Game Design Document

Something Fun Studios

"AstroTrip"

Game lab #1 2019

1 Introduction

This document shows the creative process of the development of a 2 button physics-based platformer game directed at an audience of people with physical and visual disabilities. The game is a physics-based platformer that has options for customization, procedurally generated levels, and a coop mode.

2 Scope

This document is intended to be read and edited by designers, producers, programmers and artists.

3 Concept

3.1 Goal of the Game

Since the game itself doesn't end, the goal is to pass the levels in each different difficulty. The idea is to give the target audience a replayable game with different challenges, or they can also play multiplayer mode. This way, the target audience can have a game content for a long period of time.

3.1.1 Internal Goals

Autonomy, socialization, joy, sense of achievement.

3.1.2 External Goals

Getting investors, having our product actively used by at least 1 health institution, having the product published.

3.2 Target Audience

The target audience is people with physical disabilities who struggle with computer input. There are numerous conditions that limit a person's movement. However, thanks to availability in the current age there are various, existing controllers so that most of them can still enjoy a video game. We are aiming to create a game that can be used by people with some sort of partial paralysis that limits their movement and/or are in some form limited to using very few buttons. The game will be available to people with visual impairments, such as not being able to read and/or being colorblind.

3.3 Target Systems

The target systems are: PC, windows 10 and possibly mobiles.
The target platforms are: Windows store, Steam, Discord Store, Cloud Whale Studios' platform.

3.4 Concept Summary

The aim of the game is to put the player in the shoes of an explorer, lost on a long mission to collect samples of Air, Water and Soil in different planets. The character can hop from location to location and will interact with different platforms, materials and challenges on his way to gather the samples he is looking for. The levels will be procedurally generated, which will make the game highly replayable.

Research shows that people with physical disabilities, such as cerebral palsy, have a tendency to feel isolated from society and lonely (Rokach, Lechcier-Kimel, & Safarov, 2006). This is why, the game will have a coop mode which will allow the player to go through the levels with a friend. This is done with the objective of reducing the sense of loneliness in people with physical disabilities. In this coop mode, the second player will be able to push, pull and move more freely than the first player creating more opportunities for emergent gameplay. Due to the added mechanics, the coop mode will allow players to explore areas that couldn't be explored in single player. There will be three different worlds. These three different worlds have different difficulties and introduce new mechanics to the player as they go along. The easy world is meant to teach the player the basics of the game and be a very forgiving place that the player can learn how the game works without being overwhelmed by the game. The medium world introduces enemies to the player as well as more complex levels that require more thought for the player to navigate through. The hell world is the hardest of them all, the level design is made to be extremely challenging and test the abilities the player has learnt from the previous worlds.

3.5 Setting

The setting is in the distant future, where space travel and exploration are normal and the character can traverse between different planets. There are 3 planets in single player mode, each representing a different difficulty level, which are easy, medium and hard.

3.5.1 Theme and Mood
Astronaut in a space exploration mission.

3.5.2 Form and Style
Score and collectibles.

3.6 Backstory

Juhn Snu Wack is an astronaut that works for SSRA(Super Stellar Research Association), a space organization that focuses on investigating other planets' capability of sustaining life. Juhn was assigned with an exploration mission: he needs to go to 3 planets and collect important samples to bring back to the SSRA base.

3.7 Modes

The game supports two modes: single player and multiplayer.

3.7.1 Single Player

The single player mode will allow the player to choose the level of difficulty in which he wants to play. The levels will be designed to be passed with player 1 movement mechanics and will vary in length depending on the difficulty.

3.7.2 Multiplayer

Multiplayer will support only two players. There will be a single difficulty that can be played. The levels will be designed so that the players collaborate to get the collectibles and pass the level. The multiplayer mode should incite socialization and collaboration between players. The rooms are more puzzle-like and they take longer to be completed.

3.8 Players

Singleplayer/Co-op Multiplayer

Player 1: Astronaut. Limited to catapult movement
Player 2: Robot friend. Moves left and right (no jumping), can pull and push interactable objects.

3.9 Action

Player 1 has to navigate through the map by selecting a direction and power to slingshot themselves whilst collecting items to complete the level.
In coop mode, the two players can work together to get through the level and added challenges.
Player 2 will move objects around to help Player 1.
Player 1 will reach places and press buttons that Player 2 cannot.

3.10 Objective

The objective of the game is to find their way around the procedurally-generated levels in order to collect items and to find the exit to the level.

3.11 Reward System

A three star system displays how well a player did in each level. These stars are used to unlock new levels.
See more details in chapter 7.4

3.12 Game customization

Auto Scroll
- Can be turned on or off depending if the user needs it or not.
- If it is off, the user can use a button for scrolling and another for selecting.
- If it is on, the user only needs a button for selecting as the game will go through the options by itself.

Auto Scroll Timer
- The time taken for the auto scroll to move to the next option can be changed.
- The default time is 2 seconds
- The time can be changed up to 5 seconds or down to 0.5 seconds
- The player can select increments of 0.5 seconds.

