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-CONNECT and D-RIDE.

2. Demonstration of T-CONNECT in AC-Transit
   a. One of the IDTO objectives is to implement the Connection Protection (T_CONNECT) 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
   f. System Maintenance and Handoff - PATH will monitor the system and perform regular maintenance of the system, including server maintenance, data backup, software update, daily log and reporting. System issues will be handled promptly to minimize system down time.

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?

July 1, 2021 – September 30, 2021

Task 2. IDTO System Enhancement for D-RIDE application

Subtask 2.1 Developing D-RIDE Strategy
PATH has made a couple of follow-up discussions with the on-demand shuttle vendor VIA, providing the approaches of interfacing IDTO and the On-Demand Shuttle rider app. PATH required the APIs that VIA confirmed to be available to use.

VIA decided to figure out the technical details through their internal coordination, which will allow PATH to put the origin and destination pair and see if it’s in the service zone, and also obtain an ETA.

Subtask 2.2 Field Test
PATH continuously maintains the transit operational data corresponding to the GTFS data for BART and the local agencies, and including the GTFS extension data reflecting the transfer infrastructure and activities.

Task 3. IDTO application for AC Transit

Subtask 3.1 Extend Connection Protection for AC Transit region
PATH team has presented the preliminary results of the data analysis from the perspectives of Connection Protection scenario, sites, and real demand. PATH has held several meetings with AC Transit discussing the plan and approach of the on-board device selection. AC Transit confirmed the usage of their smart terminal TCH for the interaction with bus drivers, but need to figure out how to poll and display Connection Protection request messages from IDTO server.

Task 5. Monitoring Transit Ridership in Bay Area

The PATH Team have completed the data analysis of March 2020 – to – March 2021 monitoring and are presently preparing report on this task. This report can be summarized as follows: People who stayed loyal to public transit came mostly from low-income areas with a high percentage of Latino, Black and 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 undocumented immigrants and cannot afford staying jobless.

AC Transit and VTA reported that during fare-free service periods, they observed numerous unhoused individuals, who used their buses as shelters. This portion of the agencies’ ridership did not contribute to their economic recovery.

Agencies’ response to the pandemic consisted of three parts: 1) maintaining the health and safety of their employees; 2) minimizing COVID risk for their riders by keeping 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 a monthly basis; VTA – week by week; and Tri Delta Transit – quarterly.

All three agencies reported a pass-up problem when bus drivers passed stops with awaiting passengers because their buses were 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.

All three agencies are skeptical about the flex route concept in mass transit. AC Transit was the only one experimenting with it. Prior to the pandemic, it had proved to be ineffective, and during the pandemic it ended up not being used at all and was canceled.
Despite the dramatic ridership loss, public transit proved to be an indispensable means of transportation for those categories of people who could not afford private alternatives and who had to get to work, providing essential services for the rest of us. Thus, public transit is a necessary buttress for our economy both in times of crisis as well as in good times. Yet, the service now fully depends on subsidies. To become a significant source of revenue, ridership needs to grow much faster than the current experience indicates. But ridership growth depends on the availability of reliable and well-maintained service, as well as general business activity. It is imperative to keep public transit running.

Transit recovery is underway, but as of Spring 2021, it goes very slowly. Nevertheless, California’s reopening in mid-June 2021 and the subsequent back-to-the-classroom mode of education in the Fall 2021 gives us some grounds for optimism.

IMAGES

Image 1: Flowchart of the System Components

Image 2: Flowchart of IDTO System