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ENSE 374 – Software Engineering Management

Saskatchewan Hiking Trails Web Application

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1 Introduction

Our web design is on hiking trails as people who enjoy nature, enjoy walking through trials and breathing some fresh air. During the time of covid, everyone was in lockdown in their homes. People had to wear masks for about 3 years with some still wearing them till this day. Ever since the lockdown, the amount of participation in outdoor recreation such as hiking has increased significantly with 40% of Canadians increasing their trail usage since 2020 [1]. What our design will show are numerous hiking trails throughout Saskatchewan, with each hiking trail having their own ratings and reviews based on customer experience.The application will allow users to enter filters when searching for a specific type of hiking trail they want to go on. These filters could include the distance of the trail from their home, the distance it will take to complete the trail, the trail with nearest benches and bathrooms, and etc. Programming such a web application will need the use of HTML, CSS, and JavaScript.

2 Design Problem

2.1 Problem Definition

Provide a link to the 'Business Case.'

https://github.com/kakokamo/Ense374Project/blob/8fcc43df337e2ac1dc6369957f19a0c6c241ad09/Project-Planning%20documents/Business_Case.docx.pdf

Project-Planning documents/Business_Case.docx.pdf

2.2 Project Charter

Provide link to 'Project Charter' document.

https://github.com/kakokamo/Ense374Project/blob/8fcc43df337e2ac1dc6369957f19a0c6c241ad09/Project-Planning%20documents/Project%20Charter.docx.pdf

Project-Planning documents/Project Charter.docx.pdf

3 Solution

3.1 Solution 1

https://github.com/kakokamo/Ense374Project/blob/8fcc43df337e2ac1dc6369957f19a0c6c241ad09/Project%20Prototyping/Designs/Design1.jpg

The **Hiking Trails Web Application** provides a structured and engaging interface for users to explore hiking trails across Saskatchewan. The design includes several functional areas and interactive elements to support users in discovering, filtering, and reviewing hiking trails.

1. **Navigation Bar**:
   At the top, a navigation bar allows easy access to key sections of the site, including **Home**, **Trails**, **Volunteer**, **Support**, **Suggest**, **Report**, **About Us**, and **Contact**. This

layout ensures users can quickly move between pages and find the information or features they need.

2. **Disclaimer Section**:
   A disclaimer box on the left side of the page alerts users to trail etiquette, specifically warning against littering. It mentions a fine for repeated violations, emphasizing responsible use of trails. This feature helps promote environmental stewardship and informs users of rules.
3. **Trail Search and Filter Options**:
   The main focus of the page is a **search and filter section**. Users can select a location (with "Saskatoon" as an example in the sketch) and then sort the list of trails by recommended options. The filtering options include **Price**, **Duration**, **Length**, **Terrain**, **Elevation**, **Difficulty**, **Resting/Bathroom Facilities**, and **User Rating**. This robust filter set allows users to customize their search based on specific needs, making it easier to find trails that match their preferences.
4. **Review Section**:
   On the right, a section labeled **"Reviews"** displays user reviews, showcasing feedback from multiple users. Below it, there's an option for users to **leave a review** of the website, where they can enter their name and review. This interactive feature encourages user engagement, allowing hikers to share their thoughts and contribute to the community.
5. **Contact Information and Social Media Links**:
   The left side of the page also includes a **Contact Us** area with placeholder phone numbers and icons linking to social media platforms like Facebook and Instagram. This provides users with options to connect with the team or learn more about the trails through social channels, enhancing community interaction.
6. **Footer Links**:
   At the bottom, the footer repeats key navigation links (**Trails**, **Volunteer**, **Support**, **Report**, **About Us**, and **Contact**) for easy access, reinforcing usability and site navigation.

User Benefits and Engagement:
This design solution offers users a well-organized and informative interface for exploring hiking trails. With comprehensive filters, users can easily search for trails based on a range of criteria. The review section fosters a sense of community by letting users share feedback, while the disclaimer emphasizes responsible trail use. Social media links and contact information keep users connected, encouraging return visits and ongoing interaction with the website.

3.2 Solution 2

https://github.com/kakokamo/Ense374Project/blob/8fcc43df337e2ac1dc6369957f19a0c6c241ad09/Project%20Prototyping/Designs/design2.pdf

The **Hiking Trails Web Application** offers an engaging platform for hiking enthusiasts to find, explore, and share their favorite trails. Each page serves a unique purpose, enhancing the overall experience while providing easy navigation and personalized recommendations.