Key Bindings
- All the actions in the game can have a custom key bind for it.
- The player can choose to remap the key bindings from the key remapping menu.
- More on this can be read on the [controls chapter](#).

Color Blind Modes
- The entire color scheme of the game can be changed to suit color blind players.
- The user can choose between deuteranopia and protanopia, tritanopia, and normal color schemes.

3.13 Unique Selling Points

1. The possibility to remap the controllers to fit the user's needs, as long as the input device can be remapped to keyboard keys.
2. The option for the user to collaborate and socialize with another person with the multiplayer mode.
3. The game is adaptable for people with visual impairments, like color blindness, by having color blind mode and text-to-speech.

4 User Experience

When it comes to user experience in our game, most things are directly linked to our internal goals. We are trying to bring more joy to their day to day life and give them a sense of independence. The gameplay provides a feeling of accomplishment through several mechanics and permits socialization through multiplayer.

4.1 Sense of accomplishment and replayability

Our target audience is limited when it comes to the activities they can perform in their day to day life, leading to a semi-repetitive lifestyle without a lot of variation in what they do. The market has not provided them with many products and that amplifies the feeling of being stuck in a simplistic life. With our game we aim to provide the players with a game that gives them a sense of accomplishment for the things they've learnt to do by putting the time in to perfect their skills. To provide a good experience we created difficulty levels to make sure everyone has a setting they can enjoy. Since the target audience don't have many other things to do and the market is not yet adapted to their needs. We wanted to make sure that they won't just be stuck with a simple, short game which once they play through, will have no reason to come back again, so we made the level layouts to be procedurally generated, providing a different experience every time they play the game. This way they will have more interest in returning to the game, as it won't be something they will just completely memorizeq in 3-4 playthroughs.

4.2 Auto scroll function

In order to give more freedom to the player, we implemented an "auto scroll" function, which scrolls through the menus at an adjustable speed so that you can adjust most of the options by using only one button.
The user will have access to a different kind of menu. There will be a menu system for the caretakers and another system for the players. This is done in order to avoid that a player accidentally breaks their game and is unable to quit it and ask for help (as games override the communication system they have.)

4.3 Multiplayer

The intention of the multiplayer mode is to give the players the option to share their experience of the game with a close friend or family member; again, a thing which is denounced of them just due to their condition.

When creating the multiplayer mode, we wanted to make sure both players are at an equal playing field with different experiences. We achieved this with mechanics that make use of both of the characters abilities, without making one more useful than the other. They are not identical but they compliment each other and must work together to get through levels. One of them can't

jump and the other can't interact with moveable objects so they need to thing together when approaching a challenge.

5 Levels

5.1 Single Player

When it comes to the pool of games that people with disabilities can play, there is not enough variety on the market. With this in mind, we decided to make the levels procedurally generated based on a set of parameters, meaning that there are close to infinite different level possibilities, which add a replayability factor to the game. The procedural generation will work with rooms: pre-designed rooms will be placed next to each other, following a series of pre-set parameters. After several iterations, we settled on creating a difficulty setting that provides the player with a different level of challenge. The modes will be easy, medium and difficult and they will vary in length and complexibility. Each difficulty is represented by a planet, the art and level design change depending on the planet.

5.1.1 Beat Chart

Level Name	Planet 1	Planet 2	Planet 3
Location	Blue mountains	Red desert	Purple Hell
Difficult	easy	medium	hard
Enemies	x	Ground based	Air based Ground based
Collectibles	Air Dirt Water	Air Dirt Water	Air Dirt Water
Rooms per level (#)	7	9	11
Rooms with collectibles (#)	3	3	3
Normal colors			
Deut. Prot. colors			
Trit. colors			
Mechanics	Slingshot yourself Bounce on bouncy platform	Slingshot yourself Bounce on bouncy platform	Slingshot yourself Bounce on bouncy platform

		Avoid Ground Enemies	Avoid Ground and Air Enemies
Gameplay	Collecting items Platforming	Collecting items Platforming	Collecting items Platforming
Death condition	Player touches spiked platforms or falls from the map	Player touches spiked platforms, falls from the map or touches enemy	Player touches spiked platforms, falls from the map or touches enemy

