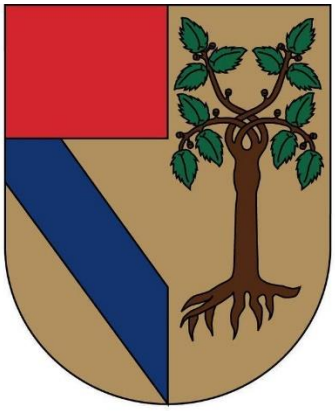


Save for solar Desing document

Alberto Stephen Dubin Hernandez 0244139

Heidi Meiners Muñoz 0266159

Natalia Trujillo Perez 0267484

Universidad Panamericana De Guadalajara

Desarrollo de aplicaciones web

Gabriel Castillo Cortés

Design document:

1. Objective:
The goal is to create an accessible web application that educates users on solar energy, provides a platform for feedback, and helps individuals estimate the potential benefits of switching to solar energy. By doing so, it promotes sustainable energy solutions and contributes to global climate action efforts.

2. Functional Requirements:

- Informational Content: A section with detailed explanations of solar energy, including:
    - Types of solar panels.
    - Installation process and costs.
    - Environmental and economic benefits.
- Review System: Allow users to leave and view feedback on solar energy experiences.
- Solar Calculator: Users can input their monthly energy costs, and the system will calculate the approximate number of solar panels needed to cover their usage.

3. Non-Functional Requirements:

- Responsive design for optimal viewing across devices.
- Fast loading times (under 2 seconds).
- Secure storage of sensitive user data.

4. Technology Stack:

- Front-End: React.js, React-Bootstrap, Bootstrap (ensures responsive and user-friendly design).
- Back-End: Node.js with Express for API development.
- Database: MongoDB using Mongoose for managing login data and reviews.
- Security: bcryptjs for password encryption, JSON Web Tokens (jsonwebtoken) for authentication.

5. Architecture:
We are using a monolithic architecture, where both front-end and back-end components are integrated within the same application.

- Advantages: Simpler deployment and maintenance for this project's scope.
- Disadvantages: Limited scalability for larger systems, but sufficient for this use case.

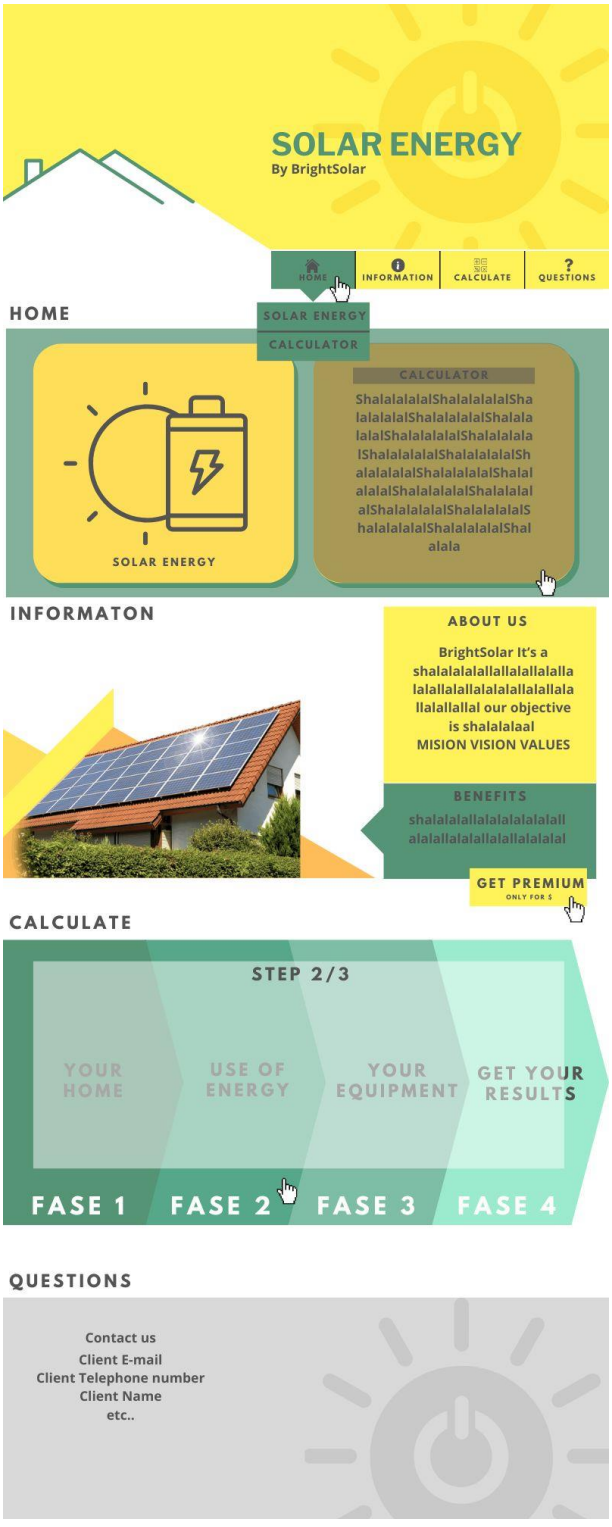
6. Database Design:
The database consists of the following collections:

- Users:
    - Fields: username, password (encrypted)
- Reviews:
    - Fields: user_id, review_content, timestamp

