Warlord Battle (Oculus, Leap motion) - Design Doc

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1 Executive Summary

Warlord Battle is a two-player game combining Action magic shooting and avoiding game with lightweight strategy game based on Oculus VR and Leap motion support in Unreal.

Players play as giant demon warlord who can take charge of his army and also cast dangerous spells to attack the opponent. The goal is to beat the opponent player by reducing its health to zero.

Generated Units can be placed on any of the track in the battlefield and will automatically move toward the opponent along the track. Units will stop and attack the enemy units when encountered any on the track. Once the units reach the other side of the tack, the unit will stop and attack the opponent player till its death.

Besides the strategy part that wisely generate units on different tracks to march to the other side and join the battle, the player as the demon warlord can also get involved in the battle and combat directly by casting spells aiming at either the enemy army units or opponent player with their hands using different gestures. Players can avoid the spell's attack by moving headset. Also players can cast spells to intercept spells casting by enemy to protect the units from being destroyed.

Both generating units and casting spells will cost energy, which can be respawned by gathering floating particles using palms. When gathering energy, the player needs to stay in a specific pose for a while which means attack and avoid is impossible at the same time. This scheme provides an interesting gameplay experience where players have to achieve a balance among generating units, casting spells, and gathering energy.

With the support of Oculus VR headset and Leap motion devices, players can experience being the giant demon taking charge of their units. Players can look at the army at their feet, moving around to avoid attack, and casting spells like the sorcerers in movies. Generating units also benefit from the leap motion with a very friendly interface and units will generate on the palm and player only need to place these unit on the battlefield as if units are actually generated on their hands.

2 GAME Design - CREATIVE

2.1 High Concept

Warlord Battle is online VR game that is played by two players on a virtual battle field. Each player can make gestures, which will be captured by Leap Motion, to cast magic spells, or can spawn minions to attack opponent's minions and hero. The goal of the game is to destroy opponent's hero.

2.2 Design Goals

2.2.1 Main Design Features

Player will control the character fighting with opponents by the movement of mouse, which includes both speed and direction, to determine the attack's strength and type. Player can also cast a spell by drawing particular patterns according the prompts on the screen.

2.2.1.1 Player goals and objectives.

Goal: Goal of *Warlord Battle* is to defeat and destroy opponent by casting magic spells or spawning minions to attack the opponent.
Conflicts & challenges: Challenges of the game include avoiding opponent's attack by moving their heads and strategy to deploy minions.
Winning condition: Players can win the game by defeating the enemy.

2.2.1.2 Main rules and procedures

Two players will be placed on the two sides of a rectangle arena. Several horizontal lanes are partitioned, which connect two players, for the passes for minions to march.
Attack by casting a magic: player have the ability to cast a spell by move right palm forward facing the target, which can be opponent's warlord or the minions.
Summon and deploy a minion: player can summon/select a minion by swiping left hand downward. All available mininos will be displayed on the left hand. Then player can choose which they want to deploy by right hand key tapping. And move the minion to specific lane with right hand/finger. The the minions will march to the opponent automatically.
Player's spell can attack minions and also opponent player. Each spell will be cooled down for a period of time after casted.

The procedures of the game: once game starts, two players can deploy minions and cast magics. Player need to decide the time and type of the attacks appropriately in order to defeat the enemy. Until one of the players' health value reduced to zero, game stops.

2.2.1.3 Player Resources

Player will have different types of minions to summon. Minions can attack and be attacked by opponent player and the minions on the same lane. How to play these minions resources is key to win the game.
Another type of resources player can make well use of is casting spell. Player can cast a spell to attack opponent's minions.
Additional, health value is also important resource in this game. Attacked by enemy will reduce the health, player will lose the game when health value come to zero.

2.2.1.4 Boundaries and Constraints

Players will be constrained in the space of scene in game. Each lane for minions to march is constrained. Minions can not be placed someplace without a lane.
During fighting, player can cast a spell when the cooling down time has ended. Attacked by enemies' minions or spells will cause some reduction of health value.

