CarboNeutral

Submitted in partial fulfillment of the requirements of the degree

BACHELOR OF ENGINEERING IN **COMPUTER ENGINEERING**

By

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CERTIFICATE

This is to certify that the Mini Project entitled **"CarboNeutral: building a greener, more resilient planet for generations to come"** is a bonafide work of **Dhara Bhatia (D12C-9), Chiraag Chugh (D12C-13), Sonnal Katara (D12C-32), Neha Lotwani (D12C-41)** submitted to the University of Mumbai in partial fulfillment of the requirement for the award of the degree of **"Bachelor of Engineering"** in **"Computer Engineering" .**

(Prof. Mrs. Priti Joshi)
Mentor

(Prof. Dr. Nupur Giri)
Head of Department

(Prof. Dr. J.M.Nair)
Principal

Mini Project Approval

This Mini Project entitled "**CarboNeutral: building a greener, more resilient planet for generations to come"** by **Dhara Bhatia (D12C-9), Chiraag Chugh (D12C-13), Sonnal Katara (D12C-32), Neha Lotwani (D12C-41)** is approved for the degree of **Bachelor of Engineering** in **Computer Engineering.**

Examiners

1……
(Internal Examiner Name & Sign)

2……
(External Examiner name & Sign)

Date:

Place
:

Contents

Abstract

All living and nonconscious things are a section of the scheme because of a rise within the range of vehicles, rapid population growth and industrialization over the years, the carbon content within the atmosphere has risen at an associate degree exponential rate. Transportation, Industrialization and technological growth are beneficial to the modern world but are major concerns generating carbon footprint.

A carbon footprint is a measure of the total amount of greenhouse gas emissions (primarily carbon dioxide) that are generated by an individual, organization, or activity over a given period of time, usually expressed in metric tons of carbon dioxide equivalent (CO2e).

Calculating and reducing one's carbon footprint has become an important aspect of environmental awareness and sustainable living.

The CarboNeutral application will help an organization reduce their carbon footprint and maintain an eco-friendly business environment.

Acknowledgements

We are thankful to our college Vivekanand Education Society's Institute of Technology for considering our project and extending help at all stages needed during our work of collecting information regarding the project.

It gives us immense pleasure to express our deep and sincere gratitude to **Mrs. Priti Joshi**(Project Mentor) for her kind help and valuable advice during the development of project synopsis and for her guidance and suggestions.

We are deeply indebted to the Head of the Computer Department, **Dr.(Mrs.) Nupur Giri** and our Principal **Dr. (Mrs.) J.M. Nair**, for giving us this valuable opportunity to do this project.

We express our hearty thanks to them for their assistance, without which it would have been difficult to finish this project synopsis and project review successfully. We convey our deep sense of gratitude to all teaching and non-teaching staff for their constant encouragement, support and selfless help throughout the project work. It is a great pleasure to acknowledge the help and suggestion, which we received from the Department of Computer Engineering. We wish to express our profound thanks to all those who helped us in gathering information about the project. Our families too have provided moral support and encouragement several times.

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1. Introduction

1.1 Introduction

CarboNeutral is a valuable tool that can help individuals and organizations understand their carbon emissions and identify ways to reduce them. By calculating the ratings of various activities, such as transportation, energy usage, and food consumption, users can gain insight into the environmental impact of their daily choices and make informed decisions about how to reduce their environmental impact. The term 'carbon footprint' encapsulates the total amount of greenhouse gases, particularly carbon dioxide, that an individual, organization, or activity is responsible for emitting into the atmosphere. It serves as a vital measure of our collective impact on the environment and plays a pivotal role in addressing global climate change. Understanding and quantifying one's carbon footprint is essential in the pursuit of sustainable living and responsible business practices. Taking steps to reduce and offset this footprint not only helps mitigate climate change but also promotes a more conscious and eco-friendly way of life.Overall, The primary aim of initiatives focused on reducing carbon footprints is to mitigate the adverse effects of climate change by minimizing the release of greenhouse gases into the atmosphere.

1.2 Motivation

The traditional methods for dwindle carbon-emission are often riddled with challenges and are also exorbitant, leaving organizations, individuals, local vendors struggling to find the right and modest thoroughfare. Under the guidance and inspiration of our mentor, we have conceived the idea for our revolutionary carbon footprint website, 'CarboNeutral,' with a vision to transform the environment into the green environment.

CarboNeutral aims to to raise awareness about environmental impacts and provide practical tools for users to make more sustainable choices in their daily lives or operations, by offering a modern, user-friendly, and efficient tool. Our motivation for building this tool is rooted in addressing the pain points and challenges that organizations, individuals,etc encounter daily.

Our mission centers around empowering individuals, businesses, and communities to understand and ultimately reduce their impact on the environment. Through our innovative application, we strive to provide comprehensive tools for calculating and tracking carbon emissions across various aspects of daily life. We aim to educate and inspire users, offering practical tips and personalized recommendations to make eco-conscious choices.

1.3 Problem Statement & Objectives

CarboNeutral Application for abatement of carbon emissions. The carbon footprint revolves around the escalating levels of greenhouse gas emissions and their profound impact on the Earth's climate system. Human activities, such as burning fossil fuels for energy, deforestation, and industrial processes, have led to a surge in carbon dioxide and other greenhouse gases in the atmosphere. This surge is driving global temperatures to unprecedented heights, resulting in erratic weather patterns, rising sea levels, and disruptions to ecosystems worldwide. The consequences are far-reaching, affecting communities, economies, and biodiversity. Urgent action is required to curb these emissions and transition towards sustainable, low-carbon alternatives. The escalate in carbon emission, detrimental gases underlines the pressing need for collective efforts to reduce emissions, embrace cleaner technologies, and fundamentally transform our relationship with the environment for a more stable and resilient future.

