

Holomon

PROJECT PLAN

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1 Introduction

1.1 PROJECT STATEMENT

We want to create a location-based mixed reality game for the Microsoft Hololens, where the player explores their environment looking for holographic monsters. This project takes inspiration from Pokemon Go, but we plan to make it a deeper and more robust gaming experience.

1.2 PURPOSE

This project is exploring a brand new technology that very few people have worked with. We will be contributing to the ongoing development of the Hololens as a whole, as not much has been done with this new technology. Much of the current work our peers have done has not been documented. Our work will be adding to the relatively small zeitgeist of Hololens development. Finally, many of us want to go into the video game industry, and making fully-fledged games is the most important part of entering into the industry.

1.3 GOALS

We would like to gain experience designing and developing video games while also exploring the possibilities of the Hololens. By the end of the project, we aim to have a building-scale game developed for the Hololens. This game will include as much of the Hololens functionality as it can, including displaying holograms, hologram interaction, voice recognition for battling with your monsters, and mixed-reality videos and trailers. We will have a variety of monsters to collect and train as well as a way to battle with them, both against AI and with other players using a Hololens.

2 Deliverables

GAMEPLAY

- Holomon
 - Twenty different Holomon to collect
 - Battle wild Holomon to weaken them before collecting them
 - Various levels, stats, and attack moves for each Holomon
 - Attack, Defense, Speed, Experience Level, etc.
 - Can be found by searching around the building
- Battling
 - Initiate battles with wild Holomon, AI trainers, and other Holomon players
 - One-on-one, battles occur in a turn-based manner
 - Each Holomon has various moves, each with their own purpose depending on the situation

- Exp system for leveling up Holomon
 - Buff and debuff items
 - Potions, speed-ups, etc
- Items
 - Earned at kiosks located around the building
 - Usable in battle

TECHNOLOGICAL

- Control battles using Hololens hand gestures or voice commands
- Building-scale exploration with Holomon appearing in different places throughout the building
- Multiple Hololenses that can communicate for multiplayer Holomon battles
- Room recognition to determine where kiosks and AI trainers can be found

USER INTERFACE/USER EXPERIENCE

- The player may interact with the menus using their voice or using gestures
- Users should not feel nauseous or otherwise uncomfortable while playing our game
- The menus shall be “tagalongs” (a Hololens term for a type of menu that stays in front of the user) so as not to disorient the player

DOCUMENTATION

- Maintain a development blog of pitfalls, roadblocks, or interesting things about developing for the Hololens.
- Tips & tricks that we’ve found during development that can help the Hololens community grow to be better games.

3 Design

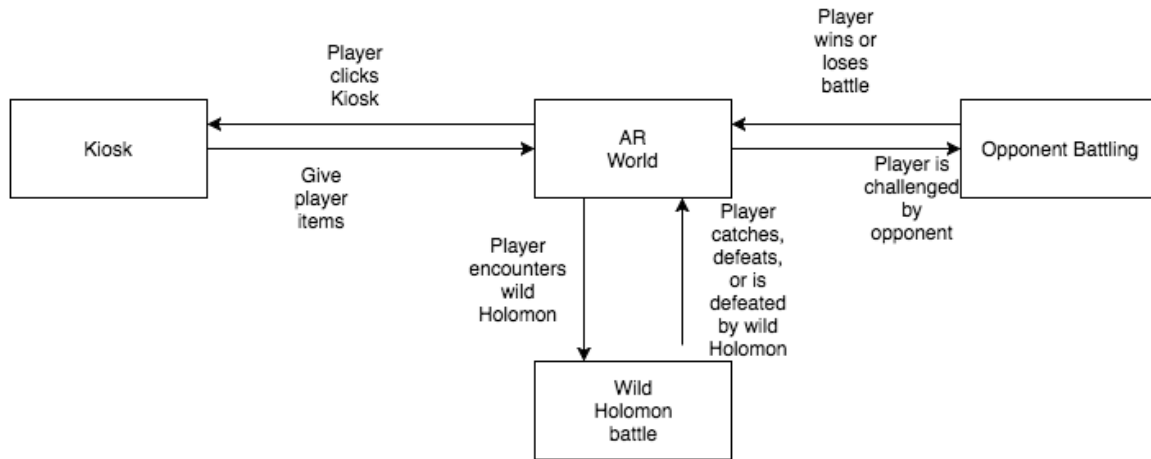
3.1 PREVIOUS WORK/LITERATURE

This project is very similar to Pokémon Go. The player explores the area to find different Holomon, in the same way Pokemon Go does. Pokemon Go also have a radar system that we are looking to build off of and improve. We’ve played Pokemon Go and we’ve seen/played the battle mode that they have, which we would also like to improve.

