

Master Design Document

Earth Crawler

CLASSIC DUNGEON CRAWL WITH A SIDE OF REALITY

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Version 2.00

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Design History

The history of a design document is important in validating consistency and vision. This page outlines, in a change log format, the various additions and revisions to the design since its inception.

Version 1.00

Version 1.00 is the initial version of the design document. This version contains mostly a general overview and a quick initial pass of the design. A lot of the document is still placeholder or temporary. Here is what was added in the initial version:

1. Game philosophy and answers to common questions.
2. Initial game feature set.
3. Brief overview of the game world, camera, and engine.

Version 2.00

Version 2.00 is the final version of the design document in which many details have been added and existing design revised. Most of the final design decisions are now reflected in this document and no placeholder or temporary content remains. Included in the changes are the following:

1. Decided on the name of the game.
2. Documented the design history.
3. Added various example images.
4. Minor clarifications in the game overview.
5. Added more detail to the game world section.
6. Added single-player and multiplayer overview.
7. Added section on game characters.
8. Added section on game weaponry.
9. Improved the visual appearance of the document.
10. Removed unused sections and placeholder content.

Game Overview

Philosophy

Philosophical Point #1

The game will be fun to play alongside friends in the real world and this will be a primary aspect of the gameplay. A unique **digital and physical** connection with your friends will be achieved as you play.

Philosophical Point #2

The game will, by design, try not to put players into any potentially dangerous situations in the physical world. But ultimately, the game cannot stop players from putting themselves into danger from their own choices, such as not paying attention to where they are going.

Philosophical Point #3

The game will try its best to be accessible to a wide range of locations in the world. Although, this is not always possible and there will be situations that are out of our control where the game will either be unplayable or not enjoyable in certain locations. These scenarios will be recognized in the design process.

Common Questions

What is the game?

This game is a mobile dungeon crawl that utilizes location-based and augmented reality technology. Players will move around in the game world by walking around in the real world. The layout of the game world is based upon the real world and the structures and objectives are generated dynamically from data on the real world around the player. The main objective of the game, i.e., the core loop, is to navigate through “dungeons” (explore), defeat enemies using an augmented reality “digital vision”, collect rewards, and lastly upgrade your character’s abilities and arsenal.

The dungeons are linear with possibilities of side-branching and are made from the layout of the real streets around you. The dungeons have a starting point somewhere in your city and an ending point somewhere else in your city. One or more paths are calculated from the starting point to the ending point and these paths become the “dungeon”. The player can take any of the game specified paths to reach the ending point, in which they will receive a reward for completing the dungeon. Players can group up in a party and navigate a dungeon together. The player will come across enemies through their journey, and a group of players in a party can use teamwork to fight the enemies together.

Why create this game?

The reason to create this game is to expand the small and relatively new market in augmented reality location-based mobile games. When I played the hit mobile game *Pokémon Go* back in 2016, it was a new experience I had never had in a game before. Walking around the city with a group of friends and playing that game is an entirely different experience of “multiplayer” that is very fun in an unexplainable way, and I feel like there is a lot of potential in this style of game. This design document aims to envision a potential new game in this market.

Where does the game take place?

The game takes place in a digital version of the real world. Imagine the *Google Maps* mobile app, but with 3D structures generated on top of it in a specific theme. The theme of the world is entirely customized and determined by the player. For example, the game world could be themed as a literal dungeon, a city with a specific regional architecture style like Europe, Tokyo, North America, etc., a fictional Sci-Fi environment, and more. These themes would be available as DLC.

What do I control?

The player controls their own digital character by moving their physical device around in the real world. The player can move their camera and look around in the game both traditionally and by using their physical device.

What is the main focus?

The focus of the game is to upgrade their character to become more powerful. To do so, the player must complete dungeons and defeat enemies in which they will earn rewards. By becoming more powerful, the player will be more easily able to defeat enemies and confront dungeons of harder difficulty.

What's different?

As far as I am aware, there is no mobile game on the market right now that utilizes location-based and augmented reality for a dungeon crawl. Another aspect of this game that is different than existing augmented reality and location-based games, such as *Pokémon Go*, is that you can group up with friends and see their digital character as they travel along with you in the real world.

Feature Set

General Features

- Location-based adventure using the real world.
- Customizable world theme.

