

California Polytechnic State University

GhostParty

Tyler Hart

Senior Project

Professor April Marie Grow

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Introduction:

GhostParty takes single player and multiplayer game modes and merges them. The gameplay is neither fully single player nor multiplayer. Even if nobody is actively online, players can still play the game the same way with ghosts. I have not heard of a game that uses this type of gameplay and wanted to test if it creates a good gameplay experience. Some obvious shortcomings compared to true multiplayer are visible when looking at the interaction between players. Players cannot directly influence each other's gameplay, meaning multiplayer is present in visibility but not action. Does this ruin the experience? Can it be helped? These are some of the questions my application aims to answer.

Background:

The motivation for this project stems from a project from my 365 Databases class. The original game was a very basic trading game that allowed players to buy and sell items from a store database shared by all players. I wanted to expand upon this database model and allow players more ways to interact with other players. The project will be built in Unity and use a MongoDB database. Unity is selected mainly because of my familiarity and MongoDB support. Players will compete in party games against AI that will attempt to mimic recorded statistics of existing players much like racing ghosts in Mario Kart. Players can also matchmake based on their store progress, discouraging unrealistic matchups. This project specifically sparked my interest because it offers a unique form of multiplayer interaction if it can be called multiplayer. While players won't be in the same world/instance, there will be plenty of ways to interact with other players through changes made to the database. Challenge your friends or the top ten players on the leaderboard to best their scores and create the perfect ghost.

Related Work:

Most of the inspiration behind my minigames is a direct result from the experience I had playing the following related games.

Mario Kart:



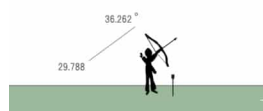
Image: <https://mariokart.fandom.com/wiki/Ghosts>

The idea of ghost gameplay relied heavily on my experience playing Mario Kart's ghost racing feature: "A Ghost is the recording of a player's driving performance" (MarioWiki.com). My adaption would be creating an AI/NPC that simulates player interaction using database-stored values from other players past attempts. The difference in my implementation is the various party-games this AI would be adapted for instead of just racing.

Mario Party:

My game was influenced by Mario Party through its variety of minigames. This project will offer the character multiple different minigames that they must win to record/create a ghost that other players can interact with. The main difference between Mario Party's games and this project is that each minigame will represent some form of medieval-themed encounter.

Bowman 1 and 2:



The idea of an archery minigame stemmed from my time playing this game. To shoot an arrow, the game needed an angle and power. I used this mechanic with different user control methods like a power bar and angle oscillation.

Design:

Instead of live multiplayer, multiplayer will be simulated through other player's ghosts (past attempts). To create a ghost, a player must complete a "run". A run consists of playing every mini game back-to-back against other player's ghosts. The player must make it through these minigames with the best score possible to produce the best ghost they can. Each player will have a win score that increases based on the amount of wins you achieve against ghosts. The most expensive skin your account owns will determine your rank, which can be used to determine what ghosts you play against in a "Store Progress" matchmaking run. You will be able to matchmake against your current ghost as well as other ghosts by username. The goal of the game is to achieve a high coin score and to end up on the leaderboard with the most player wins.

Minigames will have to be made to fulfill three important criteria:

- 1) They must be simple enough to replicate gameplay with limited database storage
- 2) Ghosts must be able to play alongside players without unexpected hinderance from real players
- 3) They must be competitive enough to keep the player engaged and wanting to score higher

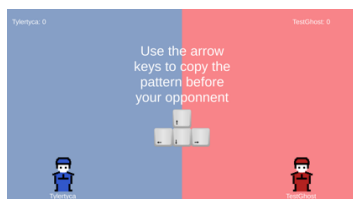
Archery minigame:

The archery minigame will behave like an archery contest where a player will set an angle and a power parameter to hit a target a variable distance away. The angle will be decided based on a bow rotating back and forth from lower to higher angle. The player will time the angle they want by hitting the space bar. The power will be decided very similarly but with a power bar. After three rounds, the player with the most hit targets wins. In the case of a tie, the player will win over the ghost.