Objectives:

- **Mitigating Climate Change:** The primary objective is to mitigate the mpacts of climate change by reducing the emissions of greenhouse gases, particularly carbon dioxide.
- **Promoting Sustainability:** Encouraging sustainable practices in energy, transportation, consumption, and other aspects of daily life to ensure a balanced and thriving planet for future generations.
- **Raising Awareness:** Educating individuals, communities, and organizations about the concept of carbon footprints and their role in climate change, fostering a deeper understanding of environment impact.
- **Empowering Individuals and Organizations:** Providing individuals, businesses, and institutions with the tools, information, and resources needed to measure, track, and their carbon emissions.
- **Enhancing Energy Efficiency:** Encouraging energy-efficient practices in buildings, transportation, and industrial processes to reduce overall energy consumption and emissions.

1.4 Organization of the Report

Our comprehensive report on the development of the CarboNeutral website is divided into three distinct sections, each serving a specific purpose. The first section introduces the project by outlining its core idea, presenting a clear problem statement for addressing challenges in methods for dwindle carbon-emission, and defining specific objectives. Additionally, we discuss the motivation behind the project, highlighting the pressing need for collective efforts to reduce emissions, embrace cleaner technologies, and fundamentally transform our relationship with the environment for a more stable and resilient future.

In the second section, we thoroughly examine the existing landscape of carbon footprint systems through a comprehensive literature review. This involves a comparative analysis of current carbon footprint websites, emphasizing their strengths and weaknesses. We also delve into research findings and academic papers related to carbon emissions, discussing their advantages and drawbacks. Crucially, we explain how we've integrated these insights into our project to overcome the limitations observed in existing systems, ultimately resulting in a more robust and effective solution.

The third section focuses on the practical aspects of our project, detailing the key functionalities of our CarboNeutral website for a seamless user experience. We provide visual aids like diagrams and flowcharts to simplify the understanding of our platform's operations, making it accessible to readers. Additionally, we outline the necessary hardware and software requirements, offering readers a comprehensive view of the project's technical aspects and feasibility. Our structured report aims to ensure readers gain a thorough understanding of the CarboNeutral website, covering its inception, problem-solving approach, and the features that benefit organizations, individual, etc. This organized approach provides a holistic view of the project's scope, objectives, and technical intricacies.

2. Literature Survey

2.1 Survey of Existing System

Author	Paper	Problem	Links
R Rahul,J Selvakumar,R Pradip Kumar,S Krishnaprabha	“A Study of Carbon Footprint in an Educational Institution in India” (2020)	Availability and accuracy of data related to energy consumption, waste generation, and other carbon footprint components can be a significant limitation. In some cases, data may be estimated or based on rough averages, which can introduce uncertainty.	https://ieeexplore.ieee.org/document/9242692
Parth Wadke, Vivek Gonal, Divesh Watwani	"Carbon Footprint: Causes, Impacts and Sector-Wise Survey" (2023)	Complex systems like institutions can be challenging to model accurately. Assumptions and simplifications may be necessary, but they can introduce uncertainty and potentially skew the results.	https://ieeexplore.ieee.org/document/10146684
Babis Theodoulidis, David Diaz, Mohamed Zaki	"Carbon Footprint Innovation through Environmental Information Management" (2011)	The climate and region in which the institution is located can have a substantial impact. For instance, a location with a milder climate may have different energy consumption patterns compared to one with extreme temperatures.	https://ieeexplore.ieee.org/document/5958127
I.A. Stepanovskaya	"Reduction of Carbon Footprint: Digital Management Strategies" (2022)	Without comparative data from similar institutions, it may be challenging to assess how the institution's carbon footprint compares to peers or industry benchmarks.	https://ieeexplore.ieee.org/document/9934232

2.2 Mini Project Contribution

Mini Project Contribution

In this section, we elucidate the distinct contributions made by our mini project, a carboNeutal website designed with a focus to die down the carbon emissions and help organizations, individuals to dwindle there carbon emission.

1. Data Collection

Gather data on various activities and their associated carbon emissions. This might include transportation (cars, buses, bikes), energy consumption (electricity, heating), and daily habits (diet, recycling).

2. User Interface (UI) Development

Design and implement the user interface for the carbon calculator, making it user-friendly and accessible.

3. Database Management

Set up and maintain a database to store emissions data and user profiles.

4. Environmental Impact Information

Include educational content on the environmental impact of different activities to raise awareness.

5. Project Management

Coordinate and manage the project, ensuring that it stays on track and meets its objectives.

6. Providing feedback to developers

Our project provide feedback to developers of carbon emission calculators on how to improve their products.

7. Feedback Mechanism

Transparency and trust are essential components of our project. To achieve this, we've introduced a feedback mechanism that allows users to suggest us. This contribution provides users with valuable insights into the quality of report we are providing helping them make more informed decisions regarding where to change there traditional methods.In addition to these contributions, our project also addresses key considerations such as mobile accessibility, data privacy, security measures, and integration of social media features to create a comprehensive platform that caters to a diverse user base.

3. Proposed System

3.1 Introduction

- User Registration and Profiles:
    1. Users create accounts and set up profiles with information relevant to calculating their carbon footprint.

- Carbon Footprint Calculator:
    1. A tool to assess carbon emissions across various categories, including energy consumption, transportation, diet, waste, and lifestyle choices.
    2. It then calculates their carbon emissions across different scopes (Scope 1, 2, and 3) and generates comprehensive reports.

- Reporting:
    1. Generate detailed reports summarizing the user's carbon footprint and emissions breakdown.
    2. This data helps users understand which areas to target for reducing their carbon footprint.

