

BUS TICKETING KIOSK

A design interface for self-service bus ticketing kiosk

CPSC 481 Human-Computer Interaction I
TCSD Portfolio

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Grading Sheet

Task Centered Design and Prototyping Grading Sheet: Be sure to include it in your portfolio

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Note: The list below is a set of guidelines, or a "convenience" checkpoint. Getting many satisfactory checks does not necessarily indicate a good project (or vice versa).

Structure and format

	Included	Not included	
Portfolio in PDF	1	0	
Section separators	1	0	
Name on outside cover	1	0	
Name and contact information on the first page	1	0	
This grading sheet included in portfolio	4	0	
	Complete	Missing portions	Not included
Table of contents	2	1	0
	Great: no problems	Good: a few minor problems	Poor: Problems throughout (your mark in other sections may also be affected as well)
Appearance (organization, layout and whitespace)	6	4	0
	No typos, grammatical or spelling errors, clear writing style	Minor typos or grammatical errors or spelling mistakes or some writing may be a bit vague	Problems in two areas (spelling, grammar, style)
			Problems in all three areas

Language and writing style	7	5	3	0
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Setting the stage

	Clear and complete (yes)	Clear and complete (no)		
Background	1	0		
Expected uses of the system	1	0		
System constraints	1	0		
Expected users	2	1	0	
Work context	2	1	0	
Approach for getting background information for tasks	2	1	0	

Tasks

	Appropriate No. (~5-7)	Fewer than what's needed for the usage of the system	No tasks were included in the portfolio	
Number of tasks	2	1	0	
Coverage of the tasks	8	6	2	0

	No violations	A few minor violations	Many violations throughout	No tasks were included in the portfolio
Do the tasks follow the properties of a good task?	8	6	2	0
Prototypes				
	Two or more	One		
Number of versions/iterations	2	1		
	Marked improvement from version to version	Few and/or superficial changes from version to version	No evolution between prototype versions	
Evolution of prototypes	6	2	0	
	Provides clear idea of how prototype changed from version to version	Describes changes but some parts are unclear	None	
Description of how prototypes evolved	4	2	0	
Requirements				
	Requirements are grouped into categories with clear and detailed explanations based on the users and their tasks	Requirements are grouped into categories, no indication of how functions were put into particular categories	Requirements are shown in a single list, no attempt at prioritization	No requirements listed
Description of system functions to be implemented	5	2	1	0
Walkthroughs				
	Walkthroughs for all relevant tasks	One	Zero	
Number of walkthroughs performed	4	1	0	
	Walkthroughs conducted, all or most usability problems were caught	Walkthroughs conducted, some minor problems were missed	Walkthroughs conducted, many minor or several serious problems were missed	Walkthrough not performed

Results of conducting the walkthrough algorithm	10	8	4	0
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	Walkthrough results summarized for each scenario/task	Walkthrough results summarized for each scenario/task but not for all tasks	Walkthroughs conducted and results shown in table but no additional analysis, summarizing problems
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An analysis conducted that summarized for all tasks what are the high level and major problems

Analysis of walkthrough results	6	3	0
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	Walkthroughs easy to follow (e.g., included diagrams at all relevant points of walkthrough, diagrams are annotated)	Some points of the walkthrough difficult to follow (e.g., walkthrough description didn't match interface, additional diagrams would have made things clearer)	Walkthroughs not conducted
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Ease of following/tracing the walkthroughs	6	3	0
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Tutorial presentations

	Provides clear background information, good tasks presented, requirements properly categorized	Minor problems: some background information unclear, minor violations in the descriptions of the tasks, requirements could better justified	Poor: task violate many properties of good tasks, or background missing or largely incomplete, requirements are not justified	No presentation
First presentation: Phase one and two	4	3	1	0
	Walkthrough: caught most problems, clear indication of what future improvements should be	Walkthrough: Missed a few minor problems in the walkthrough	Walkthrough: Missed many minor problems in the walkthrough or a few major usability problems	Walkthrough: Many serious problems were missed in the walkthrough
	Prototype: Gives a good feel for how the interaction unfolds, covers main system functions	Prototype: Some parts of the interaction unclear, a few minor system functions (relevant to task) or a major function is missing	Prototype: several main system functions missing	Prototype: main system functions were missing
Second presentation: Phase three & four	4	3	1	0
All team members completed all weekly MVP surveys to portfolio due date	Complete	Incomplete		

TCSD Phase 0: Background

Background

A computer system would aim to ease lineups at the terminals. This system would ideally allow travellers to look up significant routes, book tickets, and pay for them via debit and credit cards. The current system expects users to visit the clerks at the stall to book their tickets which leads to longer lineups and delays. Lineups result in delayed service to people most in need like people who need to book/cancel tickets at the last moment. To address these challenges and improve user experience, there is a computer kiosk system. The digital solution aims not only to reduce the physical queues at terminals but also to expedite the ticket booking process by offering a clear display of routes, automated ticketing and digital payment options. This envisioned system would empower users to complete transactions independently, allowing clerks to handle more complex customer inquiries and enhancing overall operational efficiency.

General Expectations

The new bus ticketing system will be a comprehensive solution for providing detailed information about the bus routes, departures, and arrivals within a given time frame. It will act as a centralized platform for all ticketing-related activities, allowing users to both view available buses and purchase tickets. Designed for maximum convenience, the kiosk is expected to be a user-friendly, one-stop destination for all bus-related transactions. The main goal is to streamline the user journey, making the ticketing process efficient and hassle-free.

System Constraints

Given the constraints of the project, the system will be implemented on fixed-size tablets located at strategic points within the bus terminals. These tablets may not boast high-end processing capabilities, necessitating the design of a light yet effective system. The touch-screen interface should be intuitive, reducing the learning curve for users and ensuring swift, smooth transactions. It's also imperative to ensure that the system is resilient to potential outages or bugs, ensuring continuous service availability.

TCSD Phase 1: Identification

Expected User Types

The bus ticketing system will cater to a diverse user base, spanning various ages, ethnicities, and backgrounds. Given this diversity, the system is designed to be intuitive, user-friendly, and accessible even to those unfamiliar with such interfaces. Emphasis is placed on simplicity, ensuring the system is usable even by non-English speakers.

Work Contexts

Our primary users are regular bus commuters, including workers, students, shoppers, and those attending health appointments. Expectations span across different age groups – from the youth to seniors. Given the high user traffic during peak hours, the system should handle volume efficiently. Moreover, outdoor kiosks must offer sunlight-readable displays, ensuring visibility under bright conditions.

Concrete Task Examples

Task Example 1

1. Users could view bus departure times and routes on arrival at the bus station.
 - a. The typical customer for this would be someone who does not have a smartphone with internet access or someone on a long journey who would not be able to plan ahead of time for possible delays that may happen.

John is a 25-year-old who works in downtown Calgary, he catches a bus from his closest terminal station which is Bowness every morning during the morning rush hour. His main purpose at the terminal station is to view the departures and arrivals from Bowness to his downtown bus stop. As John is able to view the times at the terminal station, it helps plan his journey since he does not have a data plan on his smartphone. Compared to other transit users John is a daily user rider within the workdays which for him it's Monday-Friday.

Task Example 2

2. Users would be able to select a bus route and time for purchase.
 - a. This is a typical use case for everyday users, they would like to view upcoming bus routes and be able to purchase a ticket for that route

- b. This functionality may be used by all users and must be simple and intuitive.
- c. Tickets will be divided into age groups, which will affect the price of the ticket

The Miller family is planning a trip to the Telus Science Fair from their closest terminal station in Bowness. They need to select the appropriate bus route and purchase tickets for each family member. They also need to take into consideration their respective age groups which affect the ticket prices. To secure their tickets, they will head to the nearest kiosk and input their bus number/route in the kiosk. They will be presented with bus routes and then prompted to choose the appropriate ticket types. In their case, this includes two adult tickets, one youth ticket for their 17-year-old, and one child ticket for their 7-year-old. They'll review the ticket summary for accuracy before proceeding to the payment section. The Miller family's frequency is that they are occasional riders, as they are planning a specific trip to the Telus Science Fair rather than using the service on a daily or regular basis.

Task Example 3

3. Users would be able to cancel a purchase

- a. Users should be able to cancel a purchase if they have made a mistake.

The Edwards family consists of parents Bob and Jane along with their children Sarah and Ethan who are 13 and 8 years old respectively. Having completed their ticket purchase at the kiosk system, they realize that Sarah does not fall into the category of a child anymore since the limit is 12 years old. The system allows you to refund your bus ticket within the first hour of the transaction by inputting your ticket number after confirming the cancellation and including the refund details. They are able to repurchase the correct age group tickets from the kiosk. The Edwards family's frequency is that they are infrequent riders, as they are not familiar with the age categories for ticket pricing and made a mistake during their purchase.

Task Example 4

4. Users would be able to see specific bus route schedules

- a. This would be a user who doesn't know the pathway for the buses at the terminal station. Allowing the user to view the stops on the route. This functionality is intended to work with a user who is not familiar with the bus route times.

For senior citizens like Mrs.Thompson who may not be familiar with the intricate details of bus routes, the ability to easily access specific bus schedules is a vital feature. Navigating the terminal station can be daunting, but with this user-friendly function, she can effortlessly view the scheduled stops along the route. This ensures her visit to the central park in the city will cater to her specific needs making the public transportation convenient for seniors like Mrs.Thompson. The frequency for Mrs.Thompson is occasional as she uses the busses during the midday usually.

Task Example 5

5. Riders should be able to refund their tickets and repurchase tickets for new destinations.

- b. This functionality will cater to last-minute changes in plans.

Alex Lee was ready for a gaming day with his cousin in Nolan Hill NW. At the bus terminal, he quickly navigated the kiosk's user-friendly interface. After selecting Nolan Hill NW as his destination and purchasing the ticket, he received news of needing to reschedule their gaming session. Fortunately, the kiosk offered a seamless refund option, which Alex utilized. Feeling spontaneous, Alex decided to purchase a new ticket and head downtown. Alex visits his cousin biweekly.

Task Example 6

6. Users would be able to buy multiple tickets at a time

- a. After selecting a route/time, at the time of purchase, the user would be able to increase or decrease the amount of tickets to purchase
- b. This feature is not essential to the system but would be nice to have, it would reduce the use time of the system for families or large groups purchasing tickets.

For a group of friends like Emma, James, Elijah, and Ella the ability to purchase multiple tickets at once is a valuable convenience, as they are heading to day out together exploring the mall in downtown Calgary they can easily select the preferred route and time at the kiosk, they can effortlessly adjust the quantity of tickets needed. This not only streamlines the process but also

saves valuable time, especially when buying tickets for larger groups. Emma, James, Elijah, and Ella are occasional riders, typically using the system for special outings or group activities, rather than daily commuting.

Task Example 7

7. Users would be able to use debit/credit cards for payments

- a. Users can pay with electronic and physical forms of payment.
- b. This will allow the users to have an easy transaction time.

For Mark and Nancy, a couple who are visiting their friends across the city from the University station, they have an option to use debit or credit cards for payments which provides a seamless and convenient transaction experience. At the payment stage on the kiosk, they can effortlessly use their debit or credit cards, whether it's a physical card or an electronic wallet on their phone. This not only eliminates the need for carrying cash but also ensures a quick and secure transaction. Mark and Nancy, use transit approximately once a week.

Use Case Collection

Deriving these concrete task examples we have used our friends and family members interviewing them about their experience with their names anonymized. All group members have participated in this asking for feedback on the City of Calgary's transit kiosk interface.

TCSD Phase 2: Tentative List of Requirements

Must Include

- **Route Selection and Viewing:** Users must be able to view available bus routes along with relevant details such as departure times, number of stops, and estimated travel duration. This is essential for users to make informed decisions.
- **Ticket Purchase and Selection:** Users should have the ability to select tickets for specific routes and times as this is the core function of the software. They should be able to specify the quantity and type of tickets needed, for example, adult, child, etc.
- **Route Schedule Accessibility:** Users should be able to view the detailed schedules for specific bus routes, including a list of stops and estimated arrival times. This enhances the user's understanding of the journey.
- **Payment Options:** The system should support electronic payment methods, including both debit and credit cards, to ensure a convenient and hassle-free transaction process.
- These “Must Include” features ensure that users can find, select, and purchase bus tickets with confidence and convenience, which are fundamental to the purpose of the software. Failing to include these features could lead to a frustrating user experience, decreased user satisfaction, ultimately and reduced adoption of the ticketing platform. Therefore, they are the backbone of the software’s functionality, catering to the user's primary needs and expectations.

Should Include

- **Purchase of Multiple Tickets:** Users should have the option to purchase multiple tickets at once, which is particularly useful for families or large groups.
- **Cancellation within the First Hour:** Providing functionality for users to cancel a purchase within the first hour is crucial for accommodating mistakes or emergencies and ensuring user satisfaction.
- **Refund Policy Information:** Displaying a clear and concise refund policy during the cancellation process, giving users an understanding of any applicable charges or restrictions.
- The “Should Include” section includes features that are not as critical as the “Must Include” section but are still required for a feeling of completeness for the kiosk. For example, people often travel in groups. Thus, having the option to purchase multiple tickets at once is good to have to reduce interaction time per customer. These features could be implemented as updates immediately after release or as low-priority tasks during development.

