Further Development of a Deployable Integrated Dynamic Transit Operations System (IDTO), Phase 2.5

Continue to demonstrate a fully functional IDTO prototype system that enables T-DISP and T-CONNECT services as well as real-time information for transit operations and travelers.

WHAT IS THE NEED?

Transit service has been very cost ineffective and the level of service, when measured by connectivity and service frequency, has been generally undesirable in the majority of suburban regions in California. The recent development of Connected Vehicle technologies (broadly defined as communication and positioning technologies) and real-time information about the overall transportation systems (both transit and highway networks) has begun to make dynamic transit operation feasible. Dynamic transit operations, including Dynamic Dispatch (T-DISP) and Connection Protection (T-CONNECT) can substantially improve transit service quality by providing faster, more convenient, and cost effective trips to the traveling public.

T-CONNECT application scenarios are intended to improve the successful transfer between mode (from car to bus, train to bus) and between different bus routes of an individual agency. T-CONNECT enables public transportation providers and travelers to communicate to improve the probability of successful transit transfers. T-DISP application scenarios are intended to adjust transit operation to be more responsive to travelers demand and traffic conditions. University of California (UC) Berkeley California Partners for Advanced Transportation Technologies (PATH) proposes transforming current fixed route operation into dynamically focused transit services in suburban regions across California.

WHAT ARE WE DOING?

This proposed study is a continuation of the second phase of the research on IDTO. The objectives of the proposed research are:
1. Developing D-RIDE Strategy
   a. PATH aims to link to the on-demand micro transit of Tri Delta Transit, “Tri-MyRide”, as the last-mile solution. The on-demand shuttle is suitable to serve as one connection option in corresponding to the purpose of D-RIDE.
   b. Field Test of D-RIDE - Field testing of D-RIDE will be conducted for 6 months. PATH will work with Tri Delta Transit to launch IDTO operation through viable outreach means to continuously solicit travelers throughout the field test period.
   c. Verification and evaluation of D-RIDE applications - A comprehensive analysis will be conducted to verify and evaluate the D-RIDE application, and the connectivity between T-CONECT and D-RIDE.

2. Demonstration of T-CONNECT in AC-Transit
   a. One of the IDTO objectives is to implement the Connection Protection (T_CONECT) application to a wider scope within California.
   b. Extend Connection Protection to AC Transit region - PATH will investigate and analyze potential connection protection demands within AC Transit area by examining the historic transit data, APC data for example. The BART-to-bus and bus-to-bus connections will be all
   c. Developing Field-Operation-Test Plan - PATH will develop a Plan for FOT that specifies major aspects of the field operational tests, including procedures for launching IDTO, performance monitoring, system management, data collection and analyses, and user activity tracking, etc.
   d. System Installation and Field-Operation-Test - PATH will work with AC Transit to determine the implementation approach.
   e. Data collection and analysis - The IDTO system will collect and archive a rich set of data to fully support the evaluation of the IDTO system and services

3. Transit/[C-]V2X Working Group
   a. Assist Caltrans in development of the Research Integration/Demonstration Deployment Assessment roadmap for connected transit operation.

4. Bus Transit Operation At or Near Signalized Intersections
   a. Improvement of bus transit efficiency and safety around intersections using connected infrastructure and V2I communication

WHAT IS OUR GOAL?
The goal is to address the needs of suburban transit agencies in California and across the country. This research best serves three of the California Department of Transportation’s (Caltrans’) Goals, namely, flexibility, reliability, and Performance. For flexibility, the strategic focus is to enable transit as an integral portion of solutions to congestions; for reliability and performance, the strategic focuses are operation and reliability improvements.

WHAT IS THE BENEFIT?
What has been envisioned is that by transforming current fixed route operation into dynamic focused transit services in suburban regions across California, transit service will become a faster and better transportation option for significant more travelers, the transit operation costs will be reduced, and transit systems will assume a greater role in the total solution to transportation congestion, safety, and improved air quality.
WHAT IS THE PROGRESS TO DATE?

April 1, 2021 – June 30, 2021

Task 2. IDTO System Enhancement for D-RIDE application

Subtask 2.1 Developing D-RIDE Strategy
PATH team has developed the front-end and back-end options to connect both the interfacing of IDTO and Tri-MyRide app, resulting in a tech memo of “D-RIDE for IDTO: Connecting Mainstream with On-Demand Transit”. However, given the interfacing approach is still under review and discussion, no actual development has been conducted.

