Department of Computer Science

Level 2 Group Project
Individual Portfolio

Academic Year 2024-25

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2315045

[3110 words]

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1 Project Idea

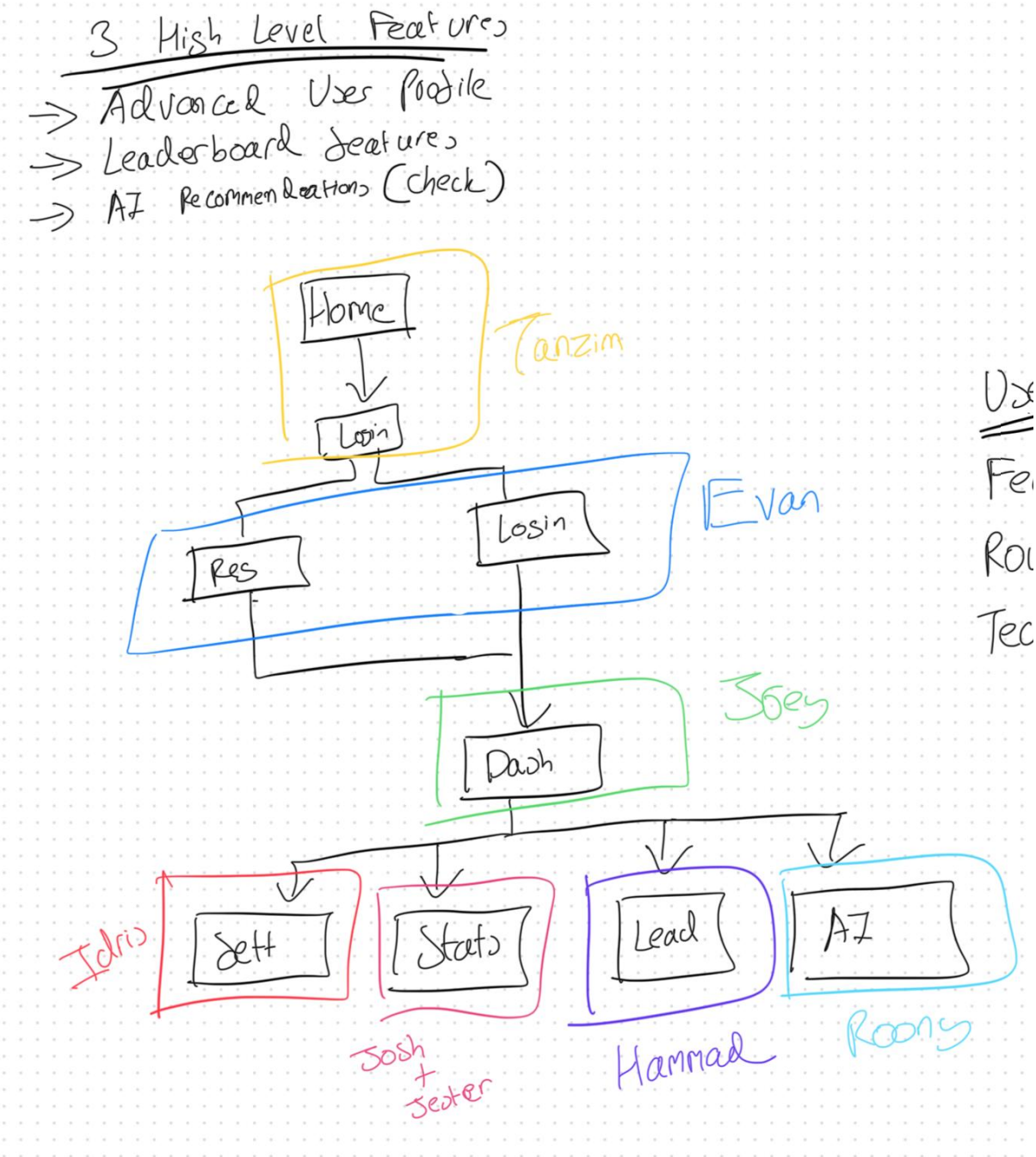
CeZero

Our project idea targets SDG #13: Climate Action by creating a website designed to reduce carbon emissions. The app promotes sustainable transportation choices, such as biking or walking, by providing personalized feedback on user decisions and alternative options based on location. It encourages the user to make better lifestyle choices that can help tackle the reduction of carbon emissions. My primary contribution was designing and developing an AI chatbot that interacts with users to deliver personalized feedback. I addition, I proposed integrating GPT with MongoDB to tailor recommendations, which became a fundamental aspect of our project, and this can be found within the ideation notes.