Multiplayer Features

- Party system to play together with friends.
- See your friends' digital characters alongside you.
- Built-in text chat with your party.
- Local and global leaderboards.

Gameplay

- Endless amount of randomly generated dungeons to complete.
- Easy-to-use augmented reality combat using a *digital vision* of the real world.
- Abilities and weaponry to buy, upgrade, or collect.
- Varying difficulty of dungeons and enemies.

The Game World

Overview

The game world consists of simple paths and lanes constructed from street data (see **Figure 1**). The theme or appearance of the world, which will be termed now as the “world skin”, is customizable and layered onto the layout data (see **Figure 3**). As the game world is fundamentally made from simple paths, it should be feasible to implement swappable world skins without a change in the actual game functionality.

Augmented World

The game world is an augmented alternative version of the world around you. Unlike some other augmented reality technologies, the world in this game does not try or desire to 100% augment all the objects around you. Instead, what is really being augmented is the road (sidewalk) under your feet and the layout of your city. An imaginative and customizable “world skin” is then layered onto it (creating an alternative reality).

Consider the next three figure images for a visual example of this idea:

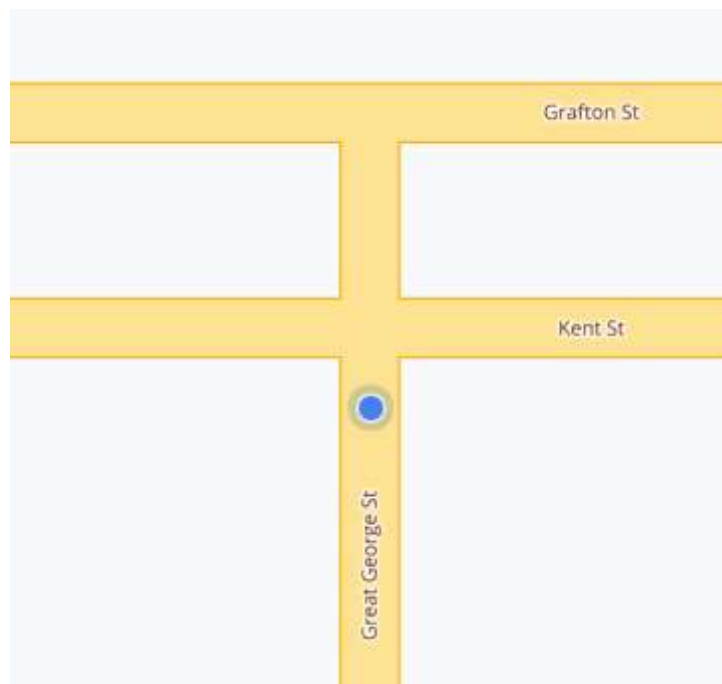


Figure 1: Imagine a view from your favorite navigation app on your phone...

