

CSE480 Proposal - Group 9

Pixey3D :

Web-based real-time 3D feedback application

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Introduction

During the last century, 3D modeling has gained its popularity in a diverse set of fields. From educational purposes in science to the interior design models, it is known that 3D modeling is often done in teams. Or at least, the models often must be reviewed a few times until its form satisfies its goal. However, reviewing 3D models requires either making screenshots of the model or other more time-consuming activities. This is where Pixey3D comes into play.

Pixey3D is a web-based application aimed to improve the efficiency of feedback communication within 3D design projects. The application allows the users to post a 3D model and generate a so-called “session” for others to easily apply feedback on. It includes a 3d rendered scene where users can interact with 3d models on the website to get high-quality, 360-degree, and zoomable views of the design at hand.

Site description

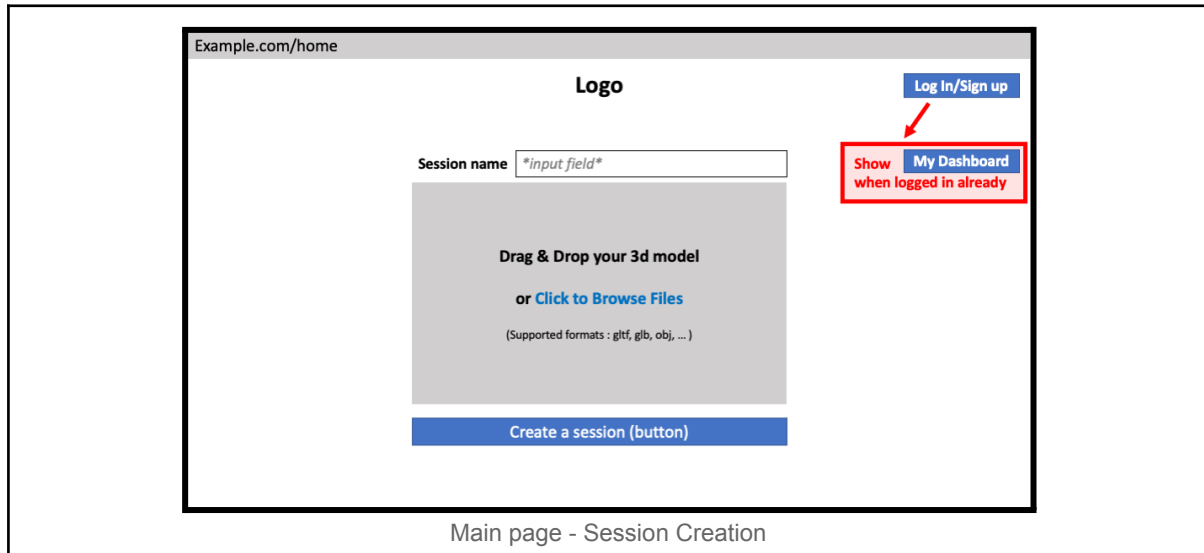
To use Pixey3D, the user is requested to either create an account, login into an existing account or use the site as a guest.

After a user has uploaded the 3D design and generated its session link, other users with this session link can give feedback on the design by adding “3D annotations” on the 3D model. 3D annotations allow different users to start discussions on specific parts of a model. Once feedback has been given, the host (user who uploaded the model) will be able to see that updates have been made in the session. In addition, the host can respond to the feedback and, if needed, change the status of the feedback from ‘Unsolved’ to ‘In Progress’ or ‘Solved’.

The site is designed with a user-friendly interface, ensuring easy navigation/interaction and making the 3D feedback process enjoyable and efficient. With a fully responsive design, the website will be accessible on a range of devices, ensuring consistency in performance and user experience.

