DEARBORN
COLLEGE OF ENGINEERING & COMPUTER SCIENCE

Project-Based Entrepreneurially-Minded Learning (PB-EML)

KEEN
ENGINEERING UNLEASHED

CarbonWise - Dearborn's Personalized Carbon Footprint Calculator

Students: Shams Ahson, Meriam Harissa, Jodi Joven, and Zaynab Mourtada **Faculty :** Dr. Zheng Song
Course: CIS435 -Web Technology

Purpose

CarbonWise empowers Dearborn residents to better understand and reduce their carbon footprint through a personalized and community-focused approach. The website calculates users' carbon emissions based on their daily habits and provides personalized AI-generated recommendations and resources specific to the Dearborn area. By connecting users with local initiatives, eco-friendly trails, and sustainable markets, CarbonWise helps individuals, families, and businesses take actionable steps toward a greener and more sustainable future for Dearborn residents.

Technologies Used

CarbonWise uses the **MERN** technology stack, designed to provide a set of technologies to build the frontend, backend, and database. The MERN stack consists of MongoDB, Express.js, React.js, and Node.js. It also incorporates OpenAI's GPT-4o API.

Database that stores sustainability resources, user profiles, and cached user-catered AI responses

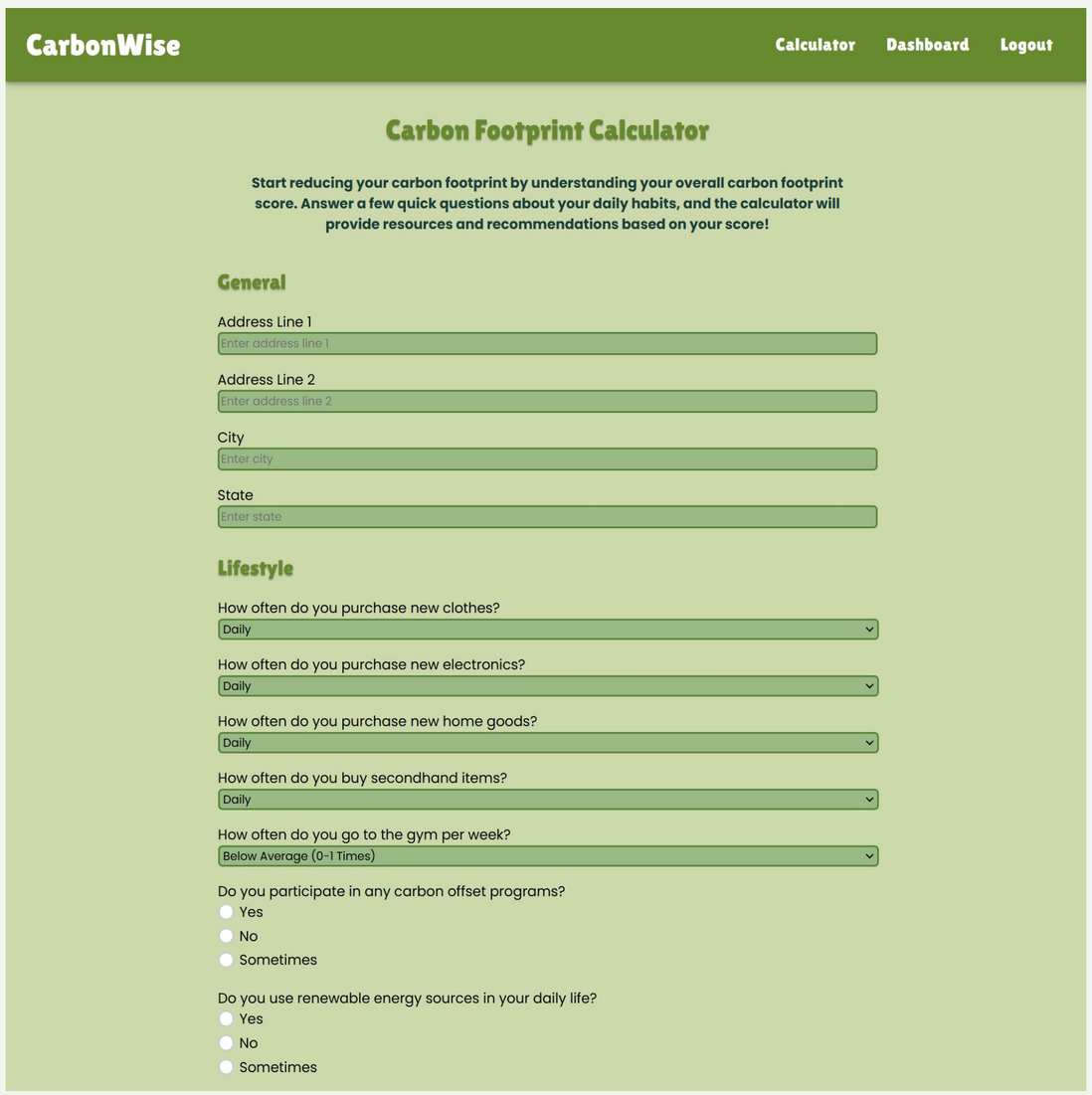
Backend server-side framework for URL routing and handling HTTP requests/responses

Frontend framework that builds the user interface and connects components to the backend

Backend JavaScript web server that executes all server side code and connects it to the frontend

CarbonWise generates recommendations for each user by fine-tuning ChatGPT's latest GPT-4o model. The AI model takes the users' answers from the carbon footprint calculator and generates personalized recommendations using local resources that the user can access in order to offset their carbon footprint.

Outcome



Lessons Learned

Through this project, we learned how to approach the technical and design challenges involved in building a carbon footprint calculator. Understanding the math behind emissions calculations was a key lesson, as we needed to ensure accuracy while keeping the process simple for users. We also focused on making the website intuitive, user-friendly, and visually appealing, which taught us how to balance functionality with design. Developing personalized recommendations helped us identify the best ways to guide users toward actionable, impactful steps customized to the Dearborn area. Overall, this project taught us how to integrate technical precision with thoughtful design to create an engaging and meaningful user experience.

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