Overview of 3D Aim Lab Project

The goal is to create a 3D aiming practice game using OpenGL, building upon the provided template. The core gameplay involves the player shooting at spheres that appear randomly. The game will include several features to enhance the user experience and add a layer of complexity beyond basic target practice.

Core Gameplay

The central mechanic is a time-based challenge where the player must hit as many moving spheres as possible. Spheres will appear at an increasing rate over time, requiring the player to maintain focus and quick reflexes. Each successful hit will award a point, and the final score will be displayed at the end of the game.

Player and Camera Control

The player can manipulate their position and view to better engage with targets.

- **Movement**: The player can move right and left only using keyboard inputs.
- **Field of View (FOV)**: The player can dynamically adjust the camera's FOV. Increasing the FOV provides a wider view but makes targets appear smaller, while decreasing it narrows the view for a more focused, zoomed-in perspective.

Game Features:

Bullet Firing

A simple visual representation of a bullet will be included. When the player shoots, a projectile will travel from the camera's position towards the point of aim, creating a satisfying visual feedback loop for each shot.

Animated Spheres

To make targets more dynamic and challenging, the spheres will not be static. They will move in a pattern that mimics human movement, making them harder to hit. This adds a realistic element to the aiming practice.

Obstacle Mode

Obstacles, such as walls or cubes, will be placed within the game environment in this mode. These obstacles can block the player's view or a bullet's path, forcing the player to adjust their aim and develop quick reflexes.

Unique Features:

- **Dynamic Difficulty**: The rate at which new spheres appear will increase over time, escalating the difficulty as the game progresses. This provides a continuous challenge and encourages players to improve.
- **Score Multiplier**: The game will implement a score multiplier for consecutive successful hits. Hitting multiple targets in a row without missing will increase the score for each subsequent hit, rewarding accuracy and consistency.
- **Power-Ups**: Occasional power-ups will spawn, offering temporary benefits. Examples include a "Slow-Mo" power-up that temporarily slows down all moving spheres or a "Double Points" power-up that doubles the score for hits for a limited time.
- **Heads-Up Display (HUD)**: A simple HUD will be implemented to display essential information, such as the current score, the number of bullets remaining, and any active power-up effects. The HUD will be drawn in screen space so it remains fixed regardless of camera movement.
- **Game Modifiers**: Before starting a game, the player can choose from a set of modifiers that change the rules. For example, a "One-Shot, One-Kill" modifier could make every target disappear with a single hit, while a "Timed Reload" modifier could introduce a delay between shots.
- **Headshot Accuracy:** Target spheres feature designated headshot zones (smaller spherical regions within the main target). In obstacle peek mode, players must precisely aim for these headshot zones while targets briefly appear from behind cover. Successful headshots award bonus points and contribute to accuracy statistics tracking.
- **Firing Error from Rapid Fire:** Weapon accuracy degrades when firing too rapidly. Consecutive shots fired within a short time window introduce increasing spread and recoil patterns. The crosshair expands dynamically to indicate current accuracy degradation, forcing players to balance speed with precision.
- **Rifle vs Pistol:** Two distinct weapon types with different shapes and firing rates.

Demo Screenshots (from the internet):