

ROADWAY SAFETY INSTITUTE

Advancing roadway safety with user-centered solutions

UTC Project Information	
Project Title	Using Smartphone App to Help the Visually Impaired Navigate Work Zones Safely
University	University of Minnesota
Principal Investigator	Chen-Fu Liao
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Funding Source(s) and Amounts Provided (by each agency or organization)	Minnesota Department of Transportation: \$89,500
Total Project Cost	\$89,500
Agency ID or Contract Number	UTC Grant Number: DTRT13-G-UTC35 MnDOT contract 99008 work order 66 CTS# 2013027
Start and End Dates	08/09/2012 – 05/31/2014
Brief Description of Research Project	<p><i>Final report abstract:</i></p> <p>According to statistics from the Federal Highway Administration (FHWA), each year approximately 17% of all work zone fatalities are pedestrians. People who are visually impaired often encounter physical and information barriers that limit their accessibility and mobility. A survey was conducted among 10 visually impaired participants as a starting point to understand their challenges and what types of information are helpful in providing bypass or routing instructions to them around work zones. The survey results were incorporated into development of guiding documents in determining information elements that are essential and useful for providing routing instructions to the visually impaired around work zones. Building on our previous efforts to provide geometry and signal timing to the visually impaired at signalized intersections, a smartphone-based navigation system was developed and integrated with navigational audible information to alert pedestrians at decision points prior to their arrival at a work zone. The recommended message elements from survey results were implemented in a smartphone app that uses GPS and Bluetooth technologies to determine a user's location. When a work zone is detected, the smartphone will vibrate to alert users and the app will then announce a corresponding audible message to users. The visually impaired users can perform a single tap on the smartphone to repeat the messages, if needed. Functionality testing and system validation of the smartphone app were performed by attaching four Bluetooth beacons to light posts near a construction site in St. Paul, MN. Additional research is needed to conduct experiments with visually impaired users and evaluate system reliability and usefulness.</p>

Last updated (9/30/2019)



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Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	MnDOT awarded Liao with a related project.
Impacts/Benefits of Implementation (actual, not anticipated)	Nothing to report at this time.
Web Links <ul style="list-style-type: none">• Reports• Project website	http://www.cts.umn.edu/Research/ProjectDetail.html?id=2013027 http://www.cts.umn.edu/Publications/ResearchReports/reportdetail.html?id=2346