ARcadeGuardians - Mixed Reality & Tangible Interaction Project Report

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Introduction

The ARcadeGuardians project is part of a Mixed Reality & Tangible Interaction course. This report presents the development process and key aspects of the game, including the use of markers, design considerations, game features, UI design, and the project's unique characteristics.

Implementation

ARcadeGuardians was developed using Unity and programmed in C#. Vuforia was integrated for marker detection and rendering of virtual objects. Pair coding methodology facilitated collaboration and code quality.

Markers

To facilitate marker recognition, the project utilizes Vuforia, a popular AR development platform. The following markers are employed in the game:

- Level Marker: Represents the level on which the user will play.
- Tower Markers: Two markers enabling tower selection and modification of tower position. The available tower types are Archer and Bomber.
- Upgrade Markers: Two markers allowing the user to upgrade specific tower stats. The Fire Upgrade marker is for the Bomber tower, while the Arrow Upgrade marker is for the Archer tower. These markers also serve the user when they want to cast a spell on the map by selecting the Spell option from the available choices.

Design

The design of the markers adheres to Vuforia's recommended guidelines. The team used a graphic tablet to create visually coherent markers that align with their respective functions. In order to enhance manipulation, the markers are placed on solid bases, with the level marker positioned higher for arbitrary reasons.

Game Features

The ARcadeGuardians game incorporates the following features:

- Tower Placement: Users can place towers on the virtual map using the tower markers.
- Tower Upgrading: Tower stats can be upgraded using the corresponding upgrade markers.
- Wave Launching: Players can initiate waves of enemies.
- Level Choice and Positioning: Users can select the desired level and position it within the game environment.
- UI Selections: The user interface provides information and interactive options to enhance the gameplay experience.
- Spells Casting on the map
- Recognition of the closest item on which the user can place the related item.

User Interface

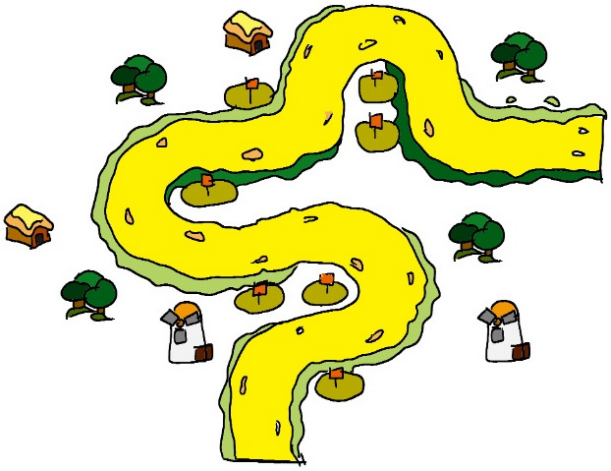
The primary purpose of the UI is to serve as an information holder. However, the team has incorporated additional elements within the UI to provide clarifications and assistance, thereby improving user experience and interactivity.

Specificity

Unlike many AR games involving tangible interactions, the ARcadeGuardians project does not employ a tangible board. Instead, the playable map is defined by the level marker. This design choice simplifies level design and enhances portability, making the game more accessible to users.

Conclusion

ARcadeGuardians is an innovative Tower Defense game that combines mixed reality and tangible interactions. By utilizing markers and marker recognition technology, the game allows players to interact with virtual elements through physical objects. The project successfully implements various game features, incorporates a user-friendly UI, and makes specific design choices to optimize gameplay and portability. ARcadeGuardians demonstrates the potential of mixed reality and tangible interactions in creating engaging and immersive gaming experiences.



(a) Level Marker

(b) Bomber Marker

(c) Fireball Marker (upgrade for bomber tower)

(d) Archer Marker

Figure 1: 4 of the available markers in the game

Figure 2: Different Tangibles

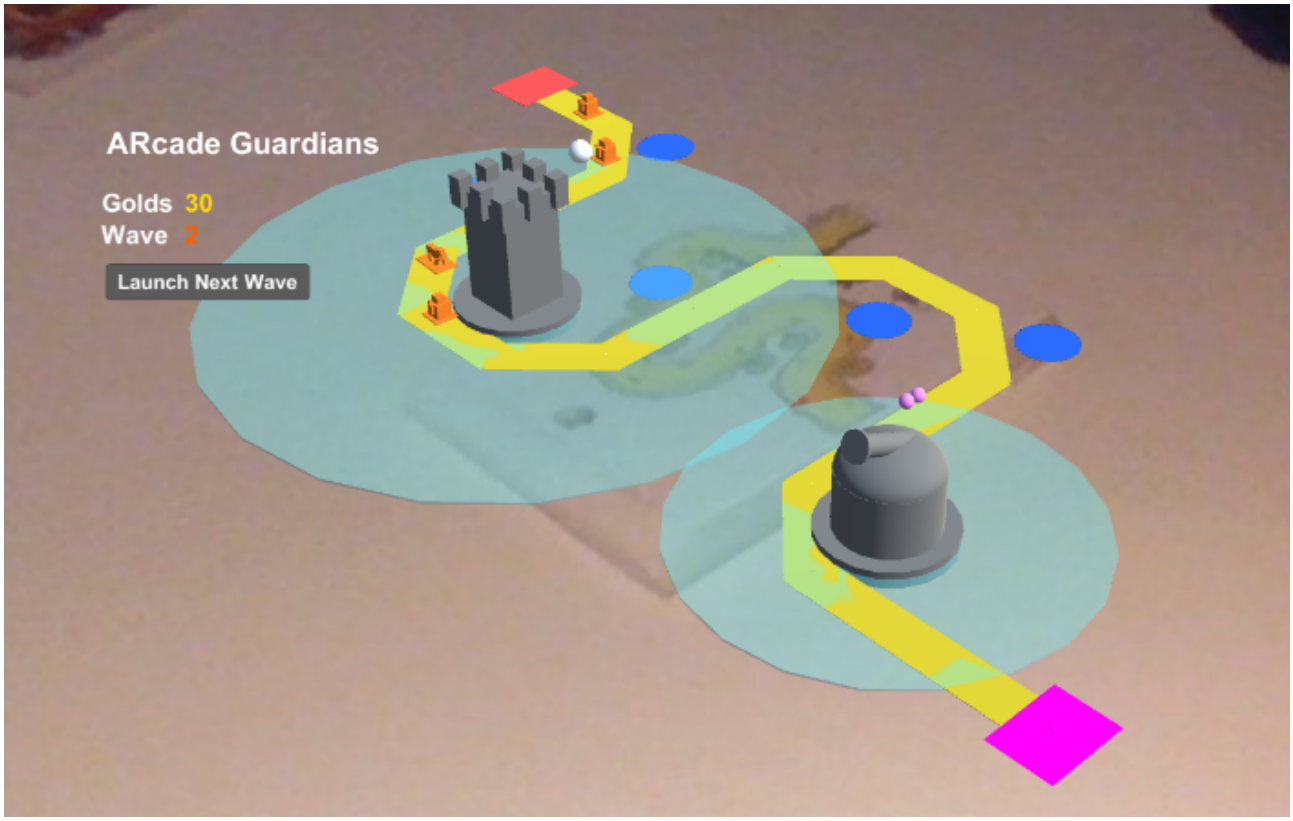


Figure 3: Gameplay Screenshot