Could Include

- **User Accounts and Login:** Providing the option for users to create accounts and log in, could enhance the user experience by allowing for faster checkout and access to booking history.
- **Rebooking for Longer Routes:** A feature allowing users to rebook tickets for longer routes in the event of last-minute emergencies or changes in plans.
- The features are placed into the “Could Include” category because while they are informative, they are not required for the completion of the project. Once the project is released, these could be later added through quality-of-life updates as they would be nice to have in the overall life cycle of the kiosk.

Exclude

- **Cash Payments:** The system does not need to support cash payments, as electronic forms of payment are the focus.
- **Seat Selection and Reservations:** The system is not supported to include a feature for the users to select specific seats or reserve particular spots on the bus as it is on priority seating.
- These features were placed into the “Exclude” category because they are completely outside of the scope of the project or would enlarge the scope dramatically. For example, seat selection and reservations are unnecessary due to the fact that it is common practice for people to take the first empty seat they see while leaving the accessibility seating for those who need it. Furthermore, adding seat selection would be dramatic when bus rides could be as little as 5 minutes.

TCSD Phase 3: Prototyping

Based on the requirements and task examples in the earlier phases we have decided to outline some interface ideas for our bus ticketing system and will discuss their potential. All of our iteration screenshots for each of the three prototypes are in the appendices with an explanation of the stages of our iterations.

Prototype 1: Linear Flow

The primary advantage of a linear flow is its straightforwardness, each step will follow a logical progression and allow the user to not be confused especially if an average user is not familiar with the technology used on a kiosk. The components which are in this interface prototype are as follows:

Welcome Screen: Brief instructions on what the user will do.

Route Information: The user enters the desired starting and ending locations. The system displays available routes and times and the ability to select bus routes from a dropdown.

Ticket Selection: Once a route is chosen, the user selects the ticket type(seniors, adult, youth or child) and the quantity.

Payment: The user pays through a card or other digital methods.

Confirmation: Message to the user regarding their purchase status. A summary of the purchase rebooking and refund policy. With a user prompt to please collect their printed ticket from the system printing machine.

Interactivity: The interactivity would leverage large, clear buttons and use a minimalistic design to reduce the visual clutter.

Prototype 2: Dashboard

A dashboard interface will allow the user an at-a-glance overview, allowing users to swiftly access different functions without needing to navigate through multiple screens.

The prototype consists of the following screens:

Home Screen: Provides a welcome for the user. And lets the user know that the system state has been reset once an interaction is done (ie. returning to this screen after buying a ticket).

Main Dashboard: Contains widgets or sections for route checking, upcoming schedules, ticket buying and more.

Purchasing Tickets: This screen allows for the selection of routes and to buy tickets based on the information available from the route.

Payment Screen: Confirms the total from the tickets and provides instructions for how to pay

Payment Confirmation: Provides confirmation that the user's transaction was successful and provides an option to return to the welcome screen in case of other transactions. The screen will return anyway eventually.

Route Information: Provides information for routes selected from the drop-down menu. The map shows the stops and the travel route for the bus.

Refund Screen: Allows users to input their ticket/reference number in order to get a refund on their ticket.

Refund Confirmation: Provides confirmation that the user's refund has been processed and will be returned to their original form of payment automatically. This screen has a return to welcome screen button but the screen returns anyway eventually.

Interactivity: The dashboard would prioritize virtual hierarchies, with more frequently used functions being large and prominently placed. Tooltips and animations could aid in the user's understanding of this interface.

Prototype 3: Map-Based

A map-based interface is inherently visual, allowing users to understand routes in a spatial context which can be intuitive for some. The components which are in this interface prototype are as follows:

The prototype consists of the following screens:

Home Screen: A home screen where a user is welcomed.

Dashboard Screen: A dashboard listing all the terminals with a search option.

Map Screen: A map laying out the busse from that terminal and close-by. Users interact as they can pinch the screen to zoom in/out.

Ticket Screen: Once the user has selected a route to purchase the tickets, they will be able to select the number of tickets to buy along with more departure times for the same bus.

Purchase Screen: The payment processing screen lists the passengers for the current session and an option to pay using a card or cash. It also adds an option to go back and change the ticket count.

Confirmation Screen: A payment confirmation page where payment is confirmed. Also instructs users where can they cancel and refund their tickets.

Recommendation

While each prototype interface has its merits, our group has chosen the Dashboard style (**Prototype 2**), which stands out for our bus ticketing kiosk system. Some of the points include:

- **Quick Overview:** The user can immediately see all essential details without the need for multiple sequential steps or chained prompts.
- **Efficient Interaction:** Regular transit users can swiftly buy tickets or check schedules without undergoing an entire structured process. The dashboard consolidates multiple pieces of data onto a single screen. This means the user can quickly glance at and understand various aspects of the system without having to navigate through multiple screens.
- **Adaptability:** The dashboard can be expanded with additional features in the future without drastically changing the UI.

A well-designed dashboard can give users a holistic view of the system. For bus scheduling and ticketing, this can help users make better decisions about which bus to take, when to book, etc.

While frequent users might find a dashboard efficient, new users might face a steeper learning curve compared to a linear flow.

TCSD Phase 4: Team Discussions and Walkthrough

Our final low-fidelity prototype is based on the dashboard version which consolidates multiple data points, such as routes and ticketing offering a comprehensive glance view. After our revisions performed on the second prototype from Phase 3, our finalized prototype includes a new refund screen as shown below:

Design Challenges

- **Overwhelming Route Display:** Initially, the interface displayed all bus routes at once. This could be overwhelming for users, especially those unfamiliar with the system or the area. A more user-centric approach would involve filtering or categorizing routes, perhaps based on popularity, location, or time of day.
- **Ticket Type Prompt:** The system originally prompted users to select a ticket type (youth, child, or adult) before allowing them to browse terminals and routes. This sequence might be counterintuitive for many users, who typically decide on a destination before considering ticket specifics.
- **Refund and Cancellation Clarity:** The initial design lacked clear instructions on how to refund and cancel tickets. Such processes are crucial for user trust and satisfaction, and their omission could lead to user frustration and potential loss of sales.
- **Refund Method Ambiguity:** Before the modifications, the method for refunding was unclear. Users were left in the dark about how their money would be returned. The recent change, which ensures refunds are directly transferred to the user's account, is a significant improvement, providing clarity and convenience.

Task Walkthrough Tables

All of these walkthrough tables use the prototype three finalized iteration version which can be seen in the appendices.

Scenario #1:

John, a 25-year-old professional, stands amidst the early morning hustle and bustle of Bowness terminal station. Each day, he embarks on a journey from Bowness to downtown Calgary where his workplace resides. Unlike many of his peers who often rely on smartphone apps with real-time transit data, John doesn't have a data plan on his phone. Hence, he relies heavily on the terminal station's dashboard interface to get a sense of the bus schedules. Upon entering the terminal, John's eyes quickly scan the vicinity. He's looking for the familiar terminal dashboard, an interface that's become an integral part of his daily routine. He searches for relevant headings or icons that will lead him to the bus routes he needs. The user-friendly design, marked by clearly labelled sections, ensures a seamless navigation process. Given his daily commute, John knows exactly which route he's looking for. As he selects his desired route, he thinks of how grateful he is for this digital aid. With the specific bus number and route name displayed, it confirms he's on the right track. John meticulously scans and interprets the provided time schedules. It's vital for him to plan his departure from the terminal and ensure a timely arrival downtown. Having gathered the necessary information, John concludes his session. Familiar with the basic principles of similar applications, he effortlessly navigates back to the home screen of the dashboard. Ready to start his day, he steps away, making room for another transit user, all the while appreciating the simplicity and effectiveness of the kiosk system.

Task Walkthrough Example #1: John

Step Number	Step Description	User's knowledge level to perform the step?	User's motivation to perform the step?	Comments
1	Launch the terminal station dashboard interface.	John has a basic understanding of recognizing the terminal's main dashboard, with the signage.	To start his journey and view the bus schedules.	This is the most straightforward step, assuming the terminal has a clearly visible kiosk.
2	Navigate to the "Route Information"	John knows he needs to view the routes so he looks for relevant	To determine the next bus departing from Bowness to	There should be clearly labelled sections for ease

		headings or icons.	downtown during the morning rush hour.	of navigation.
3	Select the desired route from Bowness to the City of Calgary downtown.	Given that John frequently commutes this route, he knows the specific bus number or route name.	To verify the timings and ensure he doesn't miss his bus.	The dashboard should list buses either by number or destination for clarity.
4	View the timings of the next few buses departing.	John can easily scan and interpret time and schedules.	To plan his departure from the terminal and ensure timely arrival downtown.	A clear and concise presentation of timings is essential to prevent confusion.
5	Finish the session and navigate back to the home screen of the dashboard.	John understands the basic principle of existing applications or returning to home screens.	To leave the kiosk for another transit user.	There should be a clear button which says "Return to the main menu".

Scenario #2:

The Miller family, consisting of Derrick, Layla, their teenage daughter Jenna, and their young son Jayden, were all set for an exciting outing on a bright Saturday morning. They had decided to visit the Telus Science Fair, an event they had been looking forward to for weeks. For a change, and to add a bit of adventure to their day, they chose to take the bus instead of driving.

As they reached the Bowness bus terminal, Derrick took on the responsibility of buying the bus tickets. Even though he wasn't someone who took the bus regularly, the ticket machine at the terminal seemed user-friendly. It had big, clear signs, making him feel confident about using it. He started by looking for the bus that would take them to the Science Fair. With a few simple taps on the screen, he was presented with a list of buses, their timings, and how long each journey would take. After a quick chat with Layla to decide on the best time for them, he moved on to the next step which was purchasing the tickets. Derrick was careful while selecting the tickets. He chose two adult tickets first. Then, he picked a youth ticket for Jenna and a child ticket for Jayden. The machine was designed well, with easy-to-see buttons and clear age labels, ensuring he didn't get confused. Once the tickets were selected, Derrick proceeded to the payment section. Being familiar with using cards for payments, he quickly went through the

process. After paying, a confirmation screen popped up, showing details of their purchase. Derrick double-checked everything, especially the tickets for the kids, to make sure everything was in order. With their tickets in hand, the Miller family found a spot to wait for their bus. As they waited, Derrick felt thankful for the hassle-free experience with the ticket machine. It was a good start to what promised to be a fun-filled day.

Task Walkthrough Example #2: The Miller Family

Step Number	Step Description	User's knowledge level to perform the step?	User's motivation to perform the step?	Comments
1	Launch the terminal station dashboard interface.	The Millers recognize the kiosk with clear signage at the Bowness terminal.	To begin the process of selecting their route and buying tickets.	The terminal should have a prominently placed and easily accessible kiosk.
2	View the presented bus routes suitable for their trip.	They just need to read and compare the options presented.	To pick the most convenient route for their journey.	A clear display of route numbers, departure times, and durations is essential.
3	Locate the bus which departs to Telus Science Fair as the destination	Moderate knowledge is required for The Millers to understand how to select locations on the dashboard.	To ensure they get route options specific to their journey.	Intuitive search or selection functionality can enhance user experience.
4	Navigate to the ticket purchasing section.	This involves tapping on a clearly labeled "Purchase Tickets" button hence basic understanding is required.	To buy tickets for their journey.	Clear buttons for smooth navigation.
5	Increase the count for two adult tickets.	There's a clear "+" button next to the adult ticket option.	To secure tickets for the two adults.	Clear sections for each ticket type streamline this step.

6	Increase the count for one youth ticket.	Use a "+" button next to the youth ticket option.	To secure a ticket for their 17-year-old.	Clear age ranges for each ticket type can help in avoiding confusion.
7	Increment the count for one child ticket.	Use a "+" button next to the child ticket option.	To secure a ticket for their 7-year-old.	
8	Proceed to the payment section.	The Millers are familiar with digital payment processes though it is designed to be intuitive.	To finalize the ticket purchase.	Providing multiple payment options can cater to a wider audience.
9	Confirmation screen.	The Millers are prompted that they've successfully purchased the tickets.	To be sure of their purchase and be ready for their trip.	A confirmation screen with clear details can be reassuring.

Scenario #3:

The Edwards family, always up for an adventure, decided to spend their day at Heritage Park. Instead of the usual car ride, they opted for a bus journey, making their way to the Bowness terminal. At the terminal, the prominent ticket kiosk caught their attention. This machine would guide them to the right bus for Heritage Park. The screen displayed various bus options, and after considering the timings and routes, they settled on one that fit their plan. Mr. Edwards took charge of the ticket-buying process. He selected two adult tickets first. When it came to the children, he mistakenly chose an adult ticket for their teenage daughter, Sarah, and a child ticket for their younger son. Before finalizing the payment, they realized the oversight. Sarah, being a teenager, qualified for a youth ticket, not an adult one. Thankfully, the kiosk was designed with user errors in mind. Mr. Edwards easily cancelled the previous selection and corrected his mistake by choosing a youth ticket for Sarah. With the ticket selection sorted, they proceeded to the payment section. The process was straightforward, and in no time, a confirmation screen appeared, signalling the successful purchase of their tickets. The Edwards family felt at ease. The kiosk, with its simple design and clear instructions, accommodated their error and still ensured a

smooth ticketing experience. With tickets in hand, they eagerly awaited their bus, anticipating the fun-filled day ahead at Heritage Park.