1. **Login Page (Before Login)**:
   This page is the initial entry point, where users can log in with their accounts. If they don't have an account, they can quickly sign up. The page also offers a preview of a few popular trails, sparking users' interest by showcasing exciting options and motivating them to create an account to unlock full access.
2. **Sign Up Page**:
   The sign-up process is straightforward, gathering essential user details to create an account. By registering, users gain access to personalized features and trail recommendations, making the experience more tailored to their preferences.
3. **Login Page (After Login)**:
   Once logged in, users are welcomed with a navigation menu and a feed displaying various trails. Each trail is accompanied by a brief description, showing the number of likes and comments. This information helps users quickly gauge trail popularity and community feedback, making it easier to choose a trail to explore.
4. **Search Page**:
   The search page includes advanced filters, allowing users to refine trails based on location, elevation, terrain, difficulty, duration, length, proximity to water, and user rating. This flexibility makes finding the perfect trail efficient and straightforward, ensuring users can easily match trails to their specific hiking needs.
5. **Best Trail Page**:
   This page features a quiz-like experience, asking a series of questions to help determine the best trail match for each user. This interactive feature adds value by offering tailored recommendations, making the app particularly useful for those new to hiking or those seeking a fresh experience.
6. **Trail Detail Page**:
   Here, users can view all information about a selected trail, including its description, comments, and user interactions. Users can engage by adding their own comments, liking or disliking others' comments, and interacting with other hikers. This level of

engagement fosters a community feel, encouraging users to share their experiences and insights.

7. **Trail Management Page**:
   This page lets users curate a personal list of trails and mark favorites. This organizational feature is useful for avid hikers who want to keep track of trails they've explored or wish to visit in the future, enhancing the app's value as a long-term hiking tool.
8. **About Us Page**:
   The About Us page introduces the team behind the app and outlines its purpose, adding a personal touch. Users can also provide feedback and contact the team, which promotes a sense of transparency and community involvement.

User Benefits and Engagement:
This application is useful because it provides a well-rounded hiking experience, from searching and selecting trails to sharing experiences with a community. Features like personalized trail suggestions, interactive comments, and the trail management system engage users and encourage repeated use. By catering to both new and experienced hikers, the application offers a supportive and dynamic tool that enriches users' outdoor adventures.

3.3 Final Solution

Table 1: Comparison of all solutions

Comparisons and Differences:	**Solution 1**	**Solution 2:**	**Final Solution:**
Personalization:	while Design 1 focuses more on search filters and reviews.	Design 2 places a greater emphasis on personalization through features such as a login system, trail feed, and quiz-like feature,	Same as design 2

Community Engagement:	Design 1 offers a review system and social media links.	Design 2 provides a more interactive community experience with features like likes, comments, and personalized suggestions,	Same as design 2
Trail Management:	This feature is missing	This design includes a dedicated trail management page for users to track their favorite trails	Same as design 2
Search Page:	Has a filtering option for users to choose the type of trail they want to hike on	Has a filtering option for users to choose the type of trail they want to hike on	Unlike designs 1 and 2, this one lacks a filter option. It will display all of the trails in a particular area with all of the trail data when the user enters the location of their home that has trails or if they wish to walk in a particular area of Saskatchewan. Also, Instead of going through the entire filtering process to discover a trail, the user can search for a certain trail more easily.

Since the final design is really an enhanced version of design 2, which was already good as it was. The user's filter choice on the search page is a little too laborious, though. You would have to go through the entire filtering procedure again in order to discover a different trail if the result of the filter you used for a trail wasn't what you were looking for. It will therefore be simpler for the user to choose the route that is most appropriate for them if that option is removed and the data about trails within the Saskatchewan location they enter in is displayed instead.

3.3.1 Components

1. **Model (Data & Logic Layer)**
    - **Database**: Stores hiking trail information, user data, reviews, and filters.
    - **Business Logic**: Implements the logic for filtering, searching, and storing/retrieving data.
    - **APIs**: Handles external interactions like location services (Map API) and user authentication (Auth API).
2. **View (User Interface Layer)**
    - **HTML/CSS**: Provides structure and styling for the web pages.
    - **JavaScript**: Adds interactivity and dynamically updates the UI.
3. **Controller (Request Handling Layer)**
    - **Server**: Processes user inputs, interacts with the Model for data, and updates the View accordingly.
    - **Filters & Search Module**: user input processing and data retrieval from the Model.

