Improving Usability of the York Region Transit Website

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ABSTRACT

The York Region Transit (YRT) website serves the needs of people taking the York Regional Transit system. However, the features offered by the website are not intuitive to the user, or directs the user to other apps or tools. We offer three new features that would be useful to attract new ridership and improve the user experience of existing riders: Accounts for the YRT system, integration of ticket purchasing, and user-provided feedback, by allowing users to review their bus routes. The ideas for these features were gathered through surveys and interviews of existing ridership. A low-fidelity and interactive prototype were produced and evaluated, through which we present our findings here.

INTRODUCTION

The aim of this project is to improve the usability of the York Region Transit (YRT) website, by designing, developing, and evaluating an interactive system. Throughout the process, we keep in mind HCI guidelines and principles, and use a user-centered approach. The YRT is a transit agency that "offers local and rapid transit services in all nine York Region municipalities, as well as connecting services in the City of Toronto and the Regions of Peel and Durham" (York Region Transit, n.d.). In 2018, the YRT system had an estimated 22.2 million trips annually (York Region Transit, 2018).

Riders are able to make payments to the transit system through the Presto card system, the YRT Pay app, and an integration with the Transit app. Presto is an integrated payment system for the Greater Toronto Area, allowing cross-system payments with neighboring transit agencies, such as the Toronto Transit Commission (TTC). This project focuses primarily on the functionality of the website, not with any companion apps.

The website serves as an informational hub for the YRT system. Fare prices, news updates, and transit delays are among the information that users of the system are looking for. In addition, a route planner allows users to plan routes between two destinations. Our aim for the project is to improve the usability of these features, as well as prototyping new features to serve and attract new YRT riders.

LITERATURE REVIEW

An introduction to visual usability for apps and websites is provided in the book, *Visual usability principles and practices for designing Digital Applications (Schlatter & Levinson, 2013).* The book offers guidelines and design patterns. Visual weight should be assigned to UI components with higher usage rate, based on the author's suggestion.

According to the article, *Target size study for one-handed thumb use on small touchscreen devices*, an experiment was conducted to test the error rate and speed related to target size on mobile devices (Parhi et al.,2006) . For single target pointing tasks, the target size should be at least 9.2mm without compromising user preference or performance. In a transit application, selecting a route is an essential task. It is also a single target pointing activity. We propose changing the size of the "down arrow" target based on the results.

Web Content Accessibility Guidelines 2.1 (1.4.11) offers suggestions for helping those with vision impairments*(Understanding Success Criterion 1.4.11: Non-Text Contrast, n.d.).* In particular, it is focused on graphic elements that are close to one another. These should have a contrast ratio of no less than 3:1 as a threshold. The map's graphical elements must provide

information about the bus route, and light colors shouldn't be used on backgrounds that are light in hue.

The primary emphasis of Screen resolution and Page Layout is on discussing various screen resolutions and page layouts in order to maximize initial exposure, readability, and aesthetics. Because it discusses the many screen resolutions and sizes that web sites should be developed for, as well as the idea that "screen sizes vary among users," it supports our strategy. We are basing our solution on one of the suggestions made in the article, *Screen resolution and Page Layout*, which is to "use a liquid layout that stretches to the current user's window size (that is, avoid frozen layouts that are always the same size)"(Nielsen, 2006).

Internet Searching, Tablet Technology and Older Adults (Jayroe & Wolfram, 2013), provides a comparison of senior technology users' interaction with the interface of iPad tablets and desktop computers. People can better understand how they interact with each technology. Therefore, designers can take the advantage of the 2 kinds of interfaces to provide better human-computer interaction. And among them, one of the improvements is that the font size is more friendly for old adults to interact with on tablets.

The Cost of Vision Loss and Blindness in Canada (Canadian Council of the Blind, 2021) evaluates the effects of vision loss and blindness. The usability of the website is severely impaired for users who are suffering from color blindness, vision loss, and blindness. As the source suggests, this issue does not only affect senior users. Therefore, by allowing the ability to continue using the Map component along with other supporting components, users with visual impairments could benefit from the experience.

PROBLEM STATEMENT
The YRT website interface contains issues relating to the concept of human-computer interaction in three main components.

