



Horizon Campus
Faculty of Information Technology
BSc (Hons.) in Information Technology/BIT (Hons.) in Networking and Mobile Computing

Please fully complete all sections as requested.

Degree Program:BSc (Hons.) in Information Technology		
Research Details		
Student Details / Group Name:		
Name with Initials	Registration No	Phone No
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Primary Supervisor		
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Mr.Isuru Samarappullige	Isuru@horizoncampus.edu.lk	
Co-supervisor / Mentor (if any)		
Name with Initials	Email	Phone No
<.....>	<.....>	<.....>
Coordinating supervisor		
Name with Initials	Email	Phone No
<.....>	<.....>	<.....>
Proposed Research Project Details:		
1. Working Title		
This should be as precise as possible. (However, this may change as the project progresses).		
AI-Powered Personalized Environmental Impact Tracker and Advisor		
2. Problem Statement		

This should state the research problem, its context, and its significance. (Suggested word count: 150)

Climate change remains one of the most urgent challenges of our time, and individual lifestyle choices—such as transportation, diet, and energy use—contribute significantly to greenhouse gas emissions. However, most people lack awareness of their personal carbon footprint and receive little to no personalized guidance to reduce it. Existing carbon footprint calculators are often generic, static, and fail to provide dynamic insights or real-time behavioral feedback. Moreover, there is a lack of AI-powered tools that combine environmental data, user habits, and intelligent recommendations in a personalized and accessible way. This project aims to bridge that gap by developing an AI-powered web application that estimates an individual's carbon footprint based on lifestyle inputs and provides tailored recommendations to reduce their environmental impact. The goal is to create a user-friendly system that not only informs but motivates users to take daily climate-positive actions, thereby supporting Sustainable Development Goal 13: Climate Action.

3. Research Aim

This should specify a clear and concise statement outlining the aim of your research. Ensure that your research aim is focused, achievable, and aligned with the broader goals of your research proposal. Also, it should encapsulate the overarching purpose and direction of the study, guiding the formulation of research objectives, questions, and methodology.

The aim of this research is to design and develop an AI-powered web-based application that enables individuals to estimate their personal carbon footprint and receive personalized, data-driven recommendations to reduce their environmental impact, thereby encouraging sustainable daily behavior.

4. Research Objectives

This should specify the research objectives that align with the overarching research aim. In this section, articulate the specific, measurable objectives that will be pursued to fulfil the overarching aim of the research. These objectives serve as the roadmap guiding the research process and describe the outcomes required. Each objective should be clearly defined and structured to facilitate systematic evaluation of progress and achievement.

Objective 1: To collect and analyze lifestyle data from users, including transport, energy, and diet patterns.

Objective 2: To develop a machine learning model that accurately estimates personal carbon footprints.

Objective 3: To build a full-stack web application that integrates the ML model, visualization dashboard, and personalized recommendation system.

5. Research Questions

This should specify the research questions which you will be seeking to answer.

In this section, articulate the specific questions that will guide the research process and provide focus to the investigation. These questions should be formulated to address key aspects of the research aim, guiding the collection and analysis of data to achieve meaningful insights and to formulate a design, concept, or implementation.

Question 1: How accurately can a machine learning model predict an individual's carbon footprint based on lifestyle data?

Question 2: What is the impact of personalized recommendations on user awareness and sustainable behavior?

Question 3: How does real-time data visualization influence user engagement and behavior?

6. Background Literature Review

This is a preliminary exploitation of research articles as a background study to justify your problem. You should refer to the key articles and books in the proposed area of research, showing on the one hand how they will support your research, but also demonstrating that there is a need for your research. (Suggested word count: 500)

- **For a research-based project**, you need to refer to a minimum of 8–10 research articles, including indexed journals, conference proceedings, books, book chapters, and other relevant sources.
- **For a product-based project**, you need to refer to a minimum of 8–10 references, including technical reports, dissertations, journals, conference proceedings, technical magazines, and other relevant sources.

Several studies and tools exist for estimating carbon footprints, but most focus on industrial or city-level emissions rather than individual behaviour. The WWF and UN carbon calculators, while popular, are static and do not incorporate AI or personalization. Research by Oinas-Kukkonen (2013) suggests that personalized feedback systems significantly impact sustainable behaviour. Google's "Your Plan, Your Planet" attempts to provide eco tips but lacks user-specific recommendations. AI has been used in environmental monitoring (Chen et al., 2021), but its application in personal sustainability tools is limited. GitHub projects like Eco Track and Carbon Footprint App demonstrate potential but lack

academic backing or behavioural evaluation. This research intends to bridge these gaps by combining AI-driven prediction, behaviour-based advice, and real-time visualization in a full-stack web platform, targeting individual users and supporting SDG 13.

7. Data Requirement

In this section, specify the origin of data necessary to achieve the research aim. Provide a brief overview of the planned data collection process, including the nature of the data to be collected and any intended data collection techniques (i.e., Surveys, Interviews, etc.).

(Hint: Select the appropriate data source. If you intend to utilize both primary and secondary sources, select both options.)

A: Primary Data

B: Secondary Data

Primary data: transport, diet, energy usage via web form, questionnaires

Secondary data: Emission factor datasets from trusted environmental sources (WWF, IPCC, carbonfootprint.com)

8. Hardware/ Software Requirements

If your study requires specific hardware or software, please outline those needs along with your plan for acquiring them during the study period.

