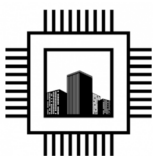


# Touchless Transit Experience (TTE) App



PHOTO BY NICK PROCAYLO SOURCE: VANCOUVER SUN

Proposal to TransLink's Open Call for Innovation



UBC  
Smart City

2020 | SEPTEMBER 24



# THE CHALLENGE

In normal times, high quality public transit is a public good that contributes to the reduction of GHGs, decreases traffic congestion, and allows us to access the city without investing in a private vehicle, a luxury that many cannot afford.

But these are not normal times. The movement of people in an enclosed space has transformed a public good into a public risk. In an unprecedented approach, TransLink urged riders to stay home, avoid unessential trips, or consider alternative modes of transportation. Since the height of the COVID-19 pandemic in March 2020, Vancouver's transit system has seen, at times, as much as 83% decline in ridership.

However, public transit continues to be a lifeline service for many individuals in Metro Vancouver, especially health care professionals, essential workers, and underprivileged communities. UBC Smart City recognizes that transit service must continue operating at the highest efficiency possible and with the best safety measures in place.

While commuters began returning to the transit system in May during BC's phased reopening, TransLink only recorded 16 million boardings in July - 40% of the ridership compared to the same month the previous year. The dramatic drop in ridership suggests that potential riders are worried about catching the COVID-19 virus on a bus, Skytrain, or SeaBus. A study conducted by the US Center of Disease Control and Prevention showed that SARS-COV-2 remains viable on plastic and stainless steel surfaces for up to 4–7 days. Considering the many shared surfaces on transit vehicles such as "next-stop" buttons and cords, we decided to design a solution that reduces touchpoints to decrease user anxiety and help prevent the spread of COVID-19.

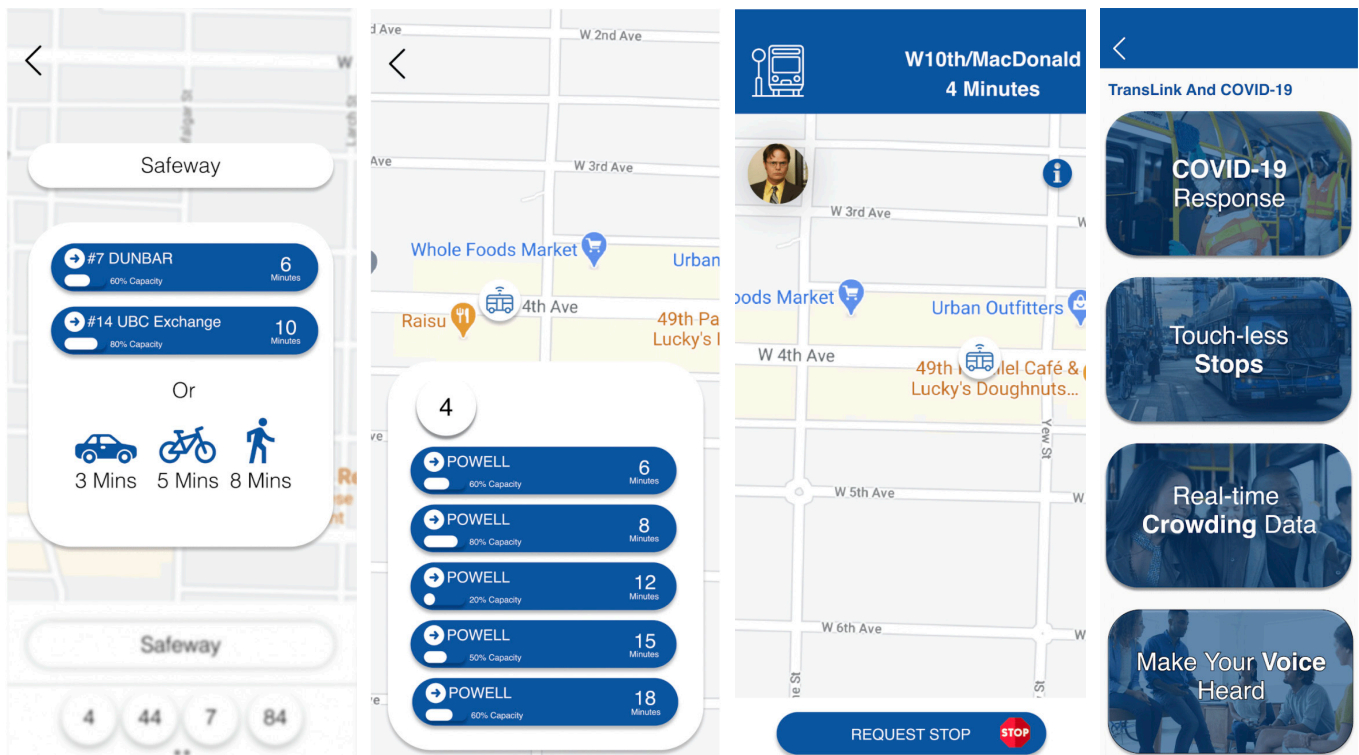
UBC Smart City is introducing the Touchless Transit Experience (TTE) app that will allow users to request stops on a bus directly from a smartphone. This app will enable hesitant transit users to take their safety into their own hands and reduce the number of shared touchpoints on TransLink buses. The TTE app will also focus on improving the user experience including public engagement opportunities, crowding data, and Translink's COVID-19 safety updates.

