Project Wisp

CST 499 - Computer Science Capstone

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Executive Summary

Project Wisp is a tactical-combat system for a top-down, 2D adventure game built in the Unity Game Engine. Players will move in real time until combat is initiated with one or more enemies, upon which time will appear to stop and objects in the scene (actors, projectiles, etc.) will move only when the player moves (exiting combat ends the effect). This slows down the speed of gameplay in an attempt to reduce stress on the player and promote strategic decision-making. To give testers an objective, a simple level will be constructed with a win condition.

The target audience are all persons interested in combat-oriented adventure games. A high skill level in gaming will not be required to enjoy the experience, but it is not aimed at being someone's first entry into the hobby. These end users make up the stakeholders and affected individuals, as well as anyone partaking in its development (including testers and myself). As this is a combat system, one's sensitivity to cartoon violence will determine if they suffer negative effects from the gameplay. Game loops may also feed addictive behavior, but such situations are not a concern at this early stage.

Development is underway and on pace for an initial build before the end of May. If known risks are mitigated, such as feature creep, then multiple rounds of testing will be performed to better optimize the system before its submission deadline. The desired outcome is a combat system that allows the player to set the pace of gameplay and appeals to gamers of any skill level.

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I. Introduction / Background

A. Project name and description

Project Wisp is a tactical-action combat system for a 2D adventure game developed in the Unity Game Engine. Actors in the game have grid-based movement and action occurs in real-time until the player enters combat with one or more enemies. Upon combat activation, all actors and objects stop their real-time behavior and only act in short slices whenever the player takes an action (movement, attack, etc.). Once all enemy combatants have been defeated, or the player leaves the range of all enemy combatants, combat ends and real time play recommences.

The purpose of the project is to prototype and refine this combat system for use in a larger scale game or as an asset for a software portfolio. Because the project involves advanced skill in game design, software engineering, and project management, it highlights many essential game development skills in one package.

B. Problem and Challenges

The core feature of Wisp is the unique combat-state behavior - this is also the core problem facing the design and completion of the project. Actors and objects will be shifting between free-movement and turn-based movement on-the-fly using a hand-crafted turn system. Success and failure of the project

depends on the execution of this core feature and the creation of complimentary mechanics.

II. Project Goals and Objectives

Goals	Objectives
Grid-based Movement	- Create standardization of units for movement - Create methods for converting between world and grid space - Use raycasting for obstruction detection
Enemies are fun and interesting to fight	- Research AI techniques, specifically Utility Theory - Implement Utility curves for AI decision making - Unique AI behavior created for each enemy - Tweak behavior values based on testing feedback
Seamless transition between combat and non-combat states	- Creation of global turn system - Actors and objects affected by combat state need shared Interface for turns - Design messaging system for state broadcasts
Project plays like a tiny game demo	- Design win condition that player can achieve - Design single level - (Stretch) Simple, quick tutorial / guide
Limit user confusion and amount of “outside” information they need	- Create simple and informative UI - If in-game guide isn’t implemented, create clear prompts / screen that displays controls and explains mechanics - Player informed of objectives in-game

III. Environmental Scan / Literature Review

A. Game: *Stoneshard*

A roguelike game that uses grid-based movement and tactical combat. What makes *Stoneshard* standout is its survival system and character customization (Suther, 2020). The game is brutal, however, giving very few moments of forgiveness when entering the wilds of its world (Wilde, 2020). Out of combat gameplay is run on a turn-based system, unlike Wisp, and it touts a small, simulated world.

B. Game: *SUPERHOT*

Combat-focused 3D game that labels itself as “the FPS where time moves only when you move” (SUPERHOT Team). The game centers itself around that core combat-mechanic, with its success credited to the simplicity and refinement in its execution (Hamilton, 2016).

C. Game: *Darkest Dungeon*

A turn-based, roguelike RPG that takes inspiration from Lovecraftian and gothic themes (Red Hook Studios, 2020). The gameplay is dark and devastating, but that is the allure. Where things go wrong for it is the repetition and tedium it eventually falls into - creating an experience that is no longer spooky, but exhausting (Gach, 2016).

D. Action vs. Tactical Combat

Players who prefer role playing games do not have a strong opinion on the question of action versus turn-based combat. Action combat is regarded as more reflexive and turn-based as more cognitive - the choice to pick one style over the other varies based on the player's mood (Hovermale, 2019). Regardless of genre, players don't want to be overwhelmed by systems (Johnson, 2009).

