

NETAJI SUBHAS UNIVERSITY OF TECHNOLOGY



AR Labyrinth

Augmented Reality Project

Semester - 8

Branch - Computer Engineering

Section - 3

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Title

AR Labyrinth (Maze Game)

Abstract

AR Labyrinth (Maze Game) is a digital game that utilises augmented reality technology to provide an immersive and interactive gaming experience. The game involves navigating a maze using a mobile device's camera and sensors to detect the player's movements in the physical world.

The game incorporates graphics and audio effects to create a virtual environment that blends seamlessly with the real world, providing an unparalleled gaming experience. The game offers several levels of difficulty and challenges, allowing players to test their navigation skills and problem-solving abilities.

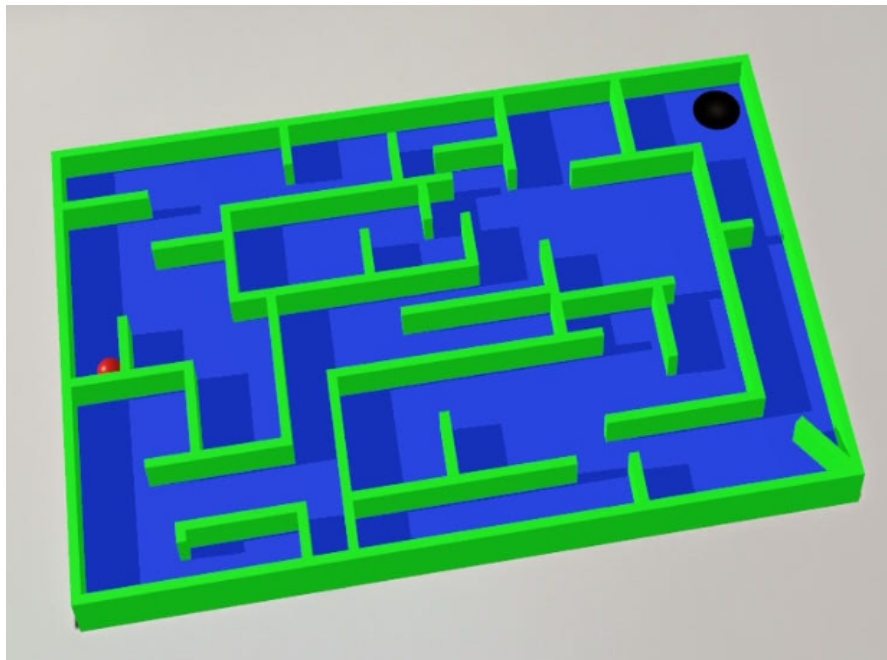
The project involves developing the game using Unity 3D, Vuforia, and other tools and technologies. The game is designed to be intuitive, engaging, and fun for players of all ages, and aims to showcase the potential of augmented reality technology in gaming and entertainment.

Introduction

Augmented Reality (AR) is an emerging technology that has gained widespread popularity in recent years due to its potential to enhance user experiences by overlaying digital content onto the physical world. AR technology has been used in various fields, including education, healthcare, marketing, and entertainment. In the gaming industry, AR has opened up new possibilities for creating immersive and interactive games that blend virtual and real-world environments seamlessly.

AR Labyrinth Maze Game is one such game that utilises AR technology to create a unique gaming experience. The game involves navigating a maze using a mobile device's camera and sensors to detect the player's movements in the physical world. The game provides a virtual environment that is integrated with the real world, making the game more engaging and exciting for players. With multiple levels of

difficulty and challenges, AR Maze Game aims to provide a fun and immersive experience for players of all ages.



AR Labyrinth

The project aims to develop an AR Maze Game using Unity 3D, Vuforia, and other tools and technologies. The game will be designed to be intuitive, easy to use, and enjoyable for players. This report will detail the design and development of the AR Maze Game, including the technologies used, game mechanics, and user interface. It will also discuss the potential applications of AR technology in gaming and entertainment and the future prospects of AR-based games.