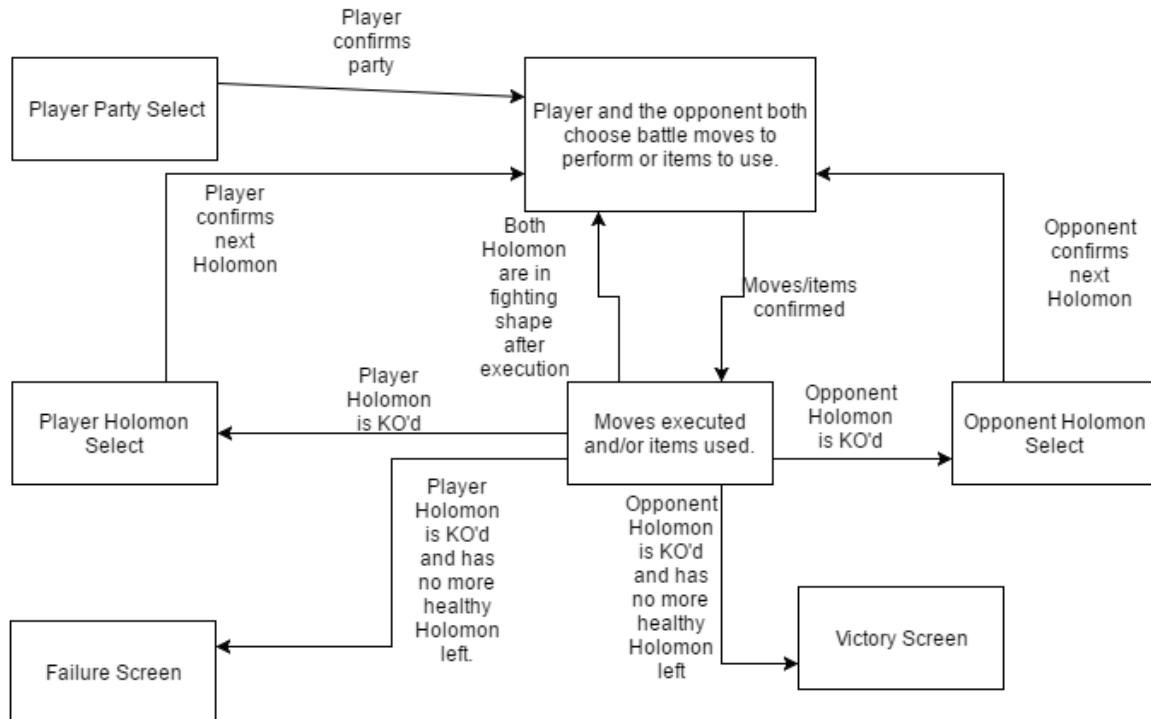
We’re using Microsoft’s Hololens Academy to get us up-to-speed on Hololens programming basics. There’s also a lot of projects on the Hololens that we can play and understand how the general feel is supposed to be.

