Software Requirements Specification

for

**AR-Powered Treasure Hunt Game**

Version 1.0 approved

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January 2025

Course : Software Design and Methodologies

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Revision History

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| **Name** | **Date** | **Reason For Changes** | **Version** |
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# Introduction

## Purpose

The AR-powered treasure hunt game is designed to provide users with an engaging experience that combines the thrill of traditional scavenger hunts with the immersive possibilities of augmented reality (AR). This document defines the requirements for the mobile application utilized by players and the administrative web interface used to create and manage games. The primary goal is to offer a platform that fosters exploration, entertainment, and education by merging digital and real-world elements seamlessly.

## Document Conventions

The following conventions are used in this document to ensure clarity and consistency:

* **Bold text** highlights key terms or concepts.
* Italicized text is used for definitions or examples.
* Monospaced text identifies code or specific system references.

All requirements are labeled with unique identifiers to facilitate tracking and verification.

## Intended Audience and Reading Suggestions

* Developers who will implement the technical requirements outlined in this document.
* Designers responsible for creating user-friendly and visually appealing interfaces.
* Testers ensuring system functionality and quality control.
* Game administrators managing and organizing games through the provided tools. Readers are advised to begin with the Introduction to understand the overall goals and scope of the project, then proceed to sections detailing system features and technical specifications.

## Project Scope

The AR-powered treasure hunt game aims to revolutionize scavenger hunts by integrating augmented reality features that superimpose digital content onto physical environments. Players will be guided through a series of challenges that require them to locate, scan, and interact with real-world objects enhanced by **AR visuals**. The platform is targeted at educational institutions, event organizers, and entertainment providers seeking innovative, location-based experiences. The game’s features include customizable AR clues, real-time scoring, and interactive maps that dynamically highlight player progress.

## References

References include foundational documents and materials such as:

* "HUNT: Scavenger Hunt with Augmented Reality" by Lu, Chao, and Parker (2015).
* IEEE Software Requirements Specifications Template.
* Documentation for ARKit (iOS) and ARCore (Android).

# Overall Description

## Product Perspective

The AR-powered treasure hunt game is conceived as a standalone system comprising two components: a mobile application for players and a web-based administrative platform for game organizers. The mobile app provides an interactive AR-driven experience, while the web interface enables organizers to configure game settings, upload multimedia content, and monitor player activities. By leveraging AR technology, the system integrates physical and digital realms, offering a cohesive and immersive gaming experience.

## Product Features

Key features of the system include:

* Players explore real-world environments to find AR clues, solve puzzles, and track progress via leaderboards.
* Administrators design games with customizable settings such as AR overlays, time limits, and point values, and monitor player activities through analytics**.**

## User Classes and Characteristics

The system supports the following user classes:

* **Players**: End-users participating in the treasure hunts, ranging in age and technical expertise. They interact with AR elements via the mobile app.
* **Game Organizers**: Individuals or teams designing and managing games, typically with intermediate technical skills.
* **System Administrators**: Professionals handling maintenance, data security, and platform updates, ensuring smooth operations.

## Operating Environment

The operating environment includes:

* Mobile devices running Android 10+ or iOS 14+ with support for ARKit/ARCore.
* Modern web browsers such as Chrome, Firefox, or Safari for the administrative platform.

## Design and Implementation Constraints

Constraints include:

* Mobile devices must support AR capabilities, including gyroscope and camera functionality.
* Adherence to data privacy regulations like GDPR is mandatory.
* Dependence on ARKit and ARCore libraries for AR functionalities**.**

## User Documentation

* A player guide detailing app features and gameplay.
* An administrator manual for using the web interface and managing games.

## Assumptions and Dependencies

* Players will grant necessary permissions for location and camera access.
* The system assumes consistent internet connectivity for real-time features like leaderboards.

# System Features

**3.1 AR Clue Discovery**

Players use their device’s camera to scan the environment for hidden clues. AR technology overlays digital hints and visuals onto real-world objects, guiding players to their next target.

**Stimulus/Response**:

* The player scans the surroundings using the app.
* When a clue is detected, AR content is displayed.

**Functional Requirements**:

1. Implement AR tracking and detection mechanisms.
2. Display multimedia overlays upon clue discovery.
3. Provide visual feedback to confirm successful discovery.

**3.2 Clue Validation and Scoring**

This feature verifies whether the scanned object matches the required clue and updates the player’s score accordingly.

**Stimulus/Response**:

* The player scans an object.
  + - The system validates the object and awards points.

**Functional Requirements**:

1. Compare scanned objects against preloaded database entries.
2. Update leaderboard in real-time.
3. Display messages for incorrect or duplicate scans.

**3.3 Interactive Maps**

The app features an interactive map showing the player’s location and nearby clue zones.

**Stimulus/Response**:

* Players open the map view.
* The map highlights clue zones and player position.

**Functional Requirements**:

1. Integrate GPS for accurate location tracking.
2. Highlight active zones dynamically based on game progress.

# External Interface Requirements

## User Interfaces

The user interface includes:

* **Mobile App**: AR scanner, interactive maps, score tracker, and game summaries.
  + **Admin Web**: Tools for creating, editing, and monitoring games.

## Hardware Interfaces

* Mobile devices with ARKit/ARCore support.
* High-resolution cameras for AR scanning.

## Software Interfaces

* APIs for AR functionalities (ARKit/ARCore).
* Backend services for data synchronization and storage.

## Communications Interfaces

* RESTful APIs for secure data transfer between mobile app, web interface, and backend servers.

# Other Nonfunctional Requirements

**5.1 Performance Requirements**

* Ensure seamless AR rendering with minimal latency (<100ms).
* Support concurrent access by up to 10,000 players.

**5.2 Safety Requirements**

* Display safety reminders for outdoor gameplay.
* Ensure data encryption to protect user privacy.

**5.3 Security Requirements**

* Implement role-based access control for the admin interface.
* Encrypt sensitive data both in transit and at rest.

**5.4 Software Quality Attributes**

* **Usability**: Design an intuitive interface for players and administrators.
* **Reliability**: Ensure system uptime of 99.9%.
* **Scalability**: Support a growing number of users and games.

Appendix A: Glossary

* Augmented Reality (AR): Technology that overlays digital content onto the real world.
* Clue: An object or challenge players must locate or solve.
* Leaderboard: A scoreboard displaying player rankings.