One Handed Guitar Game Controller

Controller development for individuals with limited hand mobility

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***Abstract*—We are looking to develop a controller focused on allowing for one handed or similarly limited mobility users to be able to play rhythm games comfortably. This paper delves into the research process and our thought process for designing the controller in this way.**

***Index Terms*—Accessibility, Rhythm Games, Controller, Design Process**

I. Introduction

While rhythm games are an enjoyable pass time, the large and often bulky controller designs for the instruments are not often accessible for people with limited mobility issues. Our overall goal is to design a controller that allows as many users as possible to enjoy games like Guitar Hero, Rock Band, or Clone Hero.

II. Problem Definition

Controllers for guitar rhythm games, such as Guitar Hero and Rock Band, require full function in both hands to use. This problem affects those with limited mobility/usage, whether that be from an injury or genetics. There has been one documented solution to this problem, the Guitar Hero pedal, which is used to replace the strumming and whammy bar functions on the guitar itself. [1] This however does not solve our problem because you have to have 2 completely separate controllers, still holding a big guitar controller, and an extra step of using your foot. There also was an attempt with the Guitar Hero Grip for the Nintendo DS, which allowed users to easily play with one hand, as well as the Omni Controller, a one handed gaming controller. [2] There also has been the popular one handed controller for the Nintendo Wii, but this controller also utilizes an accelerometer and optical sensor technology, which we will not be using. Also, the Wii controller is not optimized for guitar rhythm games. [4] Another attempt at this problem is the Touch-based Configurable Gamepad, designed for gamers with physical disabilities. This controller however does not include the satisfaction of physical buttons, which is important when it comes to timing and rhythm games. [4] Combining features from these controllers will help create a solution for this problem.

III. Justification

Those with limited hand mobility/usage won't be able to play guitar rhythm games, such as Guitar Hero and Rock Band, or the more common and customizable Clone Hero. A wider relevance would be the limited selection of one handed friendly controllers in rhythm games, or an even wider relevance would be the limited selection of one handed friendly controllers in games in general. Focusing on an accessibility standpoint, the controller that is needed for this concern will have to include; buttons that are very close to each other, so that users are able to move their fingers without needing to bend and being able to reach them. The controller will be designed to be not as bulky as other rhythm game controllers, to allow users to have more flexibility in placement of the controller in relation to the user. [5]

IV. System Architecture

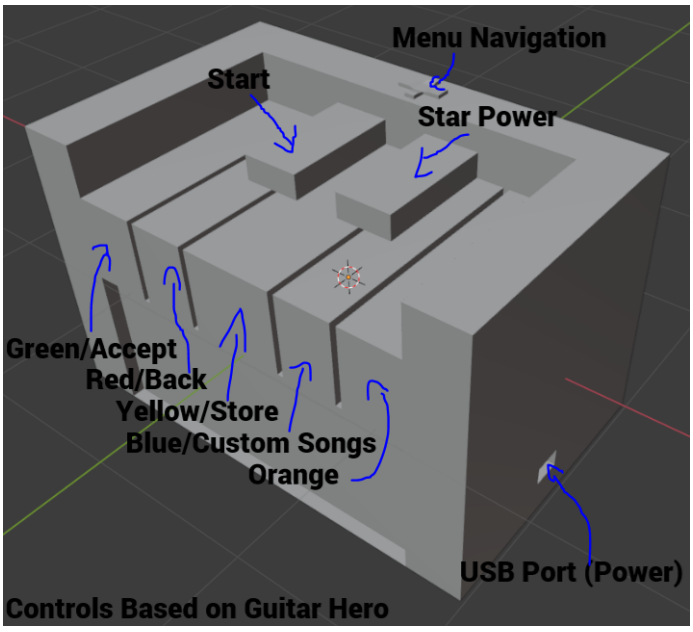

Fig. 1. First design iteration for the one handed guitar game controller

Figure 1 describes the initial design for the one handed guitar game controller. There are the main five traditionally

ivory keys meant to be used for the five main colours present in rhythm games like Rock Band and Guitar Hero; green, red, yellow, blue, and orange. The colour set up is meant to be configurable with both left and right handed users, with the figure describing the default right handed layout. The left handed layout will be configured to flip with the left handed option in the game settings. The two traditionally ebony keys are used for the start menu and the star power options, with the left one currently presumed to be used for opening the start menu and pausing the game, while the star power will be used during the actual play of the game in order to upgrade the amount of points users will get for pressing the correct keys. The D Pad above the keys is designed for easy menu navigation, with the left, right, up and down keys being used for navigating menus in those directions respectively, while allowing for configuration of the menu navigation depending on the orientation users would like the controller to be in. The USB port on the side is meant for being able plug in the controller for power so that the controller can actually run. At the time of this paper's writing, we plan on having the controller be wired, although having a chargeable battery is also under consideration. Any part of the design can be changed in further iterations, so this may not be the final product as we look into more options for better accessibility and ease of use.

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