



Mobile Accessible Pedestrian Signal (MAPS) System

An integrated assistive system to support wayfinding and situational awareness in urban environments for people with vision impairment.

IP Status: Issued US Patent; **Application #:** 15/897,854

Applications

- Navigation assistance for people with vision impairment
- Urban navigation system
 - Traffic signals
 - Subway and transit stations
 - Malls, skyways, parks, theaters

Key Benefits & Differentiators

- Real-time signal timing informs when to cross the street
- Users do not need additional devices other than their smartphones
- Works without GPS; ideal for urban canyons where GPS signal is weak or unreliable
- Provide detailed navigation assistance information to the visually impaired
- Adaptable to on-demand use scenarios such as construction sites
- Provides intersection geometry at unsignalized intersections
- Opportunity to collect useful pedestrian data

Overview

Researchers at the University of Minnesota have developed a smartphone-based personal assistive navigation system to support situational awareness for people with vision impairment. Other available solutions include GPS-based and inertial navigation systems, and machine vision technology. Adoption of these systems has been poor due to cost and inconvenience associated with carrying/wearing these devices. Because a white cane is still the primary mobility tool used by most visually impaired people, several smartphone apps provide useful navigation assistance by leveraging the various sensors (such as motion sensors, camera, GPS and digital compass) built into the cane. However, these apps do not provide traffic signal information or situation awareness.

Our app, MAPS, an acronym for Mobile Accessible Pedestrian System, incorporates a geospatial database with Bluetooth beacon information to provide **navigation assistance, situational awareness, and wayfinding to users even when a GPS solution is not available**. For instance, altered navigation paths near a construction site can be communicated directly to visually impaired pedestrians. Furthermore, the MAPS program communicates with the traffic signal controller through a secured wireless link to obtain real-time Signal Phasing and Timing (SPaT) information and informs visually impaired pedestrians with their current locations, intersection geometries, and when to cross streets. In addition, the software behind MAPS

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Category

Engineering & Physical
Sciences/Transportation
Software & IT/Algorithms
Software & IT/Communications &
Networking
Software & IT/Mobile Apps
Software & IT/Transportation

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employs a self-monitoring infrastructure using a network of Bluetooth Beacons to ensure the information integrity of the network. This system is ideal for improving the accessibility and mobility for vision-impaired pedestrians in urban (smart) cities.

Phase of Development

Pilot scale testing underway in Stillwater, MN.

Researchers

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[External Link](http://www.cts.umn.edu) (www.cts.umn.edu)

Publications

- **Using a Smartphone App to Support Visually Impaired Pedestrians at Signalized Intersection Crossings** Transportation Research Record, No.2393, 2013r
- **Using Smartphone App to Help the Visually Impaired Navigate Work Zones Safely** Transportation Research Board, 2014
- **Positioning Methodology Using Bluetooth and Smartphone Technologies to Support Wayfinding for the Visually Impaired** TRB UTC Conference, 2016
- **Using Smartphone and Bluetooth Technologies to Support Safe and Accessible Street Crossing for People with Vision Impairment** TRANSED, 2018
- **A Self-Monitoring Network to Support Situation Awareness and Navigation for the Visually Impaired in GNSS Unfriendly Environments** ITSWC, 2019

Ready for Licensing

This technology is now available for license! The University is excited to identify an industry partner who will help see this innovation reach its commercial potential. Please contact us to share your business' needs and licensing interests. A commercial license would be for the sale, manufacture or use of products claimed by the patents. Such a license would encourage continued research in the field.