MICHIGAN STATE UNIVERSITY

Project Plan Presentation

Dynamic 3D Mouth Model

The Capstone Experience

Team Delta Dental 3DMM

Ryan Hardy
Shantanu Ingalagi
Brant McCormick
Ibukunoluwa Olutayo
Amanda Saunders
Rayyan Zahir

Department of Computer Science and Engineering
Michigan State University

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From Students…
…to Professionals

Project Sponsor Overview

- Delta Dental is the largest dental insurance provider in the United States
- Provides coverage to over 90 million Americans
- Headquartered in Okemos, Michigan
- Initiatives which foster dental equity in local communities

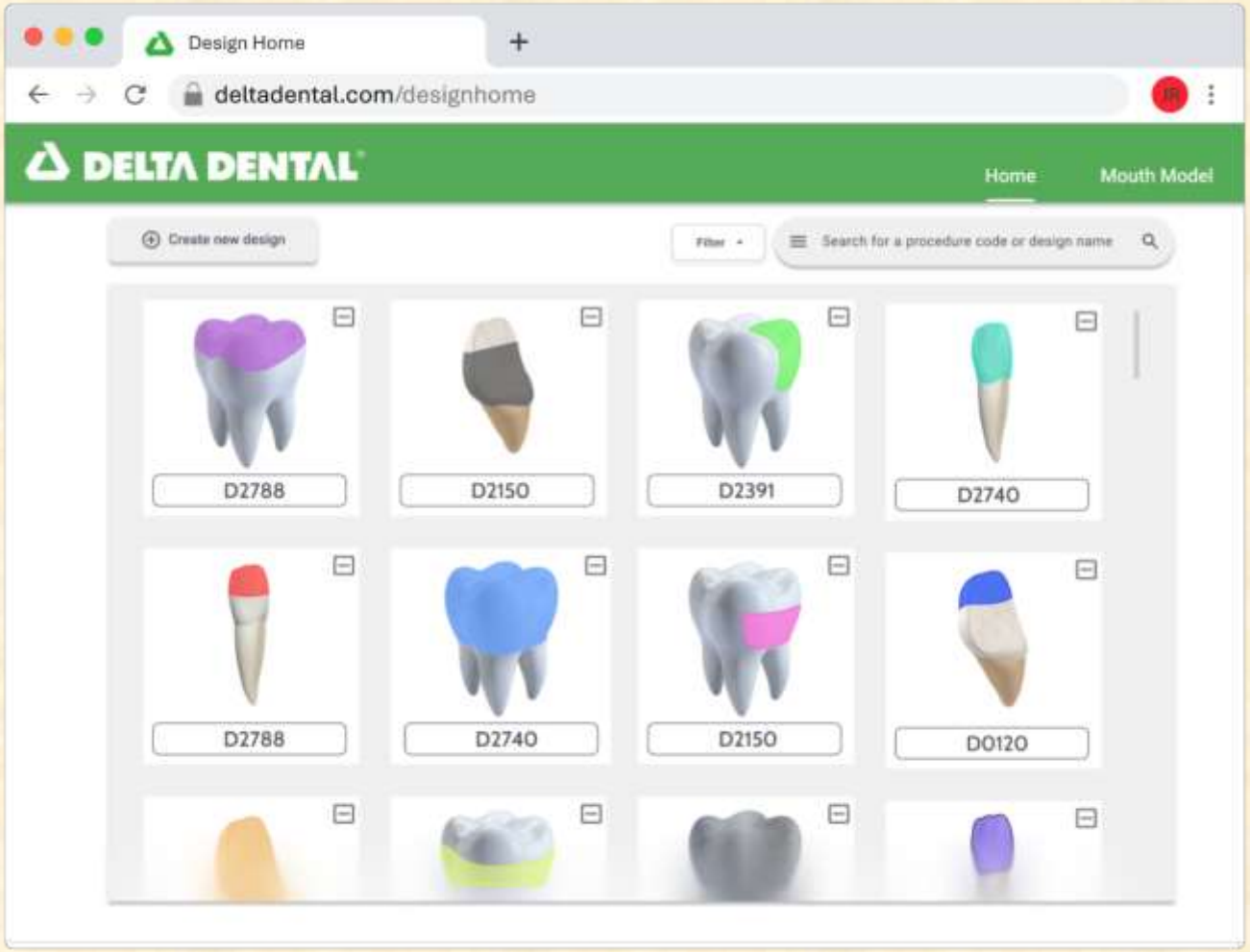
Project Functional Specifications

- Application allows user to visualize patient data via mouth models
- Current visualization software only allows static models
- UI for creating designs to allow user to customize appearance of model.
- Displays mouth model dynamically according to user designs and patient history