7. Security Measures:

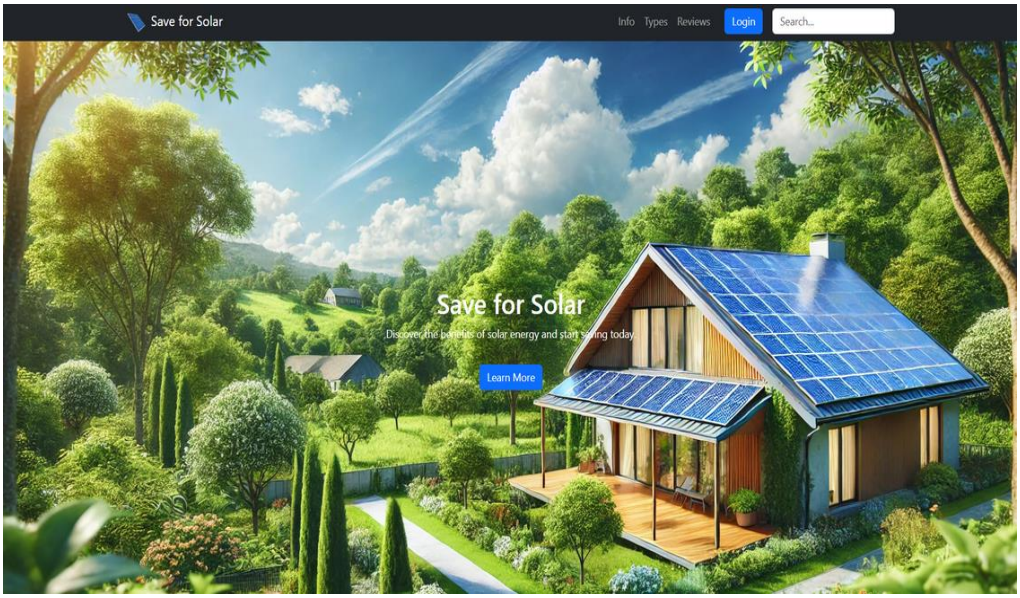
- Password encryption using bcryptjs.
- Token-based authentication with JSON Web Tokens (JWT).
- Implementation of CORS to restrict unauthorized access.
- Environment variables managed with dotenv for sensitive configuration.

First sketch



Final design

Home page



About Solar Panels

Types of Customers

Homeowners: Often combine solar panels with government incentives or tax credits.

Businesses: Enhance their brand image as environmentally sustainable.

Governments and Public Organizations: Deploy large-scale systems on public infrastructure.

Cost Recovery Time

On average, users recover their investment in **5 to 7 years**, depending on location and system size.

Sunny regions like California and Australia often have shorter payback periods due to high sunlight exposure.

Environmental Impact

A typical solar panel system reduces **3-4 tons of CO2 annually**, equivalent to planting 100+ trees.

Solar panels also reduce air pollution and dependence on non-renewable energy sources.

Countries with Most Solar Panels

- **China:** 392 GW installed (largest globally).
- **United States:** 150 GW installed.
- **India:** Rapidly growing, 70 GW installed.
- **Germany:** Leader in Europe with 66 GW.
- **Japan:** Focuses on rooftop systems, 78 GW.

Cost of Solar Panels

The average cost of a residential system is **$20,000** for a 6kW system.

Prices range from **$15,000 to $25,000**, depending on size, location, and installation complexity.

Energy Savings

Households save an average of **$1,000 to $2,000 annually** on electricity bills.

Businesses with solar installations save over **$10,000 annually**.

Types of Solar Panels

Monocrystalline

High efficiency and sleek design. Ideal for limited spaces.

Learn More

Polycrystalline

Moderate efficiency and affordable. Best for large setups.

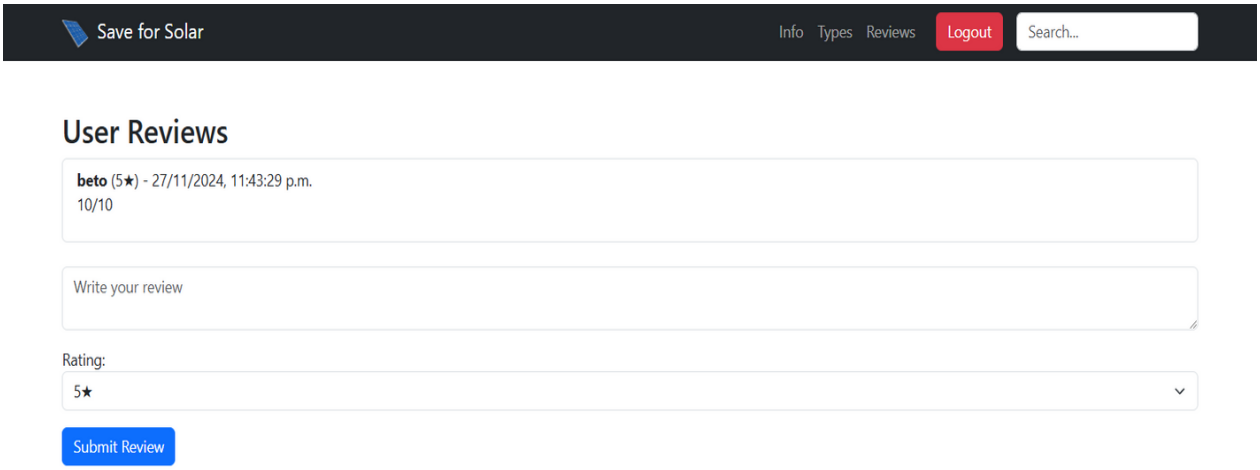
Learn More

Thin Film

Lightweight and flexible, suitable for unconventional setups.

Learn More

Reviews page



Calculator page