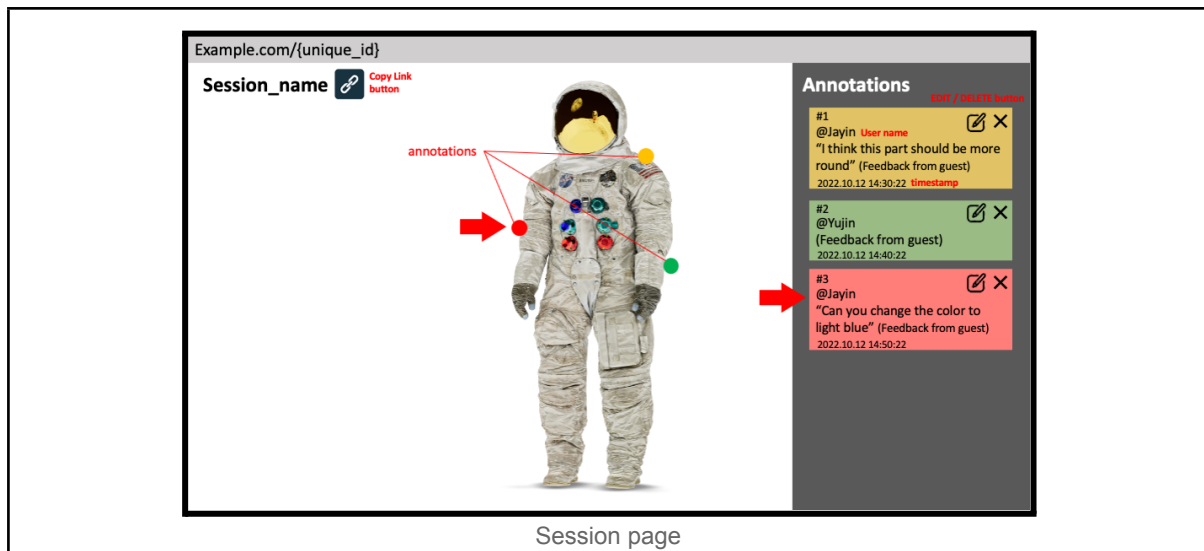
Features

Below are features of the website, accompanied by relevant visuals and technology outlines.



1. Session Creation and Management:

- Users can initiate sessions by uploading a 3D model via drag and drop or by browsing the finder, and it will generate a unique session link for inviting participants to join the session.
- **Tech-used : Supabase OR Custom Backend, React**



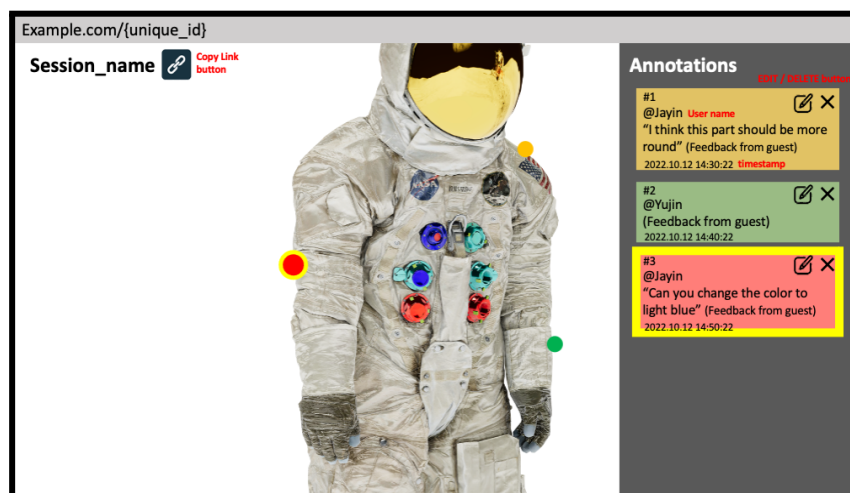
2. 3D Annotations:

- In the session, the 3D model is rendered and shown in the center. Users can rotate and zoom the 3D scene with mouse interactions to see the 3D model in different angles.

- Users can create 3D annotations directly on the model by clicking on it. An annotation is generated within the 3D scene, meaning it adjusts its position as the user rotates the 3D scene.
- Each annotation includes **username, a unique ID, text content, a timestamp, and a color-coded status**. Color-coded status comprises red (indicating 'unsolved'), yellow (indicating 'in progress'), or green (indicating 'solved'). On the right of the webpage, there is an 'Annotations' panel where all the annotations are shown in a form of text box.
- **Tech-used : Three.js, React-three-fiber, Model-viewer, TypeScript, React**

