Industrial Design for Game Hardware Assignment 1

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***Abstract*—This document is a model and instructions for LaTeX. This and the IEEEtran.cls file define the components of your paper [title, text, heads, etc.]. *CRITICAL: Do Not Use Symbols, Special Characters, Footnotes, or Math in Paper Title or Abstract.**

***Index Terms*—component, formatting, style, styling, insert**

I. Introduction

Splatoon 3 was released on September 9th, 2022. The game is enjoyable to play, but we found that the Nintendo Switch's Joycon were unsuitable for play. With this in mind, we set out to create a new controller for the purpose of playing the game.

II. Project Description

A. Problem Definition

The problem we found was that *Splatoon 3* was difficult to play with the Joycon that come with the Nintendo Switch. This problem affects those who play *Splatoon 3*, especially the player versus player side of the game, who may be used to other ways of playing games. This problem tends to be solved by using a different controller or sets of controllers to play the game.

B. Justification

If people are stuck playing a game in a way that is intuitive or uncomfortable for them, they may end up quitting the game. This would hurt the community and Nintendo in the long run. This one of the reasons that this should be addressed.

Another reason is that the Joycon themselves have a few problems. The motion controls are only found in the right Joycon, which can confuse people when they are trying to use it. The Joycon themselves are small and are hard for larger hands to grip. Finally, the Joycon can suffer a problem that causes the stick to drift and affects gameplay. As talked about by Andrew Laughlin "Two in five UK Nintendo Switch Classic owners experienced persistent drift problems with the Nintendo Joy-Con controllers, based on our survey" [2].

III. Ideation

The original idea we had coming into this was inspired by the a video by altdrewism on Reddit [1]. This inspired us to make a controller that looks like a gun to help with immersion. Rory Mcgloin found that controllers that matched the game tended to be more immersive than controllers that didn't [3]. Paul Cairns found similar things about with mobile games [6]. This is useful to know for our ideation process and can help us design better possible controllers.

A. Interviews

We interviewed six people and asked them these questions:

What do you use to play Splatoon with? If you don't use the Joycon, why? Do you ever have problems with the gryo or motion controls while playing? If you use the original Joycon, would you be willing to switch to a different controller? Do the controllers you use ever ruin your immersion?

We mainly focused on the joycon and immersion within our questions, as that is what we felt were the biggest problems we wanted opinions on.

Four out of the six people interviewed stated that they used the joycon. The two that didn't used either a pro controller, or an off brand alternative. Everyone did express interest in using a different controller, which we found beneficial. Half of those interviewed had problems with the motion controls, which is something we wish to fix. The biggest issue we gathered with the joycon were the button size and grip.

B. Re-framing the Problem

Our main goal with this project is to make a fun and immersive experience that can act as an alternative to the joycon. Using the insights we gained from our interviews, we know that players want a larger and easier to grip piece of hardware they can use to play the game with.

C. Generating Alternatives

We came up with five different controller designs. Each are a little unconventional as they are shaped as different guns. They can be viewed in fig. 1.

Fig. 1. The ideation process from [7]

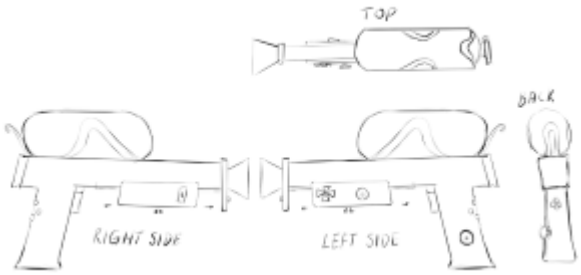

Fig. 2. The final design

Four of the six people liked the 4th option. Their reasoning was that the gun looked the most interesting and appealing. The other option that was most liked was the 2nd, which was thought to be the most comfortable looking.

IV. Final Decision

From what we had obtained, we created a the final design we wanted to work with. It used the 4th option that was offered above and can be viewed in fig. 2 below.

While much of the controller is cosmetic to help embrace the immersion, the active parts of the controller are modelled similarly to a Joycon. The places where one would set their hands is where we placed the two sets of controls. The front set of controls has a moving shaft that acts as the ZL on the controller. The ZR is the trigger of the gun. The right joystick is located at the handle where one could easily rest their thumb.

V. Product Comparison

In 1985, Nintendo released the NES Zapper [5], a light gun peripheral for the Nintendo Entertainment System that was plugged into the system like a controller. The laser-gun styled controller could be pointed at the screen and used to shoot things within the game, like ducks in *Duck Hunt* or cutouts in *Hogan's Alley*.

In 1992 the NES Zapper's successor, the Super Scope [4], was released in North America. Shaped like a bazooka, this peripheral communicated wirelessly with a receiver that was plugged into the Super Nintendo Entertainment System. The wireless technology allowed for greater freedom of movement, as well as immersion. The Super Scope also used an improved version of light gun technology that was immune to the "cheat" where one would shoot at a different light source than the target to guarantee a successful hit.

Nintendo would not officially release another gun-styled peripheral until 2007's Wii Zapper [8], a shell peripheral that a Wii Remote and Nunchuk are slotted into. The Wii Zapper takes advantage of the full technological capabilities of the Wii remote (accelerometers, optical sensing, haptic feedback, audio output), improving the user's immersion and increasing comfort when playing for extended periods of time. While the NES Zapper [5] and Super Scope [4] were only functional on CRTs, the Wii Remote uses a sensor bar and can thus be used with any type of screen.

We are planning to make a peripheral for the Nintendo Switch that is similar to the NS Zapper [5] and Super Scope [4], in the sense that it will be its own controller (as well as the controller's functionality) as opposed to a housing unit for the Joycon. However, since most of the active parts of the controller are closely modeled after the Joycon themselves, we consider the Wii Zapper [8] to be a source of useful design choices to consider for our project.

VI. Planning

For most of our group, this is uncharted territory, though we do have a bit of experience with Arduino's, as such we aren't fully sure how long this project will take, but the figure below fig. 3 made using Trello is our rough plans for the future.

Fig. 3. The Trello Chart detailing a rough Timeline

We plan to build our project in pieces. Everything should come together before the end of November.

References

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