IV. Stakeholders and Community

A. End Users

End users will be the primary stakeholders, as well as myself and anyone testing. Developers that interact with the project for reasons other than entertainment, such as for inspiration or to give feedback, would be included (essentially testers).

The hope is that all stakeholders involved get enjoyment out of the project. As this game is in the realm of entertainment and art, what the end users experience will be subjective, including whether or not they feel as if they gained anything from it. An obvious loss for the stakeholders is time. If the experience is not something they wished for or enjoyed, they cannot regain the time spent with the project. As with the gains, losses will be subjective and dependent on each user's experience. The project has no monetary investment for stakeholders, so their intent going in will be key (whether or not they are playing the game looking for enjoyment, to give feedback, etc.).

To mitigate the losses of the stakeholders, the nature of the project will be addressed upfront and, since time cannot be refunded, participation will remain voluntary throughout. Honesty - all I can do is be honest with any participant and myself.

V. Approach / Methodology

As this is a solo project, time management and task prioritization are critical. Progress on the project has already been made, so some steps detailed here have been completed.

1. Complete a rough sketch of the project's mechanics and systems.
2. Create custom assets for testing, reducing the time searching for assets during development.
3. Create a barebones scene that includes the frame of future systems.
4. Choose one system or mechanic to focus on and prototype.
5. Perform research for recommended approaches and tools to be used in implementing that feature.
6. Code the feature as quickly as possible, focusing on a working implementation.
7. Assess the feature and its effect on the system it belongs to.
8. Refactor (if needed). If features are complete, go to step 9. Else, go back to step 4.
9. Perform stress testing and solo quality assurance, fixing priority issues as they are found.
10. Based on the results from step 9, compile a test plan for testers.
11. Compile a build and hand it out to volunteer testers.

12. Receive feedback and address concerns.
13. Fix bugs and errors discovered during the feedback stage. If time allows, redistribute build and go back to step 12.
14. Prepare and add extra polish for submission.

The steps above, when put into practice, follow an agile or spiral method. Initial designing of the game did not go deep into details, but made sure that a clear vision was present. Core features of the project are implemented and, with each one, a refactor and reassessment of the relevant systems (or whole game if necessary) are completed. The process here is to add pieces to the project and then refine with every iteration. Refinements are done with caution, never going too deep until the system is near completion.

VI. Ethical Consideration

A. Major Ethical Concerns

Users may be sensitive to displays of violence, even in a fantasy setting. The project is focused on a combat system, meaning users will be required to observe and take part in acts of violence. Cartoon violence is removed from more realistic portrayals of violence by enough of a margin that a user's sensitivity would need to be severe to experience adverse effects, but it is worthy of consideration.

Video game addiction is a recent topic in psychology and health. Gameplay loops that provide similar stimuli and rewards to a Skinner Box can

manipulate players and cause psychological harm, with potential financial consequences occurring as a result.

B. Those Negatively Impacted

Video games with similar scope as this project rarely impact individuals outside of the users and developers (and any parties related to them). Users that feel pressured into experiencing the game against their will or who do not have adequate knowledge of the project's specifics will have a higher chance of being impacted in a negative way. As the developer, there is also the chance that a project can have a negative impact on you, such as succumbing to pressure to implement features out-of-scope or enduring criticism from users that is toxic and not productive.

C. Addressing Ethical Concerns

An individual's intent is not under the control of anyone else by definition, but measures can be taken to give someone a greater opportunity to act within their own volition. The project details, content, and nature will be exposed entirely to any user that is involved in the testing phase of development. A strong effort will be made to reduce any pressure one might feel to partake in testing, the hope being that everyone will be willing participants. Users who may play this game at a later date, and in a more complete form, will be given the standard amount of information for such a game so that they may make a conscious decision on whether to play it or not (noting any violence, mature themes, and so on that they may encounter).

As for video game addiction, a subject that is dear to me, there is not much needed to curb such a risk at this time. The most that can be done is to keep it in mind - to be vigilant that development doesn't go into avenues that could exploit addictive behavior.

The ethical concerns that arise from actual development must not be overlooked. Being a person that cares for their own well-being, the responsibility to protect myself from unethical practices is high. Maintaining a healthy work-balance, keeping to the project scope, and only allowing stretch features to be tackled with extra time are a few of the points within my plan of keeping development ethical.