Hardware: Standard development computer

Software: Python, Flask, Node.js, React.js, MongoDB (optional), Tailwind CSS, Chart.js, GitHub

9. Ethics

<.....>

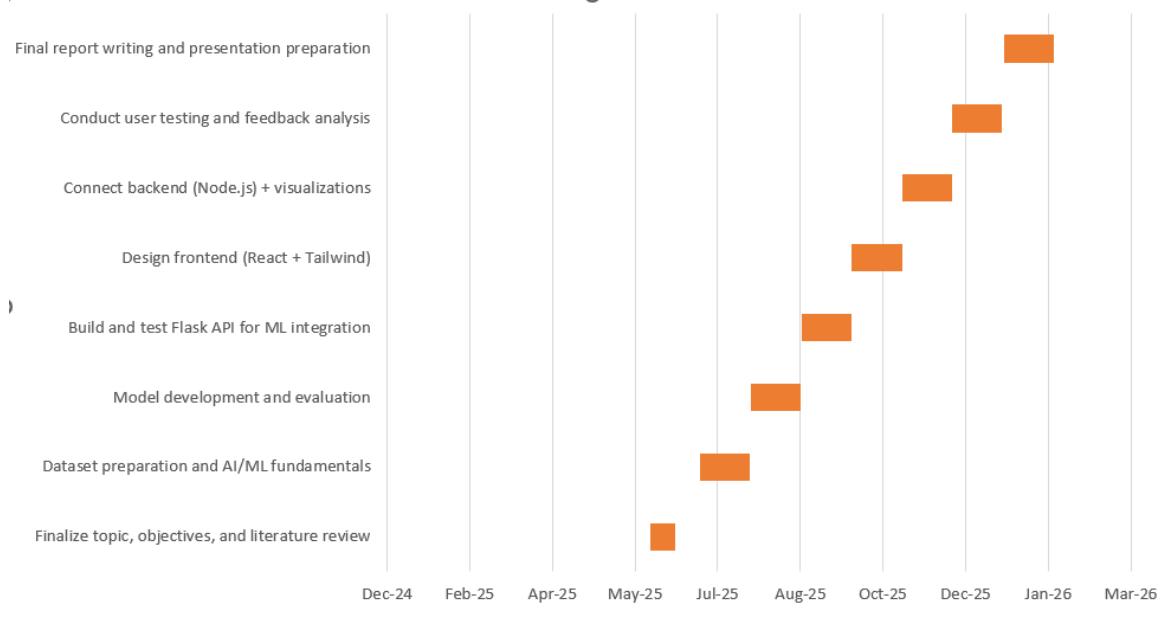
This study involves collecting non-sensitive lifestyle data (transport type, energy use, food habits). No personally identifiable or medical data is collected. Ethical considerations will include clear consent forms and optional data submission. The system does not involve human or animal testing. All user data will be anonymized and used solely for system improvement and research analysis.

10. References

This should be a short list of the key articles and books mentioned in your application. Quality is more important than quantity - demonstrating engagement with the literature both subject-specific and methodological as appropriate. (IEEE Reference Guide: https://journals.ieeeauthorcenter.ieee.org/wp-content/uploads/sites/7/IEEE_Reference_Guide.pdf

- [1] Oinas-Kukkonen, H. (2013). Persuasive Systems Design. Communications of the Association for Information Systems.
- [2] Chen, W., et al. (2021). AI for Sustainable Cities. Journal of Urban Computing.
- [3] WWF. (n.d.). Carbon Footprint Calculator. <https://footprint.wwf.org.uk/>
- [4] carbonfootprint.com. (n.d.). Emission Factors. <https://www.carbonfootprint.com/>
- [5] Google. (n.d.). Your Plan, Your Planet. <https://yourplanyourplanet.sustainability.google/>
- [6] GitHub. (2024). Eco Track & APRO-75/carbon-footprint-app repositories.

11. Gantt Chart



Students Agreement:

By signing below on <30/06/2025>, I/We, as _____, (name/s) agree to the commonly known and accepted research ethics and guidelines. I/We commit to conducting the research project as mentioned above and outlined in the agreement. I/We understand

that any changes to the group composition, identified research problem, or selected supervisor may result in penalties.

Name with Initials	Registration No	Signature
A.H. Rahman	ITBIN-2211-0268	
Nadarasa Nitharshana	ITBIN-2211-0104	
Gnanasegaram Sukanthy	ITBIN-2211-0115	

Supervisor(s) Agreement:

By signing below, I/We agree to supervise the aforementioned group of students throughout their research project, providing guidance and support for successful completion. Furthermore, by signing this document, I/we give my/our consent to the following:

1. The identified research problem is justifiable and feasible for investigation.
2. The research aim is achievable within a one-year timeframe.
3. The specified research objectives are measurable and achievable within the research period.

Supervisor's Name with Initials	Signature	Date

Departmental Use Only:

Date Proposal Form Submitted: _____

All required sections of the form have been accurately completed, and the necessary signatures have been placed. The initial research proposal has been partially approved, thereby allowing the proposed research project to proceed in accordance with the

specified guidelines outlined in the IT41028.

Research Coordinator's Signature: _____ **Date:** ____

Department Head's Signature: _____ **Date:** ____