First Generation

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I. Introduction

Background

The California State University Los Angeles (Cal State LA) Computer Science department collaborates with the College of Arts & Letters to design and develop the First Generation (FG) game, a mobile game which simulates an interactive, explorable college campus. Developing the FG game is a multidisciplinary project involving Cal State LA students from a variety of academic backgrounds. Computer science programmers, artists, animators, music composers, and game designers assist in the development process. FG is programmed using the Unity3D game development software, and developed for mobile devices which operate under iOS and Android systems.

Key Design Principles

- ❏ Create a three-dimensional (3D) open world college campus for the player to explore navigate.
- ❏ Through dialogue and conversations, the player will interact with non-playable characters (NPCs).
- ❏ Create a two-dimensional (2D) user-interface (UI) and heads-up display (HUD) to display important game statistics and conversations with NPCs.
- ❏ The player will manage money and stamina in order to complete quests and earn credits (points) that go towards the final game score.
- ❏ The final game score is calculated at the end of the in-game time limit depending on credits earned and money remaining.

- ❏ The player will navigate the map and interact with NPCs through touch control.
- ❏ Background music and sound effects will be used to enhance the gameplay experience.

Benefits of Game Design

- ❖ All game design principles were created with the idea of enhancing and/or simplifying the user gameplay experience.
  - ➢ Creating an open-world 3D campus further immerses the user into the gaming experience.
  - ➢ Dialogue interactions enhances the user experience by giving them more gameplay decisions and options to choose from. This creates more gameplay variety.
  - ➢ The HUD and UI were created to minimize screen clutter and keep the screen organized so that the user can easily access all HUD functionalities.
  - ➢ Managing resources gives more choices and freedom for the user to customize their own gameplay experience.
  - ➢ Calculating the final score and the end of the game gives the user a sense of accomplishment, and it sets goal for users to beat the next time the game is played.
  - ➢ Touch-to-move and taping choices to make game decisions is user-friendly and intuitive for mobile games and applications.
  - ➢ Background music and sound effects add additional immersive gameplay aspects.

Testing and Experimentation Results

- Testing the different iterations of the game over time resulted in minor changes each time.
  - Changing altering game design choices.
  - Adding / Removing / Altering in-game objects and elements.

Developed Software

- Unity3D application data which can be built to a variety of different platforms, but is intended to be built for mobile devices operating on Apple iOS and Android operating systems.

II. Related Works and Technologies

Use and Implementation of Related Works

- Unity 3D - Unity is a multipurpose game engine that supports games in both 2D and 3D. First Generation (the game) is made using the 3D functionality, though there will still be 2D for the UI. Unity utilizes a Drag and Drop functionality for the game assets.
    - C# - Is used for programming. C# is an object-oriented language. C# has a very similar syntax to Java so the language is very familiar.
    - Unity Collaborate (UC) - UC was used in a similar manner to GitHub.

- Maya - Used by the art team to make models and animation for the game. The programming team then implemented these animation into the game after they were exported from Maya and added to unity. The Animations were used to give the Player Character and Non-Player Character life.

- Adobe Photoshop (AP) / Microsoft Paint (MSP) - AP and MSP were used to make minor edits to images that were imported to unity.

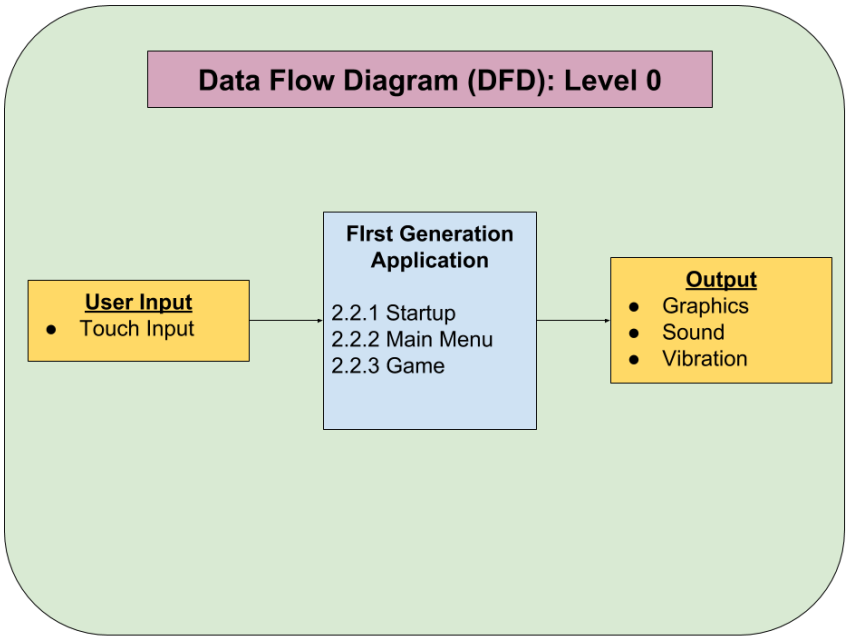
- Sibelius - Music composition software used to create in-game background music implemented in the game.