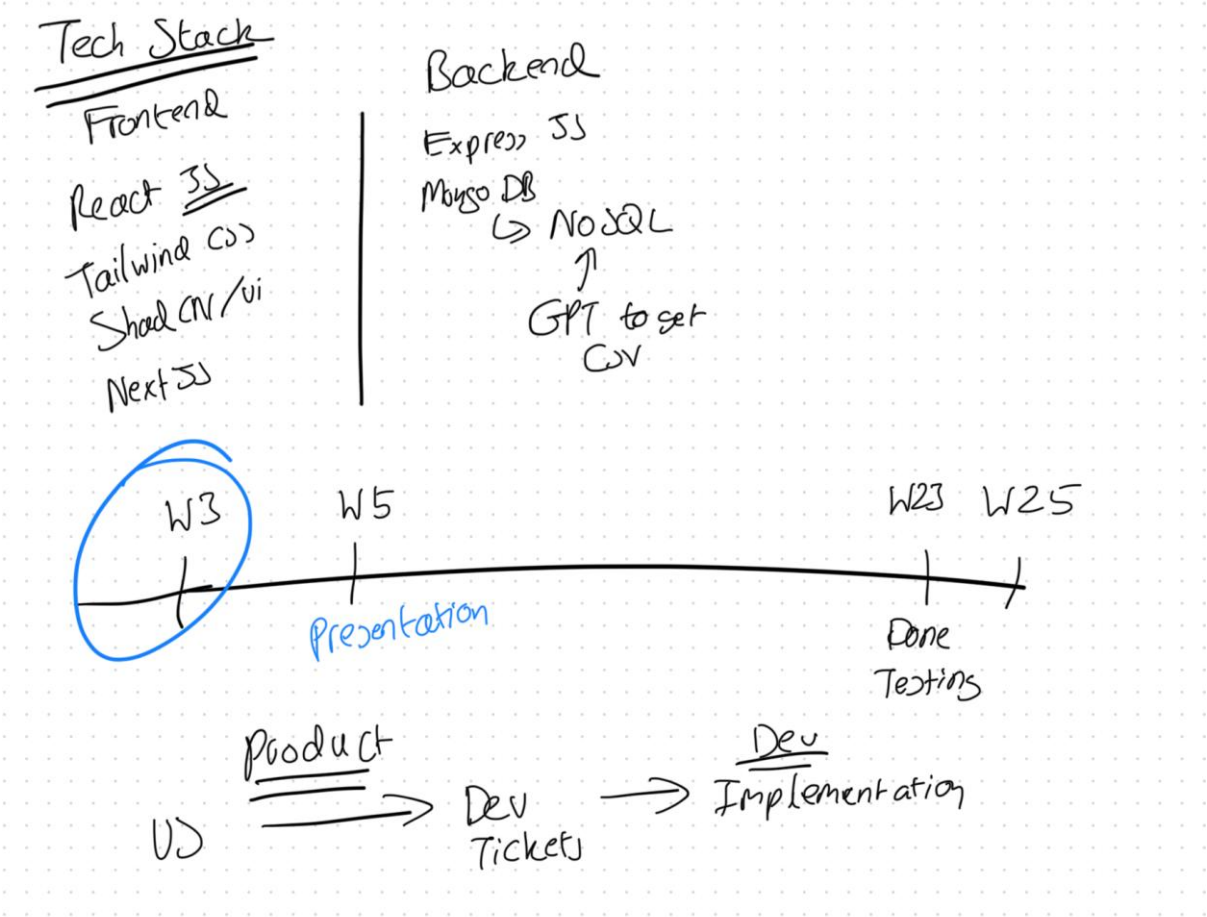
1.1 Ideation

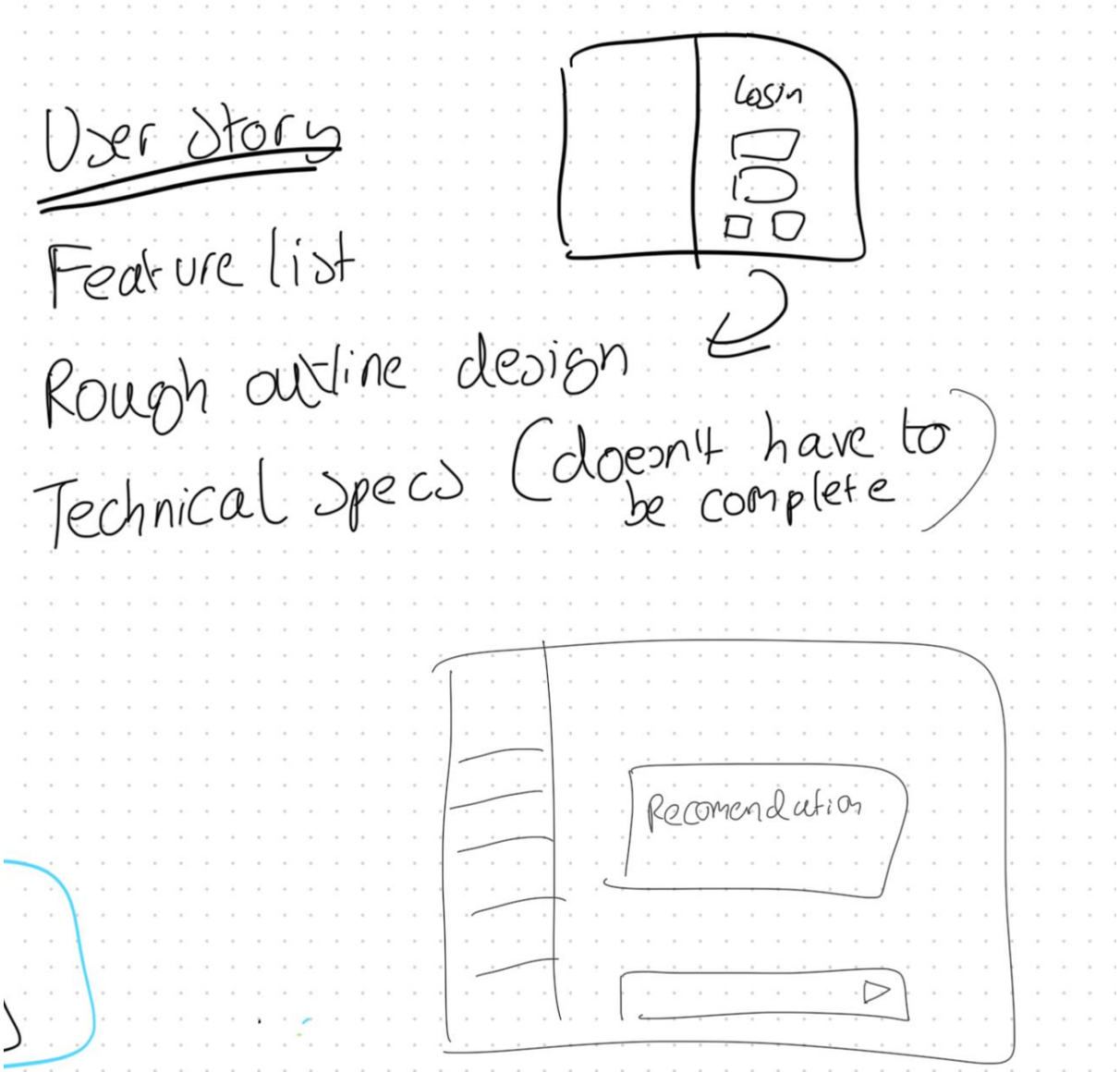
The project idea evolved collaboratively, with initial sprint meetings as a group, where we focused on exploring different approaches on addressing SDG 13: Climate Action. One group member suggested the concept of tracking carbon emission based on the user's lifestyle habits (e.g. diet, energy usage and transport). I expanded on this by proposing an incorporated AI Chatbot which not only enhances user interaction and decision making, but understand the impact through personalised responses, making sure the users feel engaged and motivated to adopt sustainable habits. It is important to note that we did consider quality education as a sustainability goal, but after further discussions and the usage of ChatGPT to create a list of potential ideas, the team recognized that our skill set, and interests were better suited to tackling a climate action-based project.