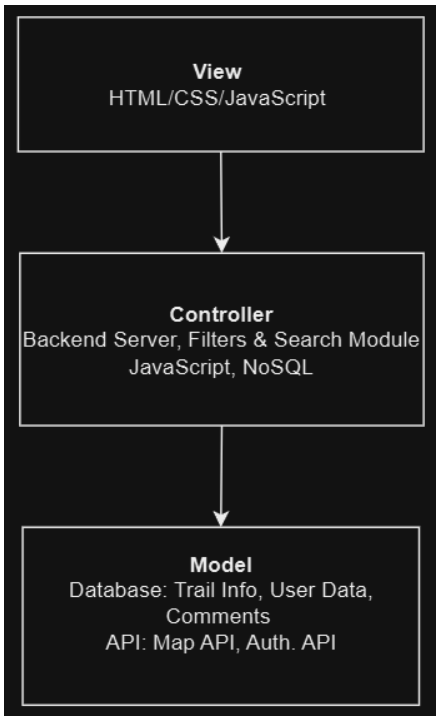


Fig 1 - Components

3.3.2 Features

The Minimal Viable Product chart can be view at:
https://github.com/kakokamo/Ense374Project/blob/52b3f181b7f59f43e8916c11118d0b1549ebac4d/Project-Planning%20documents/MVPs%20for%20SK%20Trails.pdf