2.2.2 Appeal

Players cannot experience the feeling of casting a spell or magic attack in real life. But with the power of VR tech and leap motion, they CAN now! The feeling of casting a magic spell like a wizard in Harry Potter will be an amazing and unforgettable experience. "Casting" here means really cast a spell by moving/swiping hand instead of pressing a button.

2.2.3 Look and Feel

This game will be a fantastic/fantasy style VR game, it focus more on providing a magical and enjoying game environment. No so many moving of camera will be introduced to the game, so players will not experience the possibility of painful feeling due to improper movement.

2.3 Worlds, Characters and Story

2.3.1 Backstory

Two angry demon warlord are having a battle. They will make the most of their army, their magic power to defeat the other.

2.3.2 Spaces/Worlds

Two giant demon will be standing at both side of the battlefield. They cannot move, but they can avoid coming spells by moving head position.

The logic Battlefield is a rectangle consisting of 5 different tracks parallel to each other. Each track starts from the player's position and lead to the opponent. When army units enter any of these tracks, they will move forward to the opponent.

2.3.3 Characters

To simplify the art work, we will use a demon shadow image rendered on a plane to illustrate the demon warlord instead of using actual 3d character models like this:

For units, there will be several kinds of army units with different sets of abilities. At very basic their will be three types of units: 1. Spearman: Fast, cheap, but weak units with short range attack. 2. Guard: Heavy armored powerful short range attack units, tough but expensive. 3. Archers: very weak units with long range attack.

2.3.4 Levels of Difficulty

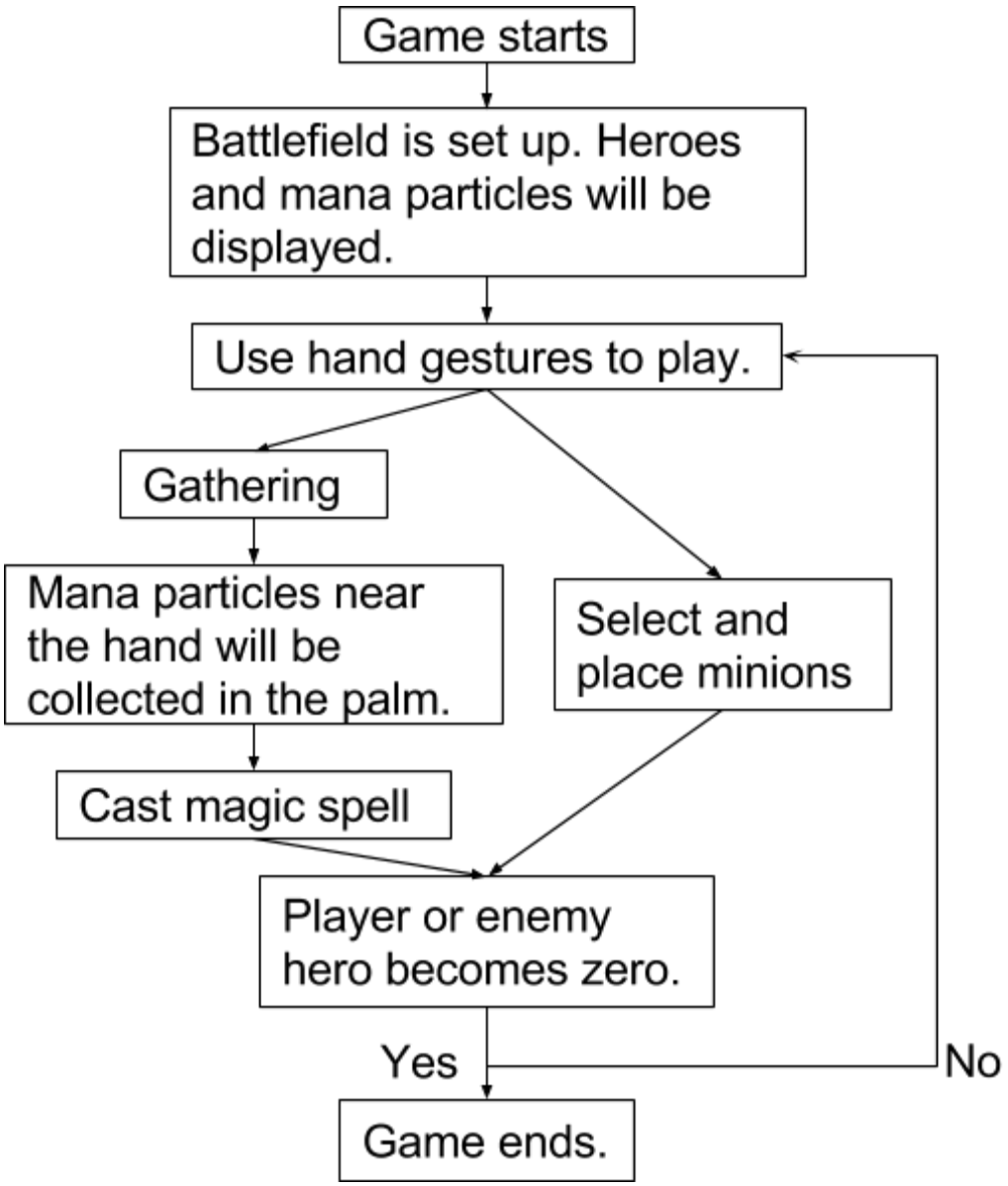
There is no explicit levels in this game. As time goes on, two players will be growing as their resources accumulated. The developing opponent forms the growing difficulty at different stages of the game naturally.

