

UTC Project Information	
Project Title	Prediction of Vehicle Trajectories at Intersections Using Inverse Reinforcement Learning
University	SDSU
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Funding Source(s) and Amounts Provided (by each agency or organization)	Safe-D (Federal): \$ 150,000 SDSU faculty In-Kind: \$ 50,000
Total Project Cost	\$ 200,000
Agency ID or Contract Number	Grant No: 69A3551747115 Project: SDSU-01-01
Start and End Dates	05/15/2020 – 05/15/2021
Brief Description of Research Project	The ability to accurately predict vehicle trajectories is essential in infrastructure-based safety systems which aim to identify critical events such as near crash situations and traffic violations. In a connected environment, important information about these critical events can be communicated to road users or the infrastructure to avoid or mitigate potential crashes. The proposed project will investigate approaches to and methodologies for vehicle trajectory prediction at intersections, and identify current challenges and opportunities. The project will also explore the applicability of inverse reinforcement learning (IRL) in developing trajectory prediction models.
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	<ol style="list-style-type: none"> 1) The final project outcomes including the final project report and all data sets used/developed in this project according to the project timeline. The following project tasks will be conducted: <ul style="list-style-type: none"> • Literature review • Data Cleaning and Organization • Selection/Development of Evaluation Metrics • Vehicle Trajectory Prediction Model Training and Evaluation 2) The education and workforce development plan include: <ul style="list-style-type: none"> • Developing course materials for a new graduate course at Civil, Construction, and Environmental

	<p>Engineering department entitled “Intelligent Transpiration Systems”.</p> <ul style="list-style-type: none"> • Presenting the research at the Explore SDSU and at the SDSU Student Research Symposium (SRS) events. • Providing funding for one graduate student at SDSU. <p>3) The technology transfer plan includes:</p> <ul style="list-style-type: none"> • Developing a method for vehicle trajectory prediction using a new machine learning framework • Presenting the research at the Caltrans Innovation Fair • Publishing journal and conference papers
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<ul style="list-style-type: none"> • This project investigates methods to train and develop vehicle trajectory prediction models. It also explores Inverse Reinforcement Learning (IRL), a recently developed machine learning framework, to develop predictive modeling at intersections. The prediction models can be utilized in advanced safety monitoring systems to predict near crash situations, which can trigger actions to prevent or mitigate crashes. • While the project focuses on signalized intersections, and the prediction is made by the infrastructure monitoring the scene, the methodology can also be applied in other locations (i.e., road segments), and in Automated Vehicles (CAV) technology where the AV (instead of the infrastructure) should monitor the scene and predict future trajectories of other road users. • Students involved with the project have the opportunity to become proficient in using the latest tools and technologies to develop vehicle trajectory prediction models.
<p>Web Links</p> <ul style="list-style-type: none"> • Reports • Project website 	<p>https://www.vtti.vt.edu/utc/safe-d/index.php/projects/prediction-of-vehicle-trajectories-at-intersections-using-inverse-reinforcement-learning/</p>