5.1.2 Level Flow Charts
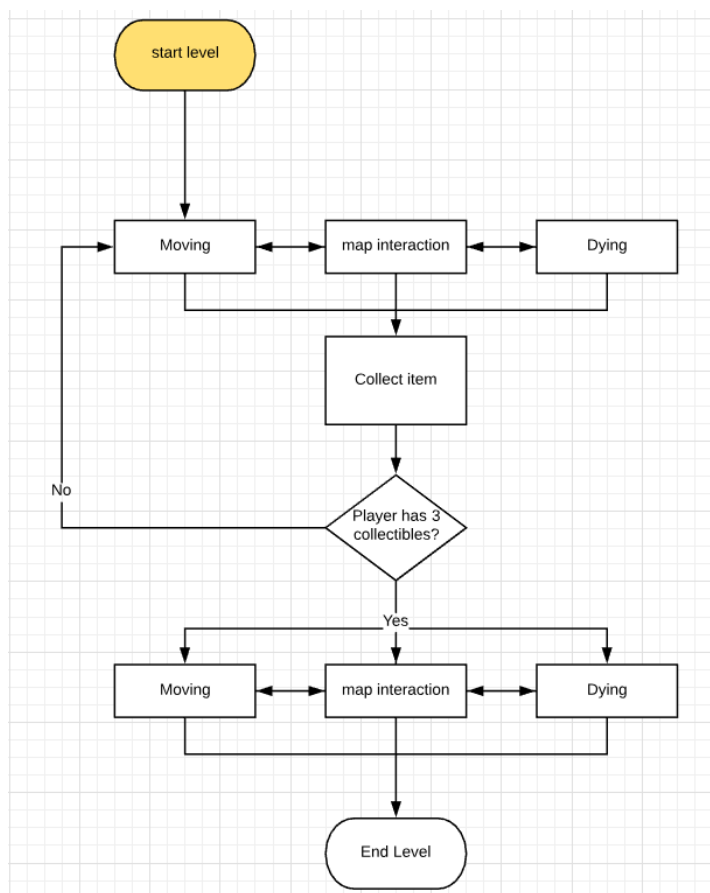
5.1.3 Annotated Maps for Level Rooms

https://docs.google.com/spreadsheets/d/1XT-kvR5FwlUrkFqUwSbkbuqJBm0d9tJb_0mTb_Uzk
MY/edit?usp=sharing

5.2 Multiplayer

The multiplayer mode for the game will be coop and will support 2 players. The goal of the level will be to collect the three collectibles and get to the end of the level. The levels will be procedurally generated with pre-set rooms, there will be 5 rooms per level out of which 3 will have collectibles. Each room will have a spawn point specifically for each player, both player will have to reach the end of the room to move on to the next. The room that the players are in will reset if either player dies, but not the level.

5.2.1 Beat Chart

Level name	Only planet
Location	
Difficulty	Medium
Number of Rooms	5
Number of Rooms with Collectibles	3
Enemies	Air based, Ground based
Collectibles	Air, Dirt, Water
Mechanics Player 1	Slingshot himself
Mechanics Player 2	Pull/push objects, move left and right
Mechanics and Gameplay	-Buttons that open a door/cage to reach the collectible -Buttons that make a certain part of the map move -Bounce on bouncy platform -Collect items -Platforming -P2 can move the movable objects
Platforms in the levels	Bouncy, moving, spikes, pressure plate
Movable objects	Rocks
Death condition	Either player touches spiked platforms or falls from the map
Reset position	If the death condition is met, the level will restart at the beginning of the room where the

	player(s) died. Collectibles won't be reset.

5.2.2 Flow Chart
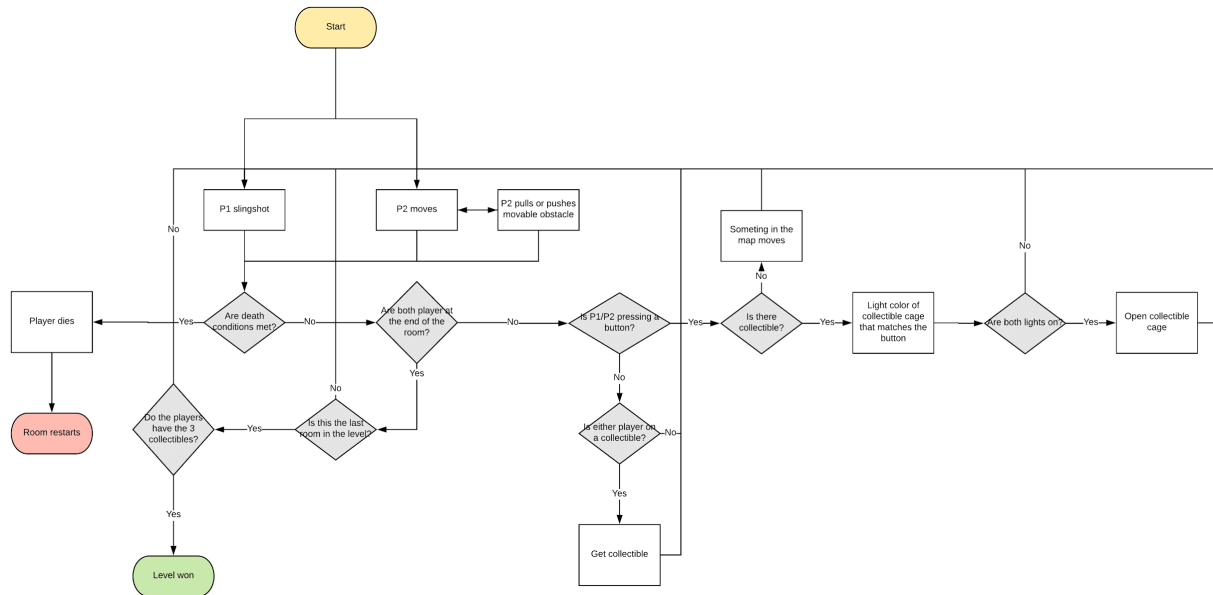
6 Graphics

6.1 Overall Style

2D Vector art because it is simpler and easier to recognize shapes and colors.