First of all, the Trip Planner component is not user intuitive for new users. Instead of positioning the tool in the center, it is accessed through a cramped box on the left. The input of origin and destination is also designed so that the origin has to be inputted before the destination without any notice to users. Moreover, the time and date input components are not dynamically sized, making certain buttons unresponsive and rendering the feature useless.

Second of all, the Itinerary component is also riddled with poor design choices. Each route is not separated clearly, making it difficult for the user to distinguish the respective button for each route at first glance. Many transit applications (ie. Google Maps, Transit Now …etc) have a feature that you can tap on the route to get more detailed route information, but this component only allows tapping on the 'details' button and 'down arrow' button to retrieve information. The YRT transit is not built on standardization. The 'down arrow' is approximately 7mm in mobile devices which is insufficient. As recommended by Parhi (2006), "*target sizes should be at least 9.2 mm for single-target tasks and 9.6 mm for multi-target tasks in order to keep the dimensions of the targets as small as possible without decreasing performance and user preference*". On top of that, when the user double taps the itinerary component, it will disappear entirely. This is not generally intuitive and causes more unnecessary time and effort from the user, ruining the user experience.

Third of all, the Map component is also not user intuitive. Since routes are marked with their respective bus route color, there are largely varying colors for all bus routes, making it difficult for users with color vision deficiencies to spot each route. On top of that, once the user clicks on the fullscreen button to enlarge the screen, all the other components with more detailed information disappear. This is very inconvenient for users without the best vision, especially more senior users, who often have the need to use public transit.

GATHERING OF USER REQUIREMENTS

We used three techniques during the gathering requirements phase, those being surveys, interviews, and observation. Our primary method of gathering user requirements was through an online survey via Google Form. We chose this as the primary method because surveys are easy to distribute, and responses are easily collected and analyzed in a database. Though we created a field for recording the age of the people who filled out the questionnaire, we decided to conduct interviews with 4 seniors as our second technique of gathering requirements since they might not be that technically advanced. As some of the behaviors may not be noticed by the participants themselves, surveys and interviews may not give accurate results. That's why we decided to choose observation as our third technique. By following some users to see how they behave during the time they are using the website, taking notes, and recording videos (where possible), we can record and analyze participants' behaviors in a more natural environment. Our data gathering survey resulted in 61 responses in total. The survey covered participants who live in or occasionally visit the York region from different age groups: 5 children (0-14 years old), 28 youths (15-24 years old), 23 adults (25-64 years old), and 5 seniors (65 years old and above). We took the data that was acquired through the three techniques and then made appropriate changes to our design, allowing us to have a more concrete idea of what to build during the prototype phase.

PROTOTYPE

High-fidelity prototypes were developed in order to evaluate the usability of features that were proposed in the previous phase. These prototypes were developed using the Balsamiq Wireframes software tool.

Account Signup and Login

Our account login/signup prototype gave users the ability to add and use saved locations, and demo what their account would look like after signing up for an account.

Figure 1. Sign up page

Figure 2. Saving locations

We evaluated this task by letting users try out our prototype in a controlled environment, where they had the ability to click around the prototype and attempt to perform this task with all the included features. We let them attempt to perform the task without any aids at first, and then jumped in to assist if they got stuck or confused. The result of our evaluation is that users

often had difficulty proceeding to the saved locations portion of the task after the account creation, so we were able to improve the prototype by adding in a direct link to the saving locations portion on the user profile page.

Ticket Purchasing
Our ticket purchasing prototype allows users to purchase tickets once they've planned a trip on the YRT system. Users are informed of the pricing structure, as well as allowing them to purchase tickets for the whole family.

Figure 3. Ticket selection process, with subtotal

Once the user has decided on the number of tickets, the purchase is finalized in the checkout page. A receipt of the ticket, as well as a download is made available to the user.

Figure 4. Purchase receipt, with download of ticket

The ticket download consists of a barcode, which users can scan on the Presto card readers to board the bus.

Figure 5. Ticket download, with barcode for Presto scanners

A mobile version of the interface was also created, with a similar user experience.

Reviewing Bus Routes
Our route review prototype enables users to post reviews regarding the crowdedness and punctuality of the routes and also get such information when planning their trip.