VII. Legal Considerations

A. Copyright Infringements

There should be no issues with copyrights as all assets used in the project are original works. The software being used is Unity, with a free license that covers projects until they accrue $100,000 in sales. There is one code snippet that has been sourced from a third-party, but the code was given as part of a tutorial with the intent that individuals would use and modify it.

B. Localization Issues with Content

There are no obvious legal issues that would arise from the content of the project. The game depicts cartoon violence and may contain mature themes in the story when it is implemented further in development. For most territories, stating the nature of the content upfront is enough - making such games in the United

States is not illegal and internationally, the most a body could do is block the game from being available.

VIII. Project Scope

A. Timeline

Dates are for reference and are expected to change

Game foundations I (Completed)	Grid-based movement implemented with coroutines
Game foundations II (Completed)	Basic “attacking” between player and enemy
Combat I (Completed)	Ranged attacks / projectiles
Turn system (Completed)	Turn system and interfaces on actors for stalling their behavior
Combat II (Completed)	Area of Effect attacks / destructible projectiles
UI Stage (4/26 - 4/29)	Simple UI (mainly for testing)
Enemy stage (4/29 - 5/6)	Enemy AI using utility curves
Enemy stage (5/6 - 5/11)	Unique enemies (count dependent on time)
Level Design (5/11 - 5/16)	Simple level with objectives and win condition
Audio system (5/16 - 5/19)	Sound effects and cues
Polish I (5/19 - 5/22)	Clean up and preparation for test build
Compile (5/22)	Creation of first build
Test phase (5/22 - 5/25)	Disperse build to testers with supplementary material
Test phase (5/25 - 6/6)	Collect testing feedback and make necessary changes (repeating as needed and able)

Polish II (6/6 - 6/13)	Polish build for turn-in, organize test data, debrief with self upon project completion

B. Resources needed

- Desktop computer, monitor, keyboard, mouse, etc.
- Copy of Unity Game Engine (free license)
- Aseprite (sprite editor for creating original assets - already owned)
- LMMS (for creating simple melodies - free software)
- Free audio clips and sound effects (if needed)
- GitHub for version control
- GitKraken with pro license for use with private repositories
- Internet connection
- Video conferencing software (Google Meet, Zoom)
- Notebook and fountain pen
- Coffee and jazz

C. Milestones

- Basic implementation of movement and interactions on a grid
- Combat systems implemented
- Turn system created and refined
- Enemy variation through unique AI
- Creation of a small level, suitable for testing
- Testing process and further refinements

- Project completion

D. Risks and Dependencies

Risks - Unable to complete a feature in a reasonable time; upon completing a feature, it does not play as well or as anticipated; feature creep taking time away from essential systems or creating a crunch scenario; the combat system is not fun; users are confused and frustrated by the gameplay; and failure to fix major bugs leading to unproductive testing.

Dependencies - Advanced features in the project will all have dependencies from earlier in the process. Projectiles are dependent on movement being implemented, collisions being detected, and actors having health, for example. In terms of tasks, the gameplay could not be implemented without first drawing-up and devising the initial gameplay design. Tweaking values and fine-tuning gameplay cannot occur until all necessary features have been implemented. Testing cannot be done until the game is in a state (with features and tuning) where testing will be productive.

IX. Final Deliverables

Deliverables for this project will be simple: the compiled game, supplementary documentation, relevant test data, and access to the source code via the private repository host on GitHub (professors will be added as collaborators).

X. Usability Testing / Evaluation

A. Usability Test Plan

Testing for Project Wisp will have three stages: pretest surveying of participants, testing proper, and a posttest debriefing with testers that will involve

gathering data along with any additional surveys filled out during testing (See Appendix for an example).

Surveying and direction given to testers will fall into different categories, the emphasis on which will depend on the stage and state of development (if testing is able to be performed more than one round). Categories will include basic usability (controls, movement, clarity of UI, etc.), thoughts on game mechanics (movement, turn system, abilities, etc.), and bugs, especially those that are game-breaking. Depending on the pretest survey of the tester, the amount of direction given for each of these will vary - this allows for more experienced participants to exercise more autonomy, though they will still be asked to focus on specific systems / categories if needed.

B. Other Evaluation Methods

When able, real-time observation of testers will be done and face-to-face debriefing sessions, both of which will be conducted over video conferencing, due to the current pandemic. One or two participants will be asked to perform white-box testing, going through the current build of the game within the game engine itself.