3. Real-time Collaboration & Auto-save

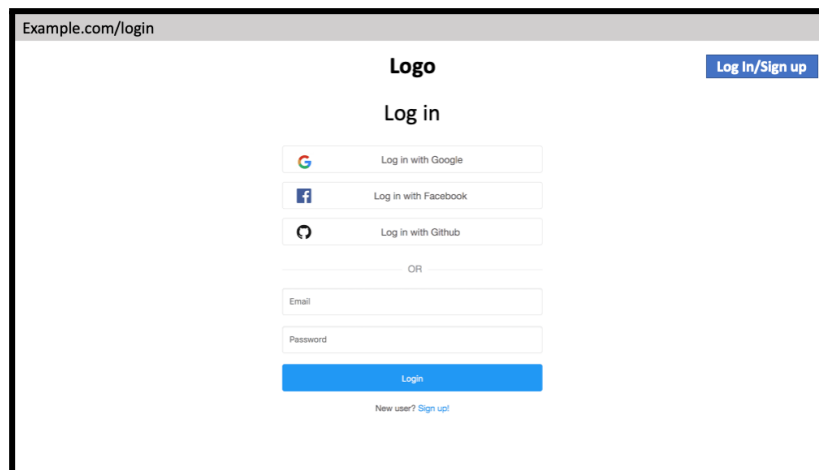
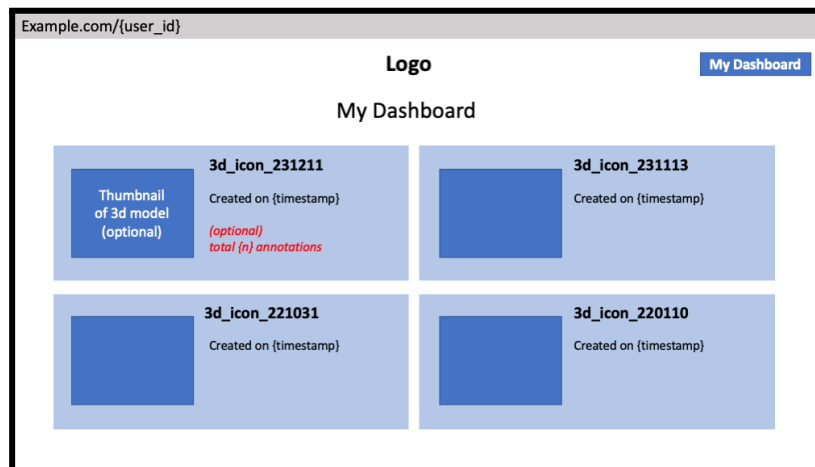
- The changes that users make in a session are automatically saved and shown to other users in the session real-time, promoting effective communication and feedback and preventing data loss.
- **Tech-used : Supabase OR Custom Backend, React**



Session page - Highlights

4. Intuitive User Interaction

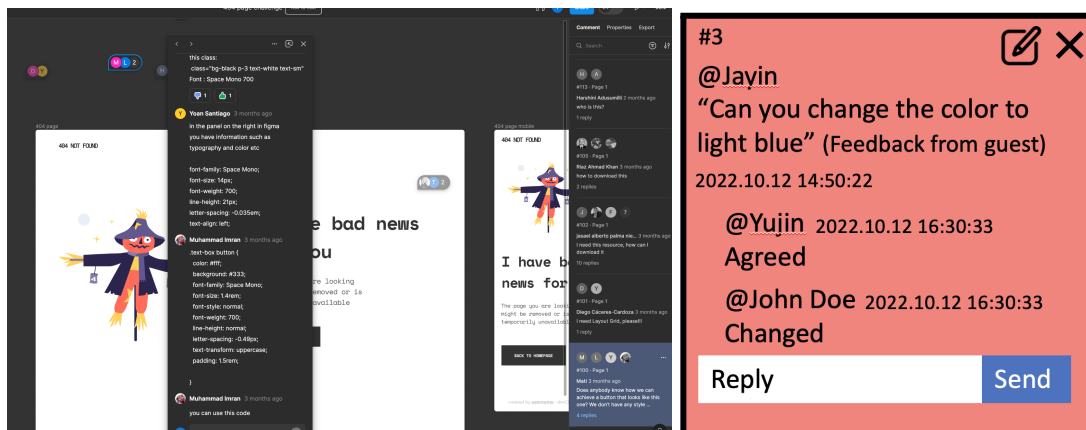
- When clicked on annotation in the 3D scene, the 3D scene will be adjusted so that the position of the annotation will be centered and zoomed.
- When clicked(or hovered) on the annotation in the right panel, it will highlight the corresponding annotation in the 3d scene (dot).
- **Tech-used : Three.js, React-three-fiber, Model-viewer, TypeScript, React**



