

# Hogwarts: Spellstorm - Project Document

**Project Name:** Hogwarts: Spellstorm

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**Workshop:** Game Development with Unity

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## 1. Introduction

### a. Project Summary

Hogwarts: Spellstorm is a virtual reality (VR) game set in an immersive magical world inspired by Harry Potter. Players utilize motion-based wand gestures and voice commands for spellcasting, interpreted by advanced machine learning models. The game emphasizes strategic gameplay, engaging players in environments like the Forbidden Forest and Hogwarts Castle. It features waves of enemies, boss battles, and unlockable content, enhancing replayability and personalization.

### b. Problem and Added Benefits

**Problem:** Existing VR games often fail to combine immersive environments with engaging gameplay, offering limited interaction mechanics. Players seek unique, magical experiences that challenge their skills and imagination.

**Added Benefits:** Hogwarts: Spellstorm addresses this gap with innovative interaction mechanics, combining wand gestures and voice commands for spellcasting. It provides dynamic, immersive environments and strategic gameplay that sets it apart from competitors. The magical theme and interactive features make it both fun and captivating.

### c. Competitors and Alternatives

Similar games include:

- **Hogwarts Legacy:** Offers immersive environments and spellcasting but lacks VR-based interactive capabilities.
- **Waltz of the Wizard VR:** Focuses on magic and spellcasting in VR but lacks structured levels and strategic gameplay.
- **Call of Duty Zombies:** Features survival gameplay but lacks magical elements and VR interaction.

### d. Main Features

- **Spellcasting Mechanics:** Combines gesture recognition and voice commands for realistic gameplay.
- **Machine Learning Integration:** Uses ML models for precise gesture and voice command recognition.
- **Immersive Environments:** Players explore detailed recreations of magical locations with responsive elements.

- **Strategic Gameplay:** Requires players to strategize based on enemy weaknesses, resources, and spell effectiveness.
- **Customization:** Includes unlockable spells, customizable avatars, and wands.

#### e. Gameplay

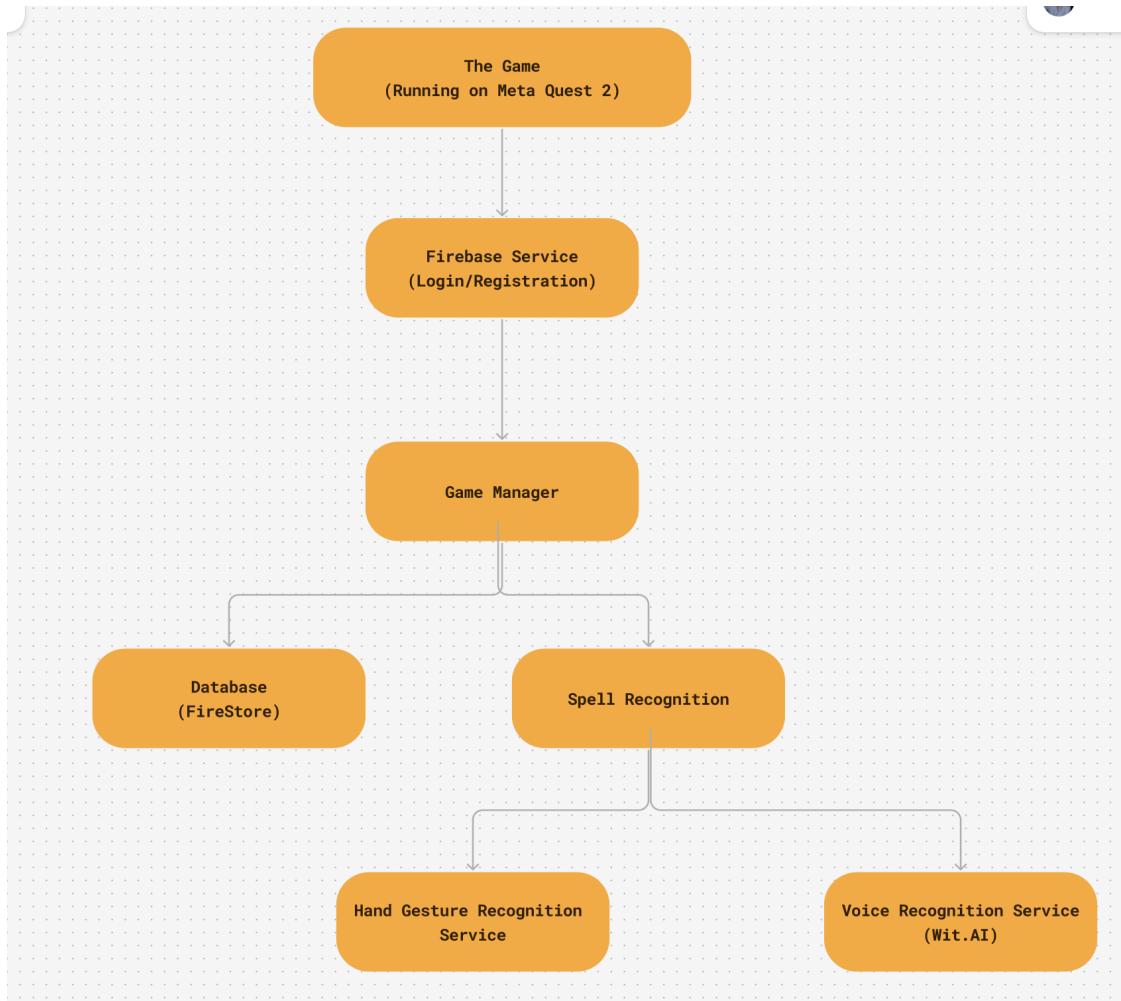
Players face waves of enemies, using voice and hand gestures to cast spells in an immersive combat experience. Enemies become increasingly challenging, requiring strategic spell selection based on their type and attack patterns. Defeated enemies drop potions that restore vitality or enhance spell effectiveness. Movement is restricted to a small area, intensifying battles and encouraging precise spellcasting. Each level concludes with a unique boss battle that demands tactical use of spells and the environment to overcome.