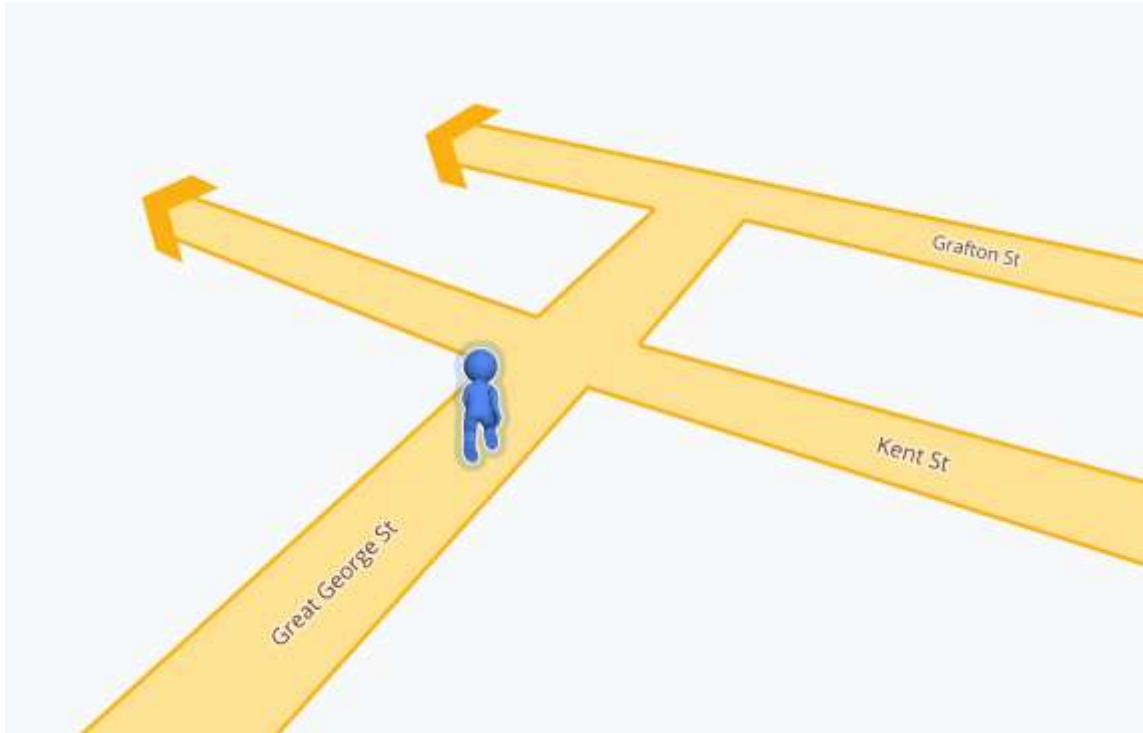


Figure 2: Next, imagine if the navigation app was a **game** and in **3D**...



Figure 3: Now imagine any **game world** correctly layered onto it... This is **Earth Crawler**.

World Skins

The theme of the world will be completely swappable and customized by the player for themselves. This feature, termed as world skins, will be driven through paid DLC. There will likely also be a couple world skins that come with the game or possibly as a free promotional DLC from any third-party sponsorships.



Figure 4: Example of an alternative world skin: **Dungeon Labyrinth.**



Figure 5: Example of an alternative world skin: **Apocalyptic City.**

The Physical World

Overview

The physical world consists of prefabricated assets of a similar theme (based on the player's current world skin) created by artists. Like a pre-render, these assets are fed offline into an in-house system where the global street data is logically and algorithmically processed against it. This information is transformed into an internal compressed data structure of how the assets should be automatically positioned and orientated into the world by the game at runtime.

All this data can be manually adjusted and verified if required by artists or engineers. The final data is packaged into the cloud where it is dynamically downloaded by players' devices based on their location (no need to download the entire global data). The data can be updated and re-packaged into the cloud as needed.

The following describes the key components of the physical world.

Key Locations

The key locations will be dungeon start points, which are chosen by the system based on real world landmarks. The real-world landmarks are not visually represented in the game world and are only used as input data into the system for generating relevant dungeons for the city. The system could choose them based on the popularity data of the landmarks (for example, number of reviews on *Google Maps*) or they could be suggested by the player base.