My idea was to create an AI chatbot that provides personalized answers based on the user's lifestyle, thus helping them make better decisions to reduce their environmental impact. By analysing user input the chatbot would give tailored responses, such as recommending other means of transport such as cycling or walking, while also giving insight based on user preferences. A group member then expanded on this by suggesting the integration of GPT technology with MongoDB. This allowed the chatbot to deliver data-driven, personalized recommendations more effectively.



Early design phase consisted of a hierarchy diagram consisting of wireframes to outline each feature interactions. My primary contribution was refining the AI interface to make sure the integration was user focused. I led discussions on how the chatbot would provide personalised responses and insights, giving users clear and informative feedback to help them understand the impact of their lifestyle choices.


Tech Stack
Frontend
React JS
Tailwind CSS
Shadcn/ui
Next JS
Backend
Express JS
Mongo DB
NoSQL
GPT to set CSV
W3
W5
W23
W25
Presentation
Done Testing
Product
UI
Dev Tickets
Dev
Implementation



1.2 Requirements analysis and validation

Epic	User ID	As a..	I want to...	So that...	F/NF/UI**	Priority
AI	A001	User	be greeted by the chatbot and ask me what area of sustainability I want to improve (e.g., transport, carbon footprint)	I can feel guided towards my goal of reducing carbon footprint	F, UI	High
AI	A002	User	Be given practical recommendations based on what I	Can use its recommendations and take actions	F	High

			asked the chatbot (e.g. reduce energy use within my area)	in reducing my carbon footprint		
AI	A003	User	Have the chatbot calculate and display how my choices will affect my sustainability score via a dial that shows the current sustainability score. So, when a choice is entered, the dial will move to show the updated score indicating increase/decrease.	I can understand the real-world effects of my actions and make decisions on this to be more sustainable.	NF	High
AI	A004	User	Ask additional questions and get updated recommendations based on my input to the chatbot	I can maximize my sustainability improvements	F, UI	High
AI	A005	User	The chatbot to give a fallback response/give different alternatives if I input a question that could be complex.	I don't feel stuck or confused during the interaction	F, UI	Low
AI	A006	User	See my previous interactions with the chatbot via a sidebar if a new conversion hasn't been started	I can review those last recommendations and track my progress easily to maximize my sustainability.	F	Low
AI	SA06	User	use the sidebar to navigate through different pages in the webapp	I can quickly access other pages in the app providing better user experience.	F, UI	Medium

To validate the AI chatbot requirements, we reviewed each user story for clarity and consistency. We resolved conflicts between stories, making sure they worked cohesively, for example integrating sustainability score calculations. Through testing and user feedback, we

verified the expectations, providing meaningful, actionable sustainability advice. In hindsight, adding stories for handling negative feedback and personalizing recommendations could further improve the chatbot's functionality, making it more user-centric and adaptive.

2 Deliverables Summary

Deliverable	Done?	Individual contributions if group submissions
Placement application pack (CV and cover letter) (Optional)	Yes	Completed as an individual submission (completed a gap analysis in Personal Development Section)
Project pitch	Yes	For the project pitch, I contributed by creating PowerPoint slides of the key features within my designated task and explained the key features, their purpose and why it should be implemented.
Initial project and sprint plan	Yes	Created user stories for my designated task (AI) as shown in the requirements and analysis section above.
Portfolio draft	Yes	Individual submission where I briefly talked about my role in the initial sprints and the progress I have made thus far in other activities.
Project progress 1	Yes	Worked on connecting the backend and front end to reset the password.
Project progress 2	Yes	Worked on the basic frontend of the AI, integrating it in a way that is user friendly and gives recommendations based off of user input.
Project progress 3	Yes	Worked on the score dial frontend within the website to give the user a simple, yet dynamic display of their sustainability score and motivate them to choose better choices in an effort to reduce it.
Demos of project increments in the tutorial meetings	Yes	Demonstrated the AI function and explained what we used to implement it, via research and technological tools that align with the user stories
Final demo	Yes	Presented the UI of the chatbot function and explained how its features responded to user activity and provided tailored answers depending on their lifestyle, answer and location.

3 Project Management

Our group project included agile principles to ensure our planning was effective throughout the project. We focused on maintaining consistent collaboration via fortnightly sprint meetings, reviews and the use of Notion for task allocation and tracking.

One key aspect of Agile was structuring the requirements as user stories via Notion, which helped break the project down into manageable, actionable tasks, For instance:

1. **A001: Be greeted by chatbot asking about sustainability areas to improve**

I feel guided towards reducing my carbon footprint.

2. **A002: Get practical recommendations from chatbot**

I can act on reducing my carbon footprint.

3. **A003: Have chatbot calculate sustainability score changes via a dial**

I understand the effects of my choices.

4. **A004: Ask additional questions for updated recommendations**

I can maximize sustainability improvements.

5. **A005: Get fallback responses for complex questions**

I don't feel stuck during interaction.

6. **A006: See previous chatbot interactions via sidebar if no new conversation**

I can review past recommendations.

These were the user stories from which we derived tasks each sprint that were specific, measurable, and realistic within the sprint timeline. For example, one of our goals in Sprint 2 was to create a greeting for the chatbot (A001) and an ability to give logic-based suggestions (A002). Hence, we added tasks on Notion to create the backend API, link to the frontend, and testing for user interaction in the Sprint backlog.