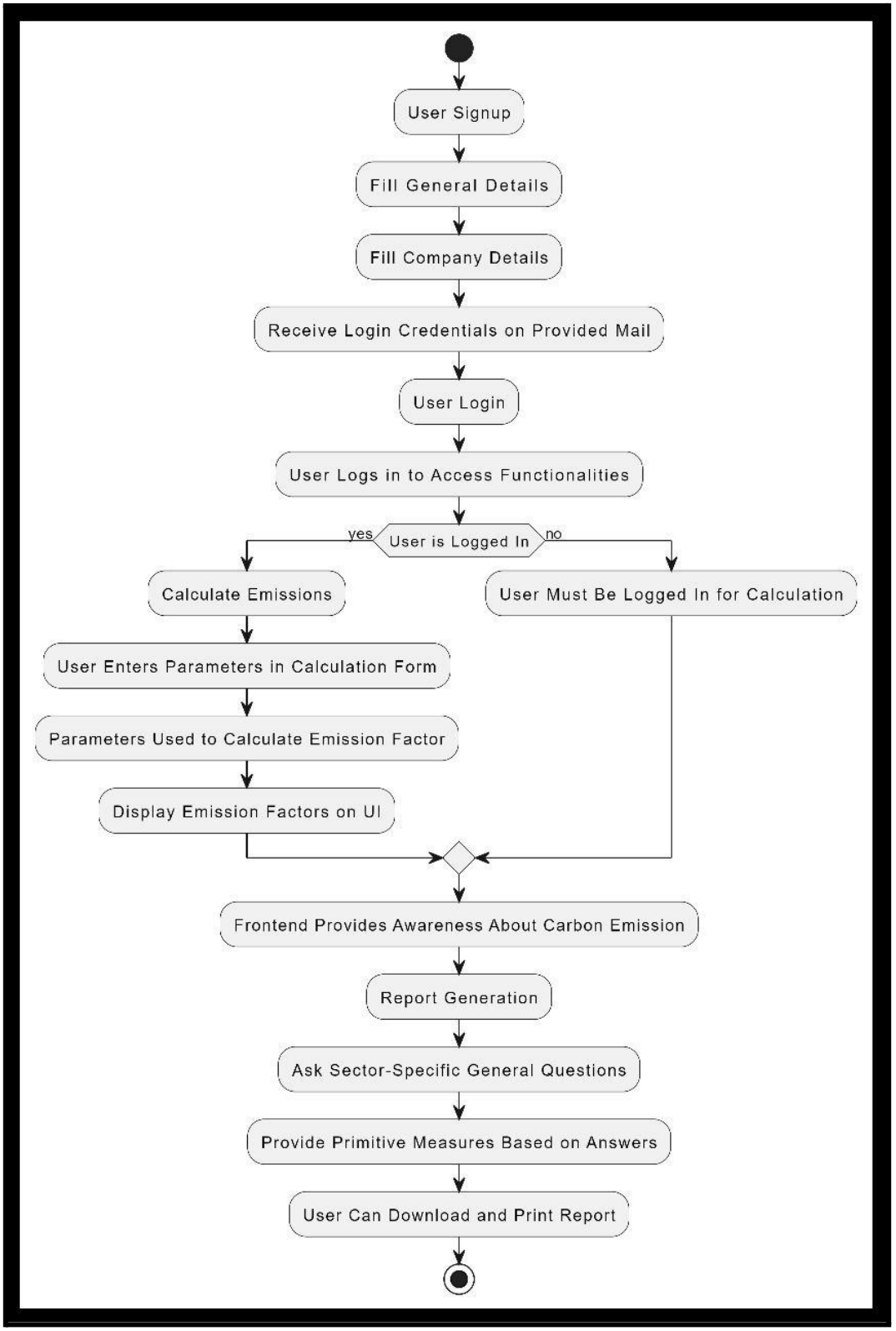
- Personalized Recommendations:
    1. Provide tailored suggestions and tips for reducing emissions based on the user's profile and calculated footprint.
    2. Recommendations might include energy-saving practices, transportation alternatives, and sustainable consumption tips.

- Education and Resources:.
    1. Offer educational content, articles, and resources to help users understand the environmental impact of different activities.
    2. It aims to raise awareness and promote behavior change among users.

- Scalability and Future Expansion:
    1. Design the system architecture to be scalable, allowing for growth in user base and potential expansion into new features or services.

- Feedback Mechanism:
    1. Allow users to provide feedback on the system, report issues.

3.2 Architecture Framework/Conceptual Design



3.3 Algorithm

- **User Registration and Login:**

  Algorithm:

  1. User navigates to the carboNeutral website.
  2. User navigates to home page.
  3. User clicks on the "Signup" button.
  4. User provides necessary information (name, email, password, etc.).
  5. The system validates the information and creates a user account.
  6. User is redirected to the login page.

- **For Calculating:**

  Algorithm:

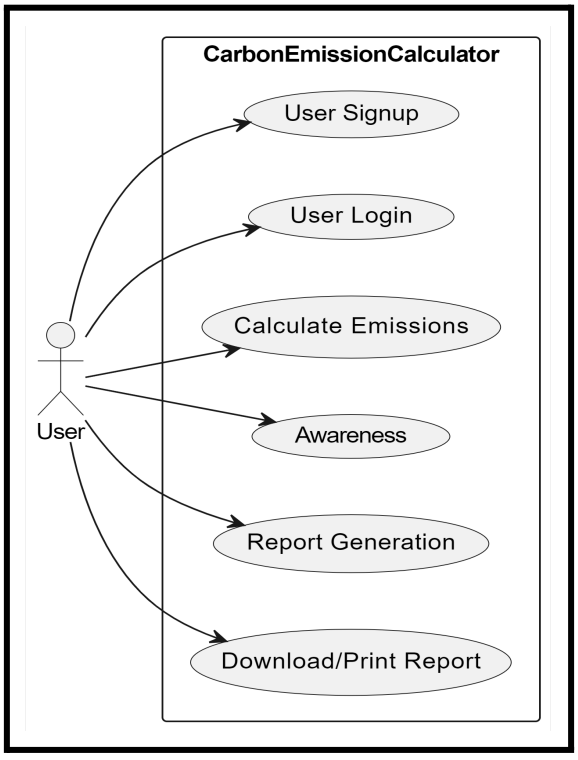
  1. After logging in, the user is directed to the dashboard.
  2. The system displays home page and option for calculation
  3. User navigates to calculation page
  4. User provides the details necessary for calculation
  5. User clicks on the “calculate” button
  6. User gets the result.