3.2 PROPOSED SYSTEM BLOCK DIAGRAM

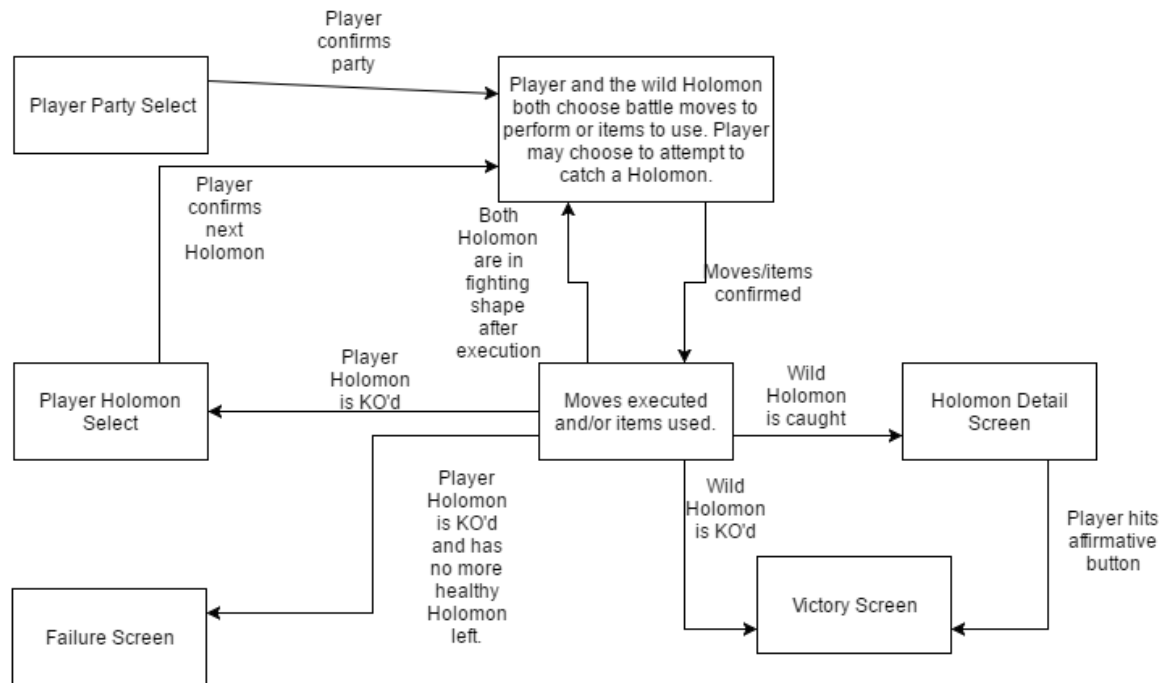
Basic Game Flow



Player vs. AI Holomon Catcher/Player vs. Player Flow



Wild Holomon Battle Flow



3.3 ASSESSMENT OF PROPOSED METHODS

When creating a Hololens app, there's only two ways to create: DirectX 11 and Unity.

DirectX 11 – This method is not recommended by Microsoft and would result in too much work for a ~7 month project.

Unity – This method is recommended by Microsoft and will be much faster to develop with. This is the method we've chosen, as we've all had experience with Unity, and understand how the pipeline process works.

3.4 VALIDATION

Because we're using an Agile/Incremental development, we will be testing new features as they are added. All new features will be examined by other members of the team, making sure they hold true to the original plan on the design doc, or the design doc has been modified to fit this new functionality. Tests will include the average cases that a user will experience, with edge cases that we see fit to test along the way.

Also, because most of our project will be using the Hololens, which depends on numerous variables (real world position/rotation, room shape, etc.), our different requirements will be tested on the Hololens, in different rooms, in different areas. We will go through and execute different tests in different areas to make sure that our

project is functioning correctly. For example, “The player will be able to engage in combat with these wild monsters” can be tested by interacting with numerous spawn points located around the building.

4 Project Requirements/Specifications

4.1 FUNCTIONAL

List and explain the functional requirements of the project. This would include all the technical requirements you fulfil during your senior design project.

The player will be able to:

- Walk around our projected environment with the Hololens
- See wild monsters in this environment
- Engage in combat with these wild monsters
- Capture these wild monsters
- View what monsters they have captured while playing
- View monster stats of each of their captured monsters
- Interact with an augmented-reality kiosk in the real world to gain virtual items
- Use these items to help capture/heal monsters
- Use a radar system to determine where these monsters are
- Interact with and battle various holographic AI
- See and battle other players

4.2 NON-FUNCTIONAL

List and explain the non-functional requirements of the project. This is where you would enlist non-technical requirements. This may still be a fundamental deliverable that your client needs at the end of the semester.

- The environment the player walks around in will be Coover Hall, and can go to any of the rooms.
- There will be 20 unique monsters to find and capture.
- All battles will be a turn-based system in which the player attacks first.
- Players can capture up to 50 monsters.
- Players can hold up to 50 items.
- Players can receive items from Kiosks every three minutes.
- Monsters will have an HP, Attack, Defense, Speed, Stamina, Level stat.
- Monsters will have two moves to use to attack.
- The radar system is refreshed every 3 seconds.
- There will be 4 AI's to interact/battle with.
- PvP battles will not last longer than 10 minutes.

