Escape from the Abandoned House: The Knife

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***Abstract*—This thesis presents the development of a 2D survival horror game titled 'The Knife,' focusing on an asymmetrical gameplay experience between a young boy and a killer in an abandoned house. The author successfully implemented core mechanics such as rhythm survival and active stealth, and optimized the game's performance using Unity Engine's Universal Render Pipeline. Despite the limitations of a solo development project with a strict time constraint, the thesis highlights the application of fundamental computer science, software architecture, and user experience design principles.**

***Index Terms*—Unity Engine, Universal Render Pipeline, Finite State Machine, Active Stealth, Rhythm Survival, Invisible UI**

I. Introduction

The Knife is a side-scrolling survival-horror game set in an abandoned house. Its main character is a boy trying to avoid a killer, creating intentionally asymmetric play. The thesis combines game design, software architecture, enemy behaviour, and visual atmosphere in a student project. The report frames sound, light, stealth, and player feedback as parts of the experience. This summary describes the implemented game and its stated limits without inferring independent player-study results [1]. Published articles on the methods and subject of this project provide context for this English summary [9].

II. Methods

The author produced a game-design document and implemented the game in Unity. The enemy uses a finite-state machine with patrol, investigation, chase, and search states. The gameplay includes a breath-holding minigame and stealth based on hitboxes and two-dimensional physics. Universal Render Pipeline lighting and shadows support the horror setting, while object pooling and sprite atlases address performance. The report also describes testing and packaging within the student's development process [1].

III. Results

The game was successfully developed, showcasing the author's mastery of Unity Engine and URP. The author implemented advanced lighting and shadow casting techniques to create an immersive environment. The game's AI was optimized to react sensitively to player actions, balancing the protagonist's vulnerability with the game's challenge. The author also applied the concept of invisible UI to enhance player immersion [1].

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IV. Discussion

The source documents a completed student game, but its conclusion also identifies limitations in animation transitions and depth of content. The reported engineering choices support the intended atmosphere and behaviour, yet there is no independent player study quantifying immersion or game balance. The development was carried out by one student over a limited period. More extensive puzzles, additional animation work, and stronger evaluation would be appropriate next steps before broader release [1].

V. Conclusion

The thesis reports a playable two-dimensional horror game built with Unity. It implements an asymmetric escape scenario, a finite-state-machine enemy, stealth and breath-holding mechanics, and lighting suited to an abandoned-house setting. The source also explains its optimization and packaging choices. Some animation and content limits remain, and player response is not quantified in the manuscript. The result is a documented student game rather than evidence of a commercially tested release [1].

References

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