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## 2. Architecture

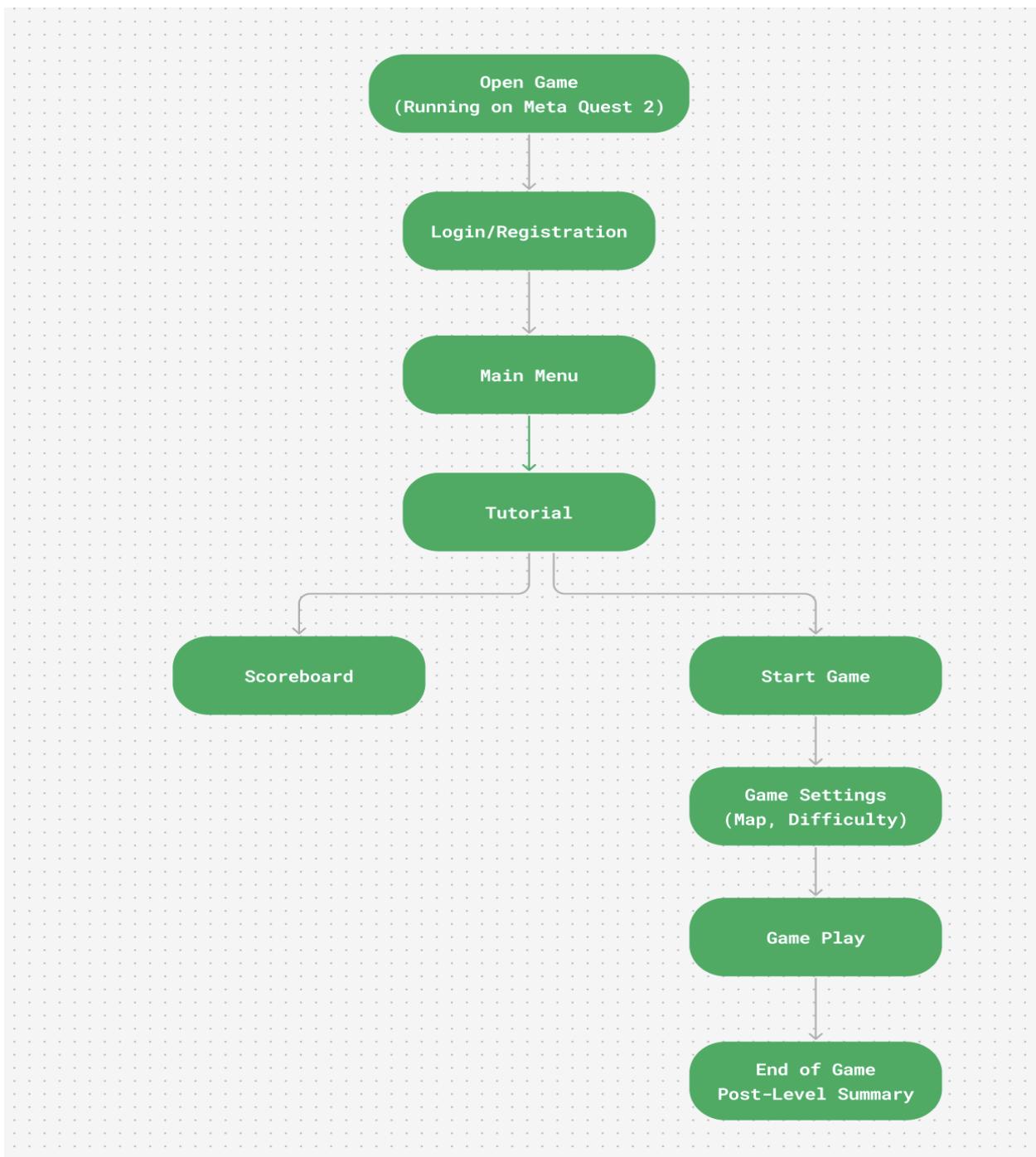
### a. System Components and Technologies