5 Challenges

One difficulty we will have is that the Hololens is a brand new piece of technology and there's not a lot of documentation on it. A lot of our project will be researching the Hololens, scanning through all of the documentation online, and looking through different tutorials. Since these are brand new devices, there aren't many cases where people have successfully created a large project for it or documented it well. On top of this, the infancy of this device means that the forums will be fairly barren and only starting to fill out.

Another potential problem will be checking out the Hololens for developmental purposes. Only having two to check out from the college could mean that they are checked out during crucial testing times. It also means that we won't have access to the device at any time that we may need it, which could slow down our progress. On top of this, if another user happens to break or ruin one of the devices, we'll be even more crunched on time when trying to test our project. However, there is a Hololens emulator we can use, and there are some cases in which we won't need a Hololens to test out new features.

6 Timeline

You may want to include a Gantt chart/something similar to help visualize your timeline to complete the project.

List of Tasks (*These tasks are referred to by number in our assignments and charts):

1. Have a building scan of Coover Hall and be able to load it onto the Hololens
 - a. Only hallways and select rooms will be scanned
2. Have the Hololens understand where it is located in the building scan from task 1.
3. Create/find 20 monster models that are fully animated. These models should be able to be viewed on the Hololens.
4. Have a spawn point that will spawn a monster at that point. The monster will then wander around that point with their walking/idle animation.
5. Place spawn points around Coover. Monsters will not be visible until the player gets within range.
6. Create the monster class, which includes the battle stats every monster has. These stats are randomly generated when the monster object is created. A master movelist also needs to be created for all monsters.
7. Create the battle system, i.e. how turns work, how damage is calculated, how moves work, etc.
8. Give the player their first monster to start the game with.
9. Allow the player to interact with a monster in Coover to start the battle.
10. Create the UI system for battling with a monster. Player will need to decide which move to attack with.
11. Add sound effects to all interactives to give feedback to the player so they know that they tapped something (A menu, Holomon, etc.)
12. Add voice recognition to battle mode, so players can either tap their UI or use voice commands to execute attacks.
13. Finalize battle logic, so that a battle ends once a Holomon runs out of health. If the wild Holomon runs out of health first, it will be removed from Coover.
14. Add a party list that shows all of the monsters the player has caught. A monster can also be selected from this list to show stats about the monster, and the monster can enter the “real world” and run around the player.
15. Create capture items that allow the player to capture wild Holomon. This includes the base class, all models, and different “tiers” of items (with better percentages), and animations.
16. Create an inventory system that holds all of the items the player has gotten so far. This includes a UI to see what they have currently. Also give the player 10 or so items at the start to use.
17. Extend the UI system during battle to allow players to capture wild Holomon. Capture rates depend on the tier of item used and the Holomon’s current

- health. If a catch is successful, the monster is added to the player's party list, and disappears from Coover.
18. Modify the start of a battle so that players select their starting Holomon. A UI is needed for this.
 19. Add the option to permanently remove a Holomon from the player's party list, so that they can free up space if needed. This will extend from the player's party list UI.
 20. Create a radar system that lets players know where to look for a Holomon. Using this radar system, players will know which direction to travel in Coover.
 21. Create the Kiosk object, which grants the player a random assortment of items every 3 minutes. These items are added to the player's inventory, and used up in battle. This include the UI on the Kiosk, the model of the Kiosk, and the placement of the Kiosks in Coover.
 22. Add a new battle type which is AI controlled. These battles will have a set number of Holomon to face, and the AI will be smart enough to know when to use what attack.
 23. Place this AI in Coover somewhere and add a UI to engage with the AI in battle. Also on this UI the player will select their Holomon they want to battle with.
 24. Create 3 more AI's, each with scaling intelligence and Holomon strength. Add these new AI's to Coover to be battled.
 25. Add network support so that the player can see other players who are also playing Holomon nearby. Other players will have a visual effect to distinguish vs. other normal people.
 26. Add the option to challenge other Holomon players to a Player vs. Player battle. A UI is needed to challenge, accept, and select monsters for the battle. Once both players have accepted, a turn-based battle will begin.
 27. Add player profiles so that stats such as "Holomon caught", "battles won", etc. can be viewed by the player or other players.
 28. Add player achievements that are awarded on certain milestones in the game, such as defeating all AI, catching all Holomon, etc.
 29. Trading between players (stretch goal)
 30. Finish up the game by adding credits. :)

