Improving Transit Facility Accessibility by Employing Wayfinding Technology

Information Brief

November 2011

Introduction

New developments in wayfinding technology are improving the accessibility of transit facilities and are enhancing independence for people with disabilities. These advancements can communicate important station information, such as scheduling and vehicle location, in accessible formats and can assist riders in locating fare vending machines and fare gates, finding boarding areas, maintaining a safe distance from moving transit vehicles, and determining the location of vehicle entrances. Passengers with visual impairments and other disabilities, as well as transit agencies, should be aware of these exciting developments. As wayfinding technologies advance, community transportation is able to become more accessible to all of the people who depend on it to get to work, social events and other activities.

This information brief focuses on identifying new technologies that improve accessibility within transit systems, especially for customers who are blind or have visual impairments and use wayfinding to navigate their environment. Wayfinding is the process of applying orientation strategies and mobility skills to negotiate an environment and locate an intended destination. Wayfinding systems allow people to "(1) determine their location within a setting, (2) determine their destination, and (3) develop a plan that will take them from their location to their destination."[1]

A businessman uses a cane to walk along a path.

A number of new wayfinging technologies are already in widespread use while more are being developed. The following are some of the new types of technologies, from standard technologies currently in use to the most advanced types that are still in the development stages. They include: tactile maps, detectable warnings, detectable directional texture at boarding platforms, infrared talking signs, Global Positioning System (GPS), smartphone applications, and smartpens.

Tactile Maps

A tactile map is created in a way that a person who is blind or visually impaired can feel it in order to read it. Tactile maps are intended to be used by people with low vision. Usually, tactile maps are made of durable thermoformed vinyl sheets. On the whole, tactile maps need to be well-designed and devoid of clutter as too much information on a page can be confusing to the reader. A person may also have difficulty interpreting what something is if she cannot feel where one object starts and the next object stops.

Detectable Warnings

Detectable warnings give pedestrians with vision impairments a tactile cue about their surroundings[2]. Found on platform edges and between the sidewalk and the street, detectable warnings alert pedestrians to dangerous hazards. Part 4.29.2 of the U.S. Access Board's Americans with Disabilities Act Accessibility Guidelines (ADAAG 4.29.2) specifies that[3]:

- Detectable warnings shall consist of raised truncated domes with a diameter of nominal 0.9 in (23 mm), a height of nominal 0.2 in (5 mm) and a center-to-center spacing of nominal 2.35 in (60 mm) and shall contrast visually with adjoining surfaces, either light-on-dark or dark-on-light.
- The material used to provide contrast shall be an integral part of the walking surface. Detectable warnings used on interior surfaces shall differ from adjoining walking surfaces in resiliency or sound-on-cane contact.

Part 4.29.2 of the ADAAG appendix (ADAAG 4.29.2) also recommends visual contrast, which would be helpful for people with low vision. An example of truncated domes with visual contrast, the yellow surface area, is shown in the photo to the right.

A detectable warning at the edge of a sidewalk.

Detectable Directional Texture at Boarding Platforms

In California, detectable directional texture, more commonly known as a door indicator, identifies where passengers should stand so that they may line up with the doors of a transit train upon its arrival. The California Code of Regulations, Section 1121B.3.1 Item 8 (b) requires that[4]:

> This surface shall differ from adjoining walking surfaces in resiliency or sound-on-cane contact...This surface will be placed directly behind the yellow detectable warning texture specified in Section 1121B.3.1, Item 8(a), aligning with all doors of the transit vehicles where passengers will embark. The width of the directional texture shall be equal to the width of the transit vehicle's door opening. The depth of the texture shall not be less than 36 inches (914 mm).

See the *California Access Compliance Reference Manual* for a diagram of detectable directional texture used in California.

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Infrared Talking Signs

A talking sign is a remote infrared sign system that includes two elements:

- Transmitters, which are encoded with information, and
- Handheld receivers, which convert the information to verbal messages.

This technology substitutes for missing visual cues for those with limited or no vision. A transmitter continuously emits an infrared beam that can be picked up with a small hand-held receiver. The user scans the environment with the receiver and intercepts the infrared beam containing a human-voice informational message that is heard through the receiver's speaker. In this way, a person who is blind can navigate his environment with full awareness of what is in it.

