

Request for Research Funding for FY 2022-2023

SPR Subpart B Project: TEO-23-18

Requesting Office	Florida's Turnpike Enterprise	Priority	18 of 23
Proposed Title	Identify and Utilize Crowdsourced Data to Improve Traffic Operations and Safety: Best Data Filtering Practices and Practical Applications		
Justification	<p>Crowdsourced data has the potential to provide significant traffic safety and operational benefits on both limited access facilities and arterials. FDOT currently has agreements in place with Waze and HERE to obtain crowdsourced traffic data. Other vendors, such as StreetLight and Wejo, are also interested in selling their data to FDOT. On limited access facilities, only a small portion of the collected Waze data is integrated into SunGuide, mainly alerts dealing with crashes or lane-blocking events. However, significant operational and safety benefits could be obtained by integrating additional Waze data into the SunGuide Incident Detection System (IDS). This project will review how other states and agencies are handling crowdsourced data, compare Waze data with SunGuide and crash data to identify where Waze data could provide the most benefits, and data mine the Waze data to determine patterns and develop filters (event type, location, time of day, etc.) so FTE and other FDOT districts can obtain the most benefits from these data without overwhelming traffic management center (TMC) operators. Potential applications of these data for active traffic management, such as improving response to shoulder hazards or identifying the back-of-queue, will be evaluated (and piloted as applicable) to identify potential benefits and how they could be integrated into SunGuide. By utilizing Waze data effectively, traffic operations and safety could be improved on the FTE system and even applied to other FDOT districts and their limited access facilities throughout the state.</p> <p>Furthermore, understanding how these various data compare and how they could be applied to improve traffic safety and operations on signalized arterials can help FDOT make the right decisions to obtain beneficial data at the lowest cost. Collected real-time data could be used to proactively identify risky traffic conditions and reduce the likelihood of crashes, as well as improve detection of and response to crashes. These data could also help identify operational issues at intersections so appropriate improvements can be made.</p>		
Impact	It is expected that the outcome of this research will help FTE and other FDOT districts identify and better utilize crowdsourced traffic data to improve traffic operations and safety. By integrating the developed filters into SunGuide, FTE and other FDOT districts can immediately implement the results of this project to obtain operational and safety benefits with minimal excessive burden on TMC operators. Effective utilization of these data for active traffic management could help FDOT improve traffic management in innovative ways throughout the state.		
Affected Offices	State Traffic Engineering and Operations Office, State Safety Office, Traffic Incident Management (TIM)		
Existing Work	<p>A thorough literature review on the state of the practice regarding the use of crowdsourced data will be conducted as part of this project. No research in this area has been done in Florida. Below are some examples of related research from other states.</p> <ul style="list-style-type: none"> • California: Young, S.D., Wang, W., and Chakravarthy, B. (2019). Crowdsourced Traffic Data as an Emerging Tool to Monitor Car Crashes. <i>JAMA Surgery</i>, 154(8):777-778. https://doi.org/10.1001/jamasurg.2019.1167 • Tennessee: Zhang, Z., L. D. Han, and Y. Liu. (2021). Exploration and Evaluation of Crowdsourced Probe-Based Waze Traffic Speed. <i>Transportation Letters: The International Journal of Transportation Research</i>. Online publication. DOI: https://doi.org/10.1080/19427867.2021.1906477 • Texas: Li, X., B. Dadashova, S. Yu, and Z. Zhang. (2020). Rethinking Highway Safety Analysis by Leveraging Crowdsourced Waze Data. <i>Sustainability</i>, 12(23). https://doi.org/10.3390/su122310127 <p>Additionally, the following website provides examples of sample applications which use crowdsourced data to improve transportation operations and management. These applications can be researched in more detail as part of this project.</p> <p>Federal Highway Administration Center for Accelerating Innovation. (2021). Sample crowdsourcing for operations applications. EDC-5: Crowdsourcing for Operations. https://www.fhwa.dot.gov/innovation/everydaycounts/edc_5/docs/crowdsourcing_applications.pdf</p>		
Keywords Used In Existing Work Search	Crowdsourced traffic data, Waze, traffic safety, traffic operations		

Related Contracts	None		
Funding Request	\$325,000	Anticipated Duration	24 months
Project Manager	Eric Gordin, P.E. (PM) James Landini (Co-PM) Christine Shafik (Co-PM)	Contracting Method	Direct contract with University of Central Florida (Dr. Al-Deek)
Equipment	N/A		
Urgency	1	Waze data is currently collected by FDOT, but most of it goes unused. This project will help FDOT understand how to best utilize these data to improve traffic operations and safety. It is likely that the quantity and quality of crowdsourced data will increase in the near future, so it is important for FDOT to be proactive in utilizing these data effectively and efficiently.	
Implementability	1	Any filtering and applications developed in this project can be integrated in the SunGuide IDS, allowing for quick implementation. Developed active traffic management applications could be applied throughout Florida.	

Project Benefits (Succinct, complete explanation) This project will provide many benefits to FDOT. It will provide a comparison of different types of crowdsourced data to ensure FDOT only purchases the most beneficial data. It also has the potential to improve traffic operations and safety on both limited access facilities and arterial roadways. By integrating additional crowdsourced data into SunGuide, TMC operators can be more quickly notified of traffic events, allowing them to respond quicker and reduce the impacts of these events. Extensive data mining and comparison of data with other data sources (including crashes and SunGuide events) will help identify event types, locations, and times for which the data will provide the most benefits while not excessively burdening TMC operators. Filters will then be developed to efficiently integrate these data into SunGuide, allowing for the most benefits at the lowest cost (time spent by operators). Additionally, innovative active traffic management applications of Waze data will be evaluated to help FDOT identify potential methods that could be used throughout the state to improve traffic operations and safety.

Project Benefits (Select all that apply and explain)	Quantifiable Benefits (units, dollars, etc...if applicable)	Methodology or Data Sources Used to Determine Quantifiable Benefits. If not applicable, please give justification of project benefits
<input type="radio"/> Materials Enhancement		
<input type="radio"/> Materials Savings		
<input type="radio"/> Time Savings	Improved Incident Response, Reduced Traffic Delay	Waze data will be compared to SunGuide data to see how much earlier Waze events are typically reported. The results of these comparisons will be used to identify locations and times where Waze alerts of various types should be included in SunGuide to improve incident response. This improved response can reduce the duration of these events and any associated traffic congestion and delays.
<input type="radio"/> Lives Saved/Injuries Prevented	Reduction in Crashes and Associated Fatalities/Injuries	Waze data will be compared to crash data to see what type of Waze alerts could be used to better warn drivers of hazards and reduce the chance of crashes. Integrating these types of Waze alerts into SunGuide could reduce crashes and their associated fatalities and injuries.
<input type="radio"/> Other (Explain)	Efficient Utilization of Crowdsourced Data, Evaluation of Innovative Traffic Management Applications	Extensive data mining will ensure that Waze data is efficiently integrated into SunGuide so significant benefits could be obtained while minimizing the additional burden on TMC operators. Innovative traffic management applications (such as back-of-queue detection) will be evaluated and piloted as applicable to help FTE and other FDOT districts improve traffic management and response to traffic incidents

*Comments should explain and support urgency, financial benefit, and implementability scores