Task Walkthrough Example #3: The Edwards Family

Step Number	Step Description	User's knowledge level to perform the step?	User's motivation to perform the step?	Comments
1	Launch the terminal station dashboard interface.	The Edwards recognizes the kiosk with clear signage at the Bowness terminal.	To begin the process of selecting their route and buying tickets.	The terminal should have a prominently placed and easily accessible kiosk.
2	View the presented bus routes suitable for their trip.	They just need to read and compare the options presented.	To pick the most convenient route for their journey.	A clear display of route numbers, departure times, and durations is essential.
3	Locate the bus which departs to Heritage Park as the destination	Moderate knowledge is required for The Edwards to understand how to select locations on the dashboard.	To ensure they get route options specific to their journey.	Intuitive search or selection functionality can enhance user experience.
4	Navigate to the ticket purchasing section.	This involves tapping on a clearly labeled "Purchase Tickets" button hence basic understanding is required.	To buy tickets for their journey.	Clear buttons for smooth navigation.
5	Increase the count for two adult tickets.	There's a clear "+" button next to the adult ticket option.	To secure tickets for the two adults.	Clear sections for each ticket type streamline this step.
6	Increase the count for one youth ticket.	Use a "+" button next to the adult ticket option.	To secure a ticket for Sarah, their 13-year-old daughter.	Clear age ranges for each ticket type can help in avoiding confusion.

7	Increment the count for one child ticket.	Use a "+" button next to the child ticket option.	To secure a ticket for their 8-year-old.	
8	Proceed to the payment section.	The Edwards are familiar with digital payment processes though it is designed to be intuitive.	To finalize the ticket purchase.	Providing multiple payment options can cater to a wider audience.
9	They realize they made a mistake by classifying Sarah as an adult, so they cancel	The big cancel button on the payment screen should be easy to locate	They would like to pay for the cheaper ticket for their daughter	
10	They repeat steps 6 and 8 to buy the correct tickets this time	They have the knowledge from performing these steps before	They need to buy tickets	
11	Confirmation screen.	The Edwards are prompted that they had successfully purchased the tickets.	To be sure of their purchase and be ready for their trip.	A confirmation screen with clear details can be reassuring.

Scenario #4:

Alex Lee, living in Silverado SW, Calgary, was all set for a fun gaming day with his cousin in Nolan Hill NW. They both loved their gaming sessions, making it a regular thing. Reaching the bus terminal, Alex immediately spotted the familiar ticket kiosk. He liked how user-friendly it was, especially since his plans often changed at the last minute. He entered Nolan Hill NW as his destination, and the kiosk quickly showed a list of bus routes. With everything clearly displayed, Alex selected his preferred route without any confusion. Next, he moved to the ticket-buying section. Clicking on "Purchase Tickets", he chose a ticket for one adult. The steps were straightforward, and he appreciated the clear instructions. After picking up his ticket, he proceeded to pay, which was a breeze. But just as he was about to celebrate his efficiency, his phone buzzed. It was a message from his cousin, saying they had to reschedule their gaming day. Alex felt a pang of disappointment, realizing he wouldn't be heading to Nolan Hill NW after all.

Luckily, he recalled the kiosk had a refund option. While he wished the system allowed for a simple ticket scan for refunds, he still managed to navigate the steps quickly. In a short while, his ticket was refunded.

Walking away from the terminal, Alex's mind was already racing with what to do next. He was thankful for a transit system that was as adaptable as he was. Today's gaming plans might be postponed, but with his spontaneous nature, Alex was sure he'd find another exciting thing to do. So he got another ticket and headed downtown in hopes of finding another interesting journey.

Task Walkthrough Example #4: Alex Lee

Step Number	Step Description	User's knowledge level to perform the step?	User's motivation to perform the step?	Comments
1	Launch the terminal station dashboard interface.	Alex Lee doesn't require any specific knowledge to find the kiosk system.	To begin the process of selecting their route and buying tickets.	The terminal should have a prominently placed and easily accessible kiosk.
2	View the presented bus routes suitable for their trip.	Alex just needs to read and compare the options presented.	To pick the most convenient route for his journey.	A clear display of routes, numbers and departure times.
3	Locate the bus which departs to Nolan Hill NW as the destination	Moderate knowledge is required for Alex to understand how to select locations on the dashboard.	To ensure he gets route options specific to his journey.	Search or selection functionality can enhance user experience.
4	Navigate to the ticket purchasing section.	This involves tapping on a clearly labeled "Purchase Tickets" button hence basic understanding is required.	To buy tickets for his journey.	Clear buttons for smooth navigation.
5	Increase the count for one adult ticket.	There's a clear "+" button next to the adult ticket option.	To secure his ticket for the journey.	Clear sections for each ticket type streamline this step.

6	Proceed to the payment section.	Alex is familiar with digital payment processes though it is designed to be intuitive.	To finalize the ticket purchase.	Providing multiple payment options can cater to a wider audience.
7	Confirmation screen.	Alex is prompted that he has successfully purchased the ticket.	To be sure of his purchase and be ready for his trip.	A confirmation screen with clear details can be reassuring.
8	Use the “Refund” button to refund the ticket	Moderate system knowledge is needed to be able to know about/navigate to the refund button.	Realized he had other plans and could not visit his cousin.	It would be more convenient if he could scan his ticket instead of entering the reference number.
9	He repeats steps 2 to 6 to buy a ticket to city hall.	He has the knowledge from performing these steps before.	He needs to buy the ticket so he can find something interesting to do.	

Appendix 1: Stages of Evolution of the Prototypes

Iteration #1: Initial Drawings and Conceptualization

This iteration step involved beginning with rough sketches and brainstorming sessions as a group to visualize the core features and functionality of the system. The sketches you will see in this section for each prototype are low-fidelity and focus on broad concepts rather than detailed design.

Iteration #2: Basic Prototyping and Interaction

Building on our initial sketches these drawings will be more structured and showcase a flow of interactions providing a clearer understanding of the user's journey through the system.

Iteration #3: Detailed Prototyping

Highly detailed, these sketches are a near-accurate representation of what an implementation would look like for the prototype with representations of buttons, menus, and other interactive elements.

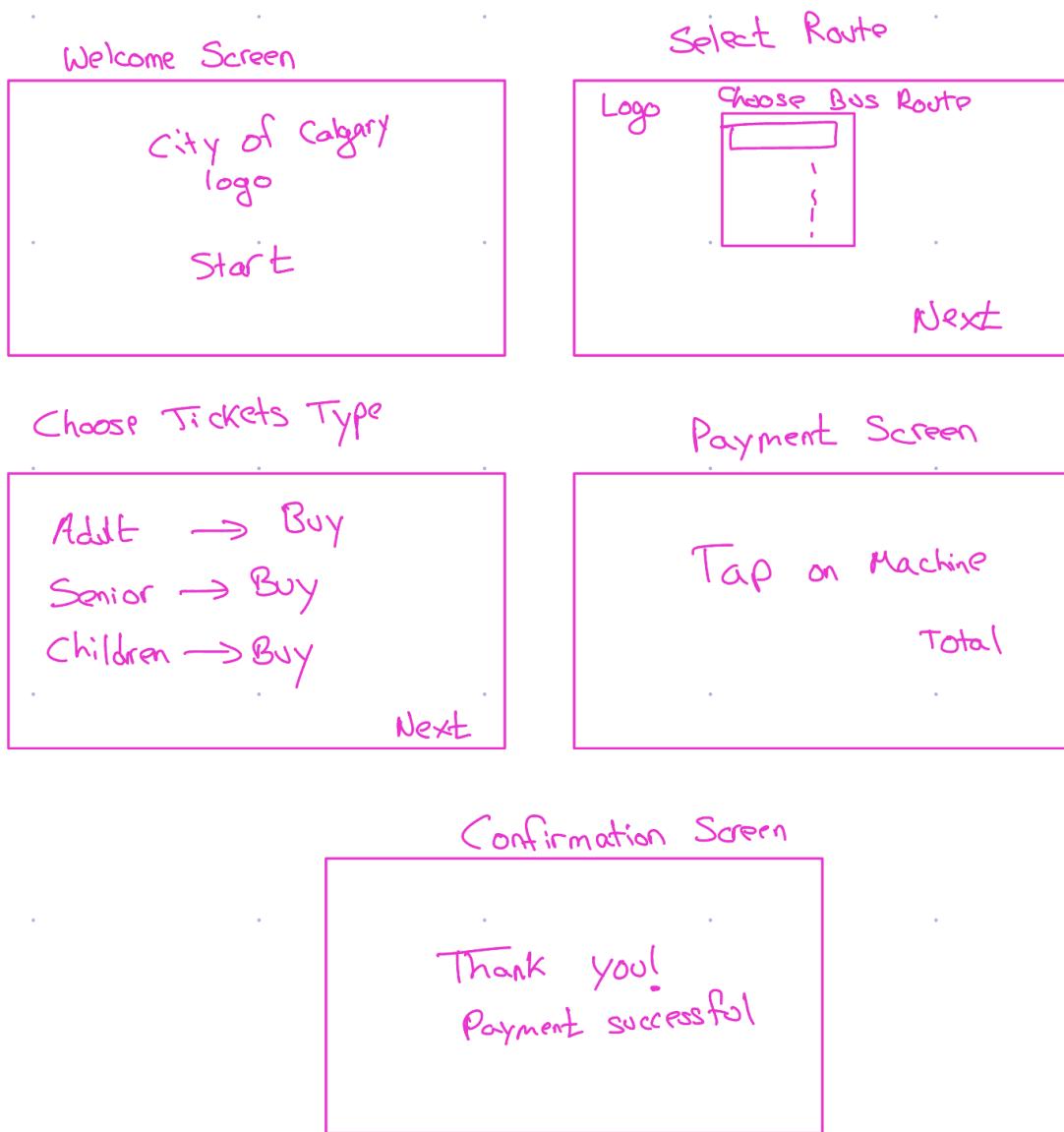
We decided to stay with paper prototyping across all three iterations as it emphasizes the importance of refining the concept and flow before investing time in building the prototype on a digital mockup platform like Figma. It also allows for quick changes and is ideal for gathering feedback from the user for any revisions.

Appendix 2: Prototype 1-Linear Flow

Iteration #1: Initial Drawings and Conceptualization

Prototype 1: Linear Flow

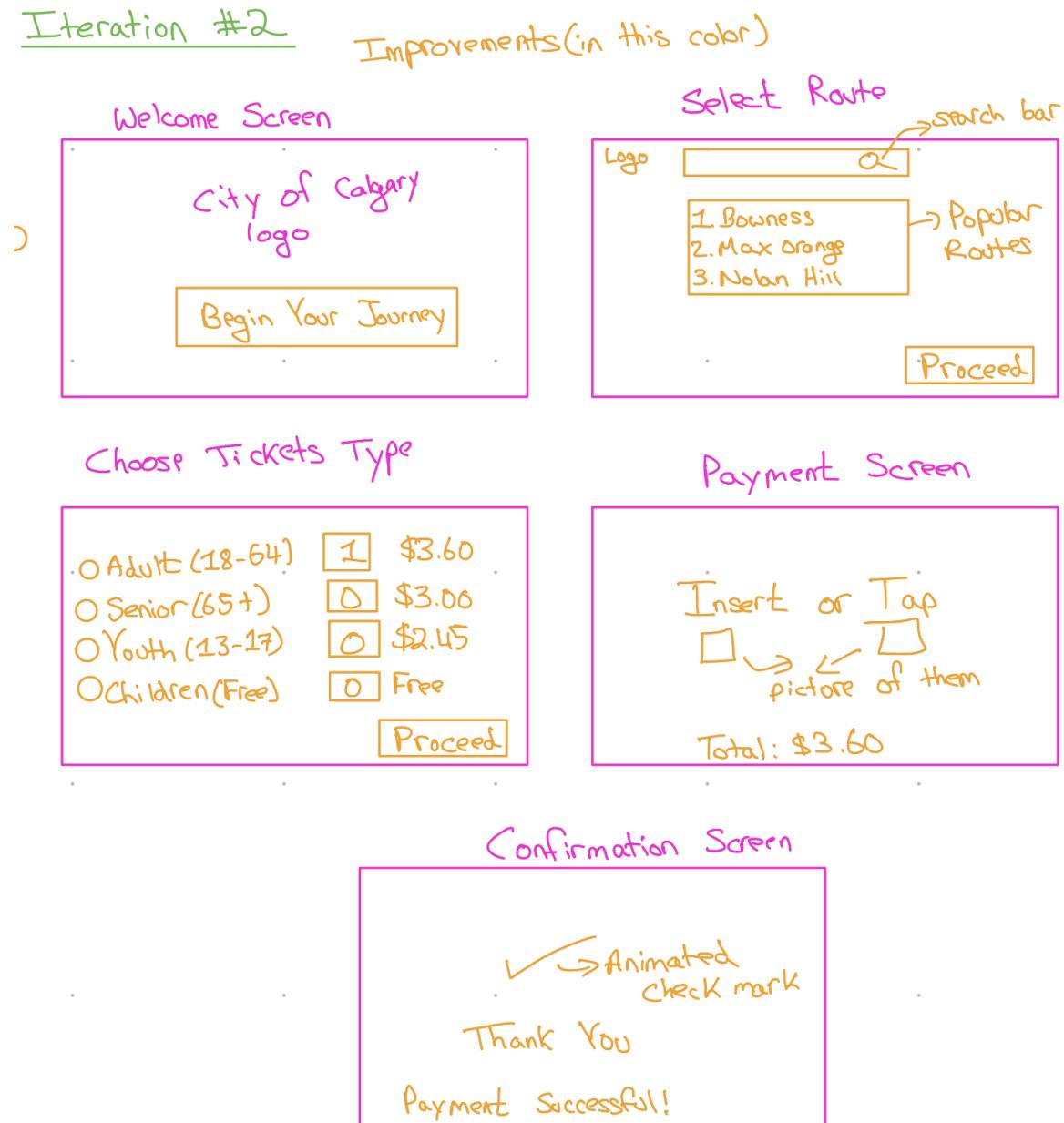
Iteration #1



In the initial phase of our design, the iteration one prototype was geared towards establishing a fundamental system. The strengths of this iteration lay in its simplicity and minimalist approach, ensuring a user-friendly interface. However, its basic design and limited functionality, which

missed out on features such as a dynamic bus route viewing indicate areas for improvement. To enhance the user experience, a more intuitive and dynamic interface was necessary and it was evident the additional features would greatly benefit future versions.

