AI LAB (CS39002) PROJECT REPORT

on

"HUNT THE WUMPUS"

Submitted to

KIIT Deemed to be University

In Partial Fulfilment of the Requirement for the Award of

BACHELOR'S DEGREE IN COMPUTER SCIENCE ENGINEERING

BY

SHIVAM KUMAR	22052760
SHIKHAR PANDEY	22052854

UNDER THE GUIDANCE OF **Dr. Sricheta Parui**

SCHOOL OF COMPUTER ENGINEERING

KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY

BHUBANESWAR, ODISHA - 751024

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CERTIFICATE

This is certify that the project entitled

"HUNT THE WUMPUS"

submitted by

SHIVAM KUMAR	22052760
SHIKHAR PANDEY	22052854

is a record of bonafide work carried out by them, in the partial fulfilment of the requirement for the award of Degree of Bachelor of Engineering (Computer Science & Engineering OR Information Technology) at KIIT Deemed to be university, Bhubaneswar. This work is done during year 2024-2025, under our guidance.

Date: / /

(Dr. Sricheta Parui)
Project Guide

Acknowledgements

We are profoundly grateful to Dr. Sricheta Parui of **Affiliation** for his expert guidance and continuous encouragement throughout to see that this project rights its target since its commencement to its completion. .....

SHIVAM KUMAR
SHIKHAR PANDEY

ABSTRACT

This project is an interactive implementation of the classic “Hunt the Wumpus” game using the Pygame library. The game presents a cave in a grid layout where the player navigates through rooms to avoid hazards such as pits, bats, and the Wumpus itself. The player can move and shoot arrows along pre-defined paths between adjacent rooms.

Extra arrows may be found randomly in safe rooms. In this project, additional competitive elements have been introduced—for example, bats now have a 10% probability of throwing the player into a pit or directly into the Wumpus’ room. This report details the development process, from requirements gathering through design, implementation, testing, and analysis.

Keywords: Pygame, Game Development, Hunt the Wumpus, Grid Layout, Interactive Animation

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Chapter 1

Introduction

In today's competitive gaming environment, interactive applications using libraries such as Pygame have become an essential tool for learning and prototyping. The "Hunt the Wumpus" game is a classic text-based adventure that has been reimagined with animations and a modern graphical interface. This project focuses on developing an interactive version of the game with a grid-based layout. The game introduces hazards such as pits, bats, and the fearsome Wumpus. Notably, the bats now have an added twist—they can throw the player into a pit or even directly into the Wumpus' room with a probability of 10%, making the game more challenging and competitive. This report documents the entire development process, including design decisions, implementation details, testing strategies, and reflections on the project.

