Design Choices

The design uses A-Frame to build an interactive environment. The choices focus on balancing a simple low-poly style with realistic and dynamic elements.

Architectural Layout: Open-Concept Zoning

Rather than building a house with enclosed rooms that are hard to view from the outside, the design uses an open-wall concept. By omitting the front wall, the user can view the entire interior (Living Room, Kitchen, Bedroom).

Dynamic Environment & Animation

A static 3D world often feels dead. To counter this, specific "life" elements were scripted into the scene:

A custom A-Frame component water-flow was registered in the <head>. It uses a tick function to constantly adjust the Y-position of the water plane. This creates a bobbing/rippling effect for the pool water, making it distinct from the solid ground.

The trees utilise A-Frame's animation property to rotate the trees back and forth endlessly to simulate a breeze, adding movement to the periphery of the user's vision.

An animated cat model is placed in the living room and on the bed, utilising *animation-mixer* to cycle through the model's internal animations.

Lighting and Atmosphere

The lighting is designed to simulate a bright, welcoming day. Sky Blue is used for both the background. Each room has a point light floating near the ceiling. The bedroom specifically uses a dimmer, reddish light to suggest a cosy, warmer atmosphere compared to the bright white kitchen.

Asset Management Strategy

The code demonstrates an optimisation strategy using the Asset Management System (<aassets>). All heavy assets (images and glTF models) are defined in <a-assets> with IDs (e.g., id="stove", id="couch").

- The tree model is loaded once but instantiated 6 times across the scene.
- The lounger model is loaded once and reused 2 times by the pool.

- The code defines mixins (like lounger-body and tree-trunk), which allow for defining geometry and material properties once and applying them to multiple entities to keep the DOM clean.

Detailed Interior Styling

The interior design is different for every room:

- Living Room**:** Features a couch facing a TV (black box) and framed wall pictures loaded from Unsplash. The presence of a centre table with a small "vase" adds clutter detail.
- Kitchen**:** A simple cylinder dining table, a fridge, and a stove. The stove and fridge are 3D models.
- Bedroom**:** Features a bed constructed from primitive boxes (base, mattress, pillow). It includes a bedside lamp construct made of a box, cylinder, and cone. This was specifically used to reduce 3D models.

6. User Navigation

The camera is positioned at 0 1.6 18. The 1.6 height simulates an average human eye level. The 18 on the Z-axis places the user initially outside the gate, forcing them to "walk" in using WASD controls, creating a sense of arrival.

All models and textures used in the project were downloaded and fetched from

https://sketchfab.com/feed

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TECHNICAL CHALLENGES

I had issues animating the pool, so I used a tick function to constantly adjust the Y-position of the water plane.

Another challenge I had was bringing the cat to life. I solved this by loading the A-Frame Extras library from a CDN on the web page. This library extends A-Frame by adding ready-made components and systems that are not part of the core A-Frame. This also helps animate the kitchen curtain.

The scene was lagging, so certain attributes like *castshadow = 'true'*, elements like fence wall were removed to enhance smoothness, including animations, which were also removed from the trees, except for two.

FUTURE IMPROVEMENTS

I would like to add more high-quality models and make it run smoothly.