Technical report for Game Engine Programming

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**Technical Report Structure for Game Engine Design**

**1. Introduction (Approx. 100 words)**

* Brief overview of the project.
* Objective: To design and implement a 3D game engine and demonstrate its features with a simple game.
* Mention key requirements: system programming language (C/C++), industry practices (Git, CMake), and systematic documentation (Doxygen).

**2. Project Specification (Approx. 100 words)**

* Define the core purpose and intended functionality of the game engine.
* Highlight planned features such as:
  + Mesh rendering.
  + Collision detection.
  + GUI system for displaying scores.
  + Animation system for dynamic visuals.
  + Audio and input handling.
* State how these features integrate cohesively to meet the game requirements.

**3. Research and References (Approx. 100 words)**

* Summarize research conducted on existing game engines and techniques:
  + Entity Component System (ECS), inheritance, or hybrid approaches.
  + Comparative analysis with industry engines like Unreal or Unity.
* Mention any mathematical or algorithmic strategies used (e.g., for collision detection or rendering).
* Include at least one reference to industry practices or academic literature.

**4. Engine Architecture and Design (Approx. 150 words)**

* **Overview of the Architecture:**
  + Use of ECS or other architectural patterns.
  + Modular design for scalability and reusability.
* **Key Components:**
  + Rendering pipeline: efficient handling of graphical assets.
  + Physics and collision subsystems.
  + Input/output management.
* **Diagrams:**
  + Class diagrams for core engine components.
  + Flow diagrams to show interaction between modules.
* Justify design decisions with comparisons to industry standards.

**5. Development Process and Challenges (Approx. 100 words)**

* Outline the development methodology:
  + Use of Git for version control.
  + CMake for build automation.
  + Debugging and testing strategies.
* Discuss encountered challenges and their resolutions:
  + Integrating components.
  + Optimizing performance.
  + Ensuring compatibility across platforms.

**6. Conclusion and Future Work (Approx. 50 words)**

* Summarize the achievement of objectives.
* Highlight strengths of the developed engine.
* Suggest areas for improvement:
  + Adding advanced features like shadows or post-processing.
  + Extending compatibility with other platforms or APIs.