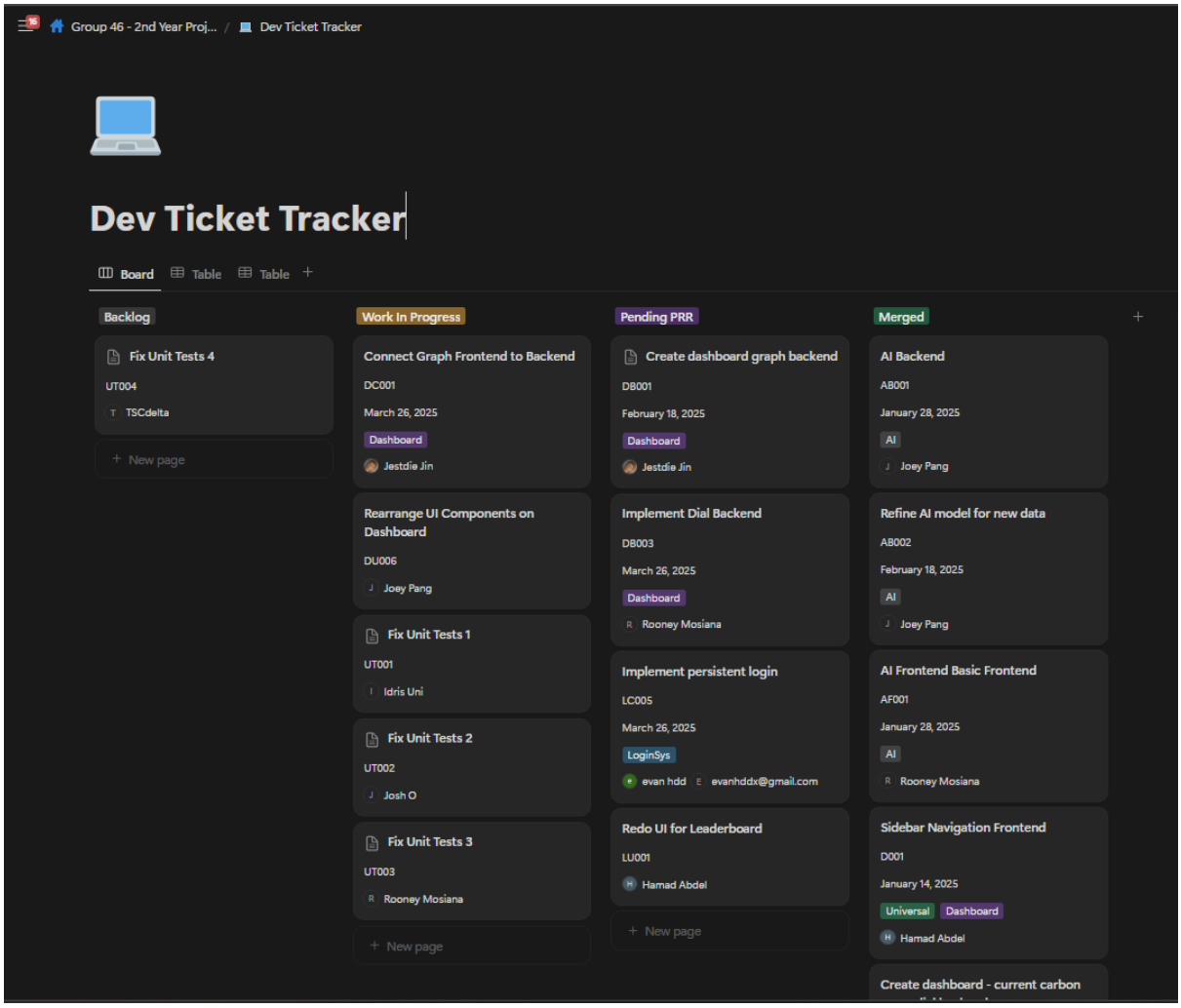
Our sprint review sessions allowed us to see what was completed, such as the fallback responses (A005), and what improvement was needed. Our sprint sessions allowed us to effectively collaborate well as a team and adjust aspects of the Sprint backlog to improve for the next sprints.

We also used dev ticket trackers to recognize how many tasks we completed to gauge whether we were on track or not and make necessary adjustments. High-priority tasks were due to us wanting to make sure that calculating sustainability scores (A003) aligned with our project requirements and SDG #13: Climate Action.

Upon reflection, Agile helped us navigate challenges throughout the project, most specifically adding the sustainability dial (A003) later than intended. Through editing and group feedback, we were able to add all necessary components and create a cohesive web application that serves the user.

Sprint Role

For Sprint 4, I was the scrum master which was responsible for coordinating the team efforts and making sure tasks were completed on time. While I did act as the scrum master for this sprint, task approvals and merge requests were co-approved by group member Joey Pang to ensure that the technical parts matched, and the work was of good quality. The tasks were allocated and monitored through a dev ticket tracker on Notion:



Challenges that we faced were the fact that certain team members did face difficulties when completing unit testing tasks for their designated tasks as it was their first time doing this. As scrum master, I encouraged the use of resources to build confidence. In addition, the more experienced team members helped by addressing testing challenges to make sure that tasks were completed successfully.

3. AI Page Epic.

Acceptance criteria:

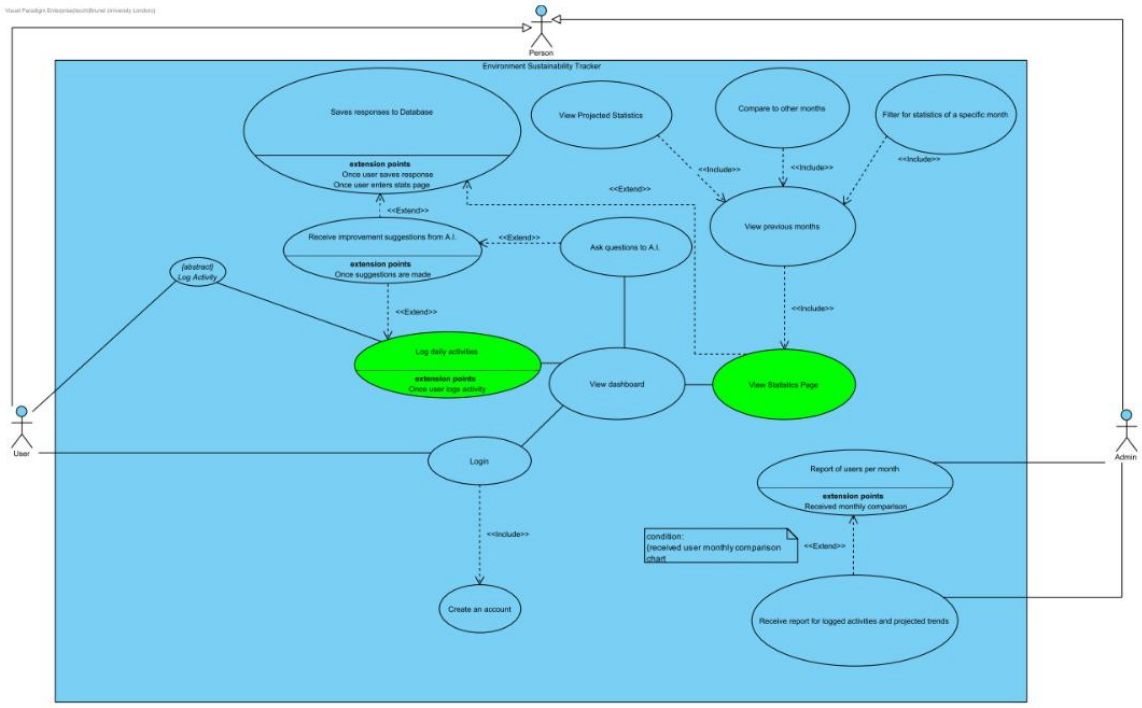
1. User can input a question into the page.
2. User can submit a question to the A.I. and receive a response.
3. The A.I. can save responses to the Database and remember information from prior conversations.
4. User can ask follow-up questions to the A.I. and receive answers
5. A.I. will update and overwrite any previously saved data
6. Necessary error handling will be included