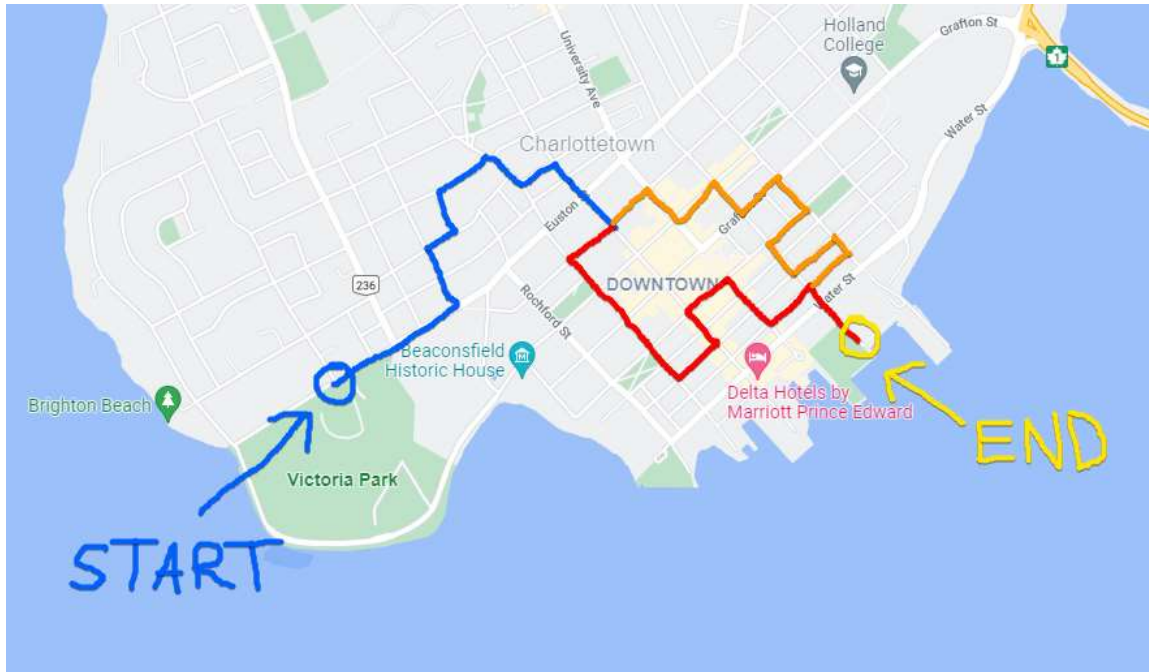


Figure 6: Example of a dungeon path through a city. The blue path splits into a choice for the player to either take the red or orange path, or for a party to split up.

Travel

The player moves their character in the world by walking around in real life. This will work by using the GPS on their device as well as other physical sensors like the accelerometer or gyroscope. While travelling through a dungeon, the player **cannot** stray off from the **designated dungeon path**. If the player does walk off the designated path, they will be warned and eventually they will automatically fail the dungeon and will be required to restart. No cheating!

Scale

The traveling scale of the game world will be 1:1 with real life, but the scale of objects in the world will be smaller compared to real life (most likely a 1:2 ratio).

Day and Night

The game has a day and night based on the current local time, but only if applicable for the current world skin. For example, if you were using the *Apocalyptic City* skin from **Figure 5**, then it would make sense for immersion purposes. On the other hand, if you were using the *Dungeon Labyrinth* world skin from **Figure 4**, then it would not be logical to have a day and night cycle enabled.

Time

Time will not have an important factor in the game. The only aspect influenced by time is that the difficulty of certain dungeons can require more time to traverse or could be time limited to complete.

Rendering System

Overview

As this is a mobile game, ground-breaking graphics are not desired or an intended selling-point. Performance and device battery life needs to be considered above graphics. The renderer must handle assets of varying styles and fidelity as well as being able to swap assets out entirely with new ones without restarting or reinstalling.

2D/3D Rendering

Unity will be used for the game engine and will be responsible for rendering. Due to the nature of the very large 1:1 scale of the game world to the real world, the engine will only render small chunks of the world at a time around you.

Camera

Overview

The camera will work as typical in most games, although there are two different modes based on the current game state, as described below. The player's character is always the focus of the camera and strictly follows them.

Third Person View

When not in combat, the camera will be moved by swiping your finger on the touch screen of the device. This will cause the camera to rotate around your character in third person. This view allows you to see an overview of where you are and what is coming up ahead.



Figure 7: Example of the third-person camera view.

First Person View

When your character enters combat, your camera will be switch to an “augmented” first-person mode. In this scenario, you will simply control the camera by aiming your device where you want to look in the game, creating a “digital vision” effect of the real world around you. This results in the combat mechanic of physically aiming at the enemies. It also adds to the alternative reality aspect of the game where enemies seem to be “in another dimension” from the real world around you.



Figure 8: Example of the first-person camera view.

Game Characters

Overview

The characters in the game, like the game world, are customizable in some way by the player to personalize their experience. Player character skins will be available, and enemy skins will be tied to the game world skin.

Creating a Character

The player's character will be customizable through purchasing, unlocking, or collecting various character skins. The character skins are not customizable themselves and come as they are.

Enemies and Monsters

The enemies in the game are strictly tied to the player's current world skin to fit the theme currently. For example, the enemies would probably consist of zombies for the *Apocalyptic City* skin (Figure 5) and as hellish creatures for the *Dungeon Labyrinth* skin (Figure 4). Most enemies will attack with melee from close, but there could be instances of enemies who strictly attack from range.



Figure 9: Example of a possible *Dungeon Labyrinth* enemy.



Figure 10: Example of a possible *Apocalyptic City* enemy.



Figure 11: Example of a possible *Medieval Kingdom* enemy.

Weapons

Overview

The game will consist of primary melee and ranged weaponry. Melee weapons will consist of swords, clubs, maces, etc. Ranged weapons will consist of bows, throwable equipment (like a grenade), magic, etc. Other fictional and joke weapons are also a possibility. Some weapons may be a hybrid (both melee and ranged) such as a spear. Defense equipment such as shields will also be included that have trade-offs (like not being able to use a two-handed weapon as a result).

