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CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION

TRANSFORMING IDEAS INTO SOLUTIONS

Research Notes

Modal

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Project Title: Transit Research

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Digital Mobility Assistant for Disabled Transit Users

Build a working prototype system that would help generate a travel plan for a disabled person using available mobility options that include transit and paratransit.

WHAT IS THE NEED?

Spatial mismatch is the mismatch between where low-income households reside and suitable job opportunities. Disabled people who can and want to work are dramatically affected by the spatial mismatch. Generally, people of lower income have to compromise on choosing where to work or find an appropriate and sustainable means of transportation.

For most of them, public transit and occasionally paratransit, is the only way to get to and from work. The main pain points of the disabled travelers include the inability to get a door-to-door ride; long waiting and travel times; risk of ending up stranded away from home due to changing services or lack of afterhours service; safety concern because of COVID-19 that caused rising crime and riots.

One way to help is to provide an application that would serve as a personalized digital companion to disabled travelers providing information about mobility options in trip planning, given travelers' circumstances.

WHAT ARE WE DOING?

At University of California, Berkeley Partners for Advanced Transportation Technology (PATH), the researchers will focus on working with the disabled community of Contra Costa County through the center for Independent Living Resources of Solano and Contra Costa Counties (ILRSCC). They will build a knowledge graph (KG) of disabled travelers with their needs, restrictions, preferences, and points of interest (POIs); and mobility services including transit, paratransit and private companies such as Uber WAV with their schedules, coverage areas, cost, etc.

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As the KG grows, new relationships between existing entities may be discovered. A knowledge update engine will be a distinguishing feature of the system. A review-like function will be the core feature of the KG built on the semi-automatic collection of feedback, reviews and surveys. This will update user preferences. The information contained in the KG will be accessible through an Application Programming Interface (API) by a functional prototype user interface (UI).

WHAT IS OUR GOAL?

The goal of this research is to build a working prototype system that would help generate a travel plan for a disabled person using available mobility options that include transit and paratransit but is not limited to those. The target community consists of the customers of ILRSCC.

In addition to the prototype, the research team will produce a concept design for the product that will describe how travelers and mobility services are added to the system and a path to deployment.

WHAT IS THE BENEFIT?

The proposed solution will enable personalization of trip planning for disabled populations. It can be readily extended to other geographic regions. It can also be extended to other traveler groups and, in general, it promotes the idea of making public transportation more accessible, more convenient, and friendlier.

This project will help Caltrans to understand how conventional transportation solutions can be adapted for vulnerable users – elderly and disabled. It would give transit providers an opportunity to test a user-centric approach to their ridership and learn more about their customers, even though it concerns a specific customer group.

WHAT IS THE PROGRESS TO DATE?

Work completed from January 1, 2023 - March 31, 2023.

Task 3: Database of mobility resources and disabled traveler needs
Formalization of demand-side characteristics:

Disability type	Required assistance level	Needs ADA vehicle	Travel modes used	Stress level when traveling	Stress factors
Low vision/blindness	Need driver's assistance	Yes / No	Bus	No stress, it's routine	Time
Hard hearing/deafness	Travel with assistant		Rail	Generally, it's routine, but occasionally stressful disturbances happen	Cost
Mobility disability	Travel with a service dog		Paratransit	Inconvenient, but used to it	Ease of use
Cognitive disability	No assistance needed		TNC	Anxious about every trip	Safety
Independent living disability			On-demand shuttle	Trying to avoid travel because it's so unpleasant	Lack of adequate assistance
Developmental disability			Personal car		Service area size
			Volunteer transport service		Reliability
					First/last mile without service
					Eligibility requirement

Top 5 User Challenges and Limitations

1. **Time investment**
   - *Case Study:* A person with a mobility disability reported that they never know when Paratransit is going to show up, so they have to book any appointments with a 2-hour window to ensure they get to their destination on time, and even then, they don't always make it on time or end up missing their appointment and need to reschedule. They reported that it is so unpleasant to travel that they try to minimize their travel.
2. **Safety**
   - *Case Study:* A person with low vision/ blindness reported that sometimes bus drivers will let them off at the wrong stop and that they are left to navigate an

area they have never been to before. A situation happened where the individual was dropped off in front of the police station in Downtown Berkeley. She got off the bus thinking she was at her normal stop and started to walk forward, not knowing there was a staircase right in front of her. She fell headfirst down that flight of stairs because she wasn't expecting to be dropped off there.

3. **Reliability**
   - *Case Study:* A person with low vision/ blindness reported that with Paratransit, they have to schedule at least a day in advance and have to make sure they are on time. But often, it's unreliable and/or they have to give a bigger window of time to get their destination on time. The return home can take much longer due to them not being on a specific timetable to return home. It also costs more to ride Paratransit than a local bus.
4. **Service area size**
   - *Case Study:* A person with both a mobility disability and low vision/blindness disability reported that sometimes the bus or rail transports don't get to the specific area or they don't qualify for paratransit because of their service areas and another service such as Uber or Lyft is necessary.
5. **Ease of use**
   - *Case Study:* A person with independent living difficulty and a developmental disability reported feeling anxious about every trip because of how crowded buses can be and how difficult it can be to board. They reported that their anxiety can get so high from how crowded a bus can be that they wait for the next bus and that this entire experience can be horrible.