We evaluated this prototype by testing the interface in a controlled setting. The participants will be users who identify themselves as customers with disabilities, the elderly or pregnant women. Usability testing will be conducted along with videotaping participants performing tasks. Next, a post-test interview will be conducted among all the participants. This includes survey and focus group discussions. The result of our evaluation shows that some users feel uncomfortable with setting the time of the ride before submitting their review, so we set the submission of ride time to be optional in order to improve our prototype.

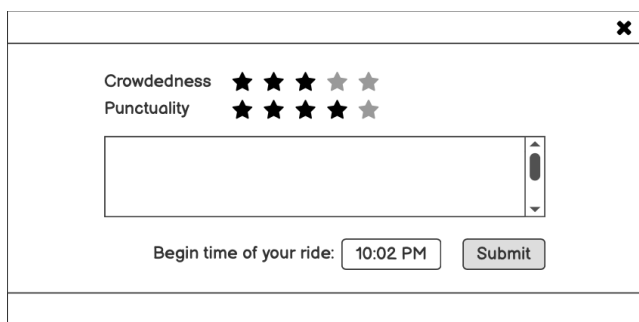**Figure 6. Browse bus route reviews from other users**

Figure 7. Write bus route review

USABILITY STUDY

The usability of our prototypes were evaluated through the use of a questionnaire. Participants first completed an informed consent form, making them aware that their information will be kept confidential. The participants interacted with each prototype, trying to complete all major tasks in 15 minutes without any guidance from the team. Afterwards, each participant completed a curated usability questionnaire. Since there could be a possibility that the participants did not know how to use the prototype, we try to arrange a quick meeting session with participants that are not as tech-savvy while conducting the testing and questionnaires. Due to rising concerns with health and safety, all meetings were conducted online over Zoom. The team conducted questionnaires in this way

because this allows for flexibility in both party's schedules, making participants more susceptible to assist with the usability study and provide feedback. On top of that, these meeting sessions also provide the team with more qualitative feedback as they are able to witness the process of the participants interacting with the prototypes, noting down any struggles they may face. Therefore, this method provides well-rounded responses while also being accommodating.

The questionnaire is divided into four main sections:
- Preliminary Questions - Participant demographics
- Feedback for Task #1 - Account Login/Signup
- Feedback for Task #2 - Ticket Purchasing
- Feedback for Task #3 - Reviewing Bus Routes

The questionnaire mainly contains close-ended questions as it is easier to gather data about the participant's feedback. An example would be "On a scale of 1-5, How would you rate the usability of User Profile?". There are also some open-ended questions that provide a way for participants to give custom feedback in case they had some additional opinions about the interface. An example would be "Are there any features you'd like to see added to the account page?".

RESULTS

Our usability questionnaire received 10 responses in total. The demographic of participants is fairly distributed, with 3 participants between 20-30 years old, 4 participants between 31-64 years old, and 3 at or over 65 years old. We did not have any participants in the teenage age range, which we defined as 19 or under.

We aimed to have users who ride the YRT system with a mix of frequencies. From our participants, 3 rode the YRT system rarely, 4 participants rode occasionally, and 3 participants rode frequently. While 6 participants are from the York region, 4 participants are from outside York, which allows them to compare between the YRT system and others. Regarding the YRT website, a majority of participants (7/10) had never visited, or rarely visited the website.

Account Login

Based on the responses from this section, all responses from participants of ages 64+ thought that

Dark Mode was unnecessary. In terms of the usability overall, almost all features were easily usable with 60% (6/10) of responses giving a 4+ score on a scale of 1 to 5. However, 20% (2/10) of participants could not get through saving locations and toggling dark mode without the team's guidance. In addition, saving locations is also the feature with the most (4/10) participants not seeing themselves using.

Ticket Purchasing
Responses from our questionnaire show that within our prototype for ticket purchasing, all users (10/10) were able to successfully purchase tickets, as well as downloading the ticket after purchasing. Participants found the prototype to be usable, with all users (10/10) rating the usability at a 4 or above, on a 1-5 score.

Feedback from participants through online interviews, suggesting making the tickets more informative, such as usage instructions. The tickets in the prototype were too simplistic, with only a barcode provided to the user.

Reviewing Bus Routes
The responses provided by the participants indicate that all of them gave a 3+ score on a scale 1 to 5. 40% (4/10) of the participants even respond with a full score. Meanwhile, 3 participants feel that submitting the time of the riding is necessary when completing this task. But still, the majority of the participants (6/10) did not provide any suggestion on removing any of the fields when reviewing a bus route.

