

Final Project Report

Project Title: HYST - Heist Your Stolen Treasure

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Course: AI

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Submission Date: 27/03/25

1. Project Overview

Project Title: HYST – Heist Your Stolen Treasure

Genre: Turn-based Multiplayer Digital Board Game

Platform: Desktop (Python with Pygame)

Team Size: 3

Main Technologies: Python, Pygame, OOP, Pathfinding Algorithms

2. Objective

The primary goal of HYST is to provide a fun and strategic 2-player board game where players navigate a procedurally generated maze to steal and escape with a central diamond while avoiding roaming guards. The game combines stealth mechanics, turn-based movement, and power-ups to enhance player interaction and challenge.

3. Game Mechanics

Players

- Two human players (P1 and P2).
- Each starts at a random exit point.
- Players take turns rolling dice to determine movement points.
- Objective: Acquire the diamond and return to their original exit point to win.

Guards

- Eight guards with varying patrol algorithms (circle, zigzag, random).
- Can detect players via line-of-sight or noise.
- If a player is captured, they respawn at their starting point, and the diamond resets.

Diamond

- Placed at the center of the maze.
- Must be collected and carried to win.
- If the carrier is captured, the diamond respawns in the center.

Maze Generation

- The board (32×32) is procedurally generated using 5×5 wall patterns.
- A validation ensures paths from each player to the diamond are always possible.

Special Abilities

- Flashbang: Stuns nearby guards (costs 5 movement points).
- Camouflage: Makes player invisible to guards for 3 turns (costs 3 movement points).

4. Architecture

The game is organized into two main files: `game_logic.py` and `hyst_game.py`.

`game_logic.py`

- Game Class: Core logic, state management, maze generation, game loop.
- Player & Guard Classes: Represent actors in the game, with logic for detection, movement, and interaction.
- Position Class: Utility class for 2D grid management.
- Guard AI: Implements basic patrol and A* pathfinding for chasing.

`hyst_game.py`

- User Interface: Renders the board and player status using Pygame.
- Input Handling: Accepts keyboard controls (WASD, F, C, Enter).
- Sound System: Plays contextual sound effects (dice, moves, capture, victory, etc.).
- Game Loop: Manages player turns, dice rolls, and animations.

5. Sound Integration

Managed by `SoundManager` class using `pygame.mixer`.

Includes background music and effects for:

- Movement
- Dice roll
- Power-ups
- Captures

- Diamond acquisition
- Victory

6. Strengths

- Replayability: Procedural maze generation ensures each playthrough is unique.
- Balance of Strategy and Chance: Dice rolling introduces luck, while movement and abilities require strategic thinking.
- Modular Design: Clean separation of logic and UI; easy to expand or maintain.
- Multimedia Feedback: Sound cues enhance engagement and immersion.

7. Limitations & Improvements8. Conclusion

Area	Current State	Potential Improvement
UI	Basic grid rendering	Add animations, menus, or HUD
Game Modes	2-player local	Add single-player vs AI
Pattern Diversity	5x5 templates	More diverse wall patterns
Controls	Keyboard only	Add mouse or controller support

HYST – Heist Your Stolen Treasure is a compelling digital board game that combines strategic turn-based gameplay with procedural maze design and guard AI. With strong foundations in modular code and engaging mechanics, the game is both enjoyable and extensible.