Aim Lab 3D - Project Overview

Core Concept

Aim Lab 3D is a target practice game set in a 3D arena environment. Players use a mouse to control their view and left-click to shoot at spherical targets. The game tracks performance metrics such as accuracy, reaction time, and overall performance to help improve hand-eye coordination and precision.

Main Features

Game Modes:

- Normal Mode: This is a standard target practice mode with consistent difficulty. It features fixed target lifetimes and spawn rates. It is ideal for baseline skill assessment and casual practice.
- Endless Mode: The difficulty progressively increases over time in this mode. The target lifetime decreases, and the spawn rates accelerate to challenge improving skills. This mode is designed to test sustained performance under increasing pressure.
- Time Trial Mode: Players race against a countdown timer. As time progresses, targets shrink in size, increasing the difficulty. Hitting targets successfully adds bonus time, rewarding speed and accuracy.
- Precision Mode: This mode features a dual-zone scoring system for targets. The central blue sphere awards 1 point for body shots, while a red headshot zone on top awards 5 points for precision hits. This mode includes separate tracking for headshot accuracy statistics.

Arena Environment

The playing field is a large, enclosed 3D arena with checkered walls and a grid-lined floor for spatial reference. It features realistic lighting from multiple sources to create a professional training aesthetic.

Camera System

The game uses a first-person perspective with smooth mouse-look controls. The field of view is adjustable from 30° to 120° using the W and S keys. A and D keys enable lateral movement, and a crosshair overlay assists with precise aiming.

Target System

- Dynamic Spawning: The arena can have up to 5 targets at once, which spawn in random positions within defined boundaries. Spawn rates are configurable and adapt to the specific game mode. Targets are automatically cleaned up when their lifetime expires.
- Visual Effects: Targets can have an optional horizontal oscillation animation and a pulsing glow effect. Their appearances and behaviors are specific to each game mode, and their movement and visual feedback are smooth.

Session Configuration

Players can choose from several session durations: 15 seconds for quick practice, 30 seconds for standard training, 1 minute for extended focus, or 2 minutes for endurance practice. The game tracks real-time accuracy percentages, shot counts, hit/miss ratios, and scores. A timer displays the time remaining.

User Interface (UI):

Main Menu

The main menu has a clean and intuitive design. It allows for duration and mode selection with visual highlights and provides comprehensive mode descriptions. A single click can start the game.

In-Game HUD

The Heads-Up Display shows the score in the top-left corner, a central timer, and the accuracy percentage in the top-right corner. A secondary panel displays information on targets, FOV, and position. It also includes status indicators for visual effects and a reference for control instructions.

Summary Screen

After a game, a summary screen provides a detailed breakdown of post-game statistics. It includes mode-specific performance metrics as well as accuracy and precision tracking. From this screen, players can choose to restart or return to the main menu.

Control System

- Movement: A and D keys control left/right strafing. W and S keys adjust the field of view. Mouse movement controls camera rotation, with automatic centering for smooth control.
- Interaction: The left mouse button is used to shoot. The spacebar pauses/unpauses the game, the R key restarts it, and the Escape key exits the application.
- Effect Toggles: The M key toggles target animation, and the G key toggles glow effects. The game provides real-time visual feedback for these toggle states