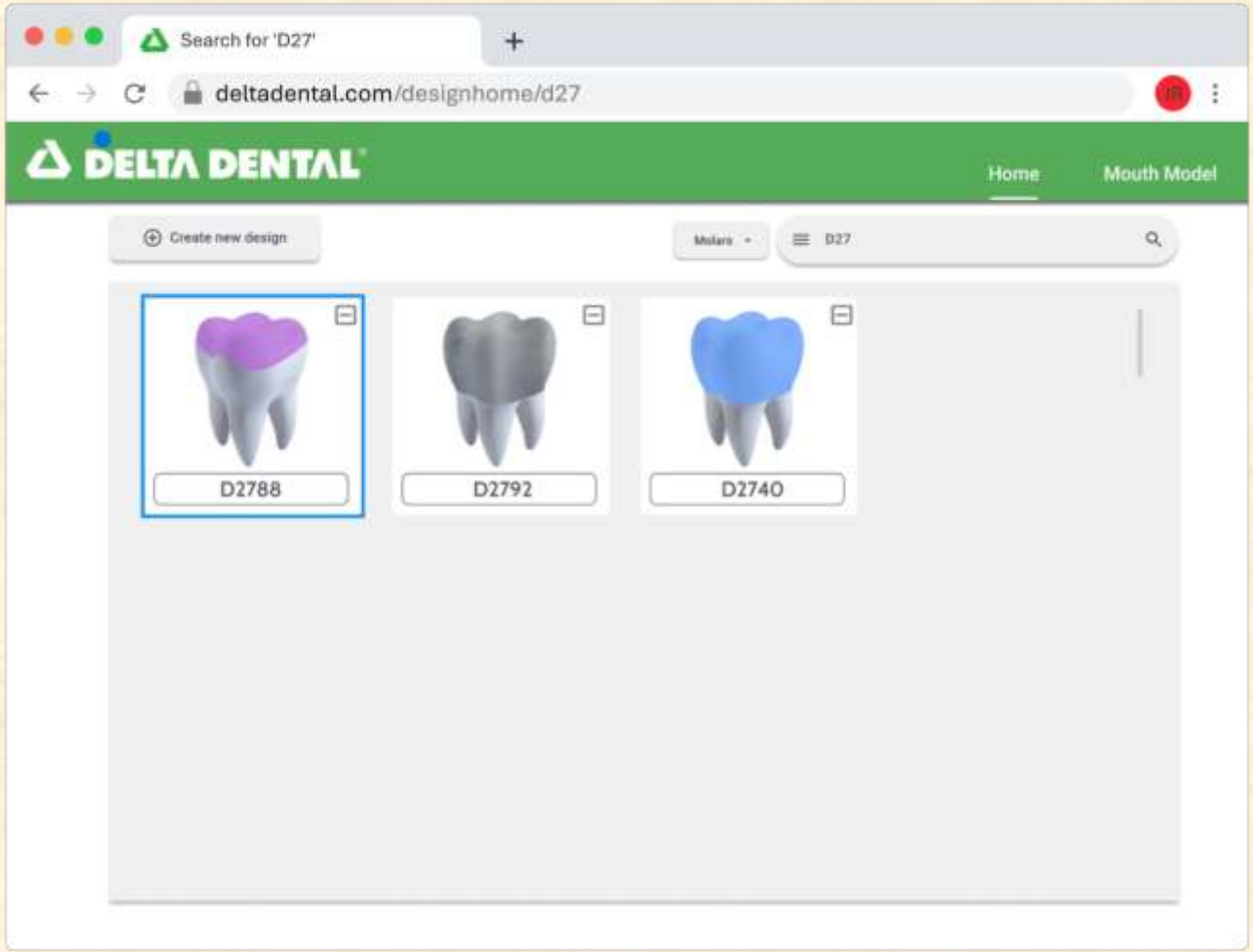
Project Design Specifications

- UI design includes a home page, design editor, tooth editor, and a complete mouth model
- Users will be able to create colored designs representing multiple procedure codes
- Individual teeth ca also be shaped and modeled to represent procedure conditions
- Both teeth and colored designs will apply to all patients with each specified condition

