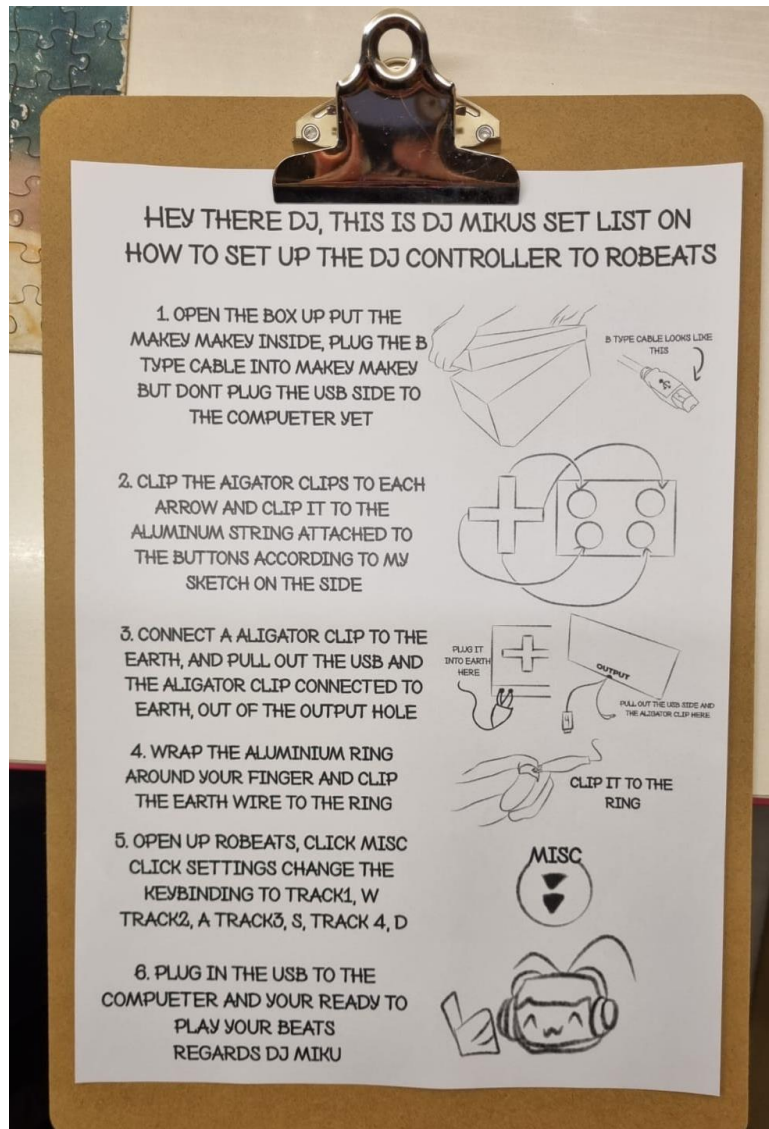
After the user journey, I also decided to draw extra visuals to the manual to help new users understand better how to set up the controller. I also used a sketchy style and a pencil type brush to make it look like someone sketched it too fitting the set list style.

This is the digital version of the manual I made.

HEY THERE DJ, THIS IS DJ MIKUS SET LIST ON HOW TO SET UP THE DJ CONTROLLER TO ROBEATS

1. OPEN THE BOX UP PUT THE MAKEY MAKEY INSIDE, PLUG THE B TYPE CABLE INTO MAKEY MAKEY BUT DONT PLUG THE USB SIDE TO THE COMPUETER YET
 
 2. CLIP THE AIGATOR CLIPS TO EACH ARROW AND CLIP IT TO THE ALUMINUM STRING ATTACHED TO THE BUTTONS ACCORDING TO MY SKETCH ON THE SIDE
 
 3. CONNECT A ALIGATOR CLIP TO THE EARTH, AND PULL OUT THE USB AND THE ALIGATOR CLIP CONNECTED TO EARTH, OUT OF THE OUTPUT HOLE
 
 4. WRAP THE ALUMINIUM RING AROUND YOUR FINGER AND CLIP THE EARTH WIRE TO THE RING
 
 5. OPEN UP ROBEATS, CLICK MISC CLICK SETTINGS CHANGE THE KEYBINDING TO TRACK1, W TRACK2, A TRACK3, S, TRACK 4, D
 
 6. PLUG IN THE USB TO THE COMPUETER AND YOUR READY TO PLAY YOUR BEATS
 
- REGARDS DJ MIKU

And here's the physical version of it where I bought a clipboard to make it look more like an actual set list



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