UBC Smart City's TTE app is an additional safety measure that TransLink can implement to protect the people who rely on transit, and restore public trust in the public transit system. This is important now more than ever as increases in personal vehicle use during the recovery phase of the pandemic are setting TransLink back in its goal to build a liveable region and protect the environment through sustainable transportation. Further, UBC Smart City believes that reducing common touch points has public health benefits and could improve transit ridership even after COVID-19. To restore pre-pandemic ridership and further Metro Vancouver's regional transportation goals, UBC Smart City looks forward to partnering with TransLink to make the Touchless Transit Experience app a reality!

# THE SOLUTION

The TTE app will allow users to request bus stops through their personal smartphone device, using the smartphone's bluetooth connection and a bluetooth low energy (BLE) sensor installed in the bus to receive the phone signal. The sensor is connected to a switch that will relay the signal to the bus driver and illuminate the "next stop" sign. The TTE app will be available in both the Apple App Store and the Google Play Store. It will be developed in React Native and could be hosted using servers or by Amazon Web Services, for cost-effectiveness.

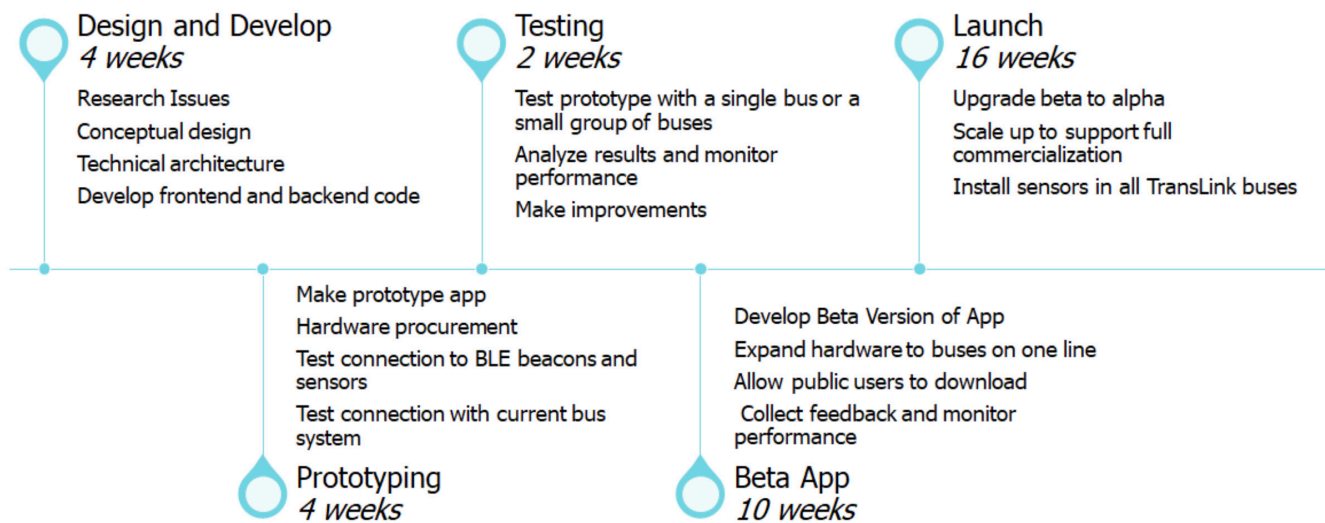
Using data from TransLink's automatic passenger counters, the app will display a percentage capacity for each transit vehicle before boarding. This assists riders in making informed decisions about their travel options, and can nudge riders to take less crowded routes, helping to soften peak transit demand. To further soften demand, walking, biking, and driving times will be displayed when an address is entered into the app. The Google Maps API will be incorporated in the backend to support this feature. Similarly, the API can be used to send notifications to the user's device as their next stop comes up. A "More Info" page will allow TransLink to load any additional information into the app such as TransLink's safety response. A public engagement section will allow local residents to connect with TransLink not just as a service provider, but as part of the Metro Vancouver community. Residents can learn about upcoming projects, ways to get involved, surveys, and other announcements from TransLink.