You can view our Gantt Chart below as fig. 1

You can also view our Critical Path diagram below as fig. 2

Total Assignment of Tasks:

Zach: 3, 5, 9, 10, 12, 15, 20, 23, 27 (110 days)

Ryan: 1, 5, 22, 23, 24, 25, 26 (135 days)

Tyler: 2, 7, 11, 13, 14, 17, 19, 21, 28, 29 (108 days)

Robert: 1, 4, 6, 8, 13, 14, 16, 18, 19 (79 days)

6.1 FIRST SEMESTER

Tasks 1–6 are expected to be completed by the end of first semester, with 7–21 being finished by the start of second semester.

6.2 SECOND SEMESTER

Tasks 22–30 will be completed over the course of the semester, according to our timeline chart (fig. 1).

7 Conclusions

Our overall project will be creating a game for the Microsoft Hololens that is similar to Pokémon GO. Pokémon GO has some missing features or features that were poorly executed. For example, we're looking to add turn-based battling, while improving the radar system. In our game, players will be able to search for Holomon, battle other AI and players, and explore their environment. Along the way we will be adding to the communal knowledgebase of Hololens development by finding our own best practices for both back-end code and UI design.

8 References

Microsoft Hololens Site/Tutorials:

<https://developer.microsoft.com/en-us/windows/holographic>

Unity API - UnityEngine.VR.WSA:

<https://docs.unity3d.com/550/Documentation/ScriptReference/VR.WSA.Input.GestureRecognizer.html>

Pokemon GO Overview/Review

<http://www.ign.com/articles/2016/07/13/pokemon-go-review>

9 Appendices

If you have any large graphs, tables, or similar that does not directly pertain to the problem but helps support it, include that here. You may also include your Gantt chart over here.