My Dashboard page (above), Log In page (below)

5. User Management System & Authentication

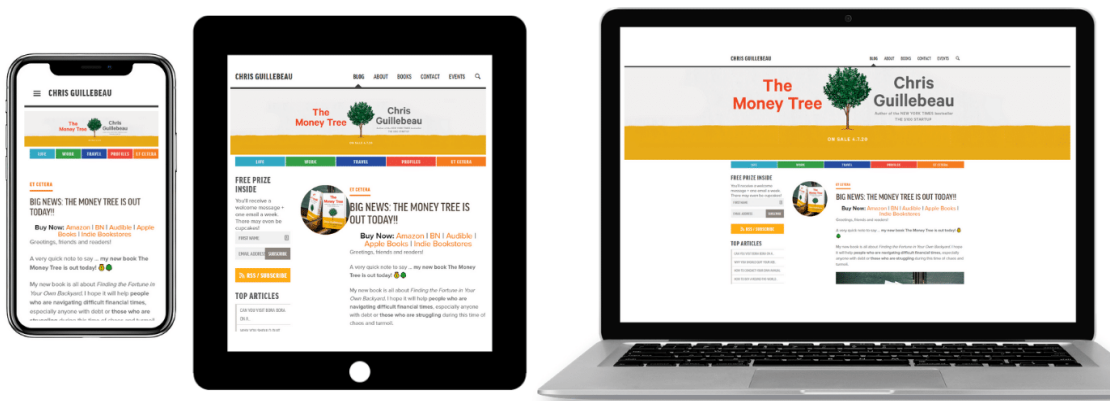
- The service will allow the temporary users (without registering) to join the session.
- **(Optional)** User registration, log-in, CRUD and account management for saving the data of created sessions.
- **Tech-used : Supabase, Passport.js, React, OAuth2**



Example of thread in Figma (left), Feedback thread in annotation (right)

6. (Optional) Feedback Thread

- The feature to allow the users to reply on the annotation directly in a form of thread.
- **Tech-used : Supabase OR Custom Backend, React**