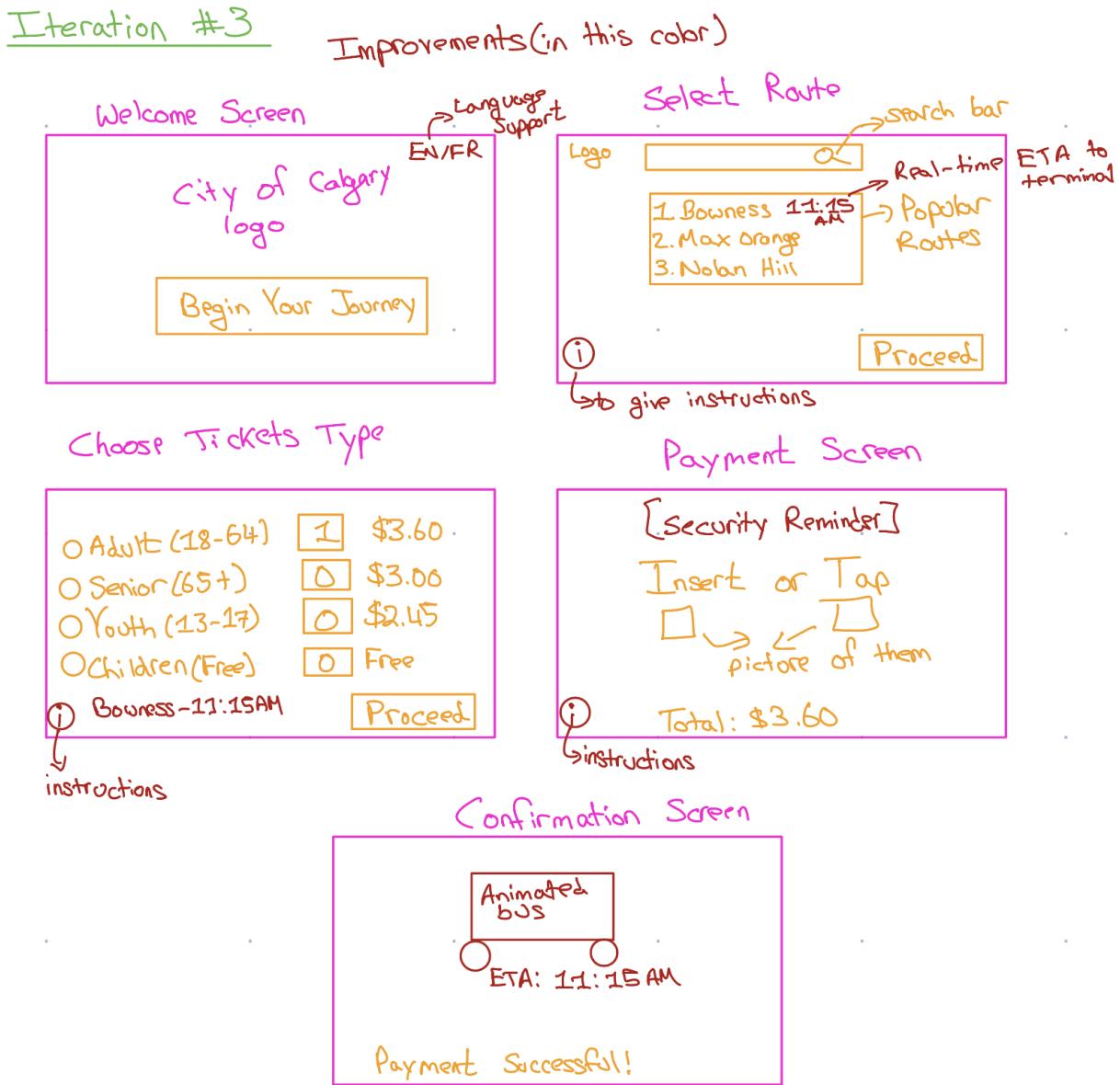
Iteration #2: Basic Prototyping and Interaction



Building upon the previous iteration the improvements are marked in orange, with the iteration the aim was to present a basic layout that would address the shortcomings of its predecessor. The

user experience was enhanced by introducing the search bar in route information. This version took a step forward in offering a better visual and functional appeal. Nonetheless, the iteration still lacked certain aspects such as a real-time bus location or security statements. To truly make this design prototype work we would need to incorporate these advanced features and expand on the current structure.

Iteration #3: Detailed Prototyping



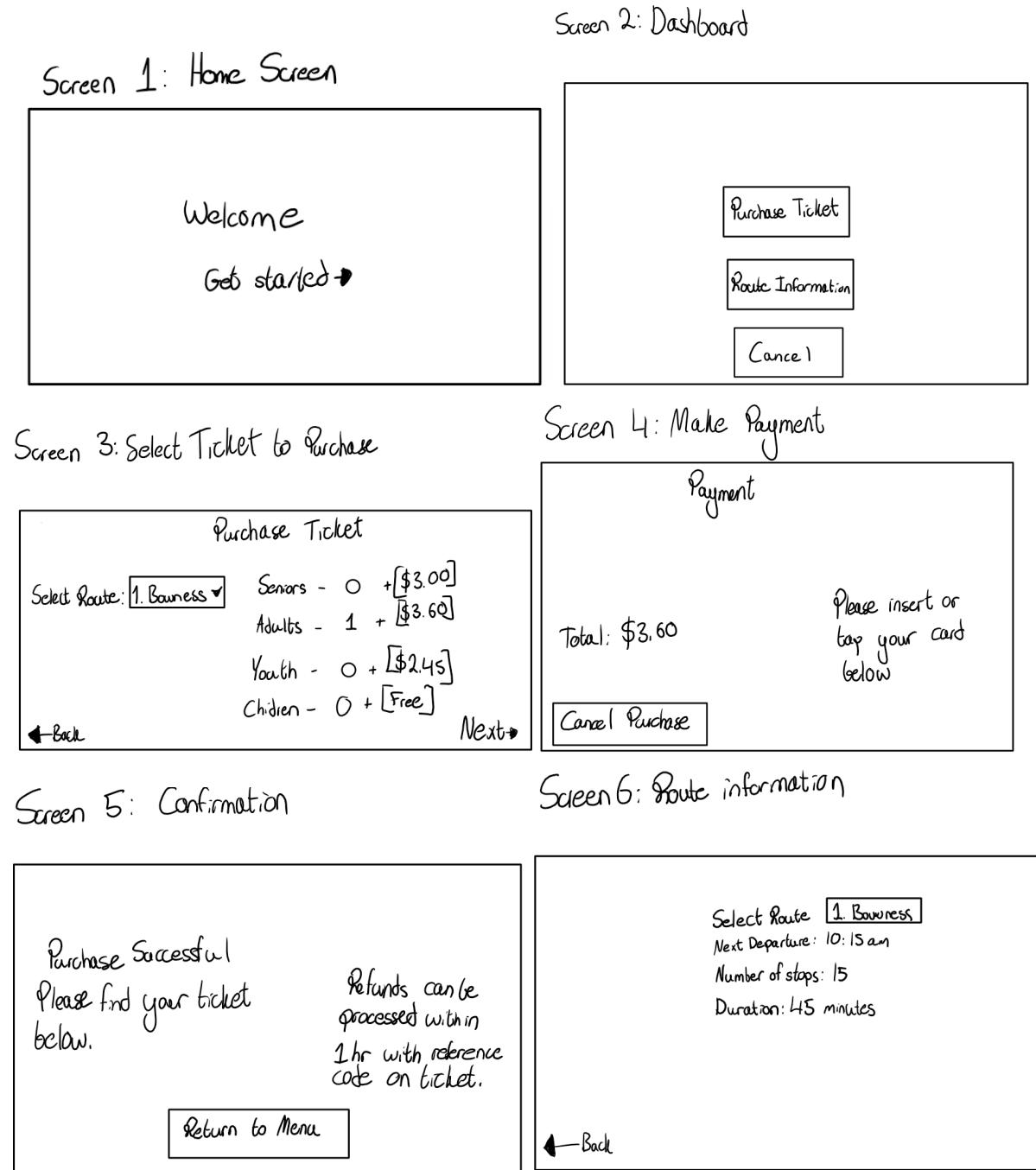
Finally, iteration three emerged as the advanced version of the accumulation of previous feedback from users and technological advancements were introduced to provide a comprehensive user experience. The iterations's dynamic interface includes real-time bus locations, setting it apart from its predecessors. Furthermore, the payment screen is improved by catering visuals for inserting or tapping the card. There are also animation improvements and instructions which provide a polished touch. This iteration has another new feature of language support of English and French as the two national languages in Canada. Like all designs, it wasn't without its challenges. The sheer number of features had the potential to overwhelm some users, and the maintenance required for the real-time functionalities would be continuous. To truly optimize this design, a balance between functionality and simplicity would be essential. This iteration in the future could also be improved by adding a refund screen where the user can either scan or input their ticket barcode.

Sample Key Interaction Tasks of Prototype 1

- Home Screen Interaction: Features smooth transitions and intuitive animations for an engaging introduction.
- Search Functionality: A prominent search bar is located at the top of the interface. Allows users to quickly input their desired destination or bus route number. As users type, real-time suggestions appear which would save time for the user and ensure the accuracy of search results.
- Ticket Type Selection: Users can select their ticket type based on their age group. Each ticket type is accompanied by a brief description and it's associated cost.
- Payment Screen: Presents users with detailed information on the method of purchase. Designed for ease of understanding and quick transaction completion.
- Payment Confirmation: Once the payment is processed, users receive a confirmation. Ensures users know that their transaction has been completed successfully.

Appendix 3: Prototype 2-Dashboard

Iteration #1: Initial Drawings and Conceptualization



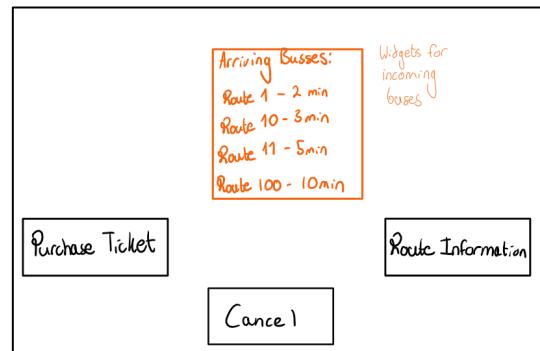
This prototype was conceived based on the idea that users needed an interface with all the information about the bus routes easily accessible. In order to facilitate this, each screen shows certain aspects of bus information on individual screens for clarity. However, it can be better. For example, users cannot see where individual bus stops and would thus rely on being familiar with

the area in order to get to their destination. Thus, the system was not self-contained and would break some of the use cases.