A lot of people with cerebral palsy have trouble keeping track of hectic situations and over detailed elements due to their eye muscles having involuntary movement. This is why we went for a simple, vector art and made most of the elements the player sees on the screen static. In the settings is where you can find adjustable colorblindness options for the most common types out there.

6.2 Background

The background will have a parallax effect that displays the planet landscape backdrop as well as the space above it. Objects such as moons and rings can be seen in the sky.

6.3 Assets

6.3.1 Single-player Assets:

Platforms
- Normal
    - When the character hits it, the character will react according to the physics of the game without any external influences.
- Bouncy
    - When the character hits it, instead of landing on the floor he bounces up depending to his previous momentum
- Moving
    - Platform is normal but moves in the y axis or x axis

Walls
- Themed to the planet they are in
- Different wall styles to show different materials

Environment
- Spikes
- Plants
- Rocks

Aliens
- Only on planet 2 and 3
- Movement animation

Structures
- Spaceship
- Space station

6.3.2 Multiplayer Assets

Map Elements
- Buttons (Yellow and Blue)
- Rocks (flat bottoms)
- Cages/Locked doors (metal) (With indicator lights yellow and blue)
- Colour coded platforms for the spawns of each player.
- Pressure plates

6.4 Character

Characters are built with vector art so that ragdoll physics can be easier to implement.

6.5 Animation

The character animation will be done using bone-based animation within unity itself. To do this the character will be drawn in separate pieces so that it can be edited in Unity. There is also an animation for the bouncy platforms to symbolize when the platform has been activated, this is done with frame-by-frame animation.

6.6 User Interface

The in-game UI will be shown on top of the character's head only when the player is ready to make the next move. As the character moves across the screen, the in-game UI will not be shown. The items collected will be shown on the UI "bar" at the top of the screen. This UI bar will be present at all times and does not follow the same disappearing rule as the Character movement UI.

To navigate through the selectable UI (including menus), the system comes with the default option of auto scroll. This means that the system automatically goes through each option until the player selects one. This option can be turned off in the setting, and the timer for the auto scroll (time between selections) can also be customizable in the settings.

The UI will be large and easy to identify through simplistic shapes and icons, and contrasting colors.

The menus throughout the game are design with the target audience in mind. Given that the default option of navigation through the menus is auto scroll, the time taken to navigate through menus is higher than usual. This is why the options are arranged in such a way that the most common ones are closer to the top so that they are faster to access.

For the best experience, the first time the game is booted up the caregiver should adjust the settings, since there is a more complex version of the options in the main menu, which some players might struggle with to set up by themselves.

Players of the game will be capable of adjusting the controls to their liking and the game can be played with a minimum of 2 buttons. The game works with Xbox controllers, keyboards and any input device that can be mapped to a keyboard command.

6.6.1 Start Screen Menu
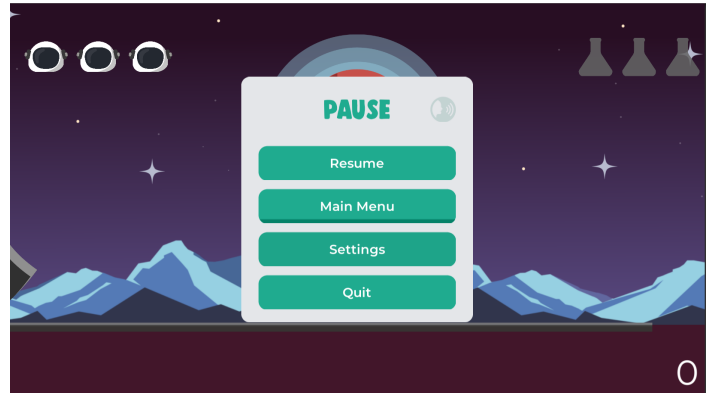
The Start screen menu will include:
- Start Game
- Options/Settings
- Quit to desktop
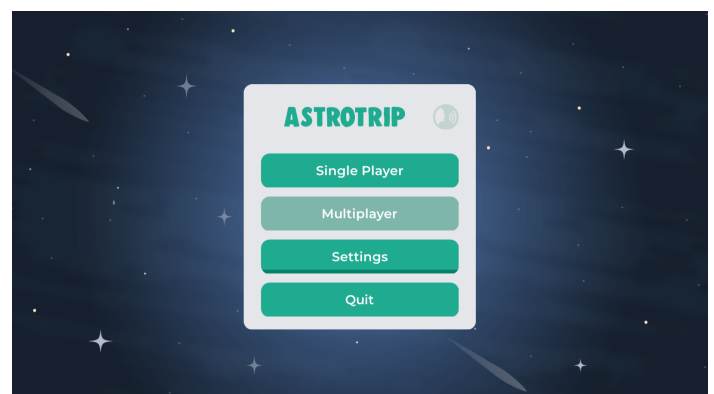
6.6.2 Pause Menu