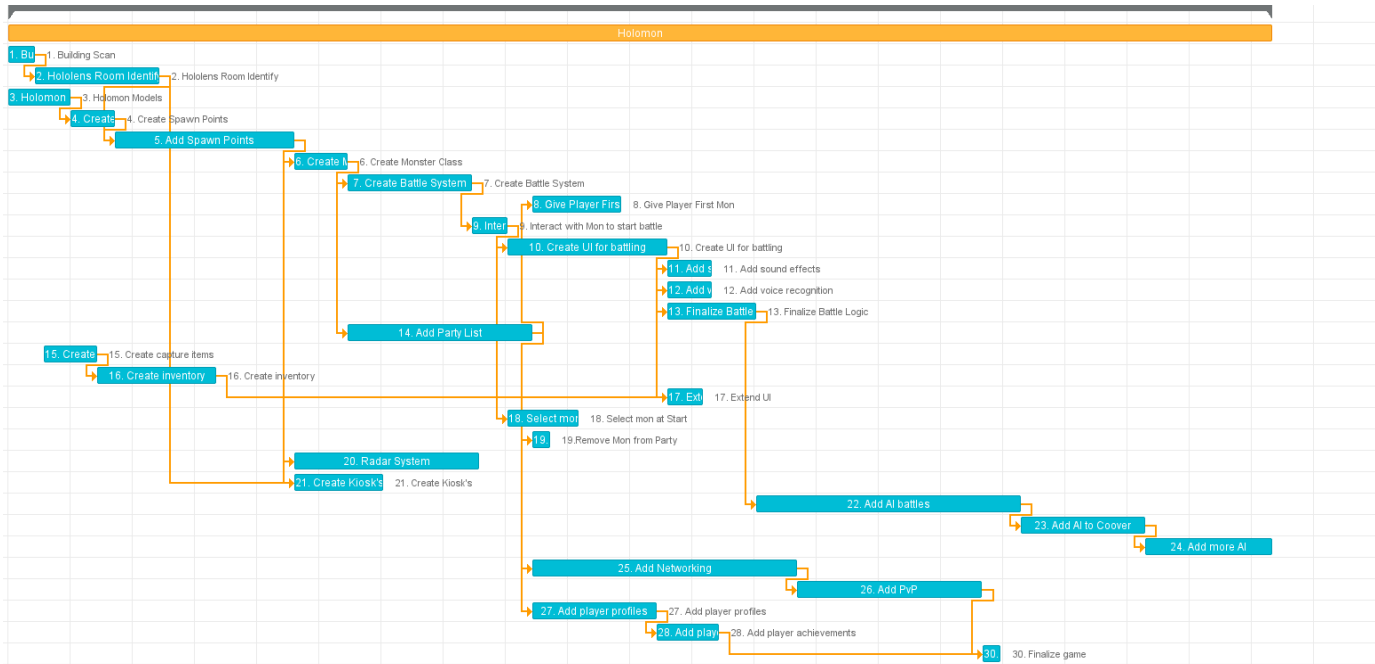


Fig. 1 Gantt Chart

([Link](#))

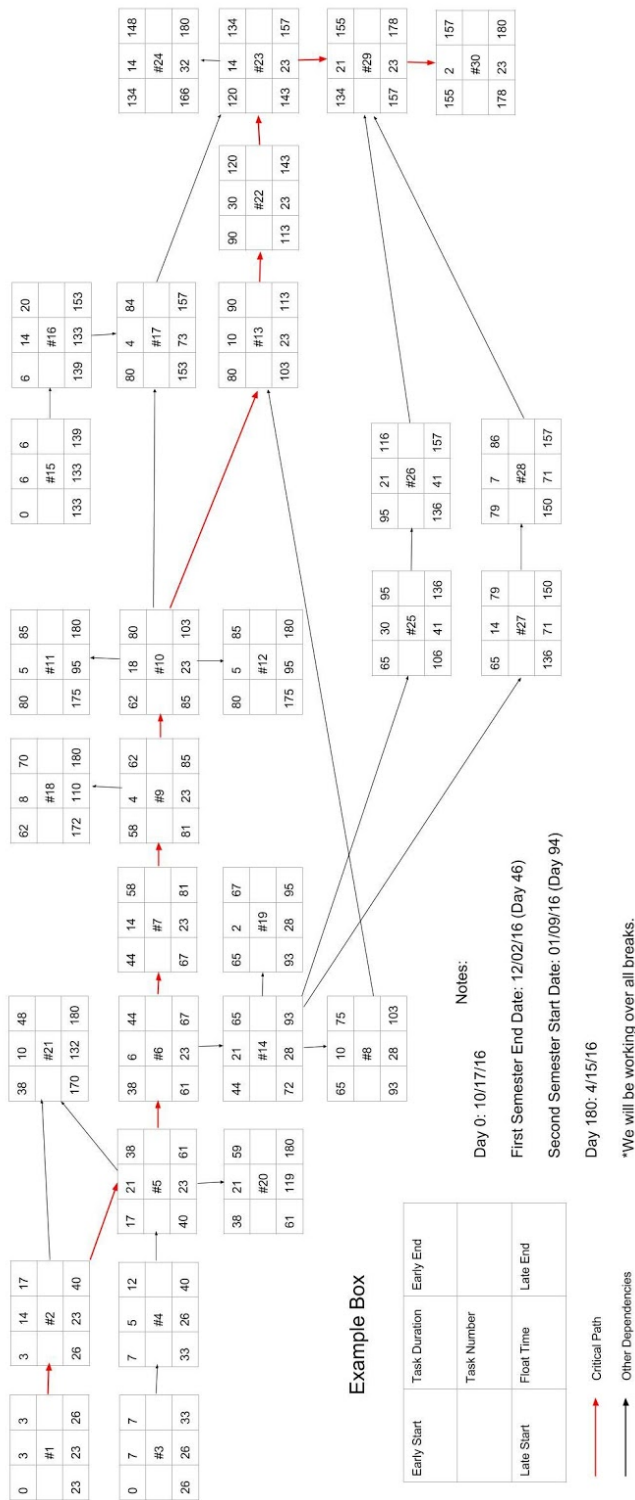


Fig. 2 Critical Path