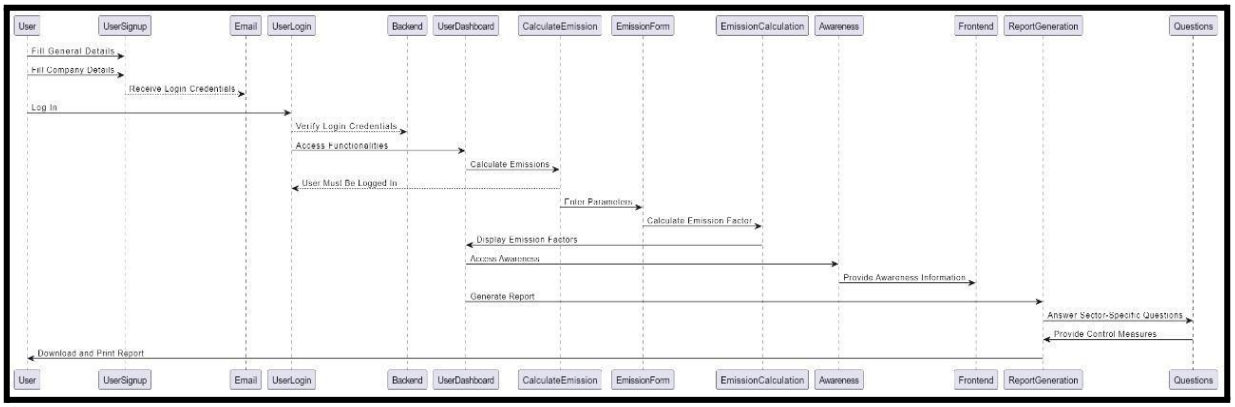
- **Factors:**

  Algorithm:

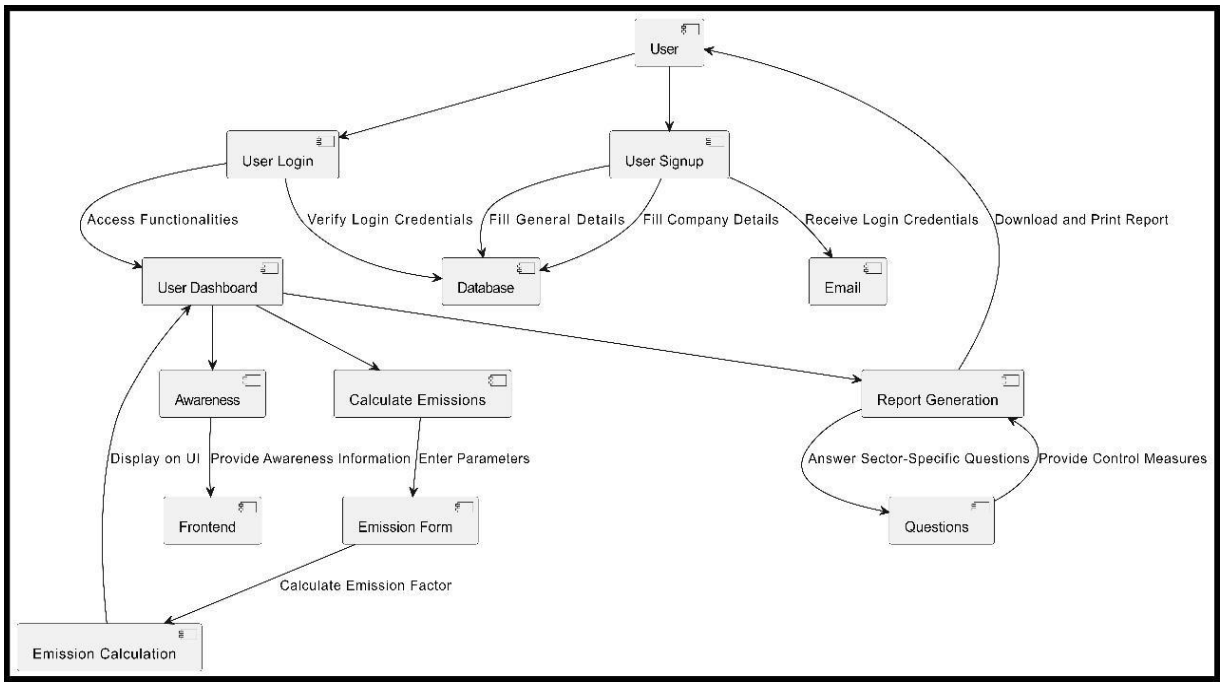
  1. When users calculates there carbon emission we provide them the factors that generally affect the carbon emission.
  2. The system displays an option for factors
  3. User naviagets to factors page
  4. User can read the given information

- **Process Design**





3.4 Methodology Applied



3.5 Hardware & Software Specifications

- Frontend:

  HTML, CSS, JavaScript

- Backend:

  Server: Node.js, Php.

  Database: MySQL, phpMyAdmin.

- Security:

  Use HTTPS, encrypt sensitive data, input validation, and implement proper authorization mechanisms.