- **VR Platform:** Unity with C# for development.
- **Hand Gesture Recognition:** MiVRy & Tensorflow.
- **Voice Recognition:** Wit.AI & Meta Voice SDK.
- **Hardware:** Oculus Quest VR headset and motion controllers.
- **Backend:** Firebase authentication and storage for leaderboards and user data.



## b. User Use Cases

- **Persona:** A Harry Potter enthusiast using the VR system.
- **Flow:**
  1. User log into the game and customize their avatar and wand.
  2. User learn spellcasting through gesture and voice tutorials.
  3. User selects a level and engages in combat, utilizing gestures and voice commands to defeat waves of enemies.
  4. User earn points to unlock new spells and upload scores to global leaderboards.



### c. Testing

- **Gesture and Voice Recognition:** Evaluated model accuracy with various users and pronunciations. Tested in various environments (silent and noisy).
  - **Gameplay Performance:** Tested gameplay flow, responsiveness.
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## 3. User Guide

### a. Screens and Project Flow

1. **Main Menu:** Options to start a game, customize settings, or view leaderboards.
  2. **Tutorial:** Interactive onboarding to practice spellcasting.
  3. **Difficulty Selection:** Displays available levels with difficulty ratings.
  4. **Gameplay:** Combines combat, resource collection, and exploration.
  5. **Post-Level Summary:** Shows performance metrics and rewards.
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## 4. Issues and Future Work

### a. Problems Faced

- **Gesture Recognition Accuracy:** Fine-tuning models to accommodate diverse user motions.
- **Speech Recognition Variability:** Addressing differences in pronunciation.
- **Performance Optimization:** Ensuring smooth gameplay on VR hardware.

### b. Known Issues

- Occasional lag in recognizing speech.
- Limited variation in enemy AI behavior.
- High resource usage during prolonged gameplay.