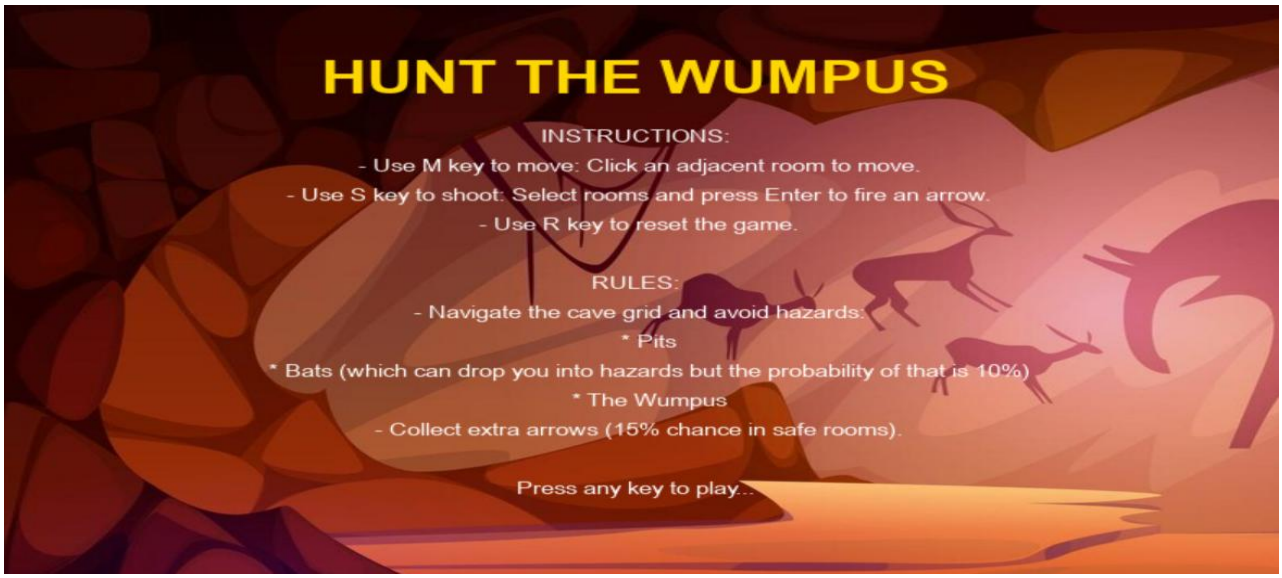

Fig1: HUNT THE WUMPUS HOMESCREEN

Chapter 2

Basic Concepts/ Literature Review

2.1 Pygame and Animation Techniques

Pygame is a set of Python modules designed for writing video games. It provides functionalities such as drawing images, playing sounds, and handling user input. This project leverages Pygame's capabilities to create smooth animations for both player movement and arrow flight. Literature on animation in Pygame suggests that managing frame rates and interpolation between positions is key to achieving smooth movement.

2.2 Game Logic and Graph Theory in Grid Layouts

The cave in "Hunt the Wumpus" is modeled as a grid, where each room is a node in a graph and the connections between rooms are edges. Graph theory provides the foundation for navigating the game's grid layout. Studies and textbooks on graph algorithms (such as breadth-first search for pathfinding) influenced the design of the room connectivity logic used in this project.

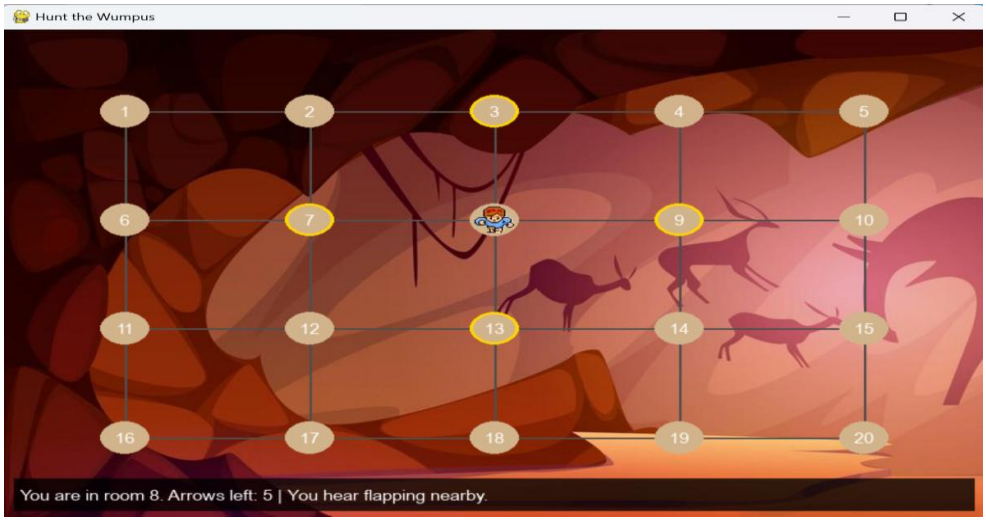

Fig 2.1: GAME GRID LAYOUT

Chapter 3

Problem Statement / Requirement Specifications

3.1 Project Planning

Objective: Develop an interactive "Hunt the Wumpus" game with a 4×5 grid layout.

Key Features:

- ✓ Smooth player movement and arrow animation.
- ✓ Random hazard placement with safe zones (rooms 1, 2, and 6).
- ✓ Bats have a 10% chance to transport the player into a hazardous room (pit or Wumpus).
- ✓ Sound effects and background music for enhanced experience.

3.2 Requirements Specification (SRS)

Functional:

- ✓ Mouse-driven player movement and shooting.
- ✓ Game-over on hazard encounters; bonus arrow pickups.
- ✓ Non-Functional:
- ✓ Consistent frame rate and responsive resizing.
- ✓ Efficient resource management.

3.3 System Design

Constraints:

Fixed 4×5 grid; safe zones are predetermined.

Developed in Python/Pygame with hardware limitations in mind.

Architecture Overview:

Input: Mouse and keyboard events.

Processing: Game state, animations, and collision/hazard detection.

Output: Rendered grid, animations, and sound.

Chapter 4

Implementation

4.1 Methodology / Proposal:

- ✓ The game was implemented using the Pygame library. The approach included:
- ✓ Defining a grid-based layout for the cave.
- ✓ Using a graph structure to represent room connectivity.
- ✓ Implementing smooth animations for both player movement and arrow flight.
- ✓ Incorporating sound effects and background music.
- ✓ Adding randomness in hazard placement and extra arrow events.
- ✓ Ensuring that bats can transport the player into a pit or Wumpus room with a 10% probability to increase competitiveness.