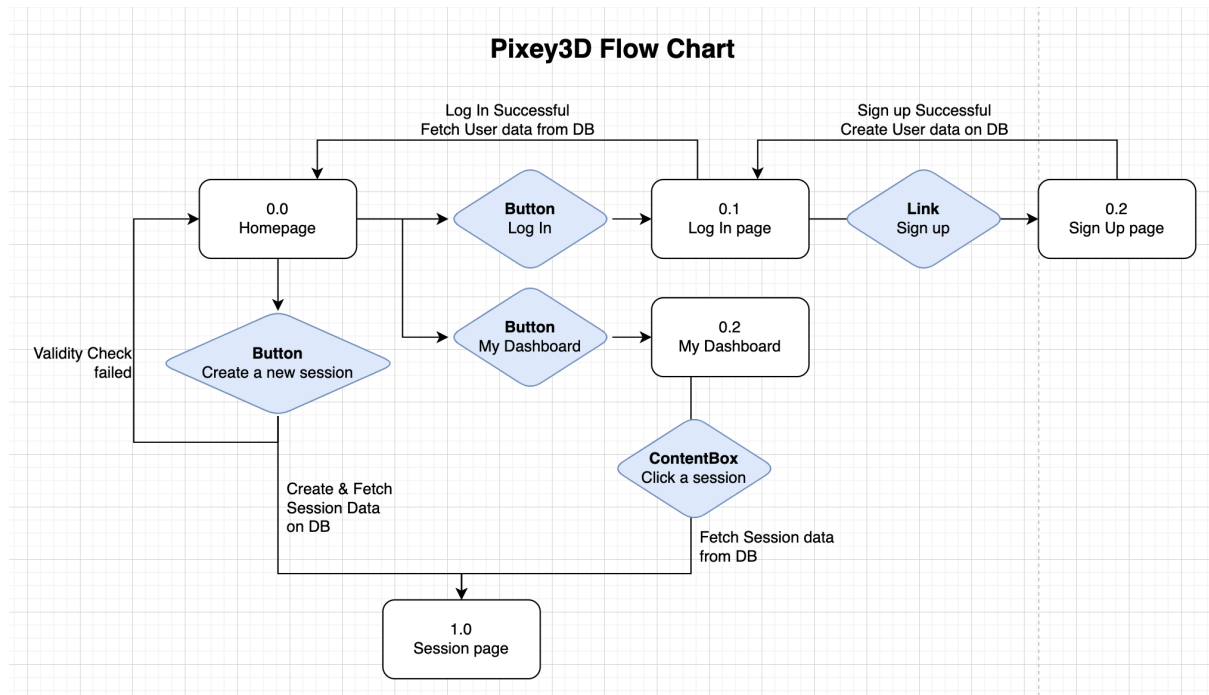
Example of Responsive design

7. Mobile Compatibility (Responsive design)

- Accessibility on various devices, including smartphones and tablets. Designed responsively to adapt to different screen sizes and devices.
- **Tech-used : Tailwind CSS, React**

Flow Chart

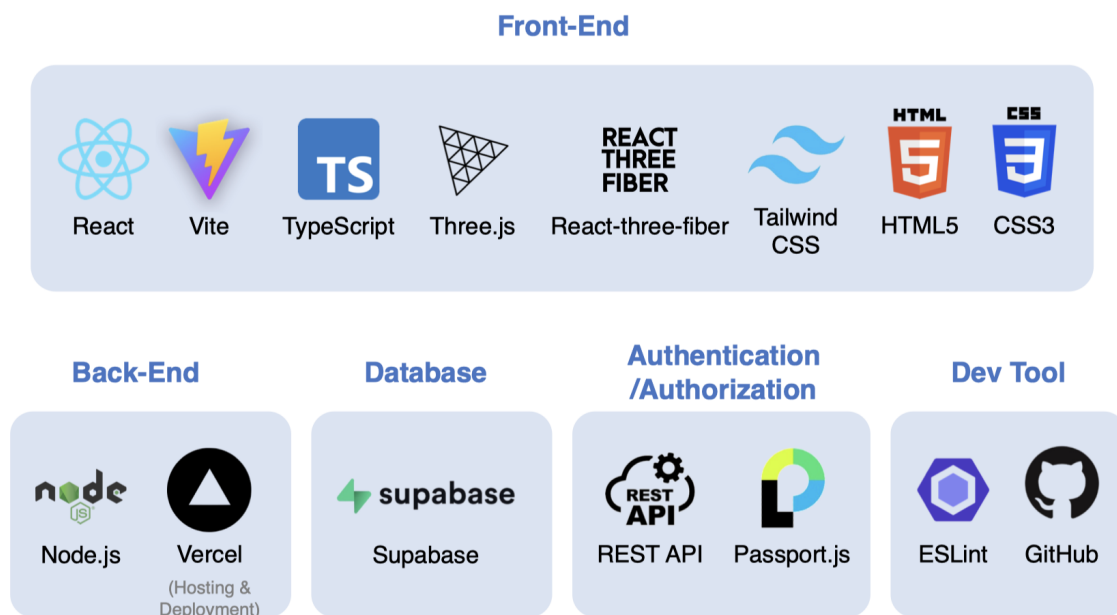
Below is a flow chart regarding the navigation within the web pages. Box refers to each webpage and blue diagonal refers to the Button(or an object with a link).



System Architecture

Overview

Below, an overview of the additional technologies is shown. The technologies are grouped into front-end, back-end, database, authentication and other development tools. For each of the technologies a short description is given.



Front-End

1. **React:** A JavaScript library for building user interfaces. It's widely used for creating interactive and dynamic web applications.
2. **Vite:** A build tool and development server that's designed to be fast. It's often used with React and other front-end frameworks.
3. **TypeScript:** A statically typed superset of JavaScript that helps catch errors early in development and improves code quality.
4. **Three.js:** A popular JavaScript library for creating 3D graphics and visualizations in the browser.
5. **React-three-fiber:** A React binding for Three.js, making it easier to integrate 3D graphics into React applications.
6. **Tailwind CSS:** A utility-first CSS framework that makes it easy to design responsive and consistent user interfaces.
7. **HTML5:** The latest version of HTML, which provides new features for structuring web content and multimedia.
8. **CSS3:** The latest version of CSS, which adds powerful styling capabilities to web pages.