Subtask 2.2 Field Test
PATH continuously monitor and update the transit operational data for the restart of post-pandemic IDTO test by updating the GTFS and related database for mass transit agencies. PATH sent the recruitment messages/emails to the riders who have interests of participating the test, has received a number of transfer demand indicating the location, route and rough time for their commute transfer. PATH has add these connection routes to the backend to examine and satisfy the real connection protection needs.

Subtask 2.2 Field Test
PATH has prepared for the restart of post-pandemic IDTO test by:

- Examining the on-board devices for the TDT bus fleet.
- Updating the GTFS and related database for mass transit agencies.
- Informing the bus drivers to actively respond to the IDTO requests.
- Releasing publicizing cards for passenger recruitment.

Task 3. IDTO application for AC Transit
AC Transit, VTA, and TriDelta monitoring and their data analysis resulted in the following preliminary findings.

During the COVID year, from March 2020 through March 2021, The research team monitored three Bay Area transit agencies, large - AC Transit and VTA; and small - Tri Delta Transit. As the lockdown was imposed, white-collar commuters, students, and elderly people stopped using public transit. Initially, the ridership fell by 90%, and then for a year slowly climbed up to less than 50% for AC Transit and VTA, and up to around 60% for Tri Delta Transit. This recovery was not monotonous. Local drops occurred during riots in June 2020, during fare reinstatements, during the second COVID wave in Winter 2020-21.

People who stayed loyal to public transit during the COVID year came mostly from poor areas with a high percentage of Latino, Black, and/or Asian population. These are people, who generally rent their homes, do not have a car, but have to go to work either because they belong to an essential workforce or are illegally employed and cannot afford staying jobless. At the same time, in areas where the unemployment rate was high even before COVID, transit activity had almost disappeared. One possible reason is that people in those areas rely on welfare and do not feel the need to work.

AC Transit and VTA reported that during fare-free service periods they observed quite a few homeless people who used their buses as shelters.

Agencies’ response to COVID consisted of three parts: 1) maintaining health and safety of their employees; 2) minimizing COVID risk for their riders by keeping their buses clean and enabling social distancing through capping the number of passengers on buses; 3) reducing their service. By fall 2020, all three agencies started providing hand sanitizers and masks to passengers as well as cleaning their buses more than once a day. AC Transit and VTA had to perform structural service change - cancel or modify certain routes in addition to bus frequency reduction. Tri Delta Transit had only reduced their bus frequency tailoring their schedules to those of BART, and that was enough. AC Transit adjusted its service on the...
monthly basis; VTA - week by week; and Tri Delta Transit - quarterly.

All three agencies reported a pass-up problem when bus drivers pass stops with awaiting passengers because their buses are already full. This happens on certain routes during certain times of day. AC Transit and Tri Delta solve this problem in real time by dispatching extra buses on routes with pass-ups as needed. VTA revises its schedule weekly accounting for the reported pass-ups.

Task 5. Monitoring Transit Ridership in Bay Area

Obtained APC data from AC Transit and Tri-Delta for the periods of the year 2019 – before COVID; and September-December 2020 – mid-COVID. PATH developed procedures to clean data (e.g., remove outliers) and normalize to the same format – so the same analysis could be applied to each transit provider. AC Transit and Tri-Delta data are processed and saved in the database.

With VTA PATH was less successful in getting the data. PATH agreed on the scope, evaluated their data sample, and they promised to deliver, but it still remains to fulfill this promise.

PATH created a timeline starting in May 2020 that incorporates social events, actions by government (e.g., lockdown, relaxation of lockdown), actions by transit agencies (change of schedules, fees, routes).

The unit of their analysis will be a Census tract. Thus, the researchers group transit stops by Census tract and assign Census tracts to transit routes. This way they will learn about geography of transit user activity, and how this geography changed from before-COVID to mid-COVID time. Geographies are characterized by economic indicators and crime.

The researchers provided them with the required data spec. Currently, they are in the process of evaluation of data samples and obtaining the full data sets from the three agencies.