2.4 Interaction Models

2.4.1 User Interface

There will be no explicit ui canvas layer in the game. Status information will be displayed at the ground near the feet.
UI related to generating army units can be bring out by posing gestures. Buttons will be displayed at the finger tip. Players can click button with the other hand.

2.4.2 Game Play Sequence and Levels



2.4.3 User/Environment – Obstacles and Props

The opponent units and spells will be the main obstacles. Players need to handle them or great damages could be made to the player hp or the army. Also, limited resources and spells and units cool down time is also a limit that should be taken into account.

2.4.4 User/Character

The user is no more than a plane (or collider box). Players can only see their hands. They will use hands to cast spells, gather resources, and interact with ui to generate units.

2.4.5 Character/Character

Besides the player giant demon warlord character, their will be army units. They are small creatures with simple agents. They can move and attack.

2.4.6 Motion Tracking

We will use Leap motion device for motion tracking in this game. Use C++ API to detect the gestures.

2.4.7 Multi-Player

The game is played by two player at the same time. A steam api for unreal will be used for the networking part.

2.4.8 Mobile

This game is developed for PC only

2.4.9 Networked Play

The game is played by two player at the same time. A steam api for unreal will be used for the networking part.

2.5 Performance and Scoring

2.5.1 State Variables

HeroStatus:

- HP
- MP
- Attack

- Defense
- speed
- Spell[]
- isAttacking

MinionStatus
- HP
- attack
- defense
- speed

BattleStatus:
- isActive
- manaRefillRate
- battleCountdown

2.5.2 Feedback

- Positive feedback:
    - Mana gathering: When gathering gesture is correctly made, glowing particles in the air will be collected in the palm.
    - Spawning minions: When selection of minion is successfully made, the minion will appear on the palm.
    - Cast spells: When spells cast by your hero hit the opponent's minions or hero, their HP will decrease. When correct gesture is made, spells will be cast with visual and audio effects.
- Negative feedback:
    - Hero's HP decreases if player failed to dodge spells cast by opponent's hero by moving his head, and the view will shake to create a little dizziness.
    - Minions hit by enemy: Lose HP, Sound feedback, hit particle system, sound feedback
    - Hero Knocked out by the enemy: lose the combat

2.5.3 Performance and Progress Metrics

The player wins by reducing the enemy hero's HP to zero. The player loses when his or her hero's HP reaches zero.