GPS

The Global Positioning System (GPS) is a U.S.-owned utility that provides users with positioning, navigation and timing (PNT) services[5]. The system consists of three segments:

- the space segment, which includes satellites that transmit one-way signals;
- the control segment, which monitors and adjusts the satellites; and,
- the user segment, in which a person uses GPS receiver equipment to determine their position and time.

Several specialized personal digital assistant (PDA) systems now use GPS software. Using these devices, a person with a visual impairment can pinpoint his exact location. Used in conjunction with the myriad of internet transit stop databases that are being installed around the country, GPS can help the consumer determine the location of a stop, the time the bus will arrive, and the bus' identification. This technology is proving to be especially promising for public transportation.

Smartphone Applications

Smartphone technology is developing rapidly and continues to evolve. More advanced than a simple mobile phone, smartphones often function as a PDA, a camera, or a media player and have internet access. Smartphone applications, or "apps", can function in many ways, but those that use GPS that announce directions can be especially helpful to users with visual impairments. Apps can also aid transit riders with cognitive impairments by providing real-time information on stops and vehicle locations via GPS-enabled cell phones.

Smartpens

Still largely in the development stages, the smartpen is a pen with a built-in computer[6]. Companies are researching and creating smart pens that perform a variety of functions, including providing specific information via audio depending on what parts of a picture a person taps with the pen. Smart pens can also include speakers, USB ports, or a number of digital features, and many transfer handwritten notes to a PC.

Conclusion

Wayfinding technologies will continue to be developed, and many are already making an impact on the accessibility of transportation systems for transit riders with visual impairments. These technological advances benefit everyone and improve the access of all neighborhoods. Resources on the next page provide further information.

Easter Seals Project ACTION
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Project ACTION Resources

The following are available free of charge in print or by download through the Project ACTION website at www.projectaction.org.

- *Accessible Pedestrian Signals: Making Your Community Safer and More Accessible for Everyone* - Describes the purpose and benefits of accessible pedestrian signals (APS) for communities across the nation.
- *Competencies for the Practice of Travel Instruction and Travel Training* - Compiles key guidelines and outlines the fundamental abilities needed for effective travel training instruction.
- *Toolkit for the Assessment of Bus Stop Accessibility and Safety* - Provides guidelines for optimal bus stop design including a comprehensive assessment tool. Addresses shelter design, lighting, security, pedestrian environment, signage, wayfinding, technology, urban/rural considerations and organizational collaboration.

Additional Resources

- *Traveler Information Systems and Wayfinding Technologies in Transit Systems* - This report provides a technology evaluation, with an understanding of wayfinding technology benefits and services for transit agencies and users. The research also identifies challenges experienced by transit agencies regarding the use and implementation of wayfinding technologies and gaps that exist in current technologies. Federal Transit Administration (May 2011). http://www.fta.dot.gov/documents/MMTPS_Final_Evaluation_Report.pdf
- *Talking Signs, Inc®* - Talking Signs® technology is an orientation and wayfinding accessibility system that allows travelers with visual impairments to locate and identify landmarks, signs and places of interest. http://www.talkingsigns.com/
- *Institute for Human Centered Design* - This international non-governmental educational organization is committed to advancing the role of design in expanding opportunity and enhancing experience for people of all ages and abilities through excellence in design. http://www.adaptenv.org/

Sources

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(3) U.S. Access Board (As amended through September 2002). *ADA Accessibility Guidelines for Buildings and Facilities (ADAAG)*. http://www.access-board.gov/adaag/html/adaag.htm

(4) State of California, Department of General Services, Division of the State Architect (February 15, 2011). *2011 California Access Compliance Reference Manual*. http://www.documents.dgs.ca.gov/dsa/pubs/access_manual_rev_02-15-11.pdf

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(6) Pogue, David (May 8, 2008). "Gadget Fanatics, Take Note," *The New York Times*. http://www.nytimes.com/2008/05/08/technology/personaltech/08pogue.html?scp=1&sq=Gadget%20Fanatics&st=cse

About Easter Seals Project ACTION

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