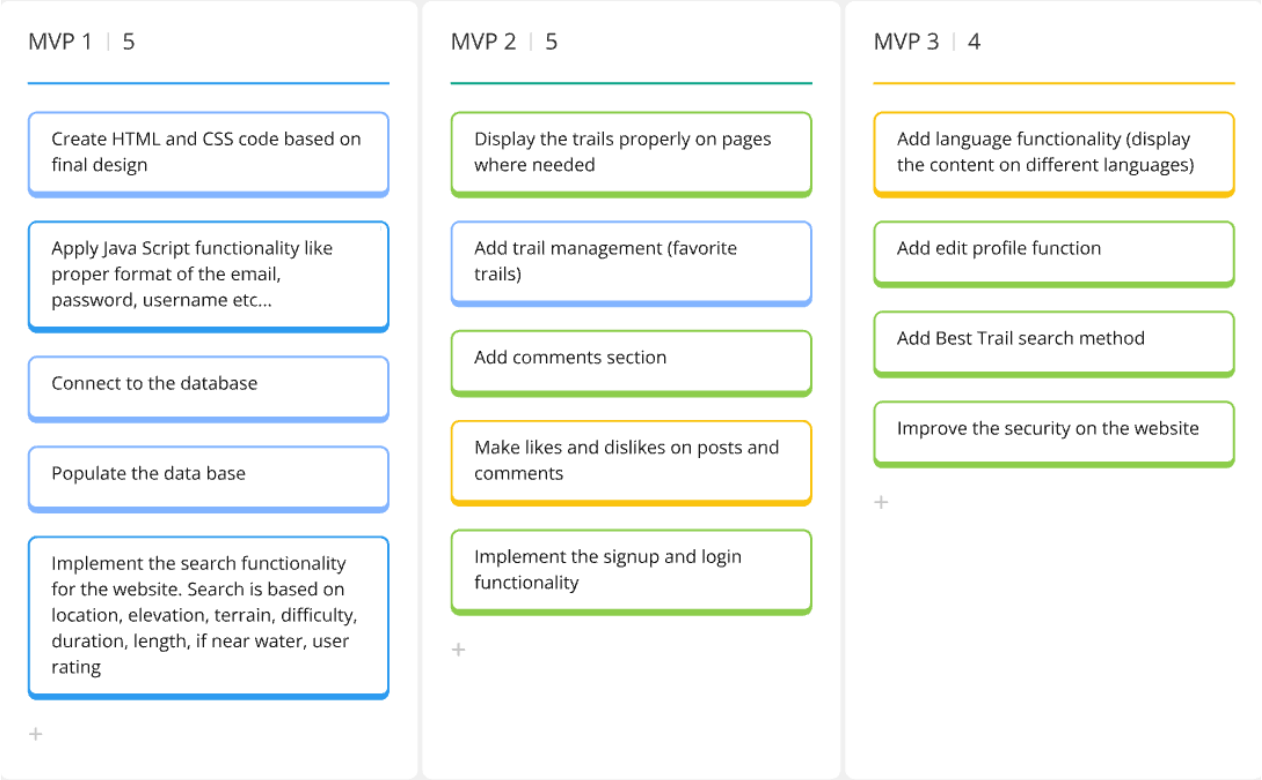


Fig 2 - MVPs

3.3.3 Environmental, Societal, Safety, and Economic Considerations

Explain how your engineering design took into account environmental, societal, economic and other constraints into consideration. It may include how your design has positive contributions to the environment and society? What type of economic decisions you made? How did you make sure that the design is reliable and safe to use?

Constraint 1: Economic Factors

- Low flow of tourists into Saskatchewan.
- The hiking destinations should be able to afford proper resources to further develop the hiking trails for better user experience.
- The cost of development, deployment, and maintenance should not overcome the budget.

Constraint 2: Sustainability and Environmental Factors

- When people hike, some are bound to litter on the trails.
- Users using poor language in comments and reviews would leave a strong message for other people that our website is not family friendly.

Constraint 3: Regulatory Compliance (Security and Access)

- Malicious people could hack the website and leave misinformative reviews and/or

comments to various trails, discouraging hiking and use of SK trails.

Constraint 4: Reliability

- The data we collect for all the trails of Saskatchewan can be inaccurate since we can't go to all of those trails in person. The information would be difficult to collect unless we outsource

Constraint 5: Social

- The design includes filtering options for trail difficulty, making it accessible for individuals of varying fitness levels.
- A review and interaction feature allows users to share experiences, fostering a sense of community among hiking enthusiasts.

3.3.4 Limitations

1. **Accuracy of Trail Information**
    - Since we can't visit every trail ourselves, the information relies on outside sources and user reviews, which might not always be accurate or up-to-date.
2. **Managing User Content**
    - It's hard to keep all user reviews and comments clean and appropriate. Sometimes, bad language or wrong information might slip through.
3. **No Real-Time Updates**
    - The app doesn't give live updates on trail conditions, like trail closures, which could be important for users.
4. **Staying Within Budget**
    - Developing, running, and maintaining the app costs money, and we need to be careful not to spend more than we planned.
5. **Environmental Concerns**
    - Promoting hiking might increase the number of people on certain trails, which could damage the environment if those trails aren't properly maintained.
6. **Learning How to Use It**
    - While we tried to make the app easy to use, some people, especially those not familiar with technology, might find it tricky to navigate at first.
7. **Privacy Risks**
    - Since we collect some user data (like location), there's always a small chance of data leaks, even though we've tried to make it secure.

4 Team Work

Meeting Agenda for all meetings:

https://github.com/kakokamo/Ense374Project/blob/main/Project-Planning%20documents/Meeting%20Agenda.docx.pdf

4.1 Meeting 1

https://github.com/kakokamo/Ense374Project/blob/main/Project-Planning%20documents/Meeting%20Minute_%20Business%20Case.docx.pdf

4.2 Meeting 2

https://github.com/kakokamo/Ense374Project/blob/main/Project-Planning%20documents/Meeting%20Minute_%20Project%20Charter.pdf

4.3 Meeting 3

https://github.com/kakokamo/Ense374Project/blob/main/Project-Planning%20documents/Meeting%20Minutes_%20Design%20interface%20Discussion.pdf

4.4 Meeting 4

https://github.com/kakokamo/Ense374Project/blob/main/Project-Planning%20documents/Meeting%20Minute_%20Design%20Selection%20.pdf

4.5 Meeting 5

- https://github.com/kakokamo/Ense374Project/blob/main/Project-Planning%20documents/Meeting%20Minute_%20Web%20Application%20Implementation%20Discussion%20.pdf
- https://github.com/kakokamo/Ense374Project/blob/main/Project-Planning%20documents/Issue%20Log.docx.pdf

- https://github.com/kakokamo/Ense374Project/blob/main/Project-Planning%20documents/Change%20Request.docx.pdf
- https://github.com/kakokamo/Ense374Project/blob/main/Project-Planning%20documents/Project%20Status%20Report.docx.pdf

4.6 Meeting 6

https://github.com/kakokamo/Ense374Project/blob/main/Project-Planning%20documents/Meeting%20Minute_%20Discussion_Status%20of%20Demo%20Completion%20and%20Presentation%20Slides.pdf

5 Project Management

Provide the link to 'Milestone-based Schedule' document. Use the Gantt chart as well to show the progress of your work here. Mention all the tasks along with their predecessors. Provide the slack time of each task and identify the critical path.