Back-End

9. **Node.js:** A server-side JavaScript runtime that allows you to build scalable and efficient server applications.
10. **Vercel:** A cloud platform for hosting web applications, known for its ease of use and deployment capabilities.

Database

11. **Supabase:** An open-source alternative to Firebase, offering real-time databases and authentication services for web and mobile apps.

Authentication / Authorization

12. **Rest API:** A REST API is a set of rules and conventions for building and interacting with web services, allowing applications to communicate over the internet in a standardized way.
13. **Passport.js:** Passport.js is a popular authentication middleware for Node.js that simplifies user authentication processes, providing a secure and customizable solution for managing user logins.

Dev Tool

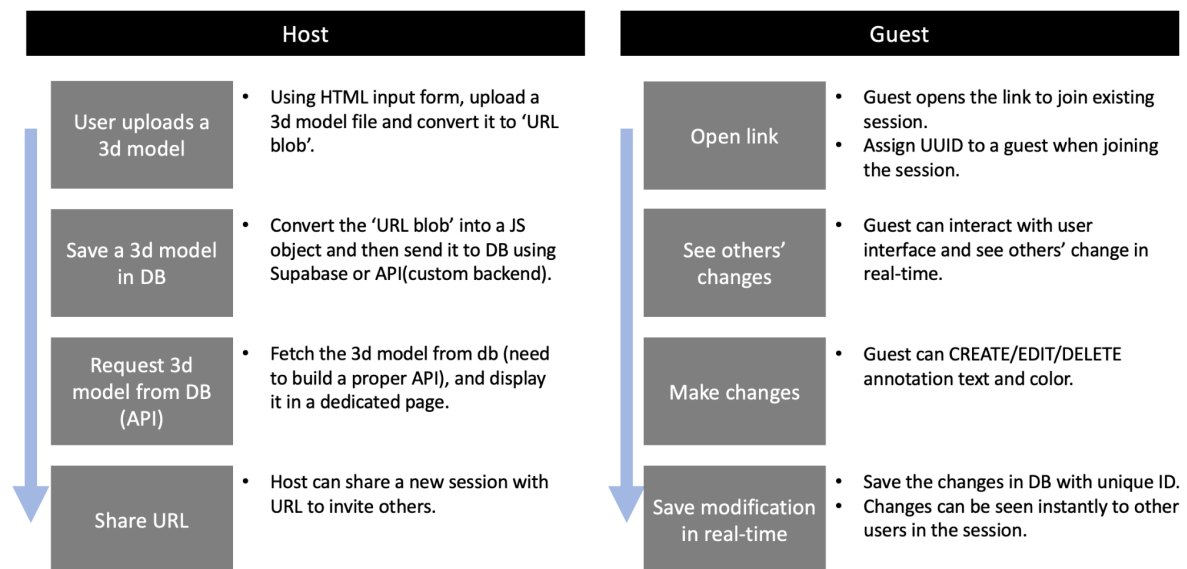
14. **ESLint:** A tool for identifying and fixing problems in JavaScript code. It's commonly used to enforce code style and best practices.
15. **Github:** Web-based platform for version control and collaborative software development.

Data Flow

Below is a data flow explained with a detailed user scenario.

'Host' refers to a user who created a session, and 'Guest' refers to the user(s) who joined the session via link.

