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Research Notes

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.

Modal

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Project Title:
Transit Research

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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 April 1, 2022 – June 30, 2022

Task 2: Preliminary Data Collection

In this project, we focus on Contra Costa County. According to 2018 Census data, 532,000 residents (47%) of Contra Costa are employed, and out of these, 52,039 (10%) use public transportation to commute to work. According to the same data source, there are 180,234 adult people with disabilities in Contra Costa, 16% of all the residents. The Table below (image 1) summarizes the distribution of the disabled population by their residence area, and for those who work – by the employer type. As we see, only roughly 34% of the adult disabled community in Contra Costa have a job or are self-employed. This is partly due to the nature of their disability, and partly due to numerous organizational and logistical factors that they need to take care of before actually focusing on a job. One of such factors is getting to work and returning back home.

Image 2 below presents the breakdown of the disabled population by disability type. Physical disability here refers to situations when people have difficulty walking – they need a cane, a walker, a scooter, or a wheelchair. Recently Contra Costa County conducted a survey of their disabled residents and their use of transportation. Image 2 shows the transportation means of disabled commuters. In this pie chart, category "Other" includes those who work from home as well as those using volunteer resources of non-profit organizations, such as Mobility Matters, that provides mobility services for elderly and disabled in Contra Costa County.

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IMAGES

Area	Housing costs	Disabled count	Private sector	Public sector	Self-employed
Western part (Richmond, El Sobrante)	Low	42,426 (24%)	9,935 (5.5%)	2,102 (1.2%)	1,952 (1%)
Eastern part (Pittsburg, Antioch, Oakley, Brentwood)	Low	67,918 (38%)	16,181 (9%)	4,413 (2.5%)	2,753 (1.7%)
North-central part (Martinez, Concord, Pleasant Hill)	Medium	41,450 (23%)	11,653 (6.5%)	1,446 (0.8%)	2,525 (1.4%)
South-central part (Walnut Creek, Lafayette, San Ramon, Danville)	High	28,440 (16%)	4,796 (2.7%)	1,302 (0.7%)	1,567 (0.9%)

Image 1: Breakdown of the disabled population of Contra Costa County by the residence area and by the employer type. The percentages are given based on the total county population.

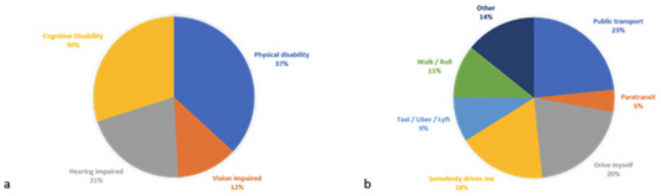

Image 2: Breakdown of disabled population in Contra Costa. a: By disability type; b: By means of work

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