3 Game Design - Implementation Details

3.1 Design Assumptions

3.1.1 Hardware

PC, Windows/Mac/Linux, LeapMotion, Oculus

3.1.2 Software

Game Engine: Unreal 4
Operating System: Windows 7 or higher
DirectX: DX10 or higher

3.1.3 Algorithms and Techniques

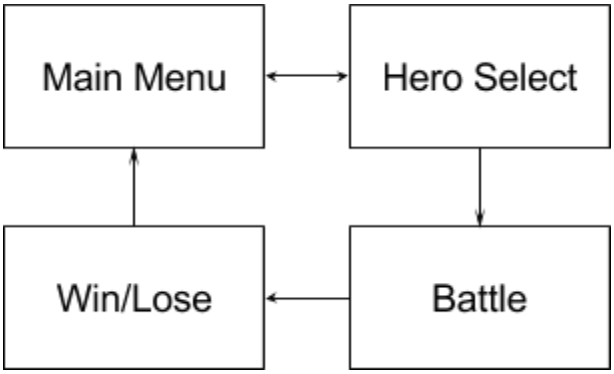
For this game, we will be using Unreal 4 engine to develop the game, for its powerful graphical programming features (e.g. blueprints) and ability to produce excellent graphics.
Since this game project is a VR project, we will use Oculus DK2 to display the graphics and take advantage of its sensor and positional tracker to detect head rotation and movement.
We will use LeapMotion to detect hand gestures as input to perform control over the hero and minions.
Mana is modeled as particles floating in the air and will be gathered by players by making gathering gesture, thus force will be applied to particles to drive them to move.
We will implement the menu as following player's hand in the virtual world so that it is handy for access and provide a futuristic experience.

3.2 Storyboards

Main Menu	Hero Select
Battle	Win/Lose

3.3 Design Logic

3.3.1 FSM - State/Effect



3.3.2 User Solution/Actions

Player wears Oculus DK2 headset with LeapMotion detector. During a battle, player makes gesture to gather mana, which is the particles in the air, then makes gesture to cast the spell to attack opponent's minions or hero. Player expose one of the palm and face it up to show minion selection interface in the virtual world and use the other hand to select the minion to spawn. After selecting the minion will appear in the middle of the palm and player uses the other hand to move it on the battlefield in one of the lanes, which the minion will walk through. Players can cast spells towards the opponent's hero or minions. When a spell is approaching the player, he can move his head to dodge the spell to avoid damage.

3.4 Software Versions

3.4.1 Alpha Version Features (vertical slice through total experience)

Alpha version should implement the basic gameplay. The player will be able to see a rectangular virtual battlefields, heroes of both sides represented by two image planes sitting at the opposite of the battlefield in the virtual world. Players will be able to see the simple minion selection interface. We will provide few choices of minion in alpha version. Particle system will be present in the virtual space representing mana. Players will be able to see their hands in the virtual world and certain type of gesture will be able to detected.

3.4.2 Beta Version Features

More types of minion will be added in the beta version, as well as their attacking strategies. We will improve the visual experience such as the minion selection interface, the magic spells cast

by heroes, the mana particles behavior, etc. We may provide different types of cast spells for different hero characters. Balancing is also one of the main issues to handle in this version.

3.4.3 Description of Self-running Demos

In this version of the game, more GUI elements will be added. Game display should be polished after these UIs' involvement. Like spells cast by the hero, moving and following UI (e.g. minion selection interface) and game menu can provide more detailed and elegant gameplay performance. The final refinement of the game will be implemented here. Entire functional game logic, minion system, magic spell system and all GUIs will be tested and connected together for this version.

4 Work Plan

4.1 Tasks

Task #	Sub mission	Member	Due date
1	Setup DK2 and leap motion development environment ; Setup Unreal engine build environment for DK2 and leap motion;	All	Apr 3
2	Setup base game scene in Unreal; Motion control/gestures identifying; Character skeleton binding with motion control; Network connection setup;	Shuai; Liang; Zimeng	Apr 9
3	Basic game logic; Identification for casting motions; Magic spell particle system; Testing;	Shuai Zimeng Liang All	Apr 16 Alpha
4	Left hand minions selection system(including UI and minions setup); Minions marching and attacking logic; Damage system for minions and spells;	Shuai Zimeng Liang	Apr 25 Beta
5	UI polishing; Testing and adjust balance;	Shuai Zimeng Liang	May 5 Final
6	Final refinement; Testing; Trailer Video;	All	May 9

