Center for Advanced Multimodal Mobility Solutions and Education

UTC Project Information – CAMMSE @ UNC Charlotte	
Project Title	Predicting Paths of Controlled Pedestrians at Intersections Using Deep Learning Models
University	The University of Texas at Austin
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Funding Sources and Amount Provided (by each agency or organization)	The University of North Carolina at Charlotte: $67,790 The University of Texas at Austin: $33,895
Total Project Cost	$101,685
Agency ID or Contract Number	
Start and End Dates	10/01/2020 – 09/30/2022
Brief Description of Research Project	Traffic safety is a critical issue for heterogeneous, multimodal transportation settings such as traffic intersections. In particular, safety of pedestrians is a very challenging problem, since pedestrians are particularly vulnerable to small accidents. With increasing numbers of autonomous and partially autonomous vehicles, predicting where pedestrians will be in the future is critical, since these vehicles need to plan safe trajectories ahead of time. It is also conceivable that these autonomous vehicles will broadcast their planned trajectories to surrounding pedestrians, to help coordination, giving the pedestrians safe corridors to cross roads, for example.

	In earlier work, the research team has investigated the Social Spatio-Temporal Graph Convolutional Neural Network (Social-STGCNN), which substitutes the need of aggregation methods by modeling pedestrians and vehicle interactions as a graph. This algorithm results in an improvement over the state of the art prediction algorithms by 20% on the Final Displacement Error (FDE), with 8.5 times less parameters and up to 48 times faster inference speed than previously reported methods. In addition, this model is data efficient, and exceeds previous state of the art on the ADE metric with only 20% of the training data. The present proposal builds on this earlier work. The objective of this project is to better understand how to model human trajectory tracking performance. Humans that receive guidance information are supposed to follow their assigned trajectories, though they may not exactly follow the assigned path. Their deviation from the assigned path is very important for collision avoidance purposes, and the goal of this project is to accurately capture how much deviation one can reasonably expect from a given human, and how do other vehicles around the pedestrian affect trajectory tracking.
Describe Implementation of Research Outcomes (or why not	

implemented) *Place Any Photos Here*	
Impacts/Benefits of Implementation (actual, not anticipated)	
Web Links • *Reports* • *Project website*	https://cammse.uncc.edu/sites/cammse.uncc.edu/files/media/CAMMSE-UNCC-2021-UTC-Project-Information-03-Claudel.pdf https://cammse.uncc.edu/sites/cammse.uncc.edu/files/media/CAMMSE-UNCC-2021-UTC-Project-Report-03-Claudel-Final.pdf