

05/19/2022

UTC Project Information	
Project Title	Real Time Risk Prediction at Signalized Intersection Using Graph Neural Network
University	Virginia Tech
Principal Investigator	Abhijit Sarkar
PI Contact Information	Asarkar1@vt.edu , asarkar@vti.vt.edu , (540)231-1528
Funding Source(s) and Amounts Provided (by each agency or organization)	Safe-D (Federal): \$120,000 Oracle cloud (Non-Federal): \$100,000 MicroTraffic (Non-Federal): \$100,000
Total Project Cost	\$320,000
Agency ID or Contract Number	Grant No: 69A3551747115 Project: 06-012
Start and End Dates	05/01/2022 – 04/30/2023
Brief Description of Research Project	Intersection related traffic crash and fatalities are one of the major concerns for road safety. In this project we aim to understand the major cause of conflicts at an intersection by studying the intricate interplay between all the roadway agents. We propose to use the current traffic camera systems to automatically process traffic video data. As manual annotation of video datasets is a very labor-intensive and costly process, A system that can process these traffic datasets automatically would strongly enhance the effectiveness of the analysis and enable new research questions to be addressed. Therefore, we propose to use computer vision algorithm to process the videos. Also, we propose to use advanced machine learning methods including graph neural network (GNN) to model the interaction of all the roadway agents at any given instance, and their role in road safety, both individually and as a composite system. As a result, the proposed model aims to develop a near real time risk score for a traffic scene.
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	The main outcome of the projects will be <ul style="list-style-type: none">• Technical Publication: The team will disseminate the results in terms of peer reviewed journal and conferences as well as through the final report.• Open-source code base: The GNN developed in Task 4 will be publicly released through open-source code sharing platforms like GitHub.

	<p>Additionally, there will be the following outcomes.</p> <p>Course Material:</p> <p>The project will use traffic data from multiple intersections. Some of these data may be useful for course project. Dr. Sarkar plans to develop course material from the project and present as lecture in courses at Virginia Tech. In particular, the researchers involved with this project will generate lecture materials and course exercises to be incorporated in Zac Doerzaph’s course on advanced vehicle safety systems. The PIs also aim to develop a tutorial material for automatic processing of traffic videos and present to representatives from DOTs. This can be done through webinars for state DOTs and/or for US DOT.</p>
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>This project is expected to have the following benefits:</p> <ol style="list-style-type: none"> 1. A better understanding of the traffic operations in the state of Virginia. 2. An automated method to process traffic video data at large scale. 3. The course material developed under this project may benefit students in the relevant field and provide new research opportunities.
<p>Web Links</p> <ul style="list-style-type: none"> • Reports • Project website 	<p>https://safed.vtti.vt.edu/projects/real-time-risk-prediction-at-signalized-intersection-using-graph-neural-network/</p>