XI. References

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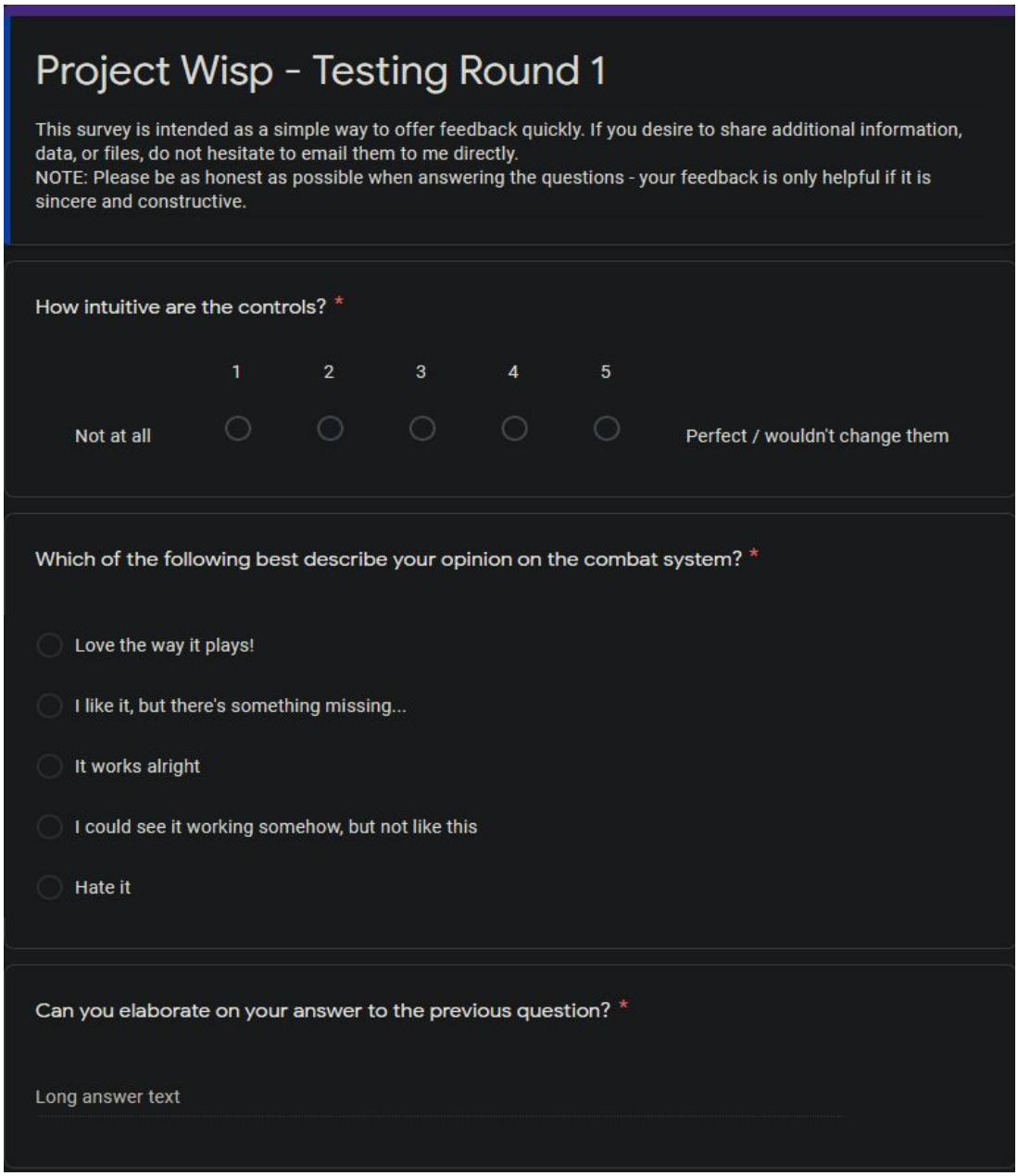
XII. Appendix



Project Wisp - Testing Round 1

This survey is intended as a simple way to offer feedback quickly. If you desire to share additional information, data, or files, do not hesitate to email them to me directly.
NOTE: Please be as honest as possible when answering the questions - your feedback is only helpful if it is sincere and constructive.

How intuitive are the controls? *

	1	2	3	4	5	
Not at all	○	○	○	○	○	Perfect / wouldn't change them

Which of the following best describe your opinion on the combat system? *

- ○ Love the way it plays!
- ○ I like it, but there's something missing...
- ○ It works alright
- ○ I could see it working somehow, but not like this
- ○ Hate it

Can you elaborate on your answer to the previous question? *

Long answer text