

Request for Research Funding for FY 2019-2020

Requesting Office	Safety	Priority	x of x
Anticipated timeframe for submitting project scope (if approved)		September/2019	
Proposed Title	Mitigating transit and bike/ped related crashes using machine-learning data analytics methods and tools		
Justification	<p>Crashes involving transit vehicles, bicyclists or pedestrians have been among the major safety concerns for transit operation and highway safety officials as well as communities in the vicinity of high-risk locations. Mitigating the crashes becomes even more challenging in Florida where transportation-related disadvantaged population such as elderly, children and, non-auto dependent population continue to increase, along with growing number of fatality and severe injury-involved crashes.</p> <p>Fundamentally, a crash is a consequence of combination of numerous causes. For example, the report of ‘Crashes on Florida’s State Highway System (SHS) Roadways’ identifies crash events with 146 contributing factors, including its relevant location and age of victim(s). We may have been able to analyze a few of major causes of crashes that involves vulnerable road users (e.g., pedestrians, bicyclists) and transit. However, understanding their subtle interactions is still under-explored due to the complexity of the nature of the problem. Majority of previous studies tended to focus on only some of the key factors to make the process simple and derive a reasonable conclusion.</p> <p>The objectives of this research are threefold. First, the team will focus on developing a spatiotemporal hazardous event mitigation method using state-of-the-art machine learning (especially classification) models. The multi-dimensional classification model enables to classify contributing factors on fatality and severe injury-involved crashes, demonstrate the subtle interactions between explanatory variables (not just the key factors), and categorize causes by the magnitude of their effects on crashes. Second, a crash event prediction model will be developed with historical crash data. The model can indicate which area(s) of planning and operation implementations need to be enhanced to mitigate the crash events and how effective the implementation plan(s) will be compared to others.</p> <p>Third, an online application tool will be developed for planning and operation purposes. It will allow multiple queries of selection by locations, datasets, proposed models and contributing factors. The tool will be developed with the proposed machine-learning models as well as negative binomial regression model, a current practice by Highway Safety Manual. Including dashboard functionality and visualization of results, the tool will provide prediction model results in a user-friendly format. It will guide practitioners and stakeholders to spatially and temporally prioritize and develop implementation plans when it comes to operation, service and public outreach planning.</p>		
Impact	Provides planning and operations team an easy to use dashboard that provides detailed investigation of fatal and severe crash events and predicts future crashes to help mitigate such events		
Affected Offices	Safety and Traffic Operations		
Existing Work	A review of pending, active and completed projects through the Transportation Research International Documentation (TRID) and the Research in Progress (RIP) online databases indicated that no similar model and tool has been developed for crashes occurring on Florida roadways		
Funding Request	\$275,000	Anticipated Duration	18 months

Project Manager	Joe Santos	Contracting Method	direct contract with university
Urgency	1= highest, most immediate need	Directly relates to FDOT mission and urgent need to mitigate and plan for severe and fatal crash events	
Implementability	1=greatest likelihood of and proximity to implementing results	An applied research that provides prediction methodology and a tool to understand, predict and plan for potential future crashes.	
Project Benefits (Select all that apply and explain)			
Project Benefits	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="checkbox"/> Materials Enhancement			
<input type="checkbox"/> Materials Savings			
<input type="checkbox"/> Time Savings			
<input type="checkbox"/> Lives Saved/ Injuries Prevented			
<input type="checkbox"/> Other (Explain)	Informed decision on public safety		