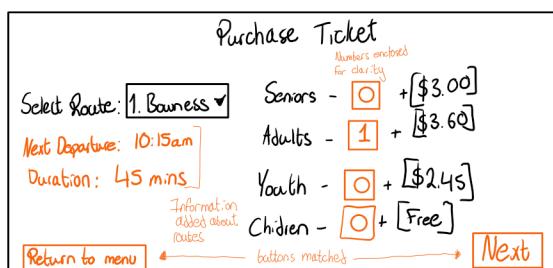
Iteration #2: Basic Prototyping and Interaction

Screen 2: Dashboard

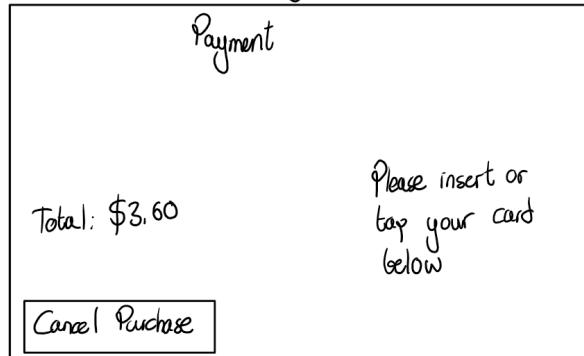
Screen 1: Home Screen



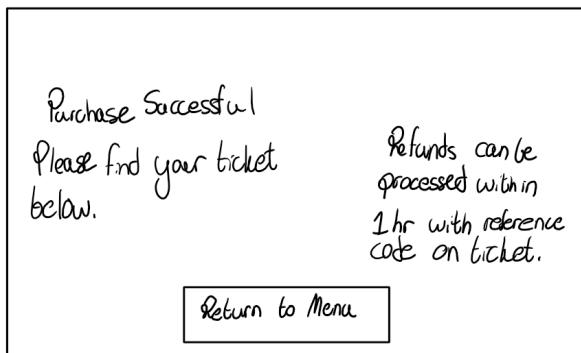
Screen 3: Select Ticket to Purchase



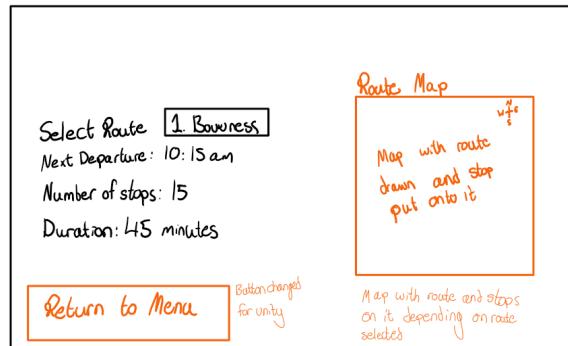
Screen 4: Make Payment



Screen 5: Confirmation



Screen 6: Route information



Iteration 2 has some improvements (in orange) to the interface mainly for clarity. For example, buttons were changed to match each other rather than using the arrows in the previous iteration. But there are also ease-of-use features added. For example, if a user is familiar with a bus route,

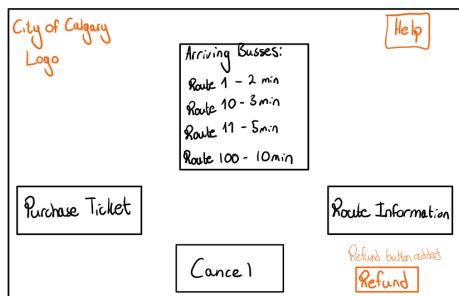
the new widget on screen 2 should be sufficient for them to see all the route information they need. Furthermore, if a user is not familiar, then the route map added to the route information screen will be able to tell them all they need to know about how to get where they need to go.

Iteration #3: Detailed Prototyping

Screen 1: Home Screen



Screen 2: Dashboard



Screen 3: Select Ticket to Purchase

Seniors (65+)	- <input type="radio"/>	+ <input checked="" type="radio"/>	[\$3.00]
Adults (18-64)	- <input type="radio"/>	+ <input checked="" type="radio"/>	[\$3.60]
Youth (13-17)	- <input type="radio"/>	+ <input checked="" type="radio"/>	[\$2.45]
Children (0-12)	- <input type="radio"/>	+ <input checked="" type="radio"/>	[Free]

Screen 4: Make Payment

Screen 5: Confirmation

Screen 6: Route information

Screen 7: Refund Screen

Screen 8: Refund Confirmation

This iteration was focusing on polishing the interface and ensuring completeness of the interface. Before, we did not include a refund screen for the reference code to be inputted. Thus, our system was not self-sufficient and did not meet our user requirements. The welcome screen also had a language button added to switch between English and French. Furthermore, all screens were outfitted with a City of Calgary logo and a help button. The logo helps in making the interface look more professional and unified. While the help button allows for assistance where needed. Finally, on the ticket purchase screen, we added age ranges for each age group such that a user would know what kind of ticket to purchase.

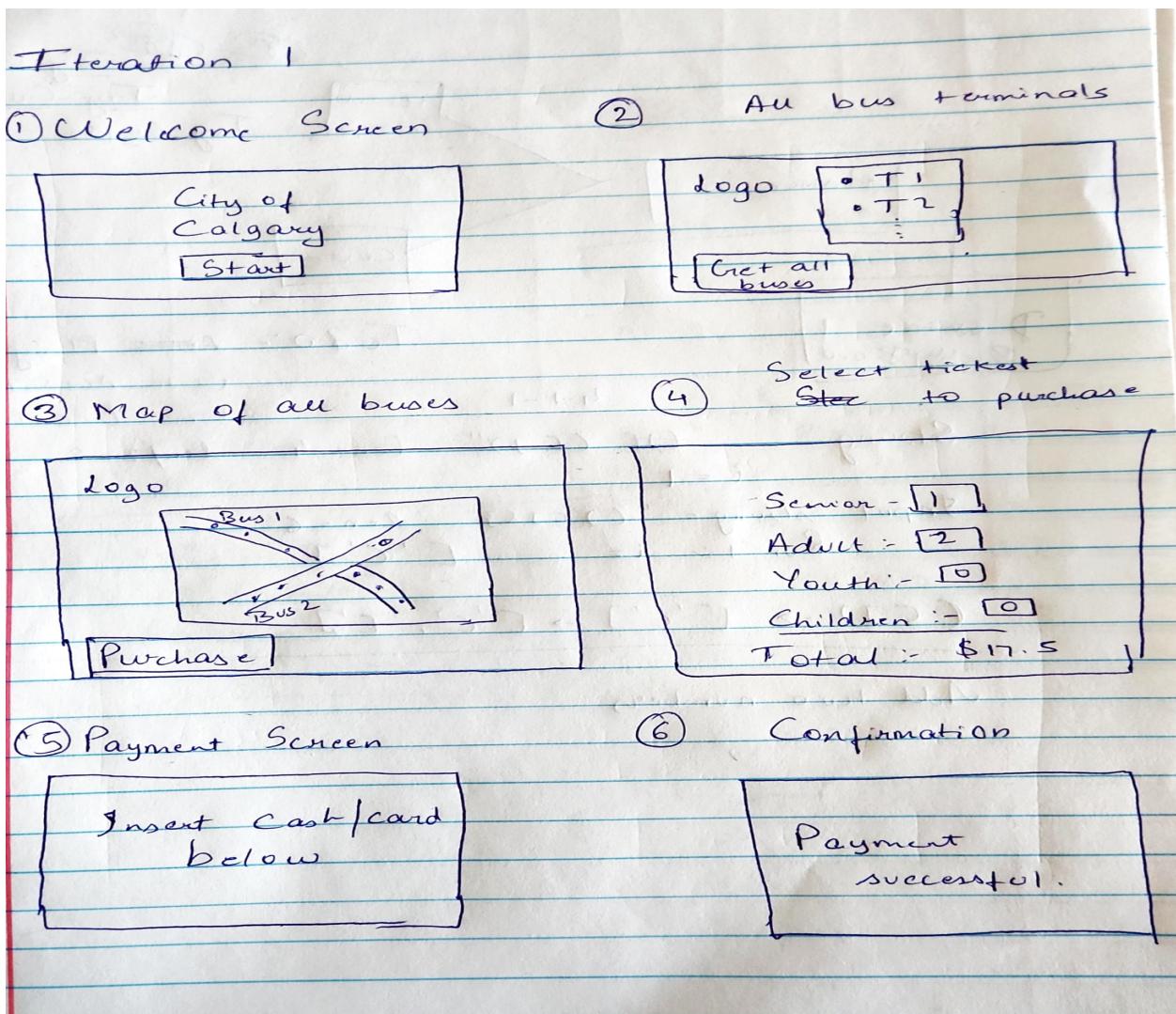
Sample Key Interaction Tasks of Prototype 2

1. The first key interaction is simply purchasing a ticket. A user would press the “Get Started” button on the welcome screen and then they would press the “Purchase Ticket” button on the dashboard screen. On the following screen, the “Purchase Ticket” screen, a user would select their route, in this case, Bowness, and then increment their respective ticket type by the amount needed and then press “Next”. Now, they have reached the payment confirmation screen with the total amount due displayed and a prompt to insert or tap their card into the machine. Following that, they will be met with a confirmation screen explaining the refund policy and where to find their ticket. This screen will time out by itself and return to the main menu. Optionally, users can press “Return to Menu” to confirm to themselves that the machine’s state has been reset (for peace of mind).
2. The second key could be checking a bus route. A user would press the “Get Started” button on the welcome screen and then the “Route Information” button on the dashboard screen. Here, they can select their route from the dropdown and view the route information on the map as well as some basic information under the dropdown. Then, they would press “Return to Menu” and find themselves on the dashboard screen again. Now they can purchase their ticket as per the first sample key interaction.
3. The final sample key interaction could be a user purchasing a ticket like in the first key sample interaction. However, it is possible a user changes their mind or makes a mistake. In this case, they would want to process a refund. Once the user is on the welcome screen, they will press “Get Started” again. Then on the dashboard screen, they will press

“Refund”. On the refund screen, the user will enter the reference code found on their ticket and press “Process Refund”. The user will be met with a confirmation screen at which point they can press “Return to Menu”, but the screen will return to the welcome screen by itself eventually.

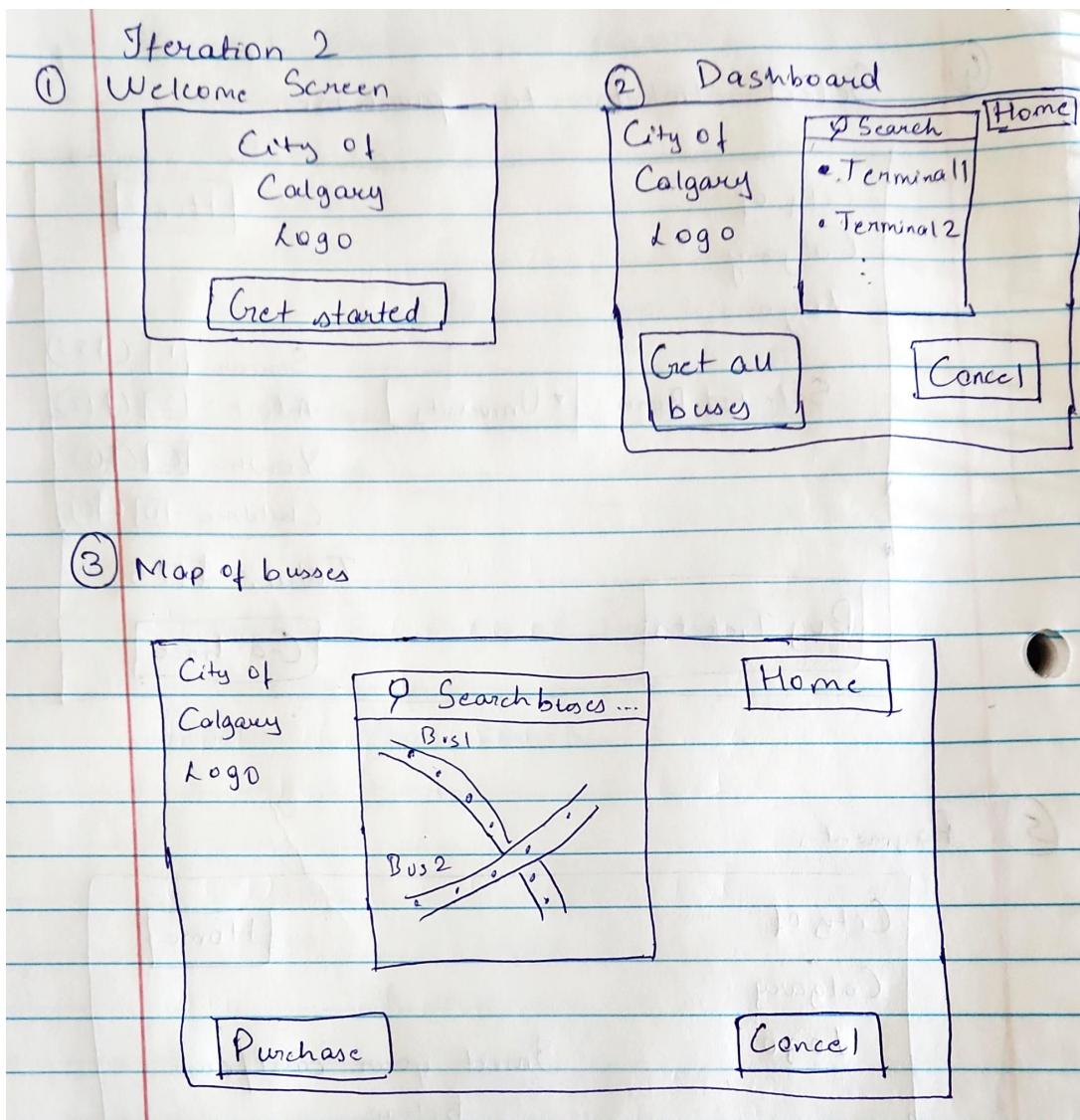
Appendix 4: Prototype 3-Linear Flow

Iteration #1: Initial Drawings and Conceptualization



In the initial phase of our design, we designed a simple interaction flow to ensure a user-friendly interface. However, owing to the simple design we missed features like allowing users to search bus routes and terminals. It slowly became evident that we needed a lot more features to allow the users to easily navigate through the UI.