Combat Assist

Since this is a mobile game, there will be some level of assistance. When attacking with melee combat, an enemy will take a hit if their character model is at least 50% in your field of view, and within reasonable striking distance. Enemy attacks will be slightly less aggressive in interval when you are not facing them, and you will receive an on-screen visual indicator that there is an enemy targeting you who is out of your vision. When multiple enemies are in front of you, depending on your weapon, multiple of them will be hit. Otherwise, priority is given to the most dangerous enemy.

When attacking with ranged combat, you will automatically target-lock onto enemies who are within 10% of the center of your screen. When you fire a ranged weapon while target-locked, you are guaranteed the projectile will connect with the enemy (though, the enemy could block it). The priority in which enemies are target-locked will be weighted based on their distance from you and how dangerous they are. Target locks can be overridden by tapping an enemy on the screen. These assistance settings could be customized by the player in the game settings.

Weapon Tiers

The weapons in the game will have tiers to them: Common, Rare, Epic, and Legendary. Weapons can be found or unlocked having a lower tier and later be upgraded to a higher one. In rare circumstances, a player can find or be rewarded a high tier weapon out of luck. The weapons are upgraded using an in-game currency rewarded from completing dungeons. Each tier exponentially increases in cost to upgrade to the next one, and some weapons have different base costs for upgrading if the base weapon is good in general.



Figure 12: Example of what melee combat could look like.



Figure 13: Example of what ranged combat could look like.

Single-Player

Overview

The single-player game experience consists of exploring and clearing dungeons, collecting rewards (as items), and upgrading. These activities can be done at the pace of the player. A player could be very dedicated and go out to strictly play the game. A casual player could, as an example, integrate the game into their daily walk or jog by specifically taking the path of a dungeon.

Here's a breakdown of the key components of the single-player game.

Hours of Gameplay

The game is meant to last for hundreds of hours of gameplay to reach 100% completion (meaning they have collected all possible items, reached max level, etc.). The game does not require consistent play and one can achieve these hundreds of hours slowly over years if they choose.

Victory Conditions

There are several ways a player can win in the game. Firstly, a player can win by successfully clearing a dungeon. Another way the player can win is when they collect or purchase all possible weapons or abilities, reach the highest level of procession, or have completed all the dungeons in their local area (until they are cycled and change to new ones). Finally, to a certain extent, a player can consider being on the top of the leaderboards as winning.

Multiplayer

Overview

The multiplayer aspect of this game is an extension of the single-player and is focused on the party system. Players can add friends and invite them to their party. Players can only be in a party if they are physically close to the party leader in real life. Multiple players in a party can make it easier to defeat enemies and explore a dungeon with multiple branching paths to exit(s). **A maximum of four players can play together using the party system.**

Servers

The multiplayer game data, party system, text chat, etc. will be handled using a client/server model. As the game is not PvP and does not require 100% real-time accuracy, the client can handle a lot of tasks themselves, reducing server strain and costs. Servers will be mostly used to serve game state, handle data persistence, and enforce game security through client validation.

There is also an option to use a peer-to-peer model for the party system, alongside a client/server model for the rest of the game. A peer-to-peer model for parties could allow for more real-time updates of where your team's characters are beside you in the game world. This could make the game more fluid as well as reducing server strain and costs.

Gaming Sites

There is currently no plan to support any gaming sites. Although, a public **RESTful API (Representational State Transfer Application Programming Interface)** could be exposed to allow access to some game data. This could then allow other people to create services based on the data, such as websites tracking a player's stats or leaderboards.

Persistence

The game world is not *globally* persistent. Player data is persistent and so does give some sense of a persistent universe. Player position is never saved and always based on your live device location. The only world persistence is between members of the same party, in which everyone shares the same game state during the party session on different devices.

Saving and Loading

Player data is always saved and reloadable except for a few certain exceptional cases. Quitting in the middle of a dungeon will intentionally not save. This is required to prevent cheating and exploits. If this was not done, a player could close the game, walk to the end of the dungeon (in real life), and reload the game to bypass enemies or mechanics. In the eyes of the game, the player would have essentially teleported to the end of the dungeon, as player positions are not persistent.