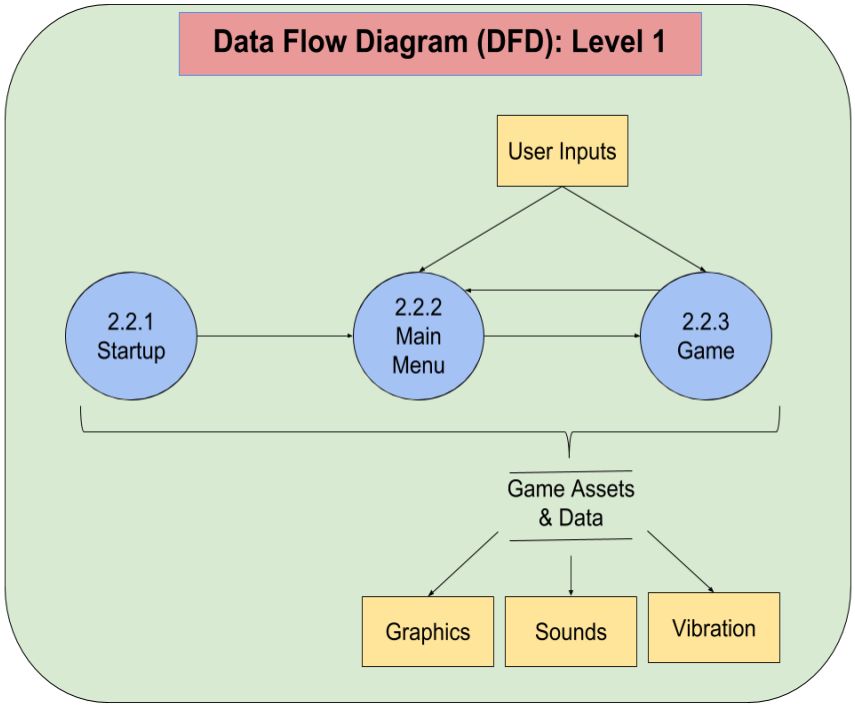
- Freesound.org - Used to download most sounds and some music implemented in game.

- Team Communication - Team communication is one of the most important aspects of this project.
    - Slack / Discord - Used for basic team communication.
    - Google Docs - Used for documentation sharing and editing.

III. System Architecture

Data Flow Diagrams (DFDs)





The signal workflow between software components begin with the user input communicating with the First Generation application. The application contains three components which are the startup, main menu, and the game itself. The main menu contains a new game or an options output. The options output contains the graphic and sound components that control the apparatuses within the First Generation application. Then the user progresses to the game and interconnects with the components within the hierarchy of the game.

Software/Algorithm/System Development and Implementation

- Splash Screens
    - Unity function allow us to play video in the beginning.
- Player Navigation System
    - Using navmesh system which player to avoid obstacles in front of them when walking around the terrain.
- Player Selection System
    - It activates the player prefab according to the input of the integers.
- Environment and Level Design
    - Used the assets from the art team and Unity assets Store.
    - Unity provides the terrain to make the environment to look more natural.
- Camera System
    - CineMachine provides different camera options like view and following options.
- NPCs Animation/Navigation System
    - The NPCs is attached with the animation script to show different movement and navmesh agent which it void each other as well as other moving obstacles.
- NPCs Dialogue System
    - Uses comma separated value parser and random generated strings to interconnect dialogue between the player and NPC.
- MiniMap System
    - Uses the render texture to display what the camera sees which is attached on top down view on the player.
- Music and SoundFX
    - The music is played through the script attached to the manager and the trigger is also used to make different music.
- Heads-Up Display

- It uses the user interface provided by Unity.

IV. Results and Conclusions

Project Developed

- The final result of this project is a downloadable Unity3D video game which is playable on mobile Apple iOS and Android devices.

What Succeeded?

- The game prototype designed by the First Generation team was built and completed before the conclusion of two consecutive academic college semesters.
- The collaboration between different departments, which included programmers, artists, animators, game designers, composers, and advisors from different academic backgrounds, worked to create a multidisciplinary project.
- Learning how to structure team project meetings, establish deadlines, delegate, responsibilities, and create playable demos to track the development process.
- Learning to develop software documentation and learning to present the results of the project through an oral group presentation and creating a visual project poster.

What Failed?

- The initial game design: full role-playing game (RPG) style.
  - Wanted full RPG game in order to have a more realistic college simulation gameplay experience.

- ➢ Time constraints and lack of asset creation resources resulted in the team abandoning the full RPG game in favor of a hybrid RPG and arcade style game.

Follow-Up Work

- ❖ We aim to make this game downloadable on the Apple App Store and the Google Play Store for mobile devices to download.
- ❖ Implementing additional quests and objectives for the player to complete during the course of the main gameplay.
- ❖ Implementing a list of high scores and a system to save high scores at the conclusion of each game.

V. References

- Unity
    - https://docs.unity3d.com/Manual/index.html
    - https://docs.unity3d.com/ScriptReference/
    - https://unity3d.com/get-unity/download
- Maya
    - https://www.autodesk.com/education/free-software/maya
- Mixamo for Animation
    - https://www.mixamo.com/#/
- Slack
    - https://slack.com/
- Adobe
    - https://www.adobe.com/#