

## Project Proposal – Three.js Aquarium Simulation

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**Title: Interactive 3D Aquarium Simulation**

### 1. Introduction

The goal of this project is to develop an interactive **3D aquarium simulation** using **Three.js**. The application will allow users to observe an aquarium placed on a desk from an external perspective and switch to the perspective of a fish swimming inside. Additionally, the aquarium environment will evolve over time, requiring user interaction to maintain it.

### 2. Features and Functionalities

The project will include the following key elements:

#### Observation Mode (External View):

- Users can rotate and zoom the camera around the aquarium to observe the fish.
- The aquarium glass will gradually become dirty over time, reducing visibility.
- A button will allow users to **clean the aquarium**, resetting the water clarity.
- Users can **feed the fish** by clicking a button, preventing them from becoming slow and inactive.

#### Fish Mode (First-Person View):

- Users can switch to the perspective of a fish inside the aquarium.
- Movement control using the keyboard and mouse (swimming around the aquarium).
- A refraction shader will be applied to simulate underwater vision distortion.
- Interaction with other fish, which will react to the player's movements.

#### Environmental Mechanics:

- Water quality degrades over time, becoming murky if not cleaned.
- Fish behavior changes depending on food availability (if unfed, they become sluggish).
- Animated fish swimming with smooth, realistic motion.
- Dynamic lighting effects to simulate a natural environment.

### 3. Technical Implementation

The project will be implemented using:

- **Three.js** for 3D rendering.
- **GLSL shaders** for water effects, refraction, and dirt accumulation on the glass.

- **JavaScript** for interactivity and user input handling.
- **HTML/CSS** for the UI (buttons to feed fish and clean the aquarium).

#### 4. Expected Challenges

- Implementing realistic fish movement and AI behavior.
- Simulating water clarity degradation and cleaning mechanics.
- Optimizing performance for smooth animations and real-time interaction.

#### 5. Conclusion

This project will provide an interactive and visually engaging experience, demonstrating key concepts in **3D modeling, animation, environmental effects, and user interaction**. The final result will be a web-based simulation that users can explore and interact with, showcasing advanced **Three.js** techniques in a creative and immersive way.