IOWA STATE UNIVERSITY

AEROSPACE ENGINEERING DEPARTMENT

Computational Techniques for Aerospace Design

AERE 361

Project Proposal

Air Buds

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I ABSTRACT

We will be designing and implementing an interactive game based on colors and progression using the LED lights on the CPX board. The player will be able to use their inputs to change how the light behaves such as speeding it up, slowing it down, or even transport the light to a different location on the board. The base game would start with the player having a single white light orbiting around the board. The player is then able to put colors on the circle with 3 different input buttons. These colors can combine and create other colors. Each with different effects on the white orbiting

The possibilities of what we can do with the game are almost endless. We would like to make this project with the ability to easily create game modules. JSON files could be used to load up new game rules or give the game different starting states.

II INTRODUCTION

This project begins with a very simple orbiting light that will interact with the players input. The player's input creates changes throughout the game and allows for new and interesting mechanics to be added. Our team of Dillon, Dylan, Ryan, Cade, and John will be working to design and execute this game on a Circuit Playground Express. The team is attempting to create this game to meet some of the main pillars of game design on a smaller scale. The Circuit Playground Express is the perfect platform to create a small and innovative project of this caliber.

III FEATURES

The features of this project will allow for a dynamic game which differs from user to user. Progression will be a huge part of the game one of the biggest reasons people would want to play. The changing game will keep players interested and with the goal of being rewarded for testing out new things.

We will be able to change way the game plays using JSON files. Each of these files can store the rules of the game basically. Implementing this correctly and using sufficient documentation will allow people to easily create their own rules using nothing more than just a basic text file editor to edit JSON files.

Another feature of the game will be a competitive way to compare two players scores from each other. This will create a sense of success when one player does better than another and allow for competition to be built in to the game. Other features of the different colors will create for a challenge within the game and force players to be attentive and consider each move.

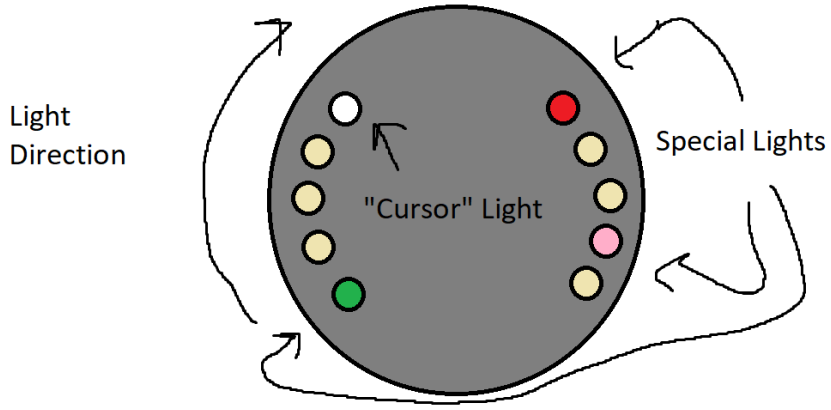

Figure 1: Game Diagram

IV PROBLEM STATEMENT

For this project, we are aiming to create a simple but interesting and engaging game that gives the player a lot of freedom to experiment and explore. With a device as simple as the Circuit Playground Express, it would be very easy to make a game that either cannot hold the player's attention or is simply not fun. This is the problem that we hope to solve.

To achieve our goal, we expect to implement principles of good game design [1]. For us, some of the most important of these are the game should give the player a sense of lasting impact, a sense of reward, and a sense of progress [2]. The game should also allow the player to have creative freedom and curiosity. In addition, we may try to incorporate additional elements of game design such as competition and challenge.

All of these can be difficult to achieve for a game that is extremely simple. However, we hope that with our idea and implementation we will create a game that fulfills these principles and is truly entertaining and attention-grabbing.

V PROBLEM SOLUTION

We plan to create a game that meets our goals for an engaging game play design but on a smaller hand held scale. As discussed in the problem statement, our idea hopes to accomplish this through implementation of good game design principles [1][2].

Our base mechanic of the game aims to give the player a sense of lasting impact and allows them to interact with the game environment. There will be a white "pointer" light that will circle around the board at a constant speed, hopping between LEDs. This pointer acts as a cursor, and one of the buttons will allow the player to toggle its movement. The other button will change the color of the LED that the pointer is on.

To achieve a sense of reward, we plan on implementing a color unlocking mechanic. The player would start out with only one color option, and "painting" with that color in a certain manner would unlock a new color. From there, the player can continue to find new colors. As an example, the player might put yellow next to blue to find green.

These new colors also add to game progression. Each color will have a special property associated with it, so that it interacts with the pointer or with the other colors on the board. For instance, red might be "fire" that will slowly consume colors around it unless it is "put out" by blue or contained by black. Or, purple might be a portal that teleports the pointer to another purple light. Ultimately, the player will want to find all of the colors.

Additional elements such as competition or challenge can be added if we decide that they should be included. Competition can come from counting the time or how many moves it takes to unlock all the colors, and challenge can come from enabling the player to lose in some ways. Perhaps the game would start over if the whole board gets covered in fire or even if the player touches it.

Table 1: Parts needed

Part description	Qty
Adafruit Circuit Playground Express	1
AAA Battery Holder	1
USB Cable	1
Arcade Button (maybe)	3
Neopixel Strip (maybe)	1

VI CONCLUSION

We plan to create a simple but interesting and entertaining game. Our idea allows for a lot of modification, so that if we find something is not meeting our criteria we can try something else to continuously improve each iteration of the game. The game involves controlling a pointer light and using it to paint the board. The colors used will react with the pointer and with each other in different ways to unlock new colors and to make them more interesting. These mechanics should combine to form a charmingly simple game that successfully engages its audience through good game design.

References

[1] Dustin Tyler. "3 Primary Game Design Principles To Keep in Mind When Making Games". In: (June 2021). Ed. by Brian Wirtz. Online; posted 25-June-2021. URL: https://www.gamedesigning.org/learn/game-design-principles/.

[2] Jonas Tyroller. *Can We Make This Button Fun To Press?* Youtube. 2020. URL: https://www.youtube.com/watch?v=7L1B5YaxxoA.