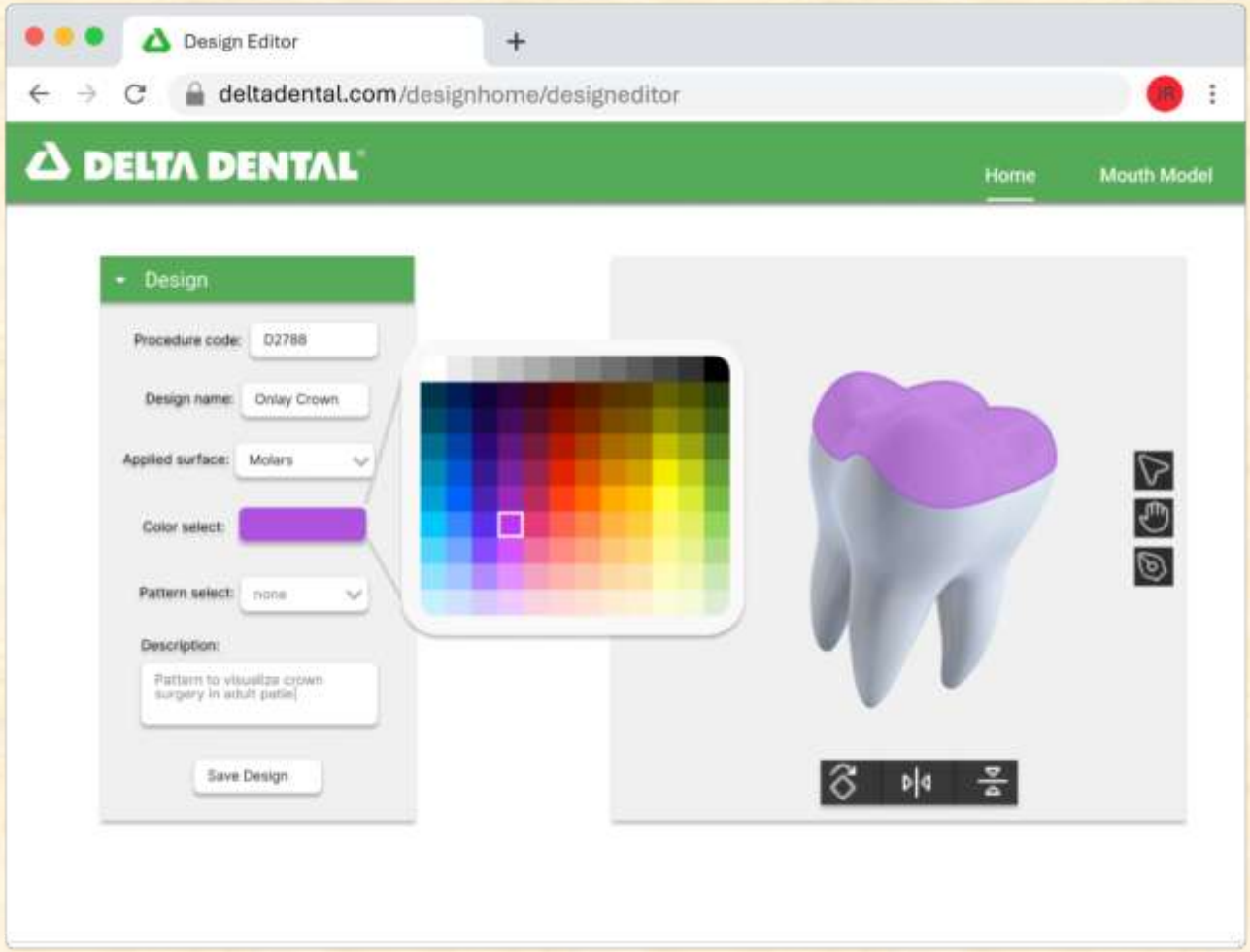
Screen Mockup: Home Screen



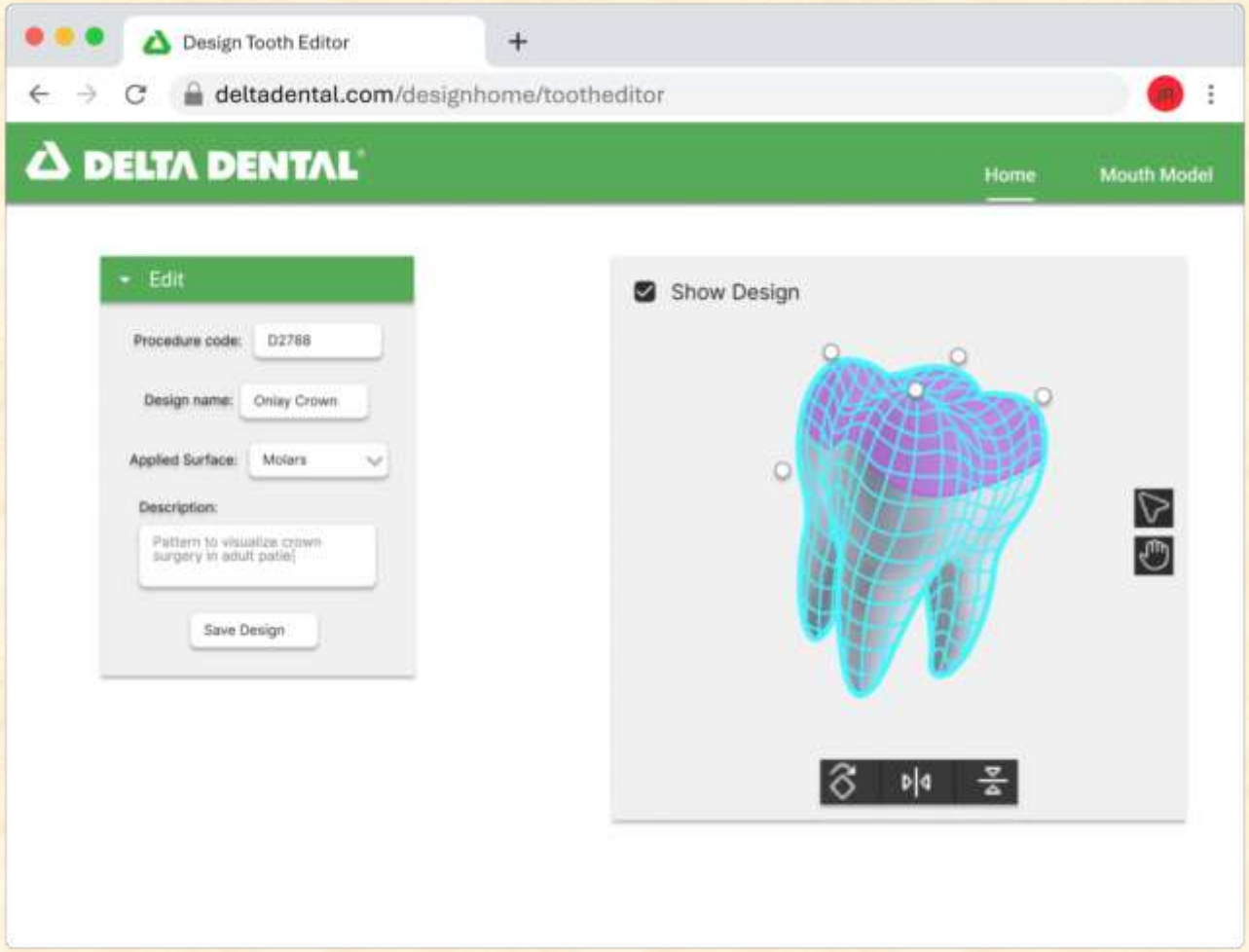
Screen Mockup: Search Results



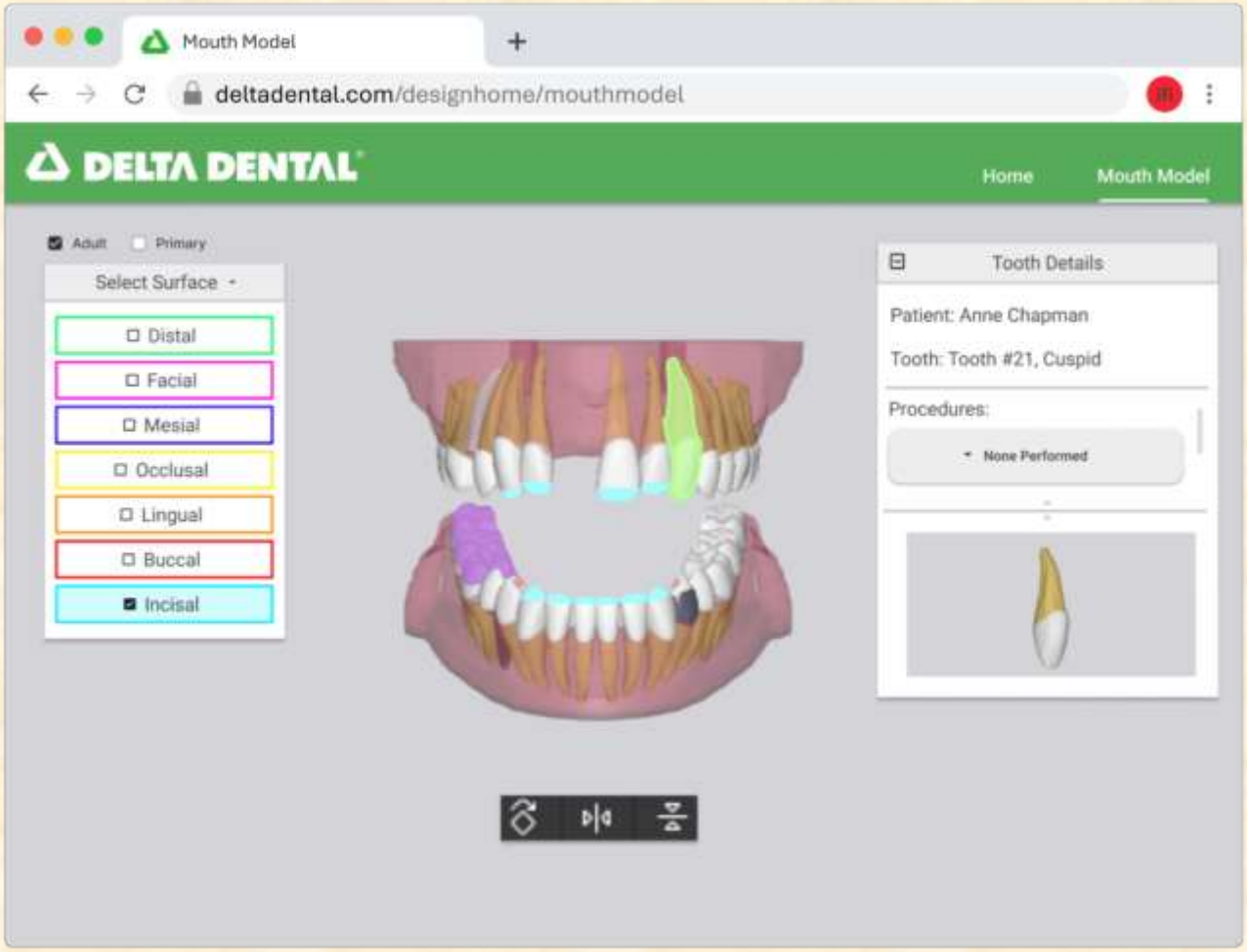
Screen Mockup: Design Editor



Screen Mockup: Tooth Editor



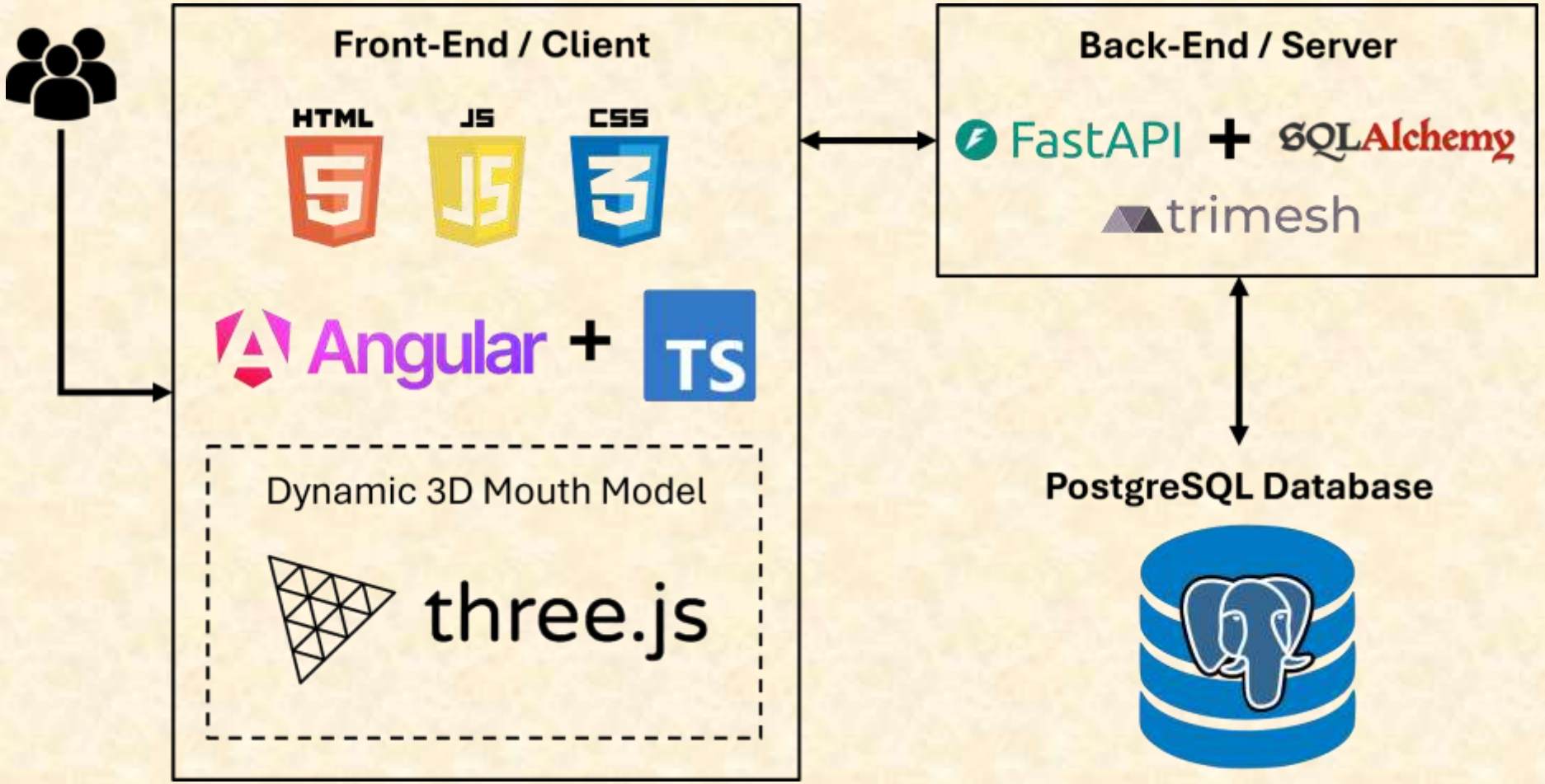
Screen Mockup: Mouth Model



Project Technical Specifications

- Three.js for rendering models and their modifications
- PostgreSQL database with tables that store design, clinician, and model information
- FastAPI backend will store user data and designs
- Trimesh will be used to perform a subset of 3D operations to increase performance

Project System Architecture



Project System Components

- Hardware Platforms
  - No hardware platforms are required
- Software Platforms / Technologies
  - Angular: Frontend framework
  - Three.js: Frontend 3D operations
  - FastAPI: Backend framework
  - Trimesh: Backend 3D operations
  - SQLAlchemy: DB Library + ORM
  - PostgreSQL: Object-Relational database



Project Risks

- Risk 1: Non-commercially licensed API
  - Blender API open-source license does not permit commercial usage.
  - Use libraries with the MIT license (Three.js for JavaScript, Trimesh for Python).
- Risk 2: User Accessibility at the cost of granularity
  - Creating intuitive, interactive interface for users to edit mouth model at the cost of some granularity.
  - Menu inputs like sliders and color wheels can be used to make 3D model manipulation easier.
- Risk 3: Protected Patient Database
  - The team has no knowledge of Delta Dental's existing patient database.
  - Use the JSON object provided in the starter code to surmise the schema.
- Risk 4: Model manipulation
  - Deciding where in the app to handle demanding 3d operations.
  - Testing the app on lower browser settings and code optimization.

Questions?