LIMITATIONS
Due to the geographic location of the York Region Transit system, the availability of willing participants to gather requirements and evaluate our prototype was limited. Our main sampling strategy was to interact with riders on the YRT system, which limits our ability to control the age group, gender distribution, and cultural differences in our sample. As a result, we have no guarantee that we sampled users who met our target audience requirements.

The interactive prototypes created for the purpose of the study were created and evaluated separately, instead of being combined into one. The ability to test the discoverability of these features is limited, since each new feature exists in isolation from each other. Additionally, we were unable to properly integrate new features together, such as having a tickets page that displays recent purchased tickets.

Our choice of questionnaire as a method of evaluation for our usability study limits the quality of data that we received. Questions chosen for the study mainly leave us with quantitative data, with qualitative data being provided through optional open-ended questions. Online meeting sessions help fill in the gaps, as we can identify moments of confusion in the user, or when an error is being made.

FUTURE WORK
With future development of our prototype, we plan on improving accessibility for disabled and senior users, as well as enhancing the user experience who use it regularly.
- Add a map component in the profile page so that users are able to easily save more locations in the profile page as well.
- Making setting ride time optional and allow the user to select from a range of time slots in reviewing a bus routes
- Ability to save a type of payment method so user could use it in the future
- Making the prototype more consistent in style
- Shows the entries that have disability access for GO Transit server
- Ability to track more trip info and user can view them offline
- Allow users to upload personal daily plan and send the best options for bus routes that fit their schedule
- Combine the prototypes for all of the features into one, with better integration between them
- Adding instructions, as well as additional information to purchased tickets

REFERENCES

[1] Parhi, Karlson, A., & Bederson, B. (2006). Target size study for one-handed thumb use on small touchscreen devices. ACM International Conference Proceeding Series; Vol. 159: Proceedings of the 8th Conference on Human-Computer Interaction with Mobile Devices and Services; 12-15 Sept.

2006, 203–210.
https://doi.org/10.1145/1152215.1152260

[2] Nielsen, J. (2006, July 30). Screen resolution and Page Layout. Nielsen Norman Group. Retrieved May 30, 2022, from https://www.nngroup.com/articles/screen-resolution-and-page-layout/

[3] National Eye Institute. (2019, July 3). Color Blindness. Retrieved May 30, 2022, from https://www.nei.nih.gov/learn-about-eye-health/eye-conditions-and-diseases/color-blindness

[4] W3C Web Accessibility Initiative. (2018, June). Web Content Accessibility Guidelines 2.1 (1.4.11). https://www.w3.org/WAI/WCAG21/Understanding/non-text-contrast.html

[5] Jayroe, T. J., & Wolfram, D. (2012). Internet searching, tablet technology and older adults. Proceedings of the American Society for Information Science and Technology, 49(1), 1–3. https://doi.org/10.1002/meet.14504901236

[6] Canadian Council of the Blind. (2021). (rep.). The cost of vision loss and blindness in Canada. Deloitte Access Economics. Retrieved May 30, 2022, from https://www.fightingblindness.ca/wp-content/uploads/2021/05/Deloitte-Final-Acc-of-VL-and-Blindness-in-Canada-May-2021.pdf.

[7] Schlatter, T., & Levinson, D. A. (2013, October). Visual usability principles and practices for designing Digital Applications. Morgan Kaufmann Publishers.

[8] York Region Transit. (n.d.). About Us. Retrieved August 10, 2022, from https://www.yrt.ca/en/about-us/about-us.aspx

[9] York Region Transit. (2018, December). York Region Transit 2018 System Performance. York Region. https://yorkpublishing.escribemeetings.com/filestream.ashx?DocumentId=3140

APPENDIX

Informed consent form signed by each participant
https://docs.google.com/document/d/163kWGk7khU5o7lLNLF8DB6Efl6iQJntWbnMW6LpL9i4/edit?usp=sharing

Questionnaire completed by participants as evaluation of the high-fidelity prototype
https://docs.google.com/forms/d/1-wCuvDM1gXru_Tu6pWrnLVUQI7Y67q6Hy1MePWFG7Os/edit?usp=sharing