*Conceptual wireframes for the Touchless Transit Experience app*

# IMPLEMENTATION

UBC Smart City recognizes the importance of a robust roll-out plan for the TTE app. Upon approval, the frontend and backend development of the TTE app will commence. Prototyping will immediately follow and several testing phases are planned to provide opportunities to make improvements. For the first public release, the installation of bluetooth sensors that interface with the bus systems will be expanded to one entire bus line (eg. Rapidbus Line). Upon a successful experimental phase, all transit vehicles will be gradually equipped with the hardware. The full implementation of the Touchless Transit Experience (TTE) app is projected to be in Summer 2021.



# RISK MITIGATION

## Privacy

Our app will not collect personal information, nor require users to make an account. If we decide to implement a feature such as mobile payments that does require personal information, this feature will be optional, and will use well-developed security methods.

## Popularity & Competition

While multiple apps already provide transit departure times, our app has the unique feature of requesting stops, plus TransLink-specific opportunities for tips and engagement that would be more challenging to implement on an existing app. To increase awareness and adoption of the TTE app, it could be advertised on TransLink's website and social media, the Buzzer Blog, advertisements inside and outside the bus, and in SkyTrain stations.

## Benefit for non-users

The app reduces everyone's risk of exposure to COVID-19 on transit because we anticipate that less people will be touching the "next-stop" cords or buttons.

**Connectivity** The consequences of momentary connectivity issues are expected to be minimal as users can always use the traditional “next-stop” button and cord.

**Abuse** To prevent users from requesting stops without the intention of disembarking, the app could limit the number of times a stop can be requested in a period of time by app users (i.e. a stop can only be requested twice every 5 minutes).

**Access** We will design the app to ensure compatibility with screen reader applications to promote accessibility for the visually impaired.