Iteration #2: Basic Prototyping and Interaction



(4) Select tickets to purchase.

A hand-drawn wireframe for a ticket selection screen. It features a large rectangular frame with rounded corners. On the left side, there's a vertical stack of three boxes: 'City of Calgary Logo' at the top, followed by 'Selected Buses:-' with a dropdown menu containing 'University' in the middle, and 'Buy Tickets' at the bottom. On the right side, there's another vertical stack of three boxes: 'Home' at the top, followed by fare selection fields for 'Senior' (\$5.5), 'Adult' (\$12), 'Youth' (\$0), and 'Children' (\$0), and a total price field 'Total: \$17.5' in the middle, and 'Get back' at the bottom.

(5) Payments

A hand-drawn wireframe for a payment screen. It has a large rectangular frame. On the left side, there's a vertical stack of three boxes: 'City of Calgary Logo' at the top, followed by 'Insert your card/cash below' in the middle, and 'Get back' at the bottom. On the right side, there's a single 'Home' button.

(6) Payment confirmation screen

A hand-drawn wireframe for a payment confirmation screen. It has a large rectangular frame. On the left side, there's a vertical stack of three boxes: 'City of Calgary Logo' at the top, followed by 'Purchase Successful' in the middle, and 'Please find your tickets below' at the bottom. On the right side, there's a single 'Home' button.

For the second iteration, we included additional buttons like Home and Back to allow the user to go back to the previous screens. For the purchase ticket screen, we added an additional button where the user could change the bus and the total fare price for each group. The capacity to search routes and terminals was added. Payment and payment confirmation screens were almost identical with more info about a successful payment being provided to the user.

Iteration #3: Detailed Prototyping

Screen 1 :- Home Screen

City of
Calgary
LOGO

Welcome,
A new way to book transit

Get Started

?

Screen 2 :- All bus ^{terminals} ~~routes~~ (Dashboard)

City of
Calgary
LOGO

Search...
• Terminal 1
• Terminal 2
• Terminal 3

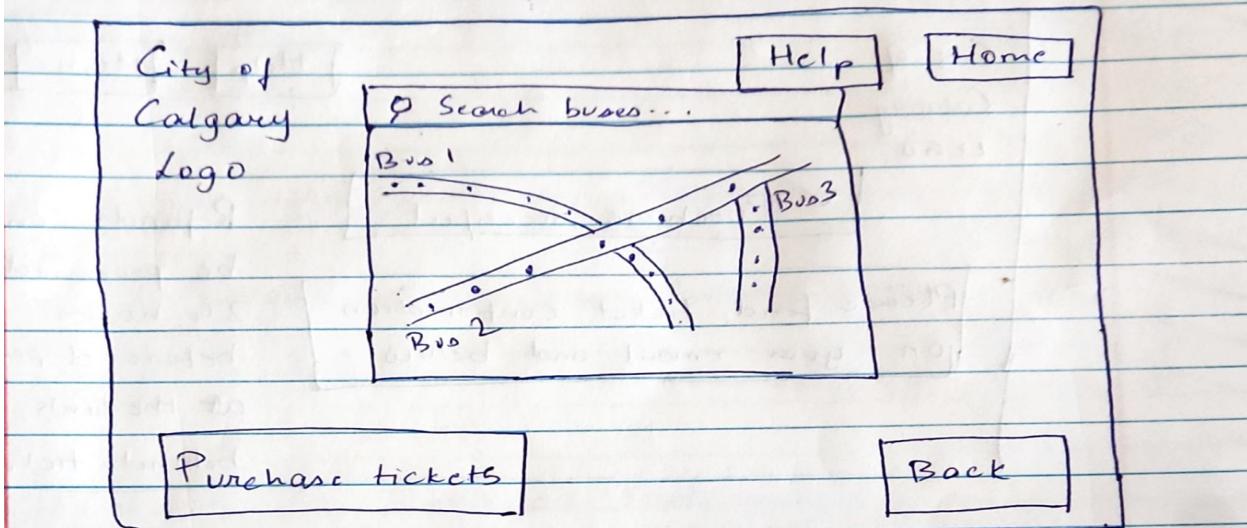
Help

Home

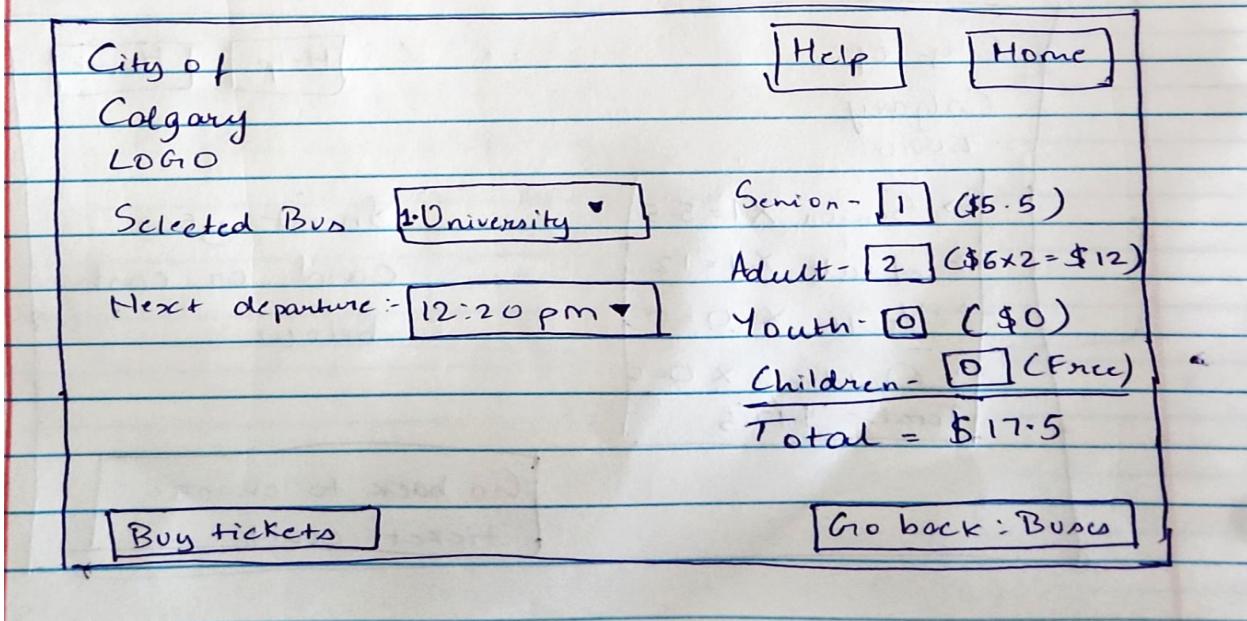
Cancel

Get all bus from this terminal

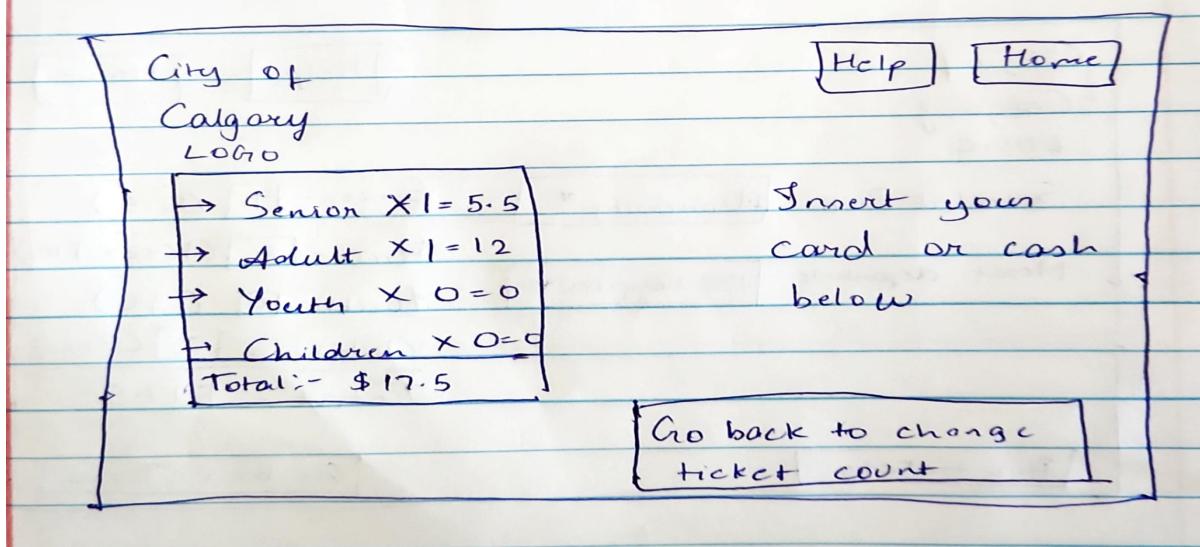
Screen 3:- Map of all buses from selected terminal



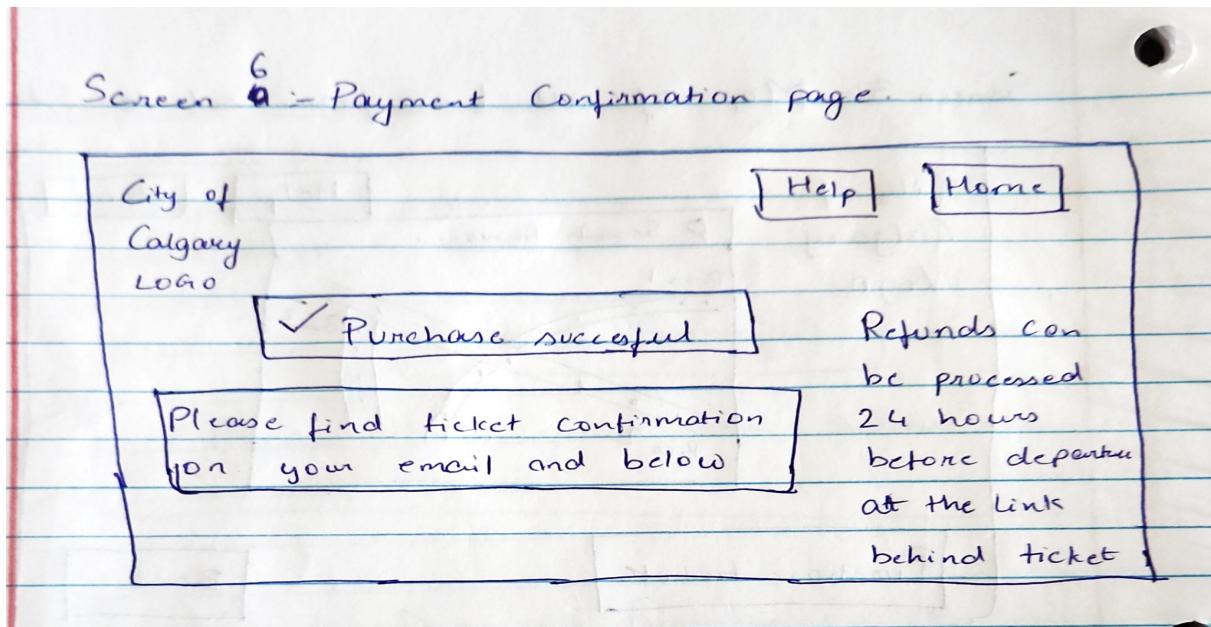
Screen 4:- Select tickets to purchases



Screen 5: Payments



Screen 6: Payment Confirmation page



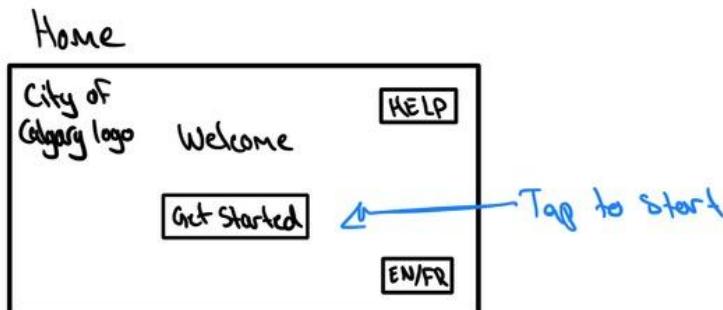
For iteration 3, we included the help button on every screen such that the user could jump to help whenever. We also included the ability for the user to change the terminals dynamically on the purchase ticket screen. For the payment successful screen, we added the refund information as well.