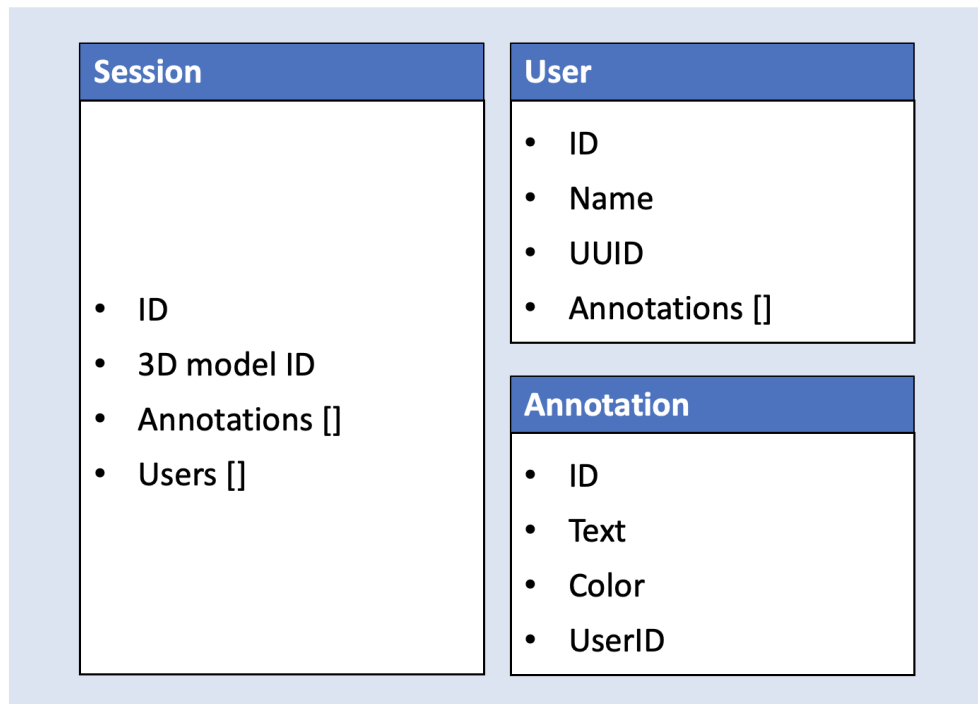
Data Flow



Database Scheme

Below is a Database Scheme. The database will be configured with Supabase and SQL.

Database



Wireframe

Below are low-fidelity wireframes for the website.

Example.com/home

Logo

Log In/Sign up

Session name

Drag & Drop your 3d model
or [Click to Browse Files](#)
(Supported formats : gltf, glb, obj, ...)

Create a session (button)