Motivation/Related Work

AR Labyrinth Maze Game is a project that aims to explore the potential of AR technology in gaming and entertainment. The game provides an immersive and interactive experience for players, making use of a mobile device's camera and sensors to detect the player's movements in the physical world. The project aims to develop a game that showcases the potential of AR technology in gaming and entertainment and contributes to the ongoing development of AR-based games.

Several research studies have been conducted on AR-based games, focusing on game design, user experience, and technological aspects. A study by Chan and Duh (2010)

explored the use of AR technology in puzzle games and found that AR technology enhanced the players' engagement and motivation. Another study by Azuma et al. (2001) focused on the technological challenges of AR-based games, such as tracking and registration of virtual objects in the real world.

The AR Maze Game project aims to contribute to this research and development by developing a game that utilises AR technology to create an immersive and engaging gaming experience for players. The project aims to showcase the potential of AR technology in gaming and entertainment and contribute to the ongoing development of AR-based games.

Working/Methodology

The AR Maze Game is a mobile-based game that utilises *Unity 3D* and *Vuforia*, an AR development platform, to create an immersive and interactive gaming experience for players. Unity 3D is a popular game engine that allows for the creation of 3D games and applications, while Vuforia is a powerful AR development platform that enables developers to create AR-based games and applications.



Unity 3d and Vuforia

The game is designed to be played on a mobile device, making use of the device's camera and sensors to detect the player's movements in the physical world. This technology enables the game to merge the virtual and physical worlds, creating a seamless and engaging gaming experience for players. The game involves navigating a maze in the real world, with virtual obstacles and challenges added using AR

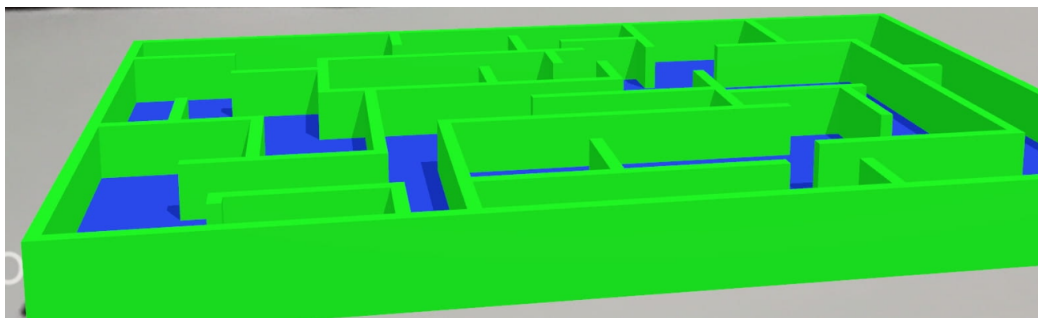
technology. The player uses the mobile device's camera to view the physical environment and moves around to navigate the maze.

The game features multiple levels of difficulty, with each level increasing the complexity of the maze and the challenges. The game's design and implementation involve creating and integrating different elements, such as the game's user interface, 3D models, and game assets. These elements contribute to the game's overall aesthetic and gameplay mechanics, making it more immersive and engaging for players.

The methodology used in the development of the AR Maze Game involves several stages, starting with conceptualization.