4.2 Testing / Verification Plan:

- ✓ Testing was carried out at various stages:
- ✓ Unit Testing: Individual functions (e.g., grid update, collision detection) were tested.
- ✓ Integration Testing: Interaction between game state, animation, and sound were verified.
- ✓ User Acceptance Testing: The game was played repeatedly to ensure that hazard placement rules were correctly enforced, animations were smooth, and user inputs were handled properly.

4.3 Result Analysis:

The final product displays a grid-based cave where the player can move by clicking on highlighted adjacent rooms. Screenshots show smooth transitions during player movement and arrow animation. The added twist—bats transporting the player into hazardous rooms—was successfully integrated with a 10% probability.

4.4 Quality Assurance:

- ✓ Quality assurance was conducted by:
- ✓ Adhering to coding standards (concise functions, clear variable names, proper indentation).
- ✓ Using Pygame’s built-in clock to manage frame rates.
- ✓ Testing under different window sizes and ensuring responsive design.
- ✓ Verifying that resources (sounds, images) were efficiently loaded and cleaned up upon exit.

Chapter 5

Standards Adopted

5.1 Design Standards

- Followed IEEE guidelines for software design.
- Used UML diagrams for system architecture.

5.2 Coding Standards

- Code is modular with clear function definitions.
- Variable names and comments improve code readability.
- Functions perform single tasks, aiding in maintainability.

5.3 Testing Standards

- Adopted IEEE standards for software testing.
- Developed test cases to verify game logic and collision detection..

Chapter 6

Conclusion and Future Scope

6.1 Conclusion

The "Hunt the Wumpus" project successfully transformed a classic text-based game into an engaging, animated interactive experience using Pygame. The project demonstrates effective use of grid-based layouts, smooth animations, and real-time user input handling. The addition of competitive elements, such as bats that can transport the player into a pit or the Wumpus' room (with a 10% probability), enhances the game's challenge.

6.2 Future Scope

- ✓ Future enhancements may include:
- ✓ Incorporating a high-score system.
- ✓ Expanding the grid size for more complex navigation.
- ✓ Adding multiplayer functionality.
- ✓ Refining animations further for frame-rate independence.
- ✓ Enhancing sound effects and visual feedback

References

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SAMPLE INDIVIDUAL CONTRIBUTION REPORT

HUNT THE WUMPUS – A PYGAME IMPLEMENTATION

SHIVAM KUMAR
Roll Number: 22062760

Abstract:
In this project, I developed an interactive version of the classic "Hunt the Wumpus" game using Pygame. My work focused on designing the grid-based layout, implementing smooth animations for both player movement and arrow flight, and integrating multimedia elements such as sound effects and background music. The game's mechanics include dynamic hazard placement and competitive features, such as bats that can randomly transport the player into dangerous rooms (with a 10% probability). This approach not only modernizes a classic game but also enhances user engagement through refined visual and audio experiences.

Individual Contribution and Findings:

- Designed and implemented the grid layout and room connectivity.
- Developed smooth animations for player movement and arrow flight.
- Integrated multimedia assets (images and sounds) and optimized performance.
- Contributed to testing and debugging to ensure robust gameplay.
- Prepared the sections on Implementation and Testing.
- Contribution for Presentation and Demonstration.
- Created presentation slides and demonstrated key game features.

Signatures(Supervisor):

SHIKHAR PANDEY
Roll Number: 22052854

Abstract:
This project transforms the traditional "Hunt the Wumpus" experience into a modern, interactive game built with Python and Pygame. My contributions centered on optimizing game logic and ensuring robust performance, including the development of efficient event handling and resource management techniques. I enhanced the gameplay by incorporating advanced hazard mechanics—specifically, introducing bats that can, with a 10% chance, forcefully relocate the player into a pit or the Wumpus's room. This integration of unpredictable elements adds a unique challenge and increases the overall competitiveness of the game.

Individual Contribution and Findings:

- Assisted in coding the game logic for hazard placement and random events.
- Improved event handling and resource management for smooth gameplay.
- Helped integrate competitive elements, ensuring bats could transport players to dangerous rooms with a 10% chance.
- Participated in system testing and performance optimization.
- Contribution to Report Preparation.
- Contributed to the System Design and Conclusion sections.
- Assisted in preparing the presentation and demonstrated the game's interactive features.

Signatures(Supervisor):_____

TURNITIN PLAGIARISM REPORT