## FINANCIAL PLAN

The TTE app will be primarily funded by Translink, as part of the broader Translink customer service portfolio. While app development can cost thousands of dollars, we propose offering our time and expertise to help develop it. While we would still need the help from an expert, this could significantly reduce the labour costs associated with the app. Other costs include the BLE sensors and integration with existing next stop systems, which are relatively cheap but would still add up over TransLink’s 1600 buses. In addition to the financial contributions, we would request from TransLink:

- Access to passenger counter data for crowding information
- Ability to connect BLE hardware and sensors in buses for requesting stops
- Permission to use the TransLink name, logo, and identity for the TTE app

Smart City does not have the ability to fund the TTE app but we are not seeking to earn any revenue from it. Creative solutions to funding challenges could be crowdfunding, as Vancouverites could be interested in helping to make this a reality, or sponsorship (with publicity opportunities in the app). Estimated upfront costs for the TTE app are presented below. Costs include both hardware (one sensor per standard bus and two sensors per articulated bus) and software.

### HARDWARE COSTS

| <u>Equipment Name</u> | <u>Cost/Pc (CAD)</u> | <u>Quantity</u> | <u>Total Cost (CAD)</u> |
|-----------------------|----------------------|-----------------|-------------------------|
| Wireless BLE Receiver | 2.70                 | 1,900           | 5,130                   |
| Wiring                | 1.50                 | 1,900           | 2,850                   |
| Installation          | 10.00                | 1,900           | 1,900                   |
| Training              |                      |                 | 7,000                   |

### SOFTWARE COSTS

| <u>Elements</u> | <u>Hours Required</u> | <u>Cost/Hr (CAD)</u> | <u>Total Cost (CAD)</u> |
|-----------------|-----------------------|----------------------|-------------------------|
| UI/UX           | 200                   | 45                   | 9,000                   |
| IoT Integration | 80                    | 70                   | 5,600                   |
| App Development | 250                   | 70                   | 17,500                  |



| <b>3rd Party Subscriptions/Middleware</b> | <b>Cost (CAD)</b> |
|---|-------------------|
| Server                                    | 15,000            |
| Database Integration                      | 3,000             |
| App Store Publishing Fees                 | 131.85            |
| Google PlayStore Publishing Fees          | 34                |
| Google Maps                               | 3,380             |
| <b>TOTAL COST (CAD)</b>                   | <b>\$87,626</b>   |

Expected revenues from the TTE app would result from increased fare revenue from increased ridership. More broadly, TransLink would benefit from:

- An opportunity for TransLink to better connect and grow ridership with youth, both as a transit service provider and as a community partner
- An improved ridership experience by reducing risk exposure for both app users and non users
- A more diversified customer communications network
- Our human resources working on the project, saving money on app development
- Increased public trust in transit, helping the region achieve its sustainable development goals

## OUR TEAM

UBC Smart City is a student-run team based at the University of British Columbia. We are a diverse, interdisciplinary team with members in civil engineering, engineering physics, economics, and planning. We are interested in working further to support its implementation or to support TransLink in restoring public trust during COVID-19. As a university student team, our composition may change slightly as we work on the project. Team members involved in creating the proposal include:

|                         |  |
|-------------------------|--|
| <b>Hamed Barkh</b>      | 4th year Civil Engineering student with experience implementing high tech solutions from BIM360 to Machine Learning. Esoteric interests include financial markets, and the economics of technological change |
| <b>Parsa Shani</b>      | 4th year Civil Engineering student, Public Sector Transformation Consultant at Deloitte, Previous Intern at 100 Resilient Cities and Seattle Department of Transportation                                    |
| <b>Benjamin Corbett</b> | 3rd year civil engineering student, member of TransLink's Transport 2050 Youth Advisory Council, transportation analyst at Bunt & Associates Engineering Ltd   |
| <b>Aliya Zhang</b>      | 3rd year civil engineering student, aspiring urban planner, engineering co-op student at Suncor Energy   |
| <b>Mohit Motwani</b>    | 4th year Economics student with a background in product management and data analysis. Intermediate proficiency in Python and associated data-analysis packages   |
| <b>Michelle Li</b>      | 3rd year engineering physics student, former engineering intern at Kodak Canada, Intermediate proficiency in Java and Python   |
| <b>Valentina Farias</b> | 2nd year master's student in community and regional planning, interested in active transportation, transit planning, and finding innovative solutions to urban challenges                                    |