The pause menu will include:
- Resume
- Options/Settings
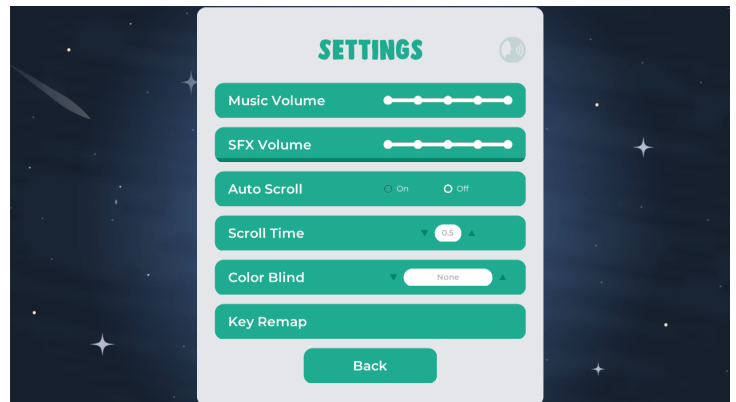- Undo last move
- Quit to desktop
- Quit to main menu

6.6.3 Settings Menu

There will be 2 settings menu, one at the Home screen and one on in the pause menu
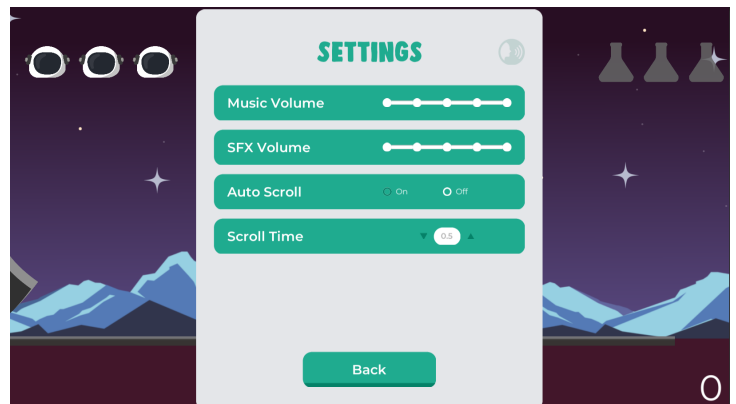
6.6.3.1 Home Screen Settings Menu
- Text to Speech
- Colour Blind mode (choose which one)
- Music Volume
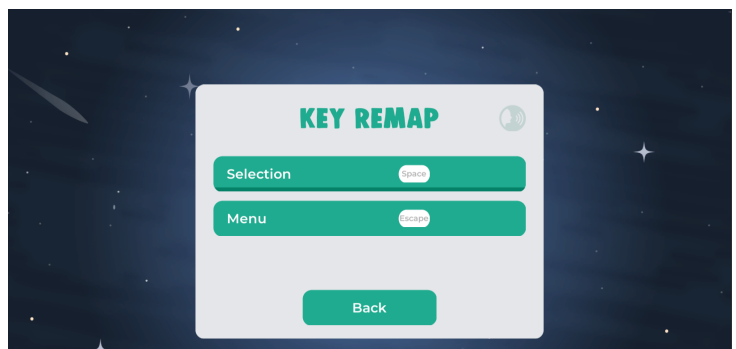- SFX Volume
- Auto Scroll
- Scroll Timer
- Key maps

6.6.3.2 Pause Menu Settings
- Auto Scroll
- Scroll timer
- Music Volume
- SFX Volume
- Colour Blind Mode (choose which one)

6.6.3.3 Key Remap Settings Menu
- Selection key
- Menu key

- Scroll keys, up and down

Link to visualize the working menu UI:
https://xd.adobe.com/view/75f1eeb5-3baf-4697-7519-f7e5b0b2c89a-03c0/?fullscreen

6.6.4 In-game UI

The UI will include:
- Power meter
- Direction
- Items Collected: the items collected part will include a placeholder for when the items have not yet been collected.
- Lives remaining UI
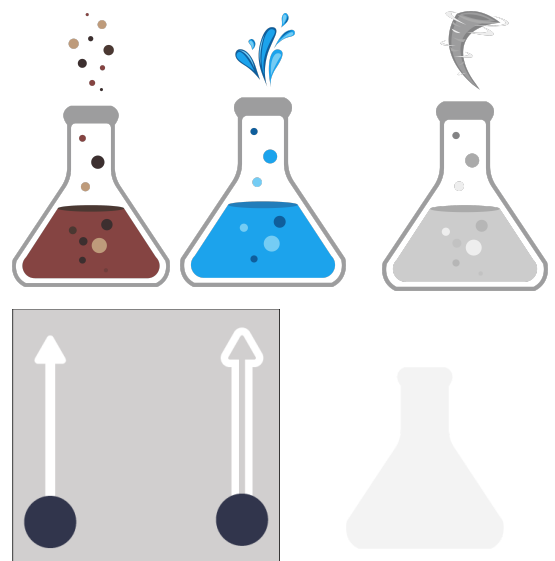
7 Gameplay

7.1 Key Mechanics

The character will power up a jump and hop from place to place, where time will freeze when he has landed until he starts choosing the direction again. He will interact in different ways with the different platforms and will have to overcome challenges and avoid enemies to collect items that are necessary to complete the level.