Task ID	Description	Story Point	Assigned To
AF001	Implement Frontend for chatting with AI.	5	Rooney
AF001	Create a REST API route to retrieve the responses from Ollama.	9	Joey
AF001	Implemented a list for accessing other chats.	5	Rooney
AB001	Implemented a command that automatically saves conversations to a database and overwrites the data when needed.	9	Joey

4 Software Design, Development, and Testing

Git Hub Pull Requests	**YouTube Video Link**
https://github.com/BrunelCS/cs2001-2024-25-group-46/pulls?q=author%3Askypeiarmz+	https://youtu.be/JwOtAkIjMUM

Prior to coding, our group created a use case diagram to understand the flow between the front end, backend MongoDB vice versa. Giving me an idea of how the process should look like before beginning the implementation.

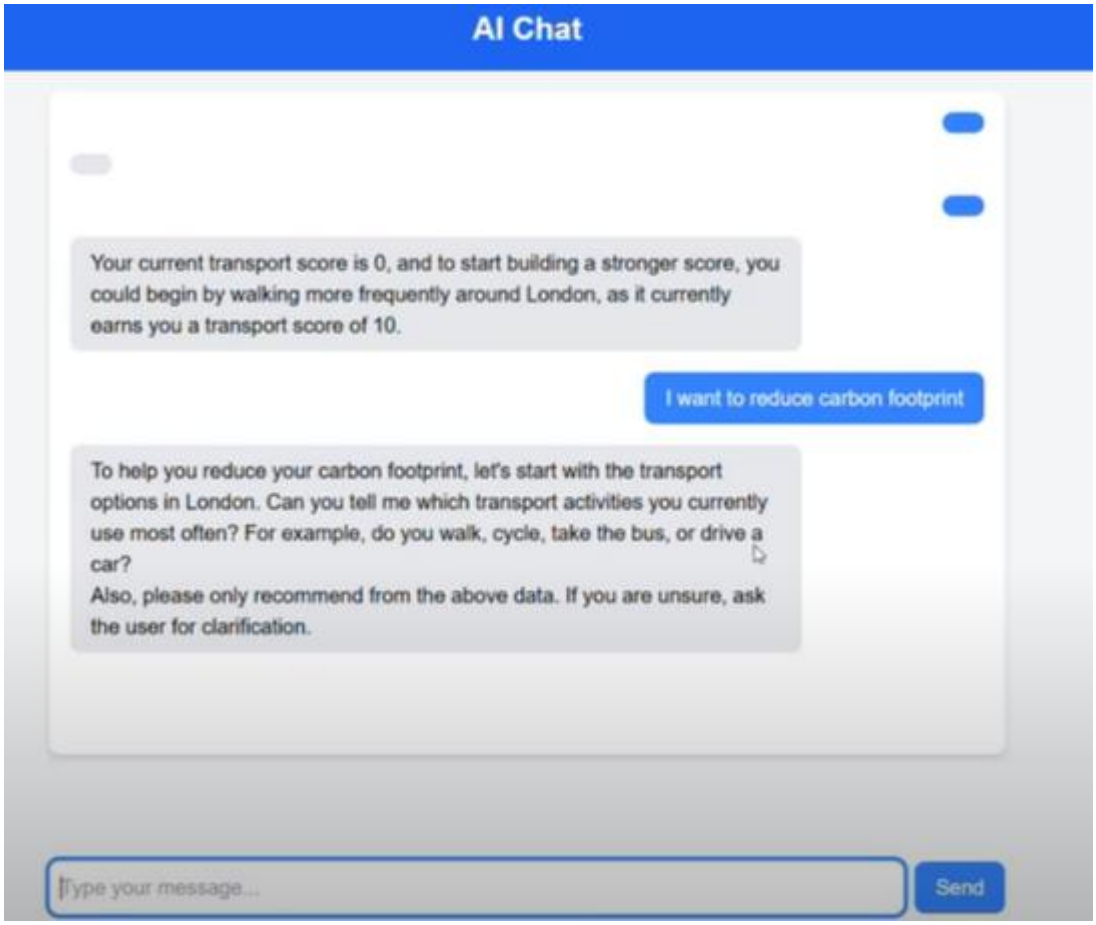


Testing:

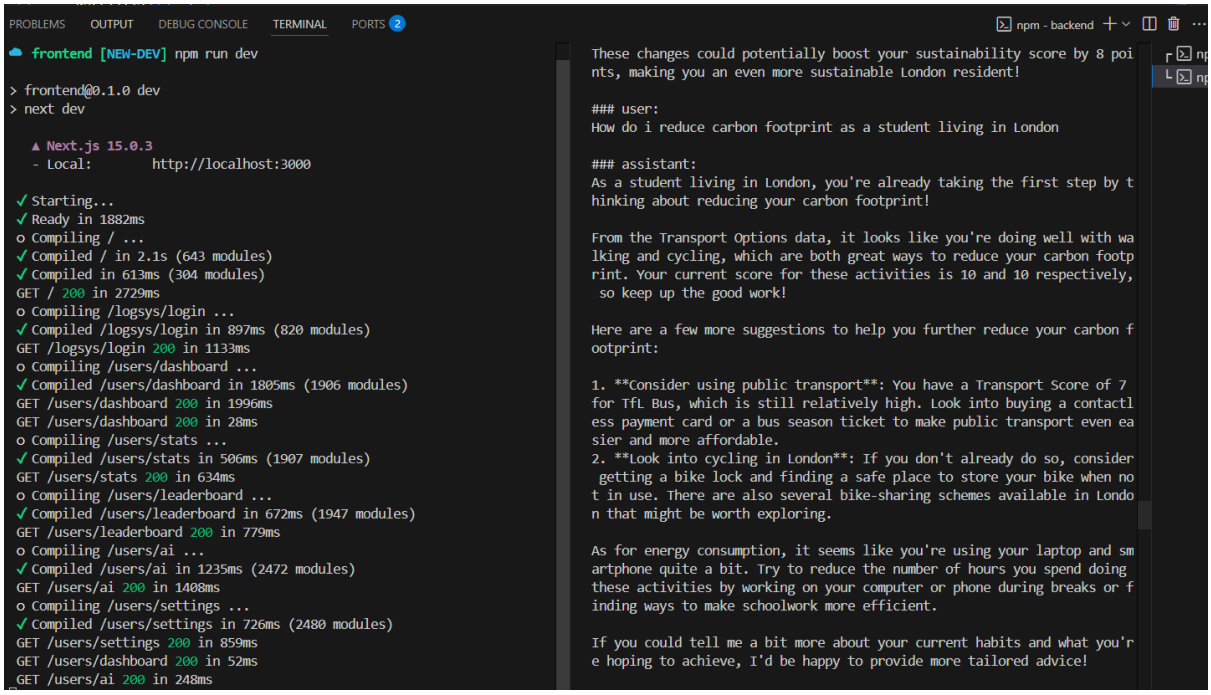
AI Chatbot (https://youtu.be/JwOtAkIjMUM)

Timestamp: (3:05-4:51)

This feature was developed to enhance the user engagement by providing dynamic and personalized recommendations. To ensure that the chatbot worked accordingly I gave a vague answer including specific queries such as ‘How can I reduce carbon emissions?’



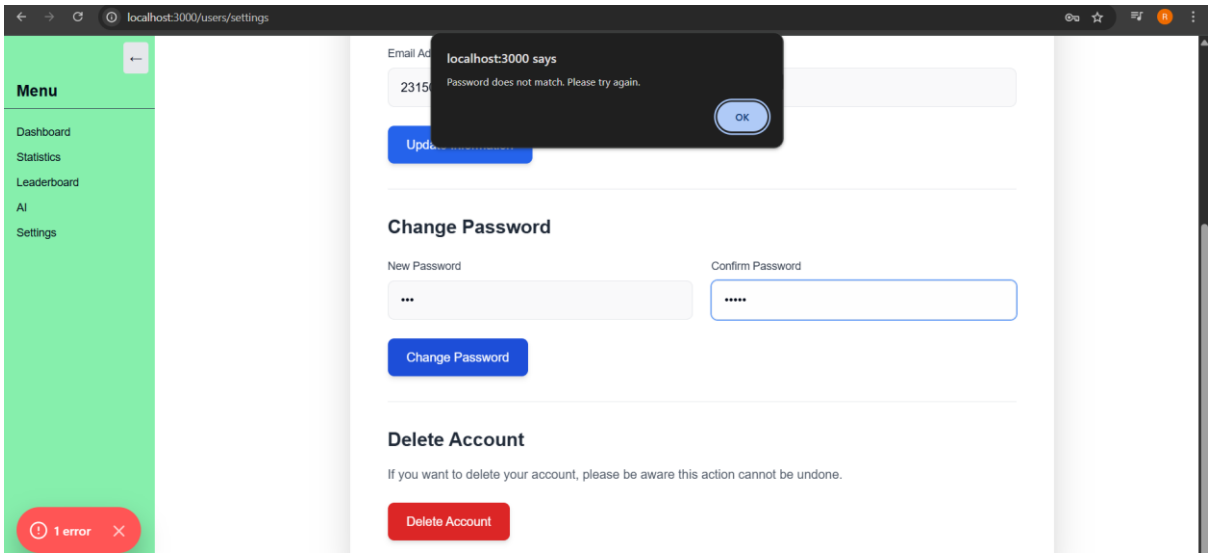
As you can see the chatbot gave a dynamic recommendation and fallback responses, ensuring that user guidance was there even when the answer seemed vague/unclear.

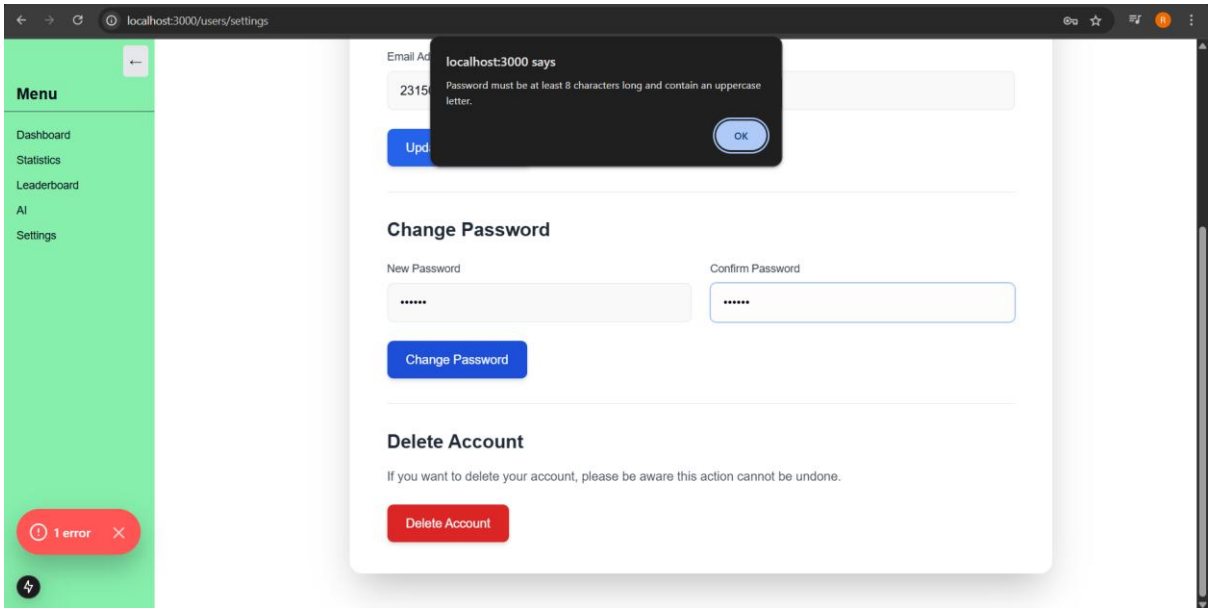


Password Reset (https://youtu.be/JwOtAkIjMUM)