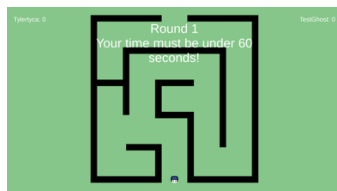
Memorize minigame:

The Memorize minigame consists of three rounds and players must repeat the pattern shown on screen with arrow keys to win a round. Players and ghosts will guess at the same time. Ties will be resolved with whoever finishes the pattern first with the lowest time and most correct directions guessed.



Maze minigame:

The Maze minigame will consist of three rounds and place two players, 1v1, on the same maze. The players will move forward at a constant speed into the maze where they must change directions with left and right arrow keys to avoid collisions with the maze walls. The player that makes it through the maze without touching any walls wins. If both players fail, the tie will result in a win for the player over the ghost. If both players complete the maze, the player that finishes first wins similar to a race.



Given more time, I would have designed a couple more minigames.

Implementation:

Database named PlayerStoreDB: Unity empty game object that will not delete across scenes

Collection named PlayerCollection:

- `_id` : "username"
- `Password` : "password"
- `AchievementPoints`
- `GhostWins`
- `GhostLosses`
- `PlayerWins`
- `PlayerLosses`
- `coins`

Collection named GhostCollection:

- `_id` : "username"
- `ArcheryAngle1` : double
- `ArcheryPower1` : double
- `ArcheryAngle2` : double
- `ArcheryPower2` : double
- `ArcheryAngle3` : double
- `ArcheryPower3` : double
- `Pattern1` : string
- `Time1` : double
- `Guess1` : string
- `Pattern2` : string
- `Time2` : double
- `Guess2` : string
- `Pattern3` : string
- `Time3` : double
- `Guess3` : string
- `ghostMoves` : string
- `ghostTimes` : string
- `ghostMoves1` : string
- `ghostTimes1` : string
- `ghostMoves2` : string
- `ghostTimes2` : string
- `maxSkin` : int

Minigame Ghost Implementation:

Archery: The ghost will replicate a user by storing the power and angle for each shot.

Memorization: The ghost will replicate a user by storing the string pattern (“up, down, down, right, left), the string guess (same format as pattern), and the time it took to complete the guess.

Maze Race: The ghost will replicate a user by storing the string moves (“LRRLLLLR”) and the string times (“1.49,2.23,4.09,5.61,8.15,9.17,12.67,14.29”) that keeps track of when each move took place.

Scenes:

LoginSignUp.unity: First scene on startup. Demonstrates database reading and writing

Menu.unity: Main menu with play, store, and exit options. Displays logged in username top right

Archery.unity: First Minigame

Pattern.unity: Second Minigame

Maze.unity Third Minigame

Results.unity: Results page

Matchmaking.unity: Matchmaking options page

Store.unity: Store page

About.unity: Introduction to database and explanation of ghosts

Instructions.unity: Clear instructions for each minigame

Scoreboard.unity: A leaderboard displaying the wins of the top 10 players

Art and other Assets:

All art in the game is either a default unity asset (text, buttons, etc.) or pixel art drawn by me.

Music is sourced from freesound.org, credited users by song use are listed below.

Menu music: Bertsz

Game music: waveplaySFX

Pattern entry: Breviceps

Pattern mistake: bernhoffbret

Analysis / Verification:**Objectives:**

This project's success will depend on whether this form of single player/multiplayer can support different modes of gameplay. These different modes will include a variety of party games the player encounters in their own instance. It might be that using another player's stats to create an AI for the player to compete with does not create a good gameplay experience. My own success will depend on how I attempt to remedy the lack of player-to-player interaction with database mechanics. I am actively looking for ways to differentiate this gameplay from hardcoded developer recordings. The ranking system idea is just one of the planned remedies.

Play Tests:

Started handing out alpha play test Wednesday 1/25/23. CSC 471, CSC 484, BUS310, CPGD club

Started handing out beta play test Wednesday 2/15/23. CSC 471, CSC 484, BUS310

Alpha Results:

(not including demographic, suggestions, and bug reporting for sake of space)

How long did it feel like you played for?
3 minutes
6 min
6-7min
15 min
5 minutes
5 minutes
10mins
15-Oct
20-25 minutes

On a scale of 1-5, how entertained were you while playing?
2
1
3
3
4
4
3
3
3

Did you understand the rules/controls of the Pattern minigame?	Did you understand the rules/controls of the Archery minigame ?
Yes	It took some time
It took some time	It took some time
Yes	It took some time
Yes	Yes
It took some time	Yes