4.2 Milestones

4.2.1 Minor

Week #	Demonstration
1	Basic VR and leap motion development environment setup. Basic game

	scene and motion detecting. Binding gestures to character skeletons. Network system connection should work.
2	Base game logic, identifying motion or gesture by leap motion. Particle systems for spells in Unreal creation.
3	Left hand selecting minions system; gesture control. Make sure damage system will work for both minions and spells (particle system).
4	Polishing UI and game balance, adjust parameters and playtesting.
5	Final refinement and test.

4.2.2 Major

Alpha Version

In alpha version, game should implement the basic VR environment and motion control system. Player can cast a spell by motion correctly. And particle system for spells should work too. Network connection for multiple players should be implemented in alpha version.

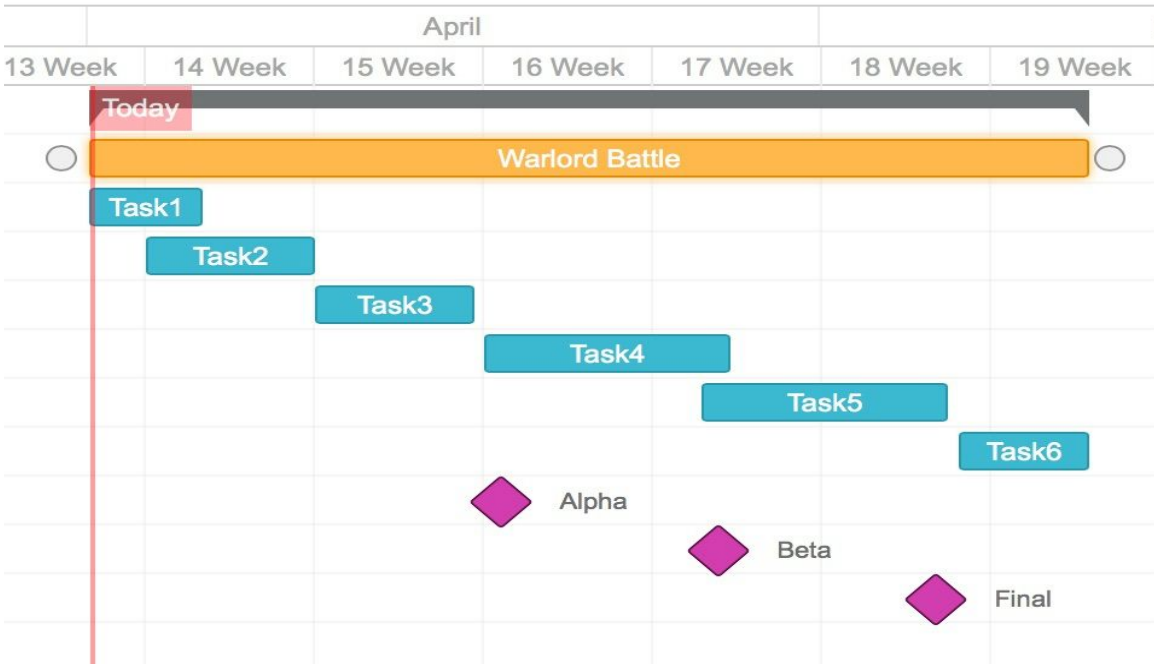
Beta Version

Following week after alpha version will focus on left hand minions selection system. Including gesture for calling a menu and minions system. RIght hand for picking up a minion and place it on lane.

Final Version

In final version of the game, more GUIs will added. Game display should be polished after testing basic gameplay logic and functions. Spells system and minions system will be well balanced and adjusted.

4.3 Development Schedule


April
13 Week
14 Week
15 Week
16 Week
17 Week
18 Week
19 Week
Today
Warlord Battle
Task1
Task2
Task3
Task4
Task5
Task6
Alpha
Beta
Final