Milestone-based Schedule
https://github.com/kakokamo/Ense374Project/blob/5d0baf282c0db5e545c755fce2c6a430c030c5e9/Project-Planning%20documents/Milestone-Based%20Schedule.docx.pdf

Fig 3 - Project Planner (Gantt Chart) at the time of presentation

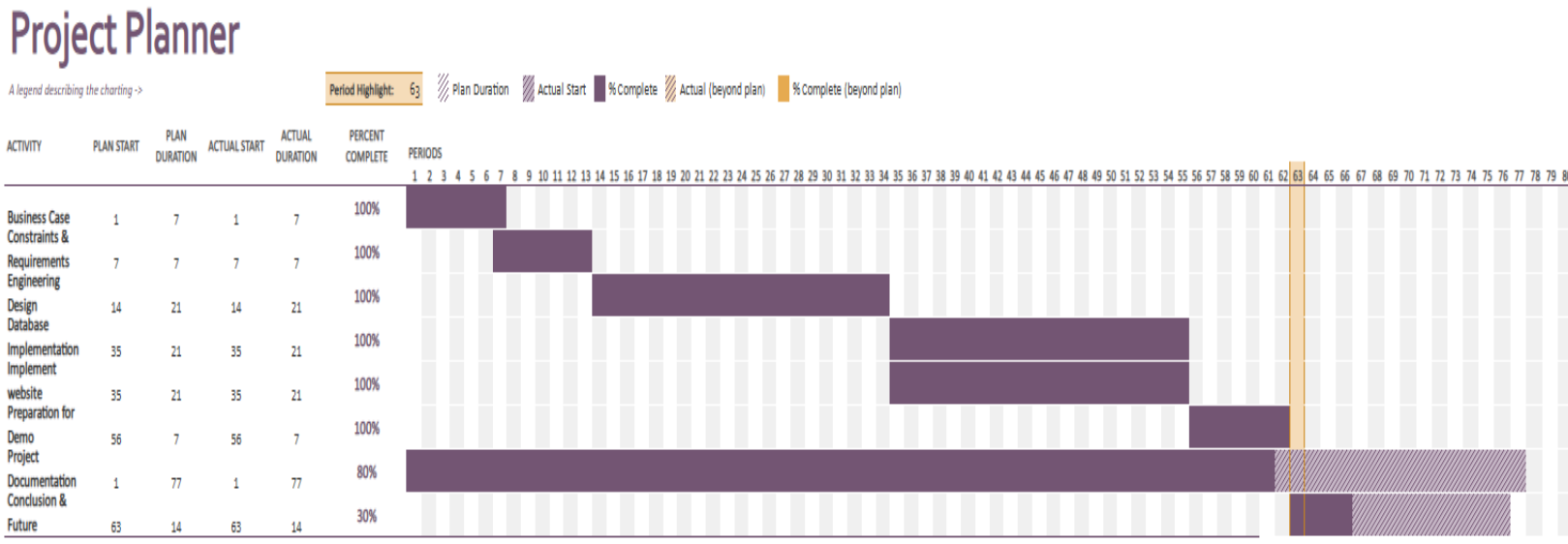
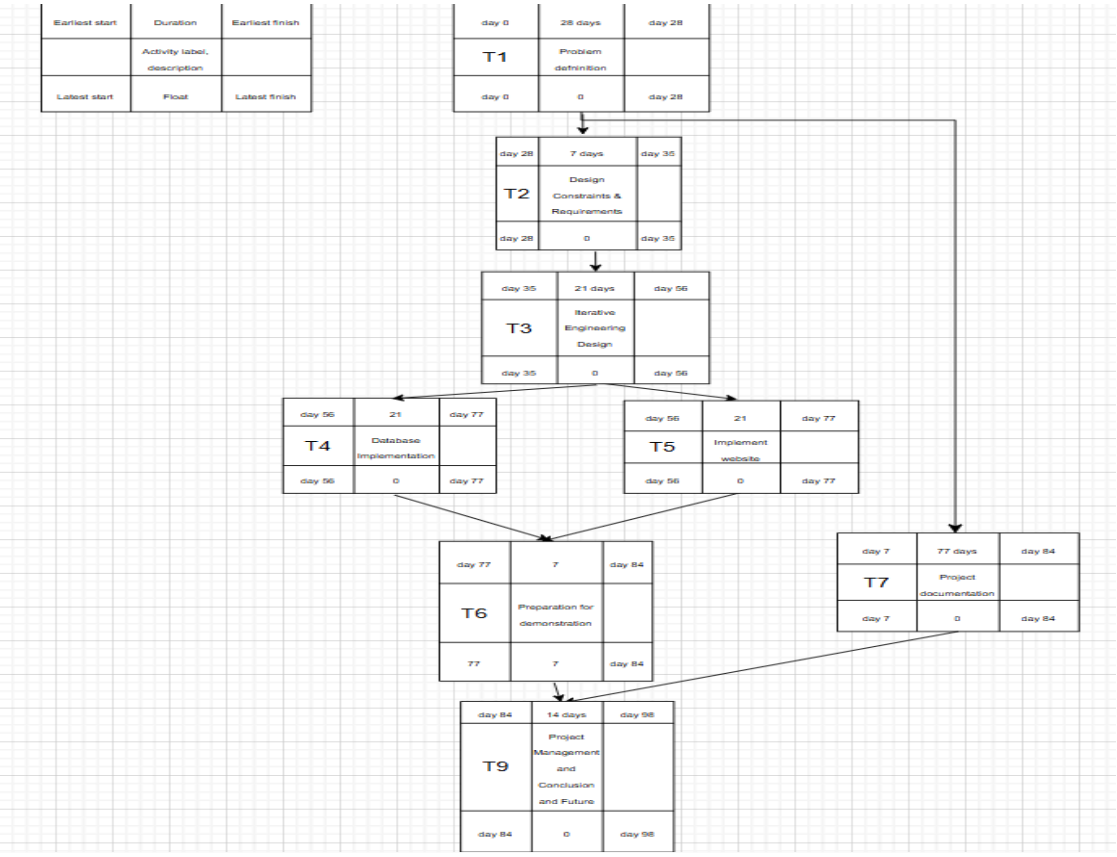