### c. Future Development

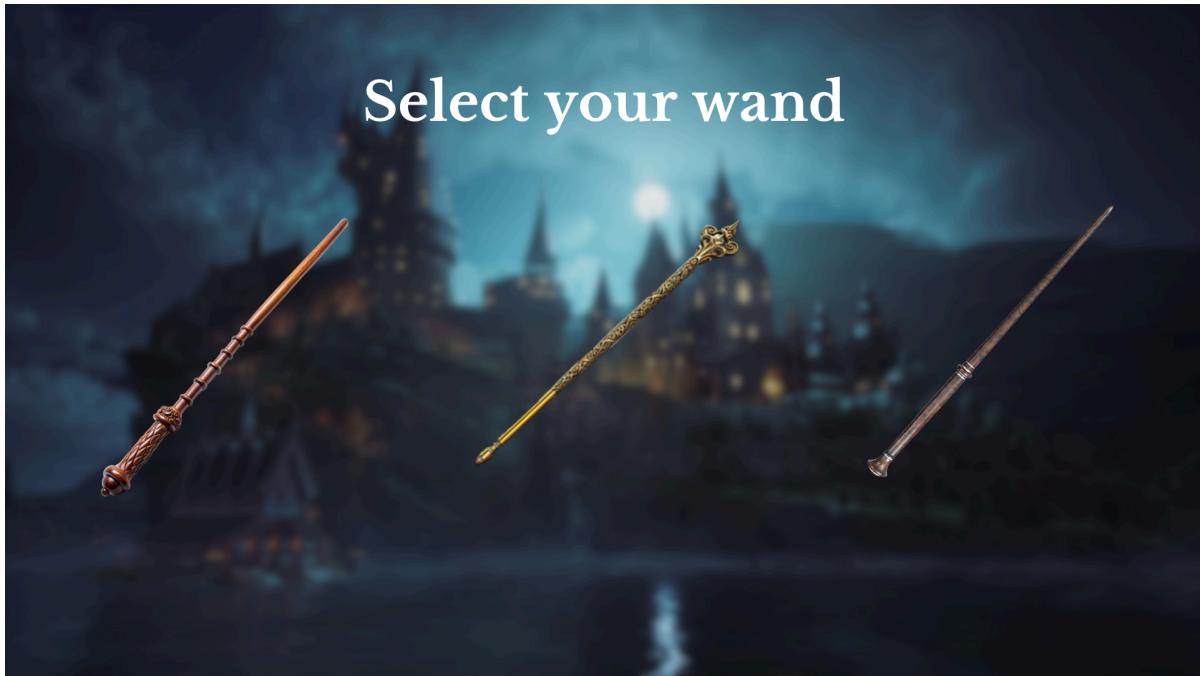
- Expand environments with new magical locations.
- Introduce additional spells and gameplay mechanics.