Show [My Dashboard](#)
when logged in already


Example.com/login


Logo

Log in

Log In/Sign up

 Log in with Google

 Log in with Facebook

 Log in with Github

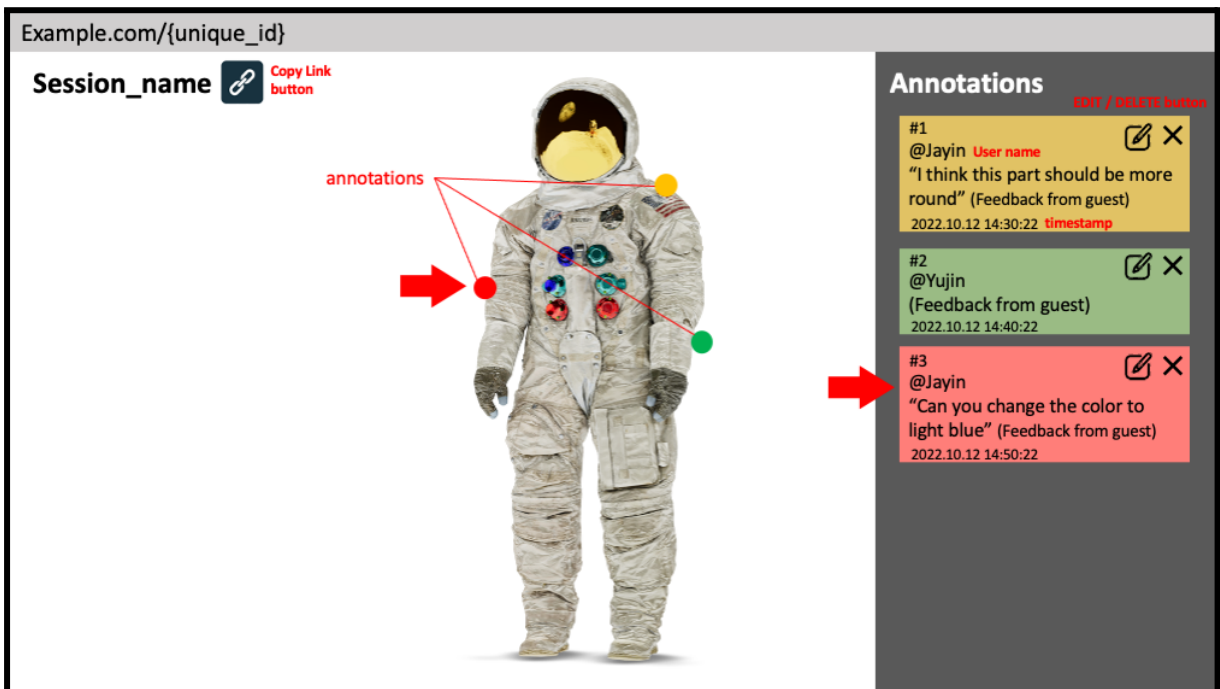
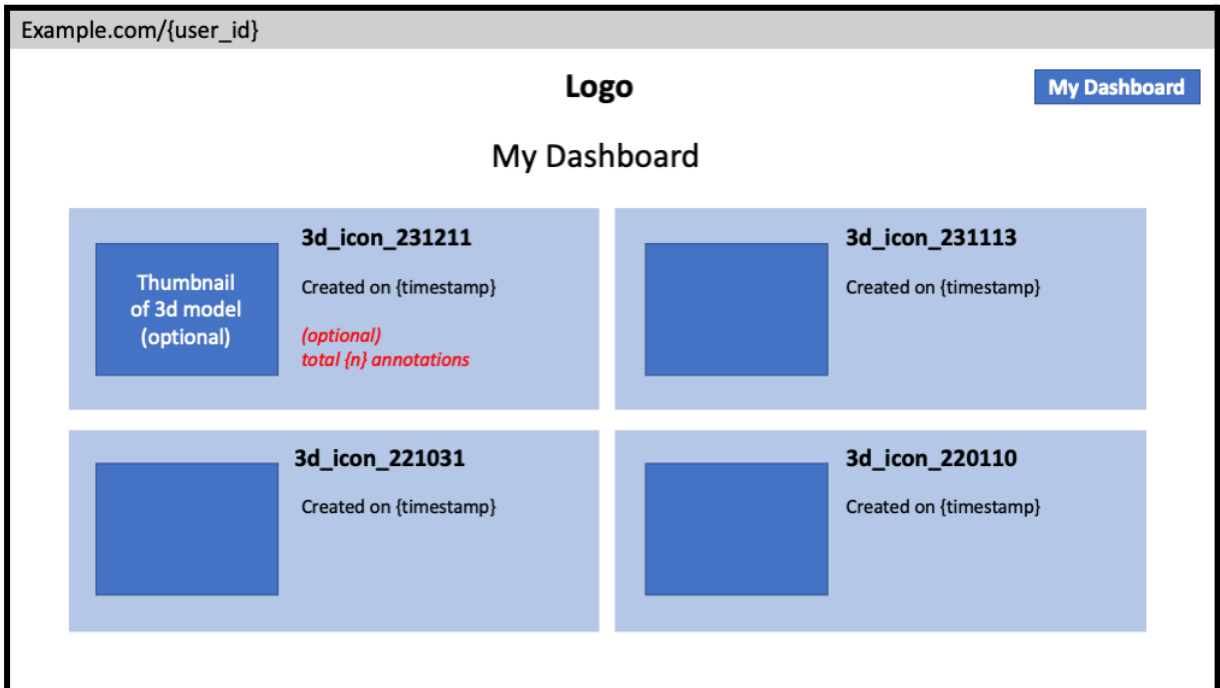
OR

Email

Password

Login

New user? [Sign up!](#)



Objective & Tentative Schedule

Task	Start Date	End Date
Initial Setup (GitHub repository, Figma, etc.)	Oct 17	Oct 24
Meetings for Specifications		
High-fidelity UI Design on Figma	Oct 17	Oct 26
'Session Creation and Management' Feature Implementation	Oct 26	Nov 1
'3D Annotation' Feature Implementation		
'Real-time Collaboration & Auto-save' Feature Implementation	Nov 2	Nov 8
'User Interaction (Annotation)' Feature Implementation		
'User Management System & Authentication' Feature Implementation	Nov 9	Nov 15
'Mobile Compatibility (Responsive Design)' Feature Implementation		
(Optional) 'Feedback Thread' Feature Implementation	Nov 16	Nov 22
Testing and Quality Assurance	Nov 23	Nov 29
Final Review and Documentation	Nov 30	Dec 5