In multiplayer, the second character will pull and push interactable objects in the map and help the second player get through the level. It will also be able to move left and right, but it will no be able to jump.

7.2 Controls

Player 1: The game can be played with a minimum of two buttons (adaptable to any input device that can be remapped to keyboard keys).
Player 2: Xbox Controller/keyboard + mouse.

The controls for both player can be remapped through the settings menu. Only a person that can use a mouse or a keyboard can change the keybinds.

7.3 Points

Items collected to finish the level.
Score calculated by the hops (slingshots) the player does in the level.

7.4 Rewards

The reward system is represented by stars. The player will be assessed on how well the go through the level. Each level will have a "par" number that will be created by adding up the average amount of moves the player needs to make to go through each section of the level. If the player finishes the level with a number of moves below the par number, they will receive three stars, if they are on par with the par number they will receive two stars, if they are above the par number they will receive one star. The minimum a player can receive from completing the level is one star. These stars will be used to unlock the next two worlds. World 2 (medium difficulty) will be unlocked with "x" stars and World 3 (hard difficulty) will be unlocked with "y" stars.

7.5 Scenes

- Main Menu Scene
- Pause Menu Scene
- Game Scene
- Game Over Scene

8 Software

8.1 Unity

Unity will be the game engine and game editing software that the game will be built on, version 2018 3.6f1.

8.2 Illustrator and Photoshop

Illustrator and Photoshop is the software used to make all the art of the game.

8.3 Visual Studio 2017

Visual Studio is the program used to write code in C# for unity.

8.4 Adobe Xd

Adobe Xd is used to visualize a working prototype of the menu UI.

9. Art

9.1 Concepting

The artstyle will be clear and simplistic, to go well with the problems of some members of the target audience of not being able to read. Research shows that people with cerebral palsy commonly have visual impairments, mostly color blindness (Himmelmann, Beckung, Hagberg, & Uvebrant, 2006). This is why all the art will be rendered with three different art palettes: one for people without color blindness, one for people with deuteranopia and/or protanopia, and one for people with tritanopia.

Different websites we used to aid us in the creation of the color blind palettes (Nichols, n.d.).

Theme # 1 - Space

Colour Palette
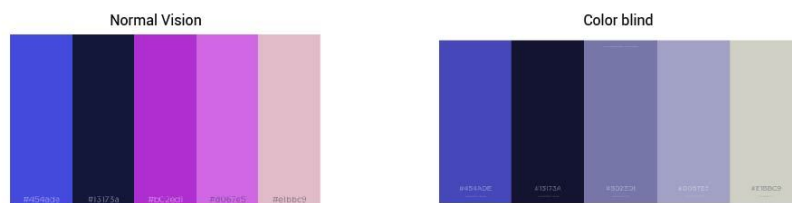
Fonts

Tittle

BUBBLEGUM

Body

Roboto

Inspiration Images

Style guide concept #1

Characters
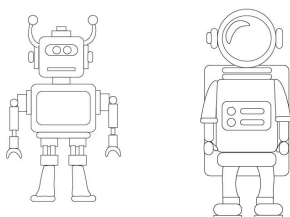
Background
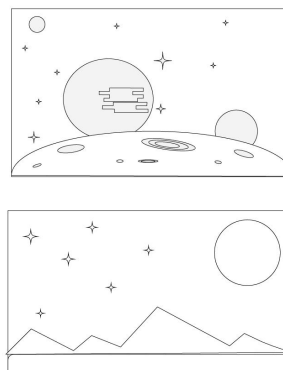
Typography

Montserrat

Montserrat

Montserrat

DK DISPLAY

DK DISPLAY

DK DISPLAY

9.2 Finalized version of art
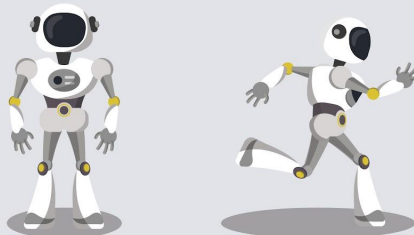
9.2.1 Character

The colors were changed to show that the character is friendly and the main character. The eyes were removed because it made it seem like the character was evil when it is not. The clamps for hands were also changed to humanoid hands so that the player can understand they are playing as a human.
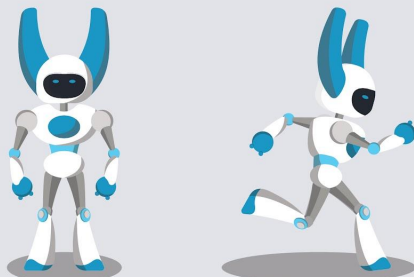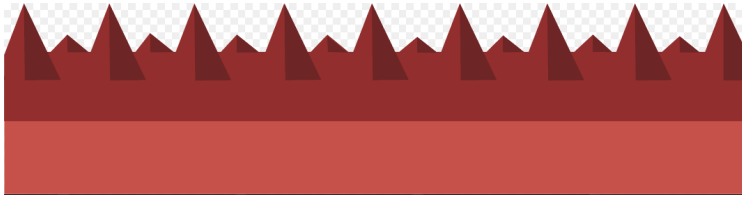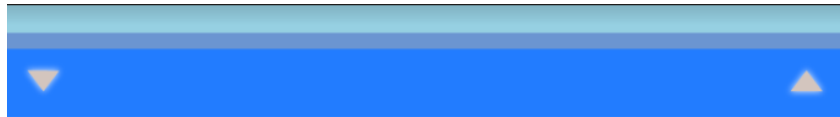
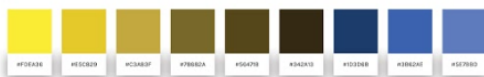### 9.2.2 Obstacles

