CtrlUP-Stick Project Designing and Concept

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***Abstract*—This document outlines the concept and the planned creation of a one-handed game controller called the CtrlUP Stick. It outlines the reasoning on why it is being built, the design think process, the iterations, history of similar products, a relative timeline outlined in a Gantt chart and the divided tasks for Xavier and Chris.**

***Index Terms*—accessibility, controller, devices, game, one-hand**

Fig. 1. Product Logo.

I. Project Description

This project explores the idea of creating a one-hand controller with the main implications of using it for games. Goal of this project is to provide a possible solution in accessibility, for those people missing limbs.

II. Problem Definition

It is not uncommon for individuals to suffer from missing upper body limbs that prohibit them from using everyday controllers on the market. In the U.S, limb amputations from trauma occur quite frequent, with 3.8 individuals per 100,000 and 2.8 of those commonly being fingers. his totals around 1.7 million people living with missing upper body limbs [1]. In addition, there are also those who are born with missing arms or fingers that are unable to use everyday market controllers and computers. Those who suffer from other issues such as a weaker hand from carpal tunnel may find it hard to use a normal computer setup. There is quite a large amount of people that will benefit from being able to use a controller with only one hand.

III. Justification

Accessibility in video games can be simplified into 4 categories; visual impairment, hearing impairment, cognitive impairment and motor impairment [2]. Motor impairment is what we are attempting to help provide a solution to, players who struggle to provide correct inputs when playing a game due to difficulty using ordinary controllers and/or keyboard+mouse.

Popular consoles such as *Xbox* and *Playstation* require 2 hands to use their controllers. At the same time, common PC setups require a keyboard and a mouse which also require using both hands. With this in mind, individuals suffering from weakened or missing upper limbs may find it difficult to properly use common devices and struggle to play games.

IV. Ideation

A. Design thinking outcome

Empathize: An individual who has broken their left hand. They are unable to properly play games on consoles and on the PC.

Define: There are many people that are unable to play with a standard controller for various reasons, some of which we listed earlier in the paper. Additionally, many one handed controllers only have a version for only one hand - left or right, not both. Therefore, we need a way to be able to play video games using only one hand regardless of which hand it is - right or left.

Ideate: In order to solve the problem we sketched a few design ideas:

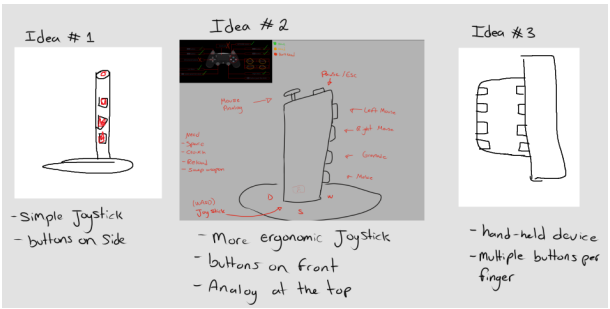

Fig. 2. First three ideas.

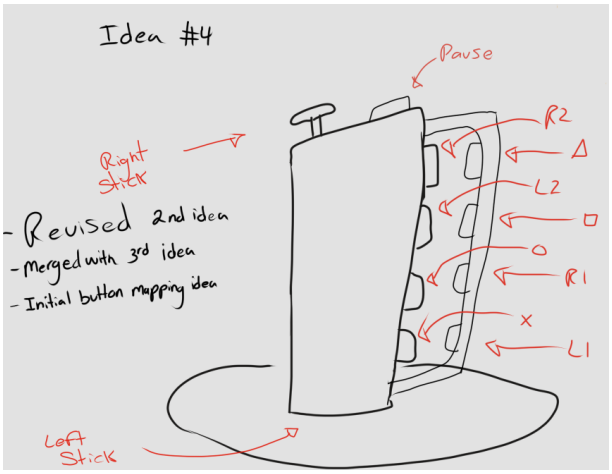

Fig. 3. Fourth Idea created with iteration on previous 3.

Feedback: *Kristian* - Mentioned the analog stick at the top might be better on the side or at an angle. *Mat* - Proposed the location of L3 which were missing before *Professor Quevedo* - Showed us an article/website of a device that also uses multiple buttons for all fingers.

B. Prototype System architecture:

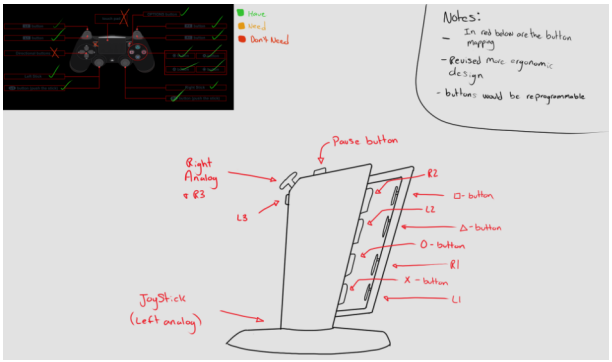

Fig. 4. Current Prototype design with all button mappings.

V. Product Comparison

- Joysticks were very popular with old arcade machines originating in the 1970s
- Further joysticks would be developed but would lose popularity in mainstream gaming for consoles such as the NES (1983), the Joystick patent we found allows for multi-directional movement with improvements to the older versions of joysticks.
- In 2006 the Wii was released which brought one-handed controllers into the spotlight
- During the PS4 and Xbox 1 generation a greater focus was made on accessibility and 1 handed controller extensions
- There have been a number of other one-handed controllers developed over the years and are still being developed today.

Fig. 5. Timeline of all the products listed.

VI. Planning

A. Gantt Chart

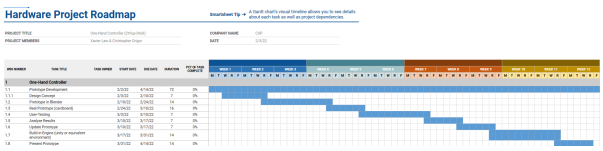

Fig. 6. Gantt Chart of all tasks.

B. Roles and Responsibilities

Most tasks will be divide fairly evenly between both group members. No one task will be completed by just one person but this is a small break-down of who will focus on certain things a little more.

Christopher - Focus more on art and designing aspects, such as making the 3D model, button mapping, and designing the blueprints for 3D printing (if required) Xavier - Focus more on the prototyping and testing, such as wiring the controller, getting user feedback and other related aspects.

References

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