Fig 4 - Critical Path Analysis diagram



6 Conclusion and Future Work

Throughout the development of our hiking trails web application, we achieved several key milestones. We successfully created a functional platform that allows users to explore, filter, and review hiking trails across Saskatchewan. By implementing features like user reviews and an intuitive interface, we made the app accessible to both experienced hikers and beginners. We also aimed to foster a sense of community by enabling users to share their hiking experiences,

and we emphasized environmental awareness through disclaimers on trail etiquette to promote responsible outdoor behavior. Additionally, we laid the groundwork for future enhancements, ensuring the app has scalable features and potential for expansion.

We learned a lot from this project and documented our findings in the Lessons Learned Report. Moving forward, we recognize areas for improvement. For example, we could enhance the accuracy of trail information by collaborating with local organizations and adding real-time updates, such as weather conditions or trail closures. Better content moderation using AI tools would ensure reviews and comments remain appropriate and helpful. To make the app more scalable, we could optimize the backend to handle more users and explore cloud-based infrastructure. Adding offline access would also make the app more useful for hikers in remote areas without internet connectivity. Strengthening data security and privacy measures is another important step, ensuring user trust. Lastly, we could explore non-intrusive ways to monetize the app, such as partnerships with local businesses, while keeping it user-friendly.

By addressing these limitations, we can create an even better experience for users, making the app more reliable, accessible, and environmentally responsible in the future.

Lessons Learned Report:

https://github.com/kakokamo/Ense374Project/blob/5d0baf282c0db5e545c755fce2c6a430c030c5e9/Project-Planning%20documents/Lessons%20Learned%20Report.pdf

7 References

- Use the IEEE reference style.
- Do not put any reference if it is not cited in the text.

[1] Trans Canada Trail, “National Leger Survey Finds Trail Use Has Increased 40% in 2021,” *Trans Canada Trail*, Aug. 2021. [Online]. Available: https://tctrail.ca/news/national-leger-survey-finds-trail-use-has-increased-40-in-2021/. [Accessed: Oct. 06, 2024].