9.2.3 Platforms

9.2.4 Collectibles

9.2.5 Style Guides

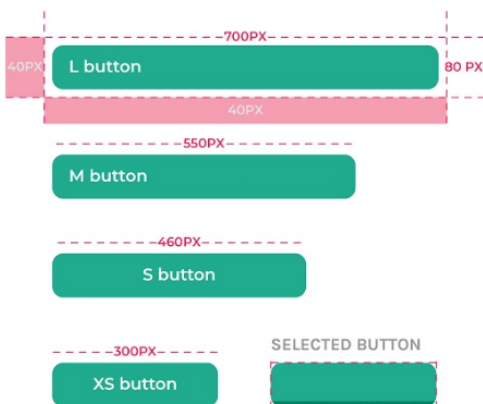COLOR PALETTE - NORMAL VISION

COLOR PALETTE - COLOR-BLIND VISION (P./D.)

COLOR PALETTE - COLOR-BLIND VISION (T.)

COLOR PALETTE - CHARACTERS

COLOR PALETTE - UI ELEMENTS

TYPOGRAPHY

BODY — Montserrat, Semibold, 30pt

TITLE — DK PATROL DISPLAY, Normal, 65pt

MENU TEXT

SETTINGS | 65PT.
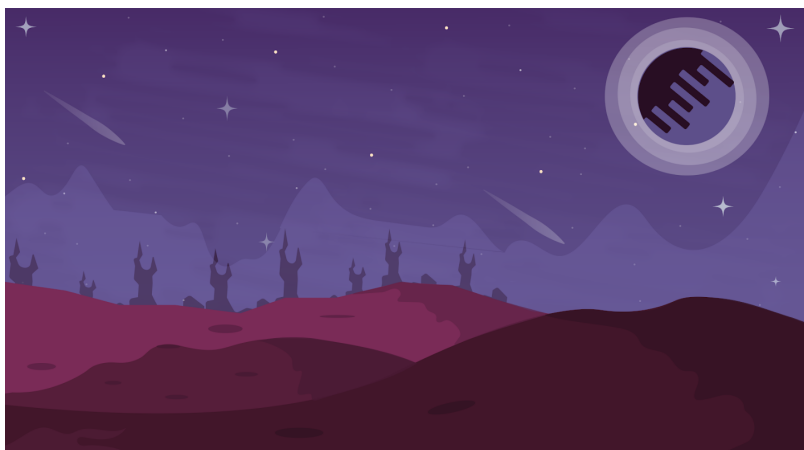
Setting | 30PT.

input | 18PT.

BUTTONS

L button — 700PX — 80 PX — 40PX — 40PX

M button — 550PX

S button — 460PX

XS button — 300PX

SELECTED BUTTON

CORNER ROUNDNESS

20°

ALTERNATIVE BUTTONS

HUDs

SWITCHES — on — off

SCROLLERS — 80 PX — 200 PX — XS — 40 PX — S button

TEXT TO SPEECH — MUTED — ACTIVE
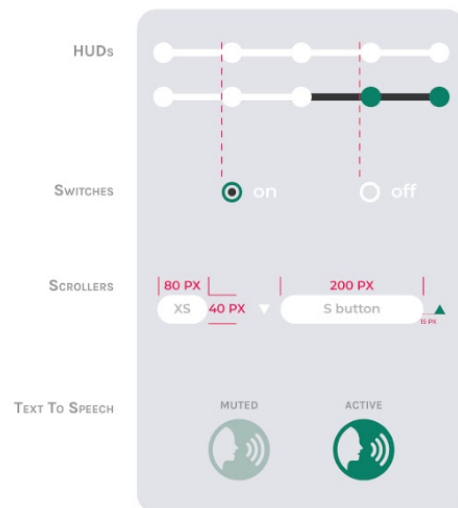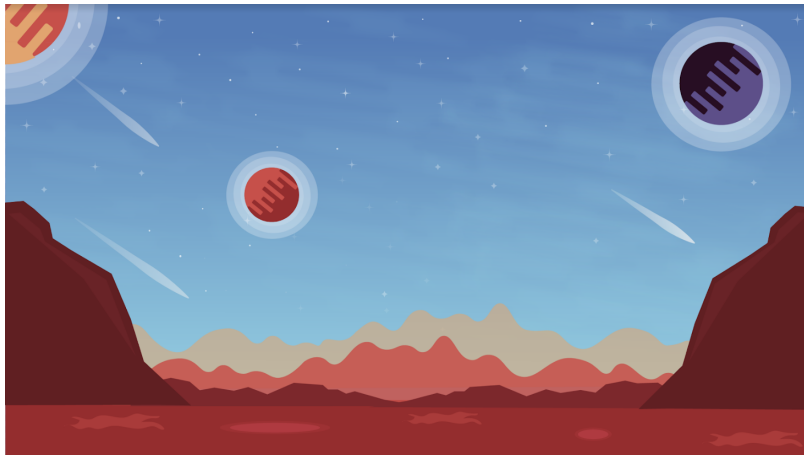
9.2.6 Backgrounds

