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Subject: Computer Graphics and Image Processing

Topic : Design and Implementation of a 3D Aeroplane Game using OpenGL

Project Objective

- To design a simple 3D aeroplane game
- Player controls a plane and passes through objects
- Focus on 3D transformation, movement, and collision
- Learning real-time graphics concepts

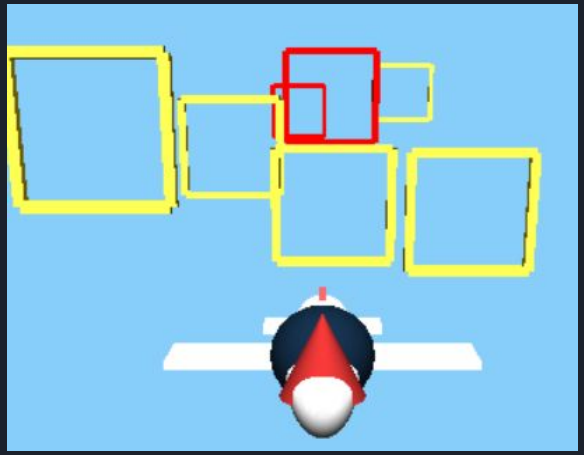
Tools & Technologies Used

- Programming Language: **C++**
- Graphics Library: **OpenGL**
- Utility Toolkit: **GLUT**
- **IDE: Code::Blocks / Visual Studio**

- **Platform: Desktop-based application**

Shapes and Graphics Elements Used

- Cube: Plane body, wings, square objects
- Sphere: Cockpit / front part of plane
- Cone: Plane nose
- Square Frame: Ring objects
- These shapes are created using OpenGL primitive functions



Algorithms and Concepts Used

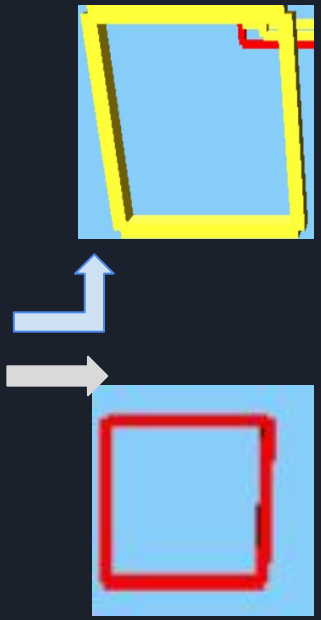
- 3D Translation, Rotation, and Scaling
- Distance-based Collision Detection
- Score Calculation Algorithm
- Game Over Condition using Miss Count
- Keyboard Input Handling

Methodology (How the Project Works)

- Initialize OpenGL environment
- Create plane and object models
- Continuously update object positions
- Detect collision between plane and objects
- Update score and miss count

Working Principle

- Plane moves forward continuously
- Objects move toward the plane
- If plane crosses an object:
  - Normal object gives 10 points
  - Red bonus object gives 50 points
- Missing 5 objects ends the game



Relation with Computer Graphics Course

- Use of 3D geometric shapes
- Application of transformation techniques
- Understanding viewing and camera concepts
- Use of OpenGL rendering pipeline
- Real-time interaction using graphics APIs

Future Scope

- Add textures and lighting effects
- Introduce multiple levels and obstacles
- Add sound effects and background music
- Improve plane model and animations
- Convert into a complete flight game

Conclusion

- The project successfully demonstrates core CG concepts
- It improves understanding of OpenGL programming
- Simple design but effective learning tool
- Helpful for practical and viva examinations

THANK YOU