

Project Proposal

Project Title

Smart Snake Game with AI and Dynamic Scoring

Group Members

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1. Introduction

Background:

This project is focused on game development using Object-Oriented Programming (OOP) principles. The goal is to create a playable version of the classic Snake Game with added AI integration and varied scoring logic. The game provides hands-on experience in GUI programming, game loops, and decision-making algorithms.

Problem Statement:

Traditional Snake Games have predictable movement and scoring. The objective is to develop a more interactive and intelligent version by implementing pathfinding AI and dynamic scoring, which adds complexity and interest for the player.

Objectives:

- Build a GUI-based Snake Game using C++ and Raylib.
- Integrate an A* algorithm for smart movement decisions.
- Implement variable score changes depending on food type.
- Ensure modular design to demonstrate OOP principles.

2. Scope of the Project

Inclusions:

- Snake Game GUI using Raylib
- A* algorithm for food pathfinding
- Multiple food types affect the score differently
- Basic sound effects and visual feedback
- Code integration using OOP concepts like classes, inheritance, and DMA
- 3 levels for different user experience

Exclusions:

- Multiplayer mode
- Internet-based features
- Complex animations or advanced graphics libraries beyond Raylib

3. Project Description

Overview:

The project is a remake of the Snake Game, enhanced with smart movement (AI using A*), dynamic scoring based on food types, and GUI using Raylib. The game architecture is built with OOP in mind, using concepts like class hierarchy, dynamic memory, and function overloading.

Technical Requirements:

- Visual Studio Code
- Raylib Library
- C++ compiler (MinGW)

Project Phases:

- Research and Planning
- Game Architecture and Class Design
- Implementing Snake Movement and Food Logic
- AI (A*) Integration
- GUI Enhancements and Testing
- Documentation and Final Presentation

4. Methodology

Approach:

The project followed an iterative development model, with regular testing after each milestone. The team used version control and code reviews to ensure consistency and correctness. Tasks were divided logically based on skill sets.

Team Responsibilities:

- Jayesha Yamin: Created the base gameplay, UI layout, collision system, mode levels and overall game structure.
- Zahra Siddiqui: Added the scoreboard system to track score and food. Designed the end-game screen with replay and exit options to improve user experience.
- Umaima Khurshid: Integrated A* pathfinding AI logic and different food types and their effects on the score and snake body (growth, shrink, reset).

5. Expected Outcomes

Deliverables:

- A working C++ Snake Game with GUI
- A* AI for smart snake decisions
- Dynamic food scoring system
- Documented source code
- A project report and presentation

Relevance:

This project helps reinforce OOP principles while demonstrating real-world application of algorithms (A*) and GUI libraries. It introduces beginner-level AI, logic implementation, and coding collaboration.

6. Resources Needed

Software:

- Visual Studio Code
- Raylib Library

Other Resources:

- Raylib documentation
- YouTube tutorials for Raylib basics
- Guidance from the instructor for enhancements