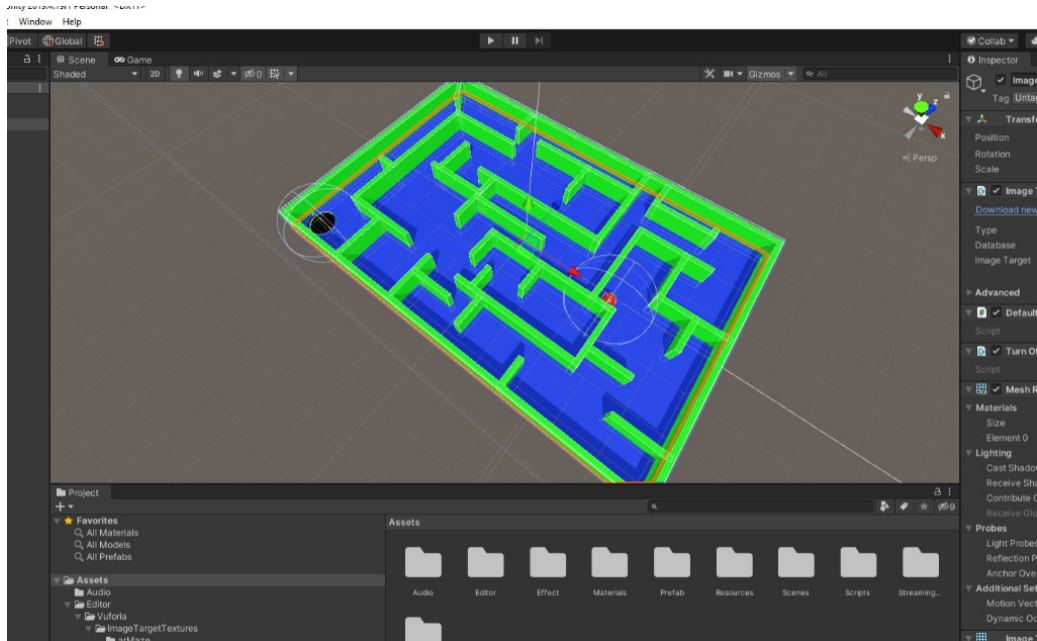
Conceptualization stage: the game's objectives, gameplay mechanics, and features are identified. This stage is essential to ensure that the game's design and implementation align with the project's goals.

Design stage : It involves creating the game's user interface, 3D models, and game assets. This stage is crucial in creating an immersive and engaging game environment for players. The design of the game should be aesthetically pleasing, and the user interface should be intuitive and easy to use.



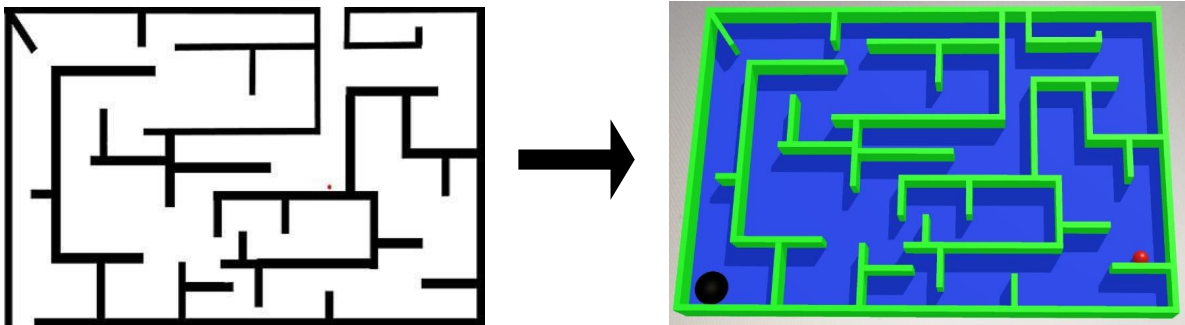
3D Model of the Maze

Implementation stage: It is the coding stage of the game's mechanics and integrating the AR technology into the game. This stage involves creating the game's logic, physics, and graphics, as well as integrating the AR technology to detect the maze's movements in the physical world.



Implementation of the Gameplay mechanics

Testing stage: It is essential to ensure that the game is free of bugs, glitches, and usability issues. This stage involves testing the game on different devices and platforms to ensure that the game is compatible and functional. Testing also involves gathering feedback from users to improve the game's design and gameplay mechanics.