10 Sound

An external Sound Designer has been contracted to do all the sound design for the game, this includes the background music and all sound effects.

11 Team

HUGO

ABOUT 21, Brazilian/German, Designer Interaction Designer

TASK Hugo was the lead designer. He was responsible for writting the game design documents, creating the level design and mechanics of the game.
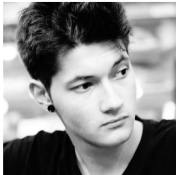
ANDREA

ABOUT 19, Venezuelan/Spanish, Producer, Designer, Scrum Master, UI designer.

TASK Andrea's main task during this project was to organize the team and their tasks. She made sure that every task was performed correctly and that the workflow was smooth.
Moreover, Andrea was responsible for the User Interface design of our game and level design.
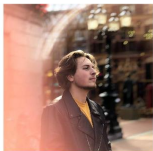
MIHAIL

ABOUT 21, Bulgarian, Designer, UX designer.

TASK Mihail's role was to design the levels and was also responsible for the User Experience Design..
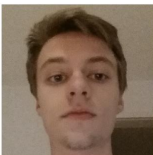
KRASI

ABOUT 20, Bulgarian, Programmer

TASK Krasi was responsible to program the menu systems in the game and the levels. He also made sure everything worked properly inside of the game.

JEFF

ABOUT 21, American/German, Programmer

TASK Jeff's task was to program the character and the levels.
He made sure all the elements were balanced and worked perfectly inside of the game.

PATRICIA

ABOUT 21, Venezuelan/ Canadian. Artist

TASK Patricia was responsible of doing research about the art requirements. She also created the colour palettes, first style guide, initial characters, and background.

12 Bibliography

Ballin, L., & Balandin, S. (2007). An exploration of loneliness: Communication and the social

    networks of older people with cerebral palsy. *Journal of Intellectual and Developmental*

    Disability, *32*(4), 315-326.

Bigman, A. (2018, January 23). Why all designers need to understand color blindness.

    Retrieved March 19, 2019, from

    https://en.99designs.nl/blog/tips/designers-need-to-understand-color-blindness/

Fulton, G. (2017, December 3). Accessibility Basics: Designing for Visual Impairment. Retrieved

    March 19, 2019, from

    https://webdesign.tutsplus.com/articles/accessibility-basics-designing-for-visual-impair

    ment--cms-27634

Grammenos, D., Savidis, A., & Stephanidis, C. (2009). Designing universally accessible games.

    Computers in Entertainment (CIE), *7*(1), 8.

Himmelmann, K., Beckung, E., Hagberg, G., & Uvebrant, P. (2006). Gross and fine motor

    function and accompanying impairments in cerebral palsy. *Developmental Medicine &*

    Child Neurology, 48(6), 417-423. doi:10.1017/S0012162206000922

Nichols, D. (n.d.). Coloring for Colorblindness. Retrieved from

    https://davidmathlogic.com/colorblind/##1797C4-#FC9FB2-#FB105D-#AD5470

Silver, A. (2016, June 21). Improving The Color Accessibility For Color-Blind Users. Retrieved

    from

https://www.smashingmagazine.com/2016/06/improving-color-accessibility-for-color-blind-users/

Staff. (2019, February 08). Cerebral Palsy and Vision Impairment. Retrieved February 24, 2019,

   from

   https://www.cerebralpalsyguidance.com/cerebral-palsy/associated-disorders/vision-impairment/

Rodriquez, S. A. (2018, September 04). Web Design Considerations for the Cognitive Side of

   Cerebral Palsy. Retrieved from https://theweco.com/web-design-for-cerebralpalsy/

Rokach, A., Lechcier-Kimel, R., & Safarov, A. (2006). Loneliness of people with physical

   disabilities. *Social Behavior and Personality: an international journal*, *34*(6), 681-700.

Torrente Vigil, F. J., Blanco Aguado, Á. D., Serrano Laguna, Á., Vallejo Pinto, J. A., Moreno Ger,

   P., & Fernández Manjón, B. (2014). Towards a low cost adaptation of educational

   games for people with disabilities. *Computer Science and Information Systems, 11*(1),

   369-391.

Vision. (n.d.). Retrieved February 24, 2019, from

   https://www.cerebralpalsy.org/information/vision