Sample Key Interaction Tasks of Prototype 3

- The first key interaction for the user is to visit the kiosk and click on Get Started. The next part involves the users searching terminals to get all the buses with the terminal. The user has the option of cancelling the session and going back to the home page in case they don't want to buy a ticket. Once a terminal is selected, the user clicks a button to get all busses from the selected terminal. On the next screen, the users see a map of all the buses from the selected terminal. This map can be zoomed in and zoomed out so users can get an overview of different routes at the same time as well.
- The second key interaction includes the user selecting the number of passengers for different age groups. On this screen, the user can change their terminals/buses. Once the user has selected the number of passengers, they can continue to purchase the ticket by clicking on the Buy Tickets button.
- The third key interaction is the payments reviewing the ticket summary and continuing to payment options. Here the user can go back to the ticket screen to change the number of passengers, if they do not see a problem, they move forward to inserting their cards/cash in the kiosk. This is the most important part because the user has to accurately verify the information and pay for the tickets. Once the transaction is successful, the kiosk prints the tickets and the refund information for the tickets.

Appendix 5: Task Walkthrough #1 Prototype Screen Flow

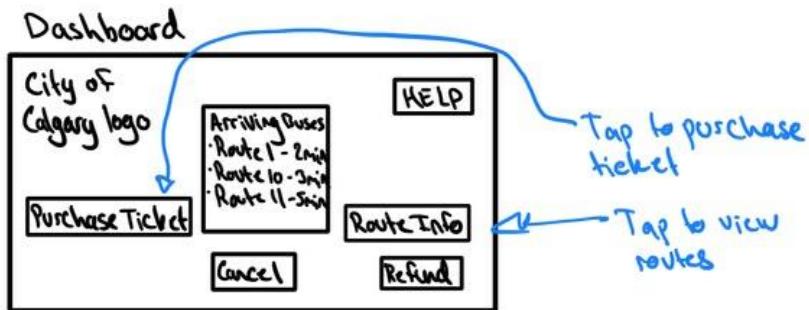
Step 1



John is greeted with a home screen where they can get started, change language, or get help.

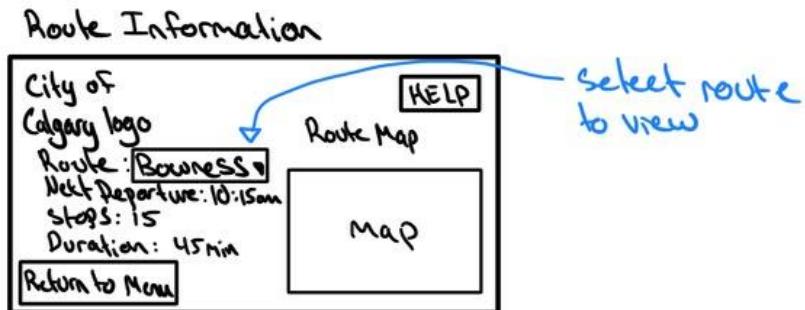
Once they click “Get Started” they will be guided to the main dashboard.

Step 2



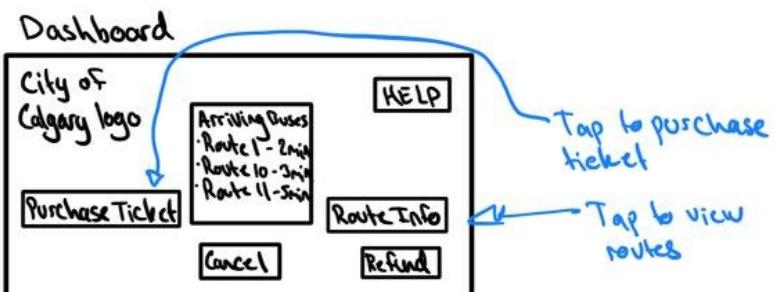
On this dashboard, John is able to view arriving buses and specific routes or proceed straight to purchasing a ticket. The user would like to view the Bowness route, so they click “Route Info”.

Step 3 & 4



John is then shown an info screen where they select the Bowness route. The screen then updates to show info about the route, including the next departure time, number of stops, duration of the route and a map of the route. Once satisfied, John returns to the main dashboard.

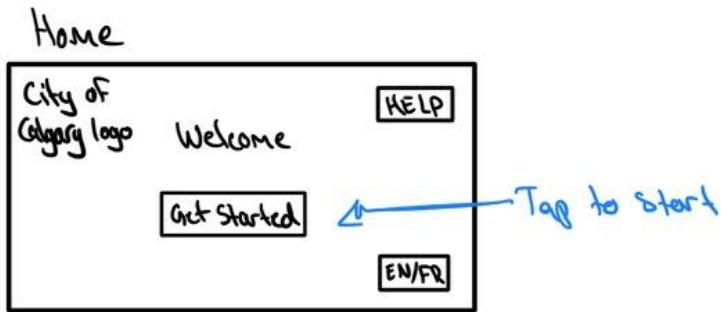
Step 5



John navigates back to the main dashboard

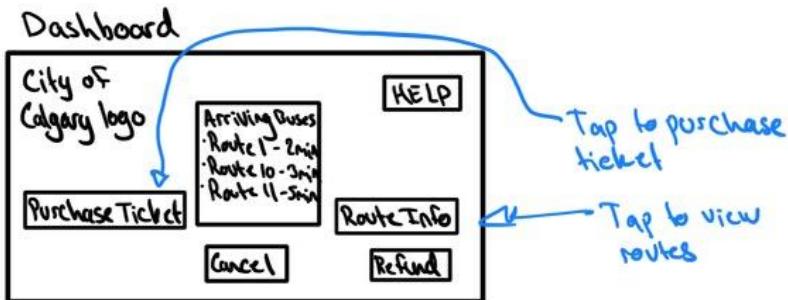
Appendix 6: Task Walkthrough #2 Prototype Screen Flow

Step 1



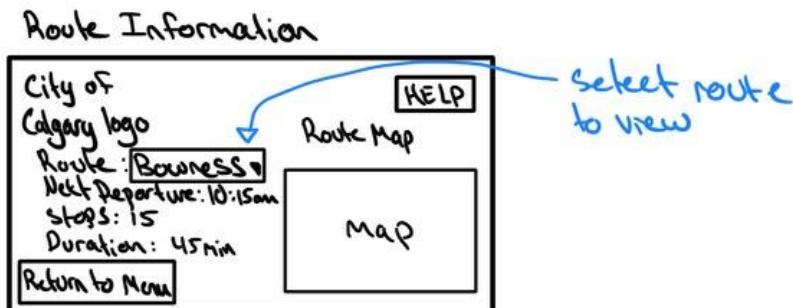
The Millers are greeted with a home screen where they can get started, change language, or get help. Once they click “Get Started” they will be guided to the main dashboard.

Step 2



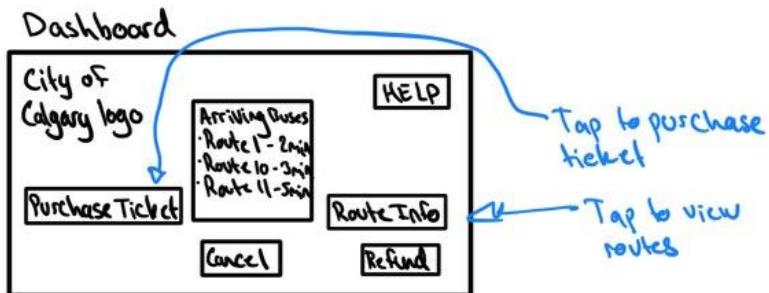
On this dashboard, the user is able to view arriving buses, view specific routes, or proceed straight to purchasing a ticket. The user would like to view the Bowness route, so they click “Route Info”.

Step 3



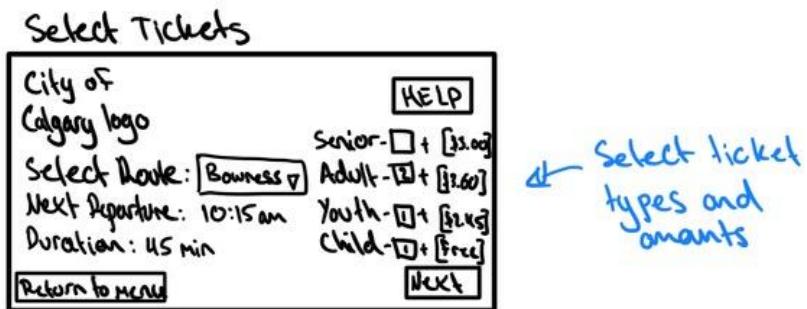
The user is then shown an info screen where they select the Bowness route. The screen then updates to show info about the route, including the next departure time, number of stops, duration of the route and a map of the route. Once satisfied, the user may return to the menu.

Step 4



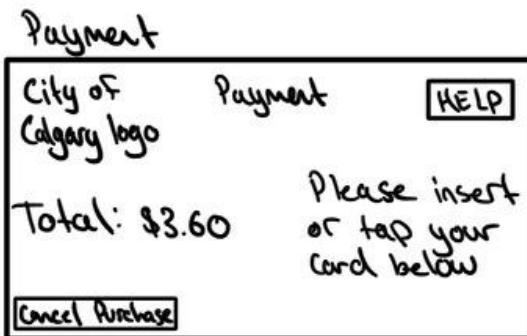
The user is now informed of the route and would like to purchase a ticket for the Bowness route, so they click “Purchase Ticket”

Step 5, 6, & 7



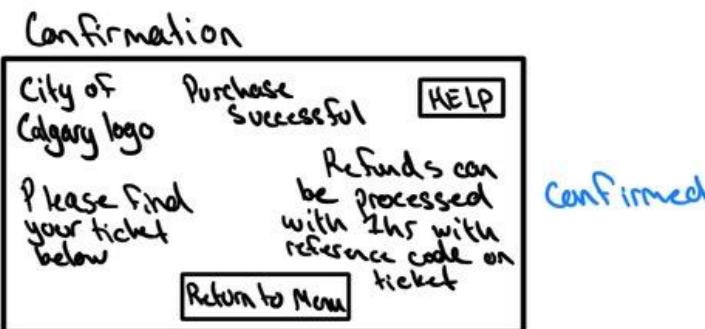
The user is then directed to the select tickets screen, they enter the amount of each type of ticket they would like and click next.

Step 8



The user is then prompted to pay at the kiosk.

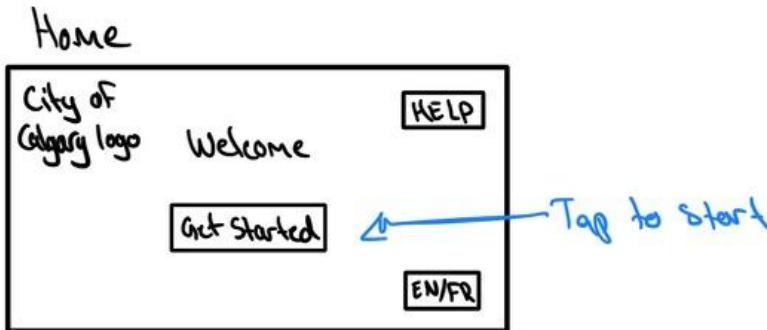
Step 9



Once payment is received, the confirmation screen will appear, displaying some info about their purchase.

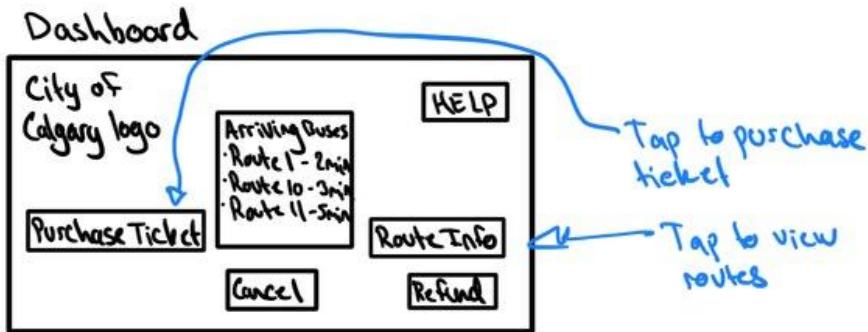
Appendix 7: Task Walkthrough #3 Prototype Screen Flow

Step 1



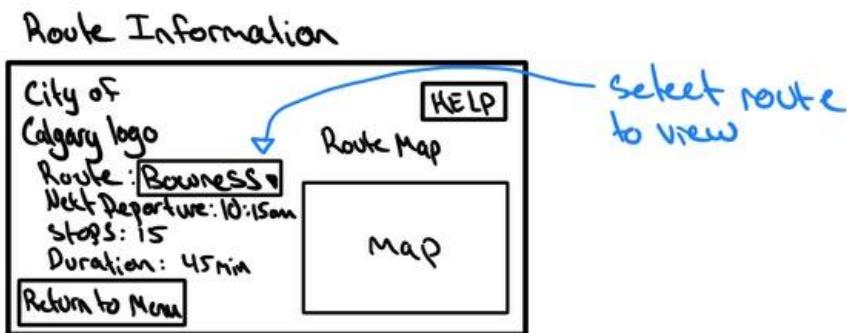
The Edwards are greeted with a home screen where they can get started, change language, or get help. Once they click "Get Started" they will be guided to the main dashboard.