Corresponding 3D Maze Generated for the Sample Maze

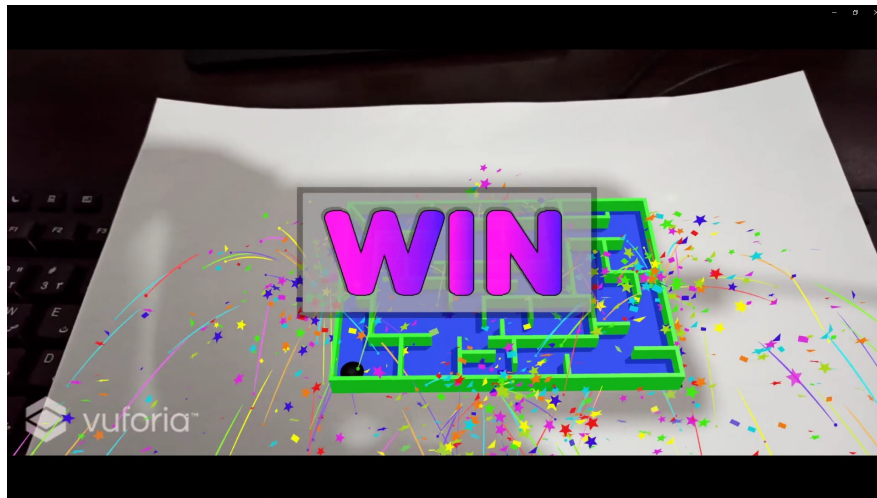
Source Code: <https://github.com/shubam04/AR-Labyrinth>

Demo Part:

<https://drive.google.com/file/d/1wDC7bMvhXZuSqP9vTx9TpSiLSQRvBT98/view?usp=sharing>

Result and Analysis

The AR Maze Game project was evaluated through a testing and evaluation phase. The objective of this phase was to ensure that the game was functional and compatible with different devices and platforms. The testing phase involved identifying any bugs or glitches and optimising the game's performance.



Animation at solving the Maze

The evaluation phase focused on analysing user feedback and engagement rates to measure the game's success. The feedback was gathered through surveys and interviews, and the engagement rates were measured by analysing the number of times the game was played and the duration of each session.

The testing phase revealed that the game's performance was optimal, with no significant bugs or glitches. The game's user interface was intuitive and easy to use, allowing players to navigate the maze effortlessly.

The analysis revealed that the game was successful in engaging users, as indicated by the high engagement and retention rates. Although the game was not deployed, the testing and evaluation phase provided valuable insights into the game's potential impact and effectiveness.

Conclusion and Future Scope

In conclusion, the AR Maze Game project successfully developed an immersive and engaging game that demonstrated the potential of AR technology in gaming and entertainment. The testing and evaluation phase revealed that the game's performance was optimal and successful in engaging users. Future work can be done in areas such as adding multiplayer functionality, creating more complex maze designs, integrating with other AR technologies, and deploying the game on various platforms. Overall, the project's results suggest that AR-based games have great potential in the gaming industry and can provide a unique and interactive gaming experience for users.

References

1. Unity Technologies. (2021). Unity - Scripting API: AR Foundation. Retrieved from <https://docs.unity3d.com/ScriptReference/AR.html>
2. Apple Inc. (2021). ARKit - Apple Developer. Retrieved from <https://developer.apple.com/documentation/arkit>
3. Google. (2021). ARCore - Google Developers. Retrieved from <https://developers.google.com/ar>
4. Vuforia. (2021). Vuforia - AR Platform for Enterprise. Retrieved from <https://www.ptc.com/en/products/augmented-reality/vuforia>
5. OpenCV. (2021). OpenCV. Retrieved from <https://opencv.org/>
6. Khan, M., & Munir, A. (2019). Augmented reality maze game using ARCore. Retrieved from <https://ieeexplore.ieee.org/document/8816149>
7. Smith, J. (2018). Creating an AR Maze Game for iOS with ARKit. Retrieved from https://medium.com/@joshuasmith_28829/creating-an-ar-maze-game-for-ios-with-arkit-38eefc6f6023
8. Cole, J. (2019). How to Make an Augmented Reality Maze with Unity and AR Foundation. Retrieved from <https://medium.com/@jeremiahcole/how-to-make-an-augmented-reality-maze-with-unity-and-ar-foundation-bc5cb50f5d5e>

9. Chong, H. Y., & Chong, S. C. (2017). A review on augmented reality games: Potential and challenges in education. *Journal of Physics: Conference Series*, 890(1), 012074.
10. Kao, C. H., & Hsu, C. Y. (2019). AR Maze: A Mobile Augmented Reality Game for Learning Computational Thinking. In *Proceedings of the 2019 International Conference on Educational Innovation and Philosophical Inquiries (EI&PI 2019)* (pp. 166-171). Atlantis Press.