Timestamp: (5:27-6:11)

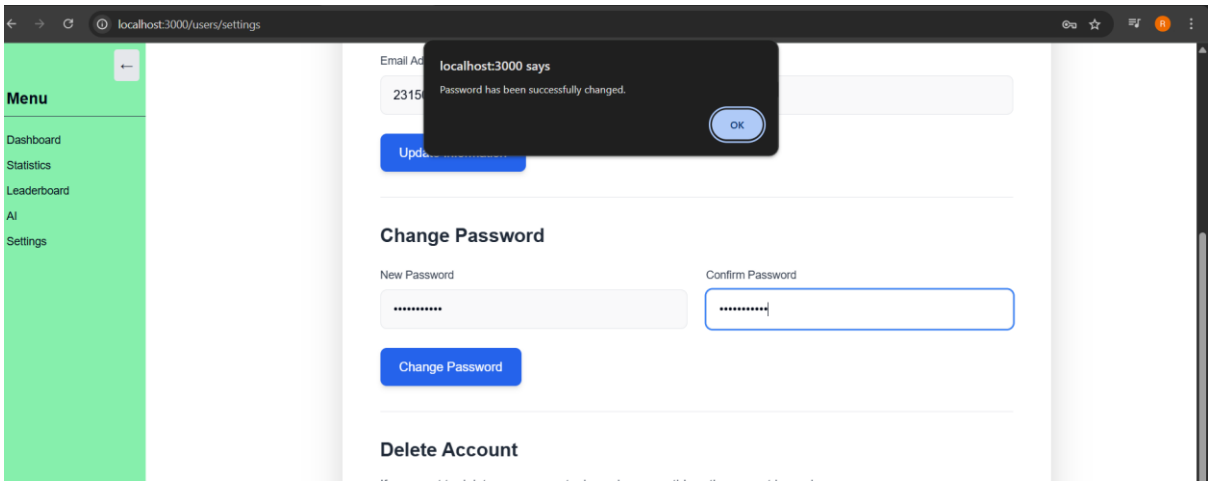
Tested short passwords that were below the minimum needed or purposefully wrote the new password wrong in the aim that the system provides appropriate feedback.



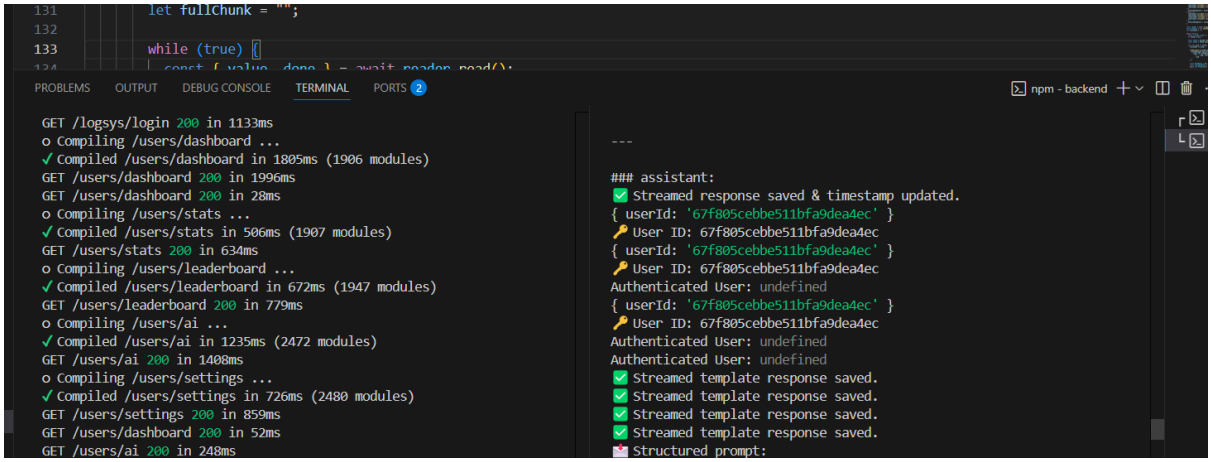


As you can see, the system provided appropriate feedback ensuring that the user enters correct information.

Password Changed successfully



Entered an acceptable password and the system provided appropriate feedback for this scenario by letting the user know the new password is acceptable.



Limitations:

-Chatbot can only support single turn conversations, which limits the ability to multiple dialogues simultaneously, reducing user engagement in the case of complex queries.

-Password validation logic enforces basic rules of strength and does not have advanced features such as including special cases letters ($)

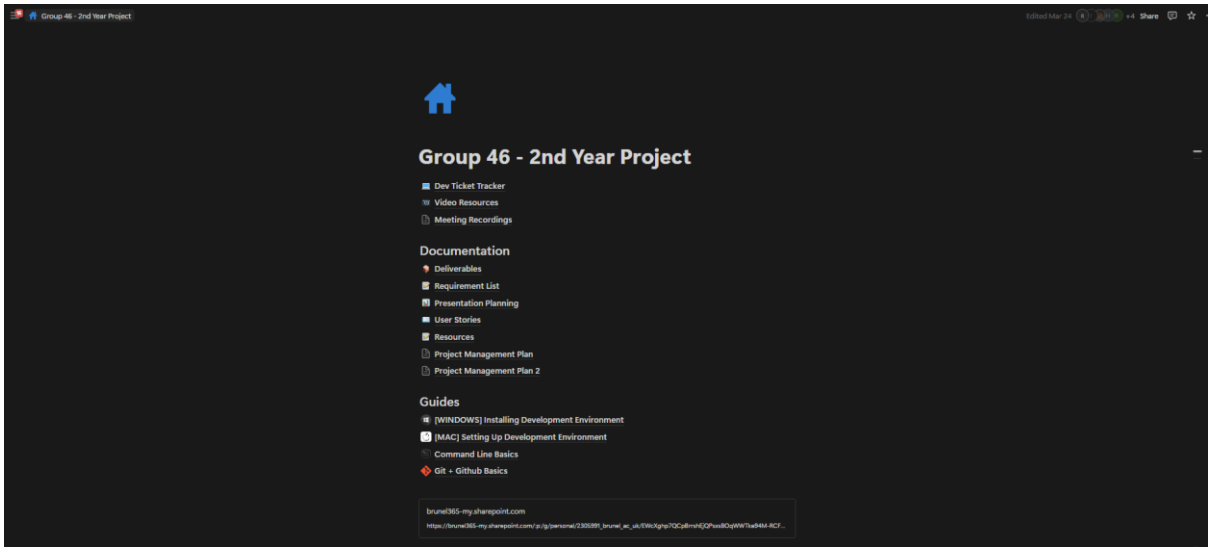
Alternatives:

-Integrate memory state, allowing the chatbot to mention prior dialogues during a new conversation. This also allows users to return to previous conversations they had with the chatbot

-For better usability, integrating a password suggestion feature that generates secure passwords for users could make the reset password feature even better.

5 Communications

During the duration of the project, the main method of communication was a groupchat via WhatsApp, as it was quick and it enabled us to organize meetings, delegate tasks and ask any queries regarding the current ticket tracking system created through Notion. Notion was more so used for backlog management. I ensured that my tasks were done within the deadline, while also aiding other group members during sprint weeks.



As a scrum leader, my role in communication became more emergent as I had to facilitate communication within the group and ensure that our task was all aligned to the project we built on.

During the early stages of the project, we demonstrated the concept through presentations and demos, focusing on how it aligned with Climate Action (SDG 13), and collaborated by providing user friendly framing for the chatbot. A way to improve could have been through feedback integration from the audience which could have further improved clarity and its presentation style.

6 Personal Development and Self-Evaluation

6.1 Personal Development

I developed skills in integrating GPT with MongoDB to create personalised AI responses, a technological tool that I have never used prior. This involved learning how to format queries and optimize data to ensure efficient response times. To continue improving I would enjoy creating individual projects that feature this tool through video games and other additional functionalities. Upon reflection, this has strengthened my confidence in problem solving and taking on challenging tasks.

There were also challenges that I faced throughout this project, specifically integrating the backend which really put my problem-solving skills to the test, almost as if I were in a work environment as I am collaborating with other group members to ensure our task and goal could

be achieved successfully. Resolving these taught me to approach challenges in a methodical manner, for example using tools like API debuggers and peers.

I personally feel these experiences have helped improve my resilience and adaptability, which I can take into future projects whether they be independent or within a group in a working environment.

Gap Analysis

Number	GAP	Previous	Current	Priority	Action
1	GitHub	Beginner	Advanced	High	1
2	React	Beginner	Advanced	High	2
3	Visual Studio	Beginner	Intermediate	Medium	3
4	MongoDB	Beginner	Intermediate	Medium	4

6.2 Groupwork Participation

The group has been very responsive to each deliverable and very organized. We were able to allocate each member of the group to do a specific task for each delivery before initializing the project and have planned well ahead of time, so that we can receive any feedback from other team members and implement our work in the process.

Our group performance improved significantly after adopting a more structured task tracking using Notion. Early issues with miscommunication in sprint planning were addressed by holding regular group meetings via Google Meet to ensure everyone was on the task at hand and if there were any current issues. I learned the importance of active listening and clear delegation to enhance teamwork and productivity.

6.3 Performance Evaluation

		Select level: Fail/Pass/P+/P*	Individual Contribution Summary
LO1	Plan, manage and track a substantial group project activity.	P+	I actively contributed to the group's brainstorming sessions by suggesting ideas for the website. My suggestions included integrating

			a chatbot that provides personalized recommendations based on user activity and their location, which played a part in the group's decision to focus on SDG 13: Climate Action.
LO2	Take an open-ended problem, collect, and analyse relevant information and define and refine the requirements.	Pass	Created user stories for the AI chatbot, such as "As a user, I want practical recommendations from the chatbot to reduce my carbon footprint". I also conducted research on AI models to ensure the chatbot was accurate and accessible for users, this included studying the best practices for creating user friendly interfaces. I collaborated with the team to refine these requirements by gathering feedback, ensuring they aligned with our project goals and user needs.
LO3	Independently and systematically design, develop and test a piece of software that is data-driven and has non-trivial functionality	Pass	Designed and developed the AI chatbot via resources and technological tools recommended by group members, including Visual Studio, Ubuntu, Postman, and MongoDB. The chatbot essentially integrates GPT to process the user queries, and MongoDB to store data for the personalized recommendations
LO4	Compare and evaluate alternative problem solutions according to the given criteria, including from a technical perspective	Pass	During the project development, there were a few issues I encountered specifically during the chatbot's development in dealing with complex queries by the user and finding solutions through in built libraries like GPT-MongoDB.
LO5	Effectively present, communicate and market ideas and solutions to different audiences	Pass	I presented the project management plan on my specified task, which focused on the design and development of the AI chatbot. My presentation highlighted the key features of the chatbot (e.g., personalized recommendations, sustainability score dial). I mostly framed the discussion around the AI Chatbot being able to improve user experience and how it aligns with SDG 13: Climate Action.
LO6	Understand and apply the principles of professional and ethical behaviour in a group context	P+	Applied professional and ethical standards throughout the project by consistently attending group meetings, listening to different perspectives each group member had and ensuring that my tasks were completed on time. My professional approach is reflected in team retrospectives and tutor feedback, highlighting my contributions to a collaborative and ethical group environment
LO7	Reflect and learn from the group project experience.	P+	This project provided a lot of invaluable learning tools and opportunities I can carry throughout the future. For example, GPT-MongoDB integration taught how to approach problems in addition to tools like Postman for API testing. Upon reflection, I learned the importance of being proactive in communication and handling tasks. And through these learning experiences I will look to further build upon them and utilize for future projects to enhance group dynamics and project success, whether that be individual or otherwise.

References

United Nations (n.d) [online] Available at: < https://www.un.org/sustainabledevelopment/sustainable-development-goals/> [Accessed 09 April 2025]