Step 2



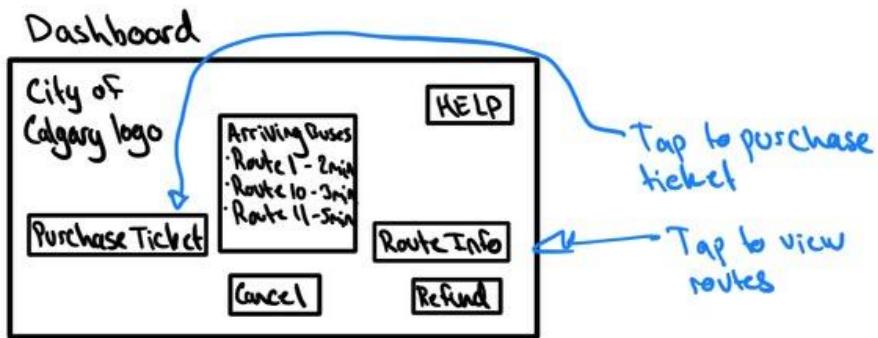
On this dashboard, the user is able to view arriving buses, view specific routes, or proceed straight to purchasing a ticket. The user would like to view the Bowness route, so they click “Route Info”.

Step 3



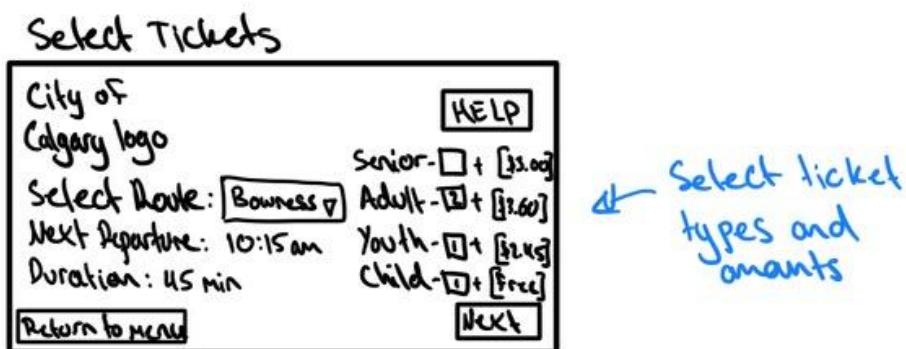
The user is then shown an info screen where they select the Bowness route. The screen then updates to show info about the route, including the next departure time, number of stops, duration of the route and a map of the route. Once satisfied, the user may return to the menu.

Step 4



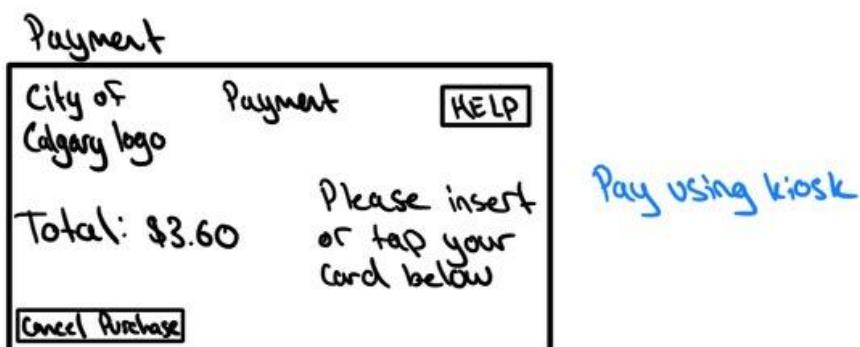
The user is now informed of the route and would like to purchase a ticket for the Bowness route, so they click "Purchase Ticket"

Step 5, 6, & 7



The user is then directed to the select tickets screen, they enter the amount of each type of ticket they would like and click next. The Edwards accidentally entered Sarah as an adult.

Step 8



The user is then prompted to pay at the kiosk. They realize that they made a mistake by classifying Sarah as an adult, so they click cancel.

Step 9

Select Tickets

City of Calgary
Logo

Select Route: Bowness ✓

Next Departure: 10:15am

Duration: 45 min

Senior (65+) - + [\$3.00]
Adult (18-64) - + [\$3.60]
Youth (13-17) - + [\$2.45]
Child (0-12) - + [Free]

Return to Menu Next

← Select ticket types and amounts

They are returned to the select tickets screen where they correct their error

Step 10

Payment

City of Calgary logo Payment HELP

Total: \$9.65 Please insert or tap your card below

Pay using kiosk

Cancel Purchase

They pay at the kiosk

Step 11

Confirmation

City of Calgary logo Purchase Successful HELP

Please find your ticket below Refunds can be processed with 1hr with reference code on ticket

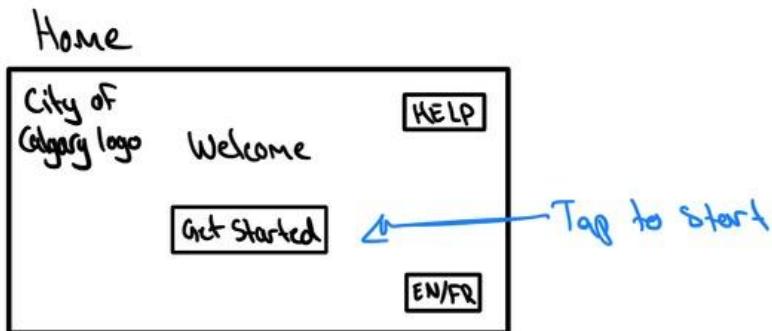
Confirmed

Return to Menu

Once payment is received, the confirmation screen will appear, displaying some info about their purchase.

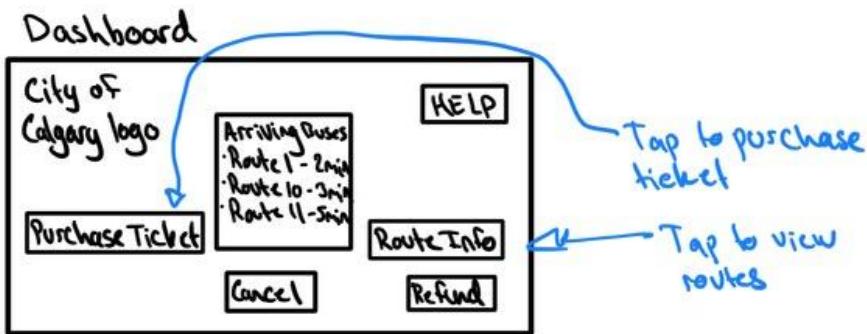
Appendix 8: Task Walkthrough #4 Prototype Screen Flow

Step 1



Alex is greeted with a home screen where they can get started, change language, or get help. Once they click “Get Started” they will be guided to the main dashboard.

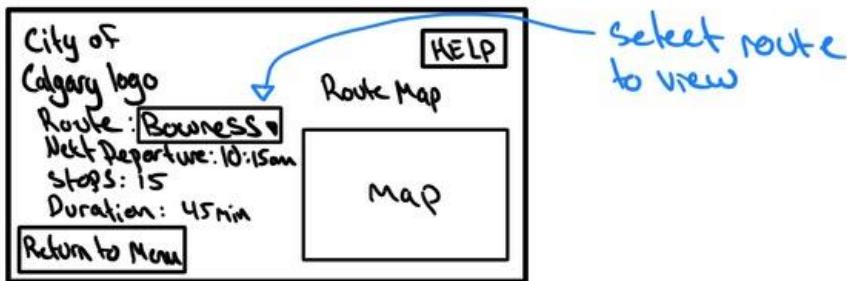
Step 2



On this dashboard, the user is able to view arriving buses, view specific routes, or proceed straight to purchasing a ticket. The user would like to view the Bowness route, so they click “Route Info”.

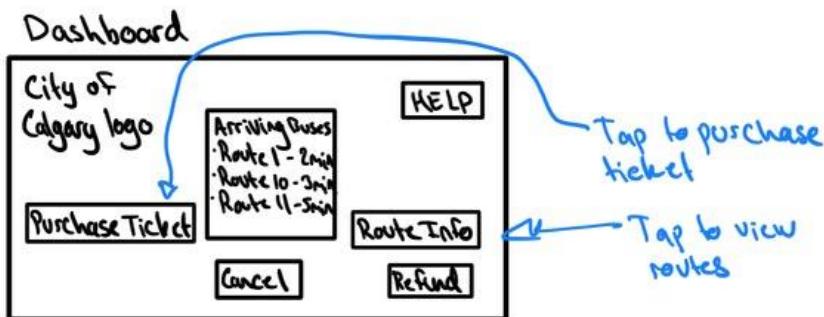
Step 2

Route Information



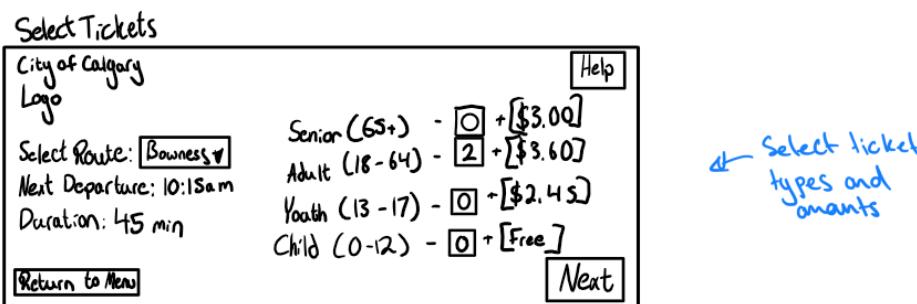
The user is then shown an info screen where they select the Bowness route. The screen then updates to show info about the route, including the next departure time, number of stops, duration of the route and a map of the route. Once satisfied, the user may return to the menu.

Step 3



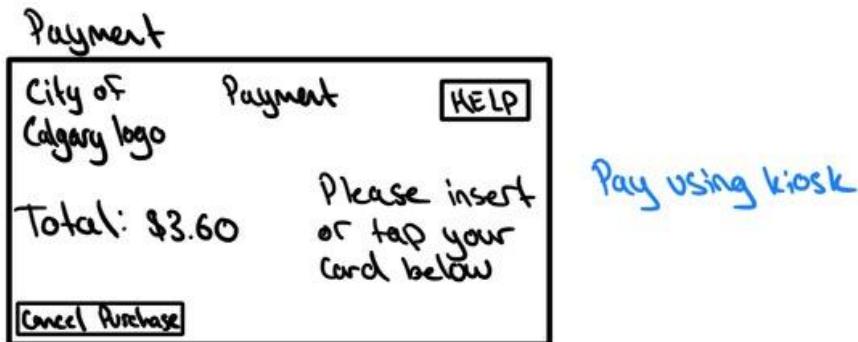
The user is now informed of the route and would like to purchase a ticket for the Bowness route, so they click "Purchase Ticket"

Steps 4 & 5



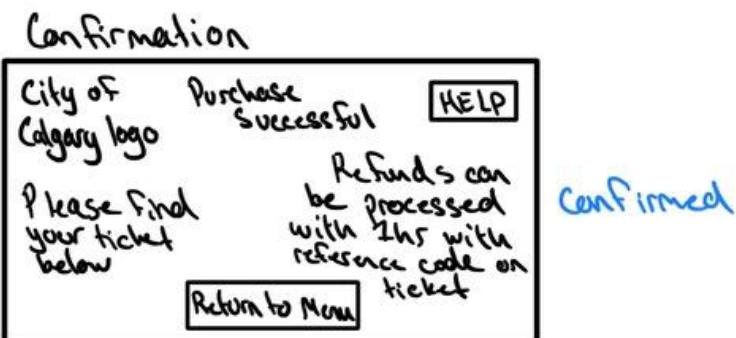
The user is then directed to the select tickets screen, here they enter the amount of each type of ticket they would like and click next.

Step 6



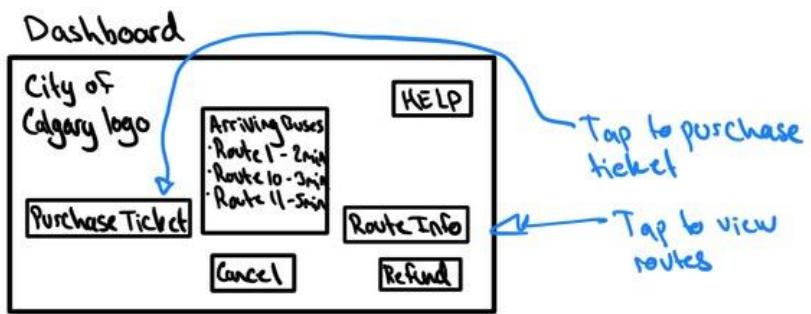
The user is then prompted to pay at the kiosk.

Step 7



Once payment is received, the confirmation screen will appear, displaying some info about their purchase.

Step 8



The user would like to refund their ticket so they click refund.