Yes	It took some time
Yes	Yes
It took some time	It took some time
Yes	It took some time

Did you feel you were playing with another person?	Did you understand what the game means by "Ghost"?	Did you feel like you were in control of the outcome of the game?	If you were to play more, do you think your score would improve?
Maybe	Yes, a Ghost is a recorded attempt made by a real person.	Yes	Yes
Yes	No, I didn't understand without explanation	Yes	Yes
No	Yes, a Ghost is a recorded attempt made by a real person.	Yes	Yes
Maybe	Yes, a Ghost is a recorded attempt made by a real person.	Why did I lose?	Yes
Yes	Yes, a Ghost is a recorded attempt made by a real person.	Yes	Yes
Yes	Yes, a Ghost is a recorded attempt made by a real person.	No	Yes
No	Yes, a Ghost is a recorded attempt made by a real person.	Yes	Yes
Yes	Yes, a Ghost is a recorded attempt made by a real person.	Yes	Yes
Maybe	Yes, a Ghost is a recorded attempt made by a real person.	Yes	Yes

Identify an aspect of the game you felt was too slow or boring	Identify an aspect of the game you felt was lacking or missing
I think waiting for the ghost to complete their pattern game turn took too long.	
Waiting for the player during archery	motivation to play
I feel like the pattern section was too slow. I would like if it had variation in speed (speeding up the patterns as the rounds progress, a skip button for the other player's ghost, or maybe more mini games but only one round of each. I think a game like "stick fight" (on steam) has a more appropriate speed to a casual competition game like this.	I think that there were too few minigames, while each game was interesting on it's own I would have enjoyed playing 6 different games instead of 3 rounds each of 2 games. In general I feel like the theme of the game would benefit from faster minigames and more minigames.

The AI would aim and choose power and then it'd take forever for it to shoot.	being able to go back one step in order to readjust the power or angle.
The instructions for the memorization game took a little too long, switching from Round 1 to this player's turn to actually memorizing, etc. I also felt that the arrows could have been shown quicker.	Leaderboard, I also played the same opponent on a 2nd playthrough
I just did not understand how to play the archery game	A practice round for each mini game.
the arrow animation was a little slow(it appears as though the arrow pops up and is then rotated/ doesn't appear in the correct orientation at first)	
The wait time on the memorization felt like it dragged on for a while	Clear instructions, with the archery game it would be good to note that its one click to stop the spin, one click to get your speed, and another to fire. For the memorization game it would be helpful to display what keys im pressing, also to clarify that im supposed to recreate the arrows with my own keys when it says Go, simple but goes a long way for UX
There were moments, especially in the archery game, where the opponent takes a long time before the shot comes out. Additionally, waiting to see the whole pattern in the other minigame feels slow	No sound, no description of rules / controls / point system, no popup menu or easy way to return to start, certainly lacking in aspects of the graphics, but not the most important to gameplay

Beta Results:

(not including demographic, suggestions, and bug reporting for sake of space)

How long did it feel like you played for?	On a scale of 1-5, how entertained were you while playing?
10 minutes	4
7 min	4
15 minutes	3
15 minutes about?	3
5 mins	2
10 min	2

Did you understand the rules/controls of the Pattern minigame?	Did you understand the rules/controls of the Archery minigame?	Did you understand the rules/controls of the Maze minigame?
Yes	Yes	No
Yes	Yes	Yes
Yes	Yes	Yes

Yes	Yes	Yes
Yes	Yes	Yes
Yes	Yes	Yes

Did you feel you were playing with another person?	Did you understand what the game means by "Ghost"?	Did you feel like you were in control of the outcome of the game?	If you were to play more, do you think your score would improve?
Yes	Yes, a Ghost is a recorded attempt made by a real person.	Yes	Yes
Yes	Yes, a Ghost is a recorded attempt made by a real person.	Yes	Yes
Maybe	No, I didn't understand without explanation	Yes	Yes
Yes	Yes, a Ghost is a recorded attempt made by a real person.	No	Yes
No	Yes, a Ghost is a recorded attempt made by a real person.	No	Maybe
No	Yes, a Ghost is a recorded attempt made by a real person.	No	No