3.6 Hardware Requirement:

- Processor: i3 or higher
- RAM: Minimum 2 GB
- Monitor
- Internet Connection

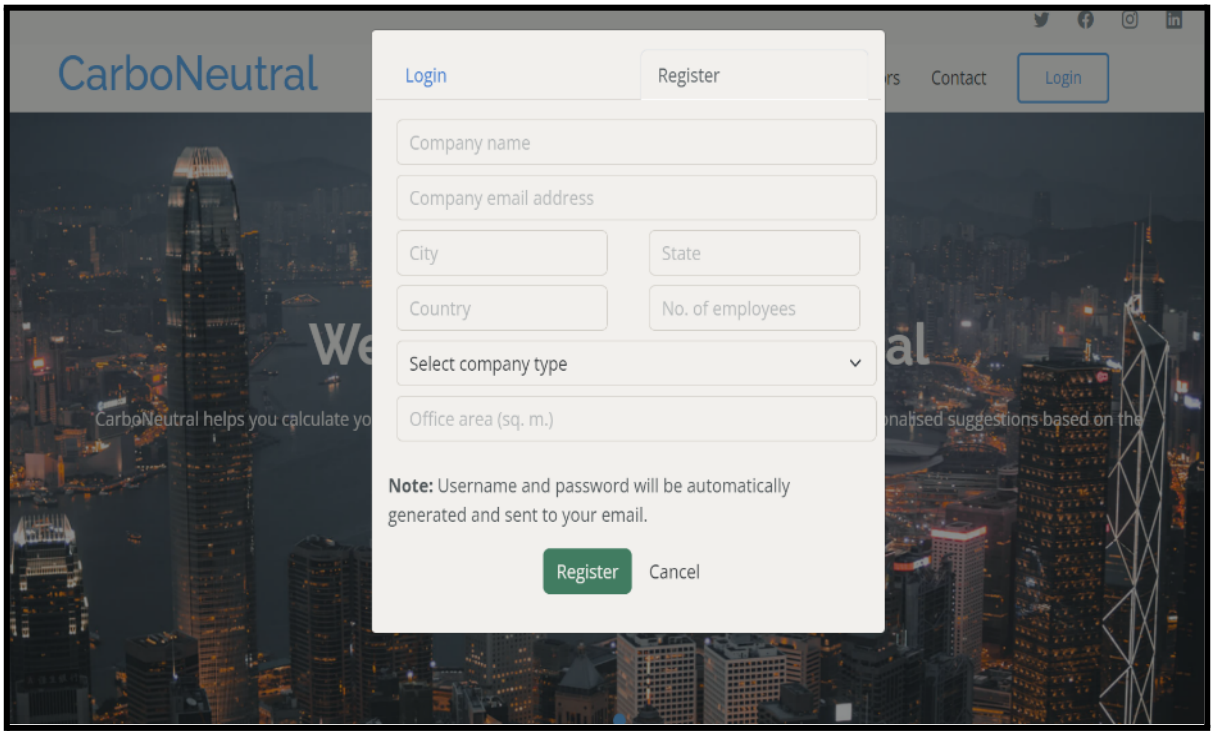
3.7 Software Requirements:

- Windows 7 or higher
- Visual Studio
- SQL Server
- Google Chrome Browser

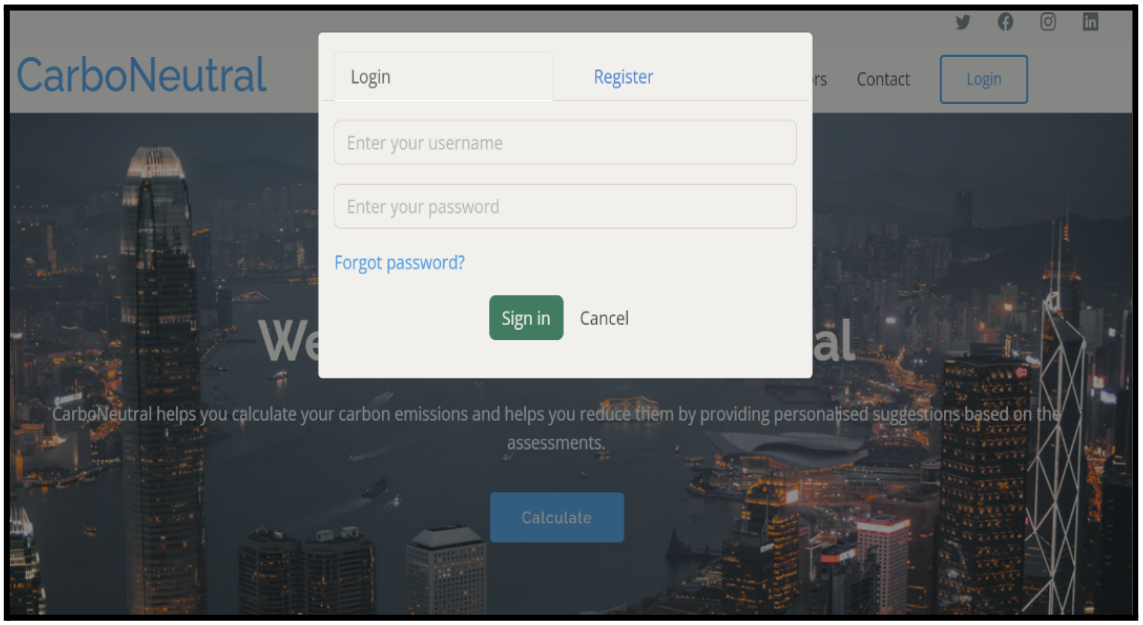
3.8 Result Analysis and Discussion

Home Page :

