SOLAR POWER SIMULATOR

A Smart Solution for Solar Energy Adoption

Problem Statement: Regional disparities in solar power generation due to location and weather conditions .
Lack of providing the benefits (energy savings, cost reduction, environmental impact).Limited tools for individuals to evaluate solar panel efficiency and ROI based on their specific location and needs

GFG VIT-AP
HACKTOBER
FEST

IN COLLOBRATION WITH CDC VIT-AP

Team Name:T3

SOLUTION OVERVIEW

Brief Description of Solution

A web-based simulator that helps users estimate :

- Energy Generation : Based on location (with real-time or average weather data).
- Cost Savings : By analyzing electricity bills and potential savings from solar power.
- Environmental impact : Estimate CO2 reductions based on the user's solar energy generation.

How it addresses the problem

People need a simple, accurate way to understand the benefits of solar power tailored to their region and we provide that through our website that gives an overview of your savings and cost reductions

SOLUTION OVERVIEW

Innovation and uniqueness of the solution

- •Personalized Reports: Tailored to user's location and energy needs.

- •Real-Time Data Integration: Accurate simulation using up-to-date weather data.

- •Easy-to-Understand Output: Simplified insights on cost savings and environmental impact.

- •Alignment with Government Goals: Supports India's clean energy initiatives (e.g., National Solar Mission).

Highlight its key features and benefits.

- Help users save up to 30% on electricity bills with solar panel installation.
- Contribute to India's CO2 reduction targets through increased solar adoption.
- Personalized insights based on regional solar potential and user needs.

GFG VIT-AP
HACKTOBER
FEST
IN COLLOBRATION WITH CDC VIT-AP

TECHNICAL ARCHITECTURE

Flowchart
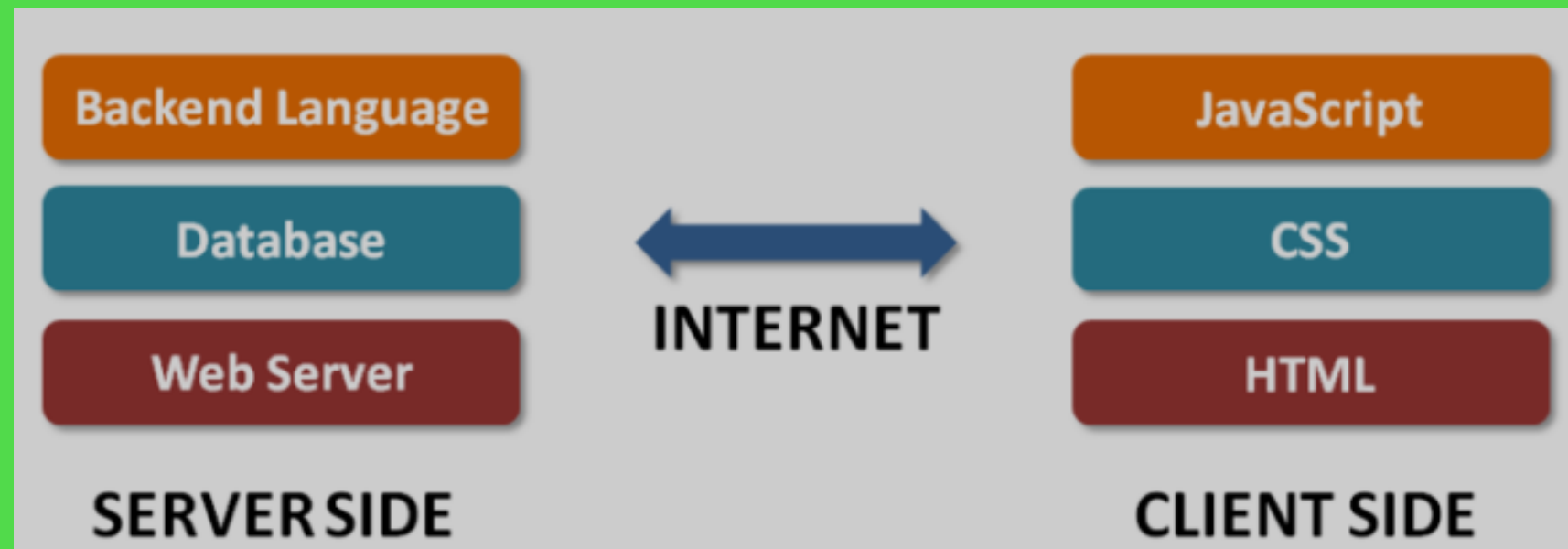
Tech stack

•Frontend: Html , Css , JS .
•Backend: Node.js for handling calculations and data .
•Data Integration: APIs for weather data (OpenWeatherMap).
•Database: MongoDB/PostgreSQL for user data and simulations.

SCALABILITY (How your solution can handle increased load)

- Expand to global markets with localized data integrations.
- Integrate with solar panel providers for direct installations.
- Potential partnerships with energy providers and government initiatives.

FUTURE SCOPE(Architecture consideration)

- Phase 1: Launch MVP with basic energy and cost simulations.
- Phase 2: Integrate real-time weather data and regional solar insights.
- Phase 3: Expand to include energy storage solutions and financing options for solar installations.
- Phase 4: Scale to international markets.

Technologies that support scalability

Weather API - a weather data service that provides historical, current, and forecasted weather data via APIs

Additionally functionalities you plan to implement

Irregular terrain and 3D shade modelling along with bifacial, fill sub-module electrical mismatch, sub-hourly and multi-year simulations of any time resolution and length

GFG VIT-AP
HACKTOBER
FEST
IN COLLOBRATION WITH CDC VIT-AP

FEASIBILITY

Potential challenges and risks and strategies for overcoming these challenges

1. Data Accuracy and Reliability

- Challenge:Accurately simulating solar power generation requires reliable solar irradiance data, which can vary based on location, weather conditions, and seasonal changes.

- Risk: Using outdated or incorrect data can lead to inaccurate results, reducing the credibility of the simulator.

-Mitigation:Use trusted sources like NASA or local meteorological agencies, and consider integrating weather APIs to update data in real-time.

2. Complex Calculations and Modeling

- Challenge: Simulating solar energy output involves complex calculations, including panel orientation, shading, and system efficiency.

- Risk: Oversimplifying or miscalculating these factors can result in misleading projections, which may discourage users from adopting solar solutions.

-Mitigation: Focus on well-researched, validated models, and offer customizable parameters for more experienced users to fine-tune settings.

GFG VIT-AP
HACKTOBER
FEST
IN COLLOBRATION WITH CDC VIT-AP

>Team Details

Nishkarsh Hublikar

B Tech Student
VIT-AP

Nandini Mourya

B Tech Student
VIT-AP

Raunak Meher

B Tech Student
VIT-AP

HACKTOBER FEST

Thanks for Joining