Identify an aspect of the game you felt was too slow or boring	Identify an aspect of the game you felt was lacking or missing
The game has great premises and good goals for the player to achieve	In the archery game, I would recommend making a cross hair of some sort to help the player aim.
The memorize game was a little bit boring because of the lack of haptic feedback, and the simple and boring aesthetic.	music, haptic feedback, sound effects
The time in between arrows in the memorization game	There could have been more color and style to make the atmosphere more interesting
The time to go to start each game (i.e "ready"..... "go")	There is no reset on the pattern game. It just times out if you get it wrong?
The maze game did not work. The input for down did not work on my run. as well as the input for right. All buttons work on my keyboard	the matching the pattern game was lacking. The ghost remembered and entered the pattern immediately. it takes more than 1 second to even enter the pattern and the ghost had it in 1.01 or something

Analysis Conclusion:

Playtest results of an average of 3/5 entertainment along with 8/9 testers understanding the term ghost gameplay points to a successful reception. None of the testers made any negative comments toward the ghost gameplay or requests for live multiplayer. Functionalities like the leaderboard, store, and matchmaking by username allow players to interact with their friends and identify rivals. The addition of rounds to each minigame encourages variety and depth in simple gameplay modes. Finally, results from playtests indicate that players are evenly matched and can improve their scores through practice and training. With plenty of gameplay aspects present, functional, and working together, my work can be verified as a success. Ghost gameplay does not ruin the experience and having more gameplay aspects like a store and leaderboard can improve the reception of games of this unique database genre.

Future Work:

Changes that made it into the game influenced by play test results.

Memorize minigame changes:

- Player and ghost turns executing simultaneously
- Fixed arrow flickering bug identified by a tester
- Added max time limit
- Sound feedback for keys being entered
- Speed up time between arrows
- Change ready... go! To ready 3 2 1 go very fast
- Visual key prompts to clarify controls

Archery minigame changes:

- Change shooting controls by tester request
- Fixed ghost waiting to shoot forever bug
- Bow related art
- Visual key prompts to clarify controls

Maze minigame changes:

- Visual key prompts to clarify controls: players did not understand left and right arrow keys turn left and right instead of all arrow keys controlling movement
- Tie should go to the player who crashed last instead of the live player every time

Matchmaking changes:

- Added ability to matchmake by username
- leaderboard showing the top ten players with the most wins

Cosmetic changes:

- Adding actual artistic skins stored in database as int 1-5. Picks what skin will be rendered instead of just white square. This could improve “Did you feel you were playing with another person?” question to be more yeses
- About tab in Menu.unity that explains how the game works (database interaction)
- Instructions tab in Menu.unity explaining the instructions of each minigame in depth
- When playing against your own ghost, clearly display “YourGhost” as username for clarity

Values highlighted by responses:

- Player time: Players want to be able to play immediately without waiting for prompt
- Matchmaking control: players want to match against meaningful opponents like friends or themselves. This makes the ghost feature pop
- Good Instructions: Players need to be able to understand each minigame clearly before being plunged in
- Scores Explained: Players need to know when they are poised to win, seeing a tie then a score being added to them breaks this value because there is no explanation

Post-Final Submission Future Work:

I think this game could be rounded out with some more minigames and cosmetic options. A social tab that allows players to send and receive friend requests would have been a good idea. A social function could have also helped fix the problem of differentiating ghost gameplay from pre-recorded developer gameplay. On a smaller scale, better art and music could be added to make the medieval theme more obvious and improve the overall quality of the game.

Conclusion:

I have successfully verified that my version of multiplayer can be used effectively to create a valid gameplay experience. I am very proud of my efforts to differentiate ghost gameplay from developer recording gameplay. After spending a decent amount of time creating gameplay from ghost recordings, I can recognize the merit in interactive AI. Ghost recordings will never be able to adapt to the player’s actions. This senior project has been a massive learning experience for Unity and MongoDB. My original goal behind doing a game-based senior project was to familiarize myself with a modern game engine and to further my experience with game development. I believe I have accomplished this goal by getting my feet wet with very different modes of gameplay throughout the implementation of the minigames. I received a lot of hands-on experience with Unity elements like scripts, colliders, UI canvases, and much more. Overall, I have gained a lot of knowledge about game engines and how to use them effectively.

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