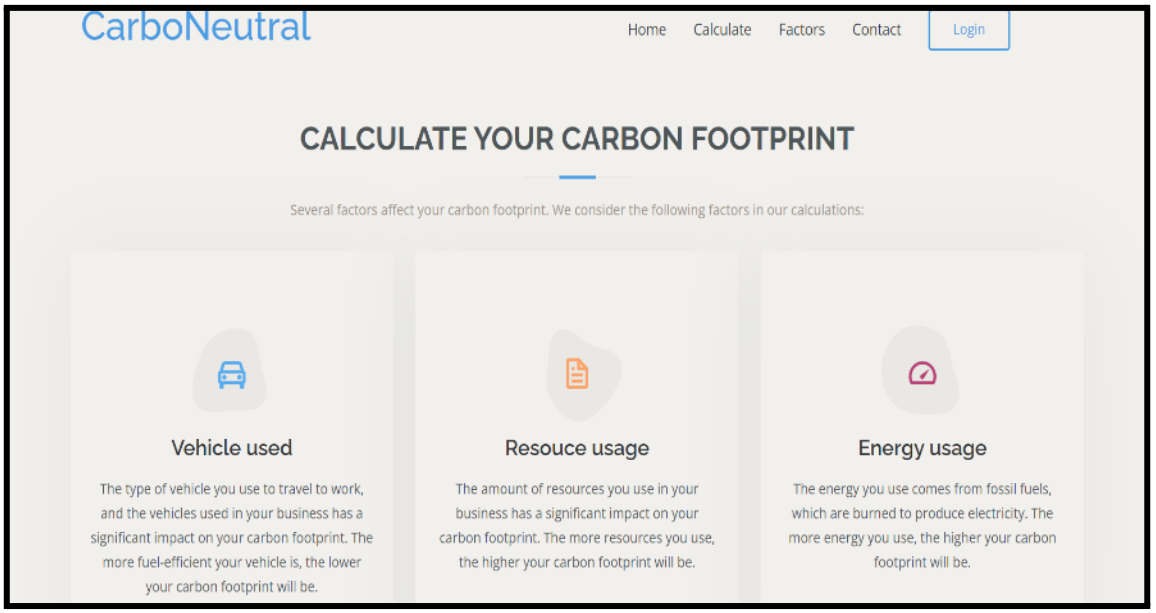
Registration Page :



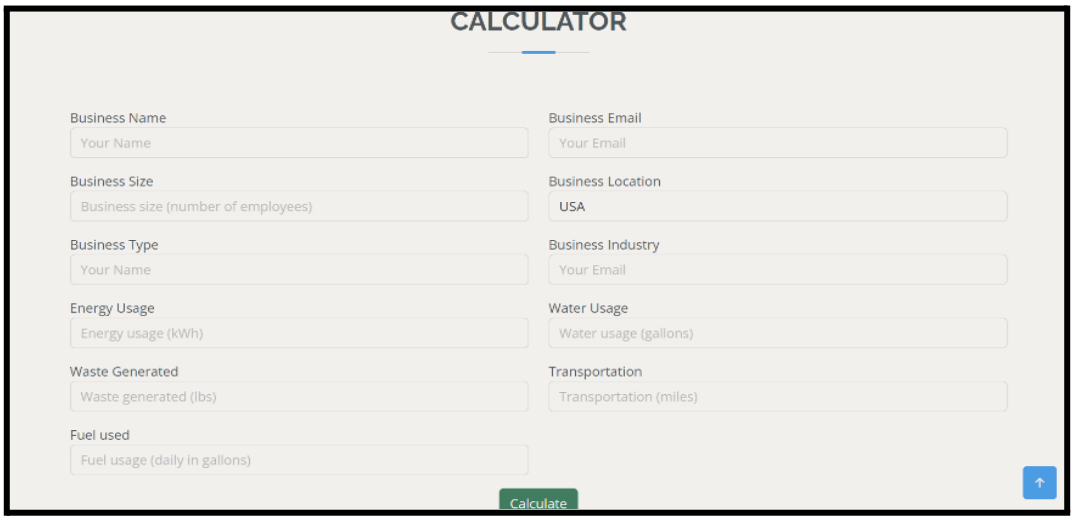
Login Page:



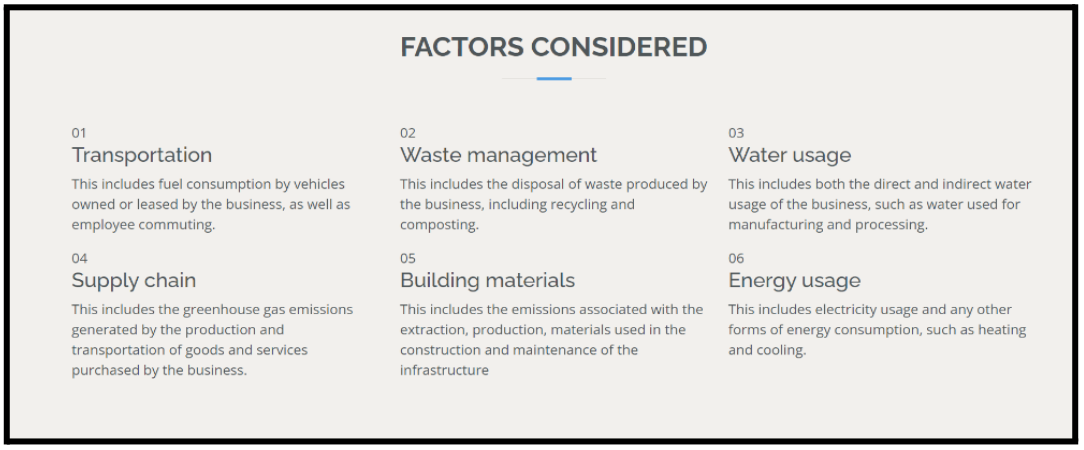
Calculator Page:



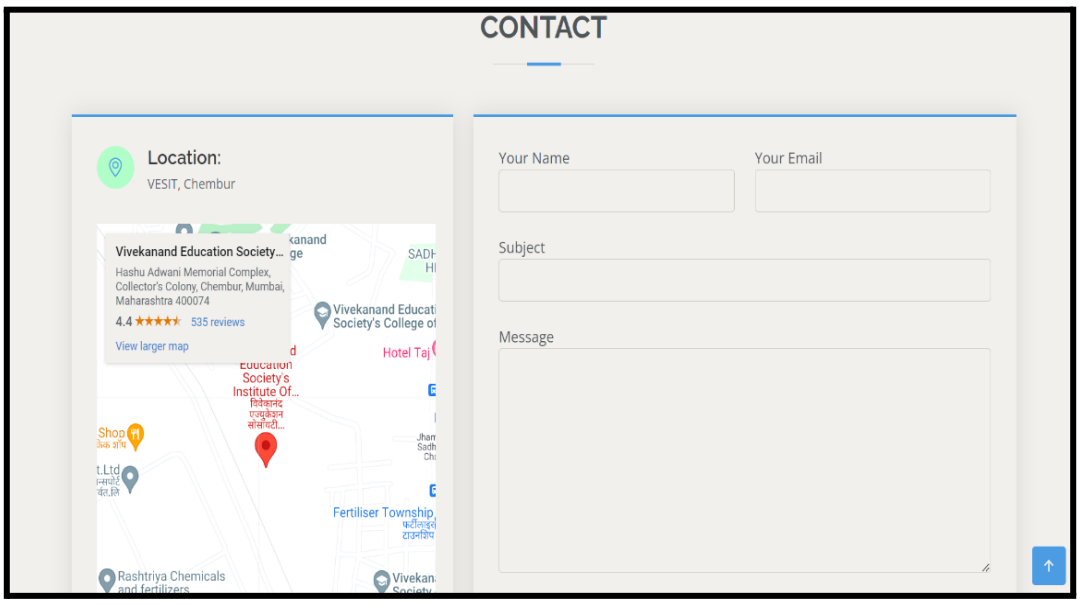
Calculation Details:



Factors Page:



Contact Us



3.9 Conclusion and Future work.

- ## Conclusion

The conclusion drawn from this concept is clear that humanity must take immediate and sustained action to mitigate the escalating impacts of climate change. The measure of our individual and collective environmental impact, the carbon footprint, serves as a stark reminder of the consequences of our choices and activities. It underscores the critical need to transition towards sustainable practices, reduce emissions, and embrace renewable technologies. The imperative is not only to safeguard our planet for future generations but also to address the pressing social, economic, and environmental challenges that arise from a changing climate. Through concerted efforts, global cooperation, and a shared commitment to sustainability, we have the power to forge a more resilient and harmonious future. The journey towards a lower, more sustainable carbon footprint is not only a responsibility but an opportunity to usher in a new era of environmental consciousness, innovation, and a brighter, more sustainable future for all.

Here are some of the key benefits of using carboNeutral:

- **Identify emission hotspots:** A carbon footprint tool can help you identify the areas of your business or personal life that are generating the most emissions. This information can be used to develop targeted reduction strategies.
- **Make informed decisions:** A carbon footprint tool can help you to make more informed decisions about your business practices and personal choices.
- **Improve your reputation:** Many businesses and individuals are now looking for ways to reduce their environmental impact. Using a carbon footprint tool to demonstrate your commitment to sustainability can improve your reputation and attract new customers and partners.
- **Sustainability reporting:** Many businesses now produce sustainability reports that disclose their environmental performance. A carbon footprint tool can be used to collect the data needed for these reports.
- **Innovation and Technological Adoption:** Pursuing carbon reduction goals can drive innovation and lead to the adoption of cleaner, more efficient technologies. This can have positive ripple effects on the broader economy.
- **Climate Resilience:** Taking action to reduce carbon emissions contributes to global efforts to combat climate change, ultimately contributing to a more stable and resilient planet.

- ## Future Work

  Our project has laid a strong foundation for the development of an carboNeutral with several promising features. To continue advancing the platform and delivering a cutting-edge experience to users and organizations , we have identified several key areas for future work:

  - Focus on strategies to adapt to the impacts of climate change, particularly in vulnerable communities and regions.
  - Provide the option for users to generate comprehensive reports summarizing their emissions data, survey results, and sustainability suggestions.
  - Ensure that the reports are customizable, allowing users to select the level of detail they want to include.
  - Enable the printing and downloading of these reports for internal use or external communication.
  - Develop and promote innovative transportation alternatives, such as electric and autonomous vehicles, public transit improvements, and active transportation options.
  - Continue to raise public awareness about the importance of reducing carbon footprints and practices that support sustainable living and business operations.

4. References

[1] R Rahul; J Selvakumar; R Pradip Kumar; S Krishnaprabha, “A Study of Carbon Footprint in an Educational Institution in India”, Conference at Hyderabad, India.

[2] Parth Wadke, Vivek Gonal, Divesh Watwani, Prithviraj Chavan, Sunita Sahu, "Carbon Footprint: Causes, Impacts and Sector-Wise Survey",Conference at Navi Mumbai, India

[3]Babis Theodoulidis, David Diaz, Mohamed Zaki "Carbon Footprint Innovation through Environmental Information Management",Conference at San Jose, CA, USA.

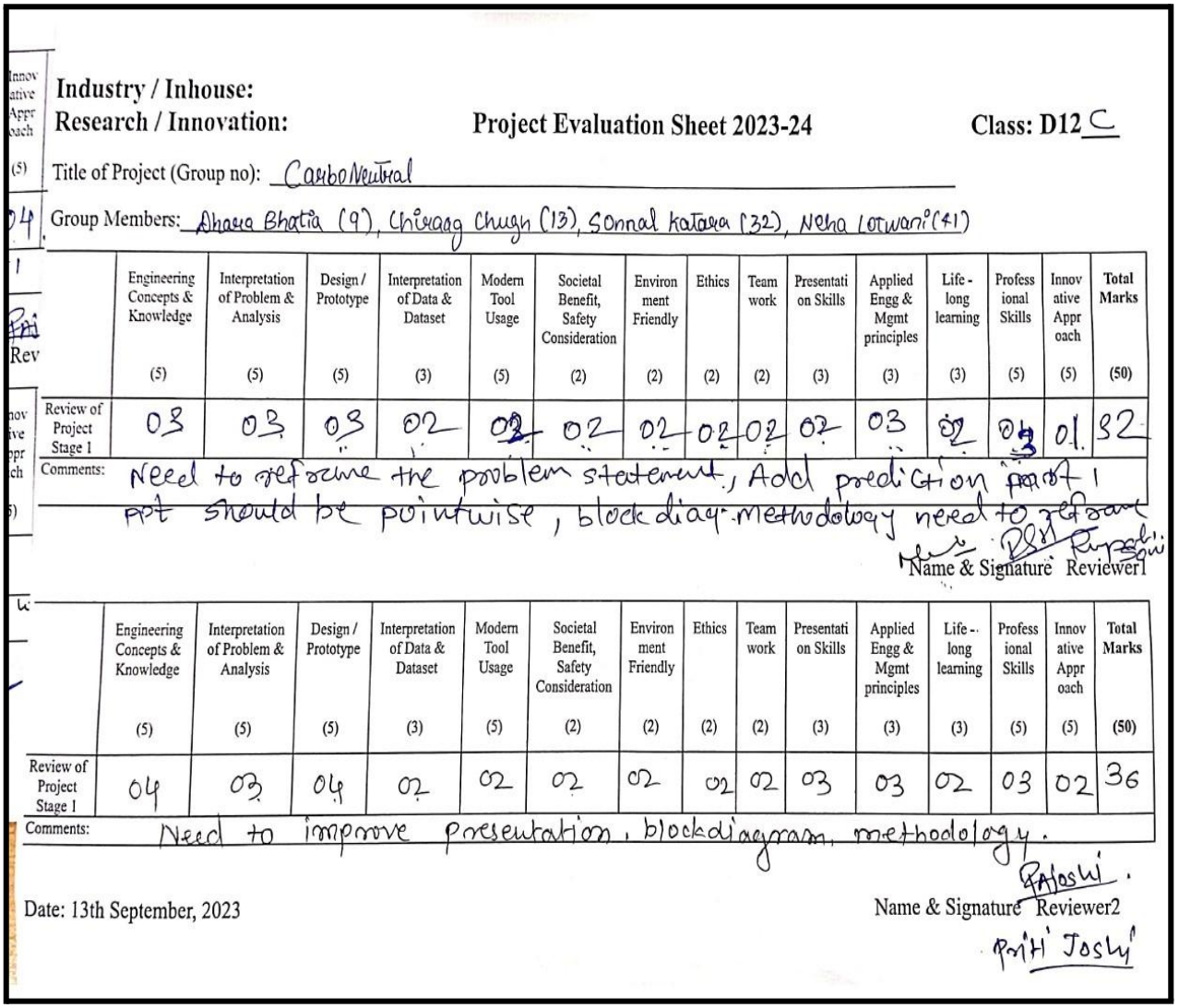
[4] I.A. Stepanovskaya, "Reduction of Carbon Footprint: Digital Management Strategies", Conference at Moscow, Russian Federation.

[5] Tan Chun Ho, Sim Chong Keat Mohd Zubir Mat Jafri and Lim Hwee San, "A Prediction Model for CO2 Emission From Manufacturing Industry and Construction in Malaysia", International Conference on Space Science and Communication,2015.

[6] https://www.sciencedirect.com/science/article/abs/pii/S0959652619331154

[7] https://www.thelancet.com/journals/lancet/article/PIIS01406736(09)61759-1

Annexure



Industry / Inhouse:
Research / Innovation:

Project Evaluation Sheet 2023-24

Class: D12 C

Title of Project (Group no): CarboNeutral

Group Members: Dhara Bhatia (9), Chiragg Chugh (13), Sonnal Katara (32), Neha Lotwani (41)

	Engineering Concepts & Knowledge (5)	Interpretation of Problem & Analysis (5)	Design / Prototype (5)	Interpretation of Data & Dataset (3)	Modern Tool Usage (5)	Societal Benefit, Safety Consideration (2)	Environment Friendly (2)	Ethics (2)	Team work (2)	Presentation Skills (3)	Applied Engg & Mgmt principles (3)	Life-long learning (3)	Professional Skills (5)	Innovative Approach (5)	Total Marks (50)
Review of Project Stage 1	03	03	03	02	02	02	02	02	02	02	03	02	03	01	32

Comments: Need to reframe the problem statement, Add prediction part 1 ppt should be pointwise, block diag. methodology need to reframe

Name & Signature Reviewer1

	Engineering Concepts & Knowledge (5)	Interpretation of Problem & Analysis (5)	Design / Prototype (5)	Interpretation of Data & Dataset (3)	Modern Tool Usage (5)	Societal Benefit, Safety Consideration (2)	Environment Friendly (2)	Ethics (2)	Team work (2)	Presentation Skills (3)	Applied Engg & Mgmt principles (3)	Life-long learning (3)	Professional Skills (5)	Innovative Approach (5)	Total Marks (50)
Review of Project Stage 1	04	03	04	02	02	02	02	02	02	03	03	02	03	02	36

Comments: Need to improve presentation, blockdiagram, methodology.

Date: 13th September, 2023

Name & Signature Reviewer2