## 5. Screenshots

### a. Main Menu



### b. customization



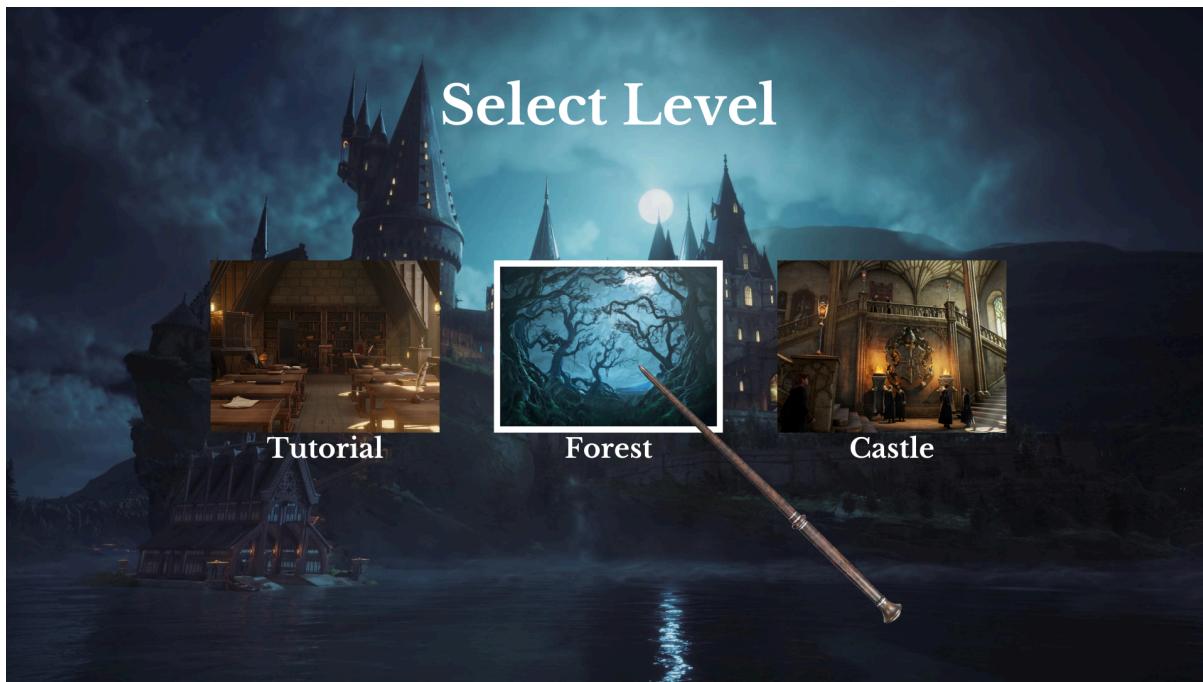
c. Leaderboard



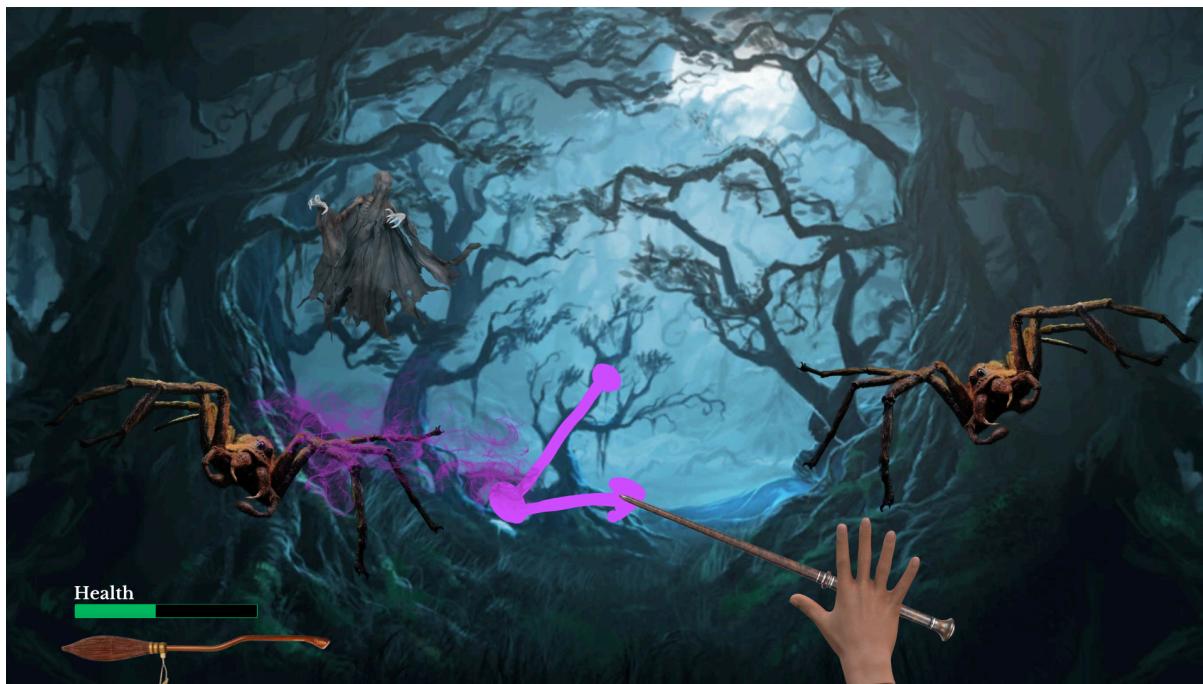
d